Comparing Patient Satisfaction of Nurse Practitioner-Led Telemedicine and Usual Care Clinics

Teresa D. King

University of Missouri - Kansas City

Approved May 2020 by the faculty of UMKC in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice

Abstract

The rural veteran patient cohort is at high-risk for disparities in health care primarily due to geographic isolation and lack of primary care providers. As a result of these challenges, the rural patient is a population of interest to the Department of Veterans Affairs prompting the creation of primary care telemedicine clinics. This model of care was developed to close gaps in health care and has been utilized successfully for many years. Primary care providers are inserted into rural clinics virtually where the need is greatest reducing health care access delays. The primary purpose of this project was to measure Nurse Practitioner-led telemedicine clinic effects on patient satisfaction of care compared with usual face-to-face visits. This project used a quasi-experimental design and convenience sampling. The population under study was rural veteran patients enrolling 34 in telemedicine and 68 in usual care patients. The project took place at a midwestern Veterans Integrated Service Network hub office and a rural outpatient clinic spoke site. Participants in both groups were provided the opportunity to complete a satisfaction of care questionnaire at the end of their visit. The primary outcome measurement was overall patient satisfaction of care, and the secondary outcome measurements included other aspects of patient satisfaction. Results found no statistically significant difference between the two groups for the primary or secondary outcomes and no association with the participant population demographics. The integration of telemedicine clinics maintains high patient satisfaction of care compared to usual care.

Keywords: telemedicine, telehealth, patient experience, patient satisfaction, primary care.

Comparing Patient Satisfaction of Nurse Practitioner-Led Telemedicine and Usual Care Clinics

In 2014, the Department of Veterans Affairs (VA) created Virtual Integrated Multisite Patient Aligned Care Teams (V-IMPACT) utilizing telemedicine (TM) to enhance access to team-based primary care services where PCPs are not available (Ambert-Pompey, Konecky, Ahlstrom, & Keefer, 2017). Rural VA patients are at higher risk for disparities in health care due to PCP shortages within the VA (Rural Veteran, n.d.). Since the implementation of V-IMPACT within the VA, this model has been adapted and used throughout the United States (U.S.), successfully expanding access and improving continuity of care (Ambert-Pompey et al., 2017).

In recent years, similar to the private health care sector, the VA has experienced the inability to hire and keep PCPs particularly within rural clinics. Veterans Integrated Services Network (VISN) 15 has medical centers and community-based outpatient clinics (CBOCs) within 263 counties in the states of Kansas, Missouri, Illinois, Kentucky, Indiana, and Arkansas with over 85% of veterans residing in these areas that are considered rural or highly rural (About VISN 15, n.d.). During 2018, there was an average of 30.37 PCP vacancies resulting in a profound gap in primary care services in this highly rural VISN (About VISN 15, n.d.). During 2018, VISN 15 funded a V-IMPACT Nurse Practitioner-led hub site offering primary care services to rural CBOCs demonstrating the greatest need (Appendix A for Definition of Terms). Economically, V-IMPACT visits are advantageous, costing roughly $299.78 per PCP visit compared to $543.63 for usual care (UC) visits within VISN 15, somewhat higher than the national VA average of $447.56 for UC visits (Boise, Idaho, TM Hub, personal communication, March 5, 2019, per V-IMPACT Business Director Meeting minutes dated 10/16/2018).

All ages, races, cultures, faiths, education, and occupation backgrounds are served by the VA. Currently, the VA population is primarily older adult men (91%), presenting a challenge for this project to include a diverse group of participants with respect to gender and age (National Center for Veterans Analysis and Statistics, 2017).

Problem Statement

As a consequence of PCP shortages and geographic isolation, rural VA patients are at high risk for decreased access to primary care and additional modalities of care are needed. Telemedicine is an evolving modality with the capability of mitigating the obstacles rural veterans face gaining access to VA medical care (Kvedar, Coye, & Everett, 2014; Marcin, Shaikh, & Steinhorn, 2015; Siminerio, Ruppert, Toledo, & Triola, 2012).

Intended Improvement and Purpose

This project addresses a delay in access to VA primary care utilizing TM as an alternative care delivery method and highlights patient satisfaction of this model as key for veterans' acceptance of this model of care. The purpose of this project was to measure Nurse Practitioner-led TM clinic effects on patient overall satisfaction of care compared to usual face-to-face care (UC). Likewise, secondary satisfaction outcome measures were compared and included wait time for appointment, convenience of office location, check -in staff technical skills and personal manner, time waiting and spent with provider, explanation of what was done at visit, provider technical skills and personal manner, privacy of visit, and visit discharge instructions. Due to restricted access to patient charts, this project did not include a comparison of access and medical outcomes.

Facilitators and Barriers

This project was supported by the VA Telehealth Program Manager and Associate Chief of Nursing – Community Care. Other facilitators include the student investigator's preceptor as well as the hub and spoke site personnel. The main barrier to this project was obtaining approval to conduct this project at two VA medical centers. As patient chart access and patient identifiers were restricted, the project did not evaluate access and a retrospective review of blood pressure and HGA1C measures were not conducted. Further, the repeat patient satisfaction questionnaire for comparison of baseline data, at three and/or six-month follow-up visits, could not be conducted. Other barriers included patient enrollment and ancillary study personnel time constraints. The cost of this project was not a barrier as the project was conducted within an existing rural clinic utilizing current staff, and minimal study supplies were needed (Appendix B for Cost Table). During the study, there were no constraints inhibiting sustainability of the intervention.

Review of Evidence

Inquiry

In the VA rural patient population, does the addition of a primary care Nurse Practitioner-led V-IMPACT clinic compared to traditional face-to-face visits provide equivalent patient satisfaction of care, access and wait times, and management of type 2 diabetes mellitus and/or essential hypertension, over a six-month period in 2019 and 2020 at the VA VISN 15 V-IMPACT hub and spoke sites.

Search Strategies

A literature review was completed utilizing the databases of Cumulative Index to Nursing and Allied Health Literature, Ovid, OvidMD, and PubMed. Search engines included the Veteran

Affairs Library Network, University of Missouri-Kansas City Health Sciences Library, and Google Scholar. Keywords utilized include *telemedicine, telehealth, patient experience, patient satisfaction, and primary care*. The Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guideline was used to perform the literature synthesis (Appendix C for PRISMA chart). Studies included were those utilizing TM modalities evaluating access to care and patient satisfaction. Publications prior to 2012, duplicates, nonrelevant publications including adolescent populations, non-peer reviewed journal publications, publications not falling within the rating system for the hierarchy of evidence (Melnyk & Fineout-Overholt, 2019) were all removed. The search yielded 23 studies for use in this project (Appendix D for Synthesis of Evidence). The body of evidence included three evidence level I systematic reviews of randomized controlled trials (RCTs), eight level II RCTs, one level III quasi-experimental study, two level IV case-controlled or cohort studies, three level V systematic reviews of quantitative descriptive or qualitative studies, and six level VI single quantitative descriptive or qualitative studies (Melnyk & Fineout-Overholt, 2019).

Evidence by Themes

The review of the evidence for this project yielded three topic themes leading to the development of the topic Nurse Practitioner-led V-IMPACT clinics: access, chronic disease management, and patient satisfaction. Within the theme access, three studies were found that utilized TM to expand access to care in a variety of settings. Fourteen studies evaluated the management of multiple chronic diseases and demonstrated utilization of TM modalities for chronic disease management have often produced equivalent or better outcomes for heart failure, stroke, chronic obstructive pulmonary disease (COPD), diabetes, weight management, headache, multiple comorbidities, and mental illness. Within the theme of patient satisfaction, six studies

queried various patient cohorts to evaluate their experiences with TM, including Parkinson's disease, radical prostatectomy, internal medicine, multiple comorbidities, alcohol use disorder, and diabetes. Positive trends were found with high patient satisfaction of care with the use of TM.

Access. Virtual visits conducted via TM hub sites utilize a variety of TM modalities such as home monitoring devices which significantly reduces geographic disparities, travel time, and cost burden of patients (Markwick, McConnochie, & Wood, 2015; Raney, Bergman, Torous, & Hasselberg, 2017; Young & Nesbitt, 2017). Markwick et al. (2015) found TM care not only increased access but also decreased patient and health care insurance costs. Raney et al. (2017) identified adoption of technology-based approaches increases the ability to provide timely care to patients. Young and Nesbit (2017) found technology-based care facilitates redesign of the primary care services role, allowing focus on the body, home, community, primary care, and assisting patients to become more engaged in their health care.

Evidence in the literature supports the use of many TM modalities to increase access, reduce wait times and overall access delays and expand the delivery of mental health and internal medicine services (Markwick et al., 2015; Raney et al., 2017; Young & Nesbitt, 2017). Expansion of access to care can increase management of chronic conditions and patient satisfaction of care resulting in improved outcomes for patients, increased efficiency and reduced workload burden of medical providers, and positive economic benefits for all healthcare stakeholders including healthcare consumers (Markwick et al., 2015; Raney et al., 2017; Young & Nesbitt, 2017).

Chronic disease outcomes.

Heart failure. Heart failure is a significant public health concern and a leading cause of morbidity and mortality in the U.S. (CDC, 2016). Yun, Park, Park, Lee, & Park (2018), Tse et al. (2018) and Bashshur, Shannon, and Smith (2014) completed an extensive review of the literature that evaluated TM technologies and effects on heart failure outcomes. All studies found TM technologies improved the outcomes of heart failure patients. Yun et al. (2018) found 24 of 37 randomized controlled trials (RCTs) identified statistically significant decreased all-cause mortality specifically in long-term follow-up with improvements in quality of life, depression, and anxiety. Tse et al. (2018) reviewed studies on heart failure alone, and Bashshur et al. (2014) reviewed studies on heart failure, stroke, and COPD. Both reviews identified decreased hospitalizations with the use of TM modalities. Bashshur et al. (2014) found decreased exacerbations and increased economic benefits with the use of TM.

Diabetes. Six studies evaluated the management of diabetes with TM. All studies identified better HbA1c reductions with the use of TM. Both Su et al. (2016) and Zhai, Zhu, Cai, Sun and Zhao (2014) completed meta-analyses comparing RTCs that evaluated TM with usual face-to-face care and found more substantial reductions in HbA1c with TM compared to UC. Per Su et al. (2016), 22 of 55 RCTs favored the use of TM, 32 studies had no preference between the two groups, and one study favored UC. Zhai et al. (2014) sought to evaluate the cost of TM services but was unable to draw any conclusion due to a lack of cost reporting within the studies. Basudev et al. (2016), Crowley, McAndrew, Webb, Sanders, and Jackson (2016), and Sood, Watts, Hirth, and Aron (2018) completed RCTs comparing TM with UC. Crowly, et al. (2016) found clinically significant greater decreases in HbA1c and Basudev et al. (2016) and Sood et al. (2018) found equivalent reductions in HbA1c. Further, Basudev et al. (2016) identified better

systolic blood pressure control with TM. Liu, Saxon, McNair, Saqnagorski, and Rasouli (2016) found TM and UC groups had significant and equivalent decreases in HbA1c.

Headache and co-morbidities. Muller, Alstadhaug, and Bekkelund (2016) published results of an RCT indicating the TM group had shorter consultations than the UC group and no differences found between the groups for diagnosing ability, evaluation of headache, prescriptions written, and follow-up needed. Of the TM participants, 99% reported a high level of acceptance and all disclosed satisfaction with video, sound, and overall care (Muller et al., 2016). The ValCrònic program, a telemonitoring preventative program focusing on patients with multiple chronic co-morbidities, monitored patients for one year (Orozco-Beltran, Hernandez, Sanchez-Molla, Sanchez, & Mira, 2017). The study found there was a significant impact or improvement in weight loss, heart rate, blood pressure, glycemic control, emergency room service use, and decreased hospitalizations due to a reduction in disease exacerbations (Orozco-Beltran et al., 2017). The benefit of the telemonitoring program was demonstrated with the reduction of disease burden for patients, health care systems, and health care providers (Orozco-Beltran et al., 2017).

Psychotherapy and weight control. Gonzalez and Brossart (2015) and Kempf et al. (2018) found the addition of TM clinics to outpatient care clinics supported the improvement of mental health symptoms and greater reductions in weight loss sustainability. Further, Gonzalez and Brossart (2015) noted improvement in access to mental health providers in the rural patient population.

Patient satisfaction. High patient satisfaction is correlated to improved chronic disease outcomes and is associated with increased patient participation in health care management, and fosters awareness to providers about the effectiveness of their care (Kruse et al., 2017; Markwick

et al., 2015; Morris, Jahangir, & Sethi, 2013). Satisfaction of care has been evaluated within a variety of patient cohorts such as Parkinson's disease, postnatal care, prostate cancer, primary care, multiple co-morbidities, alcohol use disorder, and diabetes.

Parkinson's disease, postnatal care, and prostate cancer. Wilkinson et al. (2016) compared TM and UC of patients with Parkinson's Disease, and Seguranyes et al. (2014) explored new mothers needing postnatal care. Both studies had similar TM ratings and reported satisfaction to be high (Wilkinson et al., 2016; Seguranyes et al., 2014). Similarly, Viers et al. (2015), comparing TM and UC groups, reported equivalent efficiency and patient satisfaction between the patients with prostate cancer utilizing TM and UC groups. Significantly higher satisfaction levels were reported for TM visits due to travel convenience, and general convenience and significantly reduced costs for patients (Wilkinson et al., 2016; Viers et al., 2015). Quality of life, clinical outcomes, and utilization were found to be equivalent between the groups (Wilkinson et al., 2016). Viers et al. (2015) queried providers for their opinion on TM care, and although there was a high level of satisfaction, equivalent quality of medical history, and clinical management of patients, the providers reported low confidence that TM could fit into workflow efficiently. Seguranyes et al. (2014) reported the TM group conveyed they would use TM modality again in the future.

Primary care. Through structured interviews, Powell, Henstenburg, Cooper, Hollander, and Rising (2017) described the patient experience utilizing TM, specifically videoconferencing. Patients reported concerns about privacy and the ability to conduct a thorough physical exam, yet reported overall satisfaction of TM visits and were interested in utilizing TM visits instead of face-to-face visits, citing decreased associated costs including traffic delays, gas, parking, co-pays, wait time, and work absenteeism as a primary benefit with TM (Powell et al., 2017).

