Telehealth Throughout COVID-19: Patient's Perceived Barriers in Diabetes Management

Monique Barte

OHSU School of Nursing

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Abstract

The gravity of the COVID-19 pandemic and need for social distancing made many primary health care clinics shift their delivery of care from office visits to virtual or telephone visits, collectively known as telehealth. Prior to the pandemic, telehealth use in these settings was virtually nonexistent. However, with the rapid number of cases and deaths increasing throughout the world, organizations had to rapidly integrate telehealth use into the clinic setting without the necessary pilot studies on how to best utilize this technology for patients. This capstone project assesses the barriers with telehealth for patients with type 2 diabetes at a family medicine clinic in the Pacific Northwest 2 years into the pandemic. Implementation of the telehealth usability questionnaire (TUQ) allowed for a comprehensive evaluation of the usefulness, learnability, interface and interaction quality, reliability, and satisfaction with telehealth use. The responses of the survey resonated with many literature findings such as a strong agreement with the usefulness, learnability and interface and interaction quality. Patients did not perceive telehealth to be as reliable as office visits. Qualitative questions discussing barriers for telehealth in diabetes care suggested that patients worry about the quality of their physical examination and may not get the rapport they desire with the provider. Other qualitative barriers include concerns about breaches in confidentiality, no labs available, and no place to input glucose and exercise results.

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1 Introduction

1.1 Problem Description

Type 2 diabetes is a chronic condition affecting 9.7% of the total United States population (Xu et al., 2018). The total cost of diagnosed diabetes in 2017 was $327 billion, including $237 billion in direct medical costs and $90 billion in reduced productivity (American Diabetes Association [ADA], 2018). Complications arising from type 2 diabetes include increased risk of cardiovascular disease, cancer, and all-cause mortality, as well as micro- and macrovascular complications (Xu et al., 2018). Mitigating risks through education and complications associated with this disease process is pivotal in primary care management to promote patient self-management and blood sugar monitoring via hemoglobin A1c (HbA1c) (So & Chung, 2018). Patient diabetes self-management includes medication education, checking blood sugar regularly, nutrition education, physical activity, and learning to cope with other diabetes symptoms such as fatigue, pain, hyper/hypoglycemia, stress, and mental illness.

Usage of telehealth in the primary care setting has been shown to improve HbA1c and healthcare access in patients with type 2 diabetes (So & Chung, 2018). Additionally, the ongoing COVID-19 pandemic has compounded the need and usefulness of video/telephone modalities in diabetes management due to self-isolation and social distancing requirements (James et al., 2021). However, patient barriers such as cost, level of education, and computer literacy have limited the success of remote health interventions (Scott Kruse et al., 2018). Therefore, identifying and addressing these barriers when considering telehealth for diabetes management are essential.

1.2 Available knowledge

Telehealth is the delivery of healthcare services using information and communication technologies to diagnose, treat and prevent disease and injury (Kruse et al., 2017). These technologies include telephone, video-conference, and internet-based applications to deliver health information over a distance. In response to the COVID-19 pandemic, federal agencies have encouraged the use of telehealth through increased regulation and funding (Contreras et al., 2020; James et al., 2021). Widespread implementation of this new service model has thus been a means of providing increased access to healthcare services in rural and remote areas (Cortelyou-Ward et al., 2020; Speyer et al., 2018).

The cornerstone of type 2 diabetes management is the control of glycemia to reduce the risk of long-term complications associated with this disease process (Davies et al., 2018). Adequate glycemic control requires constant monitoring of HbA1c and care delivery in the context of diabetes self-management education and support (DSMES). With the usage of telehealth in diabetes management, improvement of HbA1c and diabetes self-management have been widely noted as outcomes (Eberle & Stichling, 2021; Lee et al., 2017, So & Chung, 2018) and should continue to be integrated into the primary care setting.

Patient barriers for implementation of telehealth for type 2 diabetes management include technology illiteracy (discomfort with technology), health illiteracy, or patients desire for in-person contact with a provider (perceived lack of confidence and comfort with telehealth) design barriers of the technological interface, such as lack of customization to patient preferences and needs (Alvarado et al., 2017, Kruse et al., 2018). Other barriers stem from accessibility, such as patients not having the required technology, cost of technology, or limited internet access in the area (Alvarado et al., 2017).

