Telementoring to Improve Rural Provider Competence and Knowledge in Managing Vascular Disease

Kimberly Albero, MSN, RN, FNP-BC
Charlottesville, Virginia

Master of Science in Nursing, University of Virginia, 2017
Bachelor of Science in Nursing, University of Virginia, 2006

A Scholarly Project presented to the Graduate Faculty
of the University of Virginia in Candidacy for the Degree of
Doctor of Nursing Practice

School of Nursing

University of Virginia
June 2018

Emily Drake, PhD, RN, CNL, FAAN

Patty Schweickert, DNP, FNP-C

Beth Quatrara, DNP, RN, CMSRN, ACNS-BC

Abstract

Background. Primary care providers in the community use clinical practice guidelines to manage patients with acute and chronic diseases, often without ready access to specialist collaboration at large academic medical facilities. The term, 'telementoring,' represents the guiding mentoring relationship that develops between healthcare professionals collaborating by way of a videoconferencing platform. Telementoring has the potential to improve primary care provider capacity to treat chronic illness by connecting rural community providers with specialists.

Purpose. The purpose of this project is to evaluate whether participation in a telementoring program improves rural primary care provider competence and knowledge specifically related to the care of patients with vascular disease.

Design. A quasi-experimental pre-test/post-test design using one-group convenience sample selected from rural and underserved clinical practice sites in Virginia, which assessed provider competence and knowledge in managing patients with vascular disease before and after participating in a ten-week telementoring program.

Methods. A survey was sent to primary care providers participating in the program prior to the first telementoring session and again following ten weeks of participation in the Spring. Provider self-reported competence and knowledge regarding the management of patients with vascular disease was measured.

Measures. Demographics, time in practice, practice location, patient population served and baseline self-reported knowledge and competence were collected before the first telementoring session. The number of telementoring sessions attended and program feedback were collected in addition to self-reported competency assessment questions in post-survey. Respondents who

completed a pre-survey, returned for at least one telementoring session, and completed the post-survey at the end of the 10-week pilot program were included in the results. A paired t-test was conducted to compare the pre- and post-survey answers.

Findings. There were 18 providers who completed the pre-survey. Of those, 8 participated in in an average of 4.4 telementoring sessions and completed the post-survey. All participating providers were nurse practitioners. Provider self-reported competence and knowledge improved for every item on the survey with a total average improvement from 35.125 on the pre-survey to 54.5 on the post-survey. All participants (n=8) reported that participation in the telementoring sessions was a valuable use of their time and that they would be interested in participating in future sessions if offered.

Conclusions. The findings suggest that participation in vascular telementoring sessions improved the self-reported competence and knowledge of primary care providers. Correlation between the number of sessions attended and improvement in individual scores could not be definitively stated.

Nursing Implications. Implementation of telementoring programs has the potential to improve patient care in rural and underserved communities and provides educational opportunities for community providers, particularly nurse practitioners in primary care settings.

Key Terms: *Primary care, telehealth, telementoring, vascular disease, Project ECHO, Nurse Practitioner*

Acknowledgements

Thank you to the University of Virginia School of Nursing for providing such an enriching academic environment and access to a phenomenal group of faculty, staff, and network of professionals. Thank you also to the Jonas Foundation and the Department of Veterans Affairs for assisting in the funding of my education.

To my academic advisor, Dr. Emily Drake, thank you for your time and guidance in completing this project and my degree. You have been one of my favorite people since my time at UVA as an undergrad and I am so grateful to have had the opportunity to work with you again as a DNP student.

To my practice mentor, Dr. Patty Schweickert, your expertise in telehealth technology, your clinical prowess, and your networking abilities helped shape this project. I couldn't have done it without you!

To Dr. Beth Quatrara, Dr. Tina Brashers, and the entire ASPIRE Team, you inspired my interest in interprofessional work and introduced me to the telemedicine team. To David Cattell-Gordon, Dr. Karen S. Rheuban, Richard Rose, and the entire telemedicine team, thank you for your support and guidance and for welcoming me to into the fold.

To Dr. Andy Southerland, Dr. John Gaughen, Dr. Jimmy Berthaud, Dr. Donna White, Dr. Rebecca Bates, Craig Thomas, and David Cattell-Gordon for participating in UVA Project ECHO Vascular. You brought this project to life.

To Dr. Ivy Hinton and Dr. Virginia Rovnyak, your willingness to patiently explain and help me make sense of the statistical evaluation of my project is sincerely appreciated.

To my amazing classmates, I am so thankful to have a tribe of multi-faceted, brilliant professionals to call colleagues. I can't wait to see all the amazing things you accomplish in the years to come.

To my children, Brendan and Madeline, thank you for letting Mommy work on her homework and spend so much time at the library during the last three years. I hope you will always think of learning as a lifelong adventure and you will be as inspired and supported in your academic pursuits as I have been in mine.

To my parents and in-laws for their love, support, and help with the kids during this program. I couldn't have done it without you.

Finally, to my husband, Ron, your relentless support of my academic and professional endeavors has carried me through this program. I am so lucky to have you as a partner in this life.

TABLE OF CONTENTS

Section I

Telementoring to Improve Rural Provider Competence and Knowledge in Vascular Disease

Background

Many primary care providers in rural and underserved areas manage complex patients with multimorbidity without access to specialists and resources available at large academic medical centers (Smith, Wallace, O'Dowd, & Fortin, 2017). Advances in technology have made it possible for community providers to connect their patients with specialists using telemedicine (Broens et al., 2007). Using technology to connect rural community health care providers with specialists for telementoring and participation in grand rounds-type learning experiences has the potential to build relationships among interprofessional teams and to enhance the practice capabilities of community providers (Arora et al., 2010). Access to mentoring from specialists who possess the expertise and coaching skills to assist primary care providers in educating and managing patients in the community setting can improve outcomes for patients and competence and knowledge of primary care providers (Arora et al., 2007).

The ECHO model (Extension of Community Health Outcomes) is an example of a web-based guided practice model used to train primary care providers on the treatment of complex medical conditions (Arora et al, 2010). The mission of Project ECHO is to expand the capacity to provide best practice care for common and complex diseases in rural and underserved areas and to monitor outcomes through regularly scheduled telehealth clinics that bring together community-based primary care providers and specialists. Project ECHO is a guided practice model that allows primary care providers in remote and rural areas to participate in case-based learning with input from an interdisciplinary team including specialists at academic medical centers.

Vascular disease was selected as the clinical focus for the first teleECHO clinic in the state of Virginia. There are currently two government facilities in Virginia that use the ECHO model, but this is the first located at an academic medical center involving interdisciplinary care teams.

Definition of Terms

Appendix A includes a table of relevant glossary of terms.

Vascular Disease. Vascular disease includes any condition that affects the circulatory system, including disease of the arteries, veins and lymph vessels to blood disorders that affect circulation. Vascular diseases are usually caused by multifactorial pathogeneses involving genetic and environmental factors (Han et al., 2015). Vascular disease, atherosclerosis and thrombosis, are the principal underpinnings of the leading causes of death in the world: heart disease and stroke (Mozaffarian et al., 2016). These disorders also cause peripheral artery disease (PAD), which affects between 8 and 10 million people in the United States (Mozaffarian et al., 2016). PAD limits a person's ability to walk, may require revascularization, can result in the loss of a limb and is a clinical manifestation of a systemic disease, often associated with heart attacks, strokes, life-threatening kidney and intestinal problems, and other serious health issues (Gerhard-Herman et al., 2016). Tragic outcomes can also occur when veins are affected. Up to 600,000 people are affected by venous thromboembolism each year, and it is the cause of more than 40,000 deaths (Mahan et al., 2011). The financial burden of vascular-related complications in patients with PAD is more than $20 billion a year. Healthcare costs for venous thromboembolism are more than $7.5 billion (Pande & Creager, 2014). More than 200 million people across the globe are affected by PAD. The disease affects both men and women and the risk of PAD is increased by tobacco use, diabetes mellitus, and high cholesterol, and prevalence increases dramatically with age (Gerhard-Herman et al., 2016)

Telehealth. The Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services defines telehealth as the use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, public health, and health administration (Katzman et al., 2014). Technologies include videoconferencing, the internet, store-and-forward imaging, streaming media, and terrestrial and wireless communications. Technology enhances the ability to deliver healthcare to patients who live in rural and remote areas and may not have access to specialty care in their community. Travel to and cost of specialty care can be prohibitive for some patients, but it may be necessary for primary care providers managing the care of these patients in the community to consult with a specialist for a treatment course to be decided upon and executed (HRSA, 2016). Videoconferencing and teleconferencing between providers allows for open communication and between specialists and community providers which in turn leads to more timely care to patients who lack the resources to travel for face-to-face specialty care visits (Dario et al., 2017). Telehealth can help meet the goals of the Institute for Healthcare Improvement (IHI) Quadruple Aim of better individual healthcare, better population health, lower cost, and job satisfaction of health care providers (Carey et al., 2016).

Telementoring. Telementoring describes the mentoring relationship that develops between healthcare professionals during collaboration using a videoconferencing platform. Telementoring provides a method of transferring specialist knowledge and experience to other providers. Through telementoring, specialists can provide guidance and training about current evidence-based best practice to enable rural providers to deliver evidence-based care to underserved patients. (Arora et al, 2010). Audiovisual technology can be used to connect a team

of medical experts, based in a tertiary hospital simultaneously with many healthcare professionals based in a number of community settings (Cheallaigh et al., 2016).

The ECHO model: Proof of Concept. Project ECHO began at the University of New Mexico as a resource to help generalist healthcare providers in rural areas of the state to gain support and expertise from specialists including gastroenterologists, hepatologists, and infectious disease specialists in the treatment of patients with hepatitis C (HCV). It has evolved into a series of in-depth education programs that utilizes case-based learning to assist primary care providers to manage patients with complex health conditions by connecting them to expert specialists through telehealth technologies.

Project ECHO seeks to educate primary care providers to develop and expand access to treatment for patients with complex, chronic diseases by building treatment capacity in Virginia among rural medical providers. Project ECHO is an innovative health care program that uses state-of-the-art technology to help treat patients in rural and underserved areas with limited access to specialty level care. Project ECHO creates a one-to-many knowledge network, which allows primary care clinicians to develop the skills necessary to manage difficult to treat diseases. Over time, participating clinicians acquire increasingly specialized knowledge and become experts in their own communities. Recent reports on best practices in physician professional development form the Institute of Medicine, Carnegie Foundation, and Macy Foundation support the educational approaches in the ECHO model (Cook, Irby, & O'Brien, 2009; Hager, Russell, & Fletcher, 2007; IOM, 2002).

Research Question

Does participation in case-based education in group telementoring sessions with expert clinicians improve primary care provider competence and knowledge in managing patients with vascular disease?

Section II

Review of Literature

Primary care providers in rural and underserved areas manage medically complex patients with fewer resources and less access to expert consultation and educational opportunities like those offered in grand rounds at academic medical centers. Many of the patients being managed in community primary care settings are at risk for developing vascular disease due to multi-morbid conditions. The following review of literature sought to assess the current literature pertaining to the prevalence of vascular disease, best practices in treating vascular disease, and the use of telementoring to democratize knowledge from experts at large academic medical centers to community providers in rural and outlying areas.

To evaluate the effectiveness of telementoring, namely the Project ECHO model, in improving primary care provider competence and knowledge in managing patients with vascular disease, the electronic databases OVID Medline, CINAHL, and PubMed were searched. The key words used in this literature search included “telementoring,” “primary care providers,” “primary health care,” and “Project ECHO.” Using OVID Medline, the first heading “telementoring” supplied 226 potentially relevant articles. Through CINAHL, the same heading supplied 27 potentially relevant citations. The mesh heading “telementoring” was combined with the heading “primary care providers” to provide four potentially relevant citations using CINAHL and the search term “Project ECHO” yielded 24 citations. Bibliographies were hand searched for ancestry studies that met inclusion criteria to identify other possible sources in the

literature. Inclusion criteria were 1) studies involving the use of telementoring 2) studies involving the use of telementoring in primary care 3) studies involving education using videoconferencing 4) studies that involved the ECHO model. Exclusion criteria were 1) studies involving telemedicine with direct contact between patient and provider 2) studies that involve mentorship without the use of telehealth technology 3) studies that involve patients using telehealth technology directly. A total of 15 relevant studies were reviewed following this process. Additional research from gray literature provided by the ECHO Institute included five additional papers which outlined implementation and evaluation of telementoring programs.

Technology-based healthcare programs designed to train primary care providers in the management of complex chronic conditions are being increasingly implemented across the United States (Carey et al., 2017; Scott et al., 2012; Katzman et al., 2014). Programs of collaborative care management, mentoring, and education help to build the capacity of primary care providers to successfully accomplish the goal of consistently delivering high-quality, evidence-based, and coordinated care to patients (Fisher et al., 2017; Carey et al., 2016). The Project ECHO Model is an example of telementoring that includes the utilization of tele-technology, adherence to best practices to reduce variation in care, case-based learning, and data tracking to monitor outcomes (Katzman et al., 2014; Katzman et al., 2016; Arora et al., 2011). The ECHO model can be extended to the treatment of diseases which meet six characteristics that have been identified as being amenable to treatment using knowledge networks (Katzman et al., 2016).

1. The disease is common.
2. The disease has complex management.
3. Treatment for the disease is evolving.

4. The disease has high societal impact.
5. There are serious outcomes of failing to treat the disease.
6. Improved outcomes can be obtained with disease management.

Program Evaluation. Five of the studies (Moeckli et al., 2017 Frank et al., 2015; Katzman, et al., 2014; Zhou, et al., 2016; Sockalingam et al. 2017) included in the review of literature evaluated telementoring practices including Project ECHO models in different health care organizations and for different diseases and clinical specialties. The studies included in this review of literature examined program uptake, adoption, and reach; provider behavior and self-reported knowledge, skills, and practice, provider utilization of best practices learned in telementoring program, and effectiveness of replication of Project ECHO in varying care settings, geography, and disease processes.

