The Impact of an Advance RI-CTR Award on Tuberculosis Infection Management in Rhode Island

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ABSTRACT

OBJECTIVES: To evaluate the impact of a Rhode Island (RI) Latent Tuberculosis Infection (TB Infection) Extension of Community Healthcare Outcomes (ECHO) telementoring program on primary care clinicians' self-reported learning and performance.

METHODS: Utilizing an exploratory, sequential, mixed-methods design, we first conducted 24 qualitative interviews with RI primary care clinicians and nurses to identify TB infection management gaps. These findings informed the curriculum for a six-session RI TB Infection ECHO course launched in 2021. Participant learning and performance were evaluated using pre- and post-course-structured questionnaires and follow-up qualitative interviews.

RESULTS: Qualitative analysis revealed that participating clinicians felt comfortable with TB infection screening but lacked confidence in treatment initiation and selection. Following the ECHO course, participants demonstrated significant increases in self-reported confidence across the majority of TB infection practice areas ($P<0.05$). Notably, 75% of post-survey respondents reported making specific practice changes, such as adopting shorter treatment regimens and improving newer test interpretation.

CONCLUSIONS: The mentored research award was instrumental in the establishment of the first Project ECHO hub at The Warren Alpert Medical School of Brown University. By achieving Level 5 (Performance) on Moore's Educational Framework through documented practice change, the program demonstrated that telementoring can effectively democratize specialized TB infection knowledge. This framework has since scaled to a regional TB infection ECHO program.

KEYWORDS: Tuberculosis infection; Project ECHO

BACKGROUND

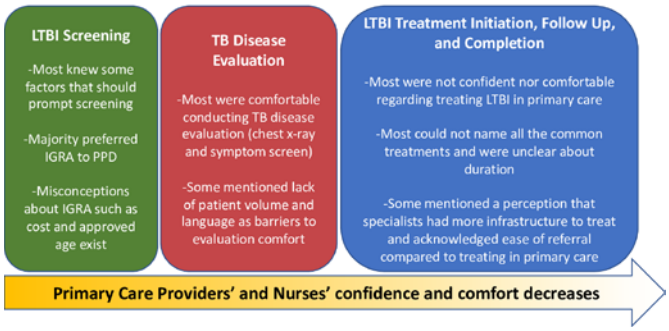
In Rhode Island (RI), there are currently an estimated 44,000 people with latent tuberculosis infection (LTBI).[1] If untreated, 5% to 10% of individuals with TB infection will develop TB disease, which is the major contributor to transmission of TB in the United States.[2,3] While this progression can be averted with TB infection treatment, decreasing progression to TB disease by 80%, only about 30% of individuals with TB infection have successfully completed treatment.[4,5]

Historically, TB infection and TB disease have been treated within specialty clinics. In RI, the RISE clinic in partnership with the RI Department of Health is traditionally staffed by academic-based specialty departments (infectious disease specialists or pulmonologists) caring for patients with both TB infection or TB disease. One of the reasons TB infection management was centralized within specialty clinics related to insurance coverage—TB infection screening only became a Grade B recommendation by the US Preventive Services Task Force (USPSTF) in 2016, opening a path for primary care coverage for TB infection screening and treatment.[6,7] However, barriers such as transport, time, language, and finances continue to contribute to individuals with TB infection being unable to access specialty care for TB infection treatment.[8,9]

Democratizing specialized care into primary care clinics that are easier to access is a potential solution to improving TB infection treatment outcomes in the United States. For example, a Massachusetts TB infection educational initiative led to increased self-reported confidence among clinicians across multiple TB infection management steps.[10] This educational initiative utilized an innovative telementoring model (Project ECHO–Expansion of Community Healthcare Outcomes) that incorporates a hub-and-spoke framework.[11,12] A hub team of specialists connects virtually via Zoom with primary care team members to create a learning community in which specialized knowledge is taught to individuals who are trusted clinicians for the patients they serve. The Massachusetts (MA) Introductory TB infection ECHO was the first TB ECHO in the United States to focus on TB infection training for primary care team members to manage TB infection.

