

Project ECHO: A Telementoring Network Model for Continuing Professional Development

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Introduction: A major challenge with current systems of CME is the inability to translate the explosive growth in health care knowledge into daily practice. Project ECHO (Extension for Community Healthcare Outcomes) is a telementoring network designed for continuing professional development (CPD) and improving patient outcomes. The purpose of this article was to describe how the model has complied with recommendations from several authoritative reports about redesigning and enhancing CPD.

Methods: This model links primary care clinicians through a knowledge network with an interprofessional team of specialists from an academic medical center who provide telementoring and ongoing education enabling community clinicians to treat patients with a variety of complex conditions. Knowledge and skills are shared during weekly condition-specific videoconferences.

Results: The model exemplifies learning as described in the seven levels of CPD by Moore (participation, satisfaction, learning, competence, performance, patient, and community health). The model is also aligned with recommendations from four national reports intended to redesign knowledge transfer in improving health care. Efforts in learning sessions focus on information that is relevant to practice, focus on evidence, education methodology, tailoring of recommendations to individual needs and community resources, and interprofessionalism.

Discussion: Project ECHO serves as a telementoring network model of CPD that aligns with current best practice recommendations for CME. This transformative initiative has the potential to serve as a leading model for larger scale CPD, nationally and globally, to enhance access to care, improve quality, and reduce cost.

Keywords: complex conditions, continuing education, professional development, telementoring

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A major challenge in the delivery of best practice medical care is that past and current systems of formal CME are inadequate to support the explosive growth in knowledge needed by clinicians in daily practice. This gap between the daily practice of medicine and new knowledge continues to expand. Continuing professional development (CPD) has not adequately addressed this gap either with clinicians or with systems-based practice.¹

This knowledge gap affects patients, particularly those in underserved areas. These patients often have limited access to multidisciplinary specialty care and do not receive timely, best practice care. Chronic conditions frequently require ongoing consultation between the community clinician and experts from multiple medical specialties to implement best practices. Difficulty with access to highly specialized knowledge for patients with complex problems who live in underserved areas contributes to unfavorable health outcomes and disparities between populations.

To address growing gaps in medical knowledge and to encourage best care, our society's solution has been to require health professionals to participate in continuing education (CE) coursework. This model of passive education has drawn increasing criticism for its inadequacy as a model for lifelong learning and performance improvement. Since the early 1990s, there has been a call for enhancing CME by placing more attention on clinician performance and patient outcomes.^{2,3}

A new system is needed that engages the health professional more actively with content and is linked to workplace learning. Adapting case-based learning and guided practice models used in medical schools and residencies to an educational model that includes learning loops with feedback from peers and specialists is one model for CPD. The purpose of this article was to describe how a telementoring network model adheres to recommendations from several authoritative reports about redesigning and enhancing CPD.

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PROJECT ECHO

Project ECHO (Extension for Community Healthcare Outcomes) was developed at the University of New Mexico School of Medicine in 2003 to improve access to complex specialty care for patients with hepatitis C in underserved communities and prisons. The model uses videoconferencing technology to support knowledge networks that connect primary care clinicians from different locations with each other and with a multidisciplinary team of university specialists in weekly

TABLE 1.
Ability of the ECHO Model to Fulfill Moore's Seven Levels of Expanded Framework for CPD