Moeckli et al. (2017) examined the program uptake, adoption and reach of and HIV telementoring program in the Veterans Health Administration and found that uptake was limited due to strain on provider time to participate and challenges convincing primary care providers to manage patients with HIV in the community setting rather than refer to a specialist for management. Frank et al. (2015) looked at provider behavior, utilization of multidisciplinary care and non-pharmacological treatment of patients whose primary care provider participated in at least one case presentation in a pain management teleECHO clinic. Evaluation of the initial implementation of the telementoring program identified increases in guideline-concordant pain care following participation in the ECHO pain management consultation (Frank et al., 2015).

Katzman et al. (2014) evaluated provider attitudes regarding participation in a pain management telementoring program and found statistically significant improvements in participant self-reported knowledge, skills, and practice. This mixed-methods study included a

focus group of nine participants including four physicians, two nurse practitioners, two physician assistants, and one dentist, which evaluated reasons for provider participation, learning from case presentation, applying concepts from ECHO pain to their patients, and the impact of Project ECHO on the clinician's team. The findings showed that telementoring through Project ECHO promotes the development of chronic pain expertise among health professionals through continuing education, professional competence and improved practice at the non-specialist level. Improvements in expertise are achieved through participation in Project ECHO telementoring, and Project ECHO Pain has been successfully replicated in federal, nonprofit, and other healthcare systems in the United States (Katzman et al., 2014).

Moore's Evaluation Framework was used in other ECHO model telementoring clinics to assess outcomes (Zhou et al., 2016). This framework is a seven level Continuing Medical Education (CME) framework to evaluate ECHO from the provider, practice, and population level. The levels of are described in Figure 1 and range from participation in the telementoring sessions to changes in community health as a result of provider participation, learning, competence, and performance (Moore, 2003).

Zhou et al. (2016) compiled a systematic review identifying 39 studies describing Project ECHO's involvement in addressing 17 medical conditions. Evaluations of Project ECHO programs generally were limited to outcomes from Levels 1 (number of participants) to 4 (providers' competence) of Moore's framework (n = 22 studies, with some containing data from multiple levels). Studies also suggested that Project ECHO changed provider behavior (n = 1), changed patient outcomes (n = 6), and can be cost-effective (n = 2). Zhou et al., (2016) concluded that Project ECHO was an effective and potentially cost-saving model that increased participant knowledge and patient access to health care in remote locations.

Sockalingam et al. (2017) used Moore's evaluation framework to evaluate a mental health ECHO program on participant engagement, satisfaction, learning, and competence. A pre-post design and weekly questionnaires measured primary and secondary outcomes, respectively. Knowledge test performance and self-efficacy ratings improved post-ECHO (knowledge change was significant, $p < 0.001$, $d = 1.13$; self-efficacy approached significance; $p = 0.056$, $d = 0.57$). Attrition rate was low (7.7%) and satisfaction ratings were high across all domains, with community providers reporting reduced feelings of isolation. The results indicated high-participant retention is achievable, and provide preliminary evidence for increased knowledge and self-efficacy. These findings suggested that engagement in Project ECHO mental health telementoring program may improve mental health management in primary care (Sockalingam et al., 2017).

The literature suggests that primary care providers can benefit from participating in telementoring in order to increase their knowledge and competence in providing care to patients who require specialty care. The ECHO model can be extended to many complex illnesses including vascular disease. With guidance and mentorship from specialists, community providers are able to provide evidence-based care in accordance with the guidelines to treat a myriad of diseases previously treated by specialists.

Theoretical Framework of the ECHO Model

The ECHO model is based on established educational theories about learning and behavior change. The theoretical framework for the ECHO model includes Social Cognitive Theory (Bandura, 1991), Situated Learning Theory (Vygotsky, 1978) and Communities of Practice (Smith, 2003).

Social Cognitive Theory. Social Cognitive Theory identifies influential factors that predispose individuals to believe in their ability to take action and engage in behavior that will produce desired results (Bandura, 1991). According to this theory, there are three factors which influence the likelihood of an individual to change his or her behavior. The person must believe that the benefits of adopting a new behavior will outweigh the costs (Arora et al., 2010). Next, the person must have confidence in his or her ability to perform the specific behavior, also known as self-efficacy. Finally, there must be reinforcement of positive behavior changes from people whose opinions are valued by the individual making the change (Bandura, 1991). The ECHO model incorporates the three components of Social Cognitive Theory with particular emphasis given to self-efficacy. Community providers learn the cost and benefits of delivering best practice care in contrast to their prior practices by seeing the impact on their patients (Arora et al., 2010). Community providers develop self-efficacy as they assume an increasing role in delivering best practice care, with the expert specialists gradually shifting into a less intrusive consultative role to ensure patient safety and support provider confidence on an ongoing basis (Arora et al., 2010).

Situated Learning Theory. Project ECHO's training components include case-based learning and co-management of patients during telehealth clinics. These components are based on Situated Learning Theory, which states that learning requires social interaction and collaboration (Arora et al., 2010). Vygotsky (1978) defined teaching and instruction as a process of assisting learners in knowledge construction and organization. According to Situated Learning Theory, teaching requires providing learners with the opportunity to extend their current skills and knowledge, modeling the idealized version of the task, engaging learner's interest, simplify tasks so they are manageable, and motivating learners to pursue the task (Arora et al., 2010). In

the case of Project ECHO Vascular, telementoring through case-based learning, the learners are rural community primary care providers and the task is management of patients at risk for vascular disease. Expert clinicians as well as the program facilitators teach the learners through repetition of evidence-based best practices, providing up-to-date information about the latest research, treatments, diagnostic tests, and motivating learners to treat patients in their community by making themselves available for consultation and mentorship. This helps to build a community of practice among rural community primary care participants and experts at the large academic medical centers.

Communities of practice. Vygotsky's work was extended by Lave and Wenger (1991) in their community of practice theory (Smith, 2003). Both situated learning and community of practice were proposed to be supported by collaborative learning, coaching and mentoring with those more expert than oneself and with peers. Lave and Wenger proposed several pointers pertinent to practice in the case of the ECHO model: learning is in the relationships between people; educators work so that people can become participants in communities of practice; and there is an intimate connection between knowledge and activity. The ECHO model uses interactive case-based learning to provide iterative practice, feedback, modeling, successive approximation, and mentoring and consultation with interdisciplinary experts and peers (Arora et al., 2010).

Section III

Methods

The results of the comprehensive review of literature indicate that primary care providers, particularly those in rural and underserved areas can benefit from engaging in telementoring with clinical experts. Improvements in provider knowledge, skill, and competence were found in

many studies which evaluated telementoring programs. The care of patients with vascular disease is one clinical area that can be addressed with telementoring sessions that connect vascular specialists with community primary care providers.

Purpose

The purpose of this project is to evaluate whether participation in a telementoring program improves rural primary care provider competence and knowledge specifically related to the care of patients at risk for vascular disease.

Hypothesis

Rural primary care provider self-reported competence and knowledge regarding management of patients with vascular disease will improve after ten weeks of participation in a vascular telementoring program.

Research Design

A quasi-experimental single group pre-test/post-test design using data from a convenience sample of rural primary care practitioners who volunteered to participate in a telementoring program was employed to test the hypothesis.

Sample

Data from community primary care providers who participated in the vascular telementoring program for ten weeks will constitute the sample. Inclusion criteria included: a) medical doctors, doctors of osteopathy, physician assistants, nurse practitioners, registered nurses, and licensed practicing nurses; b) employed full time at the site from which they were participating in telementoring sessions. Exclusion criteria: providers who did not attend at least one teleECHO clinic.

Setting

Participants joined the telementoring sessions using the Zoom® platform and were able to dial into the telementoring sessions from their own computer, clinic computer, cell phone, or tablet. The community provider participants were located in Bland County, Bath County, Wise County, Prince William County, and Albemarle County, Virginia. Teleconferencing capability allowed specialist providers at a large university medical center to connect with community providers throughout the Commonwealth of Virginia. Zoom® enables videoconferencing though a cloud-based platform and is available for Polycom and Cisco hardware that run Zoom® Connectors, the software that enables H.323/SIP conference room systems from these hardware providers to join Zoom® cloud meeting.

Measures

Competence and knowledge were assessed pre-intervention and after ten weeks of participation in telementoring sessions. Questions for the survey were adapted from the Primary Care TeleECHO Clinic Confidence and Knowledge Survey (ECHO Institute box, University of New Mexico, 2017) which is based on 18 questions and seven demographic questions (See Appendix C). Responses are measured on a 7-point Likert scale with a high score indicating a high level of skill, knowledge, or confidence. The lowest possible score is 0 and the highest possible score is 66. The final four questions on the instrument were open ended and free-text response questions for ongoing needs assessment and opportunities for input from participants to improve the operations and procedures of Project ECHO Vascular Clinic. This instrument was used with permission from the authors and has been used previously to evaluate telementoring programs at the University of New Mexico, MD Anderson, The ECHO Institute, New York Academy of Medicine, and Ontario Ministry of Health.

Procedures

Pre-Intervention. Community primary care providers were asked to complete a survey prior to participating in their first teleECHO session. They were emailed a link to a survey (see Appendix C), which included questions aimed at determining the perceived value of participation in Project ECHO and perceived self-efficacy in managing patients with vascular disease. Community providers who participate in Project ECHO were contacted via email and asked to participate by the director of Project ECHO. Participating providers were recruited from a network of advanced practice nurses connected to the large academic medical center through an existing network of advanced practice nurse preceptors.

Intervention. Telementoring sessions included input from a team of vascular specialists at a large university health center in central Virginia. Specialists include a neurologist, vascular specialist, heart failure specialist, neuroradiologist, clinical pharmacist, and advanced practice nurse. Specialists volunteered to deliver 30 minutes of didactic content on the topic in their area of expertise based on input from community providers gathered in the needs assessment (Figure 3 and Appendix D).

The group met weekly, each Thursday from 1300-1400 for ten weeks beginning in March 2018. Participating providers completed a pre-survey assessing their competence and knowledge prior to first telementoring session. Electronic surveys were sent to participants after ten weeks of participation in the telementoring sessions. The didactic content delivered through the online Zoom® platform was recorded for later review by spoke participants. Specialists were consulted and provided mentorship to community providers who presented de-identified patient cases for group discussion and input from specialists (Appendix E).

Post-Intervention. After ten weeks of participation in weekly telementoring sessions, community providers were asked to complete a post-intervention survey which included the

same questions from the pre-survey (See Appendix C). The data from the pre- and post-surveys was analyzed to determine any change in provider ratings of competence, skill, and knowledge. Electronic surveys were collected online using a computer chosen by the participant. Results of the survey were kept on a secure, password protected database and were only accessible to the primary investigator.

Data Analysis. The survey was administered using Qualtrics®, a secure, online survey tool and all data from the survey questions is stored within a password protected database. The data collected was transferred to the Statistical Package for the Social Sciences (SPSS), version 24 (SPSS, Chicago) statistical software for analysis. The paired t-test was performed to determine a change between pre- and post-intervention survey responses and determine statistical significance in spoke participants' self-reported competence and knowledge before and after participating in telementoring sessions. Attendance was taken at each telementoring session to document who participated each week. Additionally, the post-intervention survey included a question which asks providers to report the number of sessions he or she attended during the program (See Appendix D). The data to be analyzed for this scholarly project focused on the responses from community participants to determine their perceived competence and knowledge managing patients with complex vascular diseases. Descriptive statistics were computed on data pertaining to survey questions that identify provider profession and location, number of sessions attended, and demographic information.

Protection of Human Subjects and Internal Review Board

Participants were healthcare providers who volunteered to take part in telementoring sessions and willingly participated in collection of demographic information and a needs assessment prior to the first telementoring session. The information contained in the cases

presented in the tele-consultation sessions was de-identified and no personal health information (PHI) or personally identifiable information (PII) was included in these cases. The data collected from the pre- and post-survey for this study was de-identified, stored in a password protected database to which only the primary investigator and clinical supervisor had access. The data was destroyed upon completion of analysis. An application was submitted to the Institutional Review Board and a waiver was granted. (See Appendix F).

Section IV

Results

In order to measure the effect of the ECHO program intervention, a questionnaire containing the same 11 item competence and knowledge rating instrument was administered to participants prior to participation in telementoring sessions and after the completion of the ten sessions. Of the 18 participants who completed the pre-survey, 8 attended at least one session and completed the post-intervention survey. An additional two providers who attended telementoring sessions completed the post-survey and provided feedback about their participation which included useful qualitative input regarding the value of the program and the benefits of their participation and their willingness to participate in future iterations of telementoring. The results of the survey administered both prior to and the intervention and after the 10-week program are reflected in Table 4.

Study Sample

The sample included primarily advanced practice nurses working in rural settings. The average age of providers who completed the pre-survey was 37.13 years with the youngest respondent being 29 and the eldest being 56 and the median being 34.5 (*SD*=8.526). An analysis of all 18 pre-survey respondents showed an average age of 47.56 (Range: 33-76, *SD*=13.417).

The Mann-Whitney U test of the independent samples of those completing the pre-survey and those who completed the post-survey resulted in a p value of 0.059, thus the age difference between the ages of participants who completed only the pre-survey and those who participated in the telementoring sessions and completed both surveys was not significant.

Providers who completed the pre-survey reported an average of 8.6 years in practice as a primary care provider with a range from less than one year in practice to more than 30 years. The group included five nurse practitioners who had more than 10 years of experience in nursing, but who had been practicing as an APN for less than one year. Practice locations spanned 480 miles geographically and included practice sites in Wise Co, at the far southwestern corner of Virginia, up to Northern Virginia just outside Washington, D.C., throughout central Virginia in Albemarle and Nelson counties and out to Williamsburg in Southeastern Virginia. Providers reported that an average of 20% of their patient population has vascular disease. A summary of the sample characteristics and demographics of respondents can be found in Tables 3 and 4.

Competence and Knowledge Survey

The pre-intervention survey score of self-reported competence and knowledge was compared to the post-intervention score for each individual participant to determine a change in self-reported competence and knowledge before and after participation in telementoring sessions. A paired t-test was conducted on the pre- and post-survey data for the eight participants who completed the pre-survey, attended at least one telementoring session, and completed the post-survey. The average improvement of pre- and post-survey self-reported rating of competence and knowledge managing patients with vascular disease was 1.67 points on the 7-point Likert scale ranging from a low score of 0=no skill or experience to 6=expert, teaches others (p <.001).