Multiple co-morbidities, alcohol use disorder, diabetes. Patient satisfaction associations and effectiveness and efficiency of TM care were evaluated by Kruse et al. (2017) in a 44-study systematic review. Associations between TM and satisfaction included improved outcomes, the preferred modality of care, ease of use, lower costs, improved communication between provider and patient, and decreased travel time for patients (Kruse et al., 2017). An evaluation by Tarp (2017) of patients with alcohol use disorder and Siminerio et al. (2012) of patients with diabetes found satisfaction of TM care was high. Further, Siminerio et al. (2012) found providers had a high degree of acceptability of TM consultations. Patient satisfaction with the technical aspects of care including picture quality of video-based treatment was reported as mostly satisfied and sound quality was reported as less satisfied (Tarp, 2017).

Theory

The Unified Theory of Acceptance and Use of Technology (UTAUT), a derivative of the Technology Acceptance Theory (TAM), is the theoretical framework for the current (Appendix E for Theory). The UTAUT utilizes TAM constructs along with elements pertinent for health care including performance expectancy, effort expectancy, social influence, and facilitating conditions along with contextual constructs of doctor's opinion, computer anxiety, and perceived security as predictors of behavior intention (Cimperman, Brencic, & Trkman, 2016). The UTAUT has been used extensively in a variety of settings to analyze users' acceptance of TM (Cimperman et al., 2016; DeVeer et al., 2015; Kohnke, Cole, & Bush, 2014; Liu, Tsai, & Jang, 2013). DeVeer et al. (2015) utilized the UTAUT to explore the intentions of older persons in the Netherlands to accept and utilize technology and found that nearly 25% of this population will experience difficulties with technology and acceptance can be increased with giving specific attention to the population. Drawing on the UTAUT predictors of behavior, Kohnke et al. (2014)

completed a study within the United States, evaluating not only patients but also providers and health care agency leadership regarding their intention to use TM. The UTAUT predictors were found to be positively correlated with behavioral intentions to adopt and use technology allowing a better understanding of what constructs can identify individuals who are inhibiting their use of technology (Kohnke et al., 2014). Liu et al. (2013) utilized the base constructs of TAM adding in the patient-provider construct similar to the constructs by Cimperman et al. (2016) in the UTAUT. Strong positive correlations of behavioral intention and the basic TAM constructs, as well as patient-provider constructs, were noted (Liu et al., 2013). Congruent with the focus of the UTAUT and as a patient advocate, it was the endeavor of the Nurse Practitioner-led TM clinic under study to minimize and overcome the adverse impact of the UTAUT constructs to increase acceptance and use of technology.

Methods

Project Approval

This project was an evidence-based project/quality improvement project, as determined by the St. Louis VAMC IRB. The Evidence Based Practice (EBP) Committee and Chief of Nursing at the St. Louis VAMC, gave their approval to conduct this project within the VISN hub site, provided oversight, and conducted follow-up as indicated (Appendix F for project approvals). The spoke site VA has no IRB or EBP Committee and utilized the hub site VA for project approvals. After review of the hub site IRB determination and subsequent EBP Committee approval, the stakeholders at the spoke site VAMC, likewise provided approval to conduct this project.

Ethical Issues

Completion of a questionnaire by patients was voluntary, and treatment was rendered regardless of their participation. The nurse practitioners that provided patient care at the outpatient facility involved in the study were informed of the project but not advised of patient participation, nor were they allowed access to completed questionnaires. Access data, hypertension and diabetes outcomes were not measured due to restrictions. As a hub site provider, the student investigator did not include her patient population in this project. The student investigator had no conflicts of interest with the conduction of this project and received no funding or other incentives to conduct this project. The project was conducted at an existing VA clinic with existing staff. The project did not require funding.

Setting and participants

The setting for this project was a midwest VISN V-IMPACT hub site. The spoke site for this project was a rural primary care clinic located within the catchment area of a highly rural midwest VAMC. Participants were **v**olunteer veterans seeking primary care, aged 18 and older, during the enrollment period. Sampling was by convenience. Expected enrollment was 128 (64 per group).

Evidence-Based Practice Intervention

The project intervention as modified included enrollment for 30 days during September and October 2019 into the TM or UC group. Spoke site check-in staff asked patients about completing the questionnaire. Those agreeing were provided the questionnaire to complete at the end of their visit. The patient was instructed to turn in the completed questionnaire to the check-out staff as they were exiting the clinic (Appendix G for Logic Model, Appendix H for Intervention Flow Diagram, and Appendix I for Project Timeline).

Change Process

Rogers's Diffusion of Innovations theory was utilized for this project. Rogers's theory is particularly useful for the role out of organizational change that is intended for long-term implementation (Mohammadi, Poursaberi, & Salahshoor, 2018). This project was intended as a long-term change, and Rogers's theory can assist with bridging the gap beyond informing or providing the evidence to understanding and addressing other factors that enhance acceptance of the change (Mohammadi et al., 2018). With the implementation of this project, it was anticipated that there would be early adopters and late adopters of the change. This adoption pattern follows a bell-shaped curve and earlier accepters will influence the lagers to accept the change as time moves forward, and such characteristics are consistent with the underpinnings of the theory (Mohammadi et al., 2018).

Evidence-Based Project Model

The Model for Evidence-Based Practice Change, developed by Rosswurm and Larrabee (1999), will guided the project. This model is suitable for the project as the guides are derived from a combination of clinical expertise, contextual evidence, and qualitative and quantitative data (Rosswurm & Larrabee, 1999). The need for integration of TM within primary care is supported by the evidence, and utilization of this model assisted with the diffusion of the evidence into practice.

Study Design

A quasi-experimental, quality improvement project. Inclusion criteria included patients aged 18 and older completing TM and UC appointments during the enrollment period. Exclusion criteria included those patients declining completion of the questionnaire. The questionnaire was completed immediately following the end of the visit.

Validity

The quasi-experimental design inherently has internal and external validity threats including lack of randomization, history, maturation, and attrition. Several confounding variables can be identified in this study which include TM participation, age, sex, race, and education level. Comparison of patient characteristics between the groups can identify if these confounding variables influenced the primary or secondary outcomes. Using a comparison group supported control for the Hawthorne effect. Transferability of the outcomes to non-VA populations may be less successful due to the veteran population being primary older white males. To foster control external validity, the student investigator did not exclude any population.

Outcomes

The primary outcome was measurement of overall patient satisfaction of TM care compared to UC visits, via questionnaire (Appendix J for Patient Satisfaction Questionnaire). Secondary outcome measurements included comparison of patient satisfaction variables between the two groups which included wait time for appointment, convenience of office location, technical skills, and personal manner of check-in staff and their nurse practitioner provider, length of time waiting for provider after check-in, time spent with provider, explanation of what was done during visit, privacy of visit, and discharge instructions. The TM participants were also queried regarding their satisfaction with the explanation of the video telehealth technology process, sound quality, and visual quality. Demographic data collected included age, gender, race, highest education level achieved, and distance from the clinic. Additionally, TM participants were asked if they had any prior TM visit experience or had ever utilized personal electronic devices for video calls.

Measurement Instruments

No universal patient satisfaction questionnaires exist to measure TM care. As a base questionnaire, the student investigator chose the Visit-Specific Satisfaction Instrument (VSQ-9), a questionnaire evaluating the patient perception of quality of care provided by a health care provider for a specific visit (RAND Health Care, n.d.; Rubin et al., 1993). The VSQ-9 was developed by Rubin et al. (1993) and represents an adapted and shortened version from the parent questionnaires, the Patient Satisfaction Questionnaire (PSQ) by Ware, Snyder, & Write (1976), Patient Satisfaction Questionnaire-III (PSQ-III) by Hayes, Davies, and Ware (1987), and the Patient Satisfaction Questionnaire Short-Form (PSQ-18) by Marshall and Hayes (1994) as used in the Medical Outcomes Study (RAND Health Care, n.d.; Rubin et al., 1993). The student investigator modified the VSQ-9 questions to increase applicability to this project and added additional questions needed to yield data for measurement of the desired outcomes. Questions modified or added to the VSQ-9 questionnaire may not carry the same validity and reliability that has been established by the parent surveys of this instrument.

According to Ware and Hayes (1988), the validity and reliability of PSQs are supported by results from a variety of studies. Convergent and discriminant validity for the PSQ scales have been provided using multivariate-multimethod analysis (Hays et al., 1987). The PSQ-III was found to have acceptable internal consistency reliability with correlation coefficients >0.80 for all subscales except subgroup of time spent with the doctor which was an acceptable 0.77 (Marshall & Hayes, 1994). Despite the abbreviated length of the PSQ-18, the subscale items were found to have acceptable internal consistency and were substantially correlated between the PSQ-III and PSQ-18 (Marshall & Hayes, 1994). The observed magnitude and overall pattern of the coefficients for the PSQ-18 were similar to those for the PSQ-III (Marshall & Hayes, 1994).

According to Rubin et al. (1993), the VSQ-9 was distributed to 367 various practice

settings and 17,671 patients completed the questionnaire. The study found the VSQ-9 was a reliable, valuable, short, patient rating questionnaire providing patient perceptions about their visit to various health care providers gaining insight on patient satisfaction and relationship to continuing care at those practices (Rubin et al., 1993). The coefficients were not published. Specific permission is not needed to reproduce the VSQ-9. However, proper citation with use is requested by the Rand Corporation.

Quality of Data

To promote quality of data, a priori power analysis was completed (0.08, medium effect, alpha .05, *t*-test). The number of needed participants was calculated and produced a sample size of n = 128, 64 in each group. During the open enrollment period a total of 102 participants completed the questionnaires (telemedicine, *n* = 34; face-to-face, *n* = 68). There was no benchmark data for comparison.

Analysis Plan

The analysis of data was conducted utilizing IBM Statistical Package for the Social Sciences (SPSS), Version 26.0 (Appendix K for SPSS Variable Collection Template). The analysis included descriptive statistics to describe and summarize demographic features of participants quantitatively. The independent samples t-test was utilized to compare the means of the intervention and control groups for the primary outcome of overall patient satisfaction and all secondary patient satisfaction outcomes. Chi-Square testing was utilized to determine if the demographic characteristics of participants were associated with or independent of the primary and secondary outcome measures of this project.

Results

Setting & Participants

Questionnaires were distributed to volunteer participants at the spoke site in a rural VA outpatient clinic. Participants were aged 18+ and were patients presenting to the outpatient clinic for a TM or UC appointment.

Actual Intervention Course

The student investigator initiated contact with the spoke site office manager several months prior to expected implementation of the project to confirm support with implementation. Once appropriate approvals for the project were granted, the student investigator was given the opportunity to attend a spoke site staff meeting, present the project, and discuss implementation with spoke site staff. Thereafter, questionnaires were provided to participants for a 30-day enrollment period in September and October 2019. A total of 102 participants agreed to complete the questionnaire during the enrollment period.

Outcome Data

This project included a convenience sample of 102 participants, TM group (n = 34) and UC group (n = 68). Demographic data included age, gender, race, education, and distance from the VA clinic, and the data were similar between the two groups (Appendix L for Participant Demographics). Both the TM and UC group participants were predominantly male (TM, n = 30, 88%; UC, n = 59, 87%) and white race (TM, n = 30, 88%; UC, n = 65, 96%). Ages of participants between the groups were similar with the mean age for both groups falling between 66-70 years of age. The highest level of education was similar between the groups with the majority graduating high school or a GED (TM and UC groups, n = 60, 59%). The mean distance participants traveled from home to the clinic were similar between the groups (TM = 24.38 miles; UC = 26.03 miles). Within the TM group 39.4% (n = 13) had prior TM experience and 85% (n = 29) did not have video conferencing experience using their personal electronic devices.

Results indicate the difference in the main outcome measure of overall satisfaction of care between the TM and UC groups was not statistically significant, $t\ (45.661) = -1.010$, $p = .318$ (Appendix M for Patient Satisfaction). The mean of the TM group was 87.50 and UC group was 91.54. Secondary satisfaction outcome measures where not found to be significantly different between the groups (wait time for appointment $p = .518$, convenience of office location $p = .510$, check-in staff technical skills $p = .612$, check-in staff personal manner $p = .948$, once checked-in, time waiting for provider $p = .447$, time spent with provider $p = .881$, explanation of what was done at visit $p = .777$, provider technical skills $p = .406$, and personal manner of provider $p = .638$, privacy of visit $p = .666$, and once visit was complete, how clear it was to the patient what their next steps were $p = .896$). The TM group felt the satisfaction of sound was excellent (n = 19), very good ($n = 10$), and good ($n = 4$) and for visual quality, excellent ($n = 21$), very good ($n = 10$), or good ($n = 2$), and no TM participant selected fair or poor for either sound or visual quality.

A Chi-square test for association was conducted between the groups, age, gender, race, level of education and overall satisfaction of care (Appendix N for Chi-Square Test for Association). All cell frequencies were less than five. No statistically significant association existed between the primary outcome measure of overall satisfaction of care and both groups, $X^2(98) = 6.221(3)$, $p = .101$. The association was low as calculated by Cramer's V = .257. There was no statistically significant association between the primary outcome measure of overall satisfaction of care and age, gender, race, and level of education.

Missing data in the TM group included one participant who answered the demographics portion of the questionnaire but skipped all satisfaction questions. One TM participant did not answer regarding prior TM experience. Two TM participants did not respond to the question

about explanation of how the video telehealth technology would work. One TM participant failed to respond in each of the following categories: technical skills of the check-in staff, explanation of what was done for them at their visit, and personal manner of their provider. Three TM participants did not respond to overall satisfaction of their visit. Missing data in the UC group included one participant failing to respond in each of the following categories: convenience of the clinic location, time spent with their provider, explanation of what was done for them during their visit, technical skills of their provider, and personal manner of their provider. One participant in the UC group did not answer gender. One UC participant did not answer for education level. Four UC participants did not enter a distance driven to clinic.

Discussion

Successes & Strengths

This study was designed to compare patient satisfaction of TM and UC of Nurse Practitioner-Led clinics serving as primary care providers within the same clinic environment and having the same or similar authority. Equivalent patient satisfaction between the groups was supported by the findings and aligns with the inquiry of this project. Integral to the implementation and success of this project was obtaining the cooperation of the spoke site Office Manager. Staff at the spoke site were flexible and interested in the project. Training of spoke site staff and follow-up of project progress was easily accomplished with ongoing open communication channels. The measurement tool was brief, easy to read, and was partially based on a previously validated tool. This project expands our knowledge on satisfaction of care utilizing TM, a non-traditional modality of providing medical care.

