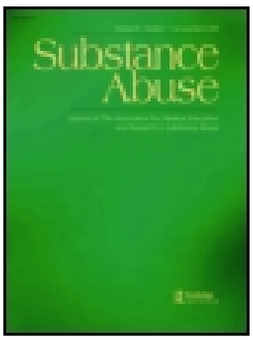

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Project ECHO and primary care buprenorphine treatment for opioid use disorder: Implementation and clinical outcomes

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ABSTRACT

Background: Our rural health system sought to (1) increase the number of primary care clinicians waivered to prescribe buprenorphine for treatment of opioid use disorder (OUD) and (2) consequently increase the number of our patients receiving this treatment. *Methods*: We used the Project for Extension for Community Health Outcomes (ECHO) tele-education model as an implementation strategy. We examined the number of clinicians newly waivered, the number of patients treated with buprenorphine, the relationship between clinician engagement with ECHO training and rates of buprenorphine prescribing, and treatment retention at 180 days. *Results*: The number of clinicians with a waiver and number of patients treated increased during and after ECHO training. There was a moderate correlation between the number of ECHO sessions attended by a clinician and number of their buprenorphine prescriptions ($r = 0.50$, $p = 0.01$). The 180-day retention rate was 80.7%. *Conclusions*: Project ECHO was highly effective for increasing access to this evidence-based treatment. The high retention rate in this rural context indicates that most patients are increasing their likelihood of favorable outcomes.

KEYWORDS

Opioid use disorder; medication assisted treatment; treatment retention rate; medications for opioid use disorder; primary care; buprenorphine; Project ECHO

Introduction

The American epidemic of opioid use disorder (OUD) requires the effective deployment of primary care. Since the 1990s, the increased availability of both prescription and illicitly produced opioids, combined with a complex mix of economic and social conditions, has led to a crisis of opioid use disorders and opioid overdose.[1] Current estimates are that approximately 1.6 million Americans have OUD, a significant undercount as institutionalized populations (e.g., those incarcerated or under civil commitment) are not included.[2]

Combined with the COVID-19 pandemic, the dual conditions at scale have created a syndemic[3,4]—a phenomenon where "social and environmental factors … promote and enhance the negative effects of disease interaction."[5] The consequences of this specific syndemic are stark.[6–8] Between June 2019 and May 2020, more than 80,000 Americans died from a drug overdose, the highest rate recorded in one year.[9] Fatalities climbed more than 30% year over year in many states.[10] OUD mortality is likely even higher, as overall deaths from drug use may be approximately twice that of overdose alone.[11] Increased access to effective, sustained treatment for OUD is urgently needed.[12]

Buprenorphine is a partial opioid agonist that allows patients with OUD to manage their symptoms of withdrawal and cravings without the euphoric effects of full-agonist opioids.[12] Treatment with buprenorphine improves quality of life while decreasing illicit opioid use, HIV risk behavior, and risk of overdose death.[12–16] The Drug Addiction Treatment Act (DATA) of 2000 and the Comprehensive Addiction and Recovery Act (CARA) of 2016 allow physicians, nurse practitioners, physician assistants, and certified nurse midwives to prescribe buprenorphine in the outpatient setting following completion of additional training, often referred to as a "DATA waiver."[17,18]

Office-based opioid treatment (OBOT) in primary care is an effective approach to treat OUD and reduce mortality in this vulnerable population.[19–24] Since 2003, American primary care clinicians have been treating OUD with buprenorphine as part of the comprehensive health care they offer patients. The primary care context frames OUD as a chronic health condition to be treated alongside others, thereby minimizing stigma, increasing retention, and improving patient health.[25] A recent analysis of the period 2010–2018 found that, among types of treatment providers, primary care clinicians demonstrated the largest increase in both buprenorphine prescriptions and improvement in 180-day retention

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rates.[26] With the acceleration of American overdose deaths, primarily from relentless westward expansion of illicitly manufactured fentanyl (IMF),[9,27] availability of this life-saving treatment is needed more than ever.