Participating providers reported an improvement of 1.375 points in their ability to collect a vascular-focused health history ($p = .014$), an improvement of 1.5 points ($p = .003$) in their ability to educate clinical staff about patients with vascular disease; an improvement of 1.625 points ($p = .000$) in their ability to give evidence-based nutritional and lifestyle modification advice; an improvement of 1.625 points ($p = .002$) in their ability to provide quality cardiovascular care; an improvement of 2.00 points ($p < .001$) in their ability to discuss complications related to vascular disease and how to treat them; an improvement of 1.125 points ($p = .026$) in their ability to demonstrate empathy toward patients with vascular disease; an improvement of 1.125 points ($p = .026$ pre=3.625, post=4.47) in their ability to identify social barriers for patients with vascular disease; an improvement of 2.25 points ($p < 0.001$) in their ability to utilize components of the national guidelines for management of vascular disease; an improvement of 1.875 ($p = .011$) in their ability to identify patients who should be treated with anticoagulation therapy; an improvement of 1.87 points ($p = .001$) in their ability to manage the side effects of medications; and an improvement of 2.00 points ($p = .002$) in their ability to generate a complete differential diagnosis (see Table 2).

There were 18 providers who completed the pre-survey. Of those, 8 participated in the telementoring sessions and completed the post-survey. Provider self-reported competence and knowledge improved for every item on the survey with a total average improvement from 35.125 on the pre-survey to 54.5 on the post-survey.

Additional analysis was done to determine if there was a relationship between the number of sessions that participants attended and the changes in their reported competence and knowledge. The average number of sessions attended was 4.4 with a range from 1-9 sessions for attended by each of the eight returning participants. The Spearman's rho correlation of ranks

was -.037, suggesting that there was no relationship between the number of sessions attended improvement in self-reported competence and knowledge.

Program Feedback

At the end of the program participants provided written comments. All eight participants who attended at least one telementoring session indicated that participation in the program was a valuable use of their time and seven of those eight stated that they would participate in future telementoring sessions if offered. One participant answered "maybe" about her likelihood to participate in future telementoring sessions. Valuable feedback was obtained from the post-participation survey from participants who offered qualitative statements when asked how participation in Project ECHO Vascular affected their practice. Participants had positive feedback and endorsed the program as a valuable use of their time. Selected responses include: "Making connections with specialists and other practitioners around the state helped me feel like a part of a professional network I can call on in the future." One community provider said, "This was a valuable way to hear from specialists about how to manage patients I may one day refer for specialty care." A complete list of qualitative feedback from participants can be found in Table 6.

Section V

Discussion

This project was the first telementoring program using the ECHO model to be implemented from an academic medical center reaching providers across the Commonwealth of Virginia and served as a feasibility study for future Project ECHO telementoring programs. The partnerships and networking established through provider participation in this program have the potential to improve professional consultation between providers in rural and outlying areas not

previously connected to the University medical center. This pilot Project ECHO telementoring program was a part of the Advance Practice Nursing Preceptor Link and Clinical Education Telehealth network, known as APN-PLACE and used existing clinical practice sites for advanced practice nursing students. It was the first in Virginia to include schools of nursing. APN-PLACE is a HRSA-funded preceptor education program that links rural and underserved clinical practice sites with schools of nursing using telehealth.

APN PLACE is funded through a grant from the US Health Resources Services Administration and is supported by The Old Dominion School of Nursing and The University of Virginia Karen S. Rheuban Center for Telehealth; HRSA Grant # D09HP28668.

All participants in this pilot project who answered pre- and post-surveys showed an improvement in self-reported competence and knowledge for all 11-item in the questionnaire. This enhanced competence and knowledge are similar to the findings from other studies (Aurora et al., 2017; Beste et al., 2016; Flynn et al., 2017; Katzman et al., 2014; Sockalingam et al., 2017) and the significant increase in guideline supported care was similar to findings from Moeckli et al. (2017). Unlike the review published by Zhou et al. (2016), we were not able to measure patient outcomes, costs, or access to health care.

Theoretical Framework. The positive feedback from study participants on the value of the program and their willingness to participate in future iterations of a telementoring program are evidence of the usefulness of the theoretical framework in the design of this study. Community providers provided insight into their own perceived competence and skills managing patients with vascular disease in completing the needs assessment and pre-intervention survey. Participation in telementoring sessions built a community of practice between spoke participants who presented and discussed cases seen in their daily practice with input from expert clinicians

who reinforced best practices and encouraged community providers to manage the care of patients they may have otherwise referred to the specialist.

The case-based learning model and co-management of patients during telehealth clinics required social interaction and collaboration during each telementoring session. Providing community providers access to a variety of expert clinicians with different areas of expertise gave community providers the opportunity to extend their current skills and knowledge through explanation of tasks in the assessment, work-up, and treatment of patients with varied vascular and neurovascular needs. Participants stated that they valued this connection with other providers. This provides further support for Communities of Practice and Situated Learning Theories.

The recruitment of specialists to serve as experts and community providers to participate required evaluation of the needs of learners established through a needs assessment sent to potential spoke participants prior to implementation and dissemination of the results of the needs assessment to the hub presenters who incorporated knowledge of learner needs into their presentations and discussion. Specialists provided iterative practice, feedback, modeling, mentoring and consultation with community providers and other experts from different disciplines during video teleconferencing sessions that included an interdisciplinary group of providers. Specialists offered their contact information to community providers participating in the telementoring sessions and made themselves available for ongoing consultation and mentorship.

Participation rates/Respondents and non-respondents. There was some attrition noted during this project. The pre-survey was completed by 18 providers. Of those, 17 were female and one was male. Study participants responding to the pre-survey included seven

Advanced Practice Nurses (APN), three students, one social worker, and one registered nurse. Since the study was focused on the perceived competence and knowledge of licensed independent providers, only the data from the surveys submitted by the nurse practitioners was included in the data analysis. If any medical doctors, doctors of osteopathy, or physician assistants had responded, their information would have been included as well. The eight respondents to both the pre- and post-survey included five nurse practitioners and three APN Students who will go on to be licensed independent practitioners within the year, following their graduation from nurse practitioner programs. Their responses were included in the analysis of the effectiveness and value of the program because they will be providing care for patients with vascular disease in the near future. A CONSORT flow diagram illustrating participation in the program is included as Figure 4.

The average age of providers who completed both the pre-survey and post-survey was 37.13 years with the youngest respondent being 29 and the eldest being 56 and the median being 34.5 (*SD*=8.526). An analysis of all 18 pre-survey respondents showed an average age of 47.56 (Range: 33-76, *SD*=13.417). The Mann-Whitney U test of the independent samples of those completing the pre-survey and those who completed the post-survey resulted in a p value of 0.059, thus the age difference between the ages of participants who completed only the pre-survey and those who participated in the telementoring sessions and completed both surveys was not significant. This finding was of interest because we were interested in whether age and years of experience as a clinician affected a provider's decision to participate in telementoring session. Some providers may have had enough confidence in their ability to manage patients with vascular disease based on their years of experience and thus chosen not to participate in the telementoring sessions. Since the distribution of age was the same across both the pre- and post-

survey participants' responses, age was determined not to have been a contributing factor in participation in the telementoring program.

The success of future ECHO programs may be enhanced by building on existing relationships, casting a wide recruitment net, marketing to community providers, and providing early and frequent communication. Engaging specialists at the hub site and scheduling speakers and presenters in advance is helpful. Timely reminders and follow-up are also important. Additional topic areas for ECHO program expansion include managing substance use disorders, transgender care, managing patients with endocrine issues, pain management, infectious disease, behavioral health, attentional deficit hyperactivity disorder, and autism spectrum disorder.

Strengths and Weaknesses

The convenience sampling of willing participants and the small number of participants limits the ability to draw statistically significant findings from this study. The survey results may be limited due to potential self-selection and self-report bias. Additionally, this is an evaluation of the pilot program at a single institution with participation by sites outside the institution. Finally, data was collected to assess a short time frame, ten weeks, of intervention. Comparable studies looked at changes in provider attitude, knowledge, competence, and confidence over time after six months to three years of participation in similar telementoring programs. In the future, further data could be collected regarding changes in practice and clinical outcomes as well as cost savings. The scope of this project did not allow for a longer study period, but this project can hopefully serve as the scaffolding for future program evaluation as this program continues and new telementoring programs start across the Commonwealth of Virginia. The results can be used to make the case for sustainability to funders, policy makers, or other health care payers, to

recruit more participants in Project ECHO and encourage health care facilities and systems that providing staff with the time to participate is worth the investment.

Nursing Practice Implications

Implementation of the telementoring program has the potential for improved patient care in rural and underserved communities. Telementoring provides educational opportunities for community providers who do not have access to grand rounds-type opportunities at academic medical centers. Telementoring may improve the ability of nurse practitioners to manage complex patients at their community clinical site. Improved relationships between community providers and specialists allow for ease of consult and referral making. Telementoring has the potential to save mileage in travel, time, and money spent for patients who can be treated in their own community.

Section VI

Products of the DNP Project

An intervention manual with a step-by-step timeline and guidelines for implementation of a telementoring program will be included in the final edition of this DNP Project Report. It will include a process flow (see Figure 2) with timeline for stages of planning, implementation, and evaluation. Steps for implementation with accompanying timeline will be included in the intervention manual as guide for replication as well as lessons learned and areas for improvement in future telementoring programs.

Abstracts will be submitted to the Mid Atlantic Telehealth Regional Conference (MATRC) and Society of Education and the Advancement of Research in Connected Health (SEARCH) as well as poster presentations at the annual MATRC and SEARCH Conferences in Spring and Summer 2019. Additional poster sessions at the Virginia Telehealth Network (VTN)

summit and Rural Health Conference in the Fall of 2018 are also possibilities following completion of this scholarly project.

Manuscript suitable for publication will be submitted to the Journal of Nurse Practitioners. A draft of the manuscript is included as Appendix J. Findings will also be shared with the American Telemedicine Association and University of New Mexico MetaECHO, as well as the Jonas Policy Institute. Submission to Rural Health Research Gateway, and The Society for Vascular Nursing are also possible. Author Guidelines for publication in The Journal of Nurse Practitioners are included in Appendix I.

Conclusion

This project was the first telementoring program using the ECHO model to be implemented from an academic medical center reaching providers across the Commonwealth of Virginia and served as a feasibility study for future Project ECHO telementoring programs. The partnerships and networking established through provider participation in this program have the potential to improve professional consultation between providers in rural and outlying areas not previously connected to the University medical center.

References

Arora, S., Geppert, C. M. A., Kalishman, S., Dion, D., Pullara, F., Bjeletich, B., . . . Scaletti, J. V. (2007). Academic health center management of chronic diseases through knowledge networks: Project ECHO. Academic Medicine, 82(2) Retrieved from http://journals.lww.com/academicmedicine/Fulltext/2007/02000/Academic_Health_Center_Management_of_Chronic.7.aspx

Arora, S., Kalishman, S., Thornton, K., Dion, D., Murata, G., Deming, P., . . . Pak, W. (2010). Expanding access to hepatitis C virus treatment “Extension for community healthcare

outcomes (ECHO) project: Disruptive innovation in specialty care. *Hepatology, 52*(3), 1124-1133. doi:10.1002/hep.23802

Arora S., Kalishman S.G., Thornton K.A., Komaromy, M.S., Katzman, J.G., Struminger, B.B., Rayburn, W.F. (2017) Project ECHO: A Telementoring Network Model for Continuing Professional Development. *Journal of Continuing Education for Health Professionals.* Fall; 37(4): 239-244. doi: 10.1097/CEH.0000000000000172

Arora, S., Thornton, K., Jenkusky, S. M., Parish, B., & Scaletti, J. V. (2007). Project ECHO: Linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in New Mexico. *Public Health Reports, 122*(2), 74-77. doi:10.1177/00333549071220S214

Bandura, A. (1991). Social Cognitive Theory of Self-Regulation. Organizational Behavior and Human Decision Processes 50; 248-287.

Berenguera, A., Pons-Vigués, M., Moreno-Peral, P., March, S., Ripoll, J., Rubio-Valera, M., . . . Pujol-Ribera, E. (2017). Beyond the consultation room: Proposals to approach health promotion in primary care according to health-care users, key community informants and primary care centre workers. *Health Expectations, 20*(5), 896-910. doi:10.1111/hex.12530

Beste L.A., Glorioso T.J., Ho P.M., Au D.H., Kirsh S.R., Todd-Stenberg J., et al. (2017). Telemedicine specialty support promotes hepatitis C treatment by primary care providers in the Department of Veteran's Affairs. American Journal of Medicine 130(4):432-8. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/27998682.

Beste L.A., Mattox, E.A., Pichler R., Young B.A., Au D.H., Kirsh S.F., Germani M.W., Hedeen, A., Harp, B.K., & Chang, M.F . (2016). Primary care team members report greater

individual benefits from long- versus short-term specialty telemedicine mentorship. *Telemedicine and e-Health*. Volume: 22 Issue 8 http://doi.org/10.1089/tmj.2015.0185

Broens, T.H., Huisin't Veld, R.M., Vollenbroek-Hutten, M.M., Hermens, H.J., van Halteren, A.T., & Nieuwenhuis, L.J. (2007). Determinants of successful telemedicine implementations: A literature study. Journal of Telemedicine and Telecare13: 303–309.

Carey, E. P., Frank, J. W., Kerns, R. D., Ho, P. M., & Kirsh, S. R. (2016). Implementation of telementoring for pain management in Veterans Health Administration: Spatial analysis. *Journal of Rehabilitation Research & Development, 53*(1), 147-156. doi:https://dx.doi.org/10.1682/JRRD.2014.10.0247

Cheallaigh, C.N., O'Leary, A., Keating, S., Singleton, A., Heffernan, S., Keenan, E., et al. (2017) Telementoring with Project ECHO: A pilot study in Europe. Format according to APA:BMJ Innovations ePub Ahead of Print: doi:10.1136/bmjinnov-2016-000141. Retrieved from: http://innovations.bmj.com/content/early/2017/08/24/bmjinnov-2016-000141.