Results Comparison to Evidence in the Literature

The results of this project were consistent with published literature comparing TM to UC of adult patient populations with specific disease states. No publications were identified for comparison of patient satisfaction of adult primary care delivered via TM with UC for veteran or patient populations. No identified published studies were identified comparing patient satisfaction of nurse practitioner-led TM clinics and UC clinics.

The published literature included comparisons of TM to usual face-to-face care of non-Veteran patients with a variety of comorbidities, and all studies found high satisfaction of TM care (Wilkinson et al., 2016; Viers et al, 2015; Powell et al., 2017; Kruse, 2017; Tarp, 2017; and Siminerio, 2012). Tarp, 2017, measured patient satisfaction of the technical aspects of TM visits, reporting mostly satisfied with picture quality and less satisfied with sound quality compared to very good to excellent responses for this current project. Powell et al., 2017, completed structured interviews of primary care patients and found patients were interested in TM instead of UC.

Internal Validity Effects

Having several staff members participate in implementation of this project could have jeopardized internal validity. The providers seeing patients could have influenced patient responses as they were aware of the project implementation. Historical relationship between patients and their providers could have affected internal validity. The TM provider was new to her clinic, and the face-to-face provider was well known to her patient population. A comparison group was utilized to minimize the Hawthorne effect.

External Validity Effects

Transferability of the results of this project outside of the VA setting is difficult as the VA patient population has unique characteristics. Demographics of the VA patients participating

in this project were not found to be dissimilar to the overall VA population. In 2017, the VA population was primarily older adult men (91%), the median age of male Veterans was 65, and approximately 77% of all veterans utilizing VA services were white, non-Hispanic (National Center for Veterans Analysis and Statistics, 2017).

Sustainability of Effects

The PCP availability is increased by remotely connecting with patients in need of care in rurally isolated areas without the need for PCP relocation. Implementation of TM clinics minimizes barriers to rural VA services. Continued utilization of satisfaction outcomes will enhance patient care by improving practice operation efficiencies and effectiveness as well as facilitating improved health outcomes of patients.

Limitations

The quasi-experimental design, convenience sampling, and small sample size are inherent limitations. The nurse practitioner providers involved with this project were not the same. The TM provider was new to her clinic, and the UC provider was present in her clinic for years. The patient-provider relationship could have affected questionnaire responses. While the participant demographics did not vary widely within or between the groups and were representative of VA patients, transferability outside of the VA is limited due to the VA population characteristics. Self-selection bias could have affected the questionnaire responses as patients attending the TM clinics were patients who had agreed to this alternative method of care. Patients were not randomized to the groups.

Interpretation

Expected and Actual Outcomes

This project was expected to find equivalency in the primary measured outcome of overall patient satisfaction of care and secondary patient satisfaction questions between TM and UC groups. Although the mean response or overall patient satisfaction for the TM group was slightly lower than the UC group, this difference was not found to be statistically significant. This finding indicates integration of TM in primary care is an equivalent mode of care delivery.

The TM group had a slightly lower mean for overall satisfaction of care which could have been due to the differences in providers of the groups. The TM NP was new to the clinic and had no established relationship with her patients. Whereas, the UC Nurse Practitioner was well established with her patients for many years and had likely developed personal relationships, possibly affecting overall satisfaction. Other differences between the groups could be the result of some patients being slower to adapt to new modalities of care delivery, having higher complexity of care, challenging home environment, financial strain, or difficult transportation to and from the clinic.

Intervention Effectiveness

The integration of TM was found overall to be a highly acceptable method of care delivery by patients and increased access to care. Telemedicine brought the PCP to the patient in the patient's usual and familiar healthcare setting. This model of care can be utilized in nearly any outpatient environment where PCP shortages are resulting in gaps in care. Utilizing the patient satisfaction questionnaire immediately following the visit increased the likelihood of recording genuine satisfaction. Utilizing convenience sampling allowed for easy enrollment into this project. Telemedicine promotes the continuation of high-quality care without the need to relocate medical providers to rural areas saving patients travel time and expense that might otherwise be needed to receive care.

Revisions

The initial intervention and data collection plan for this project were revised due to VA restrictions. This decision resulted in the inability to repeat the satisfaction questionnaire on the participants returning for follow-up at three or six months. Further outcome data for blood pressure and HgA1C management could not be collected along with access data. For future projects, randomization to the groups and utilizing the same PCP for TM and UC will reduce response bias or influence of confounding factors. Exploration of perceived patient barriers with the use of TM will allow for solutions to be sought and integrated perhaps increasing acceptability and satisfaction of this model of care. While a substantial portion of this project's questionnaire was drawn from a previously validated satisfaction questionnaire, there was no existing questionnaire fully validated and applicable for use with this project. Due to time constraints of this project, validation of the adapted satisfaction questionnaire used in this project was not completed but should be considered prior to utilization in future projects.

Expected and Actual Impact

This project was expected to emphasize and confirm findings existing within the literature that utilizing the TM model of care is associated with high patient satisfaction. This project was able to successfully add to the body of literature that TM does maintain a high level of patient satisfaction similar to that of UC. As this model of care within VISN 15 is new, identifying high patient satisfaction is integral to the successful continuation and expansion of this service.

Policy

Start-up of TM clinics is associated with an initial monetary investment for the purchase of needed equipment and training of staff. These costs were sustained within the hub and spoke

sites prior to the initiation of this project and were not costs associated with the conduction of this project. Completion of this project had no unexpected costs and the student investigator did not receive funding. Workflow inefficiencies associated with TM care due to spoke site operating TM equipment during the appointments may be present. In-person meetings with spoke site staff prior to start-up of TM clinics were held and included detailed training to help minimize potential inefficiencies. Information technology staff within the VA fully support technology malfunction and promptly address such issues to minimize workflow interruption. Keeping clinics operational during staff shortages promotes stabilization of the VA workforce and promotes timely care to patients which can lead to an overall reduction in health care costs for the VA.

Conclusion

Telemedicine has existed for decades and the reason for the slow integration into primary care is multifactorial but due primarily to interstate licensing restrictions. With the 2018 VA Final Rule effective on June 11, 2018, VA providers can now deliver healthcare to all patients irrespective of the state in which the provider and patient are located (Authority of Health Care Providers to Practice Telehealth, 2018). The VA is uniquely positioned to increase PCP availability with the integration of TM. Patients who are needing care can be remotely connected with medical providers without increased travel burden or the need for PCP relocation.

Measurement of patient satisfaction of TM care aids in the understanding of veteran patient attitudes, beliefs, and acceptance of this new model of care. Early identification of perceived barriers to TM will allow the VA to adjust and direct care, ensuring high satisfaction promoting overall wellness of patients. This project and existing published literature support the use of the TM model in addition to or in place of UC appointments while maintaining high

patient satisfaction of care. Shortages of PCPs are felt nationally, even more so in rural areas where job vacancies can stay unfulfilled for years, leaving rural veterans at high risk for inadequate access to medical care. Lack of providers coupled with many veterans requiring management of one or more chronic medical conditions positions the VA to deliver TM as an alternative model of care, closing the gaps in access to timely medical care.

Further Study

The VSQ-9 questionnaire was drawn from a previously validated satisfaction questionnaire. The questions adapted for the current project were not validated but should be considered prior to future use to increase internal consistency, face validity, content validity, and convergent and discriminant validity. Future projects should attempt randomization to the TM and UC groups and utilize the same PCP for TM and UC, potentially reducing response bias or influence of confounding factors.

Evaluation of patient and VA costs were not measured in this project. Existing published literature has identified cost savings for the VA with the use of this model of care (Russo, McCool, and Davies, 2016). Further cost savings are identified for the VA with decreased hospitalization and readmission rates associated with the use of TM (Russo, McCool, and Davies, 2016). Published literature has identified that patients are concerned with the costs they incur to receive medical care, and this model has proven to reduce those costs (Powell et al. 2017; Russo et al., 2016). Future projects identifying the costs associated with TM compared to UC could validate cost savings experienced by the VA and patients alike.

There continues to be a gap in literature evaluating Nurse Practitioner TM care. Further projects evaluating NP care provided through TM may help validate the benefits NPs bring to patient-centered care. Continued exploration of perceived patient barriers with the use of TM

will allow for plausible solutions to help increase acceptability and satisfaction of care with the use of TM.

Dissemination

This project proposal was presented at a VA 2019 Nursing and Allied Health Research Symposium, on October 18, 2019, and the 2019 Iowa Nurses Association Conference & Annual Meeting, on October 25, 2019, in Des Moines, Iowa. The final project will be submitted to Telemedicine and e-Health journal for publication consideration.

References

About VISN 15 (n.d.). VA Heartland Network – VISN 15. Retrieved from https://www.visn15.va.gov/about/index.asp

Ambert-Pompey, S., Konecky, B., Ahlstrom, D., & Keefer, A. (2017). Improving access: Team-based primary care via telehealth in the VA, *SGIM Forum 40* (10): 2, 7, 13-14.

Authority of Health Care Providers to Practice Telehealth, 83 Federal Regulations § 21897 (2018).

Bashshur, R. L., Shannon, G. W., & Smith, B. R. (2014, September). The empirical foundations of telemedicine interventions for chronic disease management. *Telemedicine and e-Health*, *20*(9), 769-800. https://doi.org/10.1089/tmj.2014.9981

Basudev, N., Crosby-Nwaobi, R., Thomas, S., Chamley, M., Murrells, T., & Forbes, A. (2016). A prospective randomized controlled study of a virtual clinic integrating primary and specialist care for patients with type 2 diabetes mellitus. *Diabetic Medicine*, *33*, 768-776. https://doi.org/10.1111/dme.12985

CDC (2016). Leading Causes of Death. Centers for Disease Control. National Center for Health Statistics, Access at: https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm

Cimperman, M., Brencic, M. M., & Trkman, P. (2016, June 1). Analyzing older users' home telehealth services acceptance behavior—applying an Extended UTAUT model. *International Journal of Medical Informatics*, *90*, 22-31. https://doi.org/10.1016/j.ijmedinf.2016.03.002

Crowley, M. J., McAndrew, A. T., Webb, J. A., Sanders, L. L., & Jackson, G. L. (2016, May). Practical telemedicine for veterans with persistently poor diabetes control: A randomized

pilot trial. *Telemedicine and e-Health*, *22(5)*, 376-384. https://doi.org/10.1089/tmj.2015.0145

DeVeer, A. J., Peeters, J. M., Brabers, A. E., Schellevis, F. G., Rademakers, J. J., & Francke, A. L. (2015). Determinants of the intention to use e-Health by community dwelling older people. *BMC Health Services Research*, *15*, 103. https://doi.org/10.1186/s12913-015-0765-8

Gonzalez, Jr., G. E., & Brossart, D. F. (2015). Telehealth videoconferencing psychotherapy in rural primary care. *Journal of Rural Mental Health*, *39*(3-4), 137-152. https://doi.org/10.1037/rmh0000037

Hayes, R. D., Davies, A. R., & Ware, J. D. (1987). Scoring the medical outcomes study patient satisfaction questionnaire: PSQ-III, MOS Memorandum No 866, Accessed at https://www.rand.org/content/dam/rand/www/external/health/surveys_tools/psq/psq3_scoring.pdf

Kempf, K., Rohling, M., Stichert, M., Fischer, G., Boschem, E., Konner, J., & Martin, S. (2018, September). Telemedical coaching improves long-term weight loss in overweight persons: A randomized controlled trial. *International Journal of Telemedicine and Applications*, *2018*. https://doi.org/10.1155/2018/7530602

Kohnke, A., Cole, M. L., & Bush, R. G. (2014). Incorporating UTAUT predictors for understanding home care patients' and clinician's acceptance of healthcare telemedicine equipment. *Journal of Technology Management & Innovation*, *9*(2), 29-41. https://doi.org/10.4067/S0718-27242014000200003

Kruse, C. S., Krowski, N., Rodriguez, B., Tran, L., Vela, J., & Brooks, M. (2017). Telehealth and patient satisfaction: A systematic review and narrative analysis. *BMJ Open*, *7*(e016242). https://doi.org/10.1136/bmjopen-2017-016242

Kvedar, J., Coye, M. J., & Everett, W. (2014, February 1). Connected health: A review of technologies and strategies to improve patient care with telemedicine and telehealth. *Health Affairs*, *33*(2). https://doi.org/10.1377/hlthaff.2013.0992

Liu, C., Tsai, Y., & Jang, F. (2013). Patients' acceptance towards a web-based personal health record system: An empirical study in Taiwan. *International Journal of Environmental Research and Public Health*, *10*(10), 5191-5208. https://doi.org/0.3390/ijerph10105191

Liu, W., Saxon, D. R., McNair, B., Saqnagorski, R., & Rasouli, N. (2016). Endocrinology telehealth consultation improved glycemic control similar to face-to-face visits in veterans. *Journal of Diabetes Science and Technology*, *10*(5), 1079-1086. https://doi.org/10.1177/1932296816648343

Marcin, J., Shaikh, U., & Steinhorn, R. (2016). Addressing health disparities in rural communities with telehealth. *Pediatric Research*, *79*(1), 169-176. https://doi.org/10.1038/pr.2015.192

Marshall, G. N., & Hays, R. D. (1994). The Patient Satisfaction Questionnaire Short Form (PSQ-18). Santa Monica, CA: RAND Corporation, 1994. Accessed at: https://www.rand.org/pubs/papers/P7865.html.

Markwick, L., McConnochie, K., & Wood, N. (2015, August). Expanding telemedicine to include primary care for the urban adult. *Journal of Health Care for the Poor and Underserved*, *26*(3), 771-776. https://doi.org/10.1353/hpu.2015.0078

Melnyk, B. M., & Fineout-Overholt, E. (2019). *Evidence-Based Practice in Nursing and Healthcare* (4th ed.). Philadelphia, PA: Wolters Kluwer.