The model had never been replicated before and it was not known whether primary care clinicians in RI had the same knowledge gaps in TB infection management. With support from Advance Rhode Island Clinical and Translational Research (Advance RI-CTR), an exploratory sequential pragmatic study was conducted. The first aim was to conduct a qualitative study to further explore primary care team

Figure 1. Primary care providers' and nurses' knowledge, attitudes, skills regarding LTBI Management—Major themes throughout the care cascade



members' knowledge, attitudes, and skills (KAS) regarding TB infection management. The results from this aim have been published, and demonstrated that primary care team members expressed more knowledge and comfort with TB infection testing, and less knowledge and comfort with TB infection treatment [**Figure 1**].[13] Afterwards, the study team updated the design of the RI TB infection ECHO program and evaluated the impact of this program on RI primary care team members' learning and performance. The purpose of this paper is to share results from this post-course study.

DEVELOPING A RI TB INFECTION ECHO HUB AND PROGRAM

We found that the existing MA TB Infection ECHO curriculum adequately addressed the knowledge gaps identified by RI primary care team members. The qualitative interviews reiterated the fact that primary care team members feel less comfortable with treatment selection. Therefore, we replicated the MA TB Infection ECHO curriculum in RI and ensured inclusion of cases related to treatment to see if we would get similar quantitative results. In order to run an ECHO course, an ECHO hub had to be created at Brown. In collaboration with leadership at The Warren Alpert Medical School, legal documents were signed with the University of New Mexico (the founding institution of Project ECHO) to become an official ECHO hub. Once that infrastructure was developed, members of the study team met with TB experts at the RI Department of Health and the RISE clinic to finalize the curriculum, discuss recruitment, create a website and obtain CME accreditation.[14] A launch session followed by a six-session RI TB Infection ECHO course took place in 2021.

QUANTITATIVE EVALUATION OF RI TB INFECTION ECHO COURSE PARTICIPANTS' LEARNING AND PERFORMANCE

The curriculum and session attendance can be found in **Table 1**. Structured questionnaires were distributed electronically for continuing medical education evaluation purposes. We asked participants whether they changed their practice as a result of the TB Infection ECHO course. Seventy-five percent of post-survey respondents stated that they changed their practice. The percentage of post-survey respondents who reported they would make a practice change and ratings of session quality are also found in **Table 1**. When considering continuing medical education activities, the Moore's Educational Framework suggests that practice change that can impact patient care is one of the highest achievements (aside from community impact).[15] That our ECHO led to 75% of participants stating practice change is noteworthy.

Twelve individuals completed the pre-survey, and eight completed the post-survey. Despite lower than anticipated enrollment, the ability to assess participant confidence and performance was not impacted. When comparing pre- and post-survey responses, there were significant increases in self-reported confidence across the majority of latent TB infection practice areas [**Figure 2**].

Given the lower than anticipated survey completion, qualitative interviews were conducted with ECHO participants to further explore the quantitative findings. Four interviews were conducted, and data analysis was completed. **Table 2** includes the final topics and illustrative quotes. Participants consistently indicated practice change. For example, participants mentioned being able to interpret interferon gamma

Table 1. RI TBI ECHO Curriculum, session attendance, participants' intention to make practice change, and participants' rating of session quality

	Name of session	Number of attendees	Attended 2+ sessions (%)	Would make practice changes (%)	Rated session quality "Very Good to Excellent" (%)
Session 1	TB Infection Background and Risk Assessment	n=26	88%; n=23 (Launch Meeting)	41%; 7/17	100%; 17/17
Session 2	TB Infection Diagnosis, Testing Options, and Testing Nuances	n=18	94%; n=17	64%; 9/14	94%; 13/14
Session 3	Ruling Out TB Disease, TB Infection Treatment Options	n=18	94%; n=17	58%; 7/12	100%; 12/12
Session 4	TB Infection Treatment Considerations, Monitoring, and Side Effects	n=20	100% n=20	45%; 5/11	91%; 10/11
Session 5	TB Infection in Children, Special Considerations	n=18	89%; n=16	36%; 4/11	91%; 10/11
Session 6	LTBI Advanced Considerations	n=16	100%; n=16	89%; 8/9	100%; 9/9

