A Just-in-Time Implementation of an Extension for Community Health Outcomes (ECHO) Program for Support of Primary Care During the COVID-19 Pandemic

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As was experienced across the country, the COVID-19 pandemic reached Colorado in early spring 2020. Yet, unlike many of the early hotspots in other states, the initial cases in Colorado surfaced in rural areas. It was evident early on it would be a public health crisis unlike anything Colorado had ever faced. There was an urgent need for rapid dissemination of up-to-date information and practice support provided by a multidisciplinary task force of academic health center and state public health experts working collaboratively to meet these needs. This article provides a roadmap for the development of a similar model, a community-connected Extension for Community Health Outcomes (ECHO) program based at an academic medical center and its ability to facilitate the service rapidly and scale to need. (J Am Board Fam Med 2021;34:481–488.)

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Introduction

The COVID-19 pandemic reached Colorado in early March 2020. Unlike many of the early hotspots elsewhere, the initial cases in Colorado surfaced in mountain towns. On March 5, public health officials reported the first 2 cases, a 30-year-old man visiting a ski area who had contact with a confirmed case in California and an elderly woman who had traveled abroad. This public health disaster was unlike anything Colorado had ever faced, impacting every medical facility and exposing weaknesses in our current systems. And, perhaps, having an even greater impact on rural and frontier areas without the resources available at an urban-based academic medical center.

Within a few days of these first cases, several state health care stakeholders requested that Extension for Community Health Outcomes (ECHO) Colorado rapidly develop and implement a program focused on training, connecting, and supporting primary care practices in the state, with a primary goal of informing these practices of the latest COVID updates, best practices, and resource allocation recommendations during the pandemic. Many recognized that primary care practices faced complexities of a rapidly evolving pandemic that would force the cancellation of routine care visits, impacting the practice's financial viability. A relevant, virtual, and

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easily accessible intervention was needed for providers, staff, and health systems in rural and underserved areas of Colorado with a focus on independent practices and safety net systems.

ECHO Colorado, a replication site of Project ECHO pioneered by the University of New Mexico Health Science Center, had an existing infrastructure with strong community and state partnerships and provided an ideal model for rapid dissemination of specialized medical and public health knowledge to community providers.[1] Based at the University of Colorado Anschutz Medical Campus and initiated in 2015, ECHO Colorado and its partners had facilitated series in more than 80 clinical and public health areas and was a well-known tool used to amplify the medical and public health expertise of institutional colleagues and community partners alike.

Using its existing resources and partnerships, ECHO Colorado rapidly developed and implemented an adaptive ECHO series focused on supporting the evolving needs of primary care providers (PCPs). Knowing this series would have to be different from any other, a statewide coalition representing payers, epidemiologic resources, public and private health systems, primary care voices, and an array of specialty care experts was assembled to assure responsiveness and inclusion of new COVID information while addressing the larger impact of COVID on communities. Here, we outline the roadmap for creating an adaptive COVID "just-in-time" ECHO for primary care (COVID JiT ECHO) as a rapid response to the novel coronavirus pandemic in Colorado. Unlike a traditional ECHO, much of the available information related to COVID through media and trusted sources was redundant, contradictory, and time-consuming to assess. As such, the "just-in-time" nature of the series provided updated and best available information across many topic areas. The series was designed to be nimble and responsive to the "community voice" of participating PCPs to ensure that it met their specific educational and practice needs.

Initiating COVID JiT ECHO

Colorado Governor Jared Polis announced a statewide stay-at-home order beginning on March 16. The first COVID JiT ECHO Task Force meeting occurred on March 20, and the first session was held on March 27.

Task Force

A multidisciplinary task force was created based on the World Health Organization's interprofessional education framework, consisting of 8 physicians, 2 pharmacists, 1 program director, and 1 medical epidemiologist.[2] Physician members represented family medicine, internal medicine, infectious disease, rheumatology, and health policy. One clinical pharmacist was board certified in ambulatory care and the other in infectious diseases. The medical epidemiologist was a member of the state health department. The program director was experienced with ECHO programs in several states covering many topics. Diversity among the task force was foundational to a comprehensive and agile approach to responding to the needs of a diverse participant base.

