Examining the Development of a Community of Practice in Paediatric Project ECHO®

by

Yalinie Kulandaivelu

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ABSTRACT

Paediatric Project ECHO® is an innovative, interactive educational model for healthcare providers (HCP) based on the community of practice (CoP) concept, that expands access to and capacity for providing evidence-informed care. This study examined the development of a CoP in Paediatric Project ECHO and barriers and facilitators to its development. A qualitative description design was undertaken with semi-structured, audio-taped interviews. Twenty-one HCPs participants were interviewed. Participants’ responses indicated evidence for CoP concepts including social interaction, knowledge sharing, knowledge creation, and identity building. The main barriers to CoP development were differences in participants’ perceptions of the program aims and challenges in making time to participate in the program. The main facilitator was the interactive program format. This is one of few studies to demonstrate how knowledge creation occurs in an intentionally created CoP. Further development and clarification of the CoP concept for the ECHO model is needed to enhance program delivery.
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ABBREVIATIONS

CE: Continuing Education

CME: Continuing Medical Education

**Complex Care ECHO**: Paediatric Project ECHO for Complex Care

CoP: Community of Practice

ECHO: Extension for Community Healthcare Outcomes

HCPs: Healthcare Providers

ICTs: Information communication technologies

IOM: Institute of Medicine

LHINs: Local Health Integration Networks

**Moore’s Framework**: Moore’s Framework for Continuing Medical Education Outcomes

MRC: Medical Research Council

**Obesity ECHO**: Paediatric Project ECHO for Obesity Management

**Paediatric ECHO**: Paediatric Project ECHO

**Pain ECHO**: Paediatric Project ECHO for Acute and Chronic Pain

**Palliative Care ECHO**: Paediatric Project ECHO for Palliative Care

**SickKids**: The Hospital for Sick Children

UNM: University of New Mexico
1 CHAPTER 1: BACKGROUND

1.1 CONTINUING EDUCATION FOR HEALTH PROFESSIONS

Continuing education is defined as organized efforts to obtain new information and develop new skills and competencies, undertaken by health professionals who have graduated from their respective degree programs and currently in professional practice.\textsuperscript{1} Health professionals are mandated by regulatory bodies to complete regular continuing education or continuing professional development to maintain competence in their profession. In addition to maintaining competence, continuing education is a way of preparing healthcare providers to meet the evolving needs of patients and the healthcare system. Some of the challenges which face the healthcare workforce today include, the exponential growth in the evidence base for medical and clinical knowledge and a shift from hospital to community-based healthcare.

Medicine and healthcare are constantly evolving fields, requiring healthcare providers to remain up to date in guidelines, treatments and standards of quality care to provide high quality care. However, the evidence base of biomedical, medical and clinical knowledge is rapidly growing. In 1980, the estimated doubling time of medical knowledge was 7 years, in 2010 it was 3.5 years, and in 2020 it is projected to be 73 days.\textsuperscript{2} A review of all journal articles published and listed in MEDLINE between 1978 to 2001 also found an increased focus on clinical research in contrast to the previous emphasis on biomedical research.\textsuperscript{3,4} The challenge for health care providers is to stay abreast this exponential growth, as well as to identify and appraise sources for the best available evidence relevant to their practice and implement this knowledge in their practice. The degree to which healthcare providers and institutions stay up to date in the latest developments often varies across regions. As a result, patients and individuals utilizing health care systems are faced with dramatically different levels of care from region to region.\textsuperscript{5}

Continuing education plays a role in maintaining healthcare providers’ competence in evidence-based practice, by providing accessible updates and information relevant to practice. However, the need for continuing education is not isolated to evidence-based practice alone.
Healthcare is also evolving in its focus, healthcare leaders, researchers, policy analysts, organizations, and patients are calling for shift from care that is delivered in hospitals to community-based healthcare, with an increased focus on prevention. This shift is related to the growing number of individuals with chronic diseases. In Canada, the prevalence of chronic diseases among adults is 44%, and is projected to increase in the future due to an aging population. The World Health Organization (WHO) has called for a transformation of the training of healthcare providers to better meet the needs of patients with chronic conditions, who form the vast majority of patient populations across the world. Their report suggested that health professionals need to develop skills which align with caring for these patients, which they divide into several core competencies including, patient-centred care, partnering, quality improvement, use of information and communication technology, and adoption of a public health perspective. Quality healthcare requires health professionals to deliver care based on the latest evidence, that takes into account patient needs and preferences, and allows patients to engage in a partnership oriented relationship with their clinician. Most healthcare is exceedingly provided outside the hospital or clinic and patients are feeling more empowered with access to health information on the Internet. These changes require a shift in the role of clinicians. The IOM suggests clinicians may need to expand the scope of their roles, for example, acting as counsellors, coaches and partners in the delivery of healthcare. To meet these demands on their practice, clinicians will need to develop new and existing skills.

Continuing education is continuing to gain importance in healthcare, as a way for clinicians to remain up to date in the evidence base for their professions, as well as to develop new skills which align with caring for patients with chronic diseases. Thus, quality of care delivered will depend upon, among other factors, clinicians’ access to continuing education.

1.1.1 ACCESS TO CONTINUING EDUCATION FOR HEALTHCARE PROVIDERS

Continuing education as a method of improving the provision of high-quality healthcare is not possible if healthcare providers face barriers in accessing it. Studies examining registered nurses’ access to continuing education found barriers such as high tuition costs and workplace budget
constraints; lack of employer or administrative support; and lack of time due to staff shortages, shift work, scheduling difficulties, and family responsibilities. However, this issue is more salient for providers serving rural and remote areas where additional challenges arise. Penz et al. (2007) examined barriers to participation in continuing education among rural and remote nurses in Canada, using survey methodology with open-ended questions. Nurses in that study perceived barriers related to three main areas: challenges of rural communities and work life, time constraints, and financial constraints. Barriers related to living in a rural community included distance from a hospital, large library or university; travel difficulties; staff shortages with no relief staff available or inadequate staffing; low-quality distance education; limited opportunities for continuing education; and lack of managerial and workplace support. Barriers related to time included busy scheduling, inflexible work hours, no time off, and shift work. Financial barriers included a lack of funding, no reimbursement or paid leave for continuing education, budget restraints, and cost of tuition, fees or expenses of continuing education. Similar barriers were also reported by participants in a survey-based study conducted by Curran et al. (2006). Health professional participants in that study also cited a lack of technological infrastructure and computer skills as barriers to accessing continuing education. Both urban and rural healthcare providers face barriers in accessing continuing education. Given the importance of continuing education in addressing the challenges of healthcare today, appropriate solutions which can improve access for both urban and rural healthcare providers are needed.

1.2 TELE-EDUCATION

Tele-education is described as methods of distance continuing education for health professions which makes use of information and communication technologies (ICTs) to deliver distance learning. It is beneficial in improving access to continuing education for healthcare providers in rural, remote and underserved areas where attending programs in person may not be feasible or practical. A number of tele-education methods utilizing the Internet, audio and video transmitting technologies have been used to deliver continuing education programming to healthcare providers in rural and remote areas. These methods continue to evolve with newer technologies improving ease of use and increases in access to ICTs among both rural and urban populations.
Sargeant (2005) describes the conceptual model of ICT use in medical education as being composed of the following interacting components:

1. Learner(s)
2. Educational materials and information resources
3. Instructor(s)

Interactions among these components are influenced by educational environments and social environments. Using this model, Sargeant describes the ways in which ICTs can facilitate medical education:

1. Connecting learners and instructors synchronously (i.e., real-time);
2. Connecting learners and instructors asynchronously;
3. Connecting learners, instructors to learning resources (specific course materials);
4. Connecting learners to learning resources (information resources)

Of particular interest for rural healthcare providers are methods of tele-education which allow synchronous or ‘live’ interaction among continuing education participants. Synchronous methods of tele-education allow for interaction among healthcare providers and can serve as a middle ground for those who prefer live interaction with other providers. Synchronous methods are also better aligned with characteristics of effective continuing education programs. Several reviews of continuing education for health professions suggest that healthcare providers learn best when learning programs are interactive and offer networking opportunities and supportive relationships.

Studies demonstrate that in their regular practice, physicians often seek information and support from colleagues to solve clinical dilemmas, rather than journals or guidelines. An ethnographic study with primary care providers in England found that they primarily devised care plans on the basis of personal and colleagues’ experience, and largely shared and received tacit knowledge with each other through fluid “communities of practice”. The authors of that study suggested that evidence-based care could be best disseminated by exploiting existing
informal or formal collegial networks. Similarly, a qualitative study with general surgeons participating in a videoconferenced case-based continuing professional development program focused on cancer care, found that participants noticed greater patient satisfaction with decision making, more appropriate care delivery, and better continuity as a result of interacting with colleagues through the program. Surgeons participating in the program also appreciated being better informed about current research literature and being exposed to decision making for many more cases than they would see in their own practices. Similar programs utilizing videoconferencing to facilitate continuing professional development and knowledge sharing found that programs improved compliance with guideline recommendations and patient care outcomes.

Several systematic reviews have described the importance of interaction in effective continuing professional education. The systematic review by Cameron et al (2014) examined the perceptions of physicians about clinical supervision and educational support via videoconferencing. They included studies focused on the continuum of medical education from undergraduate to continuing medical education, and limited their analyses to physicians. Their findings indicated that videoconferencing supported increased education and clinical practice support and autonomy for rural participants. However, videoconferencing was rated less effective for interaction and rapport building than participating in a face-to-face program.

An integrative review and thematic synthesis of literature by Moran et al (2014) examined continuing education interventions for healthcare providers in rural and remote areas to identify program components and features which were likely to lead to successful changes in patient or provider outcomes. Their review included interventions targeting all health professionals, as well as both face-to-face and digital programs. The level of evidence and the quality of studies in terms of study design were examined in this review, followed by a qualitative mapping and exploration of the relationships between rural and remote context, the mechanisms of action of the interventions, and the outcomes of the intervention. A total of ten key mechanisms of success were identified based on positive changes in service outcomes (i.e., quality, safety), staff outcomes (i.e., self-reported changes in knowledge, competence), program outcomes (i.e., program satisfaction, attendance, participation levels), and patient outcomes. These mechanisms
included active involvement of stakeholders in program design, networking, and relationship building. In addition, they found that for technology-based interventions, engagement with the program, reduction in feelings of isolation and knowledge gains were enhanced when there was a “human element” to the program such as interactive learning elements.

1.2.1 THE ECHO® MODEL

The ECHO® (Extension for Community Healthcare Outcomes) model is a videoconference-based continuing health professional education program which focuses on connecting learners and instructors synchronously. The ECHO® model was created in 2003 by Dr. Sanjeev Arora, a hepatologist at the University of New Mexico (UNM) in Albuquerque. At the time, New Mexico had the highest per capita rate of viral hepatitis where the rural, underserved, and socially disadvantaged population and their isolated and over-worked providers required a new model of healthcare delivery to combat this problem. Using cloud-based videoconferencing, weekly inter-professional rounds were organized to connect remote practitioners who presented their de-identified patients, received guidance from the academic ECHO® specialist team, and then treated their patients themselves. Patient outcomes from the first Project ECHO® implementation were identical in rural populations, prison communities and academic clinics.

Project ECHO’s mission is to democratize medical knowledge and get best practice care to underserved people all over the world. It is a lifelong learning and guided practice model of medical education that is theorized to increase workforce capacity to provide best practice specialty care and reduce health disparities through its hub-and-spoke knowledge sharing networks. Each session is rigorously structured to promote active discussion from all participants and to emphasize the non-hierarchical structure of the program. When a teleECHO clinic begins, all participants are asked to briefly introduce themselves on the videoconference prior to beginning any curriculum or case presentations. Introductions are usually followed by a short didactic presentation and discussion on a topic of interest related to the specialty of the ECHO, then a case presentation delivered by a Spoke participant (a community healthcare provider), and a discussion moderated by a Hub (academic health centre) team member. During the teleECHO clinic discussions, the Hub team facilitator makes a point of asking for clarifying questions and comments or recommendations from Spoke participants prior to the Hub team.
The aim of this discussion format is to promote Spokes’ learning by providing opportunity for them to discuss the case prior to any suggestions from the Hub team experts.

Currently, the ECHO model has become standardized and is disseminated and replicated across the world by the University of New Mexico (UNM) ECHO Institute and partner organizations (referred to as “Replication Partners”) around the world. The ECHO Institute runs a free, 3-day in-person immersion training workshop that is held monthly for new or existing ECHO program operations staff to receive comprehensive knowledge and resources for launching and running an ECHO program. Topics covered in the workshop include Spoke recruitment and retention, curriculum development, information technology (IT) best practices, use of Zoom (cloud-based videoconferencing platform), and evaluation tools.

The main tenets of the ECHO model are:

1. To use technology to leverage scarce resources
2. Sharing best practices to reduce disparities
3. Case-based learning to master complexity
4. Monitoring outcomes to assess impact

The stated benefits of Project ECHO® include no cost continuing education credits; professional interaction with colleagues with similar interests; a mix of work and learning; access to speciality consultation; access for rural and underserved patients; supporting the medical home model; avoiding excessive testing and travel; preventing the cost of untreated disease; and integration of public health into treatment paradigm. It differs from ‘traditional telemedicine’ as the treating healthcare provider retains responsibility for managing the patient and has the goal to improve both access and capacity simultaneously by using technology to bridge distance. The health conditions which are taken on by the ECHO® model meet the criteria of being common diseases; involving complex management with treatments and medicines that have a rapidly evolving evidence base; have a high societal impact (health and economic); result in serious outcomes of untreated disease; and result in improved outcomes with disease management.
Examples of health conditions taken on by the ECHO® model include chronic pain, hepatitis C, AIDS, rheumatology, and cardiology.

The educational theories underlying the ECHO® model include: deliberate practice; social cognitive theory and self-efficacy; situated learning and community of practice; and adaptive expertise. Deliberate practice is focused on improving particular tasks through provision of immediate feedback, time for problem-solving and evaluation, and opportunities for repeated performance to refine behavior. Spoke participants in Project ECHO® have the opportunity for repeated and deliberate practice by selecting, presenting and managing patient cases relevant to the condition focused on. Social cognitive theory and self-efficacy focus on the three factors which influence whether an individual will change their behaviour: (1) they must believe that the benefits of performing the new behaviour will outweigh the costs; (2) they must have confidence in their ability to perform the specific behaviour (self-efficacy) and; (3) there must be reinforcement of positive behaviour changes from persons who are seen as role models or experts. The ECHO® model incorporates these three concepts while focusing on improving provider self-efficacy in managing the specific condition at hand and interacting with specialists in the condition. Situated learning and community of practice theories focus on learning through social interaction and collaboration. Situated learning theory posits that learning must occur in authentic contexts of practice, or the place in which the learning is applied. Communities of practice theory posits that learning occurs among groups of individuals who share a profession and interact regularly to solve problems and share knowledge relevant to the profession. In the ECHO® model, discussion of patient cases, which are the heart of teleECHO clinics, allows healthcare providers to learn from one another by listening to challenges others face and providing advice and recommendations to each other based on expertise and experience. Finally, adaptive expertise focuses on the ability to transfer learning by efficiently solving previously encountered tasks and to develop new best practices as new information and problems are encountered. Healthcare providers participating in Project ECHO utilize previous experiences and knowledge from learning in the program to approach patient cases and provide recommendations.
The ECHO® model utilizes many of the mechanisms and characteristics described by previous reviews of CME and thus some of the success of the program may be attributed to these characteristics. However, no continuing education programs have transcended regional and national areas and succeeded in being implemented globally the way that the ECHO model has.\textsuperscript{31,32} The ECHO® model has become a useful method of continuing education and knowledge management and has been deployed to address public health challenges and many complex conditions.\textsuperscript{32} As of 2018, Project ECHO® has been implemented in 150 regions in 34 countries for various common, chronic complex conditions.\textsuperscript{33}

1.3 SUMMARY

Continuing education for health professionals is a way to maintain the competence of the healthcare workforce and to address the changing scope of practice for many healthcare professions. However, access to continuing education varies depending on where a healthcare provider is located and the resources available to them. To address the problem of access to continuing education, ICTs have been employed to deliver continuing education at a distance. For instance, videoconferencing continuing education programs are one method which shows promise, as they provide opportunity for real-time interaction between participants and case-based discussion that is relevant to healthcare providers’ practice. Project ECHO® is a model of videoconferencing based continuing health professional education which is intentionally designed to connect specialists at an academic health centre with community healthcare providers. The program aims to increase capacity for community-based healthcare providers to care for patients with chronic, complex health conditions which may be better cared for in the community.
2 CHAPTER 2: LITERATURE REVIEW

2.1 PREVIOUS RESEARCH ON VIDEOCONFERENCING BASED CONTINUING EDUCATION

A systematic review of Project ECHO® programs was conducted by Zhou et al in 2016, however the review only focused on studies which examined programs labelled as and utilizing the ECHO® model. Prior to the development of the ECHO® model, videoconferencing-based continuing health professional education programs have been delivered since the 1990s. The programs had varying aims, yet with the same components; healthcare providers meeting regularly over multi-point videoconference to discuss and interact over clinical topics. Thus, a scoping review of all studies examining programs with the same or similar structure as Project ECHO was conducted to obtain a comprehensive understanding of these programs from different contexts. The review aimed to map the literature on all video-conference based continuing education programs including Project ECHO programs.

The scoping review was conducted in accordance with the steps outlined by Arksey and O’Malley (2005), and revised by Levac et al (2010). Four electronic databases were searched from inception until November 2018: MEDLINE, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and PsycInfo for published work meeting the inclusion criteria. The search strategy was not limited by study design or year but limited to English language papers and hand searching of relevant previously published review papers and reference lists of included primary studies was also conducted. An iterative process was undertaken for screening of title and abstracts as well as full text screening. Included studies met the following criteria: describes a videoconference-based or telemedicine-based or telehealth-based continuing health professional education program; target participants are licensed practicing healthcare providers; the program involves multiple learners or program participants; the program occurs over ≥ 2 weeks; program uses multi-point videoconferencing or telemedicine; article provides information about evaluation methods used; and peer-reviewed journal articles. Articles were excluded if the program being investigated was a singular event; the study described telemedicine or teleconsultation programs without any continuing education components; the continuing education program under study provided recertification or
certification or licensing for new skills or knowledge; or the study did not describe evaluation of the program or did not provide sufficient information about evaluation methods. Data extraction from included articles occurred using a standardized pre-piloted form on the electronic data capture system, REDCap. Extracted information from references included author name, study context, participant information, program characteristics, study methodology, and evaluation methods. Evaluation outcomes and aims were categorized according to Moore’s Evaluation Framework for Continuing Medical Education Outcomes. Moore’s Framework (Table 1) describes ways in which continuing education programs should be evaluated to ensure they yield impact at patient and community health levels. The aim of the framework is for programs to be iteratively developed to achieve results at each level in a stepwise fashion to eventually yield and demonstrate impact at the level of patient and community health outcomes. Outcomes are organized into seven levels, beginning with Level 1 which involves evaluating participation in the program, up to Level 7 which involve evaluating changes or impact on community health. Research and evaluation which did not fit in this framework were organized into prospectively identified categories.