Fisher, E., Hasselberg, M., Conwell, Y., Weiss, L., Padron, N. A., Tiernan, E., . . . Pagan, J. A. (2017). Telementoring primary care clinicians to improve geriatric mental health care. *Population Health Management, 20*(5), 342-347. doi:https://dx.doi.org/10.1089/pop.2016.0087

Flynn, D. M., Eaton, L. H., McQuinn, H., Alden, A., Meins, A. R., Rue, T., . . . Doorenbos, A. Z. (2017). TelePain: Primary care chronic pain management through weekly didactic and case-based telementoring doi:https://doi.org/10.1016/j.conctc.2017.10.004

Frank, J. W., Carey, E. P., Fagan, K. M., Aron, D. C., Todd-Stenberg, J., Moore, B. A., . . . Kirsh, S. R. (2015). Evaluation of a telementoring intervention for pain management in the veterans health administration. *Pain Medicine, 16*(6), 1090-1100. doi:https://dx.doi.org/10.1111/pme.12715

Gerhard-Herman, M.D., Gornik H.L., Barrett C., Barshes N.R., Corriere M.A., Drachman D.E., Fleisher L.A., Fowkes F.G.R., Hamburg N.M., Kinlay S., Lookstein R., Misra S., Mureebe L., Olin J.W., Patel R.A.G., Regensteiner J.G., Schanzer A., Shishehbor M.H., Stewart K.J., Treat-Jacobson D., and Walsh M.E. (2016). 2016 AHA/ACC guideline on the management of patients with lower extremity peripheral artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. doi: 10.1161/CIR.0000000000000471.

Han, Y., Li, L., Zhang, Y., Yuan, H., Ye, L., Zhao, J., & Duan, D. D. (2015). Phenomics of vascular disease: The systematic approach to the combination therapy. *Current Vascular Pharmacology, 13*(4), 433-440. doi:CVP-EPUB-62829 [pii]

Health Resources and Services Association (2016). Definition of telehealth. *Telehealth Programs.* Retrieved from https://www.hrsa.gov/rural-health/telehealth/index.html

Institute of Medicine. (2002). *Crossing the quality chasm: A new health system for the 21st century*. Washington, DC: National Academy Press.

Katzman, J. G., Comerci, G. J., Boyle, J. F., Duhigg, D., Shelley, B., Olivas, C., . . . Arora, S. (2014). Innovative telementoring for pain management: Project ECHO pain. *Journal of Continuing Education in the Health Professions, 34*(1), 68-75. doi:https://dx.doi.org/10.1002/chp.21210

Katzman, J. G., Galloway, K., Olivas, C., McCoy-Stafford, K., Duhigg, D., Comerci, G., . . . Arora, S. (2016). Expanding health care access through education: Dissemination and implementation of the ECHO model. *Military Medicine, 181*(3), 227-235. doi:https://dx.doi.org/10.7205/MILMED-D-15-00044

Lave, J. &Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge: Cambridge University Press.

Mahan C.E., Holdsworth M.T., Welch S.M., Borrego M., & Spyropoulos, A.C. (2011). Deep-vein thrombosis: a United States cost model for a preventable and costly adverse event. Thrombosis and Haemostasis. 106:405–415.

Moeckli, J., Stewart, K. R., Ono, S., Alexander, B., Goss, T., Maier, M., . . . Ohl, M. E. (2017). Mixed-methods study of uptake of the extension for community health outcomes (ECHO) telemedicine model for rural veterans with HIV. *The Journal of Rural Health, 33*(3), 323-331. doi:10.1111/jrh.12200

Moore, D.E. (2003). A framework for outcomes evaluation in the continuing professional development of physicians. *The Continuing Professional Development of Physicians: From Research to Practice.* Chicago, IL: American Medical Association Press; 249-274.

Mozaffarian, D. D. H., Benjamin, E. J. S., Go, A. S., Arnett, D. K. Blaha, M. J., Cushman, M., …on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. (2016). Executive summary: Heart disease and stroke statistics-2016 update: A report from the American Heart Association. *Circulation, 133*(4), 447-454. doi:10.1161/CIR.0000000000000366

Pande R.L. & Creager, M.A. (2014) Socioeconomic inequality and peripheral artery disease prevalence in US adults. *Circulation, Cardiovascular Quality Outcomes 7*:532–53

Smith, M. K. (2003) Communities of practice. The Encyclopedia of Informal Education. Retrieved from: http://valenciacollege.edu/faculty/development/tla/documents/CommunityofPractice.pdf

Smith S.M., Wallace E., O'Dowd T., & Fortin M. (2016). Interventions for improving outcomes inpatients with multimorbidity in primary care and community settings. Cochrane Database of Systematic Reviews 2016, Issue 3. Art. No.: CD006560. DOI: 10.1002/14651858.CD006560.pub3.

Sockalingam, S., Arena, A., Serhal, E., Mohri, L., Alloo, J., and Crawford A. (2017) Building provincial mental health capacity in primary care: An evaluation of a Project ECHO mental health program. Academic Psychiatry ePub ahead of print. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/?term=28593537.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Zhou, C., Crawford, A., Serhal, E., Kurdyak, P., & Sockalingam, S. (2016). The Impact of Project ECHO on Participant and Patient Outcomes: A Systematic Review. *Academic Medicine, 91*(10), 1439-1461.

Tables

Table 1. Needs Assessment Results

Please select which of the following areas you would find most useful for vascular disease training.

Topic	Respondent Interest
Clinical indications for further diagnostic testing	25%
The inflammatory process leading to vascular disease	30%
Clinical practice guidelines for managing vascular disease	50%
Medication review: prescription guidelines and side effects	25%
Access to care for patients without insurance	10%
Referral process and community resources	30%

Table 2. Pre- and Post-Survey Results Compared (N = 8)

UVA ECHO Survey of Competence and Knowledge. Please rate your skills, knowledge, or competence in addressing the following issues and topics related to caring for patients with vascular disease.

	Pre-Survey Mean (SD)	Post-Survey Mean (SD)	Change	p-value
My ability to collect a vascular-focused health history.	3.63 (1.3)	5.0 (.53)	+ 1.375	.014
My ability to educate clinic staff about patients with vascular disease.	3.38 (1.1)	4.88 (.64)	+ 1.50	.003
My ability to give evidence-based nutritional and lifestyle modification advice	3.38 (.51)	5.0 (.00)	+1.625	<.001
My ability to provide quality cardiovascular care	3.5 (.92)	5.13 (.35)	+1.625	.002
My ability to discuss complication related to vascular disease and how to treat them.	3.0 (.75)	5.0 (.53)	+ 2.00	<.001
My ability to demonstrate empathy toward my patients with vascular disease	3.75 (1.0)	4.88 (.64)	+1.125	.026
My ability to identify social barriers for my patients with vascular disease	3.625 (.74)	4.75 (.70)	+1.125	.026
My ability to utilize components of the national guidelines for management of vascular disease	2.63(.91)	4.88(.35)	+2.25	<.001
My ability to identify patients who should be treated with anticoagulation therapy	3.25 (1.5)	5.125 (.35)	+1.875	.011
My ability to manage side effects of medications	3.00 (1.0)	4.88 (.35)	+1.875	.001
My ability to generate a complete differential diagnosis	3.00 (1.4)	5.00 (.53)	+ 2.00	.002

Note: Survey adapted from the Primary Care TeleECHO Confidence and Knowledge Survey (New Mexico, 2017)

Table 3.

Sample Characteristics and Demographics Pre-Survey Respondents (n=18)

Characteristic	**Mean (SD)**	**Range**
Age	47.56 (13.417)	33-76
Years of Experience	8.67	1-25
Population Served		
% of Patient with Vascular Disease	20	5-40
Characteristic	**n**	**%**
Sex		
Male	1	5.26
Female	18	94.74
Clinical Role		
MD	0	0
DO	0	0
APRN/NP	12	63.16
PA	0	0
Student	5	26.32
Other	2	10.53

Table 4.

Sample Characteristics and Demographics of Returning Participants (n=8)

Characteristic	**Mean (SD)**	**Range**
Age	37.13 (8.526)	29-56
Years of Experience	6	1-15
Number of Sessions Attended	4.4	1-9
Characteristic	**n**	**%**
Sex		
Male	0	0
Female	8	100
Clinical Role		
MD	0	0
DO	0	0
APRN/NP	8	100%
PA	0	0
Student	0	0
Other	0	0

Table 5.

Qualitative observations from participants.

Participant #1	"Making connections with specialists and other practitioners around the state helped me feel like a part of professional network I can call on in the future."
Participant #2	"This was a valuable way to hear from specialists about how to manage patients I may one day refer to them."
Participant #3	"Putting faces with names gave me an idea of who might see my patients if I refer them for specialty care. The speakers were engaging and helped me to understand complex concepts in an instructive and interactive way."
Participant #4	"Has made me think more about community resources, access to care."
Participant #5	"I am more conscious of CV complications and guidelines for management."
Participant #6	"I include additional diagnosis in my differential and think about the potential vascular complications in patients whose chief complaint is not something vascular. I feel more confident in doing a thorough neuro assessment and educate more patients about the signs of stroke. This was a great learning experience and opportunity to network with providers who I might not have met otherwise."
Participant #7	"…gave me extra knowledge about how to manage vascular disease especially heart failure."
Participant #8	"We all see the value in it (Project ECHO). The challenge is figuring out how to prioritize it in people's schedules with the demands of RVUs, clinic schedules, patient care needs of our own patients we're already connected to and caring for. I see the value in it, and I haven't even been able to participate as much as I wanted to, but if we were scheduled to be available during this hour the same way we're scheduled to take call for stroke codes. What would be the added value beyond just the added outreach for our division? Could we attach that to referrals or a contract or grant or a partnership with a community clinic?"
Participant #9	"We need not just departmental buy-in, but institutional buy-in. If the University saw the value in this, it could be filtered down to the division and department level with time and money support as a part of the larger mission of the health system and University."
Needs Assessment Input from Participant	"I want to learn the best diagnostic tools for determining if patients have vascular disease then when to refer them, order more tests, etc. I also want to learn more about the pharmacological management of patients with vascular and heart disease and resources available to patients in the community. I also want to know about the latest technology and treatment options for patients."

Figures

Figure 1.

Moore's CME Evaluation Framework for Project ECHO

LEVEL 1: Participation	Number of disciplines participating in ECHO and number of sessions attended.
LEVEL 2: Satisfaction	Evaluation surveys for each ECHO session.
LEVEL 3: Learning (Knowledge)	Improved knowledge in prevention of vascular disease; Pre-/Post- MCQs and perceived self-efficacy.
LEVEL 4: Competence	Degree to which attendees demonstrate skills in managing patients with vascular risk.
LEVEL 5: Performance	Degree to which attendees perform what ECHO intended them to do (e.g. follow algorithm for management of hypertension, tobacco cessation.
LEVEL 6: Patient Health	How much does the health of patients change as a result of provider participation in ECHO.
LEVEL 7: Community Health	Degree to which vascular health in the community changes due to ECHO related changes in practice.

Moore, D.E. 2003. A framework for outcomes evaluation in the continuing professional development of physicians. *The Continuing Professional Development of Physicians: From Research to Practice.* Chicago, IL: American Medical Association Press: 249-274.

Figure 2: Process Flow

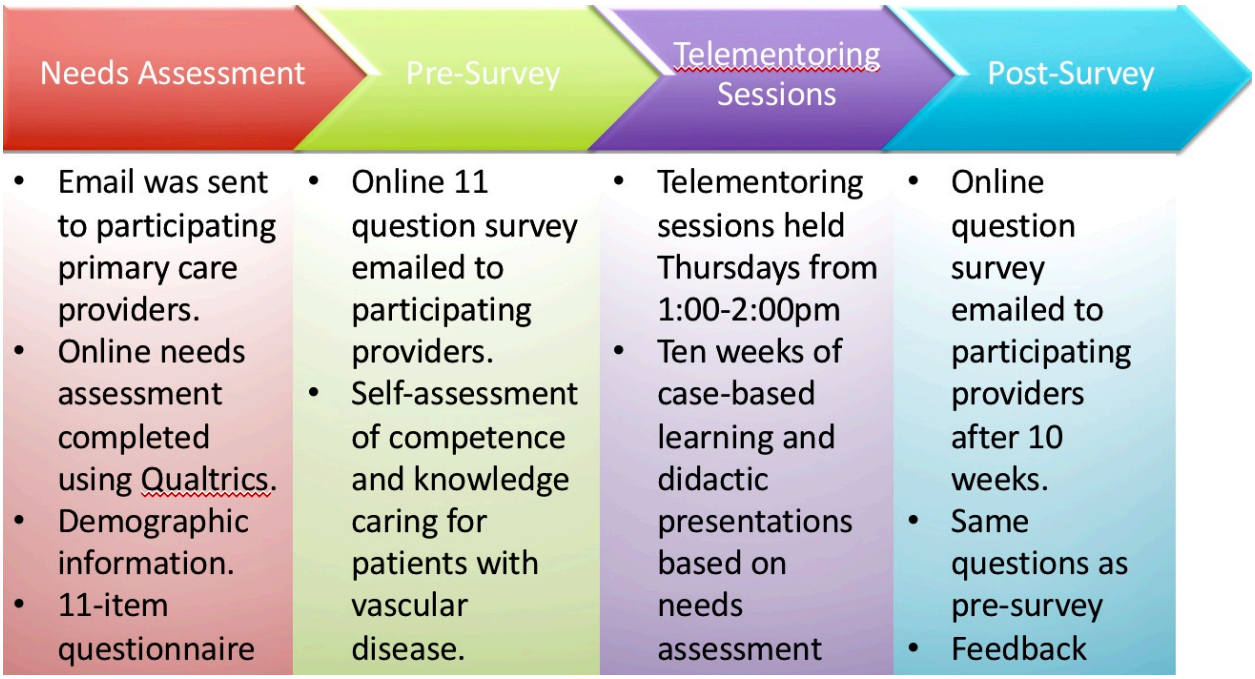


Figure 3. Didactic Topics

Topic	Speaker
Introduction to UVA Project ECHO Vascular	Kimberly Albero, MSN, APRN, FNP-BC UVA Project ECHO Program Manager
Overview of Heart Failure Management for the Community Primary Care Provider	Craig Thomas, MSN, ACNP, CHFN UVA Heart Failure Clinic
In Home Visit by Specialty Trained Nurse's Aides Improves All Cause Readmission in Heart Failure Care	Craig Thomas, MSN, ACNP, CHFN UVA Heart Failure Clinic
mHealth Application in the Management of Vascular Patients in the Community	David Cattell-Gordon, MS, LSW Director of Telemedicine
iTreat: Pre-hospital Stroke Assessment Capabilities Using Telehealth Technology	Andy Southerland, MD Neurologist
Radiologic Assessment of the Acute Stroke Patient	John Gaughen, MD Neuroradiologist
Acute Stroke Assessment for the Primary Care Nurse Practitioner	Jimmy V. Berthaud, MD, MPH Pediatric Neurologist
Pharmacologic Management of Vascular Disease	Donna White, RPh, CDE, BCACP Clinical Pharmacologist
Hot Spotting in Primary Care Treatment of Patients with Vascular Disease	Rebecca Bates, DNP, APRN, FNP Adams Compassionate Healthcare Network

