Improving Pediatrician's Behavioral Health Competencies Through the Project ECHO Teleconsultation Model

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Abstract

Project ECHO (Extension for Community Healthcare Outcomes) is a teleconsultation model for enhancing the treatment of underserved patients in primary care. Previous behavioral health (BH) adaptations of Project ECHO have primarily focused on adults or specific diagnoses and have relied on self-reported outcomes. The purpose of this pilot was to adapt Project ECHO to support pediatric primary care providers in addressing common BH needs and to conduct an initial evaluation of its effectiveness. Overall, participants reported high levels of satisfaction and a statistically significant improvement in their overall knowledge and skills ($P = 0.001$). Participation was also associated with a reduction in the use of psychotropic polypharmacy. This pilot adds to a growing body of literature suggesting that Project ECHO is a promising workforce development approach to build competencies for the management of BH issues in primary care.

Keywords

telehealth, behavioral health, project ECHO, teleconsultation, primary care

The behavioral health (BH) needs of children are prevalent, pervasive, and insufficiently addressed. Epidemiological research estimates that 13% to 20% of children and adolescents in the United States meet criteria for a mental health diagnosis,[1] and ~1 in 5 children experience impairment-related BH difficulties without meeting full criteria for diagnosis.[2] Due to a myriad of barriers (eg, access, stigma, and cost), ~75% of youth with a mental health disorder do not receive needed treatment, and it is likely that even fewer children and adolescents with subclinical symptoms receive the treatment they need.[3,4] One particularly concerning barrier is the insufficient supply and inequitable distribution of BH providers, including child and adolescent psychiatrists, psychologists, and developmental-behavioral pediatricians.[5]

As a result of these shortages, primary care providers (PCPs) are often the first and only contact for youth needing BH care.[6] Despite being the de facto BH providers for a majority of youth in the United States, PCPs report a lack of comfort, knowledge, skills, and time to manage these concerns and that BH conditions other than attention-deficit hyperactivity disorder (ADHD) are outside of their scope of practice.[7,8] Even in the face of these concerns, PCPs, as well as mental health specialists, are increasingly using psychotropic polypharmacy to treat BH needs, particularly for children enrolled in Medicaid or in the foster care system. This practice is often not evidence-based and increases the risk of long-term metabolic and neurologic side effects. The American Academy of Pediatrics has released competency statements emphasizing the need to increase PCPs ability to manage BH needs within primary care,[9] technical reports about how to achieve these competencies,[10] and mental health toolkits and guidelines to support PCPs in delivering BH services within primary care.[11-13] While these are important steps in addressing this need, they are often not in themselves sufficient to support PCPs in doing this work.[14-16]

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The American Academy of Pediatrics technical report for achieving increased competencies in BH care highlights coordinated consultation models (eg, Massachusetts Child Psychiatry Access Project [MCPAP]) as a promising way to support PCPs in meeting the BH needs in their practice.[10] The MCPAP model extends traditional telehealth models that focused on providing direct patient care to building the knowledge and competence of PCPs through case-based consultation.[17] While this has been an effective model, the learning is limited to one individual PCP at a time as they call in with specific consultation questions for the PCP.

Another emerging model of coordinated consultation is the Project Extension for Community Healthcare Outcomes (Project ECHO).[18] Project ECHO utilizes a teleconsultation model wherein a team of specialists (termed the hub) facilitates learning and shared expertise to community providers (termed spokes) over a videoconferencing platform. Project ECHO facilitates learning using 3 hypothesized avenues. The first is "evidence-based didactics," where hub team members lead brief presentations to build spokes' content knowledge. Second, case-based learning advances the comfort and competence in spokes through "learning loops." During case-based learning, spokes present cases, and the hub team facilitates structured case-consultation wherein spokes and the hub team ask clarifying questions and provide recommendations. The learning process that occurs among spokes in addition to the transactional learning between spokes and the hub team is what creates a "learning loop." Thus, Project ECHO not only expands the competence of the PCP presenting the case, but also to all spokes and hub team members participating in the tele-ECHO clinic. This shared knowledge across the spokes and hub team gained through the learning loops is the third learning avenue termed "knowledge networks."