Levels of Expanded Framework	Description of Level	Examples of Project ECHO Outcomes for Each Level
Level 1: Participation	Number of health professionals who participated in CME activity	Attendance records are well kept between 2003 and 2014, 6487 clinicians participated in ECHO and received more than 66,000 education credits.
Level 2: Satisfaction	Degree to which expectations of participants about CME activity were met	Questionnaires are completed by every attendee after a CME activity. Confidential evaluations of three randomly selected teleECHO clinics from December 2014 (endocrinology, hepatitis C and integrated addictions and psychiatry), participants reported positive agreement in their response to two questions: 1) How well were the stated objectives (in today's clinic) met? (<i>N</i> = 92 for three clinics, mean ranging between 4.3 and 4.7 on a 5-point scale with 1 = poor and 5 = excellent). 2) How well did the clinic deliver balanced and objective evidence-based content? (<i>N</i> = 92 for three clinics with mean ranging between 4.4 and 4.7 on a 5-point scale with 1 = poor and 5 = excellent). These results are similar to findings reported by clinicians participating in different teleECHO clinics.
Level 3A: Learning: declarative knowledge	Participant statements about what the CME intended them to know	Project ECHO performs postclinic evaluations on most of its teleECHO. An example of this was confidential evaluations of the Endocrinology TeleECHO Clinic (Endo ECHO) from three sessions in December 2014, participants reported positive agreement in their response to two Likert-anchored statements with 1 = strongly disagree and 5 = strongly agree. 1) The information presented today by the speaker increased my knowledge. (<i>N</i> = 34, mean ranging between 4.5 and 4.6). 2) The case presentation and subsequent discussion increased my knowledge. (<i>N</i> = 34, mean ranging between 4.5 and 4.6).
Level 3B: Learning: procedural knowledge	Participant statements about how to do what the CME activity intended	In post-teleECHO clinic confidential evaluations of Endo ECHO from three sessions in December 2014, participants reported positive agreement in their response to four Likert-anchored statements with 1 = strongly disagree and 5 = strongly agree. 1) The information presented today by the speaker increased my ability to better manage the care of patients with endocrinology issues. (<i>N</i> = 34, mean ranging between 4.5 and 4.6). 2) The information presented today by the speaker increased my comfort in managing the care of my patients with endocrinology knowledge. (<i>N</i> = 34, mean ranging between 4.5 and 4.6). 3) The case presentation and subsequent discussion increased my ability to better manage the care of my patients with endocrinology issues. (<i>N</i> = 34, mean ranging between 4.5 and 4.6). 4) The case presentation and subsequent discussion increased my comfort in managing the care of my patients with endocrinology issues. (<i>N</i> = 34, mean ranging between 4.4 and 4.7).
Level 4: Competence	Participant's demonstration in an educational setting of how to do what the CME activity intended	During each teleECHO clinic, community clinicians presented patient cases selected from their workplace. They identified the questions they wanted the specialists and peers to consider about the patient in writing and in their presentation. After each patient case, a summary of recommendations from the specialists and peers was presented and sent to the community clinician who presented the case. Community clinicians also provided recommendations and guidance to their peers during the teleECHO clinics in response to a peer's patient case or during the discussion that followed the case presentation. Project ECHO's database tracked the number of case presentations by a community clinician in a given clinic.
Level 5: Performance	Degree to which participants do what was intended in their practice	A Project ECHO hepatitis C virus (HCV) study demonstrated that community clinicians engaged in Project ECHO provided best practice care with cure rates equivalent to those of specialists treating similar patients at an academic medical center. ⁹ Often, community clinicians in teleECHO clinics are asked to re-present their patient cases in weeks to months where implementation and impact of the recommendations were reviewed and reassessed. A review of patient charts and administrative databases are measures of performance that are encouraged of all attendees during every teleECHO clinic.

(Continued)

TABLE 1.
Ability of the ECHO Model to Fulfill Moore's Seven Levels of Expanded Framework for CPD (Continued)