1.3 Rationale

Telemedicine usage has exponentially increased due to the ongoing COVID-19 pandemic and lifted restrictions via the CARES Act. As more clinics begin to implement this technology, addressing the patient barriers associated with this interface to manage chronic diseases like type 2 diabetes needs to be well studied to determine the best utilization of this virtual care delivery system. While there is a general consensus to support telemedicine use, especially in the context of specialty care, this is a new technology for many primary care offices. Patients are expected to have their diabetic foot exams completed, get blood draws, and undergo diabetes self-management education and support with each visit. Therefore, investigating the barriers associated with telemedicine in this population is worthwhile as patients are still held to the same standard to prevent disease complications and manage blood glucose levels. The Technology Acceptance Model (TAM) will be used as a theoretical framework for this project, as it has been shown to support investigation of both telemedicine usability and individual attributes relating to use (Cortelyou-Ward et al., 2020; Harst, 2019; Speyer et al., 2018; Wade, Gray, & Carati, 2017).

1.4 Specific aims

The purpose of this project was to explore patient experiences regarding telemedicine for diabetes management in the context of increased telemedicine utilization due to Covid-19. The project took place at a primary care health clinic to potentially identify specific barriers related to this care delivery approach that can then be further researched and/or addressed in the clinical setting.

2.Methods

2.1Context

The clinical project took place in a primary care health clinic in Hillsboro, Oregon. The clinic is part of the larger health system of Oregon Health and Science University (OHSU), a large urban academic center. Telehealth was defined as either scheduled telephone or synchronous two-way video visits.

2.2 Interventions

The Telehealth Usability Questionnaire (TUQ) (see appendix C) has 21 items that are based on six different domains of telehealth usage (Hajesmaeel-Gohari & Bahaadinbeigy, 2021; Parmanto et al., 2016; Weaver et al., 2021). This survey explores the communication modality and human experience with communication from the patient perspective. The TUQ questions were copied to a Qualtrics survey platform to maintain anonymity of each patient. At the bottom of the survey, there were two open-ended questions regarding telehealth visits. The first question asked, "What is the biggest barrier with telehealth use in caring for your type 2 diabetes?" The second question asked, "What would you recommend to address these barriers?" The survey was disseminated via phone calls. The researcher read the questions to participants and recorded responses on Qualtrics.

Participants were identified through an Excel generated report given to the researcher from the clinical pharmacist at Orenco station. The report listed all patients with type 2 diabetes. From this list, the researcher did manual retrospective chart reviews on EPIC. For each chart, encounter type data was filtered to include "telemedicine," "telephone-scheduled," or "video/telehealth-scheduled" to identify all telehealth visits since March 17, 2020. Those with

any telehealth visits that included an ICD code of type 2 diabetes were considered eligible for participation in this study.

2.3 Study of the Interventions

The TUQ was disseminated to each primary care patient with a diagnosis of type 2 diabetes in their history that has utilized a telehealth modality for diabetes management since March 27, 2020. March 27, 2020 was chosen as the time range since this is when the Centers for Medicare and Medicaid Services expanded its telehealth rules to allow equal reimbursement for in-person visits due to the pandemic, thus allowing increased usage of this modality. Telehealth was defined as "telephone-scheduled" or "video/telehealth-scheduled" appointments. Based on these inclusion criteria, 47 individuals were identified as eligible participants for the study.

2.4 Measures

The TUQ survey was modified to include demographic information such as age, race, gender, highest level of education, and type of internet access. Data was gathered via Qualtrics platform through phone call dissemination. Constructs measured through this survey include usefulness, ease of use and learnability, interface quality, interaction quality, reliability and effectiveness, and satisfaction (Weaver et al., 2021). Each item was then ranked using a 5-point Likert scale with 1 indicating strongly disagree and 5 indicating strongly agree. This questionnaire was chosen not only because it can be used to evaluate the patient perspective, but also because of its strong content validity and reliability (Parmanto et al., 2016).

2.5 Analysis

2.5.1. Quantitative data-patient surveys

A total of 21 patients (mean age 52.8) completed the survey with a response rate of 45%. Respondents were 71% Caucasian, 5% Hispanic, 14% Asian, and 10% identified as other. 86% reported at least some college or higher and 100% of sample size use broadband.

