

Project Report

Utilizing the ECHO Model in the Veterans Health Affairs System: Guidelines for Setup, Operations and Preliminary Findings

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Academic Editor: Andrew Hudson-Smith

Received: 21 January 2015 / Accepted: 21 May 2015 / Published: 8 June 2015

Abstract: Background: In 2011, the Veterans Health Administration (VHA) consulted with the Project ECHO (Extension for Community Healthcare Outcomes) team at the University of New Mexico, Albuquerque, to reproduce their successful model within the VHA. Methods: The VHA launched SCAN-ECHO (Specialty Care Access Network-Extension for Community Healthcare Outcomes), a multisite videoconferencing system to conduct live clinical consultations between specialists at a VHA Medical Center (hospital) and primary care providers stationed at satellite VHA CBOCs (Community-Based Outpatient Clinic). Results: Analysis of the first three years rendered a mean attendee satisfaction of 89.53% and a consultation satisfaction score of 88.10%. About half of the SCAN-ECHO consultations resulted in patients receiving their treatment from their local primary care providers; the remaining half were referred to the VHA Medical Center when the treatment involved equipment or services not available at the CBOCs (e.g., MRI, surgery). Conclusion: This paper details the setup, operation logistics and preliminary findings, suggesting that SCAN-ECHO is a viable model for providing quality specialty clinical consultation service, prompt access to care, reduced commutes and continuing education. Additionally, the use of a secured Internet-based videoconferencing system that supports connectivity to multiple (mobile) devices could expand the utilization of this service.

Keywords: ECHO; videoconference; consultation; consult; remote; specialty; education; health; diagnostic

1. Introduction

In 2003, Project ECHO (Extension for Community Healthcare Outcomes) was launched at the University of New Mexico, Albuquerque (UNM), as a strategy for providing effective hepatitis C care for thousands of distant patients spanning New Mexico with only two specialty treatment sites in the state [1]. Project ECHO convened videoconference consultations between remote primary care physicians across New Mexico and a UNM-based hepatitis C specialty team to offer expert clinical guidance. This innovative multidisciplinary consultation system produced treatment outcomes equivalent to patients seen using traditional in-person appointments at the UNM HCV clinic [2].

This ECHO system has been leveraged to better meet the healthcare needs of chronically underserved populations [3], currently offering successful clinical consultations for nearly 30 disease specialties to providers spanning 22 states and five countries [4–8].

In 2011, the Veterans Health Administration Office of Specialty Care contracted with the ECHO team at UNM to provide guidance in establishing SCAN-ECHO (Specialty Care Access Network-Extension for Community Healthcare Outcomes), a VA implementation of the ECHO videoconference provider-to-provider consultation system, linking 10 VA Medical Center pilot sites to their corresponding satellite remote Community-Based Outpatient Clinics (CBOCs). In the same year, the Institute of Medicine released a report indicating that an estimated 100 million Americans suffered from chronic pain [9]. This report found one certified pain medicine specialist for every 28,500 people with the diagnosis. The shortage of providers has led to uneven and fragmented care, possibly causing inappropriate opioid prescribing and over utilization of interventional procedures. The use of SCAN-ECHO within the closed VA health system was considered because technology could be leveraged to deliver pain specialty care to providers in non-urban settings, where the need was most apparent.

The prevalence of chronic pain in the veteran population is estimated to be 43% [10], and the use of this technology would allow for ongoing training of primary care providers to deliver similar care to that offered in an academic setting. Further, the number of returning veterans from wars in Iraq and Afghanistan now exceeds 2.2 million troops with over 48,000 injuries documented. Many of the injuries have led to complex medical issues that include pain as a principal diagnosis. With this in mind, as well as the undersupply of pain specialists, the goal of SCAN-ECHO was to deliver veteran-centered care to the community in which the veteran lived. It also afforded a means of avoiding long trips for the patient, improving primary care delivery of pain care and improving dialogue between primary and specialty care within the VA.

