EVALUATION OF PROJECT ECHO:
ASTHMA SELF-MANAGEMENT EDUCATION SERIES

Comprehensive Asthma Control Through Evidence-based Strategic and Public Health – Healthcare Collaboration Cooperative Agreement (2014-2019)

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CONTENTS

INTRODUCTION

Asthma in Maine

One in eight Maine adults has current asthma. Maine has some of the highest adult asthma prevalence rates in the U.S. In 2016, Maine had the highest adult prevalence of current asthma (12.2%) and 3rd highest adult prevalence of lifetime asthma (16.7%) in the U.S. (National Center for Environmental Health, 2016 Adult Asthma Prevalence Tables). Adult females are more likely to have current asthma than adult males; one in seven adult Maine women has current asthma (14.9%; the third highest rate in the country) and one in eleven adult Maine males (9.4%; the highest rate among males in the country). The overall current prevalence rate in the years 2014-2016 was 11.7% among Maine adults; the range among counties was 8.2% to 15.4% with the highest rates among adults in Somerset, Androscoggin, and Penobscot counties (2019 Maine Shared Community Health Needs Assessment). Higher current asthma prevalence was experienced among adults identifying as more than one race (18.9%) or American Indian or Alaskan Native (16.5%), adults with less than a high school diploma (20.9%), with household incomes of less than $15,000 (22.9%), or insured through Medicaid (21.6%)

Maine's child asthma prevalence rates are similar to those of the U.S.; in 2016, Maine ranked 13th in lifetime child asthma prevalence (13.3%) and 21st in current asthma prevalence (7.4%) (National Center for Environmental Health, 2016 Child Asthma Prevalence Tables). Boys are more likely to have current asthma than girls; one in 10 Maine boys has current asthma (10.5%) and one in 12 Maine girls (7.2%). Maine children living in Aroostook County (15.3%), children with low household incomes (16.2%), children age 12 and older (12.4%), and children identifying as more than one race (14.1%) or black or African American (12.9%) are more likely to report current asthma.

Asthma is a serious health and economic concern in Maine. Each year, asthma results in roughly 5,250 emergency department (ED) visits, 450 hospitalizations, and 13 deaths among Mainers. Three of five Maine adults with current asthma (60%) and one in three Maine children with asthma (36%) have asthma that is not well controlled (Maine Asthma Call-Back Survey, Adults 2016, Child 2012-2014). Few Maine adults and children with active or current asthma report taking self-management classes (10.8% and 14.8%, respectively) and the percentage of adults and children who report having an asthma action plan remains low (33.1% and 69.6%, respectively). Health risk behaviors such as smoking remain high, as 22.6% of Maine adults with current asthma are current smokers, compared to 17.2% of adults without current asthma. Nearly one five adult males with current asthma continue to smoke. In the past year, roughly one in three (36.5%) Maine adults with current asthma quit for 1 day or more (BRFSS, 2016-2017).

Annually in Maine, asthma results in an estimated 78,605 lost work days and $14.3 million in absenteeism costs as well as $173 million in direct medical costs ($2,140 per treated Mainer) (Nurmagambetov, Tursynbek, CDC/ONDIEH/NCEH, 2008-2012 Maine Data). Nearly half of lost work days due to asthma and one-third of asthma absenteeism costs are attributable to a parent missing work when a child misses school due to asthma. More than two in five (42.8%) children with current asthma missed school or daycare in the past year due to their asthma (2012-2014 ACBS). There are significant

differences in asthma ED rates across counties in the state and by sex and age. The overall age-adjusted rate for the state in 2016 was 45.1 per 10,000, among adults the ED rate was 41.5 and children 55.2. The highest rates were experienced by boys (66.4 per 10,000), children ages 0-4 (87.1), young adults ages 18-29, and among residents of Washington (74.4) and Aroostook (70.1) counties. The overall age-adjusted rate for asthma hospitalizations in 2016 was 3.6 per 10,000; among adults the rate was 2.7 and children 6.1, with the highest rates seen among children ages 0-4 (12.1) and among residents of Androscoggin (7.3) and Washington (6.7) counties. Mortality rates in Maine (9.4 per 1,000,000 2008-2017) are similar to the U.S. (10.2 per 1,000,000) and continue to be higher among women than men (12.5 vs. 6.1 per 1,000,000).

Asthma Self-Management Education

Asthma can be controlled and managed with proper intervention and treatment (American Lung Association, 2019). The Community Preventive Services Task Force recommends home-based interventions for children and teens with asthma (The Community Guide, 2013). According to a review of 23 studies, there is strong evidence indicating that such interventions have been associated with reductions in symptomatic days, school absenteeism, and improved quality of life for children and teens (Crocker, et al., 2011).

Asthma self-management education should be administered by knowledgeable, competent professionals utilizing evidence-based information and prioritizing patient comprehension (Cataletto, et al., 2012). It is suggested that all health care disciplines (e.g., physician, physician assistant, nurse practitioner, nurse, pharmacist, health educator, respiratory therapist, social worker, and trained lay volunteer) receive training on facilitating asthma self-management education with persons with asthma and/or their caregivers (Wagner, 2000).

While medical providers are aware that prevention and self-management are important elements in reducing the burden and costs of chronic diseases, they have limited capacity to provide this service (Kottke, Brekke, & Solberg, 1993). This has resulted in the increased use of healthcare extenders as part of patient care teams (Wagner, 2000).