Institutional and Foundational Support

The genesis of the COVID JiT ECHO occurred with no initial funding to pay for the staffing or the task force. There was only agreement that a robustly resourced COVID-focused series needed to be implemented as rapidly as possible. Fortunately, institutional leadership quickly recognized the value of the series to the health of our state and our unique ability as an academic medical center with a community-connected ECHO program to facilitate the service rapidly and at scale. As a result, the COVID JiT ECHO was offered "backstop" financial support; the institution would cover any costs that were not able to get covered via philanthropy. Subsequently, a combination of philanthropic and institutional support has allowed for sustained programming and scaling of the effort.

Content and Structure

The COVID JiT ECHO initially featured 3 weekly 1-hour sessions each with a unique focus. Subsequently, in June 2020 the series began meeting twice per week to adjust to the evolution of the pandemic. Each session began with epidemiologic updates from the state health department and medication management updates from academic clinical pharmacists. Then a topic expert provided a 20-minute presentation on a focus topic using the best available information. Topics were chosen based on the participants' needs. Within the first 4 weeks, topics ranged

from best practices for telehealth to surviving the economic impact of COVID. Each session ended with a question and answer (Q&A) portion where participants shared their experiences on the front line and in their communities. With more than 650 PCPs registered and averaging between 100 and 200 participants each session, we were able to palpate the pulse of rural and urban Colorado communities.

Epidemiology Updates

Latest COVID data including case counts and testing positivity and mortality totals were presented by a state medical epidemiologist. As hospitalization data (eg, current admissions, discharges, intensive care unit (ICU) capacity, available ventilator capacity) became available, it was also integrated into these updates, along with reviewing incidence maps, outbreak data, and syndromic surveillance. In addition, the medical epidemiologist answered questions at every session. New state public health guidance was incorporated in the updates (eg, guidelines for testing priorities, isolation requirements, new pediatric multisystem inflammatory syndrome in children) as available.

Medication Management

These critical updates were originally included in each session to debunk myths around therapeutics in the community and provided evidence relevant to evolving treatments with a focus on implications for primary care. Any new publications relevant to medications for the treatment or prevention of COVID-19 were included. Given the rapid publication of scientific data with COVID, updates were provided when newer evidence either further supported or refuted prior evidence-based updates. It was also important to cover topics that were relevant to medication use in COVID-19 that lacked supporting evidence to inform attendees of such discrepancies (eg, angiotensin-converting enzyme inhibitors, statins, nonsteroidal anti-inflammatory drugs). Issues related to medication access (eg, drug shortages), Food and Drug Administration announcements, Emergency Use Authorizations and warnings, and recommendations related to treatment of chronic illnesses were also included.

Focus Topics

In addition to the epidemiology and medication management updates, we created a special focus topic for each ECHO session to address a variety of issues identified as pertinent and timely to PCPs managing the pandemic. The first 2 focus topics were selected by the task force with all subsequent topics being identified through participant surveys. Focus topics (see Figure 1) dealt with a variety of pertinent and practical themes including clinical practice, primary care health policy, telemedicine billing, practice management, epidemiology, bioethics, and others.

At the time of submission, the COVID JiT ECHO series has provided 85 unique sessions with a large variety of topics. Early in the pandemic, sessions focused on helping practices adapt to caring for routine ambulatory patients during the initial COVID surge. Topics included telehealth workflows and reimbursement, use of personal protective equipment to prevent infection, and changing clinical workflows and practice finances. During the peak of Colorado's initial COVID surge, the topics shifted to hospital management of COVID patients, post-ICU complications, and transitions of care for these patients back into the ambulatory setting. After the initial surge of COVID cases and deaths in Colorado waned, the COVID JiT sessions covered a wide range of epidemiologic, clinical, and social topics including the disproportionate impact of COVID based on race and ethnicity, the mental and behavioral health impacts of isolation, the use of contract tracing in Colorado, COVID vaccine development and deployment planning, and return to school guidance.