2. Objective

This paper is designed to provide practical guidance in reproducing the ECHO model. Stepwise details explain procedures for efficiently establishing the service, conducting day-to-day operations and expanding the system to include additional specialties and subscribers. The exemplar detailed herein is based on the success of our initial implementation: SCAN-ECHO Pain Management.

3. Method

This section details the setup logistics (videoconferencing infrastructure, specialty consult submission, educational media, satisfaction surveys, website and marketing), staffing (clinical, administrative and technical), operations (before, during and after each session) and progressive expansion of SCAN-ECHO (additional specialties and attendees).

3.1. Setup

Videoconferencing infrastructure: Prior to launching SCAN-ECHO, the videoconferencing network had already been deployed at the Greater Los Angeles VA Medical Center and the affiliated CBOCs. Initially, this system was being used for selected provider to remote patient care encounters (e.g., infectious disease care and telemental health sessions). As the SCAN-ECHO implementation advanced, additional videoconferencing consoles were deployed throughout this region.

This system can be used in one-on-one or (for SCAN-ECHO) multipoint mode, wherein all videoconference participants are present on a designated portion of the screen; hence, all attendees can see and hear each other (Figure 1).

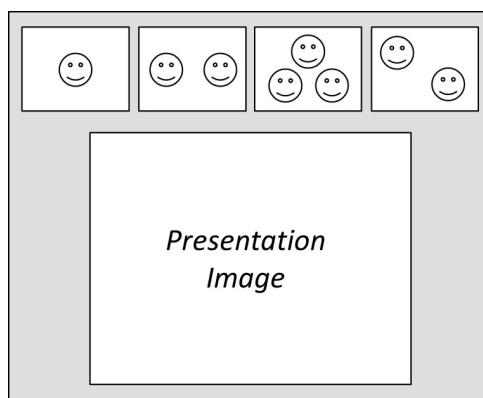


Figure 1. Screen layout for multipoint videoconference.

The presenter can choose to broadcast an image of him/herself via the camera in the presentation image area (Figure 1) or, at the touch of a button, the presenter can switch to broadcasting the full-screen image of a computer connected to the telehealth unit. Our presenters regularly prepared PowerPoint presentations for the didactics and each clinical case. These sessions involve strategically alternating between camera and computer screen (PowerPoint) view.

The basis of our (initial) system configuration involved the use of a dedicated high-speed digital audiovisual communication network, proprietary hardware (dedicated digital communication lines, terminals and a multipoint control unit (MCU) that serves as the videoconference system interface) and corresponding technical support staff (see the paragraph on technical staffing). Alternatively, a secured web-based videoconferencing system may be considered as a more economical alternative, requiring only that participants have access to a standard computer equipped with a high-speed Internet connection (≥ 3 mbps) and a webcam with a built-in microphone (around \$30–\$60), obviating the need for the acquisition, deployment, maintenance and staffing costs associated with a proprietary videoconferencing network.

Regardless of the communication technology utilized, all participants are expected to adhere to appropriate confidentiality protocols when referring to specific patients (e.g., Smith's 2nd patient, Patient #101, *etc.*). Additionally, if images or health records are included in case presentations, all identifying information should be removed or graphically obscured per Health Insurance Portability and Accountability Act (HIPAA) protocols.

Specialty consult submission: The SCAN-ECHO process begins with the primary care provider obtaining informed consent from the patient to engage in this consultation; the patient has the right to know that his/her case will be discussed with other healthcare providers and that his/her medical records will likely be reviewed and discussed. Part of this informed consent process involves explaining to the patient that care may be better managed by the patient's local provider, based on the recommendations rendered by the SCAN-ECHO consult. Alternatively, the patient has the right to refuse the SCAN-ECHO consult with no consequence and to have an (in-person) appointment with the specialist at the (distant) VA Medical Center. Finally, the patient is told that even if he/she consents to the SCAN-ECHO consultation, this does not preclude future in-person visits to the specialist at the VA Medical Center should such appointments be clinically warranted. Patients typically embrace the convenience of the SCAN-ECHO option and willingly give consent to the process.