Healthcare Extenders and Asthma Self-Management Education

Healthcare extenders are non-physician healthcare professionals who help clients take actions to prevent disease and manage health (National Association of Chronic Disease Directors, 2019). Healthcare extenders include a range of professions such as community health workers, community paramedics, patient navigators, social workers, registered dieticians, and medical assistants (ibid). The primary role of healthcare extenders is to "… work closely with patients and providers to control chronic illness [such as asthma] through education and counseling, communication with providers, and, in some cases, medication titration" (ibid).

Healthcare extenders can assist patients in self-management education by bridging gaps between patients, communities, and health systems. They provide culturally appropriate and accessible health

education and information, ensure that people get the services they need, provide informal counseling and social support, advocate for individuals and communities, and provide direct services such as basic first aid and health screening test administration (National Center for Chronic Disease Prevention and Health Promotion, 2015).

The inclusion of healthcare extenders in asthma self-management education has proven effective. In a randomized control trial, compared to clinic-based education alone, adding education delivered by in-home community health workers resulted in a significant increase in symptom-free days and a decrease in emergency healthcare utilization (Krieger, Takaro, Song, Beaudet, & Edwards, 2009). Caregivers who received in-home education from a community health worker also noted improved trigger reduction compared to those who only received clinic-based education (ibid). In a study of Medicaid-enrolled children, participants in a community health worker asthma home visit program experienced greater improvements in symptom-free days and fewer emergent health events, compared to the control group (Campbell et al., 2015). Similarly, caregivers experienced improvements in self-reported quality of life (Ibid).

Project ECHO

While healthcare extenders are perfectly situated and motivated to help their clients better self-manage their asthma, they are often limited by their content knowledge and experience navigating complex systems such as healthcare, financial assistance, housing, and transportation. In an ideal world, a medical practioner, pharmacist, nurse, community health worker, community paramedic, and certified asthma educator would work as a team to provide comprehensive care for the whole person. In reality, care is often limited to brief, siloed engagements between the patient and each professional.

The Project ECHO platform provides the opportunity to bring all these professionals together in a supportive, respectful manner where everyone is a teacher and a learner.

Project ECHO (Extension for Community Healthcare Outcomes) is a telehealth educational methodology that bridges knowledge gaps between groups of practitioners focused on common, complex, and urgent conditions. Developed in 2003 at the University of New Mexico, the classic ECHO model engaged primary care providers with a multidisciplinary team of specialists to build capacity and confidence and improve the quality of local community care. Evidence shows care provided by ECHO participants is comparable and, in some cases, superior to, care provided at academic medical centers. Specialty referrals increase and wait times are reduced, for example. In recent years ECHO has expanded beyond healthcare. Described as an 'all teach, all learn' model, ECHO creates learning loops that join participants and experts, creating and sustaining communities of practice (University of New Mexico, 2019).

The ECHO model uses case-based learning and videoconferencing to connect experts with implementers (such as educators, providers) and exponentially increases workforce capacity to provide best-practice care and reduce health disparities.

The ECHO model has four foundational principles:

1. Use technology to leverage scarce resources.
2. Share "best practices" to reduce disparities.
3. Apply case-based learning to master complexity.
4. Evaluate and monitor outcomes via web-based database.

Maine CDC Asthma Program

Maine CDC has provided leadership in developing and implementing an Asthma In-Home Self-Management Education Program. In 2018, the Project ECHO: In-Home Asthma Self-Management Education series was developed as a step toward whole-person care. It provided the platform for professionals to come together in a supportive, respectful manner where everyone is a teacher and a learner.

As noted above, healthcare extenders assist clients in self-management education by creating bridges between clients and needed services. The Project ECHO: In-Home Asthma Self-Management Education Program adds the element of the in-home meeting which entrusts the healthcare extender with the client's unique life story. Thereby the often complex and interconnected social determinants of health affecting that story are illuminated where they might otherwise remain unrecognized. And by providing healthcare extenders with both asthma education and information about navigating healthcare, financial, housing, and transportation systems, the program assists in effectively addressing the whole person.

Evaluation

Traditionally, training programs have been assessed using pre-post survey designs that focus on overall satisfaction and short-term changes in knowledge. The "So What? Challenge" continues to baffle researchers and evaluators alike: What impact did the change in knowledge have on the participants' practice, their clients' outcomes, and overall community health?

The following report summarizes the evaluation of the Project ECHO: Asthma Self-Management Education Series using an innovative approach that strives to move beyond changes in knowledge and toward changes in practices and client outcomes.

PROJECT ECHO: ASTHMA SELF-MANAGEMENT EDUCATION SERIES

The Project ECHO: Asthma Self-Management Education Series was developed to support the role of healthcare extenders delivering in-home asthma self-management education to adults and children in Maine.

Implementation of the Project ECHO model is based on the belief that people closest to the problem are closest to the solution but often furthest away from the power to implement change. Accordingly, the series was developed with community health workers and community paramedics who were experienced in providing asthma self-management education in Maine. Their role also included determining the learning objectives and identifying local faculty members.

Project ECHO Roles

There are three primary roles within the Project ECHO series:

1. Faculty members who provide technical expertise and present the educational component of a session.
2. Participants who are actively engaged in providing direct services to clients and who share their experiences and present challenging cases for peer and faculty recommendations.
3. Facilitators who coordinate and document the process. Facilitators were also available to the participants for support in developing the case presentations.