Figure 4. CONSORT Flow Diagram of Program Participation

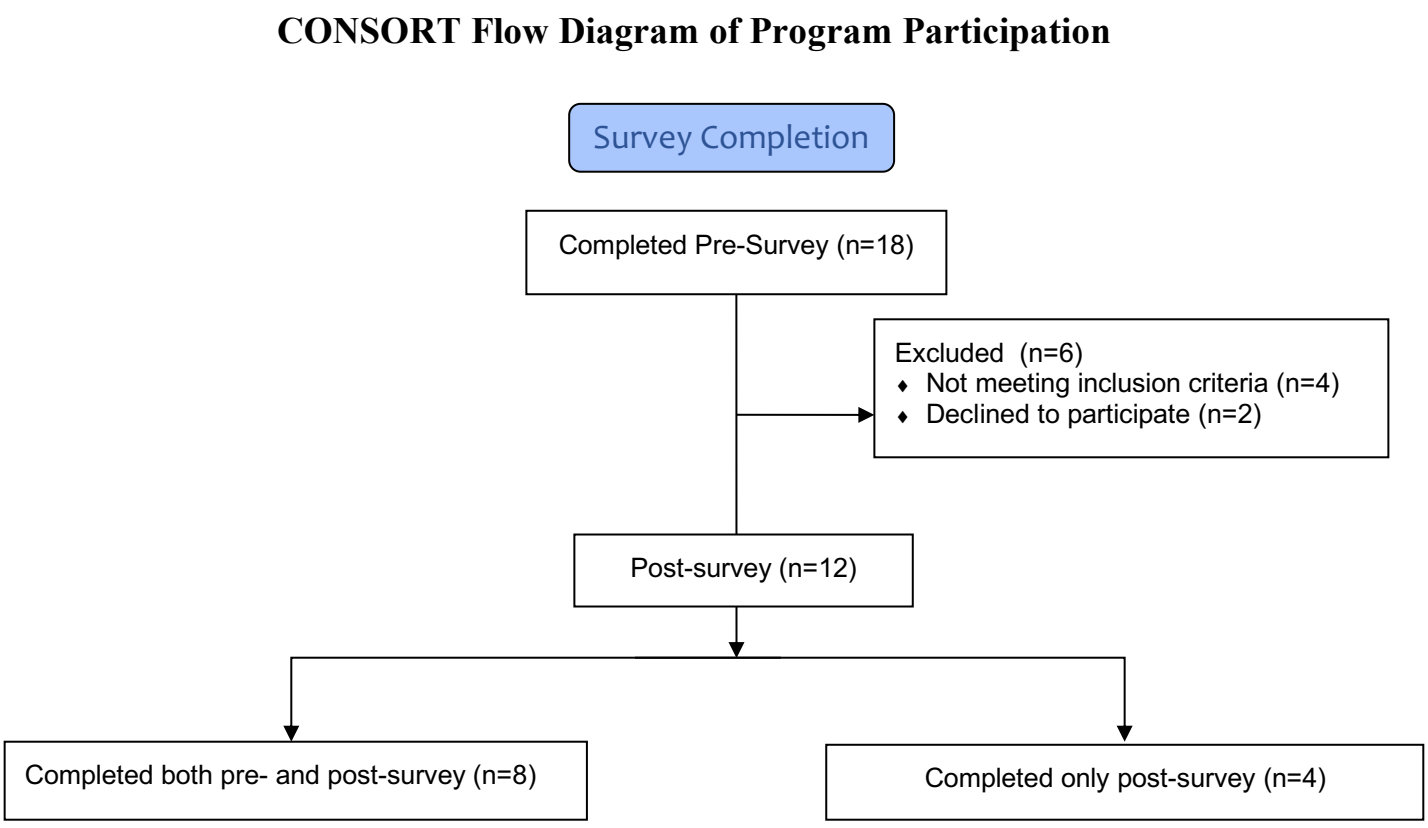
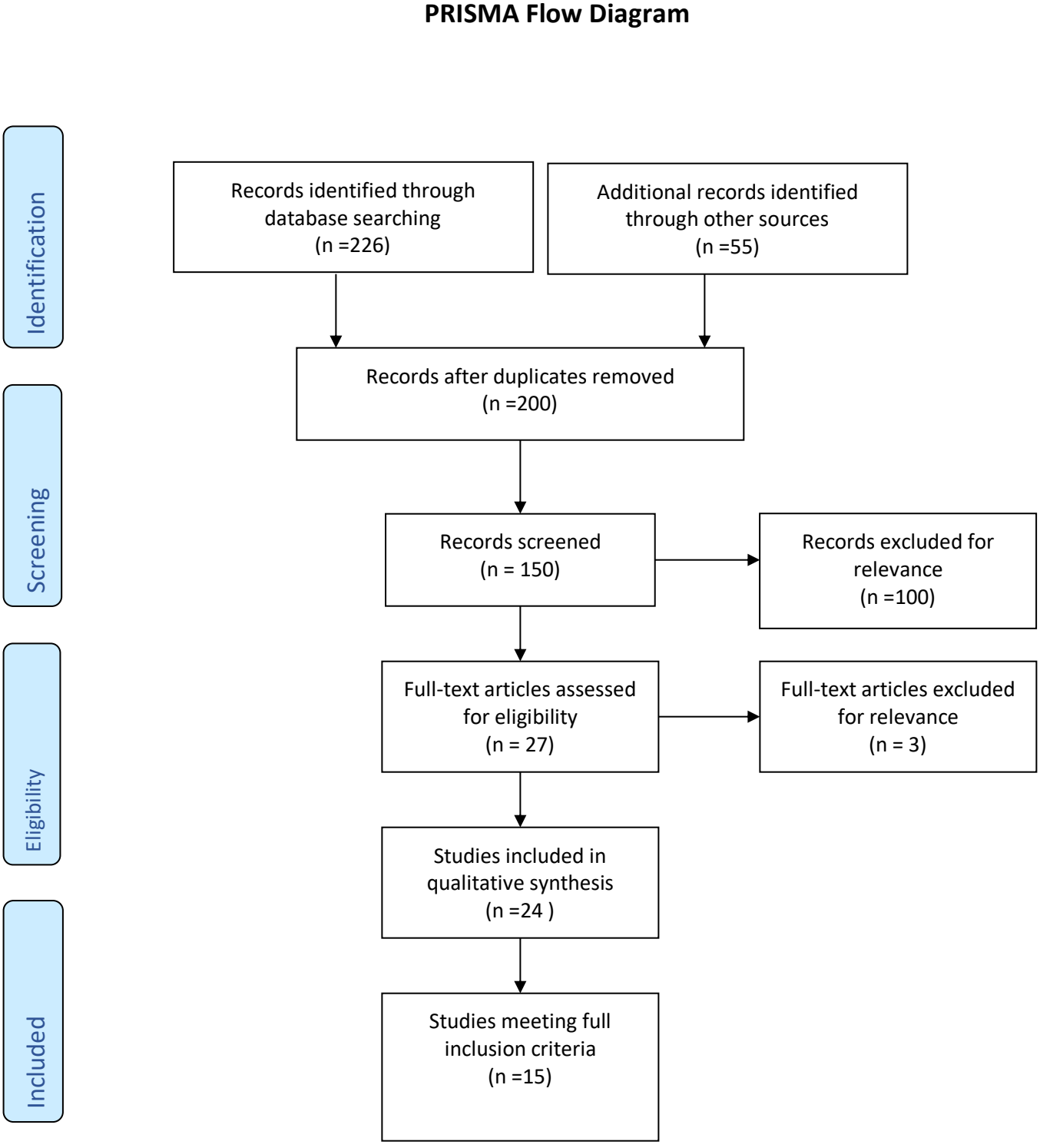


Figure 5: PRISMA Flow Diagram of Review of Literature



Appendices

A. Glossary of Project ECHO Terms

Demonopolize	Share freely with others particularly in the case of knowledge to enable others to become equally expert.
ECHO®	Extension for Community Healthcare Outcomes
ECHO Institute	Refers to Project ECHO's legal entity, faculty and staff as well as headquarters and physical location at UNMHSC in Albuquerque, NM.
ECHO Model	Developed as a platform for both healthcare service delivery and research in 2003. The ECHO model is based on four core pillars: 1. use technology to leverage scarce resources, 2. sharing "best practices" to reduce disparities, 3. case-based learning to master complexity, and 4. a web-based database to monitor outcomes. The ECHO model develops knowledge and capacity among community clinicians through on-going telementoring and education.
Force Multiplication	Refers to an exponential increase in workforce capacity created through the ECHO model. Utilizing telementoring and guided practice ECHO builds system capacity by empowering primary care providers to gain new knowledge and expertise to treat patients in their own communities.
Hub	Regional center where multidisciplinary team of subject matter experts for a teleECHO clinic is located.
Knowledge Networks	Consists of regularly scheduled teleECHO clinics that bring together expert inter- disciplinary specialists and community-based partners.
Learning Loops	The sharing of knowledge between experts and community partners through active participation in teleECHO clinics.
Project ECHO®	Refers to the overall movement to implement the ECHO model, including the ECHO Institute.
Session	Refers to an individual teleECHO clinic occurrence.
Spoke	Community partner site at which individual or team of learners is located and connects to hub via teleECHO clinics.
TeleECHO Clinic	Term used to describe regularly scheduled videoconferencing sessions which include subject matter experts and learners who use the ECHO model, didactic presentations and case-based learning to create learning loops. TeleECHO clinics are a core feature of the ECHO model.
Telementoring	Term used to describe the guided mentoring relationship that develops during a teleECHO clinic using videoconferencing technology.
VTC	Video teleconferencing; participation in teleECHO clinics via video connection.
Zoom	Teleconferencing software used for teleECHO clinics.

B. Provider Needs Assessment Survey

Before the official launch of UVA Project ECHO Vascular Telehealth Clinic, we hope to assess the current need for this service among participating community providers. Please answer the following questions about participation in the clinical and the care of patients at risk for vascular disease.

Please answer the questions that apply to your practice, organization, or site. If questions are not applicable to you, please select N/A.

1. What is your title or clinical role?
    a. MD
    b. DO
    c. PA
    d. NP/APN
    e. Student
    f. Other (specify)
2. How many years have you been practicing?
3. How long have you been working in this community?
4. In which organization do you currently work?
5. How long have you worked in the clinic or organization where you currently work?
6. Do you provide direct patient care?
7. How many patients do you see in a typical work week?
8. Of the patients you see weekly in your practice, how many have vascular disease?
    a. None

b. <10

c. 10-20

d. 21-30

e. >30

f. N/A

9. Please estimate the percentage of patients in your practice with vascular disease that you referred for treatment elsewhere.

a. 0%

b. <10%

c. 10-25%

d. 26-50%

e. 51-75%

f. >75%

g. N/A

10. Please indicate the extent to which the statements in the following section refer to your goals in treating patients at risk for vascular disease. (1-5 Strongly Disagree to Strongly Agree + N/A)

I believe that my future role as a provider in caring for patients at risk for vascular disease is

a. To become a well-trained local provider for patients with vascular disease

b. To diagnose patients with vascular disease

c. To screen and refer patients with vascular disease to specialists for treatment

d. To manage and treat patients with vascular disease using best practice therapies with the support of the ECHO clinic network.

e. To become the local expert in vascular disease in my community.
f. To provide consultation to other primary care providers in the care of patients with vascular disease
g. To continue providing care for patient with vascular disease in the future with regular participation in the UVA Project ECHO Vascular Telehealth Clinic.
h. To continue providing care for patient with vascular disease in the future, without regular participation in the UVA Project ECHO Vascular Telehealth Clinic.

Please select which of the following areas you would find most useful for further training: (Select all that apply)

a. Factors contributing to the development of vascular disease
b. Conducting a physical examination
c. The inflammatory process leading to vascular disease
d. Clinical Practice Guidelines
e. Medication review, prescription guidelines and side effects
f. Effective patient and family education
g. Clinical indication for further diagnostic testing
h. Knowledge of organizational issues, program outcomes, referral and professional networking.
i. Other (specify):

What additional topics are you most interested in learning about during Project ECHO Vascular?

C. Provider Competency Self- Evaluation Before and After Participation

On a scale from 0-6 (described below) please rate your skills, knowledge, or competence to address the following issues and topics related to caring for patients at risk for vascular disease.

0 - None or No Skill

1 – Vague knowledge, skills, or competence

2 – Slight knowledge, skills, or competence

3 – Average among my peers

4 – Competent

5 – Very Competent

6 – Expert, teaches others

Before and After participation in Project ECHO Vascular Clinic

1. My ability to collect a vascular focused health history.
2. My ability to educate clinic staff about patients with vascular disease.
3. My ability to give evidence-based nutritional and lifestyle modification advice.
4. My ability to provide quality cardiovascular care.
5. My ability to discuss complications related to vascular disease and how to treat them.
6. My ability to demonstrate empathy toward my patients with vascular disease.
7. My ability to identify social barriers for my patients with vascular disease.
8. My ability to utilize components of the national guidelines for management of vascular disease.
9. My ability to identify patients who should be treated with anticoagulation therapy.
10. My ability to manage side effects of medications.
11. My ability to generate a complete differential diagnosis.