Next, the primary care provider submits a SCAN-ECHO specialty consult request via the Computerized Patient Record System (CPRS), which is routed to the lead physician on the specialty team. For documentation thoroughness and simplicity, the first question on the referral screen asks "Does the patient consent to this SCAN-ECHO consult (Y/N)?" When considering the design of the referral screen, our clinicians reported that consult screens that demand entering multiple data fields tend to reduce the likelihood of such consults being completed and submitted. As such, we deliberately designed the SCAN-ECHO consult request screen to be brief, but specific, requiring only two entries: (1) the patient ID; and (2) the clinical question. We programmed the referral screen to automatically fill-in the referring provider's name, date and time of the referral. Upon receipt of this referral, the designated specialty physician could read the clinical question that was submitted and access the patient's full medical records to gather comprehensive details regarding the patient's case and formulate a cogent care plan. Additionally, the specialist can ask further questions of the referring provider during the SCAN-ECHO session, in order to better focus the clinical recommendation(s).

Educational media: We initially began with one SCAN-ECHO specialty service: pain management. Prior to the launch, we reasoned that since this service involves professional consultations without the patient present, the sessions would be most productive if the referring provider were armed with highly detailed information regarding the nature of the patient's condition in anticipation of the specialist's diagnostic questions. To address this need, the project manager coordinated with the clinicians on the team to produce a series of pain diagnostic tutorial videos, providing instructions for carrying out comprehensive examinations of the five most common pain regions: hip, knee, shoulder, back and neck. These training videos were produced in a professional studio and distributed to participating providers on a disc; we also posted these tutorial videos on-line to facilitate further access.

Satisfaction surveys: We developed and implemented two on-line satisfaction surveys, which were sent at the conclusion of each session: A link to the Attendee Satisfaction Survey is emailed to all attendees to solicit their opinions about the overall session; a second email with a link to the Consult Satisfaction Survey is sent (only) to providers who processed a case in the session, to assess the utility

of the specialty clinical consultation. For convenience, the surveys primarily consist of quick response type questions (e.g., checkboxes, Likert scales), along with some questions involving textual responses. This survey can be completed in 1 to 3 min (see the Results Section).

Website: The project manager assembled a website for the SCAN-ECHO Pain Management service, providing a description of the specialty clinic, instructions for submitting consultation requests, videoconference session schedule, names and photographs of each specialty team members with corresponding links to their email and an up-to-date resource library containing a variety of downloadable properties (e.g., clinical guidelines, policies, diagnostic protocols, treatment algorithms, didactic PowerPoint in-services associated with each session and case summaries with treatment recommendations).

Marketing: The project manager assembled a social marketing/provider activation plan, which involved identifying and recruiting local site champions at each CBOC and scheduling an in-person site visit to introduce clinicians to the SCAN-ECHO service. These presentations were made during the regularly-scheduled administrative staff meeting time(s) at each site, so as not to disrupt regular clinical operations. The project manager explained the SCAN-ECHO service using a traditional PowerPoint presentation, which included an overview of SCAN-ECHO, advantages to patients (prompter care from their regular local providers, reduce/eliminate inconvenience, time and expense associated with travel to the VA Medical Center) and advantages to providers (continuing education, reduce peer isolation and personalized contact with specialists). These provider activation sessions concluded with step-by-step guidance for submitting a SCAN-ECHO consultation request and instructions for connecting to the sessions via the Telehealth console.

3.2. Staffing

Staffing, clinical: The SCAN-ECHO Pain Management team consists of one physician, two nurse practitioners and one psychologist, who provide clinical care in the Pain Management Clinic at the Greater Los Angeles VA Medical Center. Their SCAN-ECHO responsibilities involve about 10 h per month: approximately four hours to review, research and assemble treatment recommendations to address referred cases; three hours to prepare the didactic presentation; one hour a month to engage in the actual SCAN-ECHO sessions; and two one-hour staff meetings to process administrative issues.

