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FROM THE FIELD

Virtual Prenatal and Postpartum Care Acceptability Among Maternity Care Providers

Genevieve Hofmann[1] · Karen Hampanda[1] · Margo S. Harrison[1] · Marcella Fasano[1] · Amy Nacht[1] · Molly Yeoman[1]

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Abstract

Introduction The Covid-19 pandemic and statewide stay-at-home orders abruptly impacted clinic operations necessitating the incorporation of telehealth. Uptake of telehealth is multifaceted. Clinician acceptance is critical for success. The aim of this study is to understand maternity care providers' acceptance of and barriers to providing virtual maternity care.

Methods Providers completed a baseline and 3-month follow up survey incorporating the validated implementation outcome measures, feasibility of intervention measure (FIM), intervention appropriateness measure (IAM), and acceptability of intervention measure (AIM).Statistical analyses evaluated differences between groups in this small convenience sample to understand trends in perceptions and barriers to telehealth. While not intended to be a qualitative study, a code tree was used to evaluate open-ended responses.

Results Baseline response rate 50.4% (n = 56). Follow-up retention/response-rate 68% (n = 38). Most reported no prior telehealth experience. 94% agreed with the FIM, decreasing to 92% at follow-up. 80% (prenatal) and 84% (postpartum) agreed with the IAM. Agreement with the AIM increased to 83%.Differences in the FIM and AIM found by division ($p < 0.01$) and years in practice ($p < 0.01$). Identified barriers included patient lack of essential tools, inadequate clinic support, and patients prefer in person visits. Themes that emerged included barriers, needs, and areas of success.

Discussion Telehealth was found to be feasible, appropriate, and acceptable across provider types and divisions. Improving patient/provider access to quality equipment is imperative. Future research must address how and when to incorporate telehealth.

Keywords Telehealth · Virtual health · Prenatal care · Postpartum care · Maternity care · Provider acceptability

Significance

Efforts to control the spread of COVID-19 necessitated the incorporation of virtual visits into maternity care. While incorporating virtual visits is safe, effective, and satisfactory to patients, telehealth has been largely underutilized in prenatal and postpartum care. The processes and impacts of introducing telehealth technologies are complex. Provider acceptance is key. There is a gap in the literature describing maternity care providers acceptance of telehealth. This study provides an opportunity to understand provider acceptance of and perceived barriers to incorporating virtual maternity care. Understanding provider acceptance can facilitate improvements to and continued uptake of these technologies.

Introduction

As the COVID-19 pandemic began to impact the United States, Colorado issued a statewide stay-at-home order significantly and abruptly impacting daily out-patient clinic operations necessitating the incorporation of virtual visits into prenatal and postpartum care essentially overnight. With guidance from the American College of Obstetrics and Gynecology and the Society for Maternal–Fetal Medicine a plan for incorporating virtual prenatal and postpartum visits was hastily adopted by obstetric providers at the University of Colorado School of Medicine (UCSOM) and College of

✉ Genevieve Hofmann
Genevieve.hofmann@cuanschutz.edu

[1] Department of Obstetrics and Gynecology, University of Colorado School of Medicine, 12631 East 17th Avenue, AO1, Room 4213, Mailstop B-198-2, Aurora, CO 80045, USA

Nursing (UCCON) (American College of Obstetrics and Gynecology, 2020).

Under the best of circumstances, the processes and impacts of introducing telehealth technologies are complex. While incorporating virtual visits into prenatal and postpartum care is safe, effective, and satisfactory to patients, telehealth had not been utilized for prenatal or postpartum care within the SOM, and only minimally used for lactation consultations and some postpartum care by CON faculty (Butler Tobah et al., 2019; Pflugeisen et al., 2016; Plugeisen & Mou, 2017).

The uptake of telehealth technologies is multifaceted. Clinician acceptance is critical for success (Wade et al., 2014). Clinician acceptance is impacted by concerns around decreased quality of care, technical issues, and increased workloads (Collier et al., 2016; Levy & Neil, 2013). It is unknown if these and potentially other factors have played a role in the non-adoption of telehealth into our practice pre-COVID-19.