Appendix A provides a list of all faculty, participants, and facilitators.

Faculty. Faculty were identified as local professionals with areas of expertise that align with the objectives. The faculty included a primary care clinician, the Nursing Department Chair from a local university, a Certified Asthma Educator, a community pharmacist, and leaders from both community health worker and community paramedicine programs.

Participants. Community Health Workers and Community Paramedics self-selected to participate in the series.

Prior to participating in the Project ECHO series, all participants were required to complete a structured training and be actively engaged with clients implementing the Maine In-Home Asthma Program. Depending on the professional scope of practice, participants completed one of the following in-person trainings.

Asthma Education for the Community Health Worker is a training curriculum developed by the Association of Asthma Educators. It consists of 5 modules, each between 90 and 120 minutes long. Modules are interactive and cover basic information about asthma, its triggers and environmental control, medications, medication delivery devices, and assessment and monitoring.

Asthma Self-Management Education Training for the EMS Professional. In the absence of an existing curriculum for community paramedics and allied professionals, the United Ambulance Paramedicine Program engaged medical and curriculum experts to develop a training program. The curriculum focused on pathophysiology of asthma, pharmacology, home assessments, and asthma action plans.

Facilitators. Staff at Partnerships For Health, who were not involved in the evaluation activities, provided logistical support, facilitation, documentation, coordination with Maine CDC, and overall project management.

Project ECHO: In-Home Asthma Self-Education Curriculum

The curriculum was based on three years' experience implementing the In-Home Asthma Program. Its aims were to increase cultural competencies, use of best practices in conducting asthma home environmental assessments, use of Asthma Action Plans, and awareness of local resources and supports to help people living with asthma. The importance of working with and supporting a diverse population (including immigrants and people living in rural areas) as well as community sources of tangible and social supports, were essential educational components.

In 2019, *Project ECHO: In-Home Asthma Self Education* was implemented. The series consisted of six sessions and focused on the following objectives:

- Increase knowledge of asthma guidelines and the role of self-management education
- Increase knowledge and confidence in conducting asthma home assessments
- Increase comfort with and confidence in supporting client asthma medication adherence
- Increase capacity to support Asthma Action Plans for children and adults
- Increase cultural competency
- Increase knowledge and use of best practices when implementing asthma self-management education visits with diverse populations
- Increase knowledge of and access to local resources to help meet client needs

The objectives formed the foundation of the educational component of each session (see Appendix B for a summary by session).

ECHO Sessions

The series took place over eight months (December 2018 – July 2019). It began with participant and faculty orientation that included the fundamentals of Project ECHO, videoconferencing basics, an overview of educational goals and learning objectives, and a dry-run mock ECHO. Thereafter a series of six virtual learning sessions (called ECHO sessions) were offered once a month.

The ECHO sessions were held once a month for 90 minutes. Each session began with a didactic learning experience. This was followed by a case presentation by one of the educators (community paramedic or community health worker). Following the case presentation, participants and faculty were given the

opportunity to ask clarifying questions before discussing case recommendations. After clarifying questions were addressed, faculty provided recommendations based on their individual expertise.

Session 1. National Asthma Guidelines and Community Resources to Address Triggers in the Home. The first Project ECHO session occurred on February 27, 2019. The physician faculty member presented the didactic component focusing on the National Asthma Guidelines. The case, presented by a community paramedic, detailed a child living with asthma who had strong support from a single mother. The primary question focused on identifying no-cost community resources to address the findings from a home environment assessment. Discussion themes included:

- Supports available to the child and family
- Medication adherence
- Appropriate medication use
- Possible resources and supports from the child's primary care provider, school, and community
- Tips and tricks to help address allergens and possible asthma triggers

Session 2. Asthma Self-Management Education and the Relationship between Asthma and Obesity. The second Project ECHO session occurred on March 27, 2019. The community paramedicine faculty member delivered an educational component focusing on asthma self-management education and detailing the In-Home Asthma Education Program. A community health worker presented the case of a 15-year-old child diagnosed with asthma at 1 year old. Session participants discussed the relationship between obesity and asthma and provided recommendations for addressing obesity in this case. Discussion themes included:

- The relationship between obesity and asthma
- Guidance to determine if the child had exercise-induced asthma
- Recommendations on medications and medication use
- Strategies to address childhood obesity
- Nutritional, dietary, and physical activity resources were identified that could potentially be available through the school, health care provider, or community

Session 3. Home Environmental Assessments and the Relationship Between Depression and Asthma. The third Project ECHO session occurred on April 24, 2019. The educational component was facilitated by a national expert from US CDC and focused on the Asthma Home Environment Checklist developed by US CDC, EPA, and HUD. A community health worker presented the case of an immigrant 47-year-old male with limited English proficiency. He presented with asthma and multiple physical and mental health concerns. In addition, he had limited social-economic resources and lived in substandard, subsidized housing. Discussion themes included:

- The connection between asthma symptomology and the client's mental health diagnoses (depression and/or anxiety)
- Recommendations to alleviate (where possible) or reduce effects of environmental triggers
- Setting goals with the client, including reduction of tobacco use
- Recommendation that the client use a peak flow meter to reduce anxiety about use and timing of asthma medications

- Problem solving including how the community health worker could contact the building manager or landlord to broach pesticide use, kitchen cleanliness, and air flow issues
- Community health worker self-care to avoid burn-out