Table 1. Moore’s Framework for Continuing Medical Education Outcomes

<table>
<thead>
<tr>
<th>Level</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participation</td>
<td>The number of physicians and others who participated in the CME activity.</td>
</tr>
<tr>
<td>2</td>
<td>Satisfaction</td>
<td>The degree to which the expectations of the participants about the setting and delivery of the CME activity were met.</td>
</tr>
<tr>
<td>3</td>
<td>Learning</td>
<td>The degree to which participants state what the CME activity intended them to know (declarative knowledge). The degree to which participants state how to do what the CME activity intended them to know how to do.</td>
</tr>
<tr>
<td>4</td>
<td>Competence</td>
<td>The degree to which participants show in an educational setting how to do what the CME activity intended them to be able to do.</td>
</tr>
<tr>
<td>5</td>
<td>Performance</td>
<td>The degree to which participants do what the CME activity intended them to be able to do in their practices.</td>
</tr>
<tr>
<td>6</td>
<td>Patient health</td>
<td>The degree to which the health status of patients improves due to changes in the practice behaviour of participants.</td>
</tr>
<tr>
<td>7</td>
<td>Community health</td>
<td>The degree to which the health status of a community of patients changes due to changes in the practice behaviour of participants.</td>
</tr>
</tbody>
</table>
The literature search and hand-searching yielded 4088 references. After title/abstract and full text screening, 97 references remained and were included in narrative synthesis. The 97 articles were published between 1994-2018 and involved 11 different countries including: Argentina, Australia, Belgium, Brazil, Canada, Ireland, Japan, Kosova, Spain, United Kingdom, and the USA. A total of 50 studies came from the United States of America, 15 studies came from Canada, and 14 studies came from Australia. A wide range of clinical areas were covered by the programs and studies, 10 studies were on programs with multiple clinical areas, while 36 unique clinical specialties were covered across the programs. The most frequent clinical areas covered by the programs were Pain, Hepatitis C, and Mental Health, with 9, 7 and 7 studies examining programs for those specialties, respectively. Seven studies did not describe the clinical area of the program being examined and 10 studies examined programs for multiple conditions. Fifty-two studies (47.7%) examined replications of the ECHO model. Table 2 lists the outcomes examined by included studies. Most studies examined Levels 1-5 of Moore’s Framework, while few studies examined outcomes related to patient and community health outcomes.

Table 2. Outcomes examined in included studies

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moore’s Framework Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>(1) Participation</td>
<td>37 (38)</td>
</tr>
<tr>
<td>(2) Satisfaction</td>
<td>55 (57)</td>
</tr>
<tr>
<td>(3) Learning</td>
<td>29 (30)</td>
</tr>
<tr>
<td>(4) Competence</td>
<td>32 (33)</td>
</tr>
<tr>
<td>(5) Performance</td>
<td>21 (22)</td>
</tr>
<tr>
<td>(6) Patient Health</td>
<td>9 (9)</td>
</tr>
<tr>
<td>(7) Community Health</td>
<td>2 (2)</td>
</tr>
<tr>
<td><strong>Other Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Barriers and facilitators</td>
<td>14 (14)</td>
</tr>
<tr>
<td>Cost analysis</td>
<td>6 (6)</td>
</tr>
<tr>
<td>Clinician information seeking &amp; decision making</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Changes in clinical team functioning</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Changes in access to continuing education</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Cases discussed (number and/or type)</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Program experience</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Program theory research</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Resource utilisation</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Perceived professional isolation</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Perceived barriers to implementing changes in practice</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Quality of technology</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Participants’ expectations of program</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Changes in participant role</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Safety of treatment</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Patients’ access to specialty care</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Predictors of healthcare provider participation in continuing education programs</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Fidelity to program format</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Feasibility of using videoconferencing</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Sustainability of using videoconferencing</td>
<td>1 (1)</td>
</tr>
<tr>
<td>How participants learned about the program</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Outcomes of case discussions</td>
<td>1 (1)</td>
</tr>
</tbody>
</table>

Reporting of continuing education programs characteristics were limited in most cases. Most studies did not specify the frequency of the intervention (32, 33%), 30 (31%) ran weekly, 12 (12%) ran biweekly, and 13 (13%) occurred monthly. Most studies did not report the length of the videoconferencing sessions (42, 43%), 22 (23%) were 60-minute sessions, 11 (11%) were 2-hour sessions, and 6 (6%) were 90-minute sessions. Fifty-four programs (57%) targeted an interdisciplinary audience, 24 (25%) targeted a single profession, and nineteen (20%) did not specify the professions of their audience. Ninety-five (97%) studies were on continuing education programs for a national audience, while 2 (3%) were international collaborations.

Seventy studies (72%) did not conduct a needs assessment or did not report on completing one, twenty-seven (28%) studies conducted needs assessments. In terms of the curriculum delivered, 56 studies (57%) made use of case-based learning, 76 (78%) included didactic or lecture style presentations, and 7 (7%) studies did not report the format of their programming.

Thirty-seven studies examined participation in continuing education programs. Twenty-two studies examined the number of sites (facilities, clinics, hospitals) that participated. Attendance from sites ranged from 5 to 35. Thirty-one studies examined the number of individual participants who attended, with participation ranging from 5 to 553 One study examined the number of instances participants asked a question or commented during a session. One study examined engagement with the e-library associated with the continuing education program.
Fifty-five studies examined satisfaction outcomes of videoconference based continuing education programs. Sixteen studies utilized qualitative methods to examine satisfaction with programs, and fifty used surveys or questionnaires to assess satisfaction with programs. Satisfaction with programs was generally high, with participants in all studies describing some beneficial components of the programs they participated in.

Twenty-nine studies examined learning outcomes of videoconference based continuing education programs at the conclusion of the program or after a specified amount of time in the program. Ten studies examined learning outcomes by creating and administering a knowledge test to participants that was graded. Six studies asked participants to rate or report their overall knowledge on the subject, while seven studies asked participants to rate or report their knowledge on specific curriculum items. Seven studies examined participants’ knowledge outcomes by administering standardized tests. Five studies conducted focus group discussions to examine participants perceived learning from continuing education programs. One study administered a simulated patient assessment and graded participants using a pass or fail system and one study did not specific the method used to examine learning outcomes. Overall, studies noted significant increases in knowledge outcomes assessed as a result of continuing education programs.

Thirty-two studies examined competence outcomes of videoconferencing based continuing education programs. Eleven studies examined participants’ self-reported overall self-efficacy and confidence ratings and 18 studies asked participants to self-report their self-efficacy and confidence in their ability in specific skills related to the program. Of these studies 14 used a pre-post design to examine changes in self-efficacy, 9 examined self-efficacy after a specified number of sessions had occurred, 3 examined self-efficacy outcomes at the end of the program, 2 studies used a retrospective pre-post design to examine self-efficacy, and 1 study examined self-efficacy after each session. One study also made use of a comparator in examining changes in self-efficacy.
Two studies conducted focus groups with participants to examine competence outcomes. In all studies, positive impacts and/or changes in self-efficacy were identified.

Twenty-one studies examined performance outcomes of videoconferencing based continuing education programs. Three studies used focus group interviews to elicit participant comments on how they applied their learning, how participation in the program impacted their clinic team, and if they shared their knowledge and skills from the program with others. All studies identified positive impacts of the programs on practice change, with participants reporting multiple ways in which they had implemented their learning from the program in their own practice. Another study surveyed participants after each session to identify the practice changes they intended to make. Three months following conclusion of the program they mailed the same survey to participants, asking them which changes they had made. All participants in that study reported making at least one change in their practice. Five studies used surveys to assess changes in practice. Three used an open-ended question in a survey at the end of the program to assess if participants or sites planned to make any changes or had made any changes in their practice as a result of the program, two used yes-no response surveys at program conclusion to assess whether practice changes were made or planned, two used a Likert response survey at program conclusion if any practice changes were planned, two used a Likert response survey with specific examples of practice changes for participants to self-report the extent to which each change was made, and another provided specific examples of practice changes for participants to select whether they had been made. A observational pre-post study examined nutrition and physical activity counseling and family-centred care using a validated questionnaire administered to parents of pediatric patients at baseline and 3-months post-program. One pre-post study with controls examined electronic medical records for PCPs’ prescribing and referral practices for the one year prior to the program on chronic pain management and one year following the program. Another observational study examined patient medical records for differences in prescribing of anti-viral medications and time to treatment initiation for hepatitis C between primary care providers who participated in VA-ECHO and presented the patient as a case, those who participated in VA-ECHO and did not present a case, and those who did not participate in VA-ECHO. Finally, a study on a program
for pain management conducted a longitudinal study to examine changes in providers’ delivery of different specialties of outpatient care, and medication initiation during the program.

Nine studies examined changes in patient health outcomes after implementation of a videoconferencing based continuing education program. Doyle et al conducted semi-structured interviews with clinicians who presented patient cases during continuing education sessions on dementia care, to examine the impact of the sessions on patient’s dementia, ratings of dementia, and family and staff carers. Changes in patients’ behavioural and psychological symptoms of dementia and ratings were assessed qualitatively by physicians. After the program, only 11% of the patients included in the study had behavioural and psychological symptoms of dementia which continued to be a problem after discharge. Most clinicians also indicated that the program had resulted in reduced stress from referral to discharge among family and staff carers.

Crockett et al examined patient health outcomes following a program for community pharmacists in pharmaceutical management of depression. A repeated measures intervention control design was used to examine self-reported psychological wellbeing and depressive symptoms, self-reported attitudes towards taking antidepressants, and self-reported adherence at baseline, 1-month, and 2-months of the intervention. Their study identified no significant differences between the intervention and control groups on the patient outcomes measured, although the authors suggested that between group differences were masked by the medications administered to patients.

Girgis et al examined patients’ quality of life, anxiety, depression and unmet psychosocial needs using validated self-report scales at baseline, 1 week, and 3 months following oncologists’ training via videoconference in consultation skills for detecting and responding to patient distress. Their study found that anxiety significantly improved at 1-week follow up in the intervention group, compared to the control group. However, no statistically significant differences were identified in emotional functioning, depression or unmet supportive care need between the groups at either time point. An observational pre-post study examined the impact of clinics’ participation in a virtual quality improvement learning network for prevention of pediatric obesity on patient body mass index (BMI). Children who received care from healthcare providers who implemented the intervention at their clinic had significant improvements in their nutrition and physical activity as reported by their parents.

Kim et al examined the effects of a telemedicine network on incidence of neonate morbidity (cases of
bronchopulmonary dysplasia, intraventricular hemorrhage, and necrotizing enterocolitis) in participating hospitals using a prospective pre-post study of Medicaid claims data.\textsuperscript{124} Their findings demonstrated a significant decrease in incidence of the specified conditions in hospitals which participated in the telemedicine network. Another study examined the effects of a videoconferencing program on pressure ulcer rates for facilities which participated versus those that did not.\textsuperscript{50} Historical data the authors examined demonstrated a reversal in the trend of increasing incidence of pressure ulcer rates. Another study examined the rates of patient adherence to anti-hypertensive drugs, low salt diet, and physical activity in a pre-post study after a continuing education program on treatment for hypertension.\textsuperscript{128} Rates of adherence to anti-hypertensive drugs, low salt diet, and physical activity significantly increased after the program.

A prospective observational study examined differences in sustained virologic response (cure rates) among patients with hepatitis C cared for by primary care providers participating in VA-ECHO and who presented the patient as a case, those who participated in VA-ECHO and did not present the patient as a case, and those who did not participate in VA-ECHO.\textsuperscript{120} Sustained virologic response rates were deemed similar between primary care providers and specialists and no significant differences were identified between patients with hepatitis C cared for by primary care providers participating in VA-ECHO and who received case review and those who did not receive case review. The authors of that study concluded that treatment of patients with Hepatitis C by primary care providers trained by ECHO was equivalent to treatment by specialists. A retrospective pre-post evaluation examined glycated hemoglobin values for patients with diabetes treated by primary care providers who participated in SCAN-ECHO and compared these to patients treated by primary care providers with clinics at the same distance away from the tertiary care centre.\textsuperscript{126} Mean glycated hemoglobin of patients in the sample significantly improved over the follow-up period of five months, the improvement was not explained by system-wide changes or improvements.

Two studies examined changes in community health after implementation of videoconferencing based continuing education programs.\textsuperscript{50,124} Kim et al examined the effects of a telemedicine network on decreasing deliveries of very low birth weight (VLBW) neonates in hospitals without neonatal intensive care units (NICUs) and on statewide infant mortality. Their study utilized a prospective pre-post design over a 9-month period. Baseline outcomes were obtained from
Medicaid and claims data using International Classification of Diseases, Book 9 (ICD-9) diagnosis codes on hospital and physician claims for the 9-month period before the telemedicine network was established. This period was compared to the 9-month period during which the telemedicine network was established. Hospitals with and without a NICU that did not participate in the telemedicine network, were compared to those that participated in the network. Results indicated a significant decrease in the number of VBLW neonates in hospitals without NICUs which participated in the program; and a significant decrease in statewide infant mortality during the study period. Deliveries of VLBW neonates and infant mortality in non-participating hospitals was unchanged.

Tetterton et al compared pressure ulcer rates from Medicaid data between facilities participating in the educational videoconferences, and those that did not. Pre-post comparisons were not conducted. Comparisons of rates between the two facilities showed no significant differences, however comparisons of the trend in incidence of pressure ulcers in the 3 years prior to the program, and the trend in the 2 years after the program demonstrated a change from an increasing incidence to a decreasing incidence of pressure ulcers.

Fourteen studies examined barriers and facilitators to program effectiveness and success. Eight studies administered surveys to elicit feedback on barriers and facilitators from participants. Seven studies conducted semi-structured interviews and three studies conducted focus group interviews with participants. Two studies conducted observations of the program and analyzed field note data to identify barriers and facilitators. The most common barrier identified was challenges with time, such as lack of time for participating and challenges in scheduling programs to meet a wide range of schedules. Additional barriers identified included challenges using technology, designing curriculum that met the needs of an audience with diverse experiences and skill levels, confusion and lack of understanding of program purpose, lack of leadership engagement, lack of reflection and evaluation, lack of compensation for participating in the program, challenges in implementing practice change, and limited relevance of program recommendations to rural or remote practice. Facilitators to programs included allowing participants to inform the curriculum, engagement of leadership at all sites, opportunities for
reflection and evaluation, opportunities for collegial interaction, participants’ perceived value in the program, and providing continuing education credits.

Six studies conducted cost analyses of the programs. Rattay et al (2017) conducted a cost-effectiveness study of an ECHO program, comparing treatment of patients with Hepatitis C infection through primary care providers to treatment via specialists. Their study identified that the ECHO model of training was a cost-effective method of caring for patients with Hepatitis C, however high program set-up costs suggested an incremental roll out approach was best. Latifi et al (2011) conducted a cost benefit analysis of the benefit to providers and institutions in being involved in their continuing education program by comparing the potential cost of having participants attend in person to the cost of the videoconferencing to demonstrate cost savings. Four studies reported costs for conducting their program however, did not conduct further cost effectiveness or cost-benefit analyses.

**Summary of previous research on videoconferencing-based continuing education**

The scoping review examined 97 articles which discussed the evaluation of videoconference-based continuing education programs for health professionals. Most published studies of continuing education programs evaluated programs at levels 1 (Participation) to 5 (Performance) of Moore’s Evaluation Framework. Fewer studies examined patient and community health outcomes of programs, and some studies examined outcomes outside of Moore’s Evaluation Framework.

Many studies included in the review provided limited information regarding format and structure of the continuing education program and design of the evaluation plan. Development of traditional continuing education programs often involve participant needs assessments. When technology is used to deliver continuing education programs, the needs assessments may also focus on target participants’ requirements for the technology and the program. The program may also undergo a phase of pilot testing. Few studies provided this type of information in their description of the intervention. Currently, there does not exist a standardized method of reporting
evaluations of continuing education programs or educational interventions and none of the articles examined in this review made reference to using any reporting guidelines. There exist guidelines for the reporting of development and evaluation of complex interventions, however it is unlikely that continuing education interventions are conceptualized as complex interventions by program planners and organizers.22,131

Most studies examined Levels 1 (Participation) and 2 (Satisfaction) of Moore’s Framework, while only two studies examined community health outcomes. These trends are similar to trends observed among other reviews of continuing education for health professionals, where few studies were able to demonstrate changes in Levels 6 (Patient Health) and Level 7 (Community Health) of Moore’s Framework.21,22,132 Participation was defined by most studies as attendance, however one study examined instances of asking comments or questions, which may be considered a more active form of participation, this type of evaluation of participation may be a more meaningful metric of participation in a program.20 Satisfaction was examined qualitatively and quantitatively, and often used to obtain feedback regarding programs. Learning and competence outcomes were evaluated quantitatively, and few studies made use of validated questionnaires or surveys. The limited use of validated instruments were similar to patterns observed in previous reviews of continuing education programs both utilizing and not utilizing videoconference.22,34 Learning and competence are often measured via self-report in continuing education due to feasibility, however this often limits their validity unless efforts are made to standardize the questionnaires used.21,133 Knowledge tests are often recommended as more objective measures of changes in knowledge, however challenges are often encountered in developing and using knowledge tests as curriculum may change and changes in procedural knowledge are not captured by written tests.38,133

Changes in performance were assessed in a variety of ways, including surveys, qualitative written feedback, examining patient charts and counting the number of individuals who subsequently shared their knowledge with others. The different methods assess different ways in which performance may be impacted as a result of a continuing education program. However, no studies discussed the change in performance examined in relation to the program design and whether its stated aims were achieved in terms of performance. Continuing education providers
may benefit from designing programs with specific aims and articulating those aims, evaluations should identify whether those aims were met, with follow up or concurrent studies examining why or why not outcomes were achieved.

Few studies examined patient outcomes, some of which were able to demonstrate positive effects or changes in patient health. Most made use of pre-post study designs, and repeated measures in the case of programs which targeted psychosocial outcomes. Few of these studies provided information regarding the design of the curriculum, which prevents insight into characteristics of the program that may have allowed positive outcomes to be demonstrated. One study relied on healthcare providers’ subjective report of changes in their patient’s health which would be subject to the providers’ personal bias in assessing and reporting their patient’s wellness. Very few studies examined community health outcomes. Tetterton et al conducted a retrospective analysis of pressure ulcer rates in facilities targeted by the intervention under study. Kim et al (2013) examined the community health outcomes as a result of a multiple component perinatal regionalization program. This is one of the first instances in which community health outcomes of a continuing education program were reported. In both studies, the outcomes being studied were medical outcomes that could be assessed via administrative data, outcomes related to psychosocial wellbeing would be less amenable to the study designs and procedures utilized in each study.