Participants reported usability of telehealth on a 5-point Likert scale ranging from strongly disagree (1), somewhat disagree (2), neither agree or disagree (3), somewhat agree (4), and strongly agree (5). There was overall general acceptance and minor variation in usability of telehealth at 4.21 (SD=1.03) with highest mean scores of time saved traveling to a hospital or clinic (M=4.70), ease of talking to the provider (M=4.52), and productivity with using the system once logged on (M=4.61).

There was overall neutrality in preferences regarding telehealth as the same as in-person visits (M=3.17, SD= 1.61), with high variability explained by 28.6% (n=6) indicating in-person visits are superior while 38% (n=8) responding with a strong preference to telehealth visits, suggesting that patient preference is potentially an important factor in determining telehealth utilization. Additionally, there was a neutrality in overall responses with the domain measuring reliability (3.42, SD=1.23). This may be attributed to the neutrality in responses regarding in-person vs. telehealth visits as mentioned previously, and uncertainty of whether the system gave errors when technical issues ensued (M=3.09, SD=1.08).

There was slight agreement and little variation when asked about usefulness of telehealth (M=4.45, SD=0.8), ease of use and learnability (M=4.40, SD=0.90), interface quality (M=4.37, SD=1.00), interaction quality (M=4.39, SD=1.08) and satisfaction (M=4.25, SD=1.185) suggesting that telehealth is generally accepted as an adjunct to in-person care for patients with diabetes.

Regarding feeling safer with telehealth use during the COVID-19 pandemic, patients' responses showed general acceptability and slight variation (M=4.26, SD= 1.10) suggesting that this modality for healthcare visits have eased some anxiety surrounding social distancing and potentially contracting the virus, while still being able to see their provider.

2.5.2. Qualitative data-patient surveys

Common themes were discussed regarding what were the biggest barriers for participants diabetes care with telehealth. "Still having to come in for labs" or "no physical examination" were the most common responses. Some participants had a difficult time describing skin changes to the provider through these visits. Additionally, scheduling for the lab can be difficult if the patient is not already in the clinic due to limited availability. One participant reported that there is no exercise or activity log to document blood sugars or physical activity levels, which takes time away from the physician encounter to convey these results. Two other respondents discussed the relationship between them and the provider seemed more impersonal through the use of telehealth visits. Additionally, when providers do not disclose who is in the room during the visit, it can make the patients feel uncomfortable and not be as open to answering questions truthfully.

2.6 Ethical Considerations

As telemedicine use becomes more pervasive, health inequities may persist in those that are not able to afford coverage, those that are not tech savvy, or those with disabilities who are unable to use this modality. Additionally, this intervention took place in a clinic that is located in a well-developed, affluent area of Oregon and thus, may have neglected those living in rural areas with limited access to high-speed internet and bandwidth and those of lower socioeconomic status. This project also limited the sample size to those of English speakers and

neglected to identify the telehealth barriers that are inherent with non-English speakers, such as the availability of interpreters.

3 Results and Challenges

Multiple iterations of the project were in discussion with clinic leadership on how to disseminate the TUQ to participants. The original intention was to send the survey link to eligible participants via MyChart. However, according to the office managers at the clinic, only patient-related care can be discussed through MyChart and the survey would not fit the appropriate criteria. Secondly, it was discussed the primary researcher would come to the clinic weekly and identify the eligible patients for the study to have them fill out the survey after provider visits. Due to workflow issues, it was determined that it would not be feasible to have the patients fill out the surveys in the clinic. The office managers felt the primary researcher would get the most data using the clinic phones to conduct phone surveys, and thus that is how this project method came to fruition.

Eligible participants were called on the phone during variable time periods over a 3-day period. On day 1, all 44 participants were called from 8AM-12PM where a total of 12 responses were collected. On day 2, those that did not answer their phones were called again from 12PM-4PM where a total of 4 other responses were collected. On day 3, the remaining participants were again called from 4PM-8PM where a total of 5 responses were collected

Unintended consequences and missing resulted from poor communication between the clinic staff and the researcher. For participants who did not answer their phones, a voicemail with the clinic phone number was left for the participants to call back. However, the clinic's phone number would call the front desk when participants would attempt to reach the number and would ask for the primary researcher. Without knowledge of the primary researcher's name,

the front desk did not inform one patient that there was a project occurring at the clinic, which ultimately caused the patient to not participate in the study. Additionally, due to limited office space, there was another instance where the researcher had to end a survey response half-way through the questionnaire due to having to relocate desks. The limited sample response rate may have contributed to factors such as limited time and patient's work schedules, which ultimately affected their ability to answer their phones. Additionally, there was one respondent with a full voicemail, which inhibited the researcher from leaving a call back phone number.