Session 4. Asthma Medication and the Relationship between Post-Traumatic Stress Disorder and Asthma. The fourth Project ECHO session occurred on May 22, 2019. The educational presentation was delivered by the pharmacist on faculty. A community health worker presented a case concerning a 49-year-old woman with otherwise good health, whose asthma triggers included cigarette smoke and strong perfume odors. While she was aware of the environmental triggers, the community health worker was unsure if her post-traumatic stress disorder (PTSD) could be a trigger as well. Discussion themes included:

- How anxiety can appear as an asthma attack
- Interaction between medications used to treat PTSD and asthma medication
- Relaxation methods such as joining a yoga group and using breathing techniques
- Recommendation for mental health counseling to address PTSD
- Recommendation that the client use a peak flow meter
- Recommendation that the community health worker accompany the client to healthcare appointments, to strengthen the client's support system and to address language and cultural barriers

Session 5. Asthma Action Plans and Follow-up Client from Session 3. The fifth Project ECHO session occurred on July 24, 2019. The Certified Asthma Educator on faculty presented on the importance of an Asthma Action Plan as a physical reminder and guidance tool to strengthen clients' confidence in their asthma self-management. A community health worker re-introduced the client from Session 3 and provided updates on his health and living environment. Following the recommendations from Session 3, the building manager had been contacted and agreed to work with the client and community health worker to address some of the environmental triggers (such as pesticides). The client had been diagnosed with cognitive disorders which impeded going to appointments and socializing. Discussion themes included:

- The stress of the immigration/citizenship process and its impact on mental health and wellbeing
- Social isolation and the importance of helping clients build a support system
- Recommendation that the inclusion of a social worker who could help the client develop ways to reduce anxiety during the citizenship process

Session 6. Health Disparities and Clients with High Utilization of Health Care. The final Project ECHO session occurred on June 26, 2019. The academic on faculty presented on health disparities and the interconnectedness of health and culture. A community paramedic presented a case of a 39-year-old woman, diagnosed with asthma at the age of 18. The client had a deep fascination with the medical field, and as a result, she was overly involved in her care. She was diligent about doctor/specialist appointments, loved to be involved in the community, and participated in workshops and support groups. Despite a high use of health care engagement, the client's asthma remained uncontrolled. Discussion themes included:

- Relationship between obesity and asthma
- The importance of viewing the care of clients systematically so that different agencies can work together to coordinate care
- Recommendations focused on positive lifestyle changes such as weight loss and exercise
- Providing a different experience of health care engagement for the client. For example, the client could be encouraged to exercise at a hospital fitness center. This setting would maximize her potential to continue with exercise, as it combined her comfort in the medical setting with her need to socialize.
- A life or health coach was also recommended as another tier of support and social interaction

EVALUATION METHODOLOGY

Evaluation Frameworks

The evaluation was guided by several frameworks including the U.S. CDC Framework for Program Evaluation, Moore's Framework for Assessing Learners and Evaluating Instructional Activities, and Patton's Utilization-Focused Evaluation. The US CDC framework focuses on practical and ongoing evaluation which is inclusive of all program stakeholders. This framework employs a holistic approach and encourages the use of evaluation in all programmatic operations.

Moore's framework is generally characterized by its quantifiable seven levels of outcome data. This framework is designed to help program evaluators and implementers integrate planning and assessment activities throughout learning activities. Levels are arranged by complexity, starting with participation and ending with community health.

Traditionally used to evaluate continuing medical education, Moore's Seven-Level Outcomes Model measures participation, satisfaction, declarative knowledge, procedural knowledge, competence, performance, patient health, and community health. Using Moore's framework, this evaluation not only focused on changes in knowledge, but also the impact of the training on healthcare extenders' practice. The framework guided the evaluation through the measurement of knowledge, competence, and performance.

Lastly, Patton's utilization-focused evaluation emphasizes utility to the primary intended users and is built upon the idea that the usefulness of an evaluation is a hallmark of its quality. Further, evaluation activities should be conducted to maximize the utilization of findings to inform decision-making and improve performance.

Study Design

The evaluation followed a prospective mixed-methods design with quantitative priority and was guided by the following questions:

1. To what extent did the trainings result in participants' increased knowledge and skills regarding asthma self-management?
    a. The degree to which participants state what the educational activity intended them to know (i.e. declarative knowledge such as describing the role of an Asthma Action Plan)
    b. The degree to which participants state how to do what the educational activity intended them to know how to do (i.e. procedural knowledge such as correct devise use, home assessment)

2. To what extent did the training improve the quality of services provided to persons with asthma?

Tools and Instruments

Multiple instruments and supporting documentation were used to answer the evaluation questions. Tools were developed by the Evaluation Team. Quantitative tools (e.g. surveys) were reviewed for readability and cultural appropriateness by the Maine CDC, Maine Access Immigrant Network, public health experts, and health literacy experts. In addition, tools were tested *in situ,* while implemented directly with participants. Tools include the following:

- *Baseline Asthma Survey*. Baseline surveys assessed participants' declarative and procedural knowledge prior to participation in the Non-Physician Training Project.

- *Post Session Reflections Survey.* A brief survey delivered after each session to capture immediate session feedback.

- *Case Presentations and Session Notes*. Details of the case presented by the healthcare extender were summarized in the case presentation template. The client-specific recommendations and additional resources identified during the session were documented in the Session Notes template.