Levels of Expanded Framework	Description of Level	Examples of Project ECHO Outcomes for Each Level
Level 6: Patient health	Degree to which health status of patients changes because of practice behavior of CME participants	<p>Project ECHO developed an HCV collaborative with similar ECHO hubs at other academic centers, states, and countries. As part of this collaborative, HCV patient data from clinicians in the collaborative is being consolidated to address questions of ECHO clinician practice behavior and changes in patient health. Preliminary patient health findings from this ECHO HCV collaborative are promising.</p> <p>In a teleECHO program aimed at nursing home providers, Catic et al¹¹ found that when the recommendations made by specialists were followed by the nursing home providers, the patients had decreased acute care hospitalizations and were much more likely to be described as clinically improved, compared with cases in which the ECHO specialist recommendations were not followed.</p> <p>A review of patient charts and administrative databases are encouraged of all attendees during every teleECHO clinics.</p>
Level 7: Community health	Degree to which health status of community of patients changes because of practice behavior of CME participants	<p>During an H1N1 outbreak in 2009 in New Mexico, Project ECHO developed a unique teleECHO clinic for community clinicians designed to share best practice information about ventilator treatment of hospitalized patients with H1N1 and antibiotic coverage of children with H1N1 and pneumonia. Best practice care was widely and efficiently disseminated to communities throughout the state.⁴</p> <p>The New Mexico Integrated Addictions and Psychiatry TeleECHO Clinic has used the teleECHO network to rapidly disseminate time-sensitive information to providers, such as reports of more dangerous heroin laced with fentanyl available through drug-dealing networks in NM, to try to decrease patient harms.¹²</p> <p>Project ECHO has increased access to specialty care for patients in underserved communities.</p>

videoconferencing sessions (teleECHO clinics). The weekly teleECHO clinics have expanded gradually to address other complex conditions, including endocrinology, epilepsy, HIV, integrated addiction and psychiatry, chronic pain, women's health and genomics, tuberculosis, bone health, complex care, and rheumatology.

Since its inception, Project ECHO has offered AMA PRA Category 1 Credits through the University of New Mexico School of Medicine Office of Continuing Medical Education and Professional Development. Credit is available for physicians, physician assistants, nurse practitioners, doctors of pharmacy, and registered dietitians. CE credits are also offered to those with bachelor or masters of arts or science degrees. Continuing Education Units for licensed social workers, licensed professional certified counselors, and licensed alcohol and drug counselors have been offered since 2008.

Knowledge transfer to community clinicians during each learning session occurs through two modalities—short didactic presentations and patient cases selected by the community clinician from their own clinical practice—which are presented to the network in a deidentified fashion. School of Medicine specialists mentor community clinicians through the use of questions, case review, and recommendations. This leads community clinicians to develop increased specialized knowledge that can be applied to the care of other patients in their own clinics.^{4,5}

Compliance With CPD Recommendations

We chose five reports as CPD frameworks for CPD to use in assessing the ECHO model. These include Moore's seven-level framework and four national reports that included broad

recommendations to redesign CE for improving health care. Overviews of these national reports are described below:

1. Macy Foundation, *Continuing Education in the Health Professions: Improving Healthcare through Lifelong Learning* (2008)⁶
 - A multidisciplinary effort to describe changes needed to shift CE rapidly to an emphasis on practice-based learning
1. Institute of Medicine, *Redesigning Continuing Education in the Health Professions* (2009)⁷
 - A national approach to CE for health professions to support efforts to achieve and maintain proficiency
1. Carnegie Foundation in Advancement on Teaching (2010)⁸
 - A comprehensive work at the pressing concerns in physician education today and preparing physicians for the future
1. American Hospital Association's Physician Leadership Forum (2013)⁹
 - Value of CME as a strategic resource for physician-hospital alignment.

Embedded in the ECHO model is the importance of providing practice and feedback to clinicians to make use of a teachable moment, reinforce attendee engagement and learning, and provide a framework for the desired outcomes. Shown in Table 1 are descriptions of seven levels of the CME framework proposed by Moore et al, 2009. Examples of assessing each level by the ECHO team highlight clinicians' participation and satisfaction, self-reported areas of learning

TABLE 2.
Project ECHO's Alignment With Recommendations From Four National Reports on Education of Physicians and Health Professionals