Mohammadi, M. M., Poursaberi, R., & Salahshoor, M. R. (2018). Evaluating the adoption of evidence-based practice using Rogers's diffusion of innovation theory: A model testing study. *Health Promotion Perspectives*, 8(1), 25–32, http://doi.org/10.15171/hpp.2018.03

Morris, B. J., Jahangir, A. A., & Sethi, M. K. (2013, June). Patient satisfaction: An emerging health policy issue. *AAOS Now*, 7(6), 29. Accessed at: https://www.checklistboards.com/article.cfm?ArticleNumber=87

Muller, K. I., Alstadhaug, K. B., & Bekkelund, S. I. (2016, May). Acceptability, feasibility, and cost of telemedicine for nonacute headaches: A randomized study comparing video and traditional consultations. *Journal of Medical Internet Research*, *18*(5), e140-e160. https://doi.org/10.2196/jmir.5221

National Center for Veterans Analysis and Statistics. (2017). *VA Utilization Profile FY 2016*. Washington, DC: Department of Veteran Affairs, National Center for Veterans Analysis and Statistics.

Orozco-Beltran, D., Hernandez, M., Sanchez-Molla, M., Sanchez, J. J., & Mira, J. J. (2017, December 15). Telemedicine in primary care for patients with chronic conditions: The ValCrònic quasi-experimental study. *Journal of Medical Internet Research*, *19*(12), e400. https://doi.org/10.2196/jmir.7677

Powell, R. E., Henstenburg, J. M., Cooper, G., Hollander, J. E., & Rising, K. L. (2017, May/June). Patient perceptions of telehealth primary care video visits. *Annals of Family Medicine*, *15(3)*. https://doi.org/10.1370/afm.2095

RAND Health Care (n.d.). Visit-Specific Satisfaction Instrument (VSQ-9). Accessed at www.rand.org/health/surveys_tools/vsq9.html

Raney, L., Bergman, D., Torous, J., & Hasselberg, M. (2017). Digitally driven integrated primary care and behavioral health: How technology can expand access to effective treatment. *Current Psychiatry Reports*, *19*(11). https://doi.org/10.1007/s11920-017-0838- y

Rosswurm, M.A., & Larrabee, J.H. (1999). A model for change to evidence-based practice. *The Journal of Nursing Scholarship*, 31(4), 317-22.

Rubin, H. R., Gandek, B., Rogers, W. H., Kosinski, M., Mchorney, C. A., & Ware, J. E. (1993). Patients' Ratings of Outpatient Visits in Different Practice Settings: Results from the Medical Outcomes Study. *Journal of the American Medical Association*, *270*(7), 835-840. https://doi.org/10.1001/jama.1993.03510070057036

Rural Veteran (n.d.). Rural Veteran Health Care Challenges. Retrieved from https://www.ruralhealth.va.gov/aboutus/ruralvets.asp.

Russo, J. E., McCool, R. R., & Davies, L. (2016, March). VA telemedicine: An analysis of cost and time savings. *Telemedicine Journal and e-Health*, *22*(3), 209-15. https://doi.org/ 10.1089/tmj.2015.0055.

Seguranyes, G., Costa, D., Fuentelsaz-Gallego, C., Beneit, J. V., Carabantes, D., Gomez-Moreno, C., ... Abella, M. (2014). Efficacy of a videoconferencing intervention compared with standard postnatal care at primary care health centres in Catalonia. *Midwifery*, *30*, 764-771. https://doi.org/10.1016/j.midw.2013.08.004

Siminerio, L. M., Ruppert, K., Toledo, F. G., & Triola, A. (2012). Telemedicine consultations: An alternative model to increase access to diabetes specialist care in underserved rural communities. *JMIR Research Protocols*, *1*(2), e14. https://doi.org/10.2196/resprot.2235

Sood, A., Watts, S. A., Johnson, J. K., Hirth, S., & Aron, D. C. (2018). Telemedicine consultation for patients with diabetes mellitus: A cluster randomised controlled trial. *Journal of Telemedicine and Telecare*, *24*(6), 385-391. https://doi.org/10.1177/1357633X17704346

Su, D., Zhou, J., Kelley, M. S., Michaud, T. L., Siahpush, M., Kim, J., ... Pagan, J. A. (2016). Does telemedicine improve treatment outcomes for diabetes? A meta-analysis of results from 55 randomized controlled trials. *Diabetes Research and Clinical Practice*, *116*, 136-148. https://doi.org/10.1016/j.diabres.2016.04/019

Tarp, K., Mejldal, A., & Nielsen, A. S. (2017, June). Patient satisfaction with videoconferencing-based treatment for alcohol use disorder. *Addictive Disorders & Their Treatment*, *16(2)*, 70-79. https://doi.org/10.1097/ADT.0000000000000103

Tse, G., Chan, C., Gong, M., Meng, L., Zhang, J., Su, X., ... Liu, T. (2018). Telemonitoring and hemodynamic monitoring to reduce hospitalization rates in heart failure: A systematic review and meta-analysis of randomized controlled trials and real-world studies. *Journal of Geriatric Cardiology*, *15*, 298-309. https://doi.org/10.11909/j.issn.1671-5411.2018.04.008

United States Census Bureau. (2014). 2010 Census Urban and Rural Classification and Urban Area Criteria [Web log post]. Retrieved from https://www.census.gov/geo/reference/ua/urban-rural-2010.html

Viers, B. R., Lightner, D. J., Rivera, M. E., Tollefson, M. K., Boorjian, S. A., Karnes, R. J., ... Gettman, M. T. (2015). Efficiency, satisfaction, and costs for remote video visits following radical prostatectomy: A randomized controlled trial. *European Urology*, *68*, 729-735. https://doi.org/10.1016/j.eururo.2015.04.002

Ware, J. E., and Hayes, R. D. (1988). Methods for measuring patient satisfaction with specific medical encounters. *Medical care*, 26(4), 393-402. https://doi.org/10.1097/00005650-198804000-00008

Ware, J. E., Snyder, M. K., and Wright, W. R. (1976). Results regarding scales constructed from the patient satisfaction questionnaire and measure of other health care perceptions, Vol I, Part B. Springfield, VA. National Technical Information Service.

Wilkinson, J. R., Spindler, M., Wood, S. M., Marcus, S. C., Weintraub, D., Morley, J. F., ... Duda, J. E. (2016, June). High patient satisfaction with telehealth in Parkinson disease. *Neurology Clinical Practice*, *6*(3), 241-251. https://doi.org/10.1212/CPJ.0000000000000252

Young, H. M., & Nesbitt, T. S. (2017). Increasing the capacity of primary care through enabling technology. *Journal of General Internal Medicine*, *32*(4), 398-403. https://doi.org/10.1007/s11606-016-3952-3

Yun, J. E., Park, J., Park, H., Lee, H., & Park, D. (2018). Comparative effectiveness of telemonitoring versus usual care for heart failure: A systematic review and meta-analysis. *Journal of Cardiac Failure*, *24(1)*, 19-28. https://doi.org/10.1016/j.cardfail.2017.09.006

Zhai, Y., Zhu, W., Cai, Y., Sun, D., & Zhao, J. (2014, December). Clinical- and cost-effectiveness of telemedicine in type 2 diabetes mellitus: A systematic review and meta-

analysis. *Medicine*, *93*(28), e312-e325(14).

https://doi.org/10.1097/MD.0000000000000312

Appendix A

Definition of Terms

Rural – according to the U.S. Census Bureau, territories and populations outside of cities and towns with ≤2500 or less are considered rural (United States Census Bureau, 2014).

Telehealth – a term used to describe a variety of integrated technology modalities to remotely connect patients with providers with the ability to diagnose, treat, and educate.

Telemedicine – a term used to describe a variety of integrated technology modalities to remotely connect patients with providers with the ability to diagnose, treat, and educate.

V-IMPACT – Virtual Integrated Multisite Patient Aligned Care Team developed by the VA to integrate TM modalities into primary care services.

VA – The Department of Veterans Affairs, a federal Cabinet-level agency that provides eligible military veterans near-comprehensive healthcare services.

Veterans Choice Program – A program within the VA allowing veterans to receive care through a community provider paid by the VA when the VA cannot provide timely care for the veteran or the closest VA medical center is too far from their home.

Videoconferencing – the use of video technology to remotely connect with patients to complete a health care visit.

VISN – Veterans Integrated Service Network. Regions across the United States comprising of VA health care systems, community-based outpatient clinics, and veteran centers.

Appendix B

Cost Table

Projected Direct Costs and Indirect Costs

Personnel	**Description**	**Quantity**	**Cost**	**Total**
Key Personnel	Student Investigator/hrs.	600+	$0	$0
Ancillary Personnel	Clerical Associate/hrs. (10 min x 600 patients)	100	$21.28/hr.	$2,128.00
Ancillary Personnel	RN Care Manager/hrs., coordination of activities with Clerical Associate	20	$36.97/hr.	$739.40
Personnel Sub-total				$2,867.40

Miscellaneous Costs	**Description**	**Quantity**	**Cost**	**Total**
Ancillary Costs	Computer hardware, internet, paper, pencils, pens, copy supplies, postage	N/A	$0	$0
Computer Costs Sub-total				$0

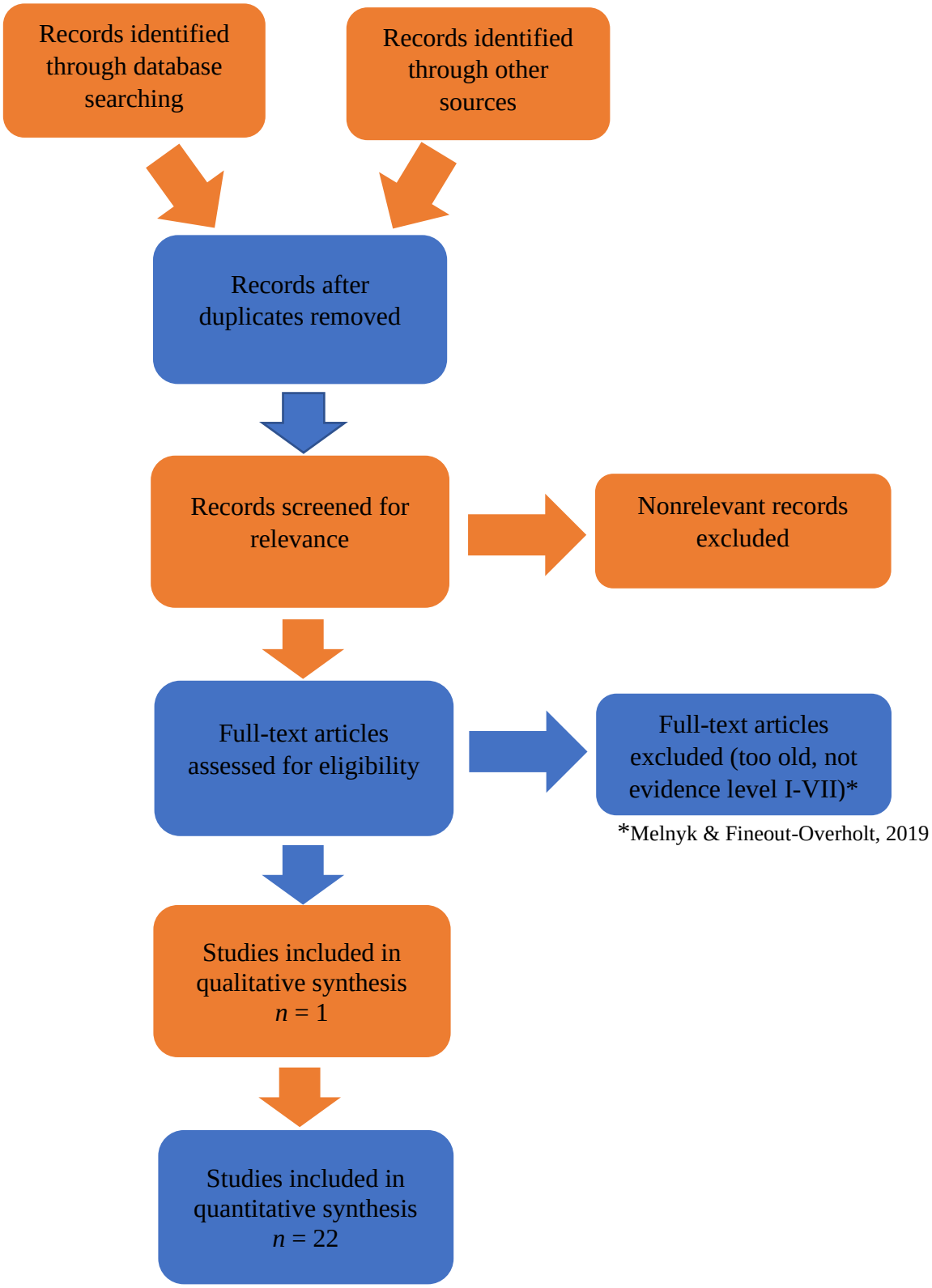
Training	**Description**	**Quantity**	**Cost**	**Total**
Spoke site personnel	One Clinical Associate for each team (0.25/hr. each)	3	$21.28/hr.	$15.96
Spoke site personnel	One RN Care Manager for each team (0.25/hr. each)	3	$36.97/hr.	$27.73
Training Sub-total				$51.42

Office Space	**Description**	**Quantity**	**Cost**	**Total**
Spoke site office space	Consultation room for questionnaire completion, 15 minutes x 384 participants	1	$0	$0
Office Space Sub-total				$0

Total Estimated Project Expenses	**$2,918.82***

Appendix C

Preferred Report Items for Systematic Review and Meta-Analysis (PRISMA)



*Melnyk & Fineout-Overholt, 2019

Appendix D

Synthesis of Evidence

First author, Year, Title, Journal	Purpose	Research Design, Evidence Level (Melnyk & Fineout-Overholt, 2019), & Variables	Sample & Sampling, Setting	Measures & Reliability (if reported)	Results & Analysis Used	Limitations & Usefulness
Theme: Access						
Raney (2017). Digitally driven integrated primary care and behavioral health: How technology can expand access to effective treatment. *Current Psychiatry Reports.*	Identify/explore technology approaches to integrating primary & behavioral health care to address workforce challenges	Single descriptive. Level VI. Technology.	Technology-based modalities of care. No sampling or setting for this review.	Digital solutions to augment limited psychiatric and behavioral health provider expertise. No reliability reported.	This was a descriptive review without relationships to study. No analysis.	No randomization.TM hubs can increase and expand access to specialty and primary care services.
Young (2017). Increasing the capacity of primary care through enabling technology. *Journal of General Internal Medicine.*	Identify enabling technologies that could increase capacity in primary care & discuss challenges & logistical issues.	Single descriptive. Level VI. Technology.	Enabling technology-based modalities of care. No sampling or setting for this review.	Descriptive measures of four domains: body, home, community, & primary care clinic. No reliability reported.	Four domains and associated technology expand and support the primary care role. Descriptive analysis of data.	No randomization. TM technology has the potential to increase the capacity of primary care providing care to patients in need.
Markwick (2015).	Describe the effective use of	Descriptive study.	Convenience sample.	A post-visit survey evaluating	Easy integration, increases	No randomization.