- *Participant Post-Training Survey.* The survey repeated many of the questions aimed at assessing declarative and procedural knowledge. In addition, it included questions about self-reported competence and intent to change.

- *Faculty Focus Group discussion.* Semi-structured discussion aimed at gathering faculty's reflections on Project ECHO series, including successes, challenges, unintended consequences, and the development of a community of practice.

- *Asthma Self-Management Client Outcomes Database.* Clients whose cases were presented during the Project ECHO series were engaged in the Maine In-Home Asthma Education Program and had consented to participate in the evaluation. The Database consists of all demographic, baseline, and health outcomes.

Data Collection

All faculty and participants were invited to participate in the evaluation activities. Table 1 summarizes when each tool/instrument was implemented and who was asked to complete it.

Table 1: Project ECHO Tools and Instruments

TOOL/INSTRUMENT	RESPONDENTS	PROJECT ECHO		
		Time 1 (prior)	Time 2 (during)	Time 3 (after)
Baseline Asthma Survey	Participants	X		
Post Session Reflections Survey	Participants and Faculty		X	
Case Presentations and Session Notes	Participants and Faculty		X	
Participant Post-Training Survey	Participants			X
Faculty Focus Group Discussion	Faculty			X
Asthma Self-Management Client Outcomes Database	Clients	X	X	X

Data Analysis and Interpretation

Quantitative and qualitative analysis were used to quantify changes and provide narratives from the participants' experiences. No personal health information from cases or electronic medical records were released. Additionally, no personal information of Project ECHO: In-Home Asthma Self-Education participants was released. Data were aggregated to protect participants' identities.

Data analysis focused on answering the evaluation questions within Moore's framework. This was achieved primarily by looking at changes between two time periods: before and after Project ECHO.

EFFICACY OF PROJECT ECHO: ASTHMA SELF-MANAGEMENT EDUCATION SERIES

Participation in Project ECHO Series

A total of 7 participants, 6 faculty members, and 3 facilitators participated in most sessions. In addition, observers were invited to sit in on sessions to increase their understanding of asthma self-management education and/or the use of Project ECHO as a platform. Table 2 summarizes participation by session and role. Lower participation in Session 5 and 6 was due, in part, to religious holidays that were observed by many of the participants.

Table 2: Project ECHO Participation by Session and Role

SESSION	FACULTY (N=6)	PARTICIPANTS (N=7)
Session 1	100.0%	100.0%
Session 2	100.0%	100.0%
Session 3	100.0%	85.7%
Session 4	83.3%	100.0%
Session 5	100.0%	85.7%
Session 6	100.0%	71.4%

Satisfaction with Project ECHO Series

Motivations for Participating. Participants were motivated by the opportunity to collaborate and share experiences so they might gain knowledge and improve the quality of service provided to their clients.

> *"[I registered for Project ECHO] to learn more from other providers and other health professionals to better serve our asthmatic clients." – survey respondent*

> *"The opportunity to collaborate with a care team [motivated me to participate in Project ECHO.]" – survey respondent*

Expectations. Participants expected bi-directional learning where they would share their experiences and gain knowledge from their peers and faculty. One participant expressed the importance of educating providers on the value of community health workers. These expectations align with the Project ECHO vision of *all teach, all learn*.

> *"[Participating in Project ECHO will] give me a chance to ask the faculty [questions] and get their feedback on how to better serve the clients" – survey respondent*

> *"[Being able to] share our experiences and listen to other experts will lead to better health results [for the clients]" – survey respondent*

Satisfaction. Both faculty and participants reported that the sessions were engaging, met their expectations, and that presentations increased their knowledge of asthma and asthma self-management education.

Participants rated Session 4 (asthma pharmacology and the relationship between PTSD and asthma) as the most engaging and reflected that both the educational component and case presentations increased their knowledge and would inform their future work with clients (see Table 3).

Table 3: Participants overall rating of each session

SESSION	EDUCATIONAL COMPONENT		CASE PRESENTATION	
	Increased knowledge	Impact future work	Increased knowledge	Impact future work
1. National Asthma Guidelines, and Community Resources to Address Triggers in the Home	Not assessed			
2. Asthma Self-Management Education and the Relationship between Asthma and Obesity				
3. Home Environmental Assessments and the Relationship Between Depression and Asthma.	100%	100%	100%	100%
4. Asthma Pharmacology and the Relationship between Post-Traumatic Stress Disorder and Asthma	100%	100%	100%	100%
5. Asthma Action Plans and Follow-up Client from Session 3	100%	100%	100%	100%
6. Health Disparities and Clients with High Utilization of Health Care	100%	100%	100%	100%

Faculty rated Session 6 (health disparities and clients with high utilization of health care) as the most engaging. Most faculty do not provide direct services to people with asthma or their caregivers. It is therefore unsurprising that while their knowledge increased, the impact of the Project ECHO series on their future work was limited (see Table 4).

Faculty noted the complexity of the case presentations and the need to discuss comorbidities and their interactions with asthma.