Recommendation Groupings (Report)	Project ECHO's Alignment With the Recommendations
<p>Relevance to Practice</p> <p>Integrate continuing education into daily clinical practice (Macy)</p> <p>Connect knowledge and experience; engage in multiple forms of reasoning (Carnegie)</p>	<p>TeleECHO clinics include the presentation of patient cases selected by community clinicians from the workplace. Case-based learning for clinicians from active patient cases in their clinical practice serves as the focus of learning. Clinicians listen to the patient case presentations of their peers and contribute to the case discussions. Specialists mentor primary care clinicians to help them manage their patient cases and share their expertise through mentoring, guidance, feedback, and didactic education.</p>
<p>Focus on evidence</p> <p>Base continuing education on the strongest available evidence for practice (Macy)</p>	<p>Specialists during teleECHO clinics present condition-specific evidence, protocol changes, and best evidence updates from the literature (screening, management, and treatment) as a focus for short didactic presentations (15–30 min). Change in best practice protocols is also disseminated to community clinicians rapidly using multiple methods. Evidence is reinforced through iterative weekly teleECHO clinic.</p>
<p>Develop habits of inquiry and improvement; focus on excellence (Carnegie)</p> <p>Share best practices and performance improvement (AHA)</p>	<p>Habits of inquiry and improvement result in community clinicians' assumption of increasing responsibility for their patients' specialized care, their engagement with best practices, and patient care aligned with excellence. In their case presentations and application of recommendations to their patients, community clinicians engage in deliberate practice and habits of inquiry. Specialists provide feedback for performance improvement, solidifying community clinicians' increasing expertise.</p>
<p>Conflict of interest</p> <p>Minimize to the greatest extent possible the reality and appearance of bias (Macy)</p>	<p>Project ECHO does not promote any pharmaceutical company, manufacturer, or devices in its education of clinicians. To avoid the reality or appearance of bias, individuals who present didactic sessions during teleECHO clinics must disclose any financial or other conflicts of interest.</p>
<p>Accessibility to learning</p> <p>Emphasize flexibility and easy accessibility for clinicians (Macy)</p>	<p>Community clinicians participate in teleECHO clinics through telephone, video, or in person. TeleECHO clinics are scheduled at times based on mutual agreement and convenience for most community clinicians and specialists—early in the morning, at noon, or late afternoon/early evening, at no cost.</p>
<p>Education methodology</p> <p>Stress innovation and evaluation of new educational methods (Macy)</p>	<p>Community clinician can review the weekly didactic presentations asynchronously. The assigned specialist is easily accessible for questions from the community clinicians whom they are mentoring.</p>
<p>Consider smaller group projects to address health care needs (AHA)</p>	<p>The model enables community clinicians to join the teleECHO clinics at any point in time and supports their individual acquisition of knowledge and skills and use in the care of their patients.</p>
<p>Address spectrum of needs</p> <p>Address needs of clinicians across a wide spectrum, from specialists in academic medical centers to rural solo clinicians (Macy)</p>	<p>In a one-to-many knowledge network, iterative learning loops include both new patient presentations and the presentation of patients who are followed and presented multiple times longitudinally. To assess this innovation, ECHO assesses the impact of the training on clinicians in the different clinics using multiple methods, including surveys (satisfaction, knowledge, and attitudes), observations (behavior and skills), interviews and focus groups (learning and quality improvement), and chart review.</p>
<p>Increase the diversity of offerings to adapt to a changing environment (AHA)</p>	<p>The Project reviews areas for improvement and simplification, specifically technology to streamline paperwork burden.</p>
<p>Personalize learning</p> <p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>Academic specialists and clinicians from underserved communities participate in teleECHO clinics that support a broad range of physical and behavioral health topics. These clinical conditions are targeted because they are common, require complex treatment, and have a significant impact in health and economic consequences.</p>
<p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>Community clinicians and academic specialists learn from each other. Community clinicians offer deep knowledge about social, cultural, and realistic approaches to local patient care, whereas academic specialists offer complimentary content expertise.</p>
<p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>To reduce costs of hospitalizations and emergency department visits and to improve quality care, ECHO trains and supports outpatient intensivist teams to manage complex patients with a history of high utilization of health care resources in their homes.</p>
<p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>ECHO offers training to community health workers in addiction and behavioral health, obesity and diabetes, as well as prisoners selected and trained as peer educators in safe and healthy behaviors and disease prevention.</p>
<p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>Community clinicians are given individualized feedback associated with their patient care. They learn the standard protocol and best practices for the chronic disease through the standard ECHO model.</p>
<p>Standardize learning outcomes while individualizing learning processes (Carnegie)</p> <p>Facilitate greater communication to improve CME offerings (AHA)</p>	<p>Written feedback, solicited from attendees, permits improvements in ECHO's offerings to address more specific needs. To improve the quality of the teleECHO clinics, weekly feedback is solicited after each clinic and reported each month. Focus groups are used periodically to collect and report feedback from participants to improve the education and training offered through ECHO.</p>