Once buprenorphine treatment begins, treatment retention is associated with multiple benefits. Longer retention correlates with reduction in illicit substance use and mortality, while improving social and occupational function and quality of life.[28,29] Interrupted buprenorphine treatment, conversely, is a strong predictor for return to substance use and mortality.[22] Unfortunately, retention rates in the United States are low. Systematic reviews find less than 50% of patients are retained at 180 days.[28] A 2018 study of OUD treatment with buprenorphine in a Medicaid population found a 180-day retention rate of 35.4%, based on prescription claims.[30] A 2013 examination of appointment attendance produced a similar 180-day retention rate of 35.7%.[31] Statewide data sets have found a median treatment duration of 53 days,[32] while a national study of pharmacy data determined six-month retention to be 29.3%.[33] CMS has recently adopted 180-day retention as a quality indicator.[34]

Despite the clear need for access to buprenorphine treatment in primary care and 15 years of encouragement by medical societies, patient advocates, community groups, and public health officials, there continues to be a shortage of active prescribers.[35–38] Even when clinicians receive a DATA waiver, they often do not prescribe buprenorphine or do so only for very few patients.[39] A Vermont study, for example, found that of 190 clinicians with waivers, 51% were treating either zero or one patient.[40] Effective implementation strategies to promote robust integration of buprenorphine prescribing into routine primary-care practice are needed.[25] Clinicians themselves identify the need for support beyond the initial waiver training to effectively implement this skill set into their practice.[32,41,42]

Tele-education is a cost-effective means of reaching primary care clinicians in rural areas and increasing their self-efficacy.[43,44] Project for Extension of Community Healthcare Outcomes (ECHO) is a tele-education model initially used to increase access to effective treatment for chronic hepatitis C in rural New Mexico, enabling patients with hepatitis C treated in primary care to have similar outcomes to those treated by a hepatologist.[45] Project ECHO uses hub-and-spoke videoconferencing to connect community-based primary care practices with an expert team (hub) and one another (spokes).[46] This model allows specialty knowledge to spread from the hub to the spokes, as well as practical, primary care–focused expertise to be shared among the spokes themselves. The Project ECHO model has since been used as a "force multiplier" to develop specialty care knowledge in primary care settings, consequently improving treatment and reducing health care disparities. Recognizing the strength of this model, in 2017 the Health Resources and Services Administration (HRSA) funded a national program—Opioid Addiction Treatment (OAT) Project ECHO—that included approximately 150 health centers.

Although Project ECHO is being implemented for a variety of health-care conditions around the United States (including buprenorphine for OUD),[47] there is little data on associated patient-level outcomes. The nature of the intervention (multiple spokes and de-identified patient information due to respect for privacy and HIPAA regulations) makes it challenging to evaluate related patient data. At least partially due to this challenge, most studies of Project ECHO have instead examined its impact on clinicians and surrogate markers for treatment.[43,48]

Our study evaluated Project ECHO as an implementation strategy and examined its impact on both implementation and clinical measures. We hypothesized that Project ECHO would be an effective tactic in closing the gap between the need for effective treatment for OUD and access to such treatment. Given Project ECHO's success in closing a similar gap in access to treatment for hepatitis C,[45] the model was a promising candidate for our intervention. The current study describes the implementation process of ongoing training, education, and case consultation through the use of Project ECHO, specifically to help primary care clinicians successfully prescribe buprenorphine for patients with OUD. The aims of this study are to: (1) describe implementation outcomes of the impact of Project ECHO on primary-care clinician prescribing of buprenorphine to treat OUD and (2) estimate patient retention in treatment at 180 days in order to compare this clinical outcome with other programs[49] and a CMS quality indicator.[34]

Methods

Study design

This study was conducted within a rural primary-care network embedded within a medium-sized hospital system in central New York state. ECHO-trained clinicians staffed eight clinics across three counties. Patients were primary care patients of these clinicians. This study measures both "implementation outcomes" and "clinical outcomes" in order to describe the impact of Project ECHO on these outcomes.[50] The study period includes patients who initiated treatment during the year-long ECHO or within the 18 months following completion of the ECHO.

Implementation strategy

We began with on-site training for physicians and advanced practice clinicians (including physician assistants and nurse practitioners), as well as nurses, support staff, and managers. We included nonclinical staff in an effort to improve overall buy-in to the intervention and reduce stigma about offering care for patients with OUD. There were two on-site trainings, each four hours in duration. The first focused on the medical model of addiction, harm-reduction principles, and efficacy of primary care treatment for OUD with buprenorphine. The second training was an American Society of Addiction Medicine (ASAM)-sponsored course that provided the first four hours of recognized training to count toward a clinician's DATA waiver. We encouraged participating clinicians to follow up by completing the additional required online training

(four additional hours for physicians, 20 additional hours for advance practice clinicians) to obtain their DATA waiver, to join us in upcoming Project ECHO meetings, and to encourage colleagues to join us for the ECHO as well.