Expanding telemedicine to include primary care for the urban adult. *Journal of Health Care for the Poor and Underserved.*	TM in primary care for urban adults.	Level VI. Expand TM services to all ages in a pilot program.	Adult patient population in Rochester, NY, requesting a primary care visit.	access, costs, and satisfaction of care with TM use. No reliability reported.	collaboration, expands practice, convenient for patients. Outcomes pooled and calculated.	Generalizability in question. TM can reduce barriers to access, increase timely care, and decrease patient and health care insurance costs.
Theme: Chronic Disease Management						
Yun (2018). Comparative effectiveness of telemonitoring versus usual care for heart failure: A systematic review and meta-analysis. *Journal of Cardiac Failure*.	Evaluate the effectiveness of telemonitoring in the management of patients with HF.	Systematic analysis/Meta-analysis of RCTs. Level I. Variables: Clinical effectiveness & patient-reported outcomes.	Data extraction from 37 RCTs, search of Ovid-Medline, Ovid-Embase, and the Cochrane Library for RCTs, through May 2016.	Studies of HF with no prior cardiovascular intervention, RTC comparing TM with UC, & studies with $\geq$1 outcome of interest.	Reduction of: all-cause mortalitiy in 24 studies, all-cause hospitali-zation in 17 studies, HF-related hospitali-zation in 12 studies, HF-related mortality in 5 studies. Cochran *Q* test and I^2 statistics.	Composition of control groups varied. All-cause mortality & HF-related mortality varied depending on the follow-up timing. TM reduces all-cause mortality, HF-related mortality and HF-related hospitalization.
Su (2016). Does telemedicine improve treatment outcomes for diabetes? A meta-analysis of results from 55 randomized controlled trials. *Diabetes Research*	Assess the overall effect of TM on diabetes management.	Systematic analysis/Meta-analysis of randomized controlled trials. Level I. RCTs involve-ing TM-based intervention.	Data extraction from 55 RCTs, PRISMA guidelines, through August 8, 2014.	Difference in HbA1c between the groups. Sub-groups: type of diabetes, age group, trial length, & primary TM approach.	TM had more reduction in HbA1c & favored in 22 studies, UC favored in 1 study, no differences found in 32 studies. *Q* statistics. Hedge's *g*.	Subgroups baseline HbA1c not controlled. Excluded non-English language papers. HbA1c only diabetes outcome. TM more effective in improving

and Clinical Practice.					Random effects.	diabetes outcomes.
Zhai (2014). Clinical- and cost-effectiveness of telemedicine in type 2 diabetes mellitus: A systematic review and meta-analysis. *Medicine*.	Utilizing TM with type 2 diabetic patients, evaluate clinical effectiveness and cost-effectiveness of glycemic control.	Systematic analysis of RCTs. Level I. RCTs involve-ing TM-based intervention with type 2 DM, on insulin and/or oral diabetic drugs.	Data extraction from 35 RCTs, PRISMA guidelines, through 2/28/2014.	Change in pre- and post-intervention HbA1c, and intervention-related costs. Good reliability per pooled estimates.	Decrease in HbA1c with TM. Cochran Q statistic, random-effects, fixed-effects, and ICER.	Intervention-costs reports of 2 disparate studies. Intervention monitoring differences. TM fills treatment gaps & reduces geographic barriers.
Kempf (2018). Telemedical coaching improves long-term weight loss in overweight persons: A randomized controlled trial. *International Journal of Telemedicine and Applications*.	Test hypothesis that a telemedical intervention with or without telemedical coaching leads to long-term weight losses, other beneficial clinical outcomes, and the additional impact on results.	RCT. Level II. Reduction in body weight and secondary changes in BMI, waist circumference, blood pressure, lipid panel, & HbA1c after 12 weeks.	Employees with BMI $\geq$27, aged 18-75. Electronic randomization, 3 parallel groups. Occupation health care setting.	Differences in primary and secondary variables at 12 weeks and 52 weeks post-intervention. Reliability not reported.	Greater weight loss and cardio-metabolic risk factors with TM, increasing when combining TM devices and coaching, at 12 and 52 weeks. Chi square test or Kruskal-Wallis and ANOVA.	Possible selection bias. Generaliza-bility or transfera-bility in question. Small study size. Lack of diet data. LOCF approach for missing data can underestimate results. TM effective for long-term weight loss.
Basudev (2015). A prospective randomized controlled study of a virtual clinic integrating primary and specialist care for patients with type 2 diabetes	Investigate the effectiveness of a diabetes virtual clinic to enhance diabetes disease management in primary care.	RCT, Level II. Virtual care (IG) versus UC (CG).	Type 2 diabetics diagnosis >1year duration, aged >18 & HbA1c $\geq$ 8.5%. Computer randomization1:1. Six general practices in London boroughs.	Baseline change in HbA1c to 12 months. Secondary: lipids, blood pressure, weight, & renal function. Reliability not reported.	HbA1C reduced but not different in both groups. IG had better systolic blood pressure, no difference: lipids, weight & renal function. Chi-square, t-test,	Three different providers giving care, no standard-ized care-plans. TM care non-inferior allowing integration of diabetes care into primary care.

mellitus. *Diabetic Medicine.*					ANCOVA, & Bootstrap.	
Crowley (2016). Practical telemedicine for veterans with persistently poor diabetes control: A randomized pilot trial. *Telemedicine and e-Health.*	Evaluate incorporating TM intervention versus UC for persistently poorly controlled diabetics in a veteran population.	Pilot RCT. Level II. TM versus UC.	Type 2 diabetes with HbA1c persistently >9% for > one-year, established insulin use, and assigned to a Durham PCP. Block randomization between December 2013 to April 2014. Durham VA.	UC or a TM intervention combining TM, medication management, self-management support, and depression management. Reliability not reported.	More HbA1c, self-care, & blood pressure improve-ment in the TM group. Depressive symptoms were about the same between the groups. Linear mixed models with a constrained intercept and unstructured covariance.	Small single-center pilot study, primarily male, veteran population, and insulin-requiring type 2 diabetics. TM may be an advantageous intervention to reduce the burden of diabetes for veteran patients.
Sood (2016). Telemedicine consultation for patients with diabetes mellitus: a cluster randomized controlled trial. *Journal of Telemedicine and Telecare.*	Examine TM management of patients with diabetes mellitus compared to UC.	Cluster randomized controlled trial. Evidence Level II. TM video consultation, intervention group (IG) and usual face-to-face care, control group (CG).	Patients referred for diabetes management, taking oral and/or insulin therapies, type I or II diabetes. Random number sampling. Cleveland Veteran Administration Network.	Primary outcome was HbA1c. Secondary data collection included Self-Rated Health and Diabetes Treatment Satisfaction Questionnaire.	TM use had similar outcomes, higher patient satisfaction, and positive health-care team reviews. Univariate and bivariate statistical analysis, descriptive statistics, chi-squares, and unpaired and paired t-tests.	Whole health centers vs. individual randomization. patients, short follow-up, group intervention by different providers, baseline HbA1c not matched. Use of TM has an overall positive effect on patients and supported by PCPs.

Muller (2016). Acceptability, feasibility, and cost of telemedicine for nonacute headaches: A randomized study comparing video and traditional consultations. *Journal of Medical Internet Research.*	Estimate the acceptance and investigate the feasibility and cost savings of TM consultations for patients with nonacute headaches (HA).	RCT. Evidence level II. TM and usual face-to-face consultations.	Nonacute HAs referred to specialists 9/30/12 to 3/30/15. Block randomization. Neurological outpatient clinic at the University Hospital of Northern Norway.	Feasibility, cost and travel estimates. Reliability not reported.	TM acceptance, video quality, & sound quality satisfaction were high with shorter consultations. Cost & travel estimates higher in rural patients. No differences between groups for diagnosis, investigations, advice, prescrip-tions, & follow-up. Shapiro-Wilk test, independent sample t-test, and chi-square.	No placebo control group or blinding of patients. Possible Hawthorne Effect. Use of TM for evaluation and treatment of nonacute headaches are advantageous.
Seguranyes (2013). Efficacy of a videoconferencing intervention compared with standard postnatal care at primary care health centres in Catalonia. *Midwifery.*	Examine efficacy of video-conferencing intervention compared to standard postnatal care.	Multicenter parallel group RCT. Evidence level II. Intervention group (IG), virtual consul-tions (VC), telephone hot-line, standard care; control group (CG), standard care, health center	Women receiving antenatal care and/or attending antenatal education groups. Women within eight Attention to Sexual and Reproductive Health units in Catalonia, 11/2008 to 12/09.	Number and type of visits, reasons for consultation (a. the mother, b. feeding, or c. the newborn), type of feeding at six weeks and women's satisfaction with the intervention. Reliability was not reported.	Mean consulta-tions higher in IG, feeding types similar between the groups, both groups very satisfied with in-person care for communication, information, accessibility and overall satisfac-tion. IG reported high satisfaction.	Low utilization of VC. Must have internet service for VC. VC effective for postpartum care, reduces health care visits, increases reasons for consultation, provides immediate consultations.

		visits, home visits, and/or breastfeeding groups.			Descriptive & inferential analysis, student *t*-test, ANOVA, Scheffé, and X^2.	
Orozco-Beltran (2017). Telemedicine in primary care for patients with chronic conditions: The ValCrònic quasi-experimental study. *Journal of Medical Internet Research.*	Evaluate the impact of telemonitoring of patients with multiple co-morbidities at high-risk for rehospitalization and/or ER visits.	Quasi-experimental, before and after design, Evidence Level III. Demo-graphic data (age, sex), weight, heart rate, blood pressure, cap-illary glycemia, and HbA1c.	Patients at high risk for rehospital-ization or ER visits with one or more of the following condi-tions: heart failure, COPD, type 2 diabetes, & arterial hypertension. Consecutive, nonprobability sampling & active recruitment of eligible patients by written invitation. Spain.	Demographic data (age, sex), weight, heart rate, blood pressure, capillary glycemia, and HbA1c, self-assessment tools, health questionnaires. Reliability not reported.	Program impact: weight loss, lower heart rate, lower systolic and diastolic blood pressure, HbA1c decreased, decreased need for ER services and hospital admissions due to disease exacerbations.	Participant risk (high risk or not) was dichotomized using the CARS scale and complemented the result with the clinical judgment of the usual health care provider. Parallel-group lacking. Possible Hawthorne effect. TM reduces chronic disease impact for the stakeholders.
Liu (2016). Endocrinology telehealth consultation improved glycemic control similar to face-to-face visits in veterans. *Journal of Diabetes Science and Technology*.	Review all new Endocrinology consults for the effect of telehealth versus usual face-to-face visits on HbA1c in a rural veteran population.	Retrospective cohort study Evidence Level IV.	Retrospective chart reviews of all new Endocrin-ology consult visits between 10/1/13 and 9/30/14. Consults were identified by ICD-9 codes. Denver VA Medical Center.	Telehealth consults, face-to-face consults, HbA1c at baseline to visit 1. Reliability not reported.	HbA1c decreased but no differences between the groups. Substantial reduction in travel time and costs for TM patients.	Nonrandomized, long-term changes not evaluated, focused on glycemic control measures only, no meaningful subgroup analysis, small patient

						population. For rural patients with limited access, TM visits can improve glycemic quality measures.
Gonzalez, Jr. (2015). Telehealth videoconferencing psychotherapy in rural primary care. *Journal of Rural Mental Health.*	Assess the effectiveness of telehealth videoconferencing psychotherapy (TVCP) for a rural patient population.	Within-subjects group design and single case studies. Level IV. PHQ-9, SF-12, and CORE-B Global Distress scale scores.	Patients referred by a physician for behavioral telehealth treatment at a rural primary care clinic.	Baseline measures and every four weeks thereafter. Graphing, visualization and simple mean shift regression for single case studies. Reliability not reported.	TVCP produced improvement on all mental health outcomes. Four single-case studies suggested treatment response was dependent upon diagnosis type and severity. Paired sample t-test pre- and posttreatment.	No control group, no randomization, small sample size, mostly Caucasian females, lack of psychotherapist experience. Single case studies lacked baseline period stability, extraneous variables not monitored, CORE-B variable graph lacked three dimensions of clear effect. TVCP can be an effective treat-ment modality, reducing mental health disparities.
Tse (2018). Telemonitoring and hemodynamic monitoring to	Examine the effectiveness of telemonitoring and wireless	Systematic review and meta-analysis of RCTs and	A search of PubMed and Cochrane Library for published	Hospitalization rates in HF utilizing telemonitoring or	Hospitalization rates reduced 26% utilizing telemonitoring,	Possible publication bias. Four studies were reviewed for

reduce hospitalization rates in heart failure: A systematic review and meta-analysis of randomized controlled trials and real-world studies. *Journal of Geriatric Cardiology*.	hemodynamic monitoring devices in reducing hospitalizations in heart failure (HF).	real-world studies. Level V. Telemonitoring and wireless hemodynamic devices.	studies up to 5/1/17. Case-control, prospec-tive or retrospect-tive observational study, or RCTs, patients with HF, hospitalization rates.	hemodynamic monitoring. Reliability not reported.	24% short term ≤6 months and 27% long-term ≥12 months, and 40% utilizing hemodynamic monitoring, 45% short-term and 37% long-term. Cochran's Q, I^2 statistic from the standard Chi-square test.	hemodynamic monitoring. Telemonitoring and hemodynamic monitoring both useful for reducing hospitalization rates for HF patients.
Bashshur (2014). The empirical foundations of telemedicine interventions for chronic disease management. *Telemedicine and e-Health.*	Establish the evidence from the available literature on the impact of TM for the management of three chronic diseases, congestive heart failure (CHF), stroke, and COPD.	A systematic review of empirical studies. Level V. TM impact on access, quality, and cost for chronic diseases, CHF, stroke, and COPD.	Studies selected by search terms, chronic disease, research design, larger sample size.	Access, quality, and cost for CHF, stroke, and COPD. Reliability not reported.	TM use identified positive economic trends and trends in reducing hospitalizations, ER visits, illness severity and preventing and reducing illness exacerbations, with improved outcomes for CHF, stroke, and COPD.	Not all RCTs. Variability in fidelity, maturation, and bundling. TM can reduce disparities in access, quality of care, quality of medication, and reduces economic of these diseases.
Theme: Patient Satisfaction						
Wilkinson (2016). High patient satisfaction with telehealth in	Evaluate patient satisfaction, clinical outcomes, travel burden, and	RCT. Evidence Level II. Patient satisfaction,	Diagnosis of PD requiring Neurology follow-up at the VA.	Patient satisfaction was measured using the Patient	All groups demonstrated a high level of patient satisfac-	Small sample size. Logistic problems encountered.