Evidence suggests that provider experience with telehealth is positive (Donelan et al., 2019; Powel et al., 2018; Serwe, 2018). Within the existing literature, a gap exists in describing maternity care providers acceptance of telehealth technologies, specifically incorporating virtual visits into prenatal and postpartum care (DeNicola et al., 2020; Powell et al., 2018). The COVID-19 pandemic provides a unique opportunity to better understand and describe how maternity care providers are providing virtual care and how this may impact the future of prenatal and postpartum care delivery.

The aim of this study is to understand maternity care providers acceptance of providing virtual prenatal and postpartum care early in the pandemic. A secondary aim focuses on increasing adoption of virtual visits by assessing and addressing perceived barriers quickly.

Methods

Participants

This project took place at the University of Colorado, School of Medicine, Department of OB/GYN and the University of Colorado College of Nursing nurse midwifery practices in Aurora, Colorado from July 2020 through November 2020 early in the pandemic. This protocol had exempt approval from the Colorado Multiple Institutional Review Board (COMIRB #20-1534). All nurse practitioners (NPs), nurse midwives (CNMs), and faculty and resident physicians (MDs) who provide obstetric services were identified using faculty directories providing a convenience sample for this descriptive study. Sample size was not calculated. These providers were emailed a baseline and follow up survey utilizing the REDCap platform, assessing their acceptance of and barriers to providing prenatal and postpartum telehealth visits. Repeating the survey in three months, allowed for identification of persistent barriers that could be addressed quickly assuming some initial reluctance and technical issues would dissipate with use.

Survey Instruments

Recognizing that the effectiveness of any new intervention is directly linked to the acceptance of the intervention, this project is grounded in a multi-construct theoretical framework of acceptability (TFA). The validated implementation outcome measures, acceptability of intervention measure (AIM), intervention appropriateness measure (IAM), and feasibility of intervention measure (FIM), were incorporated into the frameworks' seven domains (Weiner et al., 2017). The domains are constructed to be prospective, concurrent, and retrospective and "may cluster or influence" each other. Due to the pandemic's abrupt onset, this study looks specifically at concurrent acceptability or the perceived acceptability while participating in the intervention. The AIM measure aligns with the domains affective attitude, perceived effectiveness, and self-efficacy, the IAM measure with ethicality and opportunity costs, and the FIM with burden and intervention coherence (Fig. 1); (Sekhon et al., 2017). The telehealth usability questionnaire (TUQ) guided the creation of survey questions incorporating closed and one open-ended question (Parmanto et al., 2016). See Appendix for survey example. Pretesting of the survey was conducted using a small focus group of five maternity care providers to ensure clarity and ease of use. The survey took less than five minutes to complete. These responses were not analyzed.

Data Collection

Utilizing the REDCap platform, the baseline survey was emailed to 111 maternity care providers in the midwifery, generalist, and maternal–fetal medicine (MFM) services. Non-responders received up to five reminder emails within one month. The final response rate was 50.4% (n = 56). Five providers had not provided telehealth services and were ineligible for the remaining survey questions. Respondents were adequately represented by division and provider type. Responders to the first survey (n = 56) were sent a follow up three months later with a final response rate of 68% (n = 38).

Demographic information was collected including provider type, practice division, years in practice, and previous experience providing telehealth (Table 1). Participants were queried about perceived barriers and given an opportunity to