Many studies examined outcomes outside of Moore’s Evaluation Framework including implementation factors, impact on professional satisfaction and isolation, changes in access to continuing education and specialty care, and changes in how clinical teams operated. To make use of the findings from all the studies examined in the scoping review, including those outside of Moore’s Evaluation Framework, a model of how these types of interventions work would need to be developed. A model would demonstrate how the inputs and contextual factors of the intervention influence the outputs and would allow a tailored evaluation framework to be developed. Development of a model of video-conferencing based education would align with the perspective that continuing education programs are complex interventions, as defined by the Medical Research Council, and allow for evidence to be sorted into the different components and processes of the model. In an overview of reviews of all types of continuing education
programs, Cervero et al suggest the use of realist evidence synthesis methods to understand the influence of contextual factors and mechanisms of continuing education programs on healthcare providers performance and patient health outcomes. Utilizing this method of synthesis may prove useful for developing a model of videoconferencing based continuing education.

The limitations of the review include the iteratively defined scope applied to the literature reviewed. Where possible rationale was provided for choosing limits to the searches and screening, however given the highly heterogeneous body of literature, it is possible the scope may have been too limited in some respects (e.g., excluding programs which occurred as one-time events) or too wide in others (e.g., inclusion of multiple health professional specialties). The final optional step of a scoping review which involves a consultation with stakeholders was not completed due to time and resource constraints. Finally, this review was oriented to examining outcomes and evaluation as they mapped onto Moore’s Framework. Other evaluation frameworks are organized differently and may be considered less physician-centric. However, as described previously, Moore’s Framework was selected as it accommodated a greater number of outcomes allowing for more comprehensiveness, and its documented use in health professional continuing education outside of medicine.

In conclusion, this review demonstrated a continued trend in continuing education programs to rely on evaluation focused on lower levels of Moore’s Framework. Furthermore, reporting and description of continuing education programs was often varied. The broad range of literature may benefit from organizing frameworks outside of Moore’s Evaluation Framework to categorize what is known about the influencing factors, inputs and outputs of videoconferencing based continuing education programs. Developing a model of how these programs work would align with the perspective that continuing education programs are complex interventions.

2.2 VIDEOCONFERENCING-BASED CONTINUING EDUCATION PROGRAMS AS COMPLEX INTERVENTIONS

Complex interventions are defined as interventions which have multiple interacting components, with any number and difficulty of behaviours required by those delivering and receiving the intervention, target a number of groups and organization levels, have a number of varying
outcomes, and are subject to contextual factors. Videoconferencing-based continuing education programs are thought of as complex interventions when their aim is to improve patient and community health outcomes due to the number of individuals targeted, the changes in behaviour required by clinicians and patients, and the local circumstances of healthcare providers’ practice, among other factors. Developing a model of these programs that demonstrates the inputs, outputs and influencing factors, would require an understanding of how they work and in what contexts. For this purpose, it is important to consider the realist perspective, as articulated by Pawson & Tilley (1997). Realism is conceptualized as a middle ground between the epistemological poles of positivism and relativism which are often used to categorize qualitative and quantitative traditions. The main idea of the realist perspective is to focus on “mechanic of explanation”, or “how things change” to produce scientific knowledge. A program of research which utilizes this perspective aims to answer the question, what mechanisms, or ideas and opportunities, and contexts, or social and cultural conditions, bring about ‘successful’ outcomes. Adopting this perspective, the Medical Research Council (MRC) created their framework for the development and evaluation of complex interventions.

The 2008 MRC guidance outlines the main stages in the process from development to implementation of a complex intervention (See Figure 1). One of the key elements of the development and evaluation process is identifying and developing the appropriate theory of an intervention. In order to identify, develop and test the theory underlying a program, studies examining how the program works, such as how participants learn in the program, and how participants go on to change their professional practice and the care they provide for patients, are required. Despite the amount of pilot, feasibility, and evaluation evidence on the ECHO model, few publications examined how the program worked in different contexts.

Figure 1 MRC Guideline key elements of the development and evaluation process.
As described previously, the ECHO model is described as having multiple learning theories underpinning the program design, including deliberate practice; social cognitive theory and self-efficacy; situated learning and community of practice; and adaptive expertise. Of these theories, CoP theory has gained prominence as a key learning theory of the ECHO program. One study by Socolovsky et al aimed to examine several learning theories in the ECHO® model, including CoP theory and its related concept, situated learning. However, their study was limited to preliminary interpretations of the theory by Vygotsky (1978), whereas the theory has undergone considerable development over the past twenty years. The next section will describe community of practice theory and its interpretations.

### 2.3 Community of Practice Theory

CoPs generally refer to groups of people who share a common concern or passion and come together to discuss these concerns and share and grow their practice. The theory of communities of practice was first described by Lave & Wenger (1991), and has evolved in subsequent descriptions by Wenger et al., and others. The concept is popular in education and business sectors, and has been in use for over 30 years and there is growing interest in CoP for the health sector. However, their use in health care settings has been limited and inconsistent due to variation in their description and interpretation. This section describes the different

**Lave and Wenger (1991)**

CoP theory was first described by Lave and Wenger (1991) in their seminal text as: voluntary groups of people who, sharing a common concern or a passion, come together to explore these concerns and ideas and share and grow their practice. Their description suggested that learning did not occur as a simple transmission of knowledge from an expert to a novice. Instead, most learning for professionals occurred in the workplace and not a traditional classroom, a concept they termed situated learning. A second theme of the book is the concept of legitimate peripheral practice, the process through which novices and experts interact in a CoP and create the professional identity of the novice, who eventually becomes an expert. The novice starts off as a “peripheral” member of the community and through participation and development of their professional identity and practice they become an expert. The theory expands on traditional behavioural learning theories by the emphasis on learning that occurs as an internalization of external social interactions, with the internalization only occurring after an external social experience. They developed this theory of social learning using anthropological data on apprenticeships in a wide range of communities, such as midwives in an American Indian community and tailors in West Africa. They found that learning was facilitated within communities of novice apprentices and more experienced workers. In their text, Lave and Wenger also assert that the learning in these communities mainly occurred through informal gatherings where professionals interacted and shared stories, and novices consulted with experts. These meetings allowed gaps in practice to be identified and for the group to develop new solutions to recurring problems, which facilitated improvements in practice.

A critique of the concept of CoP by Li et al suggested several issues with the concepts articulated by Lave & Wenger (1991). Firstly, the model of learning described is similar to the apprenticeship model of learning in the workplace, with similar challenges and benefits. Secondly, their discussion suggests that CoP are systems for professionals to acquire and polish existing skills rather than create new ways to complete tasks. Third, Lave and Wenger clearly describe the hierarchy of power between the novices and experts, however they do not provide
insight into conflicts that would be anticipated between the novices and experts. Lastly, the description emphasizes that CoP cannot be purposefully created, however the model of learning described bears striking resemblance to apprenticeship and clinical placement programs which are formally implemented for health professional students’ learning.140

**Brown and Duguid (1991)**

Shortly after the publication of Lave and Wenger’s work, Brown and Duguid also published a discussion of CoP theory. Their description was slightly different from that of Lave and Wenger. They argued that “canonical practice”, the abstract, written guidelines of how work should be conducted were inflexible, impractical and flawed.140,142 Instead, “local understanding” and actual practices used by professionals are required to solve problems and complete tasks, and are key to the success or failure of an organization.140,142 They described CoP as workers who meet in informal groups to share information and develop new solutions to job related tasks and problems. These groups constantly adapt to changing membership, evolving circumstances and are places for innovation.142 Key to communities of practice is viewing working, learning, and innovation as processes which can occur in concert. Brown and Duguid also argue that CoP are non-hierarchical with everyone involved having an important role in working, learning, and innovating.

**Wenger (1998)**

In the second publication on CoP theory, Wenger focuses on situated learning and develops the theory further and focuses on identity development. This publication was based on the results of a case study on medical insurance claims processing clerks examining how they interact with each other and share information on completing office tasks. This text described a CoP with three essential elements: mutual engagement, joint enterprise, and a shared repertoire. Mutual engagement refers to the interactions between members of a community that leads to creating shared knowledge on issues or a problem. Joint enterprise is the process of individuals engaged in and working towards a common goal. Shared repertoire refers to the resources, jargon, and stories individuals use to facilitate learning in the group. Li et al argue that this outline of a CoP does not clearly distinguish a CoP from other group structures such as multidisciplinary
healthcare teams, which work together to improve patient health (joint enterprise), communicate and interact with one another about patient care (mutual engagement), and develop ways and resources to apply practice guidelines (shared repertoires).\(^\text{140}\)

**Wenger, McDermott, and Snyder (2002)**

The book by Wenger, McDermott, and Snyder was a departure from the 1998 work by Wenger, where the focus was placed on the benefits for CoP for organizations instead of individual identity as was first described by Lave and Wenger (1991) and Wenger (1998). The publication discussed how CoP could be intentionally created by organizations as a tool to leverage to enhance their competitiveness. In this text, CoP were defined as ‘groups of people who shared a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis’.\(^\text{139}\) The three elements of a CoP were revised to ‘domain’, ‘community’, and ‘practice’.\(^\text{139}\) The domain outlines the scope of practice and allows members to determine what is worth sharing; the community is the interactions and relationships with others that facilitates learning; and the practice is the shared resources, ideas, experiences, information, and ways of addressing problems that is shared and developed by the community. These elements were described as a means of fostering creativity and innovation in addressing workplace problems and tasks.

This text also introduced the concept of champions and facilitators in developing and maintaining the CoP. The champion is responsible for letting others in the field or organization know about the group, recruiting members and providing resources. The facilitator is responsible for the regular activities of the group.

**Evolution of the Communities of Practice theory (Li et al, 2009)**

In their work on synthesis of research examining communities of practice in healthcare settings, as well as analysis of the published works on the theory, Li et al argue areas of tension within the theory as well as suggestions for future research to examine regarding CoP. Firstly, a large discrepancy exists between the initial discussion of the CoP theory and the later discussions. Initially, CoPs were aimed at satisfying individuals’ need for personal growth, however, the
latest description appears to focus on innovation for the purpose of enhancing an organization’s competitiveness. Li et al argue that these two goals are at odds with one another, making the theory difficult to apply. Second, the authors also argue that the interpretation of the theory is inconsistent and broad, resulting in variation in the structure and function of these groups. These inconsistencies are due to the vague definitions provided for some of the CoP concepts along with unclear understanding of the differences between CoP and other types of groups. Finally, Li et al propose that future research focus on the following characteristics of communities of practice: support for formal and informal interaction between novices and experts; emphasis on learning and sharing knowledge; and creating a sense of belonging among members. They explain that these concepts can provide guidance for developing CoPs without limiting the boundaries of CoP when the concept is still evolving.

2.3.1 PREVIOUS RESEARCH ON COMMUNITIES OF PRACTICE THEORY IN HEALTHCARE SECTOR

Three systematic reviews of the use of CoP theory in healthcare fields were identified, two published in 2009 and one published in 2011.

In 2009, a systematic review of the use of the CoP theory in business and health sectors was conducted by Li et al. The aims of that review were two-fold: (1) to examine how CoP groups were defined and used in business and health sectors, and (2) to assess the effectiveness of CoPs in healthcare settings. Accompanying the published review was a critique of the interpretation of the CoP concept.140

Studies included in the review were limited to those published between 1991 and 2005, involving groups either labelled as CoPs or developed using CoP and other related theories such as situated learning, legitimate peripheral participation for the first objective. Data extraction and analysis was guided by a meta-narrative technique. The final results included 18 primary studies from the business sector and 13 from the health sector. For the purposes of this thesis the results from the health sector will only be summarized here.

In their analysis, Li et al grouped the 13 studies from the healthcare sector into 2 groups. The first group included studies that were primarily on clinical placements and apprenticeships which were developed using situated learning and legitimate peripheral participation and focused on
students’ learning knowledge and skills related to their profession and developing a professional identity. The second group included studies where the CoP was primarily used as a managerial tool for continuing professional development and improving quality of care, these studies tended to be on health professionals who worked together in groups, and focused on the knowledge-sharing and creation concepts of a CoP. These studies identified central characteristics of the CoPs examined in the primary studies, these characteristics were present to varying degrees:

1. Social interaction – Interaction occurring in either formal or informal settings, both in person or using technology.
2. Knowledge-sharing – Sharing of information that may be relevant to the group of individuals.
4. Identity-building – The development and acquisition of professional identity or expert identity.

Generally, they found that identity-building was more of a focus in studies involving students, clinical placements and apprenticeships, while knowledge-creation was more of a focus in groups with health professionals.

Li et al also examined the roles of the facilitators in studies utilizing CoP concepts. They found that the responsibilities of the facilitator were often unclear. How groups were managed usually depended on group size and human resources available. Facilitator fatigue was an issue often mentioned as a potential detriment to CoPs. Finally, power dynamics between members of a CoP was also a concept they examined, where there was considerable variation between CoPs. In apprenticeship or clinical placement CoPs, the hierarchy of power was of an expert to novice, with novices aiming to develop skills and knowledge to eventually become an expert and have greater involvement in the CoP. However, in CoPs amongst practicing healthcare professionals there were no clear power dynamics, with the inherent assumption being that all members were
collegial and respectful to one another. In these CoPs, it appears the concept of legitimate peripheral participation was less applicable. Li et al suggest that these participants would remain as learners/observers instead of becoming contributors. The second objective of the systematic review was to conduct a quantitative analysis of effectiveness. However this was not conducted due to lack of studies that utilized experimental designs and evaluated CoPs for improving healthcare provider performance, organizational performance, professional mentoring, and/or patient outcomes. Li et al did not identify any qualitative studies examining effectiveness of CoPs.

In their discussion, Li et al describe their main findings and implications for future research. Firstly, the structure and purpose of many CoPs varied from apprenticeships to voluntary informal networks, which they argue is related to the broad range of interpretations of the CoP theory. Second, their analysis indicated four common characteristics for CoPs: social interaction, knowledge-sharing, knowledge-creation, and identity-building. Third, although the majority of the studies were qualitative, they found that the aims of most studies were to describe how the CoPs functioned or to describe how they were developed and sustained. They were unable to identify studies which examined whether the CoPs did improve uptake of best practices for the different healthcare fields the studies focused on. Fourth, they suggest that the CoP concept may not be a theory of social learning, “rather, a broad conceptualization of how learning occurs in a social environment”. They explain that the concept may provide the basis for middle-range theories. However, the divergent interpretation of the concept, between focusing on self-empowerment and professional development, versus acting as a managerial tool for knowledge sharing and creation in organizations, makes it difficult to specifically describe what is a CoP and what is not. Finally, Li et al suggest future research directions for CoPs should include examining the: role of the facilitator and/or champion in a CoP, common characteristics in both mature and emergent CoPs, and power relationship within CoPs.

In 2011, Ranmuthugala et al conducted a systematic review of CoP established in healthcare. Their objectives were to examine: (1) the purpose of establishing CoPs in healthcare; (2) the composition of health sector CoPs (in terms of what types of participants were involved); (3) how health sector CoP members communicated and interacted with one another and shared
knowledge; and (4) how CoPs improved performance of healthcare organizations. They conducted a search of literature published between 1990 to 2009 and included English-language studies which evaluated CoPs for improving performance of healthcare organizations. Performance was defined as demonstrated changes in behaviour or work practice, or improvements in process or clinical outcomes, demonstrated by a change in a performance indicator. They restricted the review to empirical research and case studies. Thirty-one primary research articles were included in the final review.

The authors examined composition and purpose of CoPs simultaneously. They found that most CoPs (25/31) involved multiple healthcare professions and/or organizations. They found equal numbers of papers that focused on learning and exchange of information and knowledge, and on sharing and promoting evidence-based practice. Studies involving single professions or organizations were more often focused on the purpose of sharing and promoting evidence-based practice. In terms of how CoPs interacted, the authors found the reporting was inconsistent. Sixteen studies reported CoPs which met face-to-face on at least one occasion, three CoPs interacted in the usual work environment, and five were established as virtual CoPs. Most used multiple methods of interaction. Among the studies included, none examined the methods of communication and its impact on the effectiveness of the CoP. In terms of impact on performance of healthcare organizations, 24 studies utilized qualitative methods such as examining observations, interviews, emails, discussion forums, and reports. Ranmuthugala et al found that few studies utilized triangulation of multiple sources to validate findings and provide comprehensive evaluations of CoPs. Seven articles included in the review used quantitative research methods. Three of the seven articles examined CoPs as part of multi-faceted interventions, these studies examined outcomes related to developing local guidelines and policies, improved assessment of nutritional needs of older persons, increased use of screening tools, and greater involvement of the patient in decision making; reduced frequency of insurance liability claims received by hospitals; and improved rates of adherence to evidence-based process indicators. However, Ranmuthugala et al note that these impacts could not be directly related to the CoP component of the intervention alone. The other 3 studies focused mainly on the impact of the CoP. One study examined changes in cancer screening rates, the second examined quality of referral letters written to specialists from general practitioners, and the third examined uptake
of evidence-based practice based on self-reported change in practice, knowledge of assessment tools, and actual utilisation of tools in practice. All studies found positive changes in each indicator examined, however their results were interpreted with caveats; the first study found that the improvements may be achievable in select few organizations and the second found significant attrition rates in program participation despite the positive impact. Finally, the seventh study utilized a case study method to demonstrate establishment of networks following the first meeting.

In their discussion of the findings, Ranmuthugala et al diverge from the recommendations provided by Li et al. They recognize the variation among CoPs, however they discuss CoPs as complex concepts, requiring flexible frameworks to accommodate the variety of models through which CoPs operate. They identify the uniting concept of CoPs as the focus on relationships among members and learning and sharing of knowledge. For future research, Ranmuthugala suggest several areas of potential inquiry: understanding the barriers and facilitators to CoPs, examining sustainability of the benefits gained through establishing CoPs, accounting the issue of time in CoPs, as emerging CoPs may not yield the same benefits as mature CoPs; and finally utilizing realist evaluation methods to assess how, why and when CoPs facilitate improvements in healthcare performance.

2.4 SUMMARY

Videoconferencing based continuing education programs have been evaluated at levels 1 (participation) through 7 (community health) of Moore’s Evaluation Framework, with most studies examining outcomes related to levels 1 (participation) to 5 (performance). Studies have also examined outcomes related to implementation as well as outcomes related to impact that lie outside of Moore’s Evaluation Framework. To make sense of the broad range of studies on these interventions, they should be conceptualized as complex interventions. One of the first steps in developing and evaluating complex interventions, as defined by the MRC is to identify and develop the theory underpinning an intervention. Developing a model of videoconferencing based continuing education may be warranted to understand how they work and in what contexts, along with inputs and outputs of these programs.
The theories stated to be underlying the ECHO model include deliberate practice; social cognitive theory and self-efficacy; situated learning and community of practice; and adaptive expertise. However, few studies have examined the program theory underlying the ECHO® model and how it is implemented in different contexts. CoP theory has gained prominence in the ECHO program. One study examining the theory in the ECHO® model was limited to very early interpretations of the theory and identified evidence demonstrating early concepts of CoP theory. However, it did not provide further understanding of how the CoP developed and of barriers and facilitators. CoPs have been described multiple times over the past 30 years, with descriptions and definitions of what constitutes a CoP having diverged over time. For the purpose of our study, we will focus on the concepts of a CoP put forth by Li et al. (2009) which describe concepts that are common to all interpretations of the CoP theory. Reviews of the use of CoP concept in healthcare settings suggest a need to understand the role of the facilitator in CoPs, characteristics of emergent versus mature CoPs, power relationships in CoPs, barriers and facilitators, and how CoPs facilitate improvements in healthcare performance. To date, no studies on the ECHO model have examined how a CoP developed in the program, utilizing more recent interpretations of the CoP theory, nor have any studies examined barriers and facilitators to its development. The current study sought to understand how a CoP was developed in the context of Paediatric Project ECHO and barriers and facilitators to its development.