Project ECHO started one month after the second on-site training in order to allow participants from the on-site trainings time to obtain their DATA waivers. Clinicians were encouraged to attend the ECHO regardless of whether they had attended the initial trainings or had their DATA waiver. ECHO meetings were offered once weekly in order to increase the confidence and competence of clinicians who had received their waivers. Meetings were 90 minutes each and followed the format described by Komaromy et al.[48] The ECHO hub was staffed by two experienced primary care physicians and one clinical psychologist with postdoctoral training in delivery of integrated behavioral health services. Participants were encouraged to join using a computer, tablet, or smartphone with a webcam that allowed all to hear and see one another. This approach allowed for sharing visual materials, including cases, presentations, and articles. Participants could also join by phone if they were unable to be at a computer. The Project ECHO ran for approximately one calendar year for a total of 44 sessions.

At every meeting, the Project ECHO hub provided a brief didactic presentation related to the treatment of patients with OUD. Topics focused on applying evidence to practice (e.g., treating acute pain in a patient taking buprenorphine, use of buprenorphine during pregnancy, and care for co-occurring mental health conditions). Other topics focused on communication strategies such as responding to intermittent opioid and other substance use, effective and therapeutic discussions of toxicology reports, and integration of trauma-informed and harm reduction approaches. Some topics were experiential, such as a patient treated with buprenorphine sharing their experience, or staff sharing their experience with team-based care. Additionally, some sessions included guest experts who offered insights into research and practice around successful implementation (see the Appendix). The majority of each meeting then consisted of one or two "spoke" clinicians presenting a de-identified case for which they sought assistance. Clinicians completed and submitted an online form beforehand with details of their case. This form was designed to collect necessary information as well as to guide clinicians' thinking concerning the case's relevant details. During the ECHO session, the completed form was screen shared with all participants as the presenter described pertinent details of the case. Other participants then asked clarifying questions and offered advice to the presenting clinician. A key element of the case consultation was a supportive, nonjudgmental atmosphere where clinicians could share difficult cases and actively work through uncertainty, stigma, and implicit bias.

This project also included an internal champion (first author), who initiated the collaboration between the two institutions, held meetings with hospital leadership to encourage endorsement, and regularly encouraged clinicians to participate. He also participated in the Project ECHO as a hub-spoke participant. The project was facilitated and supported with funds from the spoke institution's participation in New York State's Delivery System Reform Incentive Payment (DSRIP) project.[51]

Data analysis

Implementation outcomes

The analysis was limited to the 27 network primary care clinicians who participated in at least one of the Project ECHO sessions and obtained a DATA wavier within the study period. We examined the relationship between the degree of participation in Project ECHO sessions and the number of buprenorphine prescriptions ordered by each clinician during the study period. We used the number of prescriptions rather than new patients treated as a metric of success to ensure a unique identifier for each clinician (because of the collaborative nature of primary care in our network, the same patient can receive prescriptions from multiple network prescribers). Number of prescriptions is also a more granular indicator of buprenorphine treatment, because when the primary prescriber is unavailable, another waivered clinician can continue prescribing for established patients with OUD. We also tested the difference in the number of ECHO sessions attended by provider type using analysis of variance.

An X-Y scatterplot was generated which represented the number of Project ECHO training sessions attended by the clinicians versus the number of buprenorphine prescriptions ordered by those clinicians during the study period (January 2017–June 2019). Because the data did not satisfy a normal distribution, Spearman's correlation was used to measure the relationship between these two variables. All data analyses were performed using SAS version 9.3.

Clinical outcomes

In addition to investigating change at the clinician level as implementation outcomes associated with our intervention, we examined what patient-level outcomes were associated with the intervention.

Number of patients with OUD treated with buprenorphine

Any patient carrying a diagnosis of OUD and receiving a buprenorphine prescription from one of the trained clinicians during the study period was part of the study's cohort.