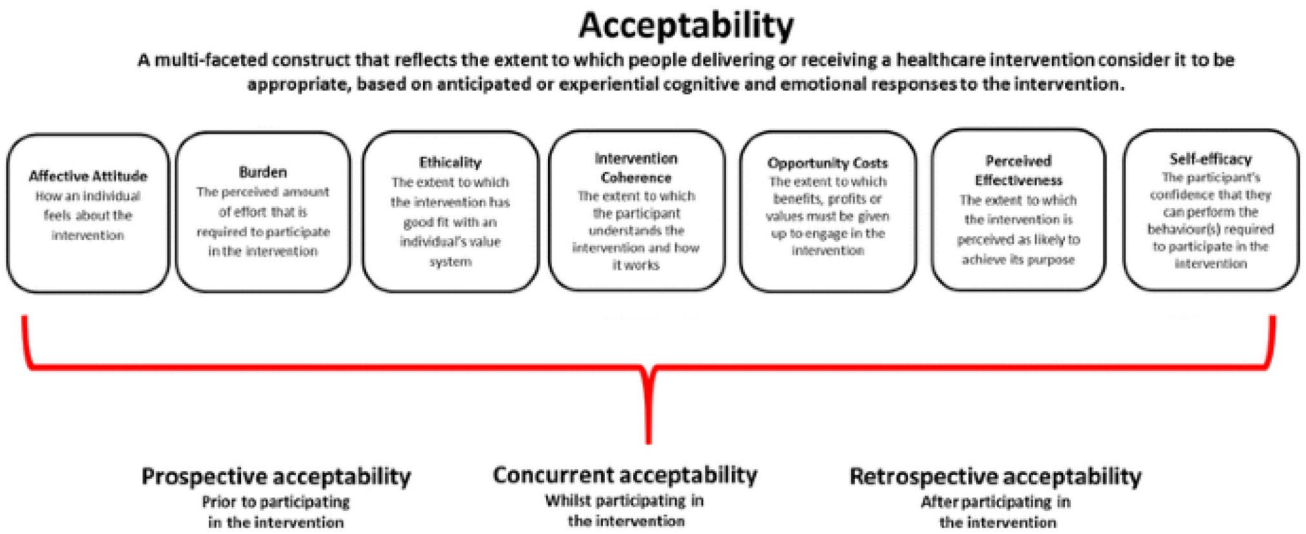

Fig. 1 The theoretical framework of acceptability by Sekhorn et al. (2017)

Table 1 Survey participants

	Initial survey n = 51	Follow up survey n = 38
Provider type		
MD	27 (53%)	19 (50%)
NP	3 (6%)	3 (8%)
CNM	18 (35%)	14 (37%)
Not reported	3 (6%)	2 (5%)
Division		
Generalist	25 (50%)	20 (53%)
MFM	8 (16%)	7 (18%)
CNM practices	17 (32%)	11 (29%)
Not reported	1 (2%)	None
Years in practice	11 years (SD 9.86)	13 years (SD 9.79)

share their experiences with telehealth within a free text box providing qualitative data for thematic evaluation.

Data Analysis

Measures of frequency were used to describe survey participants. Percent agreement was calculated using a 4-point Likert scale. The responses agree/strongly agree were coded as agreement and disagree/strongly disagree were coded as disagreement. The Chi-square test for independence and independent samples t-tests were used to evaluate differences between groups and understand trends in perceptions and barriers to telehealth. For all analyses, we used listwise deletion and dropped any case from an analysis if there was a missing value in at least one of the specified variables. The baseline and follow-up surveys included the free text question, *Any additional information you would like to share about your experience providing telehealth*. This question garnered more response than anticipated, and while not intended to be a true qualitative study, a code tree was created to evaluate open-ended responses.

Results

Seventy-five percent (n = 42) of surveyed providers at the UCSOM and UCCON reported that they had never provided virtual prenatal or postpartum care prior to March 2020. After Colorado's stay-at-home order was enacted, 91% (n = 51) reported using telehealth. Providers reported using their personal cell phones or tablets (n = 41) and personal computers (n = 28) to provide prenatal and postpartum telehealth visits on average four days per months (SD 3.65). Three months later, providers reported conducting fewer telehealth visits, averaging about two days per month (SD 2.75). Only 5% (n = 3) reported using employer provider cell phones, tablets, or laptops. This decrease along with limited employer provided telehealth tools suggests that the perceived amount of effort required to participate in the intervention, the domain Burden, was high and supported by statements like "There are too many technical and logistical issues to make this an effective use of time, at least until there are more rooms set up to be used for telehealth visits." Concerns around technical issues and potential workload increase, are consistent with previously identified barriers.