D. Post-Survey Program Feedback Questionnaire

1. Your gender: M/F
2. Your age: [Free Text]
3. What is your clinical role?
    a. MD
    b. DO
    c. APRN/NP
    d. PA
    e. Student
    f. Other
4. How long have you been practicing? [Free Text]
5. What organization do you work for? [Free Text]
6. How many Project ECHO sessions did you attend? [Free Text]
7. Was Participation in UVA Project ECHO Vascular a valuable use of your time? Y/N
8. Would you participate in future Project ECHO telementoring sessions if offered? Yes/Maybe/No
9. Please rate your skills, knowledge or competence to address the following issues and topics related to caring for patient with vascular disease after participating in UVA Project ECHO Vascular.
    a. My ability to collect a vascular focused health history
    b. My ability to educate clinic staff about patients with vascular disease
    c. My ability to give evidence-based nutritional and lifestyle modification advice
    d. My ability to provide quality cardiovascular care

e. My ability to discuss complications related to vascular disease and how to treat them
f. My ability to demonstrate empathy toward my patients with vascular disease
g. My ability to identify social barriers for my patients with vascular disease
h. My ability to utilize components of the national guidelines for management of vascular disease
i. My ability to identify patients who should be treated with anticoagulation therapy
j. My ability to manage the side effects of medications
k. My ability to generate a complete differential diagnosis

10. Which session did you find most interesting?
    a. Introduction to Project ECHO Vascular
    b. Overview of Heart Failure Management
    c. In Home Visit by Specialty Trained Nurse's Aides Improves All-Cause Readmission in Heart Failure Care
    d. mHealth Application in the Management of Vascular Patients in the Community
    e. iTreat: Pre-Hospital Stroke Assessment Capabilities Using Telehealth Technology
    f. Radiological Assessment of the Acute Stroke Patient
    g. Acute Stroke Assessment for the Primary Care Nurse Practitioner
    h. Pharmacological Management of Chronic Illness
    i. Hot-Spotting in Primary Care Treatment of Patients with Vascular Disease

11. Which session did you find most valuable?
    a. Introduction to Project ECHO Vascular
    b. Overview of Heart Failure Management
    c. In Home Visit by Specialty Trained Nurse's Aides Improves All-Cause Readmission in Heart Failure Care
    d. mHealth Application in the Management of Vascular Patients in the Community
    e. iTreat: Pre-Hospital Stroke Assessment Capabilities Using Telehealth Technology
    f. Radiological Assessment of the Acute Stroke Patient
    g. Acute Stroke Assessment for the Primary Care Nurse Practitioner
    h. Pharmacological Management of Chronic Illness
    i. Hot-Spotting in Primary Care Treatment of Patients with Vascular Disease
12. How has participation in Project ECHO affected your practice? [Open Comment Box]

E. Anatomy of an ECHO

Anatomy of an ECHO

1. Brief Planning Huddle
2. Introductions
    a. Video participants
    b. Telephone participants
    c. Hub and in-person participants

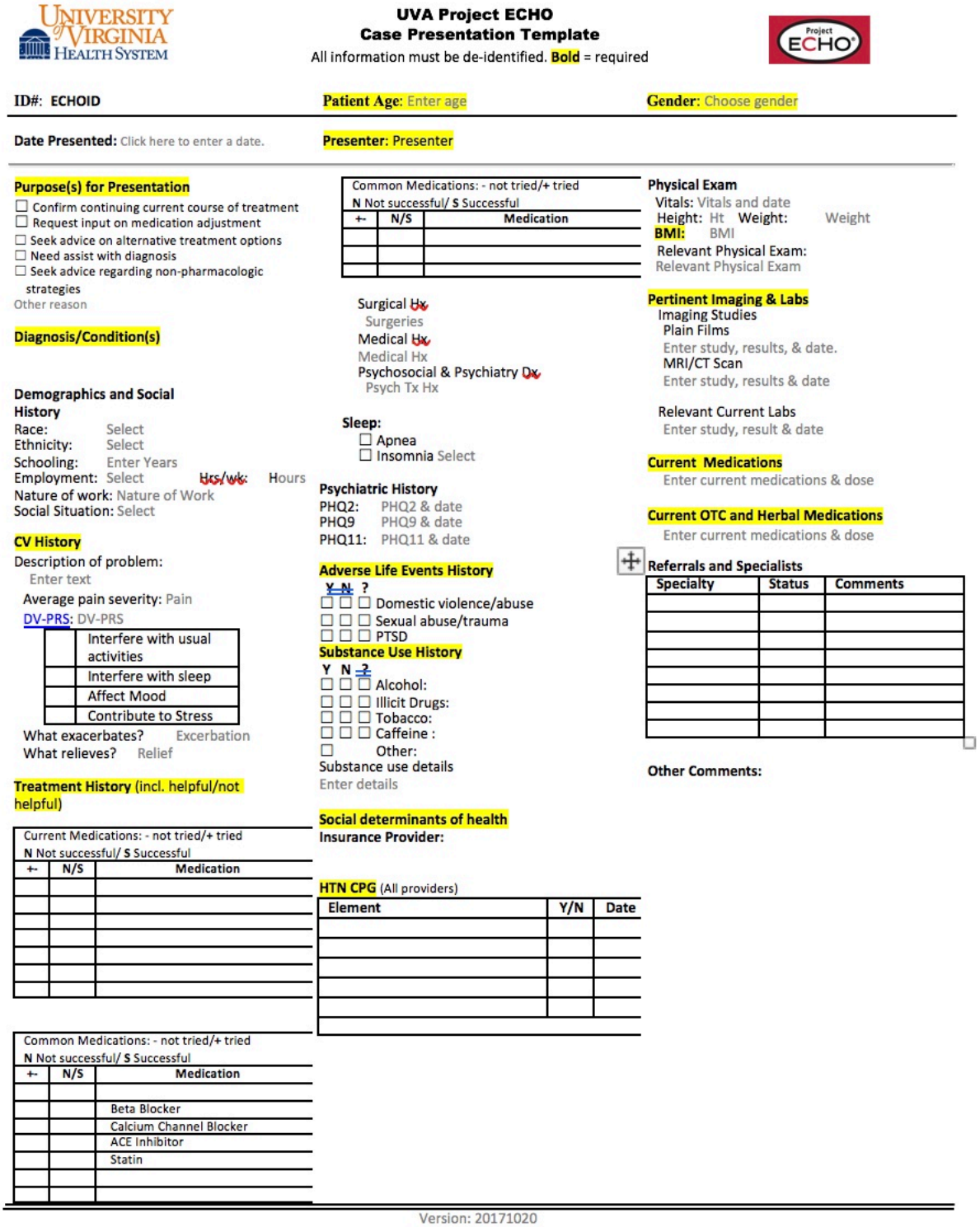
3. Announcements
    a. Updates
    b. Audience questions and concerns
4. Brief Didactic (30 minutes or less)
5. Patient Case Presentation
    a. Hub facilitator introduces the presenter "Dr. Schweickert. You have a case today, please present your case."
    b. Spoke presenter presents the case
    c. Facilitator invites other team members at spoke to comment/elaborate on case.
    d. Hub facilitator summarizes presentation
    e. Hub facilitator ensures with presenter the summary is accurate "Dr. Schweickert did I summarize this case correctly?"
6. Hub/ECHO asks audience for questions
    a. No recommendations for diagnosis or treatment at this point
    b. Video participants
    c. Telephone participants
    d. Hub/ECHO Core Group
    e. Facilitator draws out comment from participants who are not medical providers
7. Hub/ECHO asks audience for recommendations and impressions
    a. Diagnosis or further workup
    b. Non-pharmacological recommendations
    c. Pharmacological recommendations
    d. Interventional recommendations
    e. Facilitator draws out comment from participants who are not medical providers
8. Hub/ECHO summarizes recommendations and consensus on diagnosis and treatment plan
    a. Asks presenter if his or her questions have been adequately addressed
    b. Invites presenter to represent in the future and sets a tentative date for a follow-up presentation

9. Close and Debrief
    a. All facilitators on the "hub" team should review and comment on the flow and facilitation of the session, with an eye to self-reflection and issues that may not have been obvious in the moment.

Helpful Recommendations

1. The speaker should always introduce him or herself.
2. Help direct the case discussion if presenter is unable to focus or long-winded.
3. Look for "teachable moments" to impart important knowledge to participants.
4. Always treat participants with respect and address critical comments appropriately.

F. Case Presentation Template



UVA Project ECHO
Case Presentation Template
All information must be de-identified. Bold = required

ID#: ECHOID
Patient Age: Enter age
Gender: Choose gender

Date Presented: Click here to enter a date.
Presenter: Presenter

Purpose(s) for Presentation
☐ Confirm continuing current course of treatment
☐ Request input on medication adjustment
☐ Seek advice on alternative treatment options
☐ Need assist with diagnosis
☐ Seek advice regarding non-pharmacologic strategies
Other reason

Diagnosis/Condition(s)

Demographics and Social History
Race: Select
Ethnicity: Select
Schooling: Enter Years
Employment: Select ~~Hrs/wk:~~ Hours
Nature of work: Nature of Work
Social Situation: Select

CV History
Description of problem:
Enter text
Average pain severity: Pain
DV-PRS: DV-PRS

	Interfere with usual activities
	Interfere with sleep
	Affect Mood
	Contribute to Stress

What exacerbates? Excerbation
What relieves? Relief

Treatment History (incl. helpful/not helpful)

Current Medications: - not tried/+ tried
N Not successful/ S Successful

+-	N/S	Medication

Common Medications: - not tried/+ tried
N Not successful/ S Successful

+-	N/S	Medication
		Beta Blocker
		Calcium Channel Blocker
		ACE Inhibitor
		Statin

Common Medications: - not tried/+ tried
N Not successful/ S Successful

+-	N/S	Medication

Surgical ~~Hx~~
Surgeries
Medical ~~Hx~~
Medical Hx
Psychosocial & Psychiatry ~~Dx~~
Psych Tx Hx

Sleep:
☐ Apnea
☐ Insomnia Select

Psychiatric History
PHQ2: PHQ2 & date
PHQ9 PHQ9 & date
PHQ11: PHQ11 & date

Adverse Life Events History
~~Y N~~ ?
☐ ☐ ☐ Domestic violence/abuse
☐ ☐ ☐ Sexual abuse/trauma
☐ ☐ ☐ PTSD

Substance Use History
Y N ~~?~~
☐ ☐ ☐ Alcohol:
☐ ☐ ☐ Illicit Drugs:
☐ ☐ ☐ Tobacco:
☐ ☐ ☐ Caffeine :
☐ Other:
Substance use details
Enter details

Social determinants of health
Insurance Provider:

HTN CPG (All providers)

Element	Y/N	Date

Physical Exam
Vitals: Vitals and date
Height: Ht Weight: Weight
BMI: BMI
Relevant Physical Exam:
Relevant Physical Exam

Pertinent Imaging & Labs
Imaging Studies
Plain Films
Enter study, results, & date.
MRI/CT Scan
Enter study, results & date

Relevant Current Labs
Enter study, result & date

Current Medications
Enter current medications & dose

Current OTC and Herbal Medications
Enter current medications & dose

Referrals and Specialists

Specialty	Status	Comments

Other Comments:

Version: 20171020

G. University of Virginia Institutional Review Board for the Social and Behavioral Health Sciences Waiver

February 6, 2018

Kimberly Albero and Emily Drake
Academic Divisions
Charlottesville, VA 22901

Dear Kimberly Albero and Emily Drake:

Thank you for submitting your project entitled: "Telementoring to Improve Rural Primary Care Provider Competence and Knowledge in Managing Vascular Disease" for review by the Institutional Review Board for the Social & Behavioral Sciences. The Board reviewed your Protocol on February 6, 2018.

The first action that the Board takes with a new project is to decide whether the project is exempt from a more detailed review by the Board because the project may fall into one of the categories of research described as "exempt" in the Code of Federal Regulations. Since the Board, and not individual researchers, is authorized to classify a project as exempt, we requested that you submit the materials describing your project so that we could make this initial decision.

As a result of this request, we have reviewed your project and classified it as exempt from further review by the Board for a period of four years. This means that you may conduct the study as planned and you are not required to submit requests for continuation until the end of the fourth year. The Online Consent has been approved for use with participants.

This project # 2017-0593-00 has been exempted for the period February 6, 2018 to February 5, 2022. If the study continues beyond the approval period, you will need to submit a continuation request to the Board. If you make changes in the study, you will need to notify the Board of the changes.

Sincerely,

Tonya R. Moon, Ph.D.
Chair, Institutional Review Board for the Social and Behavioral Sciences

H. Project ECHO Appropriate Use Guidelines

UNM HEALTH SCIENCES CENTER

Project ECHO IT Applications Appropriate Use Guidelines

1. Use of Project ECHO applications and materials will be guided by the principles of **mutual respect** and **intellectual honesty**.
2. Absolutely no Protected Health Information (PHI), as defined by the Health Insurance Portability and Accountability Act of 1996 (HIPAA), other restricted data such as Personally Identifiable Information (PII) or business restricted information, or other information covered by regulatory restrictions such as PCI, FERPA, etc. will be included in the ECHO applications (iECHO, iHealth, ECHO Health, TeamWork, Box) or materials shared.
    a. Users will contact echobox@salud.unm.edu to request clarification before uploading documents if they have any questions about their appropriateness.
    b. If inappropriate information is located during an audit, the information will be removed immediately and user notified. This user will be offered training on appropriate use of Project ECHO IT Applications.
3. The ECHO Institute and the MetaECHO Community agree to the principle of open sharing of applications and materials within the ECHO community. However, in order to share materials (such as curricula or other ECHO tools/resources), please take steps in advance to ensure that license to use and share these materials has been granted by the creators/owners of this intellectual property. One way to accomplish this is to have the creators/owners sign an intellectual property waiver.
4. Appropriate use of didactic presentations found in Project ECHO applications includes the following (regardless of where the information is subsequently being presented or used):
    a. To ensure that individuals are able to provide proper acknowledgement to the creator/owner of materials, the following information is required:
        i. Name of creator
        ii. Date created
        iii. Date presented and/or revised
    b. Original authors/creators should be credited on the first or second slide of the deck, along with the original date the material was presented. An example: "created and presented by Dr. Karla Thornton, 1/1/14," "revised and presented by Dr. Sanjeev Arora, 5/5/14."
    c. Removal of the originating organization's logo is prohibited. Other logos can be added, but no logos should be removed.
    d. Out of date content may be removed from the Box library as needed.
5. Please remember that access to the applications and library is restricted to authorized ECHO partners and the MetaECHO community. Please do not share login information to these applications or materials downloaded without consent of the ECHO Institute and, to enhance security, we strongly suggest that you do not use any of your internal, organizational passwords as your external application password or passwords.
6. The Box.com, Teamwork, and other Project ECHO application Privacy Policies apply to all users but is a separate understanding between the individual and Box.com, Teamwork, or other organization, with UNMHSC as a third-party.