While Project ECHO was originally applied to improving the care of underserved patients with hepatitis C,[19] it is increasingly being used to support PCPs in the delivery of effective BH practices.[20,21] However, there has been limited pediatric BH adaptations for pediatricians, and the few that have been developed tend to focus on a single BH disorder. One of the few established pediatric BH ECHO adaptations has been used to train PCPs in underserved areas to effectively screen and diagnose young children at high risk for autism spectrum disorders.[22-24] Furthermore, most of the previous evaluations of Project ECHO for pediatric BH needs have relied on subjective self-report measures of knowledge and competence change with no previous studies measuring objective changes in clinical outcomes or clinical practice.

Thus, the purpose of this article is to describe an adaptation and evaluation of Project ECHO designed to address the array of common BH needs within pediatric primary care. Consistent with previous research on disorder-specific pediatric ECHOs, the authors hypothesized that PCPs would find pediatric BH ECHO satisfactory and subjectively report improved knowledge, competence, and improved practices. This study also sought to evaluate whether participation in this ECHO would result in actual changes in the psychotropic prescribing practices of PCPs. Specifically, the authors hypothesized that the use of polypharmacy would reduce after participation in Project ECHO.

Methods

Participants

Participants were pediatric PCPs in the first cohort of pediatric BH ECHO. This first cohort had 20 medical providers enrolled at the start of the project across 7 practices serving a total of 28 974 children and adolescents. Eight (40%) participants were doctors of medicine (MD), 5 were doctors of osteopathic medicine (DO, 25%), and 7 (35%) were advanced nurse practitioners. Six practices were located in a rural setting, with one practice located in a suburban setting. Most practices were contracted and recruited through the accountable care organization, Partners For Kids (PFK); however, a few rural practices that were not contracted with PFK were also invited based on the perceived needs of the community. PFK is an accountable care organization affiliated with Nationwide Children's Hospital in Columbus, Ohio, which oversees pediatric Medicaid recipients in 34 central and southeastern Ohio counties. PFK has contracted with over 1000 PCPs in 75 community practices. Practice selection was determined by the geographic location, proportion of children presenting with BH concerns to the practice, and prior engagement in the quality improvement program with PFK. Participants earned continuing medical education (CME) credits for participating.

Measures

Participants completed CME evaluation forms after each session and a pre- and post-knowledge and competency assessment after completion of the pediatric BH ECHO. The authors developed all measures after reviewing existing CME evaluation forms and measurement of outcomes used in previous evaluations of BH-oriented ECHOs. Measures were completed online using Research Electronic Data Capture (REDCap), a web-based data collection system.[25]

Table 1. Session Order, Domain, and Satisfaction[a].

Session and content (n)	Information was presented effectively	Matched scope of practice	Added value to knowledge
1. Overview of ECHO (n = 5)	100%	100%	100%
2. ADHD (n = 13)	100%	100%	100%
3. Depression (n = 16)	93%	100%	93%
4. Anxiety (n = 13)	100%	92%	100%
5. Aggression (n = 2)	100%	100%	100%
6. PTSD (n = 12)	100%	100%	100%
7. Mood (n = 9)	100%	57%	100%
8. Kids who cut (n = 9)	100%	89%	100%
9. Substance use (n = 10)	100%	90%	100%
10. Gender Identity (n = 10)	100%	90%	100%

Abbreviations: ECHO, Extension for Community Healthcare Outcomes; ADHD, attention-deficit hyperactivity disorder; PTSD, posttraumatic stress disorder; CME, continuing medical education.
[a]Percentages represent the number of respondents to CME evaluation forms who selected Agree or Strongly Agree divided by the total number of respondents.

Satisfaction. Continuing medical education forms included 3 Likert-type scale items assessing satisfaction with 5 response choices ranging from "Strongly Disagree" to "Strongly Agree." Items assessed whether the speaker effectively presented information during the didactic, the content matched the participants' scope of practice, and added value to their overall knowledge.