The session structure for the COVID JiT ECHO was developed around the concept of "just-in-time" knowledge dissemination and leveraging the "community voice." This structure spoke to the rapidity of change in the health care landscape during the COVID pandemic, along with an acknowledgment of the paucity of scientifically sound answers to clinical questions. Presenters focused on the best available information, and intention was given to revisiting topics when new information was available.

While most of the focus topic presentations were given by content experts to provide the most up-to-date information available, some sessions focused on the experiences and perspectives of

Figure 1. Comprehensive list of session number, dates, and topics for the COVID just-in-time ECHO series for primary care providers. Abbreviations: CDPHE, Colorado Department of Public Health & the Environment; CV, community voice presentation; HAN, Health Alert Network; RT, research team presentation.

Session #	Date:	Topic:
1	3/27/2020	Session 1
2	3/30/2020	Telehealth
3	4/1/2020	Personal Protective Equipment [RT]
4	4/3/2020	Should They Stay or Should They Go? (COVID outpatient triage/workflow)
5	4/6/2020	Advance Care Planning
6	4/8/2020	Building a Resilience Plan for You and Your Staff
7	4/10/2020	Practice Survival (practice finances and workflow changes) [CV]
8	4/13/2020	Supporting Patients' Resilience
9	4/15/2020	Ethical Issues in Response to COVID-19
10	4/17/2020	COVID Testing
11	4/20/2020	Coloradoan Health Disparities and COVID-19 [RT]
12	4/22/2020	Epidemiology Modeling
13	4/24/2020	Primary Care Voices: A Review of Lessons Learned in Colorado and Nationally
14	4/27/2020	Transitions of Care for COVID-19: What to Expect Post-Discharge
15	4/29/2020	Post-ICU/Post-ARDS Recovery Care
16	5/1/2020	COVID Policy Responses & the Future of Primary Care
17	5/4/2020	Syndromic Surveillance with CDPHE
18	5/6/2020	A Physician's Experience as a COVID-19 Patient
19	5/8/2020	Special Populations – Pregnant Women & Newborns
20	5/11/2020	Transitions of Care: Updates on What Outpatient Providers Should Know
21	5/13/2020	Experiences in Managing COVID in the Community [CV]
22	5/15/2020	Special Populations – Pediatrics
23	5/18/2020	Antibody Testing
24	5/20/2020	Special Populations: Immunosuppressed Patients
23	5/22/2020	Convalescent Plasma Treatment
26	5/27/2020	Telehealth Coding and Billing
27	5/29/2020	Collateral Damage – The Impact of COVID-19 on Non-COVID Health Care [CV, RT]
28	6/1/2020	Case Data, Incidence, Surveillance, Mobility, Serology HAN
29	6/3/2020	Colorado State Modeling Updates with CDPHE State Epidemiologist
30	6/5/2020	Anti-Coagulation for COVID-19: Preventing and Treating Thrombosis
31	6/8/2020	Using Biomarkers to Predict Disease Severity in Patients with COVID-19
32	6/10/2020	Health Equity with Governor's COVID-19 Health Equity Response Team
33	6/12/2020	What is the Crisis Line & How Has its Use Been Impacted by COVID-19?
34	6/15/2020	Vaccine Development: Where Are We Now?
35	6/17/2020	Updates on COVID Legislation Impacting Colorado
36	6/22/2020	Epidemiology, Medication Management, and Community Experience [CV]
37	6/24/2020	The Impact of COVID on Child Abuse & Domestic Violence
38	6/29/2020	COVID Outbreaks
39	7/1/2020	The Evidence Behind Universal Masking [RT]
40	7/20/2020	Update on Colorado State Modeling
41	7/22/2020	Return to School Guidance
42	7/27/2020	Impact of COVID on the State Budget: What Primary Care Needs to Know
43	7/29/2020	A Pragmatic Approach to Virology, Lasting Immunity, & Reinfection
44	8/3/2020	Return to School Guidance Update and Q&A
45	8/5/2020	Contact Tracing
46	8/10/2020	Extended Updates & Facilitated Discussion
47	8/12/2020	Clinical Preparedness for Fall Respiratory Season
48	8/17/2020	What We Know About SARS-CoV-2 Transmission
49	8/19/2020	Can You Be Isolated to Death in Long-Term Care?