I hereby agree to the terms, principles and guidelines above:

Signature: Kimberly Albero **Date:** 08/15/2017

Name: Kimberly Albero **Organization:** UVA

Email address: ka8p@virginia.edu

(PLEASE PRINT NAME AND EMAIL CLEARLY)

I. Author Guidelines

Author Guidelines

The Journal for Nurse Practitioners

PURPOSE

The Journal for Nurse Practitioners, JNP, provides a highly visible resource to help nurse practitioners stay current with the clinical, research, and policy concerns affecting their day-to-day practice. In addition to peer-reviewed clinical articles, *JNP* features continuing education opportunities and opinions and commentary on pressing legislative, regulatory, and clinical practice issues.

SUBMISSION OF MANUSCRIPTS

All manuscripts must be submitted through the *JNP* submission and review website (*ees.elsevier.com/jnp*) or *JNP* Online at *www.npjournal.org*. In general, manuscript length should be 3000–3500 words. Text, tables, and artwork must be submitted in electronic formats. Submission items should include an abstract summarizing the article (< 100 words); 4–6 keywords; a cover letter; a title page; a page showing the word count; the manuscript (main text, references, and table/figure legends); tables, figures, and photos or other artwork; and an ethical disclosure form provided by the site. Submit each as separate files. Do not import figures or tables into the manuscript and do not upload any file as a PDF.

All correspondence, including the editor's decision and request for revisions, will be by e-mail. Questions before submission can be sent to the editor at *jnpeditor@aol.com*.

Student Papers

Manuscripts submitted by students are welcomed and will undergo peer review. Student papers must be co-authored by a university faculty member who has worked with the student to ensure it is in publishable form. If accepted, student papers may be held for publication until the student has graduated.

Format

In the cover letter, authors should state that the manuscript has not been and will not be submitted elsewhere for publication.

A title page is required and must include the manuscript title; authors' full names, credentials, and affiliations; and the name, address, phone and fax numbers, and E-mail address of one author designated as the corresponding author.

Designate each illustration and table in the text with the citation "Figure 1" or "Table 2" as applicable.

Abbreviations

The error-prone abbreviations listed on the following Web site should not be used: *http://www.ismp.org/Tools/errorproneabbreviations.pdf*.

References

JNP uses the AMA style for references, which assigns one number for each source and numbers them consecutively in the text as superscript numbers. (Refer to *http://healthlinks.washington.edu/hsi/styleguides/ama.html* for examples.)

Biographical Data

All authors should include the credentials they would like after their name, their current title, employer, and city in which they work. The email address for the corresponding author will be included in the article.

Graphics

TIFF, EPS, or JPEG formats are required (no word documents or power point slides for figures or photos). Line art should have a minimum resolution of 1000 dpi, halftone art (photos) a minimum of 300 dpi, and combination art (line/tone) a minimum of 500 dpi. Color figures should be submitted actual size. Multiple figure files can be compressed into a Zip file and uploaded in one step; the system will unpack the files and ask for a name for each figure.

REVIEW OF MANUSCRIPTS

Manuscripts are reviewed by members of the editorial board and outside reviewers who are specialists in specific content areas for accuracy, clarity, and significance to nurse practitioners. Accepted manuscripts are subject to copyediting to conform to *JNP*'s standards. Editing changes and recommendations are subject to author approval on galley proofs before publication.

COPYRIGHT TRANSFER

If an article is accepted for publication, all authors must sign a copyright transfer form assigning all rights to the publisher.

RELEASE FOR PUBLICATION

If an accepted article identifies a particular facility, patient/client, etc., the author is responsible for securing written authorization to use that name. **The author is also responsible for obtaining written permission to use any copyrighted materials, including illustrations, photographs, tables, and any content taken from websites. Documentation of permission to reprint copyrighted materials should be submitted electronically when the article is submitted for review.**

ACCOUNTABILITY

All authors must disclose any relationship with facilities, institutions, organizations, or companies mentioned in their work by signing the disclosure form on the submission site. Funding sources also must be fully disclosed.

Articles that have received professional editing assistance funded by commercial supporters will not be considered. Authors may submit such funded articles to Elsevier's Supplements Editor at *b.jenkins@elsevier.com* for consideration as a paid supplement. Authors may contact the journal editor at *jnpeditor@aol.com* if they have questions about this.

JNP will note that all statements, opinions, techniques, etc., presented in published articles are those of the authors and do not represent the opinion of the publisher, editors, or the ACNP. The magazine also will disclaim any responsibility for ensuring the accuracy of statements made in the articles, accuracy of methods suggested, etc.

SUBSCRIPTION REGISTRATION

If you are not already a subscriber to *JNP*, once you have submitted your article, please go to www.npjournal.org and register for a **free** subscription so that you can view your work if it is accepted for publication.

J. Manuscript

Project ECHO Vascular: Telementoring to Improve Rural Nurse Practitioner Confidence and Knowledge in Managing Vascular Disease

Kimberly Albero, DNP, RN, FNP-BC

Emily Drake, PhD, RN, CNL, FAAN

Patty Schweickert, DNP, FNP-C

Beth Quatrara, DNP, RN, CMSRN, ACNS-BC

Abstract

Nurse practitioners in the community often use clinical practice guidelines to manage patients, sometimes without access to specialist collaboration. Telementoring has the potential to improve primary care provider capacity to treat chronic illness by connecting community providers with specialists through video teleconference. The purpose of this project was to evaluate telementoring using a quasi-experimental pre-test/post-test design using a convenience sample selected from rural and underserved clinical practice sites in Virginia, which assessed provider confidence and knowledge in managing patients with vascular disease before and after participating in a ten-week telementoring program. Nurse practitioners who participated in the telementoring sessions reported improved confidence and knowledge. Suggestions for future implementation are shared.

Key Terms: *Primary care, telehealth, telementoring, vascular disease, Project ECHO*

Background

Many nurse practitioners in rural and underserved areas manage complex patients with multimorbidity without access to specialists and resources available at large academic medical centers.[1] Advances in technology have made it possible for community providers to connect their patients with specialists using telemedicine.[2] Using technology to connect rural community health care providers with specialists for telementoring and participation in grand rounds-type learning experiences has the potential to build relationships among interprofessional teams and to enhance the practice capabilities of community providers.[3] Access to mentoring from specialists who possess the expertise and coaching skills to assist primary care providers in educating and managing patients in the community setting can improve outcomes for patients and confidence and knowledge of primary care providers.[4]

The ECHO model (Extension of Community Health Outcomes) is an example of a web-based guided practice model used to train primary care providers on the treatment of complex medical conditions (Arora et al, 2010). The mission of Project ECHO is to expand the capacity to provide best practice care for common and complex diseases in rural and underserved areas and to monitor outcomes through regularly scheduled telehealth clinics that bring together community-based primary care providers and specialists. Project ECHO is a guided practice model that allows primary care providers in remote and rural areas to participate in case-based learning with input from an interdisciplinary team including specialists at academic medical centers.

Vascular Disease. Vascular disease includes any condition that affects the circulatory system, including disease of the arteries, veins and lymph vessels to blood disorders that affect circulation. Vascular diseases are usually caused by multifactorial pathogeneses involving genetic and environmental factors[5] (Han et al., 2015). Vascular disease, atherosclerosis and thrombosis, are the principal underpinnings of the leading causes of death in the world: heart disease and stroke[6] (Mozaffarian et al., 2016). These disorders also cause peripheral artery disease (PAD), which affects between 8 and 10 million people in the United States (Mozaffarian et al., 2016). PAD limits a person's ability to walk, may require revascularization, can result in the loss of a limb and is a clinical manifestation of a systemic disease, often associated with heart attacks, strokes, life-threatening kidney and intestinal problems, and other serious health issues.[7] Tragic outcomes can also occur when veins are affected. Up to 600,000 people are affected by venous thromboembolism each year, and it is the cause of more than 40,000 deaths.[8] The financial burden of vascular-related complications in patients with PAD is more than $20 billion a year. Healthcare costs for venous thromboembolism are more than $7.5 billion.[9] More than 200 million people across the globe are affected by PAD. The disease affects both men and women and the risk of PAD is increased by tobacco use, diabetes mellitus, and high cholesterol, and prevalence increases dramatically with age.[7]

Telementoring. Telementoring describes the mentoring relationship that develops between healthcare professionals during collaboration using a videoconferencing platform. Telementoring provides a method of transferring specialist knowledge and experience to other

providers. Through telementoring, specialists can provide guidance and training about current evidence-based best practice to enable rural providers to deliver evidence-based care to underserved patients. Audiovisual technology can be used to connect a team of medical experts, based in a tertiary hospital simultaneously with many healthcare professionals based in a number of community settings[10]

The ECHO model: Proof of Concept. Project ECHO began at the University of New Mexico as a resource to help generalist healthcare providers in rural areas of the state to gain support and expertise from specialists including gastroenterologists, hepatologists, and infectious disease specialists in the treatment of patients with hepatitis C (HCV). It has evolved into a series of in-depth education programs that utilizes case-based learning to assist primary care providers to manage patients with complex health conditions by connecting them to expert specialists through telehealth technologies.

Project ECHO seeks to educate primary care providers to develop and expand access to treatment for patients with complex, chronic diseases by building treatment capacity in Virginia among rural health care providers. Project ECHO is an innovative health care program that uses state-of-the-art technology to help treat patients in rural and underserved areas with limited access to specialty level care. Project ECHO creates a one-to-many knowledge network, which allows primary care clinicians to develop the skills necessary to manage difficult to treat diseases. Over time, participating clinicians acquire increasingly specialized knowledge and become experts in their own communities. Recent reports on best practices in physician professional development form the Institute of Medicine, Carnegie Foundation, and Macy Foundation support the educational approaches in the ECHO model.[11]

Research Question

Does participation in case-based education in group telementoring sessions with expert clinicians improve nurse practitioner confidence and knowledge in managing patients with vascular disease?

Methods

A quasi-experimental single group pre-test/post-test design using data from a convenience sample of rural primary care nurse practitioners who volunteered to participate in a telementoring program was employed to test the hypothesis.

Sample

The initial sample included 18 primary care providers. Inclusion criteria included: a) medical doctors, doctors of osteopathy, physician assistants, nurse practitioners, registered nurses, and licensed practicing nurses; b) employed full time at the site from which they were participating in telementoring sessions. Exclusion criteria: providers who did not attend at least one teleECHO clinic. The sample included primarily advanced practice nurses working in rural settings. The average age of providers who completed the pre-survey was 37.13 years with the youngest respondent being 29 and the eldest being 56 and the median being 34.5 (*SD*=8.526). An analysis of all 18 pre-survey respondents showed an average age of 47.56 (Range: 33-76, *SD*=13.417). The Mann-Whitney U test of the independent samples of those completing the pre-survey and those who completed the post-survey resulted in a p value of 0.059, thus the age difference between the ages of participants who completed only the pre-survey and those who participated in the telementoring sessions and completed both surveys was not significant. The average number of years in practice for the participating providers was 6. Over the course of the ten-week program, 30 providers participated from 10 different sites around the state. These

included doctors, nurses, nurse practitioners, students, and clinical staff at community clinical sites around Virginia (See Table 1).

Setting

Participants joined the telementoring sessions using the Zoom® platform and were able to dial into the telementoring sessions from their own computer, clinic computer, cell phone, or tablet. Teleconferencing capability allowed specialist providers at a large university medical center to connect with rural community providers throughout the state. Zoom® enables videoconferencing though a cloud-based platform and is available for Polycom and Cisco hardware that run Zoom® Connectors, the software that enables H.323/SIP conference room systems from these hardware providers to join Zoom® cloud meeting.

We connected providers who had 430 miles of highway between them into a single videoteleconference meeting where they were able to interact with one another and discuss best practices, get input from specialists, and relay the realities of practice in their community setting. This learning loop provided insight to the specialists at the hub about the limitations of travel and resources in the furthest corners of the state and provided the community providers an opportunity to network with one another to hear what has worked for providers practicing in similar situations.

Measures

Confidence and knowledge were assessed pre-intervention and after ten weeks of participation in telementoring sessions. Questions for the survey were adapted from the Primary Care TeleECHO Clinic Confidence and Knowledge Survey[12] which is based on 18 questions and seven demographic questions. Responses are measured on a 7-point Likert scale with a high

score indicating a high level of skill, knowledge, or confidence. The lowest possible score is 0 and the highest possible score is 66. The final four questions on the instrument were open ended and free-text response questions for ongoing needs assessment and opportunities for input from participants to improve the operations and procedures of Project ECHO Vascular Clinic. This instrument was used with permission from the authors and has been used previously to evaluate telementoring programs at the University of New Mexico, MD Anderson, The ECHO Institute, New York Academy of Medicine, and Ontario Ministry of Health.

Procedures

Intervention. Telementoring sessions included input from a team of vascular specialists at a large university health center in central Virginia. Specialists include a neurologist, vascular specialist, heart failure specialist, neuroradiologist, clinical pharmacist, and advanced practice nurse. Specialists volunteered to deliver 30 minutes of didactic content on the topic in their area of expertise based on input from community providers gathered in a pre-intervention needs assessment.

The group met weekly, each Thursday from 1300-1400 for ten weeks. Participating providers completed a pre-survey assessing their confidence and knowledge prior to first telementoring session. Electronic surveys were sent to participants via email after ten weeks of participation in the telementoring sessions. The didactic content delivered through the online Zoom platform was recorded for later review by spoke participants. Specialists at the hub were consulted and provided mentorship to community providers who presented de-identified patient cases for group discussion and input from specialists.