2.5 RESEARCH QUESTIONS

To ensure successful deployment of the ECHO® model for pediatric conditions within Ontario it is important to understand how a CoP develops in Paediatric Project ECHO® and the factors which influence its development. Few studies to date have examined how the ECHO® model CoP develops in practice and the barriers and facilitators to its development.

The aim of the following study was to address the following research questions:

How does a CoP develop in Paediatric Project ECHO®?

b. What are the perceptions about this CoP among members who exhibit different levels of participation?
c. What are the barriers and facilitators influencing development of this CoP?
3 CHAPTER 3: METHODOLOGY

3.1 STUDY DESIGN

To examine these research questions, a qualitative description approach as articulated by Sandelowski was conducted. The aim of this approach is to produce a “comprehensive summary of events in everyday language” and a “straight answer to a question that is of special relevance to practitioners and policymakers”, an accessible way of answering timely research questions. Additionally, qualitative description involves low-inference interpretation, which Sandelowski describes as resulting in easier consensus among researchers. For the research questions described previously, these qualities of the qualitative description approach were suited to the purpose of providing an accessible and comprehensive summary of the extent to which a CoP develops in Paediatric Project ECHO®, and the barriers and facilitators to its development.

Data collection techniques for qualitative description studies typically include semi-structured or open-ended individual or focus group interviews, as well as observation and document review. For the purposes of our study, semi-structured interviews were selected to provide participants the opportunity to describe their experiences in the program in their own words (p.80). In person interviews were not possible due the geographically distributed nature of the Paediatric Project ECHO® participant group, and scheduling challenges.

3.2 SAMPLING

Sandelowski advises that purposive sampling techniques be used in qualitative descriptive studies. Patton describes purposive sampling as the selection of information-rich cases for in depth study, that will “illuminate” the research questions under study. For our study, participants who vary based on the following characteristics were recruited: profession, practice setting (i.e., urban, rural or remote), level of participation during teleECHO clinic discussions, whether they presented a patient case at a teleECHO clinic, and number of years practicing. These characteristics were selected as it was hypothesized that relevance and utility of the program for continuing education may differ across professions, years of experience, and practice settings. Secondly, we were interested in understanding the perceptions of the program
from those who were active participants in discussions compared to those who attended yet chose not to engage in discussions and participants who varied in their level of attendance at teleECHO clinic discussions (e.g. attended all clinics, attended few clinics). We were interested in the perceptions of those who varied in terms of attendance and active participation due to the importance of regular attendance and participation described in previous interpretations of communities of practice.\textsuperscript{139} Finally, interviewing those at different attendance levels was also intended as an opportunity to understand why some participants attended frequently and others did not.

At the time of the study, over 200 healthcare providers had registered to participate in Paediatric Project ECHO\textsuperscript{®} and 72 healthcare providers had participated in at least one teleECHO clinic. It was anticipated that 15-20 participants, who varied demographically as defined above in terms of practice setting, profession, participation level, attendance level etc. would be recruited until data saturation was achieved. Saturation was defined as the point at which no new information regarding the research questions or themes was identified from further interviews with participants.\textsuperscript{147}

3.3 STUDY SETTING

Paediatric Project ECHO

In February 2017, the Hospital for Sick Children (SickKids) was awarded funding by the Ontario Ministry of Health and Long-Term Care for \textquoteleft Paediatric Project ECHO\textquoteright. This was a 3-year demonstration project focused on improving the management of pediatric acute and chronic pain, bariatric care, complex care, and palliative care throughout the province of Ontario. For Paediatric Project ECHO\textsuperscript{®}, the Hub team consists of interprofessional teams of specialist healthcare providers from SickKids, as well as the Children’s Hospital of Eastern Ontario for palliative care. An internal operations team was set up shortly after the funding notice and the first teleECHO clinic was launched in October 2017. The operations team consists of the administrative assistant, clinic coordinator, research coordinator, project manager, IT specialist and research lead who collaboratively work together to organize curriculum development, Spoke recruitment, facilitate organization of sessions and conduct ongoing research studies. To
facilitate program planning, an educational needs assessment was conducted from May 2017-August 2017. An online survey was distributed via targeted emails to professional networks, associations, and allied health organizations related to each of the specialties, throughout Ontario. The survey assessed interest in specific educational topics as well as program format preferences, the results were summarized and utilized to help determine the program format and topics to be covered in the curriculum. The four specialties were rolled out sequentially, with some specialties having different targeted audiences for the first year of their program (subspecialists versus primary care HCP).

The conditions chosen for Paediatric Project ECHO®, namely paediatric acute and chronic pain, bariatric care, complex care, and palliative care, were selected because they have a large disease burden and can be managed in the community.

Paediatric Project ECHO® uses Zoom videoconference technology, a low-cost cloud-based technology that enables remote video conferencing with up to 500 participants, even at lower bandwidths. Zoom technology is used to link primary care providers (Spokes) and members of the academic Hub. Within the Zoom platform, participants have the option to turn on their video camera and microphone when they participate, if they have one or choose to, participate via audio on their computer, telephone or mobile phone, and to participate via a live chat where participants can type their comments and questions to the whole group as the clinic is occurring. Thus, participants have several options for ways in which they can participate in the program. When a participant in the videoconference is speaking the platform “spotlights” their screen square, which makes them appear in the full screen, when another participant responds their square swaps with the previous speaker’s square.

**Program Offerings**

There are three main types of program components within Paediatric Project ECHO®, they are offered for each paediatric specialty in the program:

a. **TeleECHO Clinics**: Each TeleECHO session is 1.5 hours in length and is facilitated by the associated medical lead(s) at the Hub. Spokes remotely join the session using Zoom
videoconference technology. The session begins with a 15-minute educational didactic, followed by an assigned Spoke presenting a de-identified patient case from their own practice, then the remainder of the session is dedicated to facilitated group discussion about the case, and recommendations generated based on best practices. All Spokes are encouraged to engage in the discussion and provide comments based on their own experiences. Each month, there are 1-2 TeleECHO sessions held for each specialty. Spokes receive no cost continuing medical education (CME) credits for attending TeleECHO clinics.

b. Core Competency Curriculum: The medical lead(s) and their clinical team work with the Project Coordinator to develop an education curriculum for each specialty. The curriculum contained a total of 8 hours of 1-hour long didactic content delivered on a monthly basis and was designed to meet the identified educational needs of the Spokes. Curricula are delivered over the Zoom videoconferencing platform to Spokes. Spokes receive no cost CME credits for completing the curricula requirements. The core competency curriculum is offered twice per year per specialty.

c. In-person Bootcamp: Spokes from Paediatric Project ECHO® are invited to take part in a 2-day, in-person bootcamp. The bootcamp focuses on teaching hands-on skills relevant to each specialty and is offered twice per year. As of January 2019, the bootcamp was being planned and was only available to the Pain and Obesity Management specialties.

Paediatric Project ECHO® for Pain

Paediatric Project ECHO® for Pain was the first specialty to launch. It launched in October 2017 delivering two teleECHO clinics per month, and monthly core competency curriculum sessions. When the proposal for the demonstration project was first developed in 2015, Ministry of Health funding had been awarded to several other clinics in Southern Ontario (London, Hamilton, Ottawa, Toronto) in addition to SickKids, to launch or expand their pain clinics to form a Pediatric Chronic Pain Network. Thus, the Ministry of Health mandated that the first year of the program (beginning October 2017) was initially targeted to these sites as they expanded their teams or launched their clinics, with the second year targeted to primary care providers across Ontario.
Paediatric Project ECHO® for Obesity Management

Paediatric Project ECHO® for Obesity Management was the second specialty to launch, in November 2017, delivering monthly teleECHO clinics and core competency curriculum sessions. The first year of this program was restricted to other clinics that were part of the Ontario Paediatric Bariatric Network (OPBN) which includes 12 clinics across Southern Ontario, with the second year targeting primary care providers. In the second year, the core competency curriculum was delivered prior to the second cycle of teleECHO clinics, to act as a prerequisite for participating providers who were not a part of the OPBN. Based on suggestion by the MOHLTC, this program was initially named Paediatric Project ECHO® for Bariatric Care, as the first phase would be targeted to the Ontario Paediatric Bariatric Network. Towards the end of the first year of the program, the name of the program was changed from Bariatric Care to Obesity Management, to better reflect the focus of the sessions and broader scope of the curriculum to be delivered.

Paediatric Project ECHO® for Palliative Care

Paediatric Project ECHO® for Palliative Care launched in January 2018 with monthly teleECHO clinics and core competency curriculum sessions. The program is open to all healthcare providers interested in participating.

Paediatric Project ECHO for Complex Care

Paediatric Project ECHO® for Complex Care launched in January 2018 with monthly teleECHO clinics and core competency curriculum sessions. The program is open to all healthcare providers interested in participating.

Evaluation of Paediatric Project ECHO®

Ongoing research and evaluation is a key component of the ECHO® model, to assess impact, effectiveness, costs, and satisfaction with the model. Paediatric Project ECHO® is currently being evaluated for implementation and performance outcomes using a pre-post, mixed method design with repeated measures. The study sample consists of healthcare providers who took part
in the Paediatric ECHO® program. The evaluation strategy is guided by components of Moore’s Framework for Continuing Medical Education Outcomes. Moore’s framework aims to assess the impact of continuing education programs by organizing outcome categories into seven levels where achievement of lower level outcomes is required to achieve higher level outcomes. Our study is separate from the larger mixed-methods study, however, the consent processes for both studies are centralized. Participants can opt-in to receiving information about qualitative studies on Paediatric Project ECHO, which include our study as well as other qualitative data collection for the larger evaluation study. Healthcare providers who opt-in receive emails with specific study information and how to enroll in the study, electronic consent is obtained for each study they participate in.

At the time of our study, the Pain ECHO® had completed the first cycle of sessions (a total of 17 teleECHO clinics) and had entered a hiatus before the next cycle of sessions beginning in November 2018. On average, the Pain ECHO® saw 10-15 participants attending each session. The Obesity Management ECHO® had completed their first cycle of sessions (a total of 10 teleECHO clinics) and had begun their second cycle of core competency curriculum targeted to primary care providers in Ontario. The Obesity Management specialty had on average 7-8 participants attending each session, out of a possible 12 sites. The Complex Care and Palliative Care specialties had completed 6 teleECHO clinic by the end of the data collection period. In the Complex Care teleECHO clinics, an average of 15-20 participants attended each session, while in the Palliative Care teleECHO clinics an average of 30-40 participants attended each session.

3.4 PROCEDURES

Participants opt-in to receive information about qualitative research components as part of the Paediatric ECHO® evaluation initiative. Upon registration in the program, they are emailed a link to electronically sign the opt-in consent form via REDCap. Due to the nature of the Paediatric ECHO® program with participants geographically dispersed across Ontario, obtaining in-person, written consent is not feasible. Participants who opted-in to receiving information about qualitative research components of Paediatric ECHO® received an email from our team, informing them of the study and requesting their availability to set up a time for a phone or in-person interview if interested. Participants who responded to the email and engaged in setting up
an interview were emailed the electronic study consent form to complete (See Appendix C for Electronic Consent Form). Once an interview time was set up and the consent form was completed, participant demographics were obtained from existing registration data that participants provided at the outset of the program, and attendance data tracked during sessions (See Appendix D Paediatric Project ECHO Registration Form).

I conducted all interviews. Participants had the option of phoning the research site or providing a phone number to call. Prior to the start of the interview, I checked that the consent form had been completed and ensured the participant was aware that the data would be treated confidentially, that consent could be withdrawn at any point in the research process, and any questions about the study were answered. I notified the participant when I began recording the call. Each interview began with an open-ended question and was guided by a list of questions focusing on the experience of participants in the program and guided by the CoP theory (see Appendix A for Semi-Structured Interview Guide). The general topic areas covered by the interview guide included how they became involved in Paediatric Project ECHO; the motivations and expectations behind joining the program; their initial thoughts on the program and how their thoughts changed or did not change over the course of the program; what they found useful and not useful about each program component; their perceptions of other participants; what they would change about the program; and their perceptions about the technology used in the program. The interview guide was piloted with a member of the study team and modified according to their feedback and suggestions. A second pilot interview was conducted with a Paediatric Project ECHO® participant, which was recorded and transcribed then reviewed by members of the supervisory committee and ECHO study team for further revisions to the interview guide and prompts, along with feedback for the interviewer. Subsequent interviews proceeded in a similar manner with members of the study team reviewing transcripts of the completed interviews after 7 and 14 interviews were completed. Interviews were audiotaped and transcribed verbatim, and all transcripts were checked against audio recordings for accuracy by the student. Field notes taken during the interviews were included in the analytic process.
3.5 Data Analysis

Sandelowski considers qualitative content analysis the analysis strategy of choice for qualitative descriptive studies.\(^\text{143}\) It involves a dynamic and iterative process of systematically applying data-derived codes to sort the data. To analyze the data using qualitative content analysis, procedures outlined by Graneheim, Hallgren & Lundman (2004) and Graneheim & Lundman (2017) were used. They define codes as “words, sentences or paragraphs containing aspects related to each other through their content and context”. In their analytic approach they do not consider codes to necessarily be mutually exclusive, specifically when dealing with experiences, as human experiences are often intertwined.\(^\text{150}\) Finally, they defined themes as an underlying “thread” of meaning through codes, meaning units, or categories on an interpretative level.\(^\text{150}\)

Interview data were first read through several times to obtain a sense of the whole. A subset of transcripts was distributed to supervisory committee members to obtain feedback and comments and discuss the data. An inductive approach to analysis was used to examine participants’ experiences in the program. Codes derived from the data were used to sort the data into more manageable content areas and meaning units with new codes being added as interviews were read through and coded. This coding scheme was recreated and repeatedly revised afterwards. Data within each code was reviewed and divided into further codes where necessary. Finally, to address the main research question of this study: to what extent does a community of practice develop in Paediatric Project ECHO, the data and themes were reflected upon and compared to the concepts of the community of practice theory outlined by Li et al (2009), namely, knowledge sharing, knowledge creation, social interaction, and identity building.\(^\text{151,152}\)

Transcribed data and coding were managed using NVivo 11 computer software program, which allows for online coding and annotation of text.\(^\text{153}\) See Appendix B for the coding scheme. I independently completed coding of all transcripts, triangulation via multiple coders was not undertaken. Triangulation makes the assumption that there is a single reality that may be corroborated and use of multiple coders seeks consensus on the nature of reality. This practice is at odds with the naturalistic paradigm of qualitative research, where reality is considered to be multiple and constructed.\(^\text{154,155}\) However, for the purposes of this study, we found a team approach to data analysis was important to ensure multiple perspectives of the data could be
considered. Thus, the supervisory committee was involved in reviewing interview transcripts and codes throughout the process. Once coding of all transcripts was completed, codes were reviewed and related to one another and to the sense of the whole, then abstracted into themes and sub-themes. Themes were also reviewed by the supervisory committee for changes in wording, and additional considerations.

3.6 Methodological Rigour

Markers of rigour in qualitative research include congruence in the research question and methods, credibility, resonance of the findings, use of theory, and reflexivity of the researcher. 150,156,157

Congruence

Due to the relatively limited amount of research on the theories of learning underpinning the ECHO model, this study aims to provide a descriptive account of the development of a CoP in the Paediatric Project ECHO® program. 133 Accordingly, a qualitative description approach was identified as the best suited method to answer the research question. 143,144 157

Credibility

Credibility is defined as the trustworthiness and quality of the research conducted. 146 To ensure credibility in this study memo notes were kept throughout the analytic process, rigorous documentation was kept throughout the data collection and analytic process, and where possible explanations and reasoning were provided for why or how certain approaches were taken. 158

Resonance

Resonance is described as the extent to which the research meaningfully impacts the reader so that they may make connections with the findings and utilize them as needed in their own practice. 159 To ensure this, the context, participants and program under study were described fully so that readers could easily make sense of the findings. 160 In addition, the research question and discussion of the findings were situated within the relevant theoretical framework and implications of the research to the theory were discussed in the discussion section. 151
**Use of Theory**

In this project, we used Sandelowski’s definition of theory: “the disciplinary paradigms in the arts, sciences, and humanities that direct or inform both the inquiry process, including the presentation of findings, and the abstract schemas (including what is commonly referred to as concepts, conceptual models, and frameworks) describing, organizing, and interpreting the target phenomena that constitute the subjects/objects of individual research projects in a substantive area” was used. Sandelowski also clarifies that theory does not exclude those which are not in the form of sets of statements specifying relationships between concepts. Theory entered this study at two points, in the process of defining the research question, and as part of the target phenomenon under study. I used the guidance on developing and evaluating complex interventions by the Medical Research Council in scoping out the research question. The study itself examined how the CoP theory occurred in Paediatric Project ECHO and findings were interpreted in the context of the CoP theory.

**Reflexivity**

Reflexivity is the self-reflection of the researcher and examination of bias and preconceived notions which may influence the research process. It is an essential component of any qualitative research study, including qualitative description studies. Prior to beginning any data collection or analysis and during the process, I reflected upon and noted my own potential biases and preconceived notions that I brought to the study. Prior to embarking on my graduate studies, I was an undergraduate student in microbiology and immunology with limited experience in health services research methods. In the process of identifying the research questions for this study, I was able to attend the teleECHO clinics in Paediatric Project ECHO® and developed an understanding of the program and some preconceived ideas of the program.

My background in more “basic” sciences may have led to my ready acceptance and comfort with the realist perspective, as the generative method of developing theory and evidence was aligned with how I had spent the previous 4 years being taught and thinking about research studies. Attending the teleECHO clinics starting with the launch of the program, I was able to witness some of the challenges the Hub and Spokes may have felt in the first couple of months of the
program. Having been sensitized to what the program was like helped in creating the interview
guide for this study as I could ask some more nuanced questions about their experiences.
However, I soon realized the effect this could have on the actual interviews as my biases could
limit the depth to which I would probe participants and ask for description and clarification of
their experiences. For example, one of my initial thoughts about the discussion structure of the
teleECHO clinics was that it was too structured and may inhibit spontaneous discussion. I also
initially believed that Spoke participants might feel a sense of hierarchy between the Hub and the
Spokes, and that the recommendations from the Hub team may not be realistic for the settings
some Spokes practiced in. I used some of these perceptions to create probes for the open-ended
questions in the interview guide and took note of questions and parts of the interview where
these biases could come through to ensure they did not influence the participant’s response. I
stopped attending the teleECHO clinics for six months prior to the start of my interviews which
provided me with some time to distance myself from the program and my biases prior to
conducting the interviews.