Retention rate

We examined the degree to which patients initiating treatment were retained. Our analysis adopted the 180-day time point for retention suggested as a quality indicator by CMS.[34] For each subject with an OUD diagnosis (any ICD-10 F11.x diagnosis), the index prescription was defined as the patient's first buprenorphine prescription occurring the day after the first Project ECHO session. Patients were defined as retained if they had at least one buprenorphine prescription written between 150 and 210 days (180 ± 30)

from the index prescription. Though different and less stringent than the definition of retention as typically reported in the literature,[33] this window around the 180-day (6-month) target allowed inclusion of patients receiving monthly prescriptions who remained active in care. All patients who started during the study period were followed for a minimum of 6 months. Any patient who started treatment after June 2019 was excluded from analysis because insufficient time had passed for them to be evaluated for 180-day retention at the time of data analysis. The proportion of retained patients was then calculated.

In order to validate non-retention, we reviewed the electronic medical record (EMR) for all patients who were not retained based on the definition above. During manual chart review, reasons for non-retention were categorized. In addition, we conducted detailed chart reviews of a 10% random sample who had retained in-treatment status in order to confirm these patients were actually retained and that the clinician prescribed buprenorphine to treat OUD (instead of chronic pain). Upon review, one of the retained patients was removed from the analysis because clinical notes indicated the patient was not being treated for OUD. Nine patients initially classified as non-retained were removed from the analysis when clinical review revealed no OUD diagnosis.

The Mary Imogene Bassett Hospital IRB exempted this project from continuing review (Figure 1).

Results

Implementation outcomes

Of the 22 clinicians who attended at least one of the in-person trainings, 19 obtained a DATA waiver and joined at least one ECHO session. Another eight clinicians who did not participate in an in-person training joined for at least one ECHO session to complete our sample of 27. Of the 27 clinicians, 23 (85.2%) treated at least one patient with buprenorphine. The number of sessions attended by each participant ranged from 1–32. Though physicians attended more sessions on average than did advanced practice clinicians, this difference was not statistically significant ($df = 26$, $F = 1.06$, $p = 0.31$). Table 1 includes comparative descriptors of participating physicians and advanced practice clinicians.

Figure 2 compares the number of Project ECHO sessions a clinician attended with their average buprenorphine prescriptions per month. The Spearman's correlation was $r = 0.50$ ($p = 0.01$).

Clinical outcomes

The number of patients initiating buprenorphine treatment with a participating clinician steadily increased over the course of the study, from zero to 270 patients. Treated patients had a mean age of 35 years and 45% (122/270) were female (Figure 3).