Parkinson disease. *Neurology Clinical Practice.*	health care utilization utilizing satellite and home arms compared with UC of veteran patients with Parkinson disease (PD).	clinical outcomes, travel burden, health care utilization.	Patients receiving primary care close to home recruited for the satellite arm and the remaining for the home arm. Random number generator with blocks of four. Philadelphia, PA VAMC.	Assessment of Communication of Telehealth instrument. Multiple reliable and validated scales used to evaluate clinical outcomes, travel burden and health care utilization. Googlemaps.com calculated travel distance and no-show and cancelations collected from VA EMR system.	tion. Satellite and home arms identified a higher level of satisfac-tion for conven-ience of visit and convenience related to distance. No differences between the groups for clinical outcomes, quality of life, health care utilization. There was a lower no-show and patient-initiated cancelation rate in the satellite arm. Fisher exact tests, t-tests.	Questionable generalizability. Remote care delivery maintains high patient satisfaction while increasing access to care to demographically and physically challenged PD patients.
Viers (2015). Efficiency, satisfaction, and costs for remote video visits following radical prostatectomy: A randomized controlled trial. *European Urology*.	Investigate efficiency, satisfaction, and costs of urology visits in the outpatient setting using video visit technology compared to usual office visits.	RCT. Evidence Level II. Visit efficiency, patient and provider satisfaction, and costs utilizing video visits (VV) and usual office visits (OV).	Patients having surgical resection of prostate secondary to prostate CA between 06/13 to 03/14. Identification of prostatectomy patients undergoing	Visit efficiency (via time studies), patient and provider satisfaction (via 21-point questionnaire), visit costs for patients. Reliability not reported.	Equivalent efficiency and patient satisfaction between groups. Reduced patient costs for VV. Most in the VV group (96%) would participate in VV again.	Small sample size, one clinic site for sampling, patients without technology access excluded. Overall health care system costs were not evaluated. VV provide increased

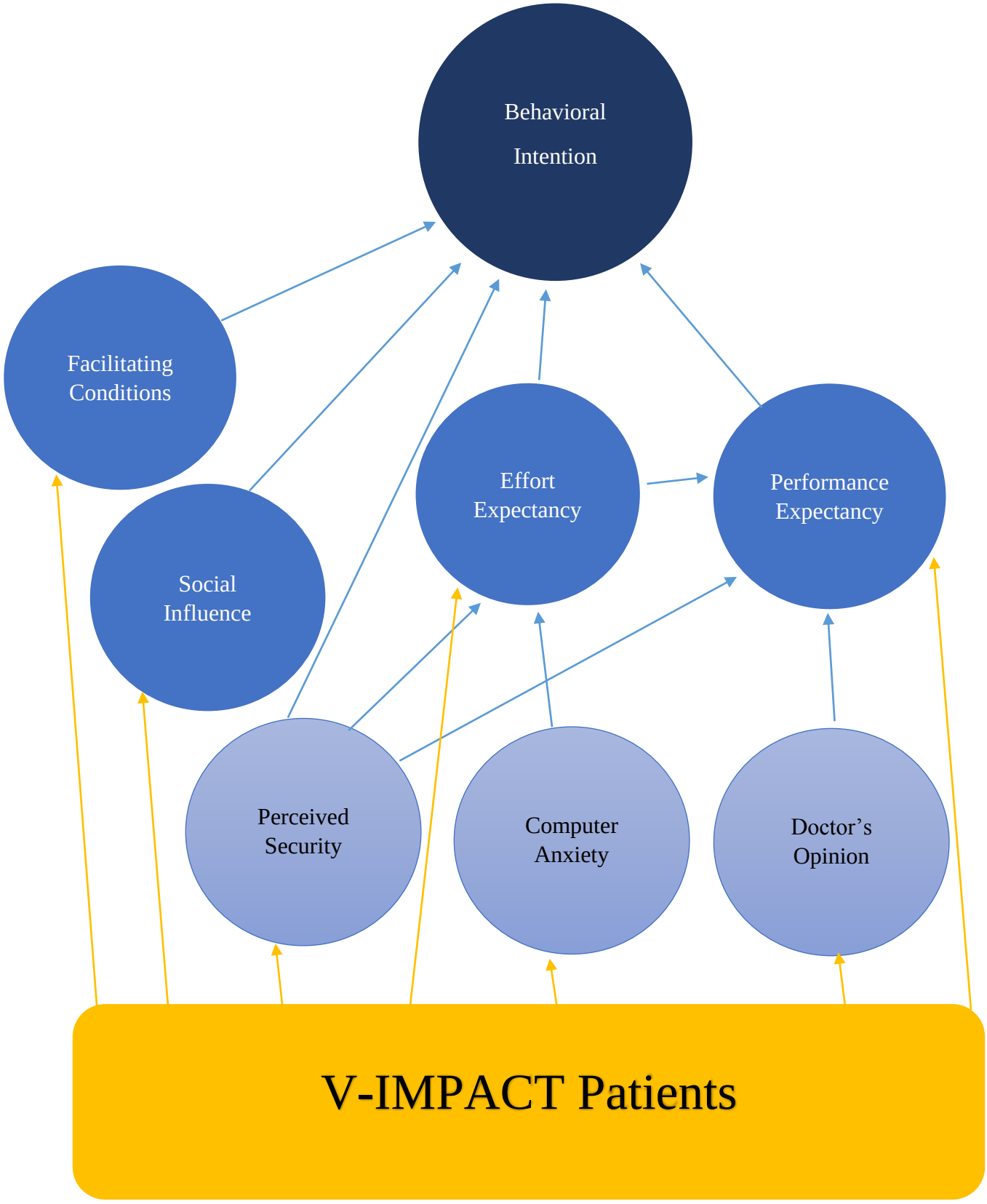
			surveillance prospectively identified and randomized 1:1 parallel fashion. Single outpatient Mayo urology clinic, Rochester, MN.		High level of provider satisfaction reported and equivalent provider-perceived quality of medical history and therapeutic management between groups. Providers had less confidence that VV would fit into clinic workflow compared to OV.	access to care, enhanced quality of services, and lower costs for patients.
Kruse (2017). Telehealth and patient satisfaction: A systematic review and narrative analysis. *BMJ Open.*	Exploring telehealth and patient satisfaction associations and TM effectiveness and efficiency.	Systematic review with narrative analysis. Evidence level V. Patient satisfaction of effectiveness and efficiency with TM.	A search of CINAHL and PubMed (MEDLINE) for published studies between 2010-2017, English only, full text only, with a combination of telehealth and patient satisfaction, and an assessment of effectiveness or efficiency measure.	Observations made of 44 studies. Common-alities (19) identified within the studies. Inter-rater reliability controlled through consensus meetings after the initial focus study of the topic.	Factors associated between TM and satisfaction: Improved outcomes (20%), preferred modality (10%), ease of use (9%), low cost (8%), improved communication (8%), and decreased travel time (7%).	No RCTs, small sample sizes, limited populations, gender, technology, selection, age, education, and racial bias. Telehealth model of care maintains high patient satisfaction of care.

Powell (2017). Patient perceptions of telehealth primary care video visits. *Annals of Family Medicine*.	Describe patient experiences with video visits.	Qualitative semi-structured interviews. Level VI. Open-ended questions to elicit patients' experience with VV, impressions of technology's ability to address health care needs, prior experience with video calls, technical issues, emotional experience during the visit, and future uses for VV.	Patients who had a VV with their primary care physician, aged 18 and older at a single academic medical center.	Satisfaction of VV, technological aspects and perceptions, compared with office-based visits. Reliability not reported.	All participants reported overall satisfaction with VV, the majority interested in VV as an alternative to UC. Convenience and decreased costs cited as a primary benefit of VV. Concerns expressed: privacy and performance of the physical exam. Content analysis approach. Classified interview text into categories with similar meanings.	Sampling of patients in two practices and one health system. Interviews delays, up to one month. VV beneficial in primary care, with improved convenience, efficiency, privacy, and comfort for patients.
Tarp (2017). Patient Satisfaction with videoconferencing-based treatment for alcohol use disorders.	Evaluate the satisfaction of patients utilizing a video-conferencing based treatment for alcohol use disorders (AUD).	Mixed method: anonymous questionnaires and qualitative study (semi-structured interviews). Evidence level VI.	Consented subjects from an RCT recruited between 09/12 and 04/13. Patients agreeing to intervention placed in TAU +I group.	Self-reported questionnaires by both groups: satisfaction with treatment in general, satisfaction with the technical equipment,	Both groups reported high satisfaction with general elements in treatment. TAU +I technical aspects mostly satisfied with picture quality,	No randomization. Questionnaires blinded and unable to determine if the same patients answered the questionnaires at

Addictive Disorders & Their Treatment.		Treatment as usual (TAU) group and TAU plus videoconferencing-based treatment (TAU +I).	Outpatient clinic in Odense, Denmark.	connection, picture quality, and sound quality. TAU +I: structured interviews evaluating video-conferencing based treatment. Reliability not reported.	less satisfied with sound quality. Shapiro-Wilk W test, 2-sample t-test with equal variances, 2-sample Wilcoxon rank-sum. Semi-structured interviews analyzed using elements from a general inductive approach.	each interval. Hawthorne effect possible for the intervention group. One person coded the data. Only TAU +I group was invited to complete interviews. The study size was small. Videoconferencing as an alternative method of treatment for AUD may increase patient satisfaction of treatment.
Siminerio (2012). Telemedicine consultations: An alternative model to increase access to diabetes specialist care in underserved rural communities. *Journal of Medical Internet Research.*	Test diabetes TM consultation acceptability of patients and PCPs.	Qualitative non-randomized study. Evidence level VI. TM consultation, patient and provider satisfaction.	Patients (25) who were referred to Endocrinology for diabetes management from seven PCPs. Isolated rural community in Pennsylvania.	Patient and PCP satisfaction surveys, HbA1c. Reliability not reported.	High satisfaction for TM consultations by patient and PCP, patients with HbA1c greater than 8.0% reduced from 88% to 50% after 18 weeks. Five-question Likert scale.	No randomization, no control group, small sample, all white/ Caucasian, mostly type 2 diabetics. TM reduces travel, time, costs, increases access to appropriate care.

Appendix E

Extended Unified Theory of Acceptance and Use of Technology



Appendix F

Site Approval

Department of Veterans Affairs
St. Louis Health Care System

Form Q
Quality Assurance or Quality Improvement Research Determination

Title of Study: Integration of Nurse Practitioner-Led Telemedicine Clinics: Improving Rural Veteran Healthcare Disparities

Principal Investigator: **Teresa D. King, MSN, APRN, ANP-C, GNP-BC, FNP-BC**

Instructions: In accordance with VHA Handbook 1058.05, "VHA Operations Activities That May Constitute Research", VASTLHCS employees may conduct certain operations activities which may or may not constitute research. Whenever the research versus non-research status of an operations activity may be in question, a determination of the status must be made. Please reference the VHA Operations Activities that May Constitute Research decision tree for an overview of how a decision between research and non-research activities is determined.

Examples of operations activities include activities designed for internal VA purposes, including routine data collection and analysis for operational monitoring, evaluation and program improvement purposes, VHA system redesign activities, patient satisfaction surveys, case management and care coordination, policy and guidance development, benchmarking activities, Joint Commission visits and related activities, medical use evaluations, business planning and development such as cost-management analyses, underwriting, and similar activities.

Please submit this form to the VASTLHCS Research Office by sending a signed copy by email to Jamie.Ray@va.gov or via fax to 314-289-7009.

Project Title: Integration of Nurse Practitioner-Led Telemedicine Clinics: Improving Rural Veteran Healthcare Disparities	
Responsible Project Lead: Teresa D. King, NP	**Role Title: Student Investigator**
Department: Nursing	**Email: Teresa.king4@va.gov**
Are VASTLHCS nurses members of the project team? ☐No ☒Yes *If yes, once a determination is made, a copy of this signed form will be sent to the Evidence Based Practice Nursing Committee (send to: STLEvidenceBasedPractice@va.gov).*	

CONDITIONS TO BE CONSIDERED FOR DETERMINATION OF RESEARCH VS. NON-RESEARCH OPERATIONS		
NOTE: If answers to questions 1 through 10 are marked **"TRUE"** the project is more than likely not research. For answers that are marked "false," please provide an explanation in the text fields below regarding how this project may still be QA/QI or contact the RDC Administrator, Jamie Ray, at 314-289-6333 for guidance.	**TRUE**	**FALSE**
1) The project is designed and/or implemented for internal VA purposes in support of the VA mission(s).	x	

VASTLHCSRE.QIQA.V1

Department of Veterans Affairs
St. Louis Health Care System

Form Q
Quality Assurance or Quality Improvement Research Determination

Title of Study: Integration of Nurse Practitioner-Led Telemedicine Clinics: Improving Rural Veteran Healthcare Disparities

Principal Investigator: **Teresa D. King, MSN, APRN, ANP-C, GNP-BC, FNP-BC**

ACOS/R&E secondary review comments, if applicable:

ACOS Research & Education Determination

This study as presented to the ACOS on the date of this form has been determined to be:

☐ Research ☒ Quality Improvement

VASTLHCS ACOS/R&E Signature:

X

VASTLHCS ACOS/R&E

Any project alteration after the signature date above that might change the status of this determination must be re-submitted for re-evaluation.