Staffing, administrative: The project manager coordinates the operational duties, including scheduling SCAN-ECHO videoconference sessions, coordinating with telehealth technical staff, sending meeting notices (1 week and 1 day before each consultation clinic), managing email traffic from attendees and potential attendees, assembling, deploying and analyzing satisfaction surveys, coordinating with clinicians to develop educational materials and tuning service delivery per attendee feedback. The project manager also hosts each SCAN-ECHO session (see the paragraph on operations, SCAN-ECHO session). Additionally, the program manager is responsible for program expansion; this is a two-pronged approach that involves: (1) recruiting additional remote subscribers via telephone and email outreach along with in-person recruitment presentations; and (2) recruiting specialists to provide additional SCAN-ECHO consultation services (e.g., gerontology, gynecology, nephrology, neurology and urology).

Staffing, technical: The telehealth technical staff consists of two technicians to operate the multipoint control unit (MCU), which serves as the hub/interface of the videoconferencing network, two telehealth

technicians stationed at the Medical Center, one telehealth technician stationed at each CBOC to facilitate quality connectivity and a technical support team to maintain existing hardware and to deploy additional teleconferencing terminals. Note, utilizing a proprietary network requires multiple technicians as specified above; use of a web-based videoconferencing system would likely substantially reduce the need for as many technicians.

3.3. Operations

Once established, running the SCAN-ECHO service on a regular basis can best be conceptualized in a serial fashion. This section provides an overview of SCAN-ECHO standard operations before, during and after each session.

3.3.1. Before

Scheduling: We discovered that there were three natural break points that remote clinicians could be available: 08:00–09:00 (pre-clinic administrative time), 12:00–13:00 (lunch time) and 16:00–17:00 (end of the day). Experience promptly revealed that the 16:00–17:00 hour was least optimal due to natural end-of-the-day exhaustion; additionally, often clinicians would still be tending to patients (well) past 16:00. We discovered that convening sessions on a fixed schedule (e.g., 3rd Thursday of the month from 12:00–13:00) facilitated the strongest attendance.

Reservations: The project manager is responsible for scheduling the videoconference system (MCU), (video) conference room and sending email notifications to all SCAN-ECHO participants detailing the date, time, connection code and referring providers whose cases will be addressed in each session. These emails are sent out one week before each session along with a one-day-before reminder message.

Specialty team meetings: The specialty team initially convened for one hour per week to formulate and adapt SCAN-ECHO operations and strategies. Subject matter included ideas for improving and refining services, processing findings gathered from the participant surveys, considering new ideas, recommendations and questions that emerged during sessions, identifying relevant didactic subject matter and brainstorming as needed. Additionally, the project manager, a mental health clinician, actively solicited and attended to the emerging impressions and feelings of all involved. As our processes became more refined, we shifted to meeting every other week.

Website: The project manager regularly updates the website; this typically involves uploading the PowerPoint didactic presentations and case summaries generated by the specialty team.

3.3.2. During

SCAN-ECHO session: Each SCAN-ECHO session runs one hour consisting of about three minutes for introductions, roll-call and administrative news, 10–15 min for the didactic, and the remaining time is used to address approximately three clinical referrals. The program manager arrives early to set up the room (align seating, adjust lighting, load PowerPoint didactic and case presentation) and to test/debug the videoconference technology. During the actual SCAN-ECHO sessions, the program manager fulfills multiple production roles, serving as host, facilitating introductions, moderating Q & A traffic, timekeeping for each segment and as the cameraman. SCAN-ECHO sessions are also optimal for

on-camera demonstrations (e.g., physical exam protocol, identifying injection point(s), etc.). SCAN-ECHO sessions may convene more frequently, depending on the volume of referrals and the availability of the specialty team and attendees.