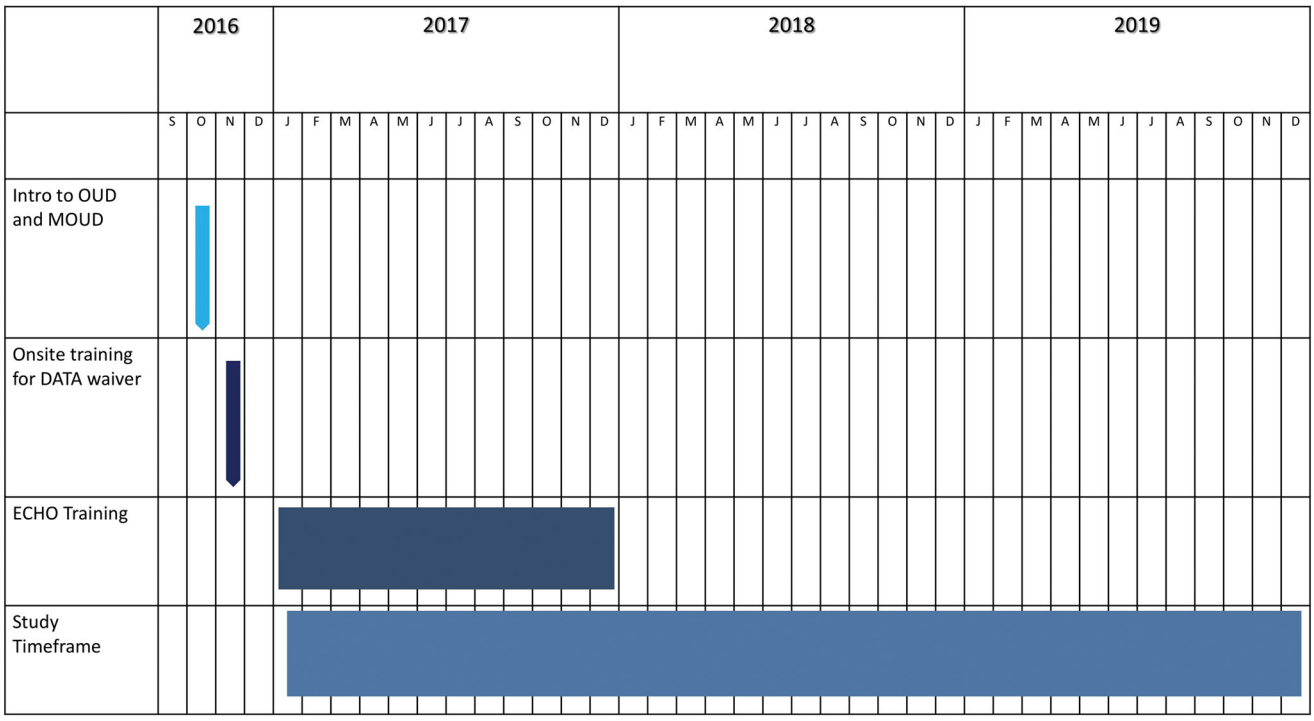

Figure 1. Summary of intervention and data collection.

Table 1. Descriptors of primary care clinicians participating in Project ECHO.

	MD/Dos ($n = 16$)	APC's* ($n = 11$)
% Female	50.0%	72.7%
Treated at least one patient with buprenorphine	93.8%	72.7%
Average number of ECHO sessions	11.8	8.2
Average buprenorphine prescriptions per month	9.13	8.83

*APC = Advanced Practice Clinicians; includes nurse practitioners and physician assistants.