At both survey points, the top barriers identified by respondents were essentially the same including patient lack of essential tools, inadequate clinic support, and patients

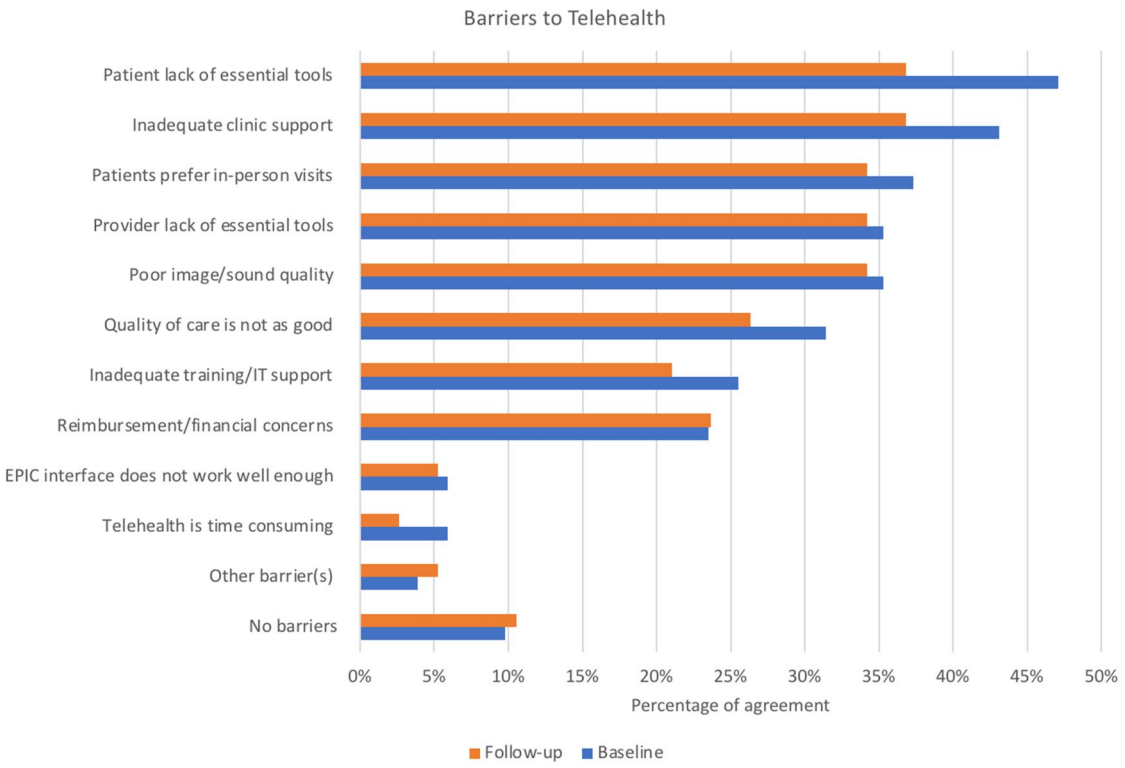

Fig. 2 Barriers to Teleheath

prefer in person visits. Providers did report fewer barriers overall at three months (Fig. 2).

The domain Intervention Coherence is the extent to which one understands the intervention and how it works. There was 82% percent agreement with the questions that fell within this domain. The FIM measure was specifically evaluated with the question *Telehealth seems easy to use*. At baseline, 94% of providers agreed that telehealth was feasible, decreasing slightly to 92% on follow up. Statistically significant differences in the FIM measure were found by division ($p < 0.01$) and years in practice ($p < 0.01$). The CON University Nurse Midwives providers and providers who had been in practice longer (23 vs. 10 years) were less likely to say that providing virtual maternity care is feasible.