3.3.3. After

At the conclusion of each session, our team remains in the conference room and engages in a debriefing, openly discussing the cases, the tenor of the session, what worked, what needs to work better and possible changes and ideas for future sessions. Additionally, the program manager informally tends to the feelings and impressions of each team member and provides appropriate processing and support. This debriefing typically runs about 15 min.

Next, members of the specialty team enter the treatment recommendations that emerged during the session in each patient’s (electronic) medical records, thereby closing-out each consult request.

The program manager emails the attendee’s links to the on-line satisfaction survey(s) pertaining to the session (see Results).

3.4. Expansion

Upon solidifying our methodology and achieving preliminary success and operational stability with the SCAN-ECHO Pain Management service, additional specialists were recruited to offer a wider array of SCAN-ECHO services from the Los Angeles VA Medical Center (e.g., gerontology, gynecology, nephrology, neurology and urology). We also expanded our attendees to include additional remote facilities, spanning multiple states. Considering the complex dynamics of the multiple specialties and attendees that emerged at various points over the first three years, the statistics that follow reflect only our initial specialty service: Pain Management.

4 Results

Over the course of the first three years of the SCAN-ECHO service, we convened an average of 1.18 pain management sessions per month; each of these sessions included a didactic educational segment along with an average of 2.97 case consultations. On average, our audience consisted of 11.20 providers spanning 4.36 remote clinics (Table 1).

Table 1. Sessions and attendance summary for monthly Specialty Care Access Network (SCAN)-ECHO pain management session summary statistics spanning three years of service (October 2011–September 2014).

SCAN-ECHO pain management	Mean (SD)
Sessions per month	1.18 (0.39)
Cases presented at each session	2.97 (1.38)
Sites participating	4.36 (2.29)
Attendees	11.20 (6.63)

Upon completion of each session, all attendees were emailed a link to a brief Attendee Satisfaction Survey, which received a 19.09% response rate, consisting of 55 (63.95%) physicians and 31 (36.05%)

NPs (nurse practitioners) or PAs (physician assistants). The survey reflected an overall attendee satisfaction (grand mean) of 89.53% among respondents (Table 2).

Whereas the foregoing Attendee Satisfaction Survey was sent to all attendees, we sent an additional email only to providers who had a case processed in the session, linking them to the Consult Satisfaction Survey, to assess the perceived utility of each clinical consultation. This survey received a 14.73% response rate consisting of 10 (66.66%) physicians and five (33.33%) NPs/PAs. The survey reflected an overall consultation satisfaction (grand mean) of 88.10% among respondents (Table 3).

Table 2. Responses to SCAN-ECHO pain management post-meeting Attendee Satisfaction Survey (sent to all attendees).

SCAN-ECHO pain management attendee satisfaction survey (n = 86)		
Question	Mean (SD) *	%
The learning objectives were met.	4.64 (.68)	92.87%
The speaker was knowledgeable.	4.90 (.30)	97.97%
The speaker was effective in his/her presentation.	4.73 (.60)	94.65%
The information was useful to me.	4.66 (.66)	93.10%
I understand the information.	4.81 (.39)	96.29%
The information will influence my patient care.	4.64 (.57)	92.75%
Information from this session will change my prescription of medication(s).	4.18 (.82)	83.58%
Information from this session will change my overall interactions with patients.	4.04 (.74)	80.87%
Information from this session will change my treatment plans.	4.16 (.70)	83.24%
Information from this session will change my ordering of diagnostic tests/studies.	4.00 (.83)	80.00%

* Likert scale: 5 = strongly agree, 4 = somewhat agree, 3 = neither agree/disagree, 2 = somewhat disagree, 1 = strongly disagree.

Table 3. Responses to SCAN-ECHO pain management post-meeting Consult Satisfaction Survey (sent only to providers who had a case processed).