Self-Reported Knowledge and Competence. Participants completed a survey after the completion of pediatric BH ECHO that asked them to assess their knowledge and competence across a range of areas using the slider feature in REDCap that ranged from 0 ("Strongly Disagree") to 100 ("Strongly Agree") before and after participation in ECHO. Domains assessed include their ability to diagnose and differentiate between mental health conditions, use evidence-based screening tools, provide education and resources regarding BH conditions, deliver evidence-based behavioral interventions, effectively prescribe psychotropic medication, and ability to persuade families to follow through with BH referrals. The measure also assessed their self-reported knowledge of relevant prescribing guidelines, nonpharmacological treatment modalities, and effective referral practices.

Self-Reported Practice Changes. Continuing medical education evaluation forms also assessed how likely the session was to result in practice changes (ie, "Not Likely," "Possibly," and "Definitely") across a range of practices including diagnostic approaches, screening processes, treatment and/or management, and clinical procedures, as well as patient education and self-management.

Prescribing Behavior Changes. Psychotropic polypharmacy was defined as 3 or more psychotropic medications prescribed to children between the ages of 6 and 18 years. The authors identified and categorized the psychotropic medications using the national drug code drug list issued by Healthcare Effectiveness Data and Information Set, a widely used set of performance measures in the managed care industry, developed and maintained by the National Committee for Quality Assurance. Medicaid claims data were used to analyze the pharmacy claims generated for psychotropic medications prescribed by the providers for children between the ages of 6 and 18 years. The changes in prescribing behaviors were assessed by establishing the baseline of psychotropic polypharmacy for the period of 1 year prior to participation in Project ECHO and comparing it with the same measure each month after the start of the program.

Procedure

Pediatric Behavioral Health ECHO. The pediatric BH ECHO used in this study included 2 primary components: a brief (15-20) minute didactic on the BH topic of the session followed by case-based learning. Hub team members included a family advisor, clinical pharmacist, social worker and community outreach specialist, pediatric primary care psychologist, and child/adolescent psychiatrist. The complete list of covered BH topics and the order of presentation is presented in Table 1. Didactics were led by hub team members who had expertise in the associated topic area and included information on diagnostic considerations, evidence-based screening processes and tools, key educational

"pearls" to share with families, an overview of evidence-based non-pharmacological interventions, prescribing guidelines and evidence-based prescribing practices, how and when to refer, and information on local BH resources. Spokes submitted active BH cases for case-based learning and consultation facilitated by a hub team member. The case-based learning process followed the Project ECHO format and included an initial case presentation by a spoke member, followed by clarifying questions first asked by spokes then hub team members and then recommendations in the same order. The hub team summarized and documented all appropriate recommendations, collected related resources, and distributed them to the spokes. Participants also received access to a cloud-based resource toolkit that included videos of the didactics and related resources (eg, handouts, publicly available and validated screeners, and local resources). The pediatric BH ECHO consisted of 10 tele-ECHO clinics that occurred every other week and were 60 to 70 minutes in duration.

Analysis

Authors used descriptive statistics (eg, mean, mode, range, standard deviations, and percentages) to describe the sample and variables of interest. To compare changes in self-reported pre- and post-knowledge and competence ratings, authors conducted Wilcoxon signed-rank tests, a nonparametric statistic, due to nonnormal data distribution. Effect sizes (r) were calculated for Wilcoxon signed-rank tests by dividing the absolute value of the Z statistic by the square root of N (ie, the number of comparisons). The effect size of 0.1 is considered small, 0.3 moderate, and 0.5 large.[26]

To evaluate the change in prescribing practices, we used statistical process control (SPC) techniques to determine if there were changes in our primary outcome measure of "% of patients with psychotropic polypharmacy." We calculated the proportion of 6- to 18-year-old patients who were prescribed 3 or more psychotropic medications out of all the 6- to 18-year-old patients established at the 7 practices enrolled in this ECHO. The proportion was expressed as a percentage and plotted on a P chart, a specific type of SPC chart or Shewhart chart.[27] We calculated the monthly percentages of patients with polypharmacy from the beginning of 2018 through September of 2019. The mean of 2018 monthly data is held constant and fixed the control limits to establish a baseline.[27] The authors added new data from January 2019 while holding the baseline constant to study the variation induced by participation in pediatric BH ECHO. The standard SPC rules were used to identify special cause variation versus common cause variation and to identify where a statistically significant shift in centerline (mean) has occurred.[28]

Table 2. Details of Cases Presented[a].