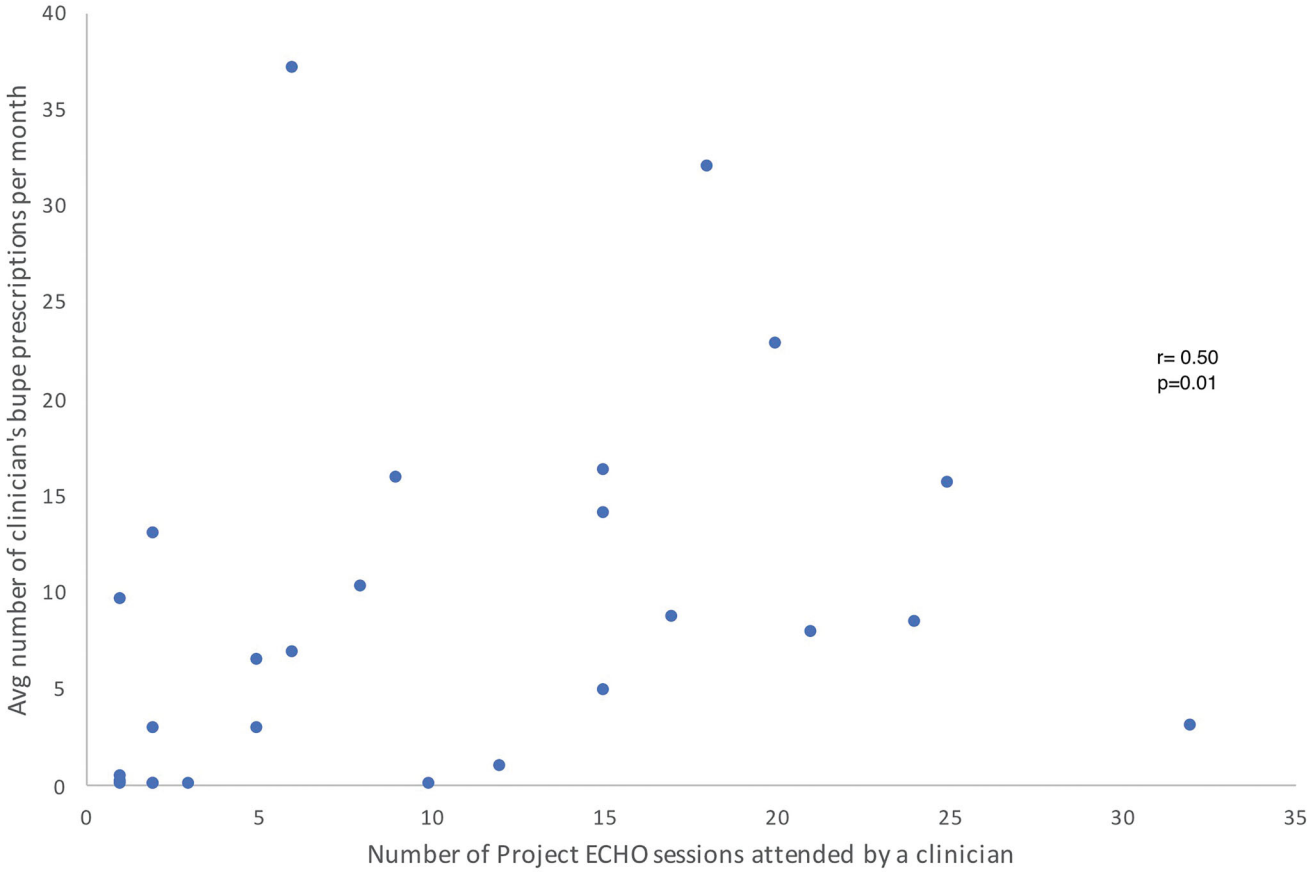

Figure 2. Relationship between number of ECHO sessions attended by each clinician and number of each clinician's buprenorphine prescriptions per month.

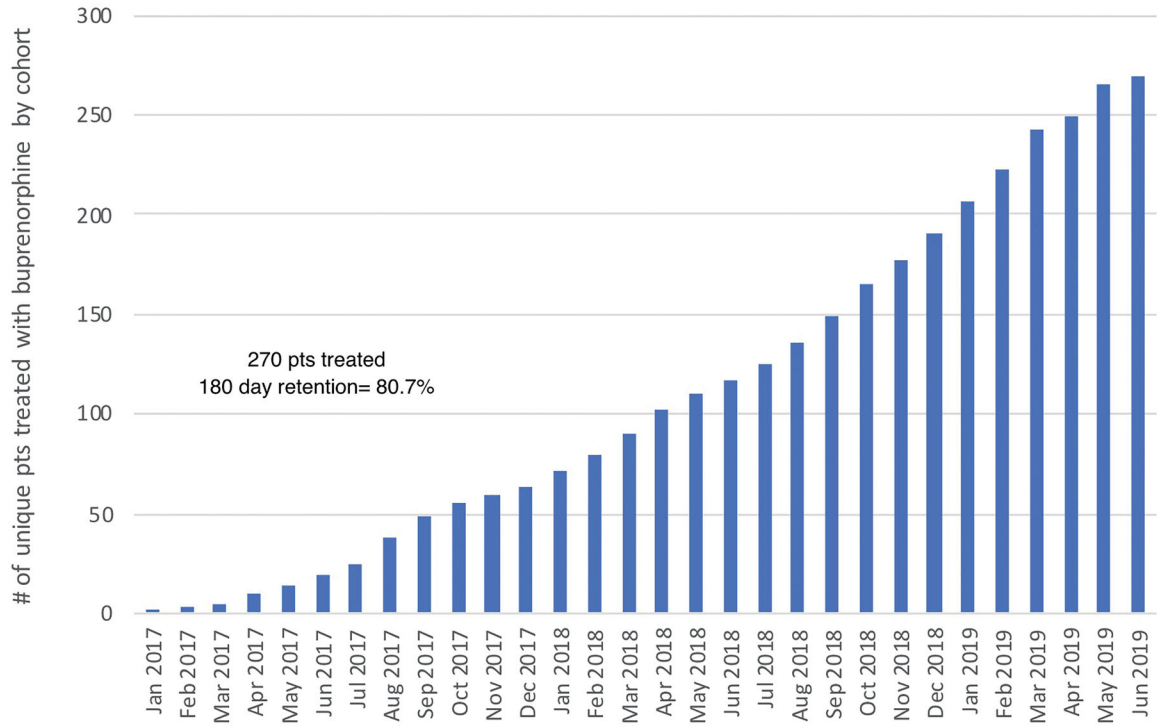

Figure 3. Number of patients with OUD initiating treatment with buprenorphine over study period.

Treatment retention

Two hundred seventy patients with an OUD diagnosis initiated buprenorphine treatment during our analysis period. Two hundred eighteen patients (80.7%) were retained in this treatment at 6 months (180 days). Manual chart review categorized the following reasons for the 52 patients who were

not retained: lost to treatment (12), transferred care outside of our system (11), incarcerated before completing 180 days of treatment (8), patient decided to stop buprenorphine (7), patient did not follow treatment agreement (5), insurance problems (5), medication change (2), moved out of the area (1), and death (motor vehicle accident; 1).