(Continued)

TABLE 2.
Project ECHO's Alignment With Recommendations From Four National Reports on Education of Physicians and Health Professionals (Continued)

Recommendation Groupings (Report)	Project ECHO's Alignment With the Recommendations
Interprofessional education	Clinicians who participate in ECHO include physicians, nurses, pharmacists, physician assistants, nurse practitioners, general and disease-specific health educators, counselors, and community health workers. The curricula are tailored to the unique skills of different participants. Didactic presentations are given by specialists from various professions and backgrounds. Case presentations are provided by community clinician participants.
Support interprofessional collaboration (Macy) Bring health professionals from various disciplines together in carefully tailored learning environments (IOM)	In 2013, ECHO faculty implemented a 4-week, interprofessional chronic, complex condition rotation. The rotation matches participation in four teleECHO clinics with student team work in complimentary academic interprofessional patient care settings. Faculty and students from medicine, nursing, and pharmacy have worked in interprofessional teams during each rotation.
Aligning with community health	Diverse organizations participate in teleECHO clinics and include federally qualified health centers, Community Health Centers, the Veterans' Administration and its initiatives, Department of Defense initiatives, the Indian Health Service (IHS), the New Mexico Department of Health (NMDOH), the New Mexico Human Services Department, the New Mexico Department of Corrections, and private practitioners.
Align continuing education efforts with quality improvement initiatives at the level of health systems (Macy)	Currently, the NMDOH provides funding for an ECHO community health worker program in obesity prevention and intervention, which aligns with priority goals for the NMDOH. Project ECHO also runs a TB program in partnership with the NMDOH and IHS which tracks individuals who need monitored therapy, coordinating efforts across agencies.
Use data from community health assessments (AHA)	Epidemiological data are being gathered in each community as a means to monitor the direction of content in the teleECHO clinics and to recruit clinical sites and clinicians to join the different types of teleECHO clinics. The data are used in identification for needed teleECHO clinics, in developing new projects and collaborative proposals with funders and with partners.

AHA, American Hospital Association; IOM, Institute of Medicine.

(knowledge and procedural skills), and patient and community level outcomes.

Project ECHO's alignment with each national report's recommendation is described in Table 2. Table 2 illustrates ECHO's compliance with learning about excellence in patient care through deliberate practice, role modeling, and feedback from peers and specialists. Workplace learning combines quality educational practices with the best evidence for patient care. ECHO demonstrates that iterative distance learning through telementoring is effective at disseminating best practice care for patients with certain complex conditions. Survey results from primary care learning demonstrate increased knowledge, skills, ability, and self-efficacy. A prospective outcomes study showed that the care provided by primary care clinicians participating in ECHO was safe and effective.¹⁰

Case-Based Learning for Best Practices

Described below are two vignettes which illuminate ECHO's direct positive impact on patients' lives.