	Number of cases (percentage)
Biological sex male	5 (71%)
On medication	3 (43%)
Receiving non-medication intervention	5 (71%)
Current BH diagnosis	
ADHD	4 (57%)
Anxiety	4 (57%)
Attachment	1 (14%)
Behavior disorder	1 (14%)
Depression	1 (14%)
Eating disorder	1 (14%)
Gender dysphoria	1 (14%)
Learning disorder	1 (14%)
Obsessive compulsive disorder	2 (29%)
Substance use	1 (14%)
Type of consult question	
Diagnostic formulation	2 (29%)
Medication management	4 (57%)
Non-medication management	4 (57%)
Resources	5 (71%)

Abbreviations: BH, behavioral health; ADHD, attention-deficit hyperactivity disorder.
[a]N = 7 cases.

Results

An average of 7 spokes attended each tele-ECHO clinic and an average of 9.9 CME evaluations were completed across tele-ECHO clinics. Seven cases were submitted across the 9 tele-ECHO clinics wherein cases-based learning was on the agenda (ie, the first clinic was an orientation and did not have time dedicated to discuss a case). Patients discussed during cases ranged from 6 to 13 years of age and most commonly had a diagnosis of ADHD and/or anxiety. The most common needs identified by the case presenter were resources as well as pharmacological and non-pharmacological treatment recommendations. Additional details about the cases submitted are presented in Table 2.

Do Providers Find Pediatric BH ECHO Satisfactory?

Participants reported high levels of satisfaction across all 3 domains except for the mood disorders session (see Table 1 for full details). In the mood disorder session,

Table 3. Self-Reported Knowledge and Competence Changes.

Outcome	Pre mean (SD)	Post mean (SD)	*P*	Effect size[a]
Overall change across domains	61.13 (16.00)	78.22 (6.63)	.001	0.62
Supporting referral follow through	61.69 (22.50)	69.92 (17.77)	.016	0.16
Knowing local resources	70.08 (18.83)	79.85 (14.06)	.019	0.19
Able to effectively prescribe	60.00 (24.61)	73.69 (16.71)	.047	0.39
Diagnosing	62.85 (22.02)	78.38 (14.70)	.006	0.54
Evidence-based interventions	51.31 (27.22)	74.54 (14.28)	.005	0.55
Screening tools	67.77 (25.07)	84.15 (12.10)	.002	0.60
Knowing prescribing guidelines	64.46 (17.77)	84.08 (10.69)	.002	0.60
Non-pharmacological interventions	57.77 (19.32)	79.23 (11.81)	.002	0.60
Providing education and resources	55.08 (16.05)	80.15 (11.18)	.001	0.62

[a]Effect sizes are as follows: small is 0.1, moderate is 0.3, and large is 0.5.[26]

57% of respondents felt that the content matched their current or potential scope of practice. While this is significantly lower than other content areas regarding scope of practice, it is important to note that 100% of respondents felt that the speaker presented information in the mood disorders clinic effectively and that the content of the clinic added value to their overall knowledge.

Does Pediatric BH ECHO Improve Self-Reported Knowledge and Competence?

Thirteen out of 20 participants completed the post-test assessing self-reported knowledge and competence changes, resulting in a completion rate of 65%. Participants completing the survey reported statistically significant increase in knowledge and competence across all domains assessed (see Table 3). When comparing pre- and post-knowledge and competence across all domains, pediatric BH ECHO resulted in a statistically significant improvement ($P = .001$) with a large effect size ($r = 0.62$). Large effect sizes were observed for increased ability to diagnose, use evidence-based screening and intervention practices, provide education and resources, knowledge of non-pharmacological interventions, and knowledge of prescribing guidelines. Improvements in self-reported prescribing ability were in the moderate range, while improved knowledge of local resources and ability to support referral follow-through were in the small range.