UMKC School of Nursing and Health Studies

July 17, 2019

DNP Project Proposal Approval
UMKC DNP Student

This letter serves to provide documentation regarding Teresa King's Doctor of Nursing Practice (DNP) project proposal. Ms. King obtained approval for her proposal, *Assessing Rural Veteran Satisfaction and Outcomes with Nurse Practitioner-Led Telemedicine Visits,* from the School of Nursing and Health Studies DNP faculty on July 17, 2019.

If we can provide further information, please feel free to contact us.

Sincerely,

Cheri Barber, DNP, RN, PPCNP-BC, FAANP
Clinical Assistant Professor
DNP Program Director
UMKC School of Nursing and Health Studies
barberch@umkc.edu

Lyla Lindholm, DNP, ACNS-BC
UMKC MSN-DNP Program Coordinator
Clinical Assistant Professor
DNP Faculty

UNIVERSITY OF MISSOURI-KANSAS CITY
2464 Charlotte • Kansas City, MO 64108-2718 • p 816 235-1700 • f 816 235-1701
www.umkc.edu/nursing • nurses@umkc.edu

Appendix G

Logic Model for DNP Project

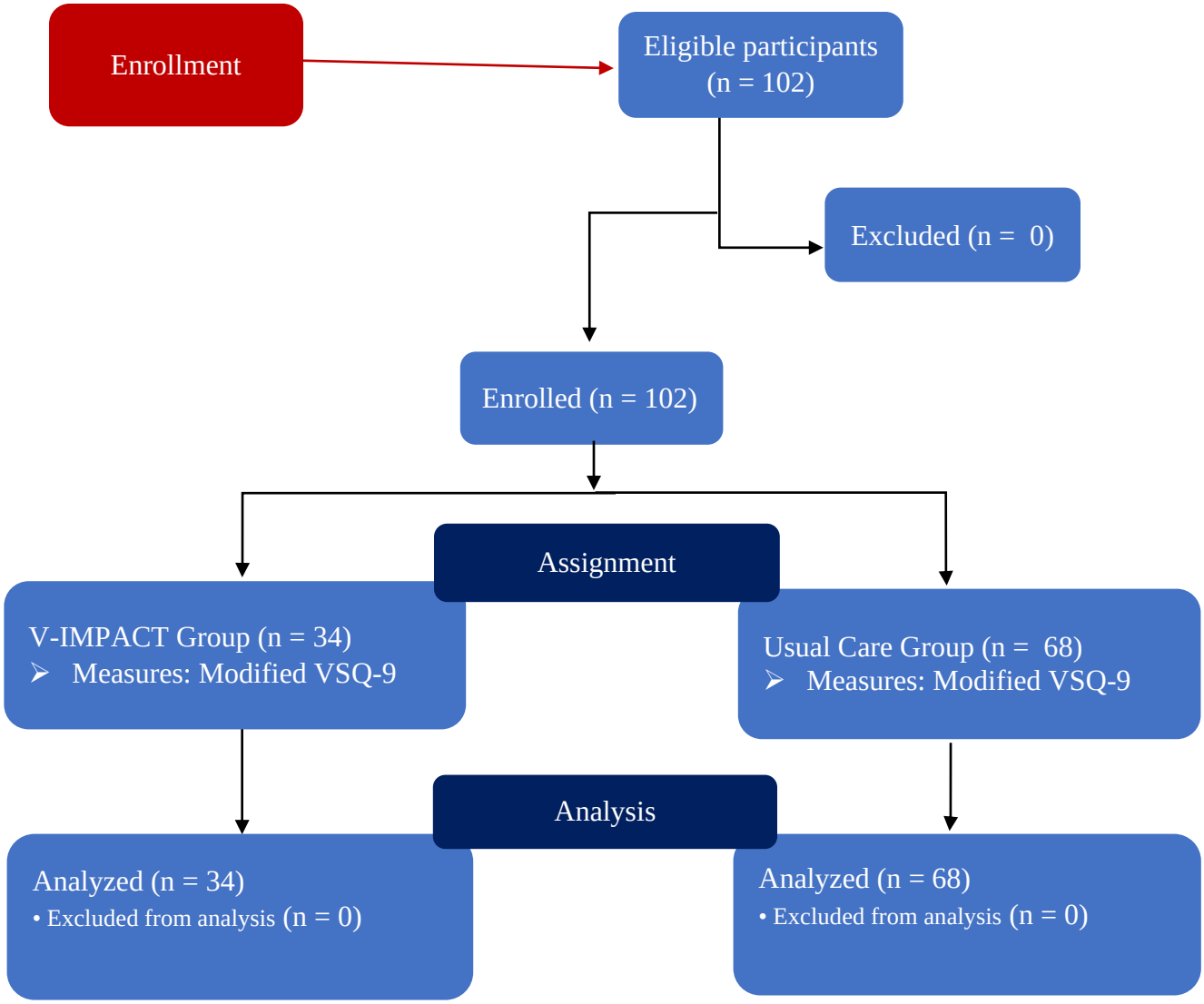
Student: Teresa King

PICOT Question: In the rural VA patient population does the addition of Nurse Practitioner-led primary care TM clinics compared to usual face-to-face (FTF) visits provide equivalent or improved patient satisfaction, management of essential hypertension and/or type 2 diabetes mellitus, and access, in VA primary care over a 6-month period in 2019 and 2020 at the VA VISN 15 TM hub and spoke sites.

Inputs	Intervention(s)	Outputs	Outcomes -- Impact		
Evidence, sub-topics 1) Access. 2) Chronic disease outcomes. 3) Patient satisfaction. **Major Facilitators or Contributors** 1) Preceptor. 2) DNP faculty. 3) VA TM hub and spoke sites. **Major Barriers or Challenges** 1) Two IRB approvals. 2) Survey approval. 3) Ancillary staff time constraints. 4) Enrollment.	**The EBP intervention which is supported by the evidence in the Input column** Integration of TM into primary care clinics. **Major steps of the intervention** 1. Training of study staff. 2. Completion of patient satisfaction questionnaire at end of TM or FTF appointments after verbal consent. 5. Collect data: blood pressure and HbA1c measurements at baseline, 3 and 6 months, and wait times at baseline. 6. Close study enrollment after one calendar month enrollment period or 64 enrolled in each group, whichever occurs first. 7. Analyze data.	**The participants (subjects)** VA patients at rural outpatient primary care clinics. **Site** VA VISN 15 TM hub and spoke sites. **Time Frame** Six months: Fall 2019 to Spring 2020. **Consent Needed** Verbal. **Person(s) collecting data** Student investigator, VA TM teamlet staff, and TM hub staff. **Others directly involved** VA TM teamlet staff and TM hub staff.	**(Completed as a student). Outcome(s) to be measured with reliable measurement tool(s)** At baseline: 1) Patient satisfaction: Modified VSQ-9 patient satisfaction tool for TM clinics and FTF groups. 2) Access: Direct comparison of wait times of TM and UC groups. At baseline, 3 and 6 months: 2) Chronic disease outcomes: Direct comparison of SBP, DBP, and HbA1c of TM and UC groups. **Statistical analysis to be used.** -Mann Whitney U. -Independent sample t-test. -Descriptive analysis. -Pearson coefficient.	**Outcomes to be measured (past DNP student time).** 1) Direct and in-direct cost savings. 2) Patient satisfaction of TM clinics.	**Outcomes that are potentials (past DNP student)** Chronic disease management/outcomes: 1) Heart failure management. 2) Asthma and COPD management. 3) Hyperlipidemia management. 4) Weight management. 5) Mental health management. 6) Smoking cessation.

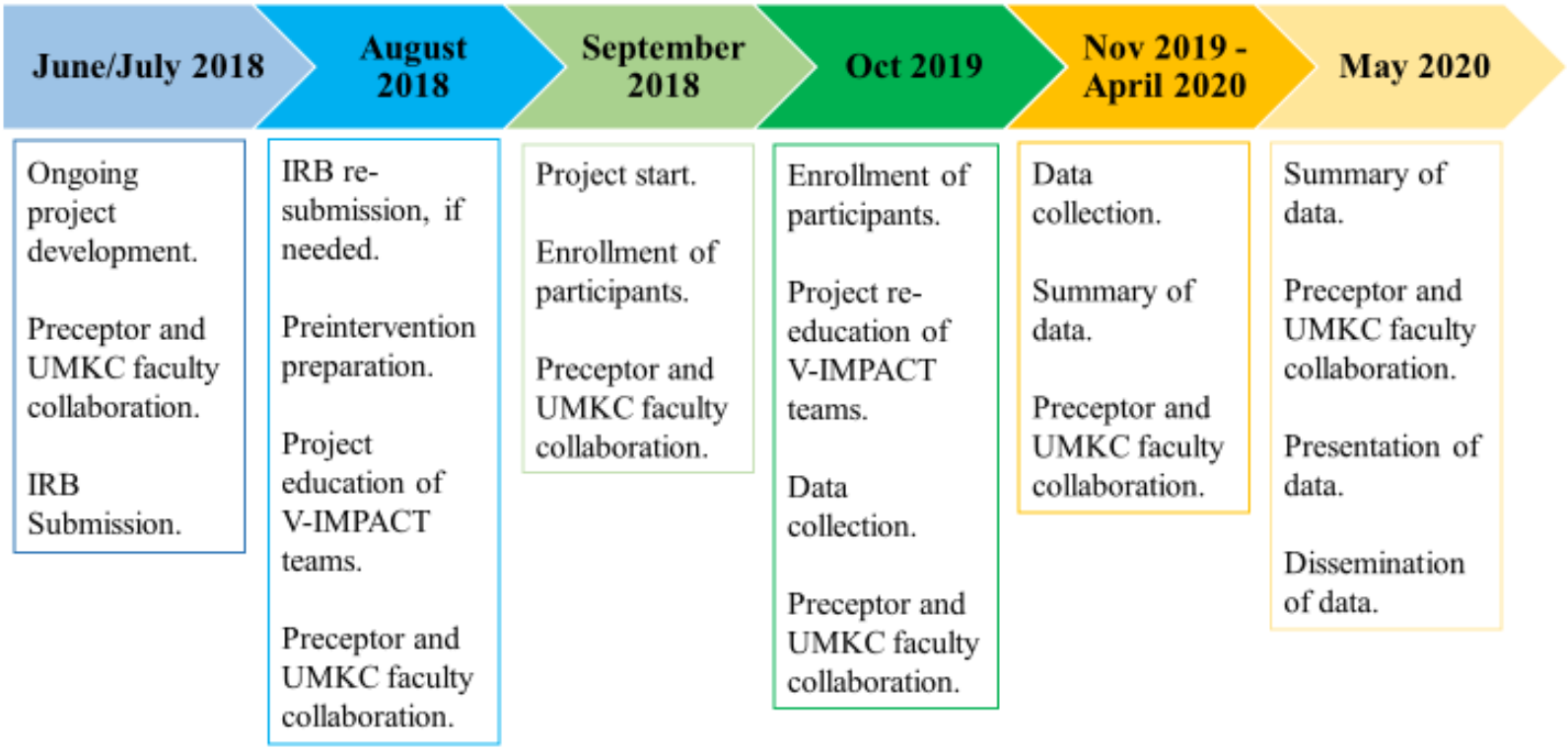
Appendix H

Intervention Flow Diagram



Appendix I

Project Timeline



Appendix J

Patient Satisfaction Questionnaire

Telehealth Visit

Demographics:

Circle your age range:

18-25	26-30	31-35	36-40	41-45	46-50	51-55
56-60	61-65	66-70	71-75	76-80	81-85	86+

Circle your gender:

Male Female

Circle your race:

White	Black or African American	Hispanic or Latino (any)	Two or more races	Asian
Some other Race	American Indian and Alaskan Native	Native Hawaiian and Other Pacific Islander		

Circle your highest level of education completed:

Did not graduate High School	High School Graduate or GED	Associates Degree	Trade School Graduate
Bachelor's Degree	Master's Degree	Post-Master's	Doctorate

How many miles do you live from the VA Outpatient Clinic: _____ miles

Have you ever completed a video conferencing medical appointment in the past? Yes / No

Have you ever used your cell phone or home computer for video calls (FaceTime, Skype, Zoom, Other) in the past? Yes / No

Questionnaire instructions:

When thinking about your visit with your Nurse Practitioner provider today, how would you rate the following:

Modified VSQ-9 Questionnaire

1. How long you waited to get an appointment?	Excellent	Very Good	Good	Fair	Poor

2. Convenience of the office location?	Excellent	Very Good	Good	Fair	Poor
3. Explanation of how the video telehealth technology would work?	Excellent	Very Good	Good	Fair	Poor
4. Technical skills (thoroughness, carefulness, competence) of your check-in nursing staff?	Excellent	Very Good	Good	Fair	Poor
5. The personal manner (courtesy, respect, sensitivity, friendliness) of your check-in nursing staff?	Excellent	Very Good	Good	Fair	Poor
6. Once checked-in, the length of time waiting for your provider?	Excellent	Very Good	Good	Fair	Poor
7. Time spent with your provider?	Excellent	Very Good	Good	Fair	Poor
8. Explanation of what was done for you?	Excellent	Very Good	Good	Fair	Poor
9. Technical skills (thoroughness, carefulness, competence) of your provider?	Excellent	Very Good	Good	Fair	Poor
10. The personal manner (courtesy, respect, sensitivity, friendliness) of your provider?	Excellent	Very Good	Good	Fair	Poor
11. The sound quality of your visit?	Excellent	Very Good	Good	Fair	Poor
12. The visual quality of your visit?	Excellent	Very Good	Good	Fair	Poor
13. The privacy of your visit?	Excellent	Very Good	Good	Fair	Poor
14. Once your visit was complete, how clear was it to you on what your next steps were?	Excellent	Very Good	Good	Fair	Poor
15. Overall, how satisfied were you with your video telehealth visit?	Excellent	Very Good	Good	Fair	Poor

Reference: RAND Health Care (n.d.). Visit-Specific Satisfaction Instrument (VSQ-9), retrieved from https://www.rand.org/health/surveys_tools/vsq9.html

Thank you for taking the time to complete this survey.