The domain Opportunity Costs reflects the extent to which one's values must be given up to engage in an intervention. While providers agreed that virtual prenatal and postpartum care were suitable and acceptable, they were less likely to agree that telehealth was appropriate for new patients. Perhaps indicating that virtual care is perceived by providers to impact the quality of care, a known barrier. The initial survey found that 70% of providers reported seeing *new to the practice* patients and 79% reported seeing *new to me* (patients seen in the practice by other providers) patients virtually. Providers continued to see a high percentage of new patients virtually at follow-up.

The IAM measure falls within the Opportunity Costs domain and was evaluated with the questions *Virtual prenatal visits seem suitable* and *Virtual postpartum visits seem suitable*. At baseline, 80 and 84% of providers agreed that providing virtual prenatal and postpartum care, respectively, was appropriate. On follow-up, there was a slight decrease in the percentage of providers agreeing that virtual prenatal (76%) and postpartum care (81%) was appropriate. No significant difference in the IAM measure was seen by provider type, division, or years in practice. A higher proportion of respondents that had provided postpartum telehealth agreed that postpartum telehealth visits are appropriate compared to providers who had not provided postpartum telehealth visits ($p < 0.05$).

Within the domain of Perceived Effectiveness, the extent that the intervention is perceived as likely to achieve its purpose, 88% agreed that they could easily talk to patients using telehealth. Only 23% agreed with the statement, *I think the visits provided over the telehealth system are the same as in person visits* suggesting that quality of care is a perceived barrier consistent with previous research.

There was 80% agreement with the questions in the last domain, Self-efficacy. Self-efficacy refers to one's ability to perform the behaviors required to participate in the intervention. The AIM measure falls within this domain and was evaluated by looking at responses to the questions *I*

like providing virtual prenatal visits and *I like providing virtual postpartum visits.* At baseline, 73% of respondents agreed that telehealth is acceptable for prenatal care and 76% stated it was acceptable for postpartum care. Acceptability increased to 83% for both prenatal and postpartum care on follow-up. No significant differences in the AIM measure were found by provider or division type for prenatal care. MFM providers were the least likely to report that postpartum telehealth is acceptable (38% compared to 85% in the generalist group, $p < 0.01$). Overall, those who reported that prenatal and postpartum telehealth visits are not acceptable had been practicing longer on average (15.8 vs. 9.5 years) than those who found telehealth acceptable (prenatal $p < 0.10$). A higher proportion of providers who had provided postpartum telehealth reported that postpartum telehealth visits are acceptable compared to those who had not provided virtual postpartum visits ($p < 0.01$).

Commonly reported barriers did not tend to have a statistically significant relationship with provider acceptance. Among the top three barriers identified, *Patient lack of essential tools* was the only barrier that was statistically significant to impact agreement with any of the three measures being evaluated. This is consistent with the existing literature. Technical issues are a barrier to clinician acceptance. Specifically, respondents who identified this barrier were less likely to say that virtual postpartum care was appropriate ($p < 0.01$). The second most identified barrier, *Inadequate clinic support*, was borderline significant in terms of acceptability of prenatal care ($p < 0.1$). While not in the top three identified barriers, *Quality of care is not as good as in person visits,* was identified, as it has been in other studies, as a statistically significant barrier amongst those less likely to say that prenatal ($p < 0.01$) and postpartum ($p < 0.01$) care is appropriate.

Prominent themes that emerged from the open-ended free text questions included barriers, needs, and areas of success. Overwhelming, this unexpected qualitative data identified the barriers technological challenges and dissatisfaction with having to rely on personal equipment. Statements like "we have NO ABILITY to do this with the tech in our clinic. I have to bring my personal cell phone or laptop. We need mics and cameras" and "I have had dropped and frozen calls, issues with sound" were typical and consistent with previously identified barriers.