(*continued*)

Figure 1. Continued

50	8/24/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
51	8/26/2020	Adult Vaccines
52	8/31/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
53	9/2/2020	COVID Testing Updates
54	9/9/2020	Community Voice: Planning for Flu & COVID [CV]
55	9/14/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
56	9/16/2020	Whole Genome Sequencing & COVID
57	9/21/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
58	9/21/2020	The Long Haul & a Patient Perspective [RT]
59	9/23/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
60	9/28/2020	Update on COVID Vaccines
61	9/30/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
62	10/5/2020	Updated School Guidance
63	10/7/2020	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
64	10/12/2020	Health Care Worker Safety during COVID & Flu Season
65	10/14/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
66	10/21/2020	COVID Vaccine Deployment plan
67	10/26/2020	Family Medicine United for CO & COVID Outbreaks in health care settings
68	10/28/2020	Substance Use Disorder in COVID
69	11/02/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
70	11/09/2020	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
71	11/11/2020	Flu Season during COVID with CDPHE
72	11/16/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
73	11/18/2020	Post-COVID Management
74	11/23/2020	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
75	11/30/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
76	12/02/2020	Vaccine Deployment Updates
77	12/07/2020	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
78	12/09/2020	Virtual Hospital at Home: Strategies for outpatient COVID management
79	12/14/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
80	12/16/2020	Return to Physical Activity
81	12/21/2020	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
82	12/28/2020	Extended Updates & Facilitated Discussion (medications & epidemiology)
83	12/30/2020	Community Voice: Experiences Managing the COVID pandemic[CV]
84	01/04/2021	Extended Updates & Facilitated Discussion (COVID policy and epidemiology)
85	01/06/2021	COVID -19 Coding and Sequencing of Variants

Colorado PCPs representing the "community voice." For these sessions, PCPs who were active session participants were recruited based on their relevant experience, including the firsthand challenges of COVID in their practices. Specifically, 6 of the ECHO sessions were focused on the "community voice" and covered topics including practice survival, managing COVID patients in the ambulatory setting, the impact of COVID on the health of non-COVID ambulatory patients, and planning for influenza season during the pandemic. In total, 8 highly engaged community PCPs shared their experiences over the 6 sessions with some PCPs presenting during multiple sessions due to their high level of innovation in developing new patient care workflows and managing ambulatory COVID patients. Of the community voice presenters, 6 were physicians (5 family medicine and 1 emergency medicine) and 2 were advance practice providers. They represented diverse practice settings working in 2 Federally Qualified Health Centers (FQHCs), 2 private practice clinics, 2 large health systems, 1 community hospital, and 1 school-based health clinic. Geographically, they represented 2 urban counties and 4 rural counties across Colorado. Honoring the fact that all practices, challenges, and patient populations are not created equally, it has been and remains important to include the COVID JiT ECHO community of providers in sharing their unique experiences, knowledge, and creative solutions with all.

Research Team

To address the dynamic nature of the COVID-19 pandemic, the COVID JiT ECHO series used a research team of resident physicians, medical students, and faculty physician mentors. This team focused on facilitating the in-session Q&A segment, creating session summary documents, analyzing participant survey data, and presenting emerging information.

For Q&A sessions, the research team compiled and categorized questions from the live chat function, then synthesized and presented the questions to the presenter(s), assuring an engaged dialog related to the responses. After each session, the research team compiled a brief overview of the session along with Q&A responses as an additional resource for participants.