Does Pediatric BH ECHO Result in Self-Reported Practice Changes?

All participants reported that they were at least "possibly" likely to change their practice across all practice domains and BH topic areas covered. Participants were most likely to report making "definite changes" to their treatment/management practices (97%) and patient education/self-management recommendations (95%). The least likely domain for "definite change" was improving clinical procedures with 73% of respondents reporting they would definitely make changes to clinical procedures. Eighty-five percent reported that they would "definitely change" their diagnostic approach and 82% reported definitely changing their screening processes after participation in pediatric BH ECHO.

Does Pediatric BH ECHO Result in Objective Prescribing Practice Change?

A monthly average of 1782 patients satisfied the criteria of age, polypharmacy, and management by a participating ECHO community practice. In the baseline period from January 2018 to December 2018, an average of 2.8% of the patients were prescribed 3 or more psychotropic medications. After implementing the ECHO sessions, the percentage dropped to 2.2% in March 2019. Although the percentages varied slightly between 2.1% and 2.3%, the average consistently stayed below the 2018 baseline of 2.8%. Using the standard SPC rules for *P* charts, we plotted a second process stage at 2.2% (a new centerline) from March 2019 and updated the corresponding control limits with this new process stage. This second process stage represents a 21.4% reduction from baseline. The reduced percentage of patients with polypharmacy continues to sustain at a lower level for the rest of 2019 (see Figure 1).

Discussion

Previous BH adaptations and investigations of Project ECHO have largely focused on adult populations or within specific diagnostic populations.[20,22] Furthermore, outcome assessment in these previous evaluations was