Patient Satisfaction Questionnaire

Face-to-face Visit

Demographics:

Circle your age range:

18-25	26-30	31-35	36-40	41-45	46-50	51-55
56-60	61-65	66-70	71-75	76-80	81-85	86+

Circle your gender: Male Female

Circle your race:

White	Black or African American	Hispanic or Latino (any)	Two or more races	Asian
Some other Race	American Indian and Alaskan Native	Native Hawaiian and Other Pacific Islander		

Circle your highest level of education completed:

Did not graduate High School	High School Graduate or GED	Associates Degree	Trade School Graduate
Bachelor's Degree	Master's Degree	Post-Master's	Doctorate

How many miles do you live from the VA Outpatient Clinic: _____ miles

Questionnaire instructions:

When thinking about your LAST visit with your medical provider today, how would you rate the following (circle your response):

Modified VSQ-9 Questionnaire

1. How long you waited to get an appointment?	Excellent	Very Good	Good	Fair	Poor
2. Convenience of the office location?	Excellent	Very Good	Good	Fair	Poor
3. Technical skills (thoroughness, carefulness, competence) of your check-in nursing staff?	Excellent	Very Good	Good	Fair	Poor
4. The personal manner (courtesy, respect, sensitivity, friendliness) of your check-in nursing staff?	Excellent	Very Good	Good	Fair	Poor

5. Once checked-in, the length of time waiting for your provider?	Excellent	Very Good	Good	Fair	Poor
6. Time spent with your provider?	Excellent	Very Good	Good	Fair	Poor
7. Explanation of what was done for you?	Excellent	Very Good	Good	Fair	Poor
8. Technical skills (thoroughness, carefulness, competence) of your provider?	Excellent	Very Good	Good	Fair	Poor
9. The personal manner (courtesy, respect, sensitivity, friendliness) of your provider?	Excellent	Very Good	Good	Fair	Poor
10. The privacy of your visit?	Excellent	Very Good	Good	Fair	Poor
11. Once your visit was complete, how clear was it to you on what your next steps were?	Excellent	Very Good	Good	Fair	Poor
12. Overall, how satisfied were you with your visit?	Excellent	Very Good	Good	Fair	Poor

Reference: RAND Health Care (n.d.). Visit-Specific Satisfaction Instrument (VSQ-9), retrieved from https://www.rand.org/health/surveys_tools/vsq9.html

Thank you for taking the time to complete this survey.

Appendix K

SPSS Variable Collection Template

*TKing Data Set.sav [DataSet1] - IBM SPSS Statistics Data Editor

File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Age	Numeric	3	0	Age	None	None	6	Right	Nominal	Input
2	Gender	Numeric	1	0	Gender	{1, Male}...	None	8	Right	Ordinal	Input
3	Race	Numeric	1	0	Race	{1, White}...	None	8	Right	Ordinal	Input
4	Education	Numeric	1	0	Highest Level of Education	{1, Did not g...	None	8	Right	Ordinal	Input
5	Distance	Numeric	3	0	Home distance	None	None	8	Right	Nominal	Input
6	PriorTMexperience	Numeric	1	0	Prior Videoconnect Medical Appointment	{1, Yes}...	None	8	Right	Nominal	Input
7	PriorPersonalVid...	Numeric	1	0	Prior Personal Videocnnect Experience	{1, Yes}...	None	8	Right	Nominal	Input
8	BaselineTMSBP	Numeric	3	0	Baseline SBP TM Group	None	None	8	Right	Nominal	Input
9	ThreeMoTMSBP	Numeric	3	0	3-Mo SBP TM Group	None	None	8	Right	Nominal	Input
10	SixMoTMSBP	Numeric	3	1	6-Mo SBP TM Group	None	None	8	Right	Nominal	Input
11	BaselineUCSBP	Numeric	3	0	Baseline SBP UC Group	None	None	8	Right	Nominal	Input
12	ThreeMoUCSBP	Numeric	3	0	3-Mo SBP UC Group	None	None	8	Right	Nominal	Input
13	SixMoUCSBP	Numeric	3	1	6-Mo SBP UC Group	None	None	8	Right	Nominal	Input
14	BaselineTMDBP	Numeric	3	0	Baseline DBP TM Group	None	None	8	Right	Nominal	Input
15	ThreeMoTMDBP	Numeric	3	0	3-Mo DBP TM Group	None	None	8	Right	Nominal	Input
16	SixMoTMDBP	Numeric	3	2	6-Mo DBP TM Group	None	None	8	Right	Nominal	Input
17	BaselineUCDBP	Numeric	3	2	Baseline DBP UC Group	None	None	8	Right	Nominal	Input
18	ThreeMoUCDBP	Numeric	3	2	3-Mo DBP UC Group	None	None	8	Right	Nominal	Input
19	SixMoUCDBP	Numeric	3	2	6-Mo DBP UC Group	None	None	8	Right	Nominal	Input
20	BaselineTMA1C	Numeric	2	1	Baseline A1C TM Group	None	None	8	Right	Nominal	Input
21	ThreeMoTMA1C	Numeric	2	1	3-Mo A1C TM Group	None	None	8	Right	Nominal	Input
22	SixMOTMA1C	Numeric	2	1	6-MoA1C TM Group	None	None	8	Right	Nominal	Input
23	BaselineUCA1C	Numeric	2	1	Baseline A1C UC Group	None	None	8	Right	Nominal	Input
24	ThreeMoUCA1C	Numeric	2	1	3-Mo A1C UC Group	None	None	8	Right	Nominal	Input
25	SixMoUCA1C	Numeric	3	1	6-Mo A1C UC Group	None	None	8	Right	Nominal	Input
26	AccessTM	Numeric	3	0	AccessTM Group	None	None	8	Right	Nominal	Input
27	AccessUC	Numeric	3	0	Access UC Group	None	None	8	Right	Nominal	Input
28	Q1TM	Numeric	3	0	How long you waited to get an appointment	{0, Poor}...	None	8	Right	Scale	Input
29	Q2TM	Numeric	3	0	Convenience of the office location	{0, Poor}...	None	8	Right	Scale	Input
30	Q3TM	Numeric	3	0	Explanation of how the video telehealth tec...	{0, Poor}...	None	8	Right	Scale	Input
31	Q4TM	Numeric	3	0	Technical skills of your check-in staff	{0, Poor}...	None	8	Right	Scale	Input
32	Q5TM	Numeric	3	0	The personal manner of your check-in staff	{0, Poor}...	None	8	Right	Scale	Input
33	Q6TM	Numeric	3	0	Once checked-in, the length of time waitin...	{0, Poor}...	None	8	Right	Scale	Input
34	Q7TM	Numeric	3	0	Time spent with your provider	{0, Poor}...	None	8	Right	Scale	Input
35	Q8TM	Numeric	3	0	Explanation of what was done for your	{0, Poor}...	None	8	Right	Scale	Input
36	Q9TM	Numeric	3	0	Technical skills of your provider	{0, Poor}...	None	8	Right	Scale	Input
37	Q10TM	Numeric	3	0	The personal manner of your provider	{0, Poor}...	None	8	Right	Scale	Input
38	Q11TM	Numeric	3	0	The sound quality of your visit	{0, Poor}...	None	8	Right	Scale	Input
39	Q12TM	Numeric	3	0	The visual quality of your visit	{0, Poor}...	None	8	Right	Scale	Input
40	Q13TM	Numeric	3	0	The privacy of your visit	{0, Poor}...	None	8	Right	Scale	Input
41	Q14TM	Numeric	3	0	Once your visit was complete, how clear w...	{0, Poor}...	None	8	Right	Scale	Input
42	Q15TM	Numeric	3	0	Overall, how satisfied were you with your vi...	{0, Poor}...	None	8	Right	Scale	Input
43	Q1UC	Numeric	3	0	How long you waited to get an appointment	{0, Poor}...	None	8	Right	Scale	Input
44	Q2UC	Numeric	3	0	Convenience of the office location	{0, Poor}...	None	8	Right	Scale	Input
45	Q3UC	Numeric	3	0	Technical skills of your check-in staff	{0, Poor}...	None	8	Right	Scale	Input
46	Q4UC	Numeric	3	0	The personal manner of your check-in staff	{0, Poor}...	None	8	Right	Scale	Input
47	Q5UC	Numeric	3	0	Once checked-in, the length of time waitin...	{0, Poor}...	None	8	Right	Scale	Input
48	Q6UC	Numeric	3	0	Time spent with your provider	{0, Poor}...	None	8	Right	Scale	Input
49	Q7UC	Numeric	3	0	Explanation of what was done for your	{0, Poor}...	None	8	Right	Scale	Input
50	Q8UC	Numeric	3	0	Technical skills of your provider	{0, Poor}...	None	8	Right	Scale	Input
51	Q9UC	Numeric	3	0	The personal manner of your provider	{0, Poor}...	None	8	Right	Scale	Input
52	Q10UC	Numeric	3	0	The privacy of your visit	{0, Poor}...	None	8	Right	Scale	Input
53	Q11UC	Numeric	3	0	Once your visit was complete, how clear w...	{0, Poor}...	None	8	Right	Scale	Input
54	Q12UC	Numeric	3	0	Overall, how satisfied were you with your vi...	{0, Poor}...	None	8	Right	Scale	Input
55											
56											
57											

Data View Variable View

Appendix L

Participant Demographics			
	Telemedicine Group *n* (%)	**Usual Care Group *n* (%)**	**All Participants *n* (%)**
Age			
N	34	68	102
18-25	0	0	0
26-30	0	2	2
31-35	0	3	3
36-40	1	2	3
41-45	2	0	2
46-50	1	2	3
51-55	1	4	5
56-60	1	4	5
61-65	8	4	12
66-70	3	14	17
71-75	11	12	23
76-80	5	12	17
81-85	1	5	6
86+	0	4	4
Gender			
Male	30 (30)	59 (59)	89 (88)
Female	4 (4)	8 (8)	12 (12)
Race			
White	30 (29)	65 (64)	95 (93)
Black or African American	3 (3)	3 (3)	6 (6)
Hispanic or Latino (any)	0	0	0
Two or more races	0	0	0
Asian	0	0	0
Some other Race	0	0	0
American Indian and Alaskan Native	1 (1)	0	1 (1)
Native Hawaiian and other Pacific Islander	0	0	0
Education			
Did not graduate High School	4	9	13 (13)
High School Graduate or GED	21	39	60 (59)
Associates Degree	6	3	9 (9)
Trade School Graduate	0	5	5 (5)
Bachelor’s Degree	3	7	10 (10)
Master’s Degree	0	4	4 (4)
Post-Master’s	0	0	0
Doctorate	0	0	0

Appendix L (continued)

Other Participant Characteristics			
	Telemedicine Group (*n* = 34)	**Usual Care Group (*n* = 68)**	**All Participants**
Distance-Mean Mileage to Clinic	24.38	26.03	25.46
Prior Telemedicine Experience	13	*n/a*	*n/a*
Prior Personal Experience with Video Conferencing on Personal Device	5	*n/a*	*n/a*

Appendix M

Patient Satisfaction

Question	Mean Scores * TM Group *n* = 33**	Mean Scores * UC Group *n* = 68	Comparison *t* ***	*df*	*P* Value *(2-tailed)*
How long you waited to get an appointment	84.09	86.4	-.650	67.657	.518
Convenience of the office location	80.30	83.21	-.662	73.307	.510
Explanation of how the video telehealth technology would work	84.68	NA	NA	NA	NA
Technical skills of your check-in staff	89.84	91.54	-.510	62.848	.612
The personal manner of your check-in staff	93.18	93.38	-.065	64.941	.948
Once checked-in, the length of time waiting for your provider	81.82	84.93	.765	64.519	.447
Time spent with your provider	88.64	89.18	-.151	66.846	.881
Explanation of what was done for you	89.06	88.06	-.285	70.710	.777
Technical skills of your provider	88.64	91.42	-.837	66.005	.406
The personal manner of your provider	91.41	92.91	-.473	58.456	.638
The sound quality of your visit	86.36	NA	NA	NA	NA
The visual quality of your visit	89.39	NA	NA	NA	NA
The privacy of your visit	90.91	92.28	-.434	61.251	.666
Once your visit was complete, how clear was it to you on what your next steps were	90.15	89.71	.131	71.656	.896
Overall, how satisfied were you with your visit	87.50	91.54	-1.010	45.661	.318

*Calculated from items rated on a 5-point Likert Scale (100=excellent, 75=very good, 50=good, 25=fair, and 0=poor).
** One telemedicine participant only completed demographics and no satisfaction questions.
***Equal variances not assumed.

Appendix N

Chi-Square Test for Association

	TM and UC Groups		Age		Gender		Race		Education Level	
	Likelihood Ratio	Cramer's V	Likelihood Ratio	Cramer's V	Likelihood Ratio	Cramer's V	Likelihood Ratio	Cramer's V	Likelihood Ratio	Cramer's V
How long you waited to get an appointment	.363	.143	.380	.342	.523	.116	.687	.100	.271	.220
Convenience of the office location	.438	.187	.350	.364	.051	.348	.931	.108	.513	.222
Explanation of how the video telehealth technology would work	NA	NA	.141	.627	.493	.166	.657	.166	.115	.362
Technical skills of your check-in staff	.653	.116	.389	.423	.391	.116	.914	.108	.688	.221
The personal manner of your check-in staff	.725	.102	.714	.378	.337	.185	.898	.123	.889	.154
Once checked-in, the length of time waiting for your provider	.395	.173	.499	.344	.444	.157	.869	.103	.893	.141
Time spent with your provider	.798	.084	.825	.359	.220	.219	.951	.083	.934	.149
Explanation of what was done for you	.738	.098	.700	.359	.512	.121	.942	.086	.867	.207
Technical skills of your provider	.435	.157	.733	.361	.091	.219	.870	.117	.888	.200
The personal manner of your provider	.802	.068	.617	.330	.017	.310	.449	.117	.745	.166
The sound quality of your visit	NA	NA	.026	.671	.745	.147	.678	.185	.083	.385
The visual quality of your visit	NA	NA	.133	.601	.560	.173	.281	.293	.068	.392
The privacy of your visit	.835	.060	.367	.354	.135	.198	.816	.091	.903	.141
Once your visit was complete, how clear was it to you on what your next steps were	.774	.090	.222	.462	.426	.172	.947	.087	.382	.303
Overall, how satisfied were you with your visit	.101	.257	.430	.447	.395	.106	.317	.156	.556	.240