After each session, participants were surveyed to identify learning priorities and any additional needs. For future topic selection, participants were asked "What topics would you like to discuss or learn about in future sessions?" with a free-form response. The responses ranged from single-word answers to short paragraphs. Responses were categorized and qualitatively coded to develop a weekly tally of the topics requested. For instance, this allowed the task force to determine in late May that the ECHO participants were requesting additional sessions on COVID testing and immune response. This weekly analysis of the postsession survey provided real-time information regarding what PCPs need to know during a pandemic and how that changes over time and allowed the task force to address these educational needs.

The research team also used in-session polling to gather information on clinical trends and practice management of COVID. These polling data often provided a snapshot of the experiences of PCPs across Colorado and were used by ECHO partners including professional medical organizations, the state health department, and others in their COVID response planning.

When a new topic was determined to be of interest and there was not an easily identifiable or accessible expert presenter, the research team was able to rapidly respond to participant learning needs. The team performed literature searches for peer-reviewed studies (both preprint and published) and reviewed the best available practice guidelines from the state health department, Centers for Disease Control and Prevention, National Institutes of Health, and World Health Organization, acknowledging the quickly changing nature of the emerging scientific literature around COVID. The team then synthesized the best available evidence-based medicine on the COVID-related topic and presented a summary during the next session.

Participants

At the time of submission, the COVID JiT ECHO had 655 total registered participants. The participants were 32% advanced practice providers, 31% physicians, 25% nurses, and 13% other, including pharmacists and health system leaders. Of the registered participants, 488 provided practice setting demographics. While most participants were located in Colorado (91%), the remaining 9% of participants were from 15 additional states across the United States (Wyoming, Oregon, California, New Mexico, Utah, Minnesota, Iowa, Oklahoma, Texas, Massachusetts, Tennessee, Maine, Louisiana, Virginia, Illinois). Within Colorado, 82% of participants practiced in an urban setting, 16% practice in a rural setting, and 2% in a frontier setting. Participants represented 42 of Colorado's 64 counties. The COVID JiT ECHO series averaged 134 participants per session from March through December.

The participants have often communicated the value of the COVID JiT ECHO, as evidenced by attendance levels remaining high throughout the course of the pandemic. As 1 PCP participant summarized: "You all (COVID JiT ECHO) ... have basically spoon-fed us the most up-to-date information on COVID-19 ... and have helped make our entire organization 'ahead of the curve.'"

Future Evaluation of Effort

Beyond the data mentioned previously regarding our reach thus far and the topics covered, the COVID JiT ECHO series continues to support practices across Colorado and will continue into 2021. Using a reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) framework, we will conduct a mixed-methods evaluation that will address the overall goal of implementing a similar effort and the individual steps toward reaching the goal of expanding the model supporting primary care practices.[3] RE-AIM is a planning and evaluation framework designed to enhance the

quality, speed, and public health impact of efforts to translate research into practice. Reaching the intended target population and effectiveness will be measured by changes in knowledge related to management of COVID at the community practice and individual PCP level. Adoption will be assessed by (1) the number of providers and practices that participate in the series; and (2) how often they participate. Implementation will be assessed by (1) feedback from providers about the implementation of practices or knowledge disseminated in the series; and (2) description of provider specific facilitators and barriers to implementation. Maintenance will be assessed by (1) the degree of continued participation in the series; and (2) continuation of changes by providers in their practice.

Comparative Dissemination

The case of the COVID-19 pandemic demonstrates the critical impact of a new information environment where there is constant information sharing. The very nature of the COVID JiT ECHO series was and continues to be dissemination of information and scaling of the effort as a dissemination multiplier. Traditionally, medical knowledge dissemination is accomplished through continuing medical education, professional medical organizations, and peer-reviewed publications; however, given the dynamic nature of COVID-19, it was necessary to provide a reliable and rapidly repeating multidisciplinary source that could be counted on for its adaptability and reliability. It was also imperative from a public health perspective, because information sharing can strongly influence behavior, debunk myths, disseminate accurate information for the public and decision makers, and, potentially, alter the effectiveness of public health measures. One worry was that with too much information streaming in, no one would know how to identify what was factual and what was not. The COVID JiT ECHO format has demonstrated itself as comparatively effective, indicated by the consistently high attendance over time. With no reduction in overall attendance for more than 10 months, providers have indicated that they have found a source of information they trust.