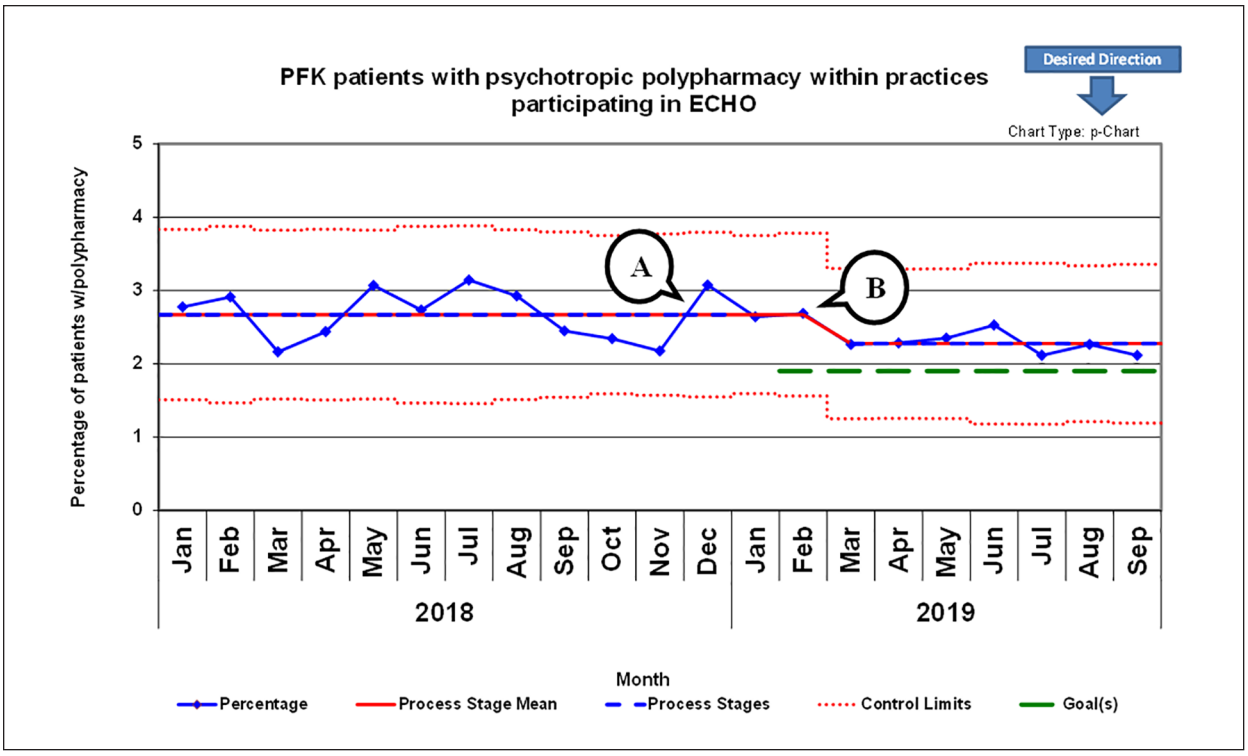

Figure 1. A Shewhart chart of percentage of patients with psychotropic polypharmacy from January 2018 to September 2019. The percentages in 2018 are locked in as the baseline average of 2.8% and shown as the first blue dashed line. At point A, community practices are enrolled; at point B, the ECHO sessions began. New average of 2.2% is shown by the second blue dashed line. The red dotted lines represent control limits set at ±3 standard deviation from the mean. The green dashed line represents the goal of 1.9%. PFK, Partners for Kids; ECHO, Extension of Community Health Outcomes.

limited to self-reported changes in knowledge, attitudes, and practice. The purpose of this pilot was to adapt Project ECHO to support PCPs in addressing the common BH needs seen in pediatric primary care practices and conduct an initial evaluation of its effectiveness.

The results of this pilot demonstrate that PCP satisfaction was high, consistent with previous examinations of Project ECHO.[22,23,29] The only area in which providers felt that the content was outside of the scope of their practice was the advanced mood disorders (eg, bipolar depression, disruptive mood dysregulation disorder) tele-ECHO clinic. This finding is not unexpected as the advanced mood disorder clinic was created to be an advanced clinic that extended beyond unipolar depression with the goal of helping PCPs identify the true limits of their competence in this area. The fact that the providers in this study only found one topic area to be beyond the scope of their practice is important as previous research has demonstrated that PCPs generally find BH needs beyond ADHD to be outside of the scope of their practice.[7] While we were careful to tailor pediatric BH tele-ECHO clinics to meet the developmental needs of PCPs, self-selection bias may have also contributed to this finding. That is, the provider's electing to participate in pediatric BH ECHO may be more interested in delivering BH interventions and therefore believe that these needs are more within their scope than the average PCP.

Consistent with previous research, participating PCPs reported statistically significant increases in their self-reported knowledge and competence across all domains assessed.[29] PCPs reported large increases in knowledge of non-pharmacological interventions as well as knowing prescribing guidelines for psychotropic medications. PCPs also reported large improvements in their diagnostic skills, the ability to use evidence-based screening tools, provide education and resources, and implement evidence-based interventions and moderate perceived improvement in their ability to prescribe psychotropic medications effectively. Thus, the results of this study demonstrate that the pediatric BH ECHO is a promising strategy to increase PCPs' self-reported knowledge and competence in their ability to screen, diagnose, provide education, and deliver both pharmacological and non-pharmacological interventions for common BH needs. This finding is particularly

important for pediatric BH given previous research demonstrating that PCPs provide the majority of BH care despite not feeling knowledgeable, competent, or comfortable in managing BH needs in patients.[8]

Although statistically significant, PCPs reported only small improvements in their knowledge of local BH resources. Participating PCPs' pre-knowledge of local resources was the highest of all domains and that may have contributed to the small size of this effect. Many PCPs also lived in areas with limited access to local resources, which may have been confused with a lack of knowledge. That is, providers may have learned all of the local BH resources available to them; however, given the lack of resources available, PCPs may have felt as though there should be more. PCPs also reported only small increases in their ability to support families in following through with BH referrals. Supporting linkage to outpatient BH services is a difficult task and is a common frustration among PCPs. In fact, two thirds of PCPs report that they struggle to obtain BH services for patients, which was double the rate for other specialty services.[30] Thus, these findings of small effects may be indicators of factors limiting patients' access with BH care that are outside of PCPs knowledge of resources and competence in supporting follow through with referrals.