> *"I think we all noticed that as we jumped into some of those case presentations there were a lot of instances where it was questions like will this disease state affect my patient's asthma. Or will this look like my patient having an asthma attack. Things like that…It was just case in point that they all kind of intermix and intertwine and it's hard to just talk about one disease state." – faculty focus group participant*

Table 4: Faculty overall rating of each session

SESSION	EDUCATIONAL COMPONENT		CASE PRESENTATION	
	Increased knowledge	Impact future work	Increased knowledge	Impact future work
1. National Asthma Guidelines, and Community Resources to Address Triggers in the Home	Not assessed			
2. Asthma Self-Management Education and the Relationship between Asthma and Obesity				
3. Home Environmental Assessments and the Relationship Between Depression and Asthma.	100%	66.7%	75%	50%
4. Asthma Pharmacology and the Relationship between Post-Traumatic Stress Disorder and Asthma	66.7%	66.7%	66.7%	100%
5. Asthma Action Plans and Follow-up Client from Session 3	66.7%	66.7%	66.7%	66.7%
6. Health Disparities and Clients with High Utilization of Health Care	66.7%	100%	66.7%	66.7%

Changes in Participants' Knowledge

The extent to which the Project ECHO series increased participants' knowledge

Participants showed a high level of knowledge about asthma physiology, triggers and irritants, medication, and medication delivery devices. These are summarized in Table 5. Accordingly, while there was an overall increase in the group's level of declarative knowledge, it was not substantial.

Table 5: Self-reported Asthma Knowledge (N=7)

STATEMENT [1]	CORRECT ANSWER		CHANGE
Physiological Aspects of Asthma	Pre (N=7)	Post (N=7)	% Change
Medical providers use the National Asthma Guidelines when treating and diagnosing asthma	71.4%	83.3%	+ 16.7%
The goal of asthma treatment is not to cure asthma	85.7%	100.0%	+ 16.7%
Asthma treatment can reverse an airway obstruction	85.7%	100.0%	+ 16.7%
During normal breathing, air flows through unobstructed airways to bring oxygen to the lungs	83.3%	100.0%	+ 20.1%
Asthma Triggers and Irritants			
An asthma trigger can be either an allergen or an irritant	100.0%	100.0%	No change
An asthma trigger causes the airway to become smaller, making it difficult to breathe	100.0%	100.0%	No change
Exposure to dust mites in the home can be reduced	85.7%	100.0%	+ 16.7%
Asthma Medication			
Long-term controller medications reduce the swelling in the airways	100.0%	100.0%	No change
Quick-reliever medications affect the airways	85.7%	100.0%	+ 16.7%
In asthma, the benefit of inhaled corticosteroids outweighs the risks of the side effects	71.4%	85.7%	+ 20.0%
Albuterol is a quick reliever medication for asthma	85.7%	100.0%	+ 16.7%
Medication Delivery Devices			
A nebulizer does not consist of a metered dose of inhaler and spacer	28.6%	42.9%	+ 50.0%
Nebulizers require proper cleaning between uses	100.0%	85.7%	- 14.3%
Dry Powder Inhalers (DPIs) must be stored in a cool and dry location to prevent clogging	85.7%	100.0%	+ 16.7%
A spacer slows down the medicine to allow you to inhale more medication into the airways and leave less on the throat and mouth	100.0%	85.7%	- 14.3%

[1] All statements are written in the affirmative language for ease of reading

A core component of asthma self-management education is working with the client to achieve asthma control as defined by the national guidelines. After attending Project ECHO, participants were able to identify the characteristics of well-controlled asthma as well as the benefits of an Asthma Action Plan.

Participants' self-reported levels of confidence in activities performed during asthma self-management education increased – particularly around home assessments and medication. Table 6 provides further detail.

Table 6: Procedural Knowledge of Asthma-Related Activities

ITEM	CONFIDENCE		CHANGE
	Pre (N=7)	Post (N=7)	% Change
Describing the difference between rescue and controller medications	71.4%	100.0%	+ 40.1%
Conducting a home assessment for asthma triggers	71.4%	100.0%	+ 40.1%
Describing the difference in the way a person with asthma breathes compared with someone without asthma	57.2%	71.4%	+ 24.8%
Educating families and clients about asthma triggers in the home	85.7%	100.0%	+ 16.7%
Identifying the four most common asthma symptoms	85.7%	100.0%	+ 16.7%
Identifying uncontrolled asthma	71.4%	85.7%	+ 20.0%
Demonstrating how to properly use medication devices	85.7%	100.0%	+ 16.7%
Describing an Asthma Action Plan	85.7%	85.7%	No change
Identifying the early warning signs of an acute asthma episode in younger children	71.4%	71.4%	No change
Giving families and clients recommendations on how to reduce exposure to asthma triggers	85.7%	85.7%	No change

Changes in Participants' Confidence and Practice

Improved knowledge to benefit clients. Participants reported that the sessions had improved their knowledge of asthma medications, Asthma Action Plans, and home environmental assessments which would directly impact their work.

> *"I gained more information about medications used. That will affect the information I will provide to my clients." – survey respondent*

> *"I have gained more and very important information about the home environment assessment. That will help with my work when I do the assessment." – survey respondent*

> *"This was helpful in terms of helping clients to make a nice action plan." – survey respondent*