1. Mr. A, a 49-year-old man diagnosed with idiopathic pulmonary fibrosis, used high-flow oxygen. When first presented to the Chronic Pain and Headache Management TeleECHO Clinic, he was taking high-dose benzodiazepines and opioids to treat anxiety and chest pain. He spent his time mostly in bed, developed a pulmonary embolism, was hospitalized every 2–6 weeks for pneumonia and respiratory decompensation, and walked with a walker. After several months of care from his clinical team with support

from the interprofessional ECHO team, Mr. A was successfully tapered off benzodiazepines and transferred to buprenorphine/naloxone. He reduced his oxygen use, stopped using a walker, swam every day, and since switching to buprenorphine 3 months ago has not been hospitalized. He reports that he feels more "alive" than he has in years.

2. Ms. Y, a 55-year-old woman diagnosed with schizophrenia, chronic right shoulder pain, and insomnia, was presented during the Integrated Addictions and Psychiatry TeleECHO Clinic because of disordered sleep, weight loss, and discomfort with her medication regimen. On review with ECHO specialists, Ms. Y's complicated and potentially hazardous medication regimen was identified as a starting place for recommended change in her care. The regimen included multiple, redundant high-dose sedatives for sleep/anxiety and antidepressants/anticonvulsants prescribed for undetermined indications and antipsychotic medications with complicated dosing requirements. Over several months, her primary care clinician, with support from the interprofessional ECHO team, was able to adjust her medications, reducing the number taken from six to two, and she is now sleeping through the night, gaining weight, and anticipating family reengagement in an upcoming visit.

In each vignette, there is a direct link between improved outcomes and evidence for best practice in CE and professional development. The ECHO model's ability to fulfill Moore's seven levels for CPD reinforces the overwhelming

need for improved access to best practice care by clinicians in underserved communities. The model illustrates the value of support from an interdisciplinary team which can address issues such as medical or behavioral health and medication management. In addition, the vignettes highlight how ECHO's formal didactic curriculum and case-based patient presentations align with national recommendations for educating of physicians and health professionals.

Next Steps

Adherence to authoritative recommendations will continue to be imbedded in the ECHO model. A broad set of educational approaches will be linked to clinician behaviors ranging from best evidence and integration of learning into daily practice. The ECHO model embodies a new vision of professional development and support for interprofessional collaboration and teams.

The ECHO model is currently being disseminated in the United States and globally. An important next step for ECHO is to adapt to the changing cultures, norms, languages, and disease patterns, and socioeconomic conditions that exist around the world. The explosive demand for ECHO replication has created an imperative to best use resources and technology to provide adequate technical assistance.

An effort will be undertaken to streamline learning into more complex conditions and other areas of care. Improved care would be possible with a stable team of well-trained clinicians in the health care workforce. Future studies will address the impact of this training and educational effort on recruitment and retentions of clinicians in rural and urban underserved areas and on the quality and cost of care provided.

ECHO at the University of New Mexico School of Medicine is largely funded through philanthropic and grant support. In Ontario, Canada and Northern Ireland, the government has assumed the responsibility to fund and sustain ECHO. In the United States, efforts will be made to incorporate funding of the ECHO model into the health care financing in our country.

In conclusion, Project ECHO serves as a telementoring network model of CPD to improve clinician performance and provide best practice care in underserved areas. Project ECHO will continue to expand professional development. More chronic care conditions will be added to build on our present successful integration of physical and behavioral health. This transformative initiative has the potential to serve as the model for larger scale CPD, nationally and globally to enhance access to care, improve quality, and reduce cost.

Lessons for Practice

- Project ECHO is a novel telementoring network designed for CPD and improving patient outcomes in underserved areas.
- This model is aligned with recommendations from national reports for educating physicians and health professionals about performance improvement.
- Examples described about alignment in a framework of CE may help other networks attempting to translate the explosive growth in health care knowledge into daily practice.

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