During the first few interviews, I realized that not all participants had the same understanding of
the program or awareness of all its features. For example, I realized that healthcare providers saw
themselves as participants in Paediatric Project ECHO, not Paediatric Project ECHO for Pain or
Paediatric Project ECHO for Complex Care. Thus, their perceptions were usually not tied to any
specific paediatric speciality. I adjusted the phrasing of my interview guide questions
accordingly, and also expanded my recruitment of participants to include healthcare providers
from all the specialties, as the study had initially aimed to examine the Pain specialty. In general,
each time I realized a participant might not understand a feature of the program, I would probe
them to explain what they meant, and tried to avoid using specific ECHO related terms such as
“Hub” or “Spoke” and opted for “SickKids team” and “other participants on the
videoconference”.

3.7 Ethical Considerations

Research ethics approval was obtained from the University of Toronto (REB #00036264) and the
Hospital for Sick Children (REB # 1000057321). A number of measures were taken to protect
the rights of participants, including (a) ensuring anonymity, privacy and confidentiality of
personal information, and (b) proceeding through formal ethical review processes at the participating hospital and university. During the interviews, the interviewer clarified that study participation would not influence any subsequent participation in the Paediatric Project ECHO program and that all information obtained during the study would be treated with confidentiality in keeping with privacy legislation. Upon enrolment in the study, each research participant was assigned a unique study identification number. The master-linking document was stored separately from participant data on a password-protected file on a secure server at SickKids. Only members of the research team had access to study data. All audio files were de-identified prior to transcribing them. To prevent deductive disclosure of participants, identifying characteristics of participants are presented in aggregate.161
4  CHAPTER 4: RESULTS

4.1  PARTICIPANT CHARACTERISTICS

Thirty-nine healthcare providers were invited to participate in an interview, out of 65 participants who opted in to be contacted about qualitative research, 34 were Spoke participants and 5 were Hub participants. Twenty-nine healthcare providers responded: 3 responded after study recruitment had concluded, 5 were unable to participate due to scheduling difficulties during the summer, while 21 healthcare providers went on to participate in an interview. Participants who did not respond were emailed with a follow-up up to 3 times, overall 10 participants did not respond after the follow-up emails. Participants were recruited over 6 weeks (June 2018-August 2018). Eleven professions were represented in the sample of participants, see Table 3 for summary of participants characteristics. The characteristics of the sample were compared against the characteristics of participants in the overall program to ensure representativeness.

Of the 4 specialties available in Paediatric Project ECHO® (Pain, Complex Care, Palliative Care, Obesity Management), 1 healthcare provider had participated in all four specialties, 5 had participated in three specialties, 5 had participated in 2 specialties, and 10 participated in one specialty. Seventeen participants had taken part in the Pain specialty, 10 in Complex Care, 8 in Palliative Care, and 3 in Obesity Management. During their interviews, two participants also reported that they participated in the Epilepsy across the lifespan ECHO®, another ECHO® program organized through SickKids, focusing on epilepsy in adult and paediatric populations, that is run separately from Paediatric Project ECHO®. Most participants (18/20, 86%) were female, which was consistent with the representation in the program participants, where 90% of participants are female. Most participants reported practicing in their profession for several years: 12 had been practicing for ten or more years, 4 had been practicing for 5-10 years, 4 for 1-4 years, and 1 participant had been practicing for less than a year. A total of 55 sessions were delivered across the specialties, including both teleECHO clinics and core competency sessions. Participants in this study had attended between 1 to 30 of these sessions. The median number of teleECHO and core competency sessions attended by participants was 11.

Table 3. Characteristics of study participants
As part of Paediatric Project ECHO registration, participants are asked to indicate their gender (social construct) with the following options: female, male, other, or prefer not to disclose, and prompted to specify if they chose “other”. The participants in this study indicated their gender using the categories “female” and “male”.

The Ontario LHINs were dissolved in March 2019, after the conclusion of data collection.
This section will summarize the themes developed from the study data. Initially the analysis began with examining the data against the elements such as community, domain and practice of one interpretation of the CoP theory. However, upon realizing this approach covered only a subset of the data, and a literature review of the interpretations of the CoP theory, an inductive approach was utilized thereafter to examine participants’ experience in the program. Finally, given that it was the first year of Paediatric Project ECHO®, the interviews also provided an
opportunity for participants to share their feedback on the program. The themes and categories presented below are not mutually exclusive.

1. The format of Paediatric Project ECHO facilitated knowledge sharing and a sense of community among participants.

Participants described Paediatric Project ECHO® as a “community” or “network” and felt “comfortable” participating in the program and interacting with other participants over videoconference. Several participants who practiced in community settings described how they felt involved and engaged in the program due to the interactive format, the format of asking Spoke participants for questions and comments before the Hub team, and the emphasis placed on participation by the facilitators who sought comments and questions from other participants in the videoconference. Participants described a feeling of “surprise”, when they realized after the first teleECHO clinic that the program was quite interactive. One physician participant (HCP18, Spoke) described how their expectations changed after starting to participate in the program:

“As community providers it’s very easy to feel in the shadow or overshadowed by SickKids. That is nothing that there, that anyone has said or done, but there’s certainly a sense that, you know, we’re in the background. So by asking for those questions [from Spoke participants] first, I think it makes you feel more like a voice that wants to be heard. It makes you feel like you are a greater participant. So, you know, to go back to my expectations, I sort of thought, hey, I’m just a community practitioner. I’m just going to sit and watch again, I’m just going to sit in the audience in and kind of like, I’m going to learn, but nobody necessarily is seeking my input. And by asking for community input first, I think you’re kind of really validating, yeah, we want your input, we want your questions, we want to know your experience. And that’s a really nice feeling to have in terms of building connections to kind of get the sense of, you know, my voice is welcome here. It’s safe here. It’s desired.”

Another participant (HCP09, Spoke) described their perception of the program focusing on two-way learning, with the format of the discussion component of the case presentation:
“It's more about networking and collaborating and, so my feeling, maybe I'm wrong, but [I felt] there was a real interest in the learning going both ways. Smaller centers in smaller communities. There's great expertise and creativity and skill and in finding ways to do really good work with what's available and approaching perhaps unique challenges in different communities. That we can learn a lot from that as well as learning from the most recent research at a larger centre with large numbers. That's a different sort of knowledge and skill and expertise and so larger centers can learn too.”

This type of two-way learning was also discussed by Hub team members as well. One interviewee (HCP08, Hub) described the type of “learning curve” they went through in participating in the program:

“This was I think a learning curve for us, in regards to remembering that a lot of places don’t have all the resources that we have. And needing to remind ourselves of that and so when we come up with suggestions, recommendations, that we think about what resources they may or may not have there. We’re still learning what resources we have here in Toronto you know, and you know, what do they have up in Thunder Bay, I have some idea but and also I don’t know what life is like up there.”

This sense of community also came from healthcare providers sharing cases and experiences they were struggling with, and through the case discussions offering recommendations and suggestions to one another. For community providers, hearing from other healthcare providers struggling with similar challenges and resource levels also contributed to this sense of community. A hub team member (HCP14, Hub) described their perceptions of interacting with other participants in Paediatric Project ECHO®, and how each other’s challenges resonated with them:

“So like having this person who you know is struggling and I can sort of feel it. Like I've been there. We've all had these cases where you feel awful or you know, you're struggling…Other people, I think could sense how genuine it was and then genuinely wanted to help and offer their advice and opinions.”
Several participants described the variety of options available for participating in the program including telephone, video, and chat functions as factors that helped them feel “comfortable” and engaged in the program. Several participants felt this was important as they did not have access to a web camera or microphone regularly or did not have dedicated desk space for them to use to participate. One participant (HCP07, Spoke) described how they felt about the different options for participating:

“Well I could either choose to – if a number of my team members were available that day we would book a space and kind of video in together, on the other hand if I was jammed between appointments I could just connect from my office computer um and so I just sort of felt like there were ways to integrate it into whatever I was doing even though I couldn’t always do that, it made it more accessible. I didn’t have to go to a specific location or hub it was pretty accessible from what would normally be parts of my day and so I guess that’s what I would mean by comfortable.”

Participants also found the technology “easy” to use (HCP05, HCP16; Spokes). One participant (HCP16, Spoke) described how the videoconferencing platform being used made them feel like they were participating in an in-person conversation:

“I think I went into it initially thinking it you know would just be, you know, watching a webinar, but there was much more interactive then that. It was with the video. I mean the [videoconferencing] helps in being able to see all the other participants that were on the call. Then like just the technology behind it, the timing of conversations, being able to see that people were not only listening, but then you can see them actually listening and participating. I don’t know if that makes sense. The technology behind it I guess. And then the just the fact that, you know, when someone was speaking they would come up on the screen and you’d be able to understand who they were and what they were doing. It was more of a personal connection. It felt like you were, I mean with a Webinar, I’d say like you're in the room and whereas this, it felt like you were a little bit more...in a meeting room as opposed to a classroom environment. I guess that would be the comparison. I felt like you know everyone was basically just sitting around a table and you know, your picture’s up on the screen just like anybody else’s is. Versus a webinar, you're in a class
Participants also described how the technology support staff available for working with them in troubleshooting and preparing for case presentations helped them feel “welcome” in the program (HCP09, Spoke). Participants described how the organization and care taken by the operations team to ensure they had a positive experience helped them feel included in the community. One participant (HCP13, Spoke) described their experience with the IT support staff:

“I had a huge issue with the connection and the IT guy responded privately to me through, like through the messenger. And he actually made a point of making an appointment with me that we both had like the mutual same time and the following day, and he actually took the time to fix my computer and walk me through things...He was the nicest guy and I thought, wow, like this, this whole ECHO thing just blows my mind sometimes because everybody's so darn friendly and wants everybody to just have a great experience participating. I was very impressed with that.”

Participants did not perceive any challenges or fears in presenting cases or interacting during the discussion components. They reported that they chose not to interact during discussions, it was due to wanting to focus on listening to the discussion. Several participants explained that as a result of the program they felt more willing and comfortable to ask questions and for help from the hub team regarding their own patients even outside of the program should they arise.

Participants described the program as a resource or supportive group they could go to should they have any complex patients they needed assistance managing.

When discussing other continuing education programs, participants often compared the other options to the ECHO® program and perceived ECHO® to be “different” or “unique” from other programs, including regularly occurring webinar-based programs. Participants described ECHO® as “more interactive” compared to other programs. Several participants compared Paediatric Project ECHO to webinars they had participated in and described how the element of seeing other participants’ faces on the videoconference made the program more engaging and “personable” (HCP16, Spoke). One participant described how participating in the program felt...
like they were in a round-table meeting speaking to other clinicians through the
videoconferencing platform instead of a lecture as they were accustomed to in other professional
development or education programs (HCP08, Hub). Other participants described how Paediatric
Project ECHO® provided a greater opportunity to share information with other clinicians
compared to other programs they had participated in.

One participant (HCP05, Spoke) who practiced in rural settings described how their options for
continuing education were limited:

“So we do 2 thirty minute journal clubs a week, that’s run by paediatricians that we just
take turns presenting with our nursing staff, and then there’s sit down rounds um that are
more formal, that’s an hour long round once a week that we rotate through, often the
obstetricians take turns presenting so those are also relevant topics. But they’re topics that
we have to present, and then there’s adult grand rounds once a week, but that’s not – it’s
almost never relevant to – to my practice.”

Other participants from community settings explained that their other options involved traveling
a far distance, requiring a day or multiple days off, and being costly or not feasible due to limited
funding, these options included day workshops and conferences. Participants from urban settings
also described challenges related to funding as well. Few participants described participating in
longitudinal continuing education programs.

In terms of the program content, participants found that few other programs had the same type of
relevance and were oriented to community practice as ECHO®. When participants described
ECHO’s relevance to community practice, they explained how the discussion amongst
community participants and hub team members generated practical ways to implement changes
to process or care that were feasible for a wide range of resource levels.

2. **Barriers to the development of a CoP included differing understanding and
expectations of the program, and time.**

Several participants from community settings would often describe the main purpose of
Paediatric Project ECHO as being “unclear” (HCP10, HCP17; Spokes). Other participants had an
understanding of the program that differed from the stated program aims. Few participants discussed an understanding of the program that was the same as the stated program aims. Some believed the cases were merely a means of learning about the different specialty conditions and offering case-based learning (HCP06, Spoke). One participant believed the main purpose of the program was to offer didactic presentations with “relevant” topics (HCP05, Spoke). Another participant explained that they had not been aware that they could even submit cases to be presented in the program (HCP17, Spoke). Hub team respondents described disappointment that participants from community settings were not submitting patient cases (HCP08, HCP21; Spokes).

Participants from community locations often described feeling “overwhelmed” by the number of sessions occurring each week across the program, as they were registered to receive emails about all specialties of the program. In general, many participants were interested in specialty topics in paediatrics and found the volume of sessions occurring each week prevented them from attending all of them.

“Some weeks it seems like there’s like two or like every week, so if you want to try to do them all it’s a lot, so I don’t know if it’s better just to focus on one and then just like stay on that one. But I’m trying to pick and choose I guess which, sometimes seems like there’s overwhelming amounts. The hour ones usually fit in my day pretty good, the ones that are like an hour and a half or an hour and fifteen minutes sometimes I’ll like miss out on the beginning or the end. I think there’s like one today too, so I was like maybe I’ll catch it at the end.” (HCP03, Spoke)

Thus, they described trying their best to attend every session of the different specialties, but ultimately were not able to as there were many happening each week. This resulted in participants attending at least a few sessions of each specialty, which in total, they perceived as frequent attendance. Conversely, hub team respondents described their expectation of participants attending their ECHO® specialty regularly not being met. Hub team members also explained that they had expected an audience of largely physicians and nurse practitioners, whereas the actual program had participants from many different non-physician or non-nursing healthcare professionals. One hub team participant (HCP21, Hub) described their expectations:
“I think that one of the expectations I had around you know continual participations from the participants it has not been met in a way. I know that it does take time away from people’s day to attend the teleECHO clinics and the core competency sessions so although we’ve had good attendance we might not be having regular participants and I’d also hope that there’d be more physicians and nurse practitioners and nurses kind of attending some of the sessions and I find that we do have some of that but a lot of it is also community therapists and perhaps home care providers who are joining so I think my expectations might’ve been a bit high in thinking that everybody would be able to join each week and that we’d be able to hit the target populations but, I think we’re still having good attendance”

Many community participants were also unaware of the different features and components of the Paediatric Project ECHO® program. Some of the features and components participants had not been aware of were: recordings of teleECHO clinics could be accessed through Google Drive; where to access the schedule of topics and that it was released ahead of time; case presentations could be done together with another participant; that participating in the program could be used towards continuing education credits; and some participants were not aware that Spokes were encouraged to submit patient cases to be discussed during teleECHO clinics.

Participants also joined the program for different reasons. One participant (HCP06, Spoke) described two reasons for joining that was common amongst participants:

“One was as a way to enhance, um, connections with both similar sized centers and SickKids, so it seemed like a really good way to personalize those connections you know a face to face, visual, um, and it also contained subjects that are very relevant to my practice that I find interesting. So I participate in [epilepsy], complex care and palliative care.”

Participants often described their reason for participating in the program as pursuing further learning in paediatrics, or in specific paediatric specialties, as well as to connect with other centres.
Time was a challenge for all respondents. Participants found it difficult to schedule in time to participate, or to finish up with patients in time to participate in the program. Many participants explained that if possible, they would have attended more sessions, however busy schedules prevented them from attending more. If given the option to change the scheduling of the program, they believed one-hour long sessions were easier to fit into their schedule, compared to the 1.5 hour long teleECHO clinic sessions that were held at the time of the study. Since the sessions occurred around noon, participants often discussed taking their lunch break at the same time so that they could participate. Some participants discussed the possibility of changing the sessions to run earlier in the morning prior to the start of the work day. One participant (HCP06, Spoke) described their experience as they were in the first year of practicing in their profession:

“[Time]’s become more of a challenge as my schedule has become more busy, at the beginning I’d blocked that time out of my schedule so I wasn’t booking any patients over the ECHO hour, and I’ve been finding more recently, as my day has become busier that I either finishing up with earlier patients are little late and missing the start or needing to fit in more um some urgent patients, overlapping some of the ECHO time. And so the middle of the day is beginning to present a little bit of a challenge... I’m wondering if, the sort of the beginning or end of the day might be a little bit easier – probably the beginning, like the morning.”

Some participants managed the volume of sessions by checking the schedule of sessions and booking time off for sessions that they were specifically interested in or relevant to themselves. Others would review slides or recordings of sessions after they had occurred.

3. **Participants obtained practical information to implement in their institutions, and had an increased awareness of other types of healthcare providers as result of the discussion between the Hub and Spokes.**

Several interview participants described instances in which information they had obtained from the program either through the patient case presentation discussions or didactic presentations had become useful to the clinic or institution they currently worked at. One clinical nurse specialist (HCP03, Spoke) described how information she had learned about strategies for unblocking
feeding tubes had been useful for her to share with other colleagues and had eventually become useful when they were able to use one of the strategies with a patient who had come to their institution.

Another participant (HCP05, Spoke) described some of the information they shared with an administrator at their site:

“Usually there’s one or two pearls I take from each session and so a couple of the pain sessions there were some great ideas, one specific example is that given the idea of putting up a poster in each patient room and helping the parents advocate for topical anesthetic for the kids. And so after the pain session I went to our manager and gave her that website and I think we’re gonna implement that, so it – you know there’s a couple little tools like that, that aren’t necessarily huge practice changes but things that are ideas that I hadn’t heard about that are things that we’re gonna take back and implement in our program.”

This participant also described how this was a benefit of the program to them:

“It’s not possible as a community provider to stay up to date on everything, and so what I’m looking for is – tell me what’s changed, what the standards of care are, tell me what you guys are doing at SickKids, or wherever you’re at, and then help me think through how I can actually do – bring that into my own centre. So we do some of that, and I think doing more of that would be really helpful. Cause we don’t – we don’t always know when what we’re doing is out of date, right we cause you know – we – I’m not in a tertiary level centre all the time”

This sentiment was echoed by other participants, who described how important the program was to them in learning about standards of care and new practices that were not necessarily done in their own institution. Four participants (HCP03, HCP 15, HCP17, HCP18; Spokes) described how they were in the midst of or planning to speak to someone in managerial or administrative roles in their institution about changing a policy, guideline, or practice.

Hub team members described how their perceptions of community practice and non-specialty healthcare providers changed. One hub team member (HCP14, Hub) discussed how one of
takeaways from the program for them was changing their perspective on specialty practice and how they approached new patients:

“I think in the past I think more like, okay, this kid is so specialized I need you to come up to sick kids for treatment to see us specialists. But now ... I am also thinking like there are people in the community, let’s see if we can find someone in the community who’s willing to take this on and who might be a good fit for this person. So sort of just reminding me more about, um, people in the community who might be a good fit for this patient and not defaulting to specialized services. I think sort of yeah, before we obviously, I don’t want to say like an ego, but you think... your centre is the only place [that] can help this kid. And maybe in the past, not a lot of confidence in community providers or they don’t have enough experience. They’ve never seen this before. They’re not interested in seeing these types of kids. They’re not going to be helped by anyone else, but I think through ECHO, just meeting people who are in the community who do want to learn more and who are seeing these types of kids and have the set of skills makes it more top of mind for me to help kids connect with community providers.”