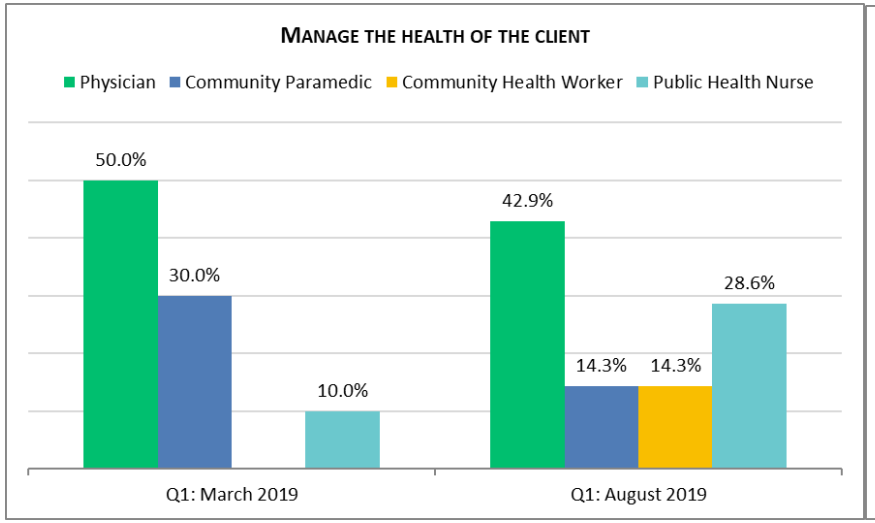
Participants also reported that faculty and peers' recommendations provided additional community resources and linkages.

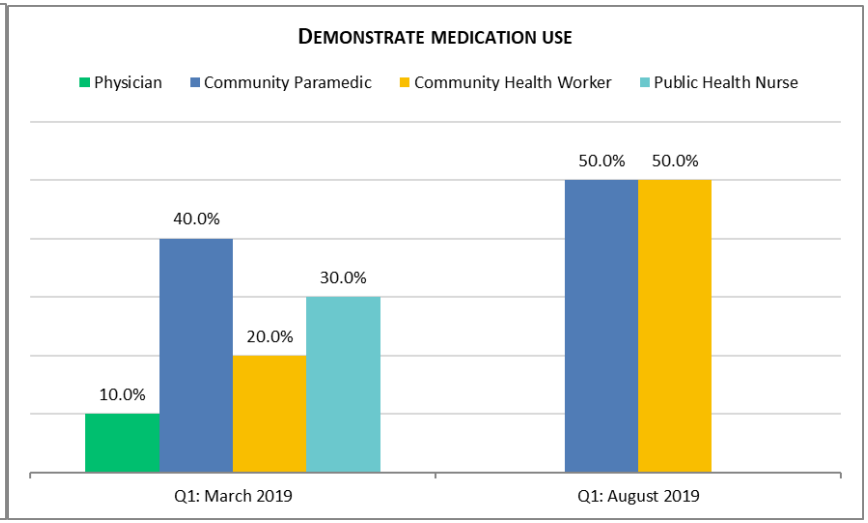
> *"Gain[ed] contacts and resources that I can utilize in order to better serve my patients." – survey respondent*

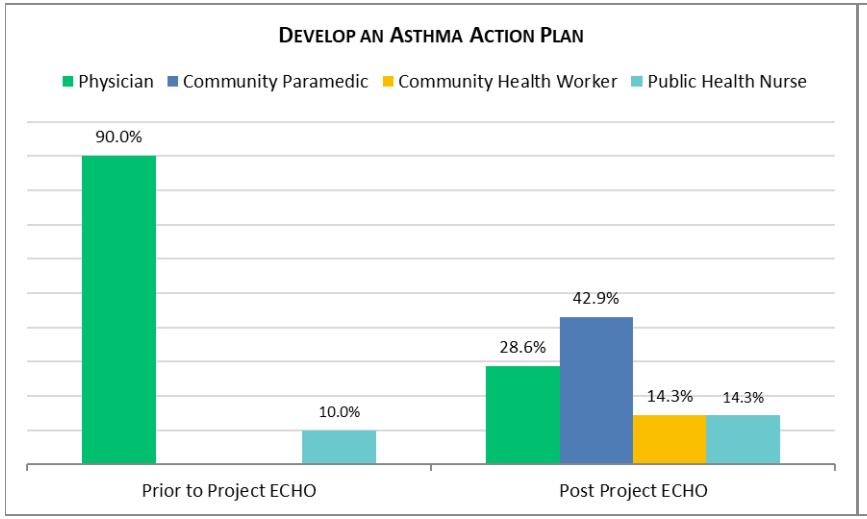
> *"Making more connections with professional providers can lead to a good result to support our asthmatic patients." – survey respondent*

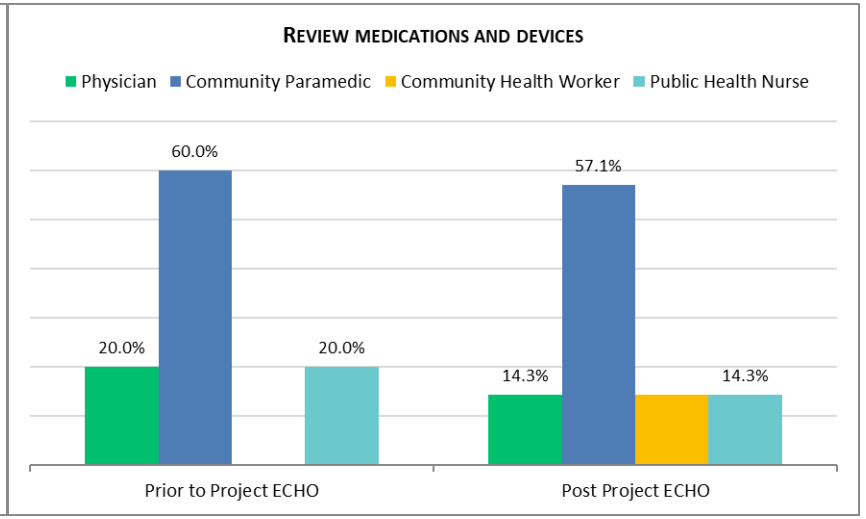
Expanded scope of practice. One of the primary changes that appear to have resulted from Project ECHO is an expanded view of community paramedic and community health workers' scopes of practice. This is shown in Figure 1. Prior to Project ECHO series, the role of the physician was viewed as primary for correct medication usage and implementation of Asthma Action Plans. Project ECHO appears to have shifted these roles with healthcare extenders being more active in both medication and Asthma Action Plans.