The results of this project were shared with the clinic. Immediate measures that the clinic can take to improve barriers to telehealth use in those with type 2 diabetes include disclosing individuals sharing the provider room and consulting with the information technology department to come up with an area of the electronic health record where patients can input at home blood sugar results or exercise logs. Long term solutions for telehealth improvement may also include ensuring displayed error messages when patients have issues troubleshooting telehealth visits to improve reliability.

4 Discussion

4.1 Summary

This project sought to assess barriers to telehealth use in those with type 2 diabetes during the COVID-19 pandemic. The rapid implementation of telehealth use into the primary care setting was exponential as the number of telehealth appointments between March 2, 2020 and April 14, 2020 increased by 683% (Hawrysz et al., 2021). The desired outcome of this intervention was to determine the success of telehealth use for those with type 2 diabetes, recognize the limitations of the system, and offer future steps on improvement. Utilizing the Technology Acceptance Model (TAM) as a theoretical framework supported the investigation of

both telemedicine usability and individual attributes relating to use with the TUQ (Cortelyou-Ward et al., 2020; Harst, 2019; Speyer et al., 2018; Wade, Gray, & Carati, 2017). We were therefore able to get quantitative and qualitative data on patients, which will ultimately allow for improved quality of care with this modality.

4.2 Interpretation

The results of the TUQ survey were similar to the literature findings, although variation can be attributed to differences in sample size, survey dissemination methods, or time frame to complete the project. Most patients in this study had an overall acceptance regarding usability of telehealth, particularly with decreased travel time (Layfield et al., 2020; Rho et al., 2014; Waqar-Cowles et al., 2021). Likewise, the literature supports the lowest scored subscale of reliability due to the lower individualized scores of seeing providers as well as person and receiving error messages with the system (Macdonald et al., 2018; Waqar-Cowles et al., 2021,). Other barriers noted in this study that are reflective of the literature include the quality of the care received as some patients reported the inability of receiving a thorough physical examination and impersonal rapport with this system were limitations of use (Alvarado et al., 2017, Kruse et al., 2018). Additionally, one systematic review identifying telemedicine barriers of 30 different studies noted that 11% of the articles mentioned confidentiality and privacy issues such as breaches of personal health information, which was echoed by one of the participant's responses (Kruse et al., 2018). Because age-related barriers were also discussed throughout the literature from lack of exposure and training to these technologies, a correlation coefficient of individualized TUQ scores and ages were conducted (CC=0.22) and suggested that this study indicates a weak correlation between the variable (Kruse et al., 2018).

When asked about the safety of telehealth use surrounding the COVID-19 pandemic, patients in this study reported a higher response compared to previous results (Layfield et al., 2020). The differences in this response may be due to variation in wording such as "worried" (Layfied et al.,2020) indicating a more negatively framed response vs. "safety" (current study) indicating a more positively framed response.

4.3 Limitations

The small sample size of this study does not allow the results of this study to be generalizable to similar populations and therefore may not be statistically conclusive. No power analysis was conducted as time and resources limited the project to a convenient sample. Additionally, there was no differentiation between phone and virtual visits, which may cause bias in the results. Because many patients had done a mix of both types of telehealth visits, it would have limited the sample size even further to exclude one or the other in the inclusion criteria. Lastly, the use of phone surveys may have skewed participants' answers due to unfamiliarity with the researcher. The phone survey dissemination method also made it difficult to reach patients who may have had a full inbox, were not expecting a phone call, or were working during the hours called.

4.4 Conclusions

The COVID-19 pandemic re-shaped how health care is delivered in the United States with the use of telehealth in primary care facilities. Due to the gravity of the pandemic with the compounded need for social distancing, many organizations had to forgo the iterative processes to study the impacts telehealth use would have with certain populations. Beyond the intended decrease in viral transmission, telehealth has a variety of potential benefits for both patients and healthcare organizations. Now two years into the pandemic, it is crucial to continue assessing the

benefits and barriers to allow organizations how to best continue to utilize the technology for those with type 2 diabetes, who are at high risk for many comorbidities and require frequent follow-up.