Participants from different health professions described the value they perceived in learning more about what different types of health professionals did to manage these complex patient populations. They often worked independently and as a result would seldom work with other types of healthcare professionals, aside from referring or suggesting a referral to another type of professional. Upon participating in the program, they described having a better understanding of what other professionals did and being able to communicate about that to patients. One physician participant (HCP06, Spokes) described their experience:

“So I recently met a patient with complex regional pain syndrome who [had] already been diagnosed and they had been offered therapy through a chronic pain program but hadn’t followed through on it. And so I had a discussion with her about the value that I thought she may find in beginning to work with a psychologist and physiotherapist. And I framed that discussion in the context of having just participated in the ECHO program...”
A kinesiologist participant (HCP10) described how the program had opened up their understanding of the other types of health care professionals their patients would see. They described how they would now suggest or recommend that their patients seek the help of other types of professionals when a problem or issue outside their scope of practice arose and suggested questions, they should ask their physician about. Other participants (HCP09, HCP15, HCP19, HCP20) described how the program was an opportunity for them to learn about other healthcare professionals, and how it was useful to them in thinking about their patients as a whole. Learning about the other professions also motivated clinicians to conduct a better search for healthcare providers in their communities who would provide a specific service to patients they were seeing at the time or in the future.

4. **Participants valued the relevance of the program to practicing in the community and felt a sense of validation in learning they were practicing similarly to SickKids and other similar-sized centres.**

Many participants found the value of the program in its relevance to community healthcare providers. They explained that very few other continuing education programs were relevant to community practice. They perceived that this relevance came from the discussions during the teleECHO clinics when Spoke participants would discuss how a recommendation could be delivered in their setting. One participant (HCP06, Spoke) described this value:

“So as someone working in the community it’s very valuable to get input of other people who have navigated this problem in the community – because some of the recommendations that they have, I can more readily implement. One of the challenges with of getting only the - hearing from the hub would be that I don’t necessarily I – so for example if they were to say ‘the gold standard for paediatric chronic pain management is a multidisciplinary team and an intensive program’ but if I can’t access that in the community then what’s helpful for me to hear are ways that other people have navigated that, that problem and pieced together different services that are available in order to give the patients a good and beneficial treatment experience.”
Many participants described how they had not necessarily learned from the program, but it had validated or “confirmed” (HCP02, HCP05, HCP06, Spokes) what they felt they already knew. They described part of their motivation in continuing to participate was to ensure they were practicing similarly to similar-sized institutions and with what could be made of their resources. One participant described how they felt about learning that SickKids’ pain clinic used the “3P” model of managing pain:

“Just knowing the 3Ps, like the basics and having that affirmed, that’s part of the way like I felt different [providers] I work with also work and we don’t have it defined in [those terms] but that’s reassuring and that’s good – and that kind of is helpful to have those, those kinds of things clarified like presented in that clear way. If I’m working with a family, if I send them someplace like SickKids, we’ve already talked about that model, so then I think that that’s helpful for patients as well too - and reassured ‘oh everyone’s using that same language’. When you talk about education around pain, you’re talking about a patient with pain, if everyone is kind of saying it in a similar way, then that helps the patient and that helps me the psychology person to kind of maybe talk to a pediatrician who’s working with that child as well.”

These reports of validating and gaining confidence as a result of participating in the program, especially for those who tended to have more knowledge or expertise in the paediatric specialties, demonstrated the concepts of professional identity development in CoPs.

Changes to program & Suggestions for improvement

Participants in this study had a number of suggestions for improving the Paediatric Project ECHO® program. Unanimously, they preferred 1-hour sessions over 1.5 hours as they had an easier time scheduling shorter sessions, however they were still appreciative and encouraging of less frequent longer sessions. Due to many participants signing up for and participating in multiple ECHOs, they suggested reviewing and revising future schedules to ensure less overlap and distributed frequency of the different sessions.
In terms of the program agenda and discussion format, participants from community settings were appreciative of asking for questions or comments from community participants prior to the Hub, and perceived it as a feature that was beneficial. However, participants believed deviation from the format when necessary for specific discussions and relaxing the strict adherence to the format would facilitate the community. The flexibility offered by the program in terms of allowing participants to pick and choose sessions to go to and having multiple ways to call in and no mandatory components, were features participants felt should continue because they had facilitated their experience.

Participants offered suggestions for improving the communication about sessions to participants. Specifically, they suggested providing an option to sign up for a calendar invite for all ECHO sessions, and having a centralized website for obtaining the schedule of topics and sessions. For case presentations, clear and easily accessible information about the different options for presenting such as co-presentations and presenting on behalf of someone were suggested to improve the number of cases submitted to the program. Participants who had submitted and presented a case suggested clear communication about the ease of the process, as fear of the technology was often a deterrent.

In terms of the resources provided, participants suggested that a summary of recommendations from case presentations be sent to all participants. Many participants described issues in utilizing and accessing the resources via Google Drive, which deterred from their experience and prevented them from sharing information with others. A solution for the technical issues related to that was suggested. In terms of technology support during core competency or teleECHO sessions, participants found that supportive and friendly IT staff helped in addressing some of their fear of the technology, and felt it was something which should continue.

In terms of recruitment of participants, healthcare providers from community settings felt that greater advertising and recruitment targeting primary care sites was needed. Participants reported hearing about the program via email or their manager or a member of their team who had received an email about the program via one of the specialty paediatric networks (e.g. Chronic Pain Network, Complex Care Satellite clinics). They suggested targeted emails to administrative and managerial staff at institutions, especially for those who would need to request or notify their
manager regarding permission for participating in the program. They also felt that greater
advertising for the call for submitting case presentations was needed even outside of the program
participants, to attract new participants.

Finally, participants who worked at more specialized clinics (e.g. participants from chronic pain
clinics, Ontario Pediatric Bariatric Network clinics) and participated Paediatric Project ECHO®
suggested that they should be more clearly and effectively engaged in the delivery of the
program. They felt that although the hub was located at SickKids, it was important to
demonstrate the expertise in the different specialties was available in other regions as well.
5 CHAPTER 5: DISCUSSION, IMPLICATIONS AND CONCLUSION

This section will begin by summarizing the key findings of the study and compare and contrast them to related studies on Project ECHO and other videoconferencing continuing education programs. Second, key findings will be discussed in the context of the communities of practice literature. Third, implications for Project ECHO programs and communities of practice theory will be offered. Lastly, strengths and limitations of this work will be discussed and suggestions for future research questions stemming from this work will be provided.

5.1 DISCUSSION OF KEY FINDINGS

The aim of this study was to examine the extent to which a CoP developed in Paediatric Project ECHO from the perspective of healthcare provider participants, as well as the barriers and facilitators to its development. A qualitative description approach was utilized to examine the research questions to provide a comprehensive summary of how a CoP developed in the program as well as barriers and facilitators to its development. It was anticipated that this accessible, detailed summary may be useful for Project ECHO® program administrators and organizers given that the study occurred at the end of the first cycle of two of the specialties. This was seen as an appropriate time to seek feedback from participants in preparation for the upcoming cycle.

Participants reported sharing knowledge with other program participants and with healthcare providers outside of the program, and perceived a sense of community amongst the program participants. Knowledge sharing and their sense of community was facilitated by the format of the teleECHO clinic discussions, the flexibility of the options for participating in the program, collaborating with other clinicians on cases they were struggling with, and the relevance and usefulness of the knowledge gained and shared in the program. Barriers to the program included time, and participants’ different understandings and expectations of the program, compared to the stated aims of Paediatric Project ECHO®. Participants also discussed a number of perceived benefits of the program. They reported greater awareness and understanding of other types of healthcare providers, gaining a sense of validation in seeing that they were practicing similarly to other paediatric centres, and practical information they were able to implement in their institution.
or clinic or bring to someone in a higher level or administrative/leadership position in their institution.

In this study, participants reported feeling welcome and comfortable participating in the program, some participants described the program and its participants as a “community”. They described the format of the teleECHO discussions, where community participants’ questions and comments were solicited prior to the Hub team providing comments as contributing to their sense of feeling that they were actively involved and contributing to the program. The flexibility of options for participating in the program also created a collegial and informal atmosphere for the program, which increased participants’ comfort with participating. Paediatric Project ECHO was also one of the only opportunities participants reported for being able to participate in longitudinal continuing education, interact with different types of healthcare providers and with healthcare providers from institutions outside their own. Finally, the cases which participants presented and the sense of helping one another on difficult cases helped participants to feel connected.

Salemohamed et al (2018) and Carlin et al (2017) conducted one of the only other qualitative studies with Project ECHO participants. Both studies were conducted with ECHO® Ontario Pain participants. In the qualitative description study by Salemohamed et al (2018) with ECHO® Ontario Pain participants, healthcare providers described feeling nervous about presenting cases at the ECHO®, with some feeling negative emotions because they felt they were at a loss as to what to do for their patient and that made it more challenging to present their case. Some also shared that although the program facilitators aimed to ensure a non-judgemental learning environment, they still felt judged after presenting a case. In the case of Paediatric Project ECHO®, participants often described feeling more confident after a case presentation, as the ensuing discussion would reinforce some of the options they had been considering or had been unsure of previously, or because it provided them with useful feedback to put into action. The comfort that participants in Paediatric Project ECHO experienced may be related to the number of years they had been practicing. Generally, they had been practicing for over 10 years which may have allowed them to enter the program and discussions with greater comfort with their own experiences and sharing them with the ECHO program. Previous qualitative studies examining
Project ECHO® programs by Salemohamed et al (2018) and Carlin et al (2017) recruited Spokes as participants in qualitative interviews. Our study is one of the first studies to examine perceptions of the program from both the Spokes and the Hub. Our findings indicated that Hub participants in Paediatric Project ECHO® obtained a greater understanding of how healthcare providers in different settings practiced and may have shifted their perspectives in approaching patients who needed specialty care.

Our findings are similar to those of previous studies that examined knowledge seeking and sharing amongst healthcare providers participating in videoconferencing based continuing education. A study conducted in Ontario, Canada by Gagliardi et al (2007) among physicians participating in a multi-disciplinary videoconferencing-based grand rounds for cancer care examined clinicians’ information seeking and sharing. Participants in that program included community based general surgeons as well as cancer specialists. In their description of the program, Gagliardi et al do not specify roles or hierarchy amongst participants. Participants in their study reported that the program was the only opportunity they had to interact with healthcare providers within their own institution as well as other institutions. They also reported that the collective experience of both surgeons from different hospitals and of the non-surgeon cancer specialists was beneficial in discussing patient cases and generating recommendations. Healthcare providers in our study reported similar perceptions of having very few opportunities to interact with healthcare providers in their own institution as well as other institutions. Healthcare providers in our study also reported similar perceptions of the benefits of Paediatric Project ECHO coming from the participation of a wide range of participants in terms of practice setting (e.g. urban and rural) and profession. In the program examined by Gagliardi et al (2007) and Paediatric Project ECHO, the lack of a designation of teacher and learner hierarchy, and open structure may have facilitated the knowledge creation that occurred. This is in contrast to the ECHO Ontario program, which operates as a cohort format, with participants entering and completing the program at designated times of the year, and a clear teacher and learner hierarchy.

Healthcare providers in our study described differing understanding and expectations of the program. The stated aims of Paediatric Project ECHO® are to increase capacity for clinicians in
the community to care for paediatric patients with complex healthcare needs. The case presentation component is designed to be the main feature of the program, with the aim being that clinicians from community settings can submit a patient case they are finding difficult to manage for discussion in the program. The healthcare provider presents the case and receives support and feedback from participants in Paediatric ECHO®, including the interprofessional team of specialists at the Hub, while the other community participants learn by contributing and listening to the discussion of the case. However, participants in this study believed the aim of the program was to deliver timely and relevant continuing education topics. Other participants believed the aim of the program was to deliver case-based learning, however they were unaware that community participants were supposed to deliver the majority of case presentations. Finally, participants also reported feeling the purpose and aims of the program was unclear. Carlin et al (2017) conducted a qualitative description study with participants from ECHO® Ontario Pain as well. Focus groups were conducted with participants who attended weekend workshops in different locations in Ontario as part of the ECHO® Ontario Pain program. That study examined healthcare providers’ experience in ECHO® sessions, personal takeaways or valued lessons, dissemination of knowledge acquired through ECHO® to non-participating colleagues and to patients, and perceived benefits or drawbacks of the ECHO® model for continuing professional education. Participants in that study also reported feeling confused about what happened “next” as the structure of that program meant that participants would “graduate” from the program after completing specified sessions. Participants in the study by Carlin et al were unsure about what the next step would be for them.

Across all interviews conducted, participants in our study described challenges in fitting the program into their schedule. They reported having busy schedules which prevented them from finding time to participate. Participants in the studies by Salemohamed et al and Carlin et al also reported challenges in scheduling and making time to participate.97,162 Challenges related to time have also been reported in studies of other types of continuing education programs. Participants in all studies suggested shorter session lengths as one of addressing this challenge. Healthcare providers in our study also reported that technology allowed them flexibility to participate from different settings or with different technology capabilities, and the lack of strict attendance and participation requirements made it easier to participate within their own limits. In contrast, the
structure of ECHO® Ontario Pain requires participants to present patient cases and attend a certain number of sessions to be involved in the program.

When discussing their experiences in the program, participants in our study described obtaining practical information from the program to implement at their institution or clinic. New guidelines, greater awareness of different types of healthcare providers, suggestions for doing tasks differently, and advice on changing or starting medications are some examples of knowledge and information that participants described as “takeaways” from the program that they were able to use. In the study by Salemohamed et al (2018), healthcare providers perceived that ECHO Ontario Pain was beneficial in learning more about the various roles of other healthcare providers and how they were helpful in chronic pain management.162 Participants in that study described how this helped them to integrate other healthcare providers, other tools, and resources in the community to improve patient health outcomes in their practice. They also identified that learning standards and procedures that were outside the formal training for their profession were helpful as well, in becoming more aware of their patients’ medications and side effects due to opioids. These findings are aligned with findings of the current study, where healthcare providers described how learning about other professions involved in the management of the different specialty paediatric conditions allowed them to counsel their patients about the benefits of other healthcare providers and to search for providers in the community who could provide specific services. Healthcare providers in our study also provided some insight to why this was helpful to them, as many of them practiced in relative isolation from other professions and often had limited opportunities to work with other types of healthcare providers in an interdisciplinary manner. Salemohamed et al (2018) found participants in ECHO® Ontario Pain perceived improvements in the care they provided for patients they presented as patient cases, the care they provided for other patients in their practice, and the learning and collaborating they engaged in with others at their practice or institution by sharing what they had learned from ECHO®.162 Improvements to patient care were related to how healthcare providers interacted and communicated with their patients, as well as changes to their management of patients with chronic pain. Participants in our study reported sharing information about the program with colleagues in their practice and institution, however they did not share what they had learned in the program in the form of presentations or sessions as the participants in ECHO® Ontario Pain.
Participants in our study also discussed their perceived improvements in patient care, however they discussed these improvements coming from didactic sessions, hearing from different centres and from different professions. Improvements in patient care were often discussed in terms of a change in a policy, procedure or process at their institution as opposed to direct patient care. Similar to participants in the study by Salemohamed et al, participants in our study reported sharing information with other clinicians at their site by creating shared folders of slides, handouts, and other resources they had collected from the program or emailing specific resources to one another.

Participants in our study described gaining a sense of validation from the program by learning they were practicing similarly to SickKids and other similar-sized centres. They described practicing in relative isolation from other institutions and being unaware of whether they were on the “right track”. and valued the relevance of the program to practicing in the community. Participants in the study by Carlin et al described gaining confidence and feeling their practice was affirmed by what they learned in the program. Participants in the current study described a similar benefit of feeling validated that they were practicing similarly to SickKids and other similarly sized centres. One of the suggestions provided by participants in the study by Carlin et al was changing the program structure to devote more time to didactic learning. Participants in our study stated that they perceived equal benefit from case presentations and didactic sessions, however examples of benefits they perceived from the program were often related to didactic presentations. A suggestion for modifying the program from participants in the current study was to select more didactic topics which could be relevant to community practice.

This study extends the literature on Project ECHO® in several ways. Firstly, Paediatric Project ECHO was able to reliably create a non-judgemental and welcome learning environment over the first year. Some of the facilitators to creating this environment was a flexible program structure, a discussion structure that placed value on community participants’ participation, and supportive IT. These strategies have been anecdotally described as important strategies in the model, however this is the first study to demonstrate their importance in developing the community of an ECHO program, and in a CoP. Second, the unique structure of Paediatric Project ECHO® of year-round open registration and participation created challenges for the
program regarding participants’ expectations of the program, while also creating an enjoyable learning environment. Paediatric Project ECHO is one of few ECHO® programs which adopts this type of structure, thus this study provides insight as to how the program and a CoP was implemented in this type of context. Furthermore, examining the CoP theory in the context of this structure demonstrated some of the barriers and facilitators a CoP may face. Third, this study when compared with other qualitative studies of ECHO® programs demonstrated some slight differences in how knowledge is shared and constructed between the different ECHO® programs. Participants in Paediatric Project ECHO® placed value on having a program that emphasized multi-directional learning, which was not reported by ECHO® Ontario Pain participants. In terms of the CoP theory, this provides some insight into power relationships and knowledge creation, suggesting that a non-hierarchical structure may be a facilitator of knowledge creation. Finally, the benefits reported by Paediatric Project ECHO® participants were more frequently at the institution level, whereas most impacts of ECHO programs are often reported at the patient level.

5.2 DISCUSSION OF KEY FINDINGS RELATED TO COMMUNITIES OF PRACTICE

In this section, the study results will be discussed in relation to the CoP concepts described in the review conducted by Li et al (2009). The four concepts they described as being common among all interpretations of CoPs were: knowledge sharing, knowledge creation, social interaction and identity building. Knowledge sharing refers to sharing of relevant information among members of the CoP; knowledge creation refers to the development of new ways to address tasks or problems; social interaction refers to the interaction between members, either formally or informally, with or without the use of communication technologies; and identity building refers to developing one’s professional identity.

Participants in our study reported that knowledge sharing was a benefit and purpose of the program. They perceived the program as a way of sharing knowledge with other healthcare providers across the province. Knowledge sharing was facilitated by the inclusive nature of the program, the interactive technology and discussion format, and developing a sense of community by sharing challenging cases. Previous interpretations of CoPs emphasized the importance of ‘community’ in CoPs, described as the interactions between members that builds relationships
over time and allows members to feel a sense of belonging and commitment to one another (p.34). However, it was unclear how community influenced the functioning of CoPs. Our study offers the explanation that community is a facilitator of the knowledge sharing in CoPs. In contrast to an earlier interpretation offered by Wenger et al (2002), regular participation was not important in developing a sense of community. The perceptions of both those who participated actively and frequently, did not differ from those who participated infrequently. Furthermore, when asked, they did not report their sense of community as being tied to their regular participation in the program. Those who had participated regularly as well as those who participated infrequently did not report that the number of times they participated had a large influence on their sense of community. These findings were similar to those of Friberger and Falkman who conducted a qualitative study examining the collaboration processes and enablers and challenges of a virtual CoP in oral medicine among Swedish dentists. The program in that study had a similar structure to the ECHO® model in that an expert team of specialists led the sessions, and participants submitted cases for presentation, all of which occurred over teleconference. Participants in that study described similar feelings of collegiality from participating in the program. Their sense of collegiality was enabled by the experts who led the program sessions who valued the participation of others and maintained an informal rapport amongst those who participated. Implicit in their description of how the experts in that program worked with those who began with less knowledge in oral medicine was that the experts considered themselves learners as well. A user-friendly IT system which was revised according to participant feedback was another enabler in developing their community.