Figure 1: Changes in Scope of Practice









Changes in Client and Community Health

Collectively, participants engaged with approximately 50 clients during the Project ECHO series. The immediacy of the Project ECHO series' impact on clients was highlighted.

> *"This [Project ECHO] is the most efficient way for us to communicate and to learn from. To communicate what's happening on the ground for the hardest hit of our clients with a very specific focus on a chronic illness. And to be learning and to immediately – like right after ECHO, a client walk in …and for [CHW] to immediately apply that knowledge." – focus group participant*

Examples of success included increasing access to additional resources and strengthening communication with clinical providers.

> *"Helping people find additional resources to achieve a positive outcome through support & education." – survey respondent*

> *"Gave me the chance to build a good connection with clinicians and supporting the patient." – survey respondent*

> "*Convinced the client to follow the Action Plan and worked on her losing weight." – survey respondent*

Future Directions

Team approach to asthma self-management education. Respondents felt that service to the community would be maximized by community health workers and community paramedics working together.

> *"We need to find a way to hook up community paramedics and community health workers. I feel like we're missing a really big opportunity there. I think the benefit of the community health workers is that they…might seem less intrusive. And being with somebody who (1) can help you translate, and (2) is more familiar with some of your cultural background might really help to open the door for community paramedics to offer the wealth of information...So I think there's a huge opportunity here to figure out how to connect those two areas of expertise." – focus group participant*

> *"Have the community health worker lead the way. And if there is a medical need that needs follow up then the community paramedic partners up with them." – focus group participant*

Expansion of Project ECHO series to rural areas and to vulnerable communities. Project ECHO demonstrated the possibility of telemedicine in Maine. Its ability to increase capacity of educators in rural areas in Maine was seen as an effective and efficient way to increase access to care.

> *"I think having, reaching out to rural areas of Maine…there are people up there that just don't have the resources … I'd love to see an ECHO program reaching out into Waldo County, Penobscot County. – that's what the program is really set up for is the rural connections." – focus group participant*

"I think this also gives a unique perspective on where we may move in rural healthcare access and medicine using telemedicine hookups. I could see in the future as we get to know each other as community health workers and CPs and we become members of a healthcare team. If in particular these folks encounter a specific issue related to a chronic disease like asthma, that they could communicate via telemedicine hookup in some fashion and get immediate feedback on ways to manage those problems. I see that coming down the line." – focus group participant

DISCUSSION

The Project ECHO: Asthma Self-Management Education Series took place over eight months. Monthly ECHO sessions were attended by educators, faculty, and facilitators. The results of the evaluation suggest that participants had a high level of knowledge prior to Project ECHO. While knowledge did increase, the largest impact appears to be in participants' confidence to engage with clients. This is evident in the expanded scope of their practice.

Improving healthcare quality, particularly in local communities with scarce resources and intertwined social challenges is critically important. Community practitioners' ability to increase knowledge, skills and capabilities is essential to ensure that patient outcomes improve. Project ECHO provides a platform for professionals to come together and use their strengths, knowledge, and expertise to help each other. The results appear to be synergistic where educators' knowledge and competencies are increased. At the same time, faculty is exposed to real-time, real-life experiences. Together, the collective wisdom that is generated empowers the educator to better advocate on behalf of the client and assist him/her to address social determinants. The result: client outcomes improve, and professionals experience a decreased sense of isolation and increased joy of work.

LIMITATIONS

The evaluation was limited by the small number of participants engaged in the Project ECHO series. In addition, participants demonstrated strong knowledge and substantial experience prior to the series. Together, these may influence the evaluation findings and caution should be taken not to generalize results.

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APPENDIX A: PROJECT ECHO FACULTY, PARTICIPANTS AND FACILITATORS

NAME	ROLE
Faculty	
Mike Wilcox, MD	Physician
Deidre Pratt	Community Pharmacist
Rhonda Vosmos	Certified Asthma Educator
Jen Morton, DNP, MPH, APHNBC	Nursing Faculty
Ginger Chew	In-Home Assessment Expert
Dennis Russell	Community Paramedic Expert
Sarah Lewis	Community Health Expert
Kevin Springer	Ambulance Services at Northern Light Health
Participants	
Daphne Russell	Community Paramedic
Asha Ali	Community Health Worker
Mohammed Hassan	Community Health Worker
Christian Bisimwa	Community Health Worker
Sana Osman	Community Health Worker
Sanaa Abduljabbar	Community Health Worker
Sabine Diasonama	Community Health Worker
Facilitators & Staff	
Michelle Mitchell	Facilitator
Lisa Tuttle	Facilitator
Alyssa Colon	Notetaker
Maggie Rende	Technical Coordinator
Chad Mitchell	Technical Coordinator