Next steps for this project include collecting provider perceptions to telehealth barriers in those with type 2 diabetes. Additionally, it may also be useful to use the momentum of this project to develop a telehealth diabetes education class with pre- and post- test surveys and use of the TUQ.

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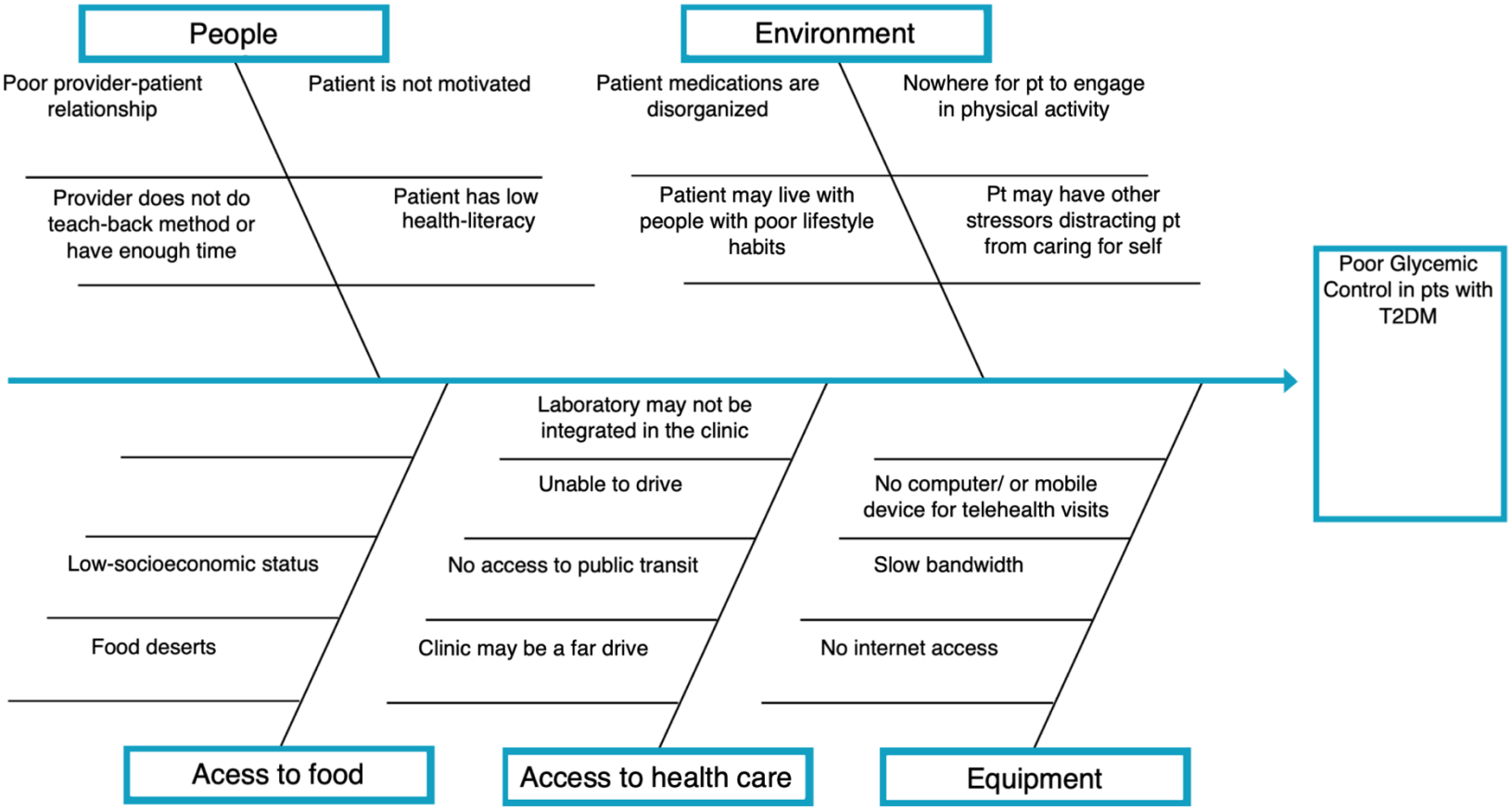
Appendix A: Project Timeline