Figure 2. ECHO Participants' Self-Reported Confidence in various TBI practice areas before and after the ECHO

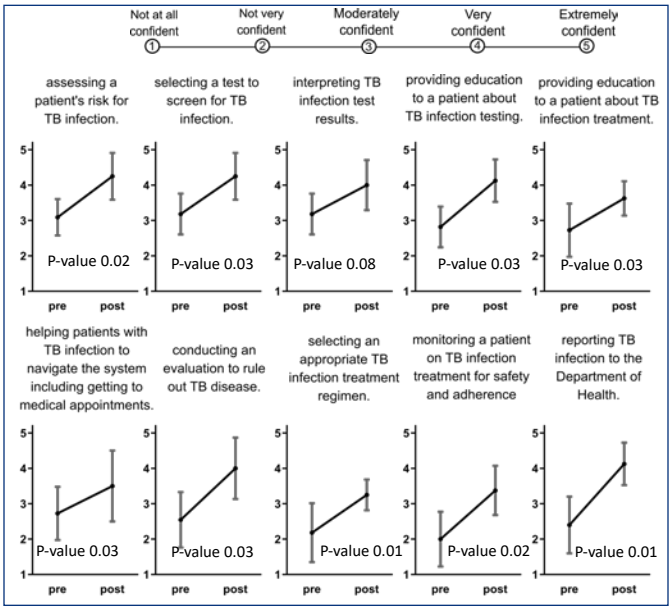


Table 2. Summary of topics and select quotes from post-TBI ECHO course qualitative interviews

Topics	Sample Quotes
Improvement in test interpretation	"I can now interpret IGRA results which I really couldn't do before..."
Practice change in LTBI treatment	"I changed to rifampin from INH and B6 which is much better for my population. And you know, the smile on their [the patient's] face when it's only four months instead of nine months is pretty good" "Well you know I think I would be more inclined to take on treatment on my own and not send the person out..."
Improvement in patient counseling	"I can now better explain LTBI to my patients. I have a better understanding of it now. It's not only the course—I mean the course sort of pushed me to do more reading, get into the studies and such like that, so the course was a motivator do that."

release assay (IGRA) results. The IGRA test requires only one venous blood draw compared to the older tuberculin skin test, which required two patient visits for placement and interpretation. Participants also mentioned changing to rifampin, a shorter course regimen. Both of these practice changes decrease the number of patient appointments.

IMPACT OF AN ADVANCE RI-CTR MENTORED RESEARCH AWARD ON TB INFECTION EDUCATION

The study supported by the Advance RI-CTR Mentored Research Award to investigate the impact of the implementation of a TBI ECHO program in RI ended in 2022. Since the course replicated the Massachusetts course and showed comparable impact on primary care team member self-reported confidence, individuals from other states began reaching out asking if the course could be replicated in other states. TB education in the United States is supported by the Centers for Disease Control and Prevention (CDC), and is decentralized across four regions through the funding of regional Centers of Excellence. RI and MA are included in the Northeast region covered by the Global TB Institute (GTBI) at Rutgers University.[16] Members from both MA and RI TB Infection ECHO hub teams met with the GTBI to discuss the possibility of creating a regional TB Infection ECHO program.

Through The Warren Alpert Medical School of Brown University ECHO hub that was developed with support from the Advance RI-CTR Mentored Research Award, and with funding support from GTBI and the Pittsfield Anti-TB Association, a regional TB Infection ECHO course has taken place over four iterations (2021, 2022, 2024, 2025). The hub has also supported other ECHO courses such as a Telemedicine for Educators ECHO, a Hepatitis C ECHO, and a Perinatal Opioid Use Disorder ECHO.[11]

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