In addition to changes in knowledge and competence, PCPs participating in pediatric BH ECHO also reported a high likelihood of changing their practice due to the information and skills learned, consistent with previous research.[20,22,23] Assessing the extent to which PCPs expect to change their practice is important because existing research demonstrates that changes in knowledge do not always result in changes in behavior.[31] Nearly all PCPs reporting being "definitely likely" to make changes to the way they educate, treat, and promote self-management in their patients struggling with BH needs. Most participating PCPs report that they are also likely to change their screening and diagnostic approaches after their participation in this Project ECHO.

While self-reported intention to change is important and the most common way to evaluate Project ECHO adaptations, it is also important to measure actual changes in behavior. This is one of the first studies to assess objective pediatric BH clinical practice outcomes as a direct result of participation in Project ECHO. The results of this study suggest that participation in project ECHO is associated with a significant reduction in the use of psychotropic polypharmacy and a continued downward trend after completion of this Project ECHO. Thus, the change was not restricted to the duration of ECHO participation and the percentage of polypharmacy continued to decline for months after participation leading to a significant baseline shift. Continuous feedback to the community providers and consultation on complex patient cases should reduce the percentage of patients with polypharmacy further.

While this pilot extends the growing research supporting Project ECHO, this adaption and evaluation is not without limitations. Because this is a pilot study, the results are limited to this first cohort and thus a smaller sample size with no experimental control group. A true pretest (ie, prior to involvement) would have strengthened the design, but could not be gathered from a sufficient number of participants to be useful due to rolling enrollment without a requirement for the pre-survey to be completed prior to participation. In addition, not all attendees completed post-tests. Considering the geographically distant nature of the model, it was difficult to support follow-through with completion. While this study is the first pediatric BH ECHO evaluation to include an observed behavioral change, it should be mentioned that there was no experimental control group and several of the other outcomes in this evaluation are limited by common method and informant variance. That is, for all outcomes except psychotropic polypharmacy prescribing behavior, PCPs reported their own self-perceived change in knowledge, competence, and behavior. Through time and resource-intensive, future studies would benefit from actual tests of knowledge and assessing additional changes in behavior through alternative methods such as direct, systematic observation.

Despite these limitations, this study adds to a growing body of research suggesting that Project ECHO is a feasible model of workforce development to improve the knowledge and competency of PCPs in screening, diagnosing, and managing BH needs within primary care. With such a significant shortage of BH specialists, adding group-based learning and consultation methods to support BH management within pediatric primary care will be important to maximize the reach of BH expertise. Project ECHO's 3 avenue learning process is emerging as a valuable tool to extend this reach to groups of PCPs at a time.

In addition to this general pediatric BH ECHO, PCPs would also benefit from continued development of condition-specific ECHO projects. These condition-specific ECHOs will allow PCPs to obtain more detailed and comprehensive training specific to any specific condition that they may feel insufficiently prepared to address after the general pediatric BH ECHO. For example, many of the providers in this pilot found the mood disorders clinic to be advanced relative to their current

scope of practice. It would be beneficial to provide PCPs the option to register for a "deeper dive" condition-specific ECHO on advanced mood topics following this general pediatric BH ECHO that may help them become more comfortable treating these patients.

Conclusion

Insufficient supply and inequitable distribution of BH providers combined with the numerous other barriers to BH care result in children and adolescents often only receiving the BH treatment that is provided by their PCP. This is one of the first evaluations of a pediatric BH ECHO designed to address the array of pediatric BH needs facing PCPs and to include observational changes in provider behavior (ie, psychotropic polypharmacy prescribing). The group tele-consultative approach taken by Project ECHO extends the reach of BH providers in the context of the severe global shortages of these professions. This pilot adds to a growing body of literature suggesting that Project ECHO is a promising workforce development approach to build a firm foundation of competencies for the management of BH issues in primary care before advanced interventions and support is put in place.

Author Contributions

CAD – data analysis, draft and revisions, JV – data design, acquisition and analysis, review of draft, approval HMM – data analysis, draft revision, SPG – contribution to conception of work, design and review of draft, UPR – original concept, design, data plan, first draft, revisions and final approval.

Declaration of Conflicting Interests

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