The 218 retained patients received an average of 14.2 buprenorphine prescriptions of various durations between their initial prescription and the subsequent 6 months. The number of prescriptions ranged from 5–35 ($SD = 5.33$). This broad range is consistent with what we would expect with a patient-centered approach to OUD care because the duration of prescriptions must be adjusted to meet the needs of patients based on individual circumstances (e.g., tailoring dose, adjusting length of prescription based on stability of control of OUD).

Discussion

This study's results demonstrate the feasibility and effectiveness of a tele-education framework to expand access to buprenorphine in rural primary care. The number of DATA-waivered primary care clinicians increased and a substantial majority (85.2%) of these DATA-waivered clinicians prescribed buprenorphine to patients during the study period. Two hundred seventy unique patients were prescribed buprenorphine to treat OUD and a substantial majority (80.7%) of patients were retained in treatment for at least 180 days.

Primary care systems must be responsive and adequately equipped to address epidemics ranging from COVID-19 to OUD, as well as their related syndemics. More than 20 years of research has demonstrated the benefits of making buprenorphine available to patients in primary care practices. However, primary care clinicians in general have been slow to adopt buprenorphine prescribing.[38–42] As a consequence, access to evidence-based treatment remains inadequate, particularly in rural communities. Our evaluation demonstrates that integration of substance use disorder treatment into primary care is feasible, achievable, and effective.

In the setting of the COVID-19 pandemic, government agencies have intentionally relaxed or even suspended regulations regarding buprenorphine initiation and treatment.[6–8,52] DATA waiver requirements themselves were lifted in January 2021 to allow any physician to immediately prescribe buprenorphine for up to 30 patients.[53] While this action is pending review with the new administration, we may soon have a future where impediments to primary care treatment of OUD are no longer regulatory but largely ones of medical capacity and culture.

In such a situation, an immediate increase of treatment availability is one possible and hopeful outcome. However, developing capacity in primary care practices is often complicated and difficult work, especially for a stigmatized and marginalized condition.[54,55] Project ECHO was able to succeed in spite of challenges. Our clinician engagement and patient retention compare favorably with other published reports. In the context of Olfson et al.'s recent analysis demonstrating that only a minority of patients reach 180 days of treatment,[26] our project demonstrates an approach for improving treatment retention. Primary care is well-suited to managing chronic disease, accustomed to offering comprehensive, whole-person care, and has the flexibility to detect and respond to epidemics. An implementation strategy—in this case Project ECHO—facilitating adoption of buprenorphine provision as part of primary care offers significant promise.

Three aspects of this approach are worth highlighting. First, the health system invested financial resources in the project, made possible through a statewide healthcare reform project (DSRIP) funding innovative projects such as addressing care of patients with substance use disorders.[51] Second, the health system assigned responsibility for implementation to an internal champion who may have been critical to the project's success. The outcomes achieved in this project may not have been possible without these two investments. In a recent exploratory study, for example, only three of 10 non-prescribing clinicians reported they were prescribing 6 months after the start of a 16-week Project ECHO.[47] Achieving significant increases in OUD care may require actions in addition to the ECHO sessions themselves. Finally, the intervention encouraged application of low-threshold, harm-reduction principles which have been successful in other settings.[20,56] These principles likely contributed to the high retention rate and offer patients the possibility of a nonlinear recovery. Low-threshold treatment with buprenorphine offers patients the hope of meaningful improvement, though they may experience the challenges characteristic of substance use disorders and other chronic health conditions commonly managed in primary care.

It is vital that we sustain and expand our health system's initial effort to implement treatment of OUD into primary care. Future analysis will examine whether continued investment in Project ECHO is necessary to achieve similar results in other clinic settings, or whether our internal core of trained primary care clinicians can successfully encourage their colleagues to treat OUD with buprenorphine.

This study has some limitations. Because the clinicians were volunteers, they may not be fully representative of primary care clinicians as a group. The program evaluation was conducted as a retrospective analysis of real-world treatment, rather than a prospective study. The study was conducted within a single health system in a particular geographic area of the United States, and had atypical resources to implement the Project ECHO. Finally, analysis of treatment retention was based on EMR review, as opposed to review of verified, dispensed prescriptions. Because a recent analysis of national retention rates was based on pharmacy data of dispensed prescriptions and considered patients non-retained if there was a gap of seven days or more without buprenorphine, our 180 day retention rate cannot be directly compared to its rate of 29.3%.[33] Considering patients who still receive buprenorphine prescriptions from their clinician after 180 days as "retained," however, is more consistent with a harm-reduction, chronic

disease care approach and more replicable for further practice-based research.