SCAN-ECHO Pain Management Consult Satisfaction Survey (n = 15)		
Question	Mean (SD)*	%
My diagnostic question(s) were answered clearly.	4.47 (1.06)	89.33%
My diagnostic question(s) were answered completely.	4.43 (1.09)	88.57%
I feel confident in my ability to implement the recommended diagnostic plan.	4.40 (1.12)	88.00%
My treatment question(s) were answered clearly.	4.40 (1.06)	88.00%
My treatment question(s) were answered completely.	4.40 (1.06)	88.00%
I feel confident in my ability to implement the recommended treatment plan.	4.33 (1.11)	86.67%

* Likert scale: 5 = strongly agree, 4 = somewhat agree, 3 = neither agree/disagree, 2 = somewhat disagree, 1 = strongly disagree.

To date, our SCAN-ECHO service has expanded to offer consultations in pain management, gynecology, urology, neurology, nephrology and gerontology, amounting to a total of 200 video consultation sessions, addressing 423 specialty consultations.

Benefits to patients: In the first three years of the SCAN-ECHO Pain Management consultation clinic, a total of 101 case consultations were processed. Among these consults, about half resulted in the patient receiving their pain management at their local CBOC via their regular primary care provider. In the other

half of the cases, it was determined that the treatment would best be carried out at the Los Angeles VA Medical Center by a member of the pain management team; these were cases that involved specialized treatment or treatment involving medical equipment that is not available at the CBOCs (e.g., MRI, CT scan, surgery, image-guided injection).

The majority of these cases involved patients who receive their primary care at one of four CBOCs affiliated with the Greater Los Angeles VA Medical Center (Santa Maria, Santa Barbara, San Luis Obispo, Bakersfield), an average round-trip distance of 287 miles, equivalent to 5.5 h of travel time (Figure 2).

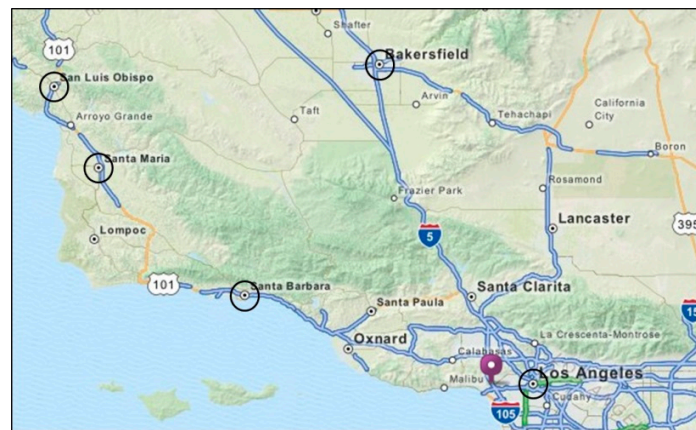


Figure 2. Map of Los Angeles VA Medical Center (hub) and affiliated VA Community-Based Outpatient Clinics (spokes): San Luis Obispo (360 miles), Santa Maria (300 miles), Santa Barbara (200 miles) and Bakersfield (210 miles). Note: map and round-trip driving distances (from CBOCs to Los Angeles) derived from <http://www.mapquest.com/>.

In total, these patients (the half whose pain management was handled by their local CBOC provider per SCAN-ECHO treatment recommendations) were spared a total of approximately 14,500 travel miles, translating to about 277 travel hours. Reducing the time, expense and rigors of lengthy travel are advantageous to patients, particularly for those experiencing high levels of pain.

In terms of wait time, SCAN-ECHO pain management consultations met or outperformed conventional in-person visits: the typical wait time for an in-person appointment at the Los Angeles VA Pain Management Clinic is about 30 days; in months wherein one SCAN-ECHO session was convened, the wait was less than 30 days, depending on the date that the consult was submitted. In six of the months, two SCAN-ECHO sessions, scheduled two weeks apart, were convened due to the higher volume of consults received. These more frequent sessions essentially halved the wait time.