Knowledge creation was demonstrated by healthcare providers’ responses regarding how the evidence-based practice presented by the Hub team and discussion amongst the Hub and Spokes became practical information they could take back to their centres. Participants’ perspective was that the value and relevance of the program to community practice came from this interaction and discussion between the Hub team and community participants. Knowledge creation can be traced back to an early interpretation of CoPs by Brown & Duguid (1991). In their description, Brown & Duguid discuss canonical and non-canonical practice. Canonical practice refers to written, formalized guidelines and practices, and non-canonical practice refers to “actual” practice, which is derived from individuals’ experiences conducting tasks and identifying what
does and does not work. They argue that CoPs are essential for disseminating and creating this type of tacit knowledge, non-canonical practice which requires the interaction between professionals. In this study, community participants perceived that the Hub team brought the knowledge and information related to specialized guidelines and practice. The community participants brought their expertise in the resource levels and realities of their practice setting and the ensuing discussion turned the evidence-based practice into actionable information they could use in their own practice. Our study demonstrated that the value of CoPs lies in knowledge creation that occurs when professionals are brought together. A review of CoPs in healthcare by Ranmuthugala et al (2011), identified studies which demonstrated improvements in implementing evidence-based practice, through descriptive qualitative studies and quantitative studies reporting on improvements in screening rates, selected indicators or participant self-report. However, no studies were identified which applied knowledge creation concepts to these outcomes. An ethnographic study by Gabbay and Le May examined how healthcare decisions were made in a general practice clinic in the United Kingdom. They found that clinicians would seldom utilize research evidence or guidelines, but instead relied upon what they termed “mindlines”, collectively constructed, tacit knowledge that was the product of the interactions between clinicians, patients, pharmaceutical representatives, and their organizational context. They called this a type of “knowledge in practice”, that was largely created by local “actors” (clinicians, patients), and likened it to Brown and Duguid’s descriptions of CoPs i.e. non-canonical practice. In their conclusions, they discussed the importance of leveraging formal and informal networks to cultivate the creation and dissemination of knowledge in practice. The findings from our study add to their findings as they demonstrate the potential for “knowledge in practice” to occur in geographically distributed CoPs that operate over videoconferencing.

Healthcare providers in our study reported social interaction in the program occurring during program sessions, using the videoconferencing platform. They also reported that the program facilitated email and phone communication outside the program between the Hub and Spokes. Participants also reported that they perceived a non-hierarchical structure was an important aspect of the program structure, as it necessitated the participation from community participants and ensured the sessions remained relevant to them. However, the CoP theory does not address issues of hierarchy in the different interpretations. Indeed, the review conducted by Li et al
(2009) identified that the lack of guidance posed a problem in implementing CoPs in healthcare. In prior interpretations of the CoP theory, Lave and Wenger (1991, 1998) discuss a hierarchy between novices and experts, where novices aim to become experts through gradually participating and becoming more involved in a CoP. This hierarchy is not addressed in later works. Instead, they discuss how a community of practice involving different types of professionals, or professionals with different specializations, could come together to share knowledge and practices relevant to everyone, as well as to ask advice of those who may have different expertise from an individual’s scope of practice. For Spokes in our study, it was important that the learning environment remained non-hierarchical, as it recognized the knowledge the community participants brought to the program as the experts in community practice. For Hub team members, they viewed the program as a way to help other community providers in a collegial environment, they did not perceive it a hierarchy in the relationship.

Identity building in CoPs, refers to developing one’s identity as a professional, and is usually described in the context of apprenticeships or professional training where members of a CoP aim to become experts in the profession.\textsuperscript{166} Participants in our study did not report aims of becoming experts in the paediatric specialty topics. However, they did report a sense of validation in being able to understand how healthcare providers in other regions of Ontario and at SickKids were practicing. They emphasized that the validation they felt was related to reducing some of the professional isolation they felt, as many healthcare providers described practicing in relative isolation from other types of healthcare providers and other providers across the province. In their review, Li et al (2009) found that identity building was mainly relevant to the studies of CoPs in apprenticeship or professional training programs. Our findings demonstrate that members of CoP may develop an identity as a group and in relation to one another as they realize the context in which other healthcare providers practice and understand each other’s’ expertise.

Finally, in reviewing the findings from this study against the Project ECHO® literature on CoP theory, several differences were identified. In the first explanation of the learning theories underlying the ECHO® model, Arora et al discuss situated learning and legitimate peripheral participation, concepts within earlier interpretations of CoPs, as underlying the ECHO® model.\textsuperscript{167} Situated learning refers to learning in the context in which one practices, and legitimate
peripheral participation refers to the process through which novices become experts in their profession. The emphasis in their explanation was on the development of expertise in specific health conditions that are the focus of different ECHO programs, and the learning that would occur through case presentations led by Spoke participants. The findings from our study contrast with the discussion of the CoP concept by Arora et al. Learning occurred through the interaction of different community participants who shared similar practice settings and were able to contribute to discussions of how evidence-based guidelines would be implemented in different settings. Participants in our study sought expertise in the specialty paediatric topics, however, did not discuss motivations of becoming experts in the specialty. Socolovsky et al (2013) conducted a qualitative study examining key learning theories of the ECHO® model utilizing semi-structured interviews with participants in ECHO-Chicago for resistant hypertension. The aims of that study were to determine the extent to which social cognitive theory, situated learning theory, and community of practice theory underlie the ECHO® curriculum and to identify opportunities to more effectively incorporate the key principles of those theories in their program. They utilized directed content analysis and used the key tenets of each theory to sort their data. For the community of practice theory, they utilized the two tenets derived from the work of Vygotsky (1978) who theorized that learning was social and a product of social interactions between peers as well as learners more expert than oneself. The tenets of the theories served as the basis of their semi-structured interview questions. Their findings demonstrated that the theories did underlie the program and that closer adherence to them would improve participants’ experience. Similar to the work of Socolovsky et al, learning was social in the context of Paediatric Project ECHO® and a result of the interactions between other community providers and the hub team. However, the findings from the current study demonstrate the importance of the role of community providers in constructing their learning through discussions with the hub team and other community providers, as well as the importance of an inclusive learning environment. Furthermore, our study demonstrated that learning occurred between healthcare providers from different settings, areas of expertise and different professions.

Examining the CoP theory against the data was challenging due to the vague and contradictory nature of some concepts in the theory. We used the main concepts identified by Li et al to organize our discussion of findings related to the theory. The findings from this study extend the
literature on CoP theory by strengthening the concept of socially constructed “knowledge in practice” or knowledge creation, which was shown to be possible in a geographically distributed community of practice that primarily met virtually. The participants’ perception that the program was non-hierarchical adds to the literature as it demonstrates how power relationships are managed in a virtual community of practice that spans regional and organizational boundaries. Finally, barriers and facilitators of CoPs were identified which may be used to make changes to delivery of other ECHO® programs.

5.3 IMPLICATIONS FOR COMMUNITIES OF PRACTICE

The CoP theory for healthcare settings may benefit from further clarification to delineate two types of CoPs that seem to exist according to previous reviews of the concept. The first type of CoP is those present in apprenticeships and clinical placements where participants aim to develop expertise in their profession and ultimately become experts. The second type is CoPs between practicing professionals from different fields or professions who focus on sharing knowledge and identifying new ways of addressing problems or tasks. Our study examined a CoP of the second type and we found that using the common concepts of CoPs outlined by Li et al was most relevant to our findings. Older interpretations of CoPs were more problematic as they did not address the experience and knowledge of practicing healthcare providers, and the power dynamics between disparate types of knowledge (e.g. expertise in practicing in low-resource settings vs. paediatric specialties). Furthermore, they did not emphasize the importance of knowledge creation as a main purpose of CoPs. Our study demonstrated that, although the Hub team members represent the “experts” in their specialty compared to the Spokes, the Spokes represent the “experts” when it comes to knowledge and understanding of practicing in the community (rural, remote and underserved regions). This non-hierarchical nature was important to participants in this study who described the value they perceived came from the discussion between Hub team members and community providers when discussing how to implement a new guideline or policy in their own practices. Thus, revisions to the CoP definition should include the importance of knowledge creation that occurs as a result of professionals with different types of expertise and experience gathering to share knowledge and discuss problems.
Participants reported that the format and procedures of the program, such as introducing oneself at the beginning of sessions, or muting oneself when not speaking, of ensuring their camera was on if they had one, asking questions prior to providing recommendations during the case presentation discussions, and ensuring community members provided their questions and recommendations before the hub team, were structures that played a large role in organizing the community. Procedures, such as introducing oneself each session, turning on the video camera, and asking for questions and recommendations from community providers first were described by participants as procedures which made it easier to become involved in the program and facilitated their participation. These features are pre-determined and are a part of the Paediatric Project ECHO® format. Our study demonstrated their effectiveness in facilitating knowledge sharing among members of a CoP. Thus, facilitators to CoPs may include reducing barriers to participation and adopting a highly inclusive structure.

5.4 IMPLICATIONS FOR PROJECT ECHO

The findings from this study have several implications for Paediatric Project ECHO® moving forward:

1) Voluntary participation in the program and the ability to join as frequently or infrequently as needed are features which contribute to the development of community and the overall community of practice. Imposing further structure to the program may act as barriers to the CoP.

2) Participants were motivated to join the program due to its focus on paediatric specialty topics. They did not view the four specialties as separate programs, but rather the same program, and did not distinguish their participation in one from another. This may be a result in part of there being limited options for continuing education related to paediatrics for community healthcare providers. When planning the program, this factor is important in planning the timing, frequency and scheduling of sessions.

3) The ECHO® model and earlier interpretations of CoP theory both posit that as a result of participating in Project ECHO®, participants will become experts in the specialty of the ECHO®. Our results indicate that participants did not join the program with the aim of becoming more expert in the specialty, although they perceived changes in their
confidence for managing the specialty conditions. In the case of Paediatric Project ECHO®, becoming an expert may not be an expected long-term outcome of the program.

4) Participants often perceived benefits from the didactic presentations and ensuing discussion. Potential modifications to the program that may be worth exploring would be less frequent case presentations and didactic topics that are tightly aligned with the needs of centres and clinics who participate. Greater communication and more transparent messaging of the program will be important to ensure participants full engagement in the program. The aims of the program may need to be re-examined, as many providers discussed that the main benefit was not the case presentation component alone.

5) Healthcare providers perceived challenges in making time to participate in the program, further incentives for participation should be explored to maintain the program participants in the long term, as well as greater communication and advertising around existing incentives e.g. continuing education credits. Engaging local administrative and managerial staff as “champions” encouraging staff members’ participation and use of the programs as methods of quality improvement may also encourage participation.

6) Although the ECHO® model, as disseminated by the ECHO® Institute, does not specify that participation in all program sessions or presenting a patient case is necessary, the model is modified in different settings. Thus, in certain contexts programs may implement a requirement to present a case as a method of improving participation and engagement with the program. Our findings as related to the CoP theory suggest that implementing these requirements may detract from the community.

7) CoPs are intended to be fluid and ongoing. Using structures such as cycles and graduation may reduce these characteristics and the outputs that can be observed. These types of structures also reinforce the perception of a hierarchy between participants. The ECHO® model needs further clarification of the relationship between the Hub and the Spokes. Currently, the model describes two-way learning, and non-hierarchical structure, and this study was conducted with this assumption. However, this element is not accounted for by the CoP theory and is seldom described in the literature around ECHO®. Programs describe benefits of the program as shared learning, however the
outcomes evaluated are isolated to Spoke participants, and structure of programs reinforce the notion of an expert-learner relationship.

8) The ECHO® model as initially described is intended for Spoke participants to become “experts” in the specialty they participate in and disseminate the knowledge and skills they gain to others. Participants in our study described disseminating information they obtained from our program, however they did not perceive themselves to be experts, nor did they intend to become experts. Participants in other studies related to ECHO® have also reported similar behaviours, although it is unclear whether they perceived themselves to have become “experts” in the specialty. This tenet of the model may require modification or further study, as knowledge sharing appears to occur almost immediately upon joining the program, and participants may not intend to become experts.

9) Our study identified that much of the knowledge sharing and creation involved discussion of didactic topics and how evidence could be implemented in practice. Currently, the model places less emphasis on this component and benefits such as reducing variation in care, which is a stated goal of the ECHO® model are described as deriving from the case presentations. Findings from our study suggest that this benefit can be obtained through the discussion amongst the Spokes and Hub around didactic topics as well. This benefit of the program has not been explored previously and future research may choose to explore in depth how the ECHO® model reduces variation in practice.

5.5 IMPLICATIONS FOR RESEARCH

Our study demonstrated how a CoP developed in the context of Paediatric Project ECHO and barriers and facilitators to its development. In addition, participants in our study reported benefits of the program such as developing ‘local’ knowledge of implementing new guidelines, and exposure to different types of healthcare providers. Previous reviews of CoPs in healthcare have discussed a need for further studies of how CoPs benefit healthcare systems. Thus, future studies may extend upon our findings by examining how Spoke participants in ECHO programs obtain ‘local’ knowledge and implement it in their own practices, and barriers and facilitators to doing so. For this type of research question, case study methodology may be used, and cases may be drawn from other ECHOs in Ontario.
Another point of inquiry may examine the CoP concept in ‘mature’ ECHOs, ECHO programs which have been running for longer than 1 year to assess similarities and differences between an emerging CoP, like Paediatric Project ECHO and a mature one. Qualitative description and case study would be study methodologies to be employed for this research question.

5.6 STRENGTHS

One of our study’s strengths was the results were reviewed and revised using comments from the multidisciplinary supervisory committee. This team-based approach strengthened the data analysis and interpretation by allowing multiple perspectives to be considered. Another strength was the characteristics of the sample of participants recruited for the study, which was representative of the breakdown of professions and practice settings of Paediatric Project ECHO® as a whole. Credibility of the study was ensured by checking all of the transcripts against the audiotapes. I was also immersed in the data collection and analysis phases. I conducted all the interviews, transcribed all the interviews, checked all the interviews against the audiotapes, read and re-read all interviews transcripts, and coded all the interviews. The assumptions and theory utilized were also explicitly described. All methodological decisions made such as the choice of qualitative description as our approach, the conduct of our qualitative content analysis, and the representation of findings were also explained in the methods section. Finally, I explained the ways I exercised reflexivity and the biases or preconceived notions I held at different points in the study and how they may or may not have influenced the research process and the findings.

5.7 LIMITATIONS

One of the main limitations of the current study was the initial reliance on the CoP theory which was broad and vague. In this respect, the main research question of this study was problematic, as the definition and description of a CoP varies widely. The findings in this study were examined against the main concepts of the varied descriptions of a CoP, and the ways in which they aligned or did not align with the data were described.
A second limitation of the study was the short data collection period. Participant recruitment occurred over a period of 6 weeks, which may have prevented further depth of reflection and analysis that could be conducted at the same time. The hallmark of qualitative analysis is that data collection and analysis occur simultaneously and influence one another. In our study, after conducting the first five interviews, having gained a sense of participants’ perceptions of the program, I modified the interview guide to capture more of participants’ experiences in the program and to accommodate the differences in how healthcare providers understood the program.

A third limitation of this study were the temporal challenges of the study. Specifically, participants were recruited after the first year of the Paediatric Project ECHO® project, and it is unknown how long it may take a community of practice to develop, and among new interventions, the first two years can be drastically different from the “true” intervention due to issues in implementation. Participants also joined the program at different time points, and as a result had not spent the same amount of time or sessions in the program.

Finally, a fourth limitation came with the time period when study recruitment occurred. The target audience for Paediatric Project ECHO® from phase 2 onwards are primary care providers across Ontario, however recruitment for this study began just after this shift in audience had begun. Examining the participant profession breakdown eight months since the recruitment period, the makeup of the participants has not changed, thus it is unlikely this issue may have had an influence on the findings. The participant sample was also limited in the number of participants from the Obesity Management ECHO®. This was due to the audience for the first phase of that ECHO® being limited to members of the Ontario Paediatric Bariatric Network (OPBN). The first phase had concluded, and the second phase had been launched when this study had begun. Thus, the number of healthcare providers participating in that specialty overall was limited. Responses from our participants indicated that they found little to no difference between the conduct and organization or experience in the ECHOs.
5.8 CONCLUSIONS

This study aimed to examine the extent to which a CoP developed in Paediatric Project ECHO®, as well as the barriers and facilitators to its development. Evidence for concepts such as the sharing and creation of knowledge, social interaction and identity building were identified. Key barriers and facilitators to the CoP were identified. Facilitators included program format such as flexibility of the program technology and structure, a non-hierarchical discussion structure and developing a sense of community in the program. Barriers to the CoP included participants’ different understandings and expectations of the program aims and purpose, and time. Main benefits of the program came from obtaining practical information to implement, increased awareness of other types of healthcare providers and of how other sites and SickKids practiced.

The significance of our findings is three-fold. Firstly, our findings demonstrated that the Paediatric Project ECHO program structure facilitated knowledge sharing and knowledge creation, which are the two main features of a community of practice. While previous studies on CoPs were only able to demonstrate the concept of knowledge creation in existing, informal CoPs, our study provided evidence that these features could be intentionally created in a formally delivered continuing education program. Furthermore, our study highlighted the importance of knowledge creation to those joining a community of practice.

Secondly, our findings demonstrated that a CoP could influence healthcare practice and performance, when participants take knowledge or skills from the CoP and apply them in their own practice. Futures studies may be conducted to examine how this occurs, and the barriers and facilitators to its implementation.

Third, our findings demonstrated that an important factor in the development of this CoP was ensuring multi-directional learning and acknowledging the different types of expertise and knowledge that participants bring to the program. Individuals involved in formal education and continuing education aiming to create CoPs may incorporate strategies to manage power relationships and reducing hierarchy when implementing a CoP.
Appendix A Semi-Structured Interview Guide

Good morning/afternoon [insert participant name],

Thank you for setting aside the time for this interview. My name is Yalinie and I am a Master’s student at the University of Toronto, working with Dr. Stinson and Dr. Laloo on Paediatric Project ECHO, and I will be conducting your interview today. I wanted to take a moment to discuss the agenda for the interview. I hope to explore three main themes:

1. How and why you got involved in the program
2. Your experiences with the program, and
3. How we can improve the program.

The interview will take about 30 minutes. You do not have to answer any questions you do not want to, and the interview can stop at any time. You may withdraw your consent at any point up until the point of data analysis. In compensation for your time we will send you a $50 gift card.

The interview will remain confidential and your responses will stay anonymous, please speak freely and honestly about your experiences.