Future study of Project ECHO to enable primary care–-based OUD treatment should focus on identifying the necessary ingredients for success, such as primary care practice characteristics. Future studies might also investigate how to effectively support clinicians having difficulty integrating OUD care into their practice. Determining the optimum "dose" of Project ECHO sessions (their duration and frequency) to achieve effective clinician engagement and patient outcomes would also assist health-care systems and individual practices. A multi-health-system randomized clinical trial would help establish a causal impact on treatment retention from a strategy based on Project ECHO and an internal champion. Finally, a more detailed analysis of the patients who did not remain in treatment beyond six months would help improve efforts to increase retention.

This study describes a much-needed process to assist in addressing the opioid epidemic. Project ECHO for OUD—emphasizing a compassionate, data-driven, low-threshold, harm-reduction approach—facilitates initiation and continuation of life-saving treatment in the trusted setting of primary care. Though there is no magic-bullet solution to this devastating and crippling public health problem, this study describes a process that is feasible for primary care clinicians and their colleagues, as well as a method of estimating 180-day retention that is realistic for primary care practices and consistent with a harm-reduction model of care.

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Author contributions

Dr. Anderson: Project ECHO co-leadership; design and delivery of project; conception of study; data analysis; and writing, editing, and review and approval of manuscript.

Dr. Martin: Leading Project ECHO and developing its educational content, design, and delivery of the project as well as the writing and editing of the manuscript.

Dr. Gadomski: Conception of the study, study design, analysis, and review and approval of the manuscript.

Ms. Krupa: Data analysis, writing and editing of results section, and review and approval of the manuscript

Dr. Mullin: Design and delivery of the project as well as the writing, editing, and review and approval of the manuscript.

Dr. Cahill: Co-leading Project ECHO and developing its educational content, writing, editing, and review and approval of the manuscript

Dr: Jenkins: Data analysis, writing and editing of results section, and review and approval of the manuscript

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Appendix. List of weekly project ECHO didactic topics.

Project ECHO topics	
Week	Topic
1	Introduction to medication assisted treatment for primary care clinicians
2	Potential negative effects from Buprenorphine
3	Buprenorphine induction (part 1)
4	Buprenorphine induction (part 2)
5	OUD: diagnostic criteria & tips for assessment
6	Acute pain management for patients on buprenorphine maintenance
7	Guest presenter: nurse coordinator on nursing's role in treatment
8	Patient experience with buprenorphine treatment (with patient participating in didactic)
9	Coordinating buprenorphine care across a health center
10	Presentation and discussion of a recent low-threshold buprenorphine study
11	Taking a harm reduction approach: practical skills for clinicians
12	Extended-release injectable naltrexone for OUD
13	Predictors of buprenorphine success and failure
14	American Society of Addiction Medicine (ASAM) conference presentations (selections)
15	Clarifying terms: opioid therapy, misuse or abuse, and addiction
16	Buprenorphine in chronic pain management
17	Buprenorphine misuse and diversion
18	Toxicology testing for patients with OUD
19	Discussions with patients about relapse
20	Voices of people affected by substance use disorders
21	Perinatal care for OUD
22	Approaches to OUD
23	Guest presenter: a clinical nurse manager
24	Differential diagnosis in return to use in OUD
25	Acute pain in OUD
26	Co-occurring psychiatric illness in OUD
27	Trauma-informed care for OUD
28	Guest presenter: low-threshold opioid pharmacological treatments
29	Buprenorphine: evidence on treatment duration, tapering, and discontinuing
30	Guest presenter: smoking cessation in the context of OUD
31	Unconscious bias
32	Guest presenter: a retail pharmacist's perspective
33	Co-occurring disorders: anxiety and post-traumatic stress disorder
34	Engaging families in treatment
35	Care for chronic hepatitis C virus infection
36	Motivational interviewing
37	Recent updates in buprenorphine care
38	Updates in care for OUD
39	Care for pain in OUD
40	Practical approaches for anxiety care
41	Guest presenter: care for OUD
42	Guest presenter: methadone and care for OUD
43	Guest presenter: communities and public policy for OUD
44	Reflections on care for OUD at Bassett