	Jun	Jul	Aug	Sep	Oct	Nov	Dec-Mar
Finalize project design and approach (703A)				X			
Complete IRB determination or approval (703A)					X		
PDSA Cycle 1 (703B)						X	
PDSA Cycle 2 (703B)						X	
PDSA Cycle 3 (703B)						X	
Final data analysis (703B)							X
Write sections 13-17 of final paper (703B)							X
Prepare for project dissemination (703B)							X

Appendix B: Cause and Effect Diagram



Appendix C: Telehealth Usability Questionnaire

TELEHEALTH USABILITY QUESTIONNAIRE (TUQ)

#	Statements	N/A	1	2	3	4	5	6	7
1.	Telehealth improves my access to healthcare services.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
2.	Telehealth saves me time traveling to a hospital or specialist clinic.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
3.	Telehealth provides for my healthcare need.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
4.	It was simple to use this system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
5.	It was easy to learn to use the system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
6.	I believe I could become productive quickly using this system	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
7.	The way I interact with this system is pleasant.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
8.	I like using the system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
9.	The system is simple and easy to understand.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
10.	This system is able to do everything I would want it to be able to do.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
11.	I can easily talk to the clinician using the telehealth system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
12.	I can hear the clinician clearly using the telehealth system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
13.	I felt I was able to express myself effectively.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
14.	Using the telehealth system, I can see the clinician as well as if we met in person.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
15.	I think the visits provided over the telehealth system are the same as in-person visits.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
16.	Whenever I made a mistake using the system, I could recover easily and quickly.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
17.	The system gave error messages that clearly told me how to fix problems.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
18.	I feel comfortable communicating with the clinician using the telehealth system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
19.	Telehealth is an acceptable way to receive healthcare services.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
20.	I would use telehealth services again.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE
21.	Overall, I am satisfied with this telehealth system.	☐	DISAGREE	☐	☐	☐	☐	☐	☐	☐ AGREE

Appendix D: Clinical Letter of Support

Letter of Support from Clinical Agency

Date: *[10/17/2021]*

Dear Monique Barte,

This letter confirms that I, Mohammed Alyajouri allow Monique Barte (OHSU Doctor of Nursing Practice Student) access to complete his/her DNP Final Project at our clinical site. The project will take place from approximately November 1, 2021 to May 30, 2022.

This letter summarizes the core elements of the project proposal, already reviewed by the DNP Project Preceptor and clinical liaison (if applicable):

Project Site(s): OHSU Primary Care Clinic, Orenco Station. 6355 NE Cornell Rd Suite 100, Hillsboro, OR 97124

- **Project Plan: Use the following guidance to describe your project in a <u>brief</u> paragraph.**
  - Identified Clinical Problem:
    Barriers to telehealth use in those with uncontrolled type 2 diabetes.
  - Rationale:
    Telehealth is a relatively new modality in primary care and is expected to continue to be utilized in this setting. Exploring patient barriers with this technology will be essential for adequate management for type 2 diabetes.
  - Specific Aims:
    Explore patient experiences for diabetes management in the context of increased telemedicine utilization due to Covid-19.
  - Methods/Interventions/Measures:
    Phone surveys will be disseminated to gather data
    Data will be collected through qualtrics
  - Data Management:
    Surveys wills be anonymous with no identifying information.
    The Telehealth Usability Questionnaire will be disseminated through phone calls.
    This survey data will be collected using Likert scales.
  - Site(s) Support:
    The site agrees to provide space to conduct activities and retrieve patient data from site files.

During the project implementation and evaluation, Monique Barte will provide regular updates and communicate any necessary changes to the DNP Project Preceptor.

Our organization looks forward to working with this student to complete their DNP project. If we have any concerns related to this project, we will contact Monique Barte and Rebecca Martinez (student's DNP Project Chairperson).

Regards,

Mohamed Alyajouri	Practice Manager
DNP Project Preceptor	Job Title
Signature	11/10/2021
	Date Signed

Appendix E: IRB determination

NOT HUMAN RESEARCH

October 22, 2021

Dear Investigator:

On 10/22/2021, the IRB reviewed the following submission:

Title of Study:	Barriers to telehealth use in patients with uncontrolled type 2 diabetes
Investigator:	Rebecca Martinez
IRB ID:	STUDY00023692
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the HIPAA and Research website and the Information Privacy and Security website for more information.

Sincerely,

The OHSU IRB Office