Post-Intervention. After ten weeks of participation in weekly telementoring sessions, community providers were asked to complete a post-intervention survey which included the

same questions from the pre-survey (See Appendix C). The data from the pre- and post-surveys was analyzed to determine any change in provider ratings of confidence and knowledge .

Data Analysis. The survey was administered using Qualtrics, a secure, online survey tool and all data from the survey questions is stored within a password protected database. The data collected was transferred to the Statistical Package for the Social Sciences (SPSS), version 24 (SPSS, Chicago) statistical software for analysis. A paired t-test was performed to determine a change between pre- and post-intervention survey responses and determine statistical significance in participants' self-reported confidence and knowledge before and after participating in telementoring sessions. Attendance was taken at each telementoring session to document who participated each week. Additionally, the post-intervention survey included a question which asks providers to report the number of sessions he or she attended during the program. Descriptive statistics were computed on data pertaining to survey questions that identify provider profession and location, number of sessions attended, and demographic information.

Results

In order to measure the effect of the ECHO program intervention, a questionnaire containing the same 11 item confidence and knowledge rating instrument was administered to participants prior to participation in telementoring sessions and after the completion of the ten sessions. Of the 18 participants who completed the pre-survey, 8 attended at least one session and completed the post-intervention survey. An additional two providers who attended telementoring sessions completed the post-survey and provided feedback about their participation which included useful qualitative input regarding the value of the program and the benefits of their participation and their willingness to participate in future iterations of

telementoring. The results of the survey administered both prior to and the intervention and after the 10-week program are reflected in Table 2.

Confidence and Knowledge Survey

The pre-intervention survey score of self-reported confidence and knowledge was compared to the post-intervention score for each individual participant to determine a change in self-reported confidence and knowledge before and after participation in telementoring sessions. A paired t-test was conducted on the pre- and post-survey data for the eight participants who completed the pre-survey, attended at least one telementoring session, and completed the post-survey. The average confidence rating on the pre-survey questionnaire was 35.12, which improved by almost 20 points to 54.50 on the post-survey. The average improvement of pre- and post-survey self-reported rating of confidence and knowledge managing patients with vascular disease was 1.67 points on the 7-point Likert scale ranging from a low score of 0 = no skill or experience to 6 = expert, teaches others (p <.001).

Participating providers reported an improvement of 1.375 points in their ability to collect a vascular-focused health history (p = .014), an improvement of 1.5 points (p = .003) in their ability to educate clinical staff about patients with vascular disease; an improvement of 1.625 points (p = .000) in their ability to give evidence-based nutritional and lifestyle modification advice; an improvement of 1.625 points (p = .002) in their ability to provide quality cardiovascular care; an improvement of 2.00 points (p < .001) in their ability to discuss complications related to vascular disease and how to treat them; an improvement of 1.125 points (p = .026) in their ability to demonstrate empathy toward patients with vascular disease; an improvement of 1.125 points (p = .026 pre=3.625, post=4.47) in their ability to identify social

barriers for patients with vascular disease; an improvement of 2.25 points ($p < 0.001$) in their ability to utilize components of the national guidelines for management of vascular disease; an improvement of 1.875 ($p = .011$) in their ability to identify patients who should be treated with anticoagulation therapy; an improvement of 1.87 points ($p = .001$) in their ability to manage the side effects of medications; and an improvement of 2.00 points ($p = .002$) in their ability to generate a complete differential diagnosis (see Table 2).

Additional analysis was done to determine if there was a relationship between the number of sessions that participants attended and the changes in their reported confidence and knowledge. The average number of sessions attended was 4.4 with a range from 1-9 sessions for attended by each of the eight returning participants. The Spearman's rho correlation of ranks was -.037, suggesting that there was no relationship between the number of sessions attended improvement in self-reported confidence and knowledge.

Program Feedback

At the end of the program participants provided written comments. All eight participants who attended at least one telementoring session indicated that participation in the program was a valuable use of their time and seven of those eight stated that they would participate in future telementoring sessions if offered. Valuable feedback was obtained from the post-participation survey from participants who offered qualitative statements when asked how participation in Project ECHO Vascular affected their practice. Participants had positive feedback and endorsed the program as a valuable use of their time. Selected responses include: "Making connections with specialists and other practitioners around the state helped me feel like a part of a professional network I can call on in the future." One community provider said, "This was a

valuable way to hear from specialists about how to manage patients I may one day refer for specialty care."

Discussion

All participants in this pilot project who answered pre- and post-surveys showed an improvement in self-reported confidence and knowledge for all 11-item in the questionnaire. This enhanced confidence and knowledge are similar to the findings from other studies[13-17] and the significant increase in guideline supported care was similar to findings from Moeckli et al. [18] Unlike the review published by Zhou et al.[19], we were not able to measure patient outcomes, costs, or access to health care.

Participation rates/Respondents and non-respondents. There was some attrition noted during this project. The pre-survey was completed by 18 providers. Of those, 17 were female and one was male. Study participants responding to the pre-survey included seven Advanced Practice Nurses (APN), three students and one social worker and one registered nurse. Since the study was focused on the perceived confidence and knowledge of licensed independent providers, only the data from the surveys submitted by the nurse practitioners was included in the data analysis. If any medical doctors, doctors of osteopathy, or physician assistants had responded, their information would have been included as well. A CONSORT flow diagram illustrating participation in the program is included as Figure 1.

Some providers may have had enough confidence in their ability to manage patients with vascular disease based on their years of experience and thus chosen not to participate in the telementoring sessions. The average age of providers who completed both the pre-survey and

post-survey was 37.13 years with the youngest respondent being 29 and the eldest being 56 and the median being 34.5 (*SD*=8.526). An analysis of all 18 pre-survey respondents showed an average age of 47.56 (Range: 33-76, *SD*=13.417). The Mann-Whitney U test of the independent samples of those completing the pre-survey and those who completed the post-survey resulted in a p value of 0.059, thus the age difference between the ages of participants who completed only the pre-survey and those who participated in the telementoring sessions and completed both surveys was not significant. This finding was of interest because we were curious whether age and years of experience as a clinician affected a provider's decision to participate in telementoring session.

One potential reason for limited participation in Project ECHO Vascular may have been the clinical topic selected. While the needs assessment and epidemiologic findings for the state were considered in selecting topics and designing curriculum, vascular disease may not have had the societal and critical outcomes clinical impact of some other conditions. Which is to say, while many providers see patients with existing vascular disease or who are at risk for stroke and other vascular illness, providers may already feel confident in their ability to manage these patients or may focus their efforts on more immediate and critical conditions with which they are less familiar and perhaps less confident.

The success of future ECHO programs may be enhanced by building on existing relationships, casting a wide recruitment net, marketing to community providers, and providing early and frequent communication. Engaging specialists and scheduling speakers and presenters in advance is helpful. Timely reminders and follow-up are also important. Additional topic areas for ECHO program expansion include managing substance use disorders, transgender care,

managing patients with endocrine issues, pain management, infectious disease, behavioral health, attentional deficit hyperactivity disorder, and autism spectrum disorder.

Conclusion

This project was the first telementoring program using the ECHO model to be implemented from an academic medical center reaching providers across the state and served as a feasibility study for future Project ECHO telementoring programs. The partnerships and networking established through provider participation in this program have the potential to improve professional consultation between providers in rural and outlying areas not previously connected to a University medical center.

References

1. Smith SM, Wallace E, O'Dowd T, Fortin M. Interventions for improving outcomes inpatients with multimorbidity in primary care and community settings. Cochrane Database of Systematic Reviews. 2016; Issue 3. Art. No.: CD006560. DOI: 10.1002/14651858.CD006560.pub3.

2. Broens TH, Huisint Veld RM, Vollenbroek-Hutten MM, Hermens HJ, van Halteren AT, Nieuwenhuis, LJ. Determinants of successful telemedicine implementations: a literature study. Journal of Telemedicine and Telecare. 2007; 303-309.

3. Arora S, Kalishman S, Thornton K, et al. Expanding access to hepatitis C virus treatment extension for community healthcare outcomes (ECHO) project: Disruptive innovation in specialty care. Hepatology. 2010;52(3):1124-1133. http://dx.doi.org/10.1002/hep.23802. doi: 10.1002/hep.23802.

4. Arora S, Thornton K, Jenkusky SM, Parish B, Scaletti JV. Project ECHO: Linking university specialists with rural and prison-based clinicians to improve care for people with chronic hepatitis C in new mexico. Public Health Rep. 2007;122(2):74-77. https://doi.org/10.1177/00333549071220S214. doi: 10.1177/00333549071220S214.

5. Han Y, Li L, Zhang Y, et al. Phenomics of vascular disease: The systematic approach to the combination therapy. Curr Vasc Pharmacol. 2015;13(4):433-440. doi: CVP-EPUB-62829 [pii].

6. Mozaffarian DDH, F.A.H.A., Benjamin EJS, F.A.H.A., Go AS, et al. Executive summary: Heart disease and stroke statistics-2016 update: A report from the american heart association. Circulation. 2016;133(4):447-454.

7. Gerhard-Herman MD, Gornik HL, Barrett C, et al. 2016 AHA/ACC guideline on the management of patients with lower extremity peripheral artery disease: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. doi: 10.1161/CIR.0000000000000471.

8. Mahan CE, Holdsworth MT, Welch SM, Borrego M, Spyropoulos AC. Deep-vein thrombosis: a United States cost model for a preventable and costly adverse event. Thrombosis and Haemostasis. 2011; 106:405–415.

9. Pande RL, Creager MA. Socioeconomic inequality and peripheral artery disease prevalence in US adults. Circulation. Cardiovascular Quality Outcomes 2014; 7:532–53

10. Cheallaigh CN, O'Leary A, Keating S, Singleton A, Heffernan S, Keenan E, et al. (2017) Telementoring with Project ECHO: A pilot study in Europe. BMJ Innovations. 2017. doi:10.1136/bmjinnov-2016-000141. Retrieved from: http://innovations.bmj.com/content/early/2017/08/24/bmjinnov-2016-000141.

11. Institute of Medicine. Crossing the quality chasm: A new health system for the 21st century. 2002. Washington, DC: National Academy Press.

12. ECHO Institute Website. www.box.projectecho.unm.edu

13. Aurora et al. Project ECHO: A Telementoring Network Model for Continuing Professional Development. Journal of Continuing Education for Health Professionals. Fall 2017; 37(4): 239-244. doi: 10.1097/CEH.0000000000000172

14. Beste LA, Mattox EA, Pichler R, et al. Primary care team members report greater individual benefits from long- versus short-term specialty telemedicine mentorship. Telemedicine and e-Health. 2016; 22 (8) http://doi.org/10.1089/tmj.2015.0185

15. Flynn DM, Eaton LH, McQuinn H, et al. TelePain: Primary care chronic pain management through weekly didactic and case-based telementoring. 2017. doi:https://doi.org/10.1016/j.conctc.2017.10.004

16. Katzman JG, Comerci GJ, Boyle JF, Duhigg D, Shelley B, Olivas C, Arora S. (2014). Innovative telementoring for pain management: Project ECHO pain. Journal of Continuing Education in the Health Professions, 34(1), 68-75. doi:https://dx.doi.org/10.1002/chp.21210

17. Sockalingam S, Arena A, Serhal E, Mohri L, Alloo, J, Crawford A. (2017) Building provincial mental health capacity in primary care: An evaluation of a Project ECHO mental health program. Academic Psychiatry ePub ahead of print. Retrieved from: http://www.ncbi.nlm.nih.gov/pubmed/?term=28593537.

18. Moeckli J, Stewart KR, Ono S, et al. Mixed-methods study of uptake of the extension for community health outcomes (ECHO) telemedicine model for rural veterans with HIV. The Journal of Rural Health. 2017; 33(3), 323-331. doi:10.1111/jrh.12200

19. Zhou C, Crawford A, Serhal E, Kurdyak,P, Sockalingam S. The Impact of Project ECHO on Participant and Patient Outcomes: A Systematic Review. Academic Medicine, 2016; 91(10), 1439-1461

Table 1.

Sample Characteristics and Demographics Pre-Survey Respondents (n=18)

Characteristic	**Mean (SD)**	**Range**
Age	47.56 (13.417)	33-76
Years of Experience	8.67	1-25
Population Served		
% of Patient with Vascular Disease	20	5-40
Characteristic	**n**	**%**
Sex		
Male	1	5.26
Female	18	94.74
Clinical Role		
MD	0	0
DO	0	0
APRN/NP	12	63.16
PA	0	0
Student	5	26.32
Other	2	10.53

Table 2. Pre- and Post-Survey Results Compared (N = 8)
ECHO Survey of Competence and Knowledge.
Please rate your skills, knowledge, or competence in addressing the following issues and topics related to caring for patients with vascular disease.

	Pre-Survey Mean (SD)	Post-Survey Mean (SD)	Change	p-value
My ability to collect a vascular-focused health history.	3.63 (1.3)	5.0 (.53)	+ 1.375	.014
My ability to educate clinic staff about patients with vascular disease.	3.38 (1.1)	4.88 (.64)	+ 1.50	.003
My ability to give evidence-based nutritional and lifestyle modification advice	3.38 (.51)	5.0 (.00)	+1.625	<.001
My ability to provide quality cardiovascular care	3.5 (.92)	5.13 (.35)	+1.625	.002
My ability to discuss complication related to vascular disease and how to treat them.	3.0 (.75)	5.0 (.53)	+ 2.00	<.001
My ability to demonstrate empathy toward my patients with vascular disease	3.75 (1.0)	4.88 (.64)	+1.125	.026
My ability to identify social barriers for my patients with vascular disease	3.625 (.74)	4.75 (.70)	+1.125	.026
My ability to utilize components of the national guidelines for management of vascular disease	2.63(.91)	4.88(.35)	+2.25	<.001
My ability to identify patients who should be treated with anticoagulation therapy	3.25 (1.5)	5.125 (.35)	+1.875	.011
My ability to manage side effects of medications	3.00 (1.0)	4.88 (.35)	+1.875	.001
My ability to generate a complete differential diagnosis	3.00 (1.4)	5.00 (.53)	+ 2.00	.002

Note: Survey adapted from the Primary Care TeleECHO Confidence and Knowledge Survey (New Mexico, 2017)

Figure 1. CONSORT Flow Diagram of Program Participation