Discussion

The COVID-19 pandemic has brought about huge changes in the Colorado health care system and across the world, learning a great deal about critical components for an effective response. Unlike the COVID surges on the East and West Coasts, the COVID surges in Colorado began in rural areas and required an approach that incorporated PCPs and their communities.

The main purpose of our COVID JiT ECHO series was to provide PCPs with a centralized source of best practice knowledge and practice support through the ECHO model. The flexibility of the ECHO model proved an innovative method to address many nonclinical priorities, including telemedicine and reimbursement, business practice support, and shared experiences and stories providing the ability to connect and reduce isolation. Through a leverage of the collective wisdom of the primary care community and being responsive to the individual needs of providers, the COVID JiT ECHO series has become an integral part of the pandemic response for hundreds of PCPs across Colorado.

The COVID JiT ECHO also provided a platform for two-way sharing of information with the state health department. Close coordination with the state health department was a key feature in ensuring that the COVID JiT ECHO recommendations were up to date and aligned with the Colorado public health response. For the Colorado Department of Public Health & the Environment (CDPHE), it has been another meaningful way to connect directly with providers to disseminate information as well as to hear feedback from primary care communities. In several instances it led to partnerships between participants, presenters, and the state's pandemic response. It has also led to including topics or resources in CDPHE's Health Alert Network (HAN) broadcasts that might otherwise have not been included by alerting the health department to specific questions or needs among providers.

The following concepts were identified by the task force and ECHO Colorado leadership as being critical to successfully develop and implement the ECHO series and build the trust of participants that the series would be worthwhile to attend. (1) Using an existing infrastructure (ECHO Colorado) to rapidly aggregate and amplify trusted sources of information was a key component to success. This also allowed for leveraging strong pre-existing and new partnerships within the community and state. (2) The commitment and expertise of a dedicated

task force allowed for the continuation of the ECHO series over the length of the pandemic so far, despite the fatigue felt by providers and the health care community. (3) The research team was an important asset that allowed the COVID JiT ECHO series to be agile and responsive and to quickly present essential information. In addition, it provided a unique opportunity for continued education and professional development for displaced learners who are not able to participate in their normal clinical duties due to COVID-related cancellations. These learners directly contributed to and learned from the primary care community, while developing presentation, data analysis, and research skills. (4) The emphasis on the "just-in-time" nature of the rapidly evolving COVID pandemic with presenters' willingness to discuss what was known at the time and to interpret emerging evidence, rather than only sharing established best practices, helped built trust within the community of participants.

One unintended outcome of the COVID JiT ECHO series has been building a community of practice within the audience of PCP participants. While the intention of the "community voice" was to share best practices among providers and be responsive to the needs of communities, there have been examples of collaboration and empowerment of the COVID JiT ECHO community to effect change beyond the ECHO series. One example is a spin-off ECHO series called Primary Care Voice: Advocacy & Innovation Leveraged (PreVAIL), which focused on the power of storytelling to impact policy and advocacy for communities. The series has created a collaborative community of PCPs that, by sharing stories and analyzing current and local experience, is working to inform and leverage policy actions to mitigate the impact of COVID on patient access to primary care, realign primary care as foundational to the health care system, and improve health equity for disproportionately impacted communities.

COVID-19 continues to create new challenges that compound and highlight underlying problems in our health care system. As Colorado adapted to this new normal, the COVID JiT ECHO model was a critical component of a statewide system for responding to the pandemic. Subsequently, we are better prepared for a potential fall COVID-19 resurgence. This "just-in-time" series is an evolution of the traditional ECHO model and can serve as a potential tool in other states' and health care systems' responses in the future to share information with the primary care community.

While simultaneously working to improve the COVID JiT ECHO model using the RE-AIM framework discussed earlier, we are currently engaged with other states that implemented similar efforts in response to COVID-19. These collaborative comparisons will allow for development of meta-analyses and best practices to improve peer-mentored models that support health and disaster responses that meet the needs of the diverse communities we serve.

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