5. Discussion

Benefits to providers: CBOC providers participating in the SCAN-ECHO Pain Management program reported multiple benefits associated with this program: the didactic portion of each session provided formal continuing education and specialized (pain management) skill building, as well as one hour of Continuing Medical Education (CME) credit per session. Additionally, all attendees, even those not currently having a case processed, have the opportunity to learn via hearing colleague's cases and actively engaging in live interactive Q & A to further the learning process of all involved. The multipoint

videoconference platform, which displays all attendees on the screen simultaneously, has served to help build positive peer relationships among providers at remote CBOCs and to personalize the access to the Pain Management team at the VA Medical Center. This virtual community helped to supplement professional communications in between SCAN-ECHO sessions, consisting of brief consultation phone calls and emails, as well as prompting further SCAN-ECHO pain management consultation requests. CBOC providers reported feeling less professionally isolated and more confident in their ability to provide essential pain management to patients.

Limitations

Despite the enthusiasm for SCAN-ECHO among specialists and remote primary care providers, lack of financial support (reserved/protected time) appears to be the key encumbrance to attendance. Primary care providers are assigned substantial clinical caseloads, which takes precedence over other valuable professional activities, even those involving clinical education, which has the potential to serve as a multiplier effect (e.g., the answer to one case consultation may be applicable to numerous similar cases). Given these priorities, SCAN-ECHO consultation submissions and attendance have been relatively low. This low level of engagement has relegated us to offering only one session per month; this delay could also be an inhibiting factor. Administrative support, in the form of specifically allocated time(s) for SCAN-ECHO attendance, could potentially address both of these issues; our specialists have expressed a desire to offer more than one session per month, should the referral load warrant that.

Another constraining factor involves the proprietary telehealth network that is currently in use. In order to use this system, costly telehealth terminals must be deployed and maintained. Such terminals are hard-wired into the telehealth communication network; hence, users must access these terminals in the room in which they have been installed, which has resulted in scheduling conflicts. A potential solution to this would be to use a secured Internet-based videoconferencing service, which would enable SCAN-ECHO attendees to engage in these sessions via a variety of readily accessible devices (e.g., a PC equipped with a webcam, laptop, smartphone, tablet, *etc.*), thereby alleviating the need to reserve specific rooms, affording additional access (e.g., those on travel/remote assignment). Additionally, utilization of a secured Internet-based videoconferencing system would substantially reduce the need for technical support staff at the MCU and each clinic; a centralized help-desk may be sufficient to support such a system.

6. Conclusions

The predominately positive feedback received from SCAN-ECHO participants suggests that this is a viable alternative/supplement to traditional in-person specialty care appointments, offering efficient and effective localized care to patients and facilitating continuing education and professional community building among providers.

The SCAN-ECHO system could be enhanced via increased administrative support (e.g., allocating reserved hours for participation and encouraging/incentivizing engagement in SCAN-ECHO). Additionally, utilizing a secured Internet-based videoconferencing platform that supports multiple (mobile) devices could expand accessibility to these clinical videoconferences.

Acknowledgments

We gratefully acknowledge the quality work of the other members of the Veterans Health Administration (VHA) Greater Los Angeles SCAN-ECHO Pain Management team: Ariel Baria, NP, Joann Saavedra, NP, and Bruce Nailboff, PhD; as well as the support of the SCAN-ECHO leadership team: Susan Kirsh, Lisa Altman, Leonard Kleinman, and Justin Davis. The project and findings detailed in this paper were conducted under the Veterans Health Administration Office of Specialty Care Services and implemented as quality; no patient identifying information was analyzed or included in the preparation of this document.

Funding for this project was supported by the Veterans Health Administration Office of Specialty Care Services T-21 funding initiative.

Author Contributions

Herschel Knapp and Sanjog Pangarkar adapted and developed the implemented methodology, conducted the SCAN-ECHO sessions, gathered and analyzed the data, and coauthored the manuscript.

Conflicts of Interest

The authors declare no conflict of interest

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