For the purposes of research, I would like to record our conversation. Is that okay with you?

[TURN ON RECORDER—With the recorder on, state participant number, and today’s date.]

Do you have any questions before we get started? [Respond to questions].

1. Domain
   1. How did you get involved in Paediatric ECHO?
      *Probe: What influenced your decision to become involved in the program?*
   2. Did you know about Project ECHO before you got involved? What were your initial thoughts?
   3. Once you learned about the program what were your expectations of the program?
      *Probe: For what you would take away from the program, for your experience in the program*
   4. Could you tell me your thoughts on whether the program met your expectations? Why or why not?
      *Probes: expectations for personal learning, expectations for the project itself*
   5. What are your plans for continuing or not continuing to participate in the program? What will influence whether you continue to participate?
   6. How would you describe this program to your colleagues?

2. Practice
   1. Which components of the program were most useful? How did you find them more useful? *Probes: didactic presentation, case-based discussion, advice from peers, online resources, didactic topics, recommendations from facilitators, being able to participate*
in the discussion.

2. Have you applied what you learned from the program to your practice? How have you applied what you learned from Paediatric ECHO to your practice?
   Probes: was this learning based on the TeleECHO clinics, the curriculum, or the boot camps; best practice recommendations, change in how you handled a patient.

3. Is there anything that has changed in your own practice since you became involved in ECHO? What has changed?

4. If you were to tell your colleagues at your practice what you learn in the program what would you tell them?

5. Do you refer to the resources or recordings that are posted online afterwards? If so, what do you usually review? Why? If not, why not?

6. Do you have any suggestions for how we could improve the case-based learning section of the course?

7. Have you ever presented a patient case at the program?
   a. If yes:
      i. What was it like?
      ii. How relevant were the treatment recommendations?

8. How relevant were the [other] presented ECHO cases to your own practice? How relevant were the treatment recommendations to your own practice?

3. Community

1. Participants in other ECHO programs have reported feeling less professionally isolated as a result of the program. Do you feel that Paediatric ECHO had an impact in this area for you? Could you tell me more about that?

2. Are you comfortable participating in the Paediatric ECHO Project? What is working well, and what changes could be made to make you feel more comfortable?
   Probes: Zoom technology, variety of presenters, Hub team, facilitator(s)

3. Do you usually turn your video on during teleECHO clinics? If so, why? If not, why not?

4. What do you think about the session facilitators in the program?

5. What are your interactions with other Hub or Spoke team members like? How would you describe it?

6. What is your relationship with the other participants in the program?
   Probes: (Hub team, other members of your clinic who participate with you, other Spokes)

7. Do you interact with other Spokes and Hub team members outside of the teleECHO clinics? If so, how?

8. What do you think we could do to motivate more clinicians to participate in the discussions in the future?

4. Barriers/Facilitators

1. What do you think about the roll call or the flow clinic that could be changed:
   Probes: Roll call, case presentation, didactic

2. How do you organize your time being involved in the program?

3. How do you feel about the times / days that the ECHO program is offered? Is there enough flexibility to accommodate your schedule?

4. How do you usually participate in the program? By phone, videoconference, chat box etc.? How would you ideally like to participate in the program?
   a. What is it like using Zoom to join teleECHO clinics?
5. [If they participate in other CME programs or ECHO programs] How does this program compare to other continuing education programs that you participate in?
6. Is there anything else that we could do to improve in the program?

That is the end of my questions for you. Is there anything else you would like to mention or tell us about the program?

Thank you, those are all the questions I have.

[TURN OFF RECORDER]

Do you have any questions for us?

Thank you for taking the time to speak with us about your experiences with the Paediatric ECHO program and helping us to improve the program, we really appreciate it. Please contact us if there are any questions you may have after our call.
Appendix B Coding Scheme

- ECHO compared to other CE
- suggestions for program improvement
- Access
- Attendance
- Cases
  - Discussion and recommendations
  - Cases that were delivered
- Core competency sessions
- Didactic presentations
- Expectations of the program
- How did you hear about ECHO
- Information about the program
- Interactions with other participants
- Participating in discussions
- Takeaways
- Technology
  - Videoconferencing
  - Case submission system
  - IT support
  - emails and reminders about the program
- Time
- Topics
- What do you tell others about the program
- Relevant to my practice
- Why did you get involved
- Examples of applying what you “learned”
Appendix C Electronic Consent Form

Research Consent Form for Qualitative Interview
(Paediatric Project ECHO Participant)

**Title of Research Project:**
Evaluation of Paediatric Project ECHO in Ontario for Pain, Bariatric Care, Complex Care, and Palliative Care (Paediatric Project ECHO)

**Investigators:**
**Principal Investigator**
Dr. Jennifer Stinson, SickKids; 416-813-7654 ext.304514

**Co-Investigators**
Dr. Chitra Lalloo, SickKids; 416-813-7654 ext.302332
Dr. Fiona Campbell, SickKids; 416-813-7451 ext.207451
Dr. Eyal Cohen, SickKids; 416-813-7654 ext.202626
Dr. Jill Hamilton, SickKids; 416-813-5115 ext.205115
Dr. Adam Rapoport, SickKids; 416-813-7654 ext.201812

**Research Contacts**
Dr. Chitra Lalloo, Research Lead; 416-813-7654 ext.302332
Annie Jiwan, Clinical Project Coordinator, 416-813-7654 ext.309992
Erinn McCarthy, Clinical Project Coordinator, 416-813-7654 ext.327105
Dr. Adam McKillop, Project Manager, 416-813-7654 ext.309991
Senthoori Sivarajah, Administrative Assistant, 416-813-7654 ext. 309664

**Trainee**
Yalinie Kulandaivelu, Master's Student, University of Toronto

**Purpose of the Research:**
Paediatric Project ECHO (Paediatric ECHO) is a new model of healthcare delivery that offers community-based healthcare providers with the training, mentorship, and support required for them to deliver best-practice care to their patients. This model uses a combination of
videoconferencing, didactic presentations and hands-on workshops to enhance learning and build a supportive community of practice.

Paediatric Project ECHO is adapted from the original Project ECHO model, which was developed in 2003 by Dr. Sanjeev Arora, a hepatologist at the University of New Mexico. The Project ECHO model has been implemented by 112 partner institutions in 21 different countries, and covers more than 55 complex conditions and problems. Currently, there are three (3) successful ECHO replications in Ontario, which include the University Health Network’s Chronic Pain and Rheumatology ECHOs, and the Centre for Addiction and Mental Health’s Mental Health ECHO.

SickKids’ Paediatric Project ECHO focuses on four (4) specialties: paediatric acute and chronic pain, bariatric care, complex care, and palliative care. We would like to learn what participants in Paediatric Project ECHO like and dislike about the model, whether it is feasible to implement, and whether it leads to enhancements in participants’ knowledge, self-efficacy and clinical practice.

Each of the four (4) specialties will offer monthly TeleECHO clinics, which involve a didactic presentation and case-based learning. Additionally, each specialty will have an eight (8) hour core competency curriculum component. The pain specialty will also have a two (2) day in-person boot camp. As a participant in Paediatric Project ECHO, you have the option of attending any combination of these sessions in any or all specialties (see Table 1).

Table 1. Sessions offered by each specialty

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Acute and Chronic Pain</th>
<th>Bariatric Care</th>
<th>Complex Care</th>
<th>Palliative Care</th>
</tr>
</thead>
<tbody>
<tr>
<td>TeleECHO Clinic</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>(90 minutes per</td>
<td>Twice a month</td>
<td>Monthly</td>
<td>Monthly</td>
<td>Monthly</td>
</tr>
<tr>
<td>session)</td>
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<tr>
<td>Core Competency</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Curriculum</td>
<td>(8 hours of content)</td>
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<td>Camp</td>
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<td>(2 day in-person</td>
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<td>Boot Camp)</td>
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Description of the Research:
You are being invited to participate in this study because you are a healthcare professional working who is taking part in Paediatric Project ECHO. Participation in this study is voluntary, and you are able to still participate in Paediatric Project ECHO if you do not participate in this research.
If you agree to participate in this study, we will obtain your demographic information (e.g., age group, gender, race etc.) from the Paediatric Project ECHO registration database for use in this study rather than asking you to re-enter this information. These data will be stored in a secure locked location and will adhere to the SickKids policy as outlined in the confidentiality section of this form. (Please see confidentiality section below).

CHOICE OF ONE-ON-ONE INTERVIEW OR FOCUS GROUP:

The focus group will be with other participants in the Paediatric Project ECHO program. It will be conducted using the ZOOM videoconferencing software or via telephone.

During the interview or focus group, you may be asked questions about:

- Your satisfaction (likes, dislikes) with Paediatric Project ECHO;
- Changes in your comfort level, knowledge, and self-efficacy (confidence) before and after participating in Paediatric Project ECHO;
- Changes in the way you practice and/or changes in the clinical outcomes of your patients; and,
- The ECHO community of practice.

During the individual interview or focus group, you will be video and audio recorded. You will not have to answer any questions that you do not want to, and you will be able to stop the interview at any time. The recordings produced from this study will be stored in a secure, locked location. Only members of the research team will have access to them. Video and/or audio files and transcripts will be stored in a secure locked location and will not be transferred outside of SickKids. Recordings will be destroyed when the study is completed. Participants will be assigned a unique user ID which will be used for identification purposes in video and/or audio recordings and transcripts in order to protect participants’ privacy. The one-on-one interview or focus group will take approximately sixty to ninety (60-90) minutes to complete.

Potential Harms: We know of no harms that taking part in this study could cause you.

Potential Discomforts or Inconvenience: Answering some of the questions may cause some discomfort. You do not have to answer any question that you feel uncomfortable with. A potential inconvenience is the time it takes to complete the study. The one-on-one interview or focus group will take approximately sixty to ninety (90) minutes to complete.

Potential Benefits:

To individual participants: you will not benefit directly from participating in this study.

To society: We hope that Paediatric Project ECHO will be a feasible model to share specialty expertise and improve provider, patient, and health-system level outcomes.
Confidentiality: We will respect your privacy. No information about who you are will be given to anyone or be published without your permission, unless required by law. For example, the law could make us give information about you if a child has been abused, if you have an illness that could spread to others, if you or someone else talks about suicide (killing themselves), or if the court orders us to give them the study papers. The data produced from this study will be stored in a secure, locked location. Only members of the research team (and maybe those individuals described above) will have access to the data. This could include external research team members. Following completion of the research study the data will be kept as long as required then destroyed as required by SickKids policy. Published study results will not reveal your identity. During the focus group interviews, we will remind everyone that the information shared is private and should not be repeated outside the group but we cannot be sure that information about you will be kept private. People in groups may share information with others outside the group.

Reimbursement: Participants will receive Continuing Medical Education (CME) credits for participation in TeleECHO Clinics, Core Competency Curricula and/or Boot Camps. As a thank you for taking part in the qualitative interview, you will be provided a $50 coffee gift card. After the three (3) year demonstration of Paediatric Project ECHO, you will be provided a summary report describing outcomes from the overall project.

Participation: It is your choice whether to take part in this study. You can stop at any time. New information that we get while we are doing this study may affect your decision to take part in this study. If this happens, we will tell you about this new information. And we will ask you again if you still want to be in the study. During this study we may create new tests, new medicines, or other things that may be worth some money. Although we may make money from these findings, we cannot give you any of this money now or in the future because you took part in this study. If you become ill or are harmed because of study participation, we will treat you for free. Your signing this consent form does not interfere with your legal rights in any way. The staff of the study, any people who gave money for the study, or the hospital are still responsible, legally and professionally, for what they do.

Sponsorship: The sponsor of this study is the Ontario Ministry of Health and Long-Term Care.

Conflict of Interest: The research team members have no conflicts of interest to declare.

Consent: By selecting ‘Yes’ below, I agree that:
1) You have explained this study to me. You have answered all my questions.
2) You have explained the possible harms and benefits (if any) of this study.
3) I know what I could do instead of taking part in this study. I understand that I have the right not to take part in the study and the right to stop at any time. My decision about taking part in the study will not affect my participation in Paediatric Project ECHO, or any current or future employment at SickKids.
4) I am free now, and in the future, to ask questions about the study.
5) I understand that no information about who I am (including the tapes) will be given to anyone or be published without first asking my permission.

6) I agree to be video/audio recorded during this study. These video/audio recordings will be used to evaluate whether Paediatric Project ECHO is feasible to implement, and whether it leads to enhancements in participants’ knowledge, self-efficacy and practice.

7) I agree, or consent, to take part in this study.

☐ Yes
☐ No
*must provide value

In addition, I agree or consent for the tape(s) to be used for:

1. Other studies on the same topic ☐
2. Teaching and demonstration at SickKids ☐
3. Teaching and demonstration at meetings outside SickKids ☐
4. Not to be used for anything else ☐

In agreeing to the use of the tape(s) for other purposes, I have been offered a chance to view/hear the tape(s). I also have the right to withdraw my permission for other uses of the tape(s) at any time.

_________________________________  ______________________________________
Name of Participant:_____________________
*must provide value

Date:  ______________________________________
*must provide value

Contacts

If you have any questions about this study, please call Dr. Jennifer Stinson at (416) 813-7654 ext.304514.

If you have questions about your rights as a participant in a study or injuries during study, please call the Research Ethics Manager at 416-813-5718.
Appendix D Paediatric Project ECHO Registration Form

Paediatric project ECHO Registration Form

Thank you for your interest in Paediatric Project ECHO!

We’d like to learn a little more about you, your interest in Paediatric Project ECHO, and your practice.

By completing this form, you consent for your information to be used to better inform and tailor our program to suit your needs. This information will not be shared with other parties. Some of the question fields are not mandatory.

Collected information will be used by the project team for the following purposes:
1. Registration.
2. Program planning to ensure program is being offered to a diverse group of individuals.
3. Program evaluation/research in the future.

Please allocate approximately 5-10 minutes to complete our Registration Form. Please note there are 3 pages for you to complete.

For more information, please visit our website at:

www.sickkids.ca/ProjectECHO/

Part 1: Paediatric Project ECHO
Which Paediatric Project ECHO specialty are you registering for? (check all that apply)
   a. Obesity Management
      Focused on medical weight management and the treatment of obesity.
   b. Complex Care
      Focused on patients who are characterized by high service needs, severe chronic and life-threatening health conditions, functional limitations, and high health care use (Cohen et al, 2011). Complex Care patients vary but may include children with severe congenital or acquired brain injuries, multi-system genetic conditions, extreme prematurity, cancer, or complex congenital heart disease with ongoing developmental sequelae.
   c. Pain
      Focused on patients with acute or chronic pain. Pain is defined as chronic when it lasts more than 3 months (continuous or intermittent) and/or lasts longer than would otherwise be expected.
   d. Palliative Care
      Focused on improving the quality of life of patients and their families facing the problems associated with life-threatening illness, through the prevention and relief of suffering.
   e. None of the above

Why are you interested in participating in Paediatric Project ECHO? (select all that apply):
a. To learn more about paediatric care
b. To gain and exchange knowledge with an interdisciplinary, specialist team
c. To network with colleagues
d. To discuss my patients with specialists
e. To become more comfortable managing complex patients
f. For Continuing Medical Education (CME) credits
g. Other (please specify below)

**Part 2: Demographic Information**

Name: [Enter text]

Organization: [Enter text]

Postal Code (organization): [Enter text]
*To track regional participation

Email address: [Enter text]

Phone Number: [Enter text]

What is your primary profession?
  a. MD Paediatrician
  b. MD (Family Physician)
  c. MD (Specialist) (please specify below)
  d. Physician Assistant
  e. Nurse Practitioner
  f. Registered Nurse
  g. Pharmacist
  h. Psychologist
  i. Social Worker
  j. Occupational Therapist
  k. Physiotherapist
  l. Kinesiologist/Exercise Counsellor
  m. Dietitian
  n. Child Life Specialist
  o. Other (please specify below)

How many years have you practiced (after completing training)?
  a. Less than 1 year
  b. 1-4 years
  c. 5-10 years
  d. Greater than 10 years
  e. Not applicable
Are you a member of any of the following networks/programs? 
(Please select all that apply)
   a. **Ontario Paediatric Bariatric Network (OPBN)**
   b. **Complex Care Kids Ontario (CCKO)**
   c. **Ontario Paediatric Chronic Pain Network** *(Children's Hospital of Eastern Ontario (CHEO), Holland Bloorview Kids Rehabilitation Hospital, London Health Sciences Centre (LHSC), McMaster Children's Hospital, The Hospital for Sick Children)*
   d. **Pain Medicine Residency Programs** *(McMaster University, University of Ottawa, University of Toronto, Western University)*
   e. **Canadian Hospice Palliative Care Association (CHPCA)**
   f. **Hospice Palliative Care Ontario (HPCO)**

What is your age group?
   a. 0-19 years
   b. 20-29 years
   c. 30-39 years
   d. 40-49 years
   e. 50-59 years
   f. 60-69 years
   g. 70-79 years
   h. 80+ years

What is your current gender identity?
   a. Female
   b. Male
   c. Transgender
   d. Different identity (please describe below)
   e. Prefer not to answer

What best describes your race?
   a. Aboriginal (e.g., Inuit, Métis, North American Indian)
   b. Black (e.g., African, Haitian, Jamaican, Somali)
   c. Chinese
   d. Filipino
   e. Japanese
   f. Korean
   g. Latin American (e.g., Mexican, Brazilian)
   h. South Asian (e.g., Indian, Pakistani)
   i. South East Asian (e.g., Thai, Vietnamese)
   j. White (Caucasian)
   k. Other (please specify below)
   l. Prefer not to respond

**Part 3: Practice Characteristics**
Please indicate your primary practice setting:
a. Academic hospital
b. Family Health Team (FHT)
c. Community Health Centre (CHC)
d. Aboriginal Health Access Centre (AHAC)
e. Non-academic hospital
f. Private practice
g. Other (please specify below)
h. Not applicable

If applicable, please indicate your secondary practice setting:
   a. Academic hospital
   b. Family Health Team (FHT)
   c. Community Health Centre (CHC)
   d. Aboriginal Health Access Centre (AHAC)
   e. Non-academic hospital
   f. Private practice
g. Other (please specify below)
h. Not applicable

What LHIN are you a part of? (Select all that apply)
   a. Erie St. Clair
   b. South West
c. Waterloo Wellington
d. Hamilton Niagara Haldimand Brant
e. Central West
f. Mississauga Halton
g. Toronto Central
h. Central
i. Central East
j. South East
k. Champlain
l. North Simcoe Muskoka
m. North East
n. North West
o. I am not sure (please indicate your city/town below)
p. Not applicable

What type of environment do you practice in? (Select all that apply. If more than one, please elaborate under "Other")
   a. Remote
      (defined as areas without year-round road access, or which rely on a third party such as an airplane or ferry for transportation to a larger centre)
   b. Rural
      (defined as areas with a population of less than 30,000 that are more than 30 minutes away from a community with a population of more than 30,000)
c. **Suburban/Urban**
   (defined as areas with populations over 30,000)

d. **Other** (please specify below)

Approximately how many children (aged 0-18) are registered as patients in your own practice right now?

[Enter text]
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