Discussion

Overall acceptance of prenatal and postpartum care increased to 83% while agreement with feasibility and appropriateness decreased slightly looking specifically at the AIM, FIM, and IAM measures (Fig. 3). Some statistically significant differences were demonstrated. In terms of feasibility, the University Nurse Midwife provider group were less likely to agree that telehealth was feasible compared to the generalist provider group (10.9% compared to 52.2%). This group sees a diverse, mostly government insured, and often non-English speaking patient population suggesting

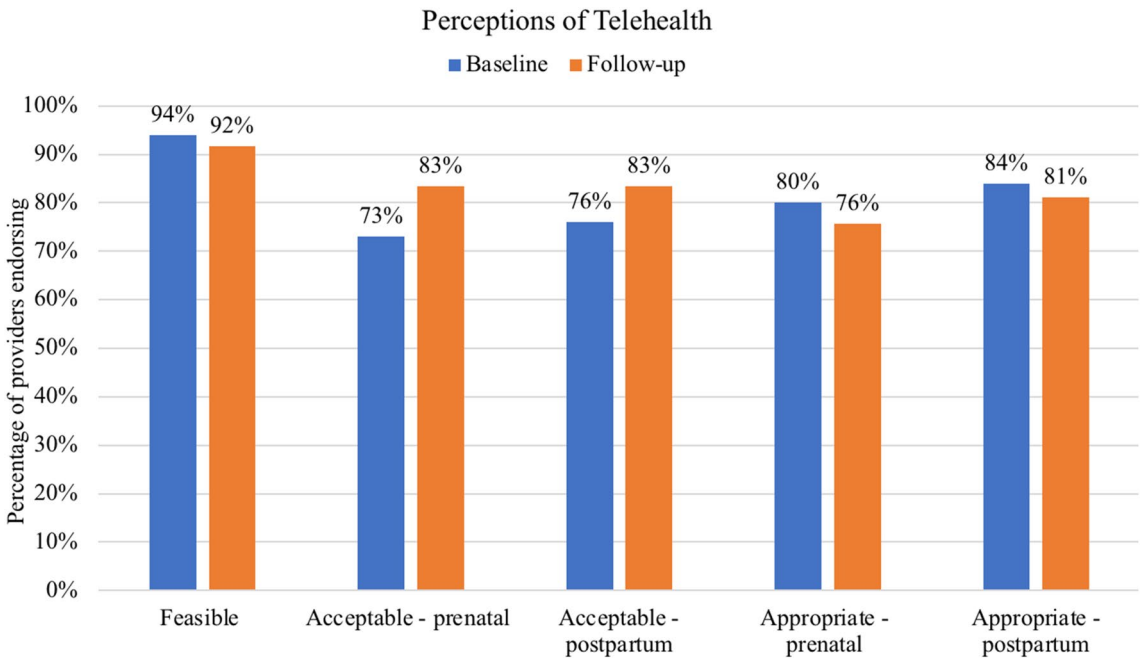

Fig. 3 Perceptions of Telehealth

that patient specific characteristics may pose significant barriers to using telehealth and is reflected in this CNM's statement, "Many of our patients use a different language, cumbersome to get interpreter. Patients are not great with technology, their phones are not charged, internet poor quality…not seeing them in person adds a barrier to their care." This statement highlights the role "technical function" plays in making telehealth a feasible option and is again consistent with existing literature.

A significantly higher proportion of providers who provided postpartum telehealth care reported that postpartum telehealth is acceptable compared to those who reported not providing postpartum telehealth visits (85 and 40% respectively) suggesting that comfort comes from experience and doing. One physician wrote: "While I think that it is an acceptable form of visits during these times, I would not want all my prenatal and postpartum visits to move to telehealth. My most successful telehealth visits were with patients that I knew previously and had seen in person at least once." On baseline survey, only 69% of respondents agreed with the statement, "Telehealth is a suitable way to see new patients," yet, 70% of providers reported seeing "new to the practice" patients and 79% reported seeing "new to me" patients virtually. Providers continued to see a high percentage of new patients virtually at follow-up and this may have impacted the IAM measure at follow up.

Findings from the domain Perceived effectiveness and Self-efficacy suggests that providers may perceive that telehealth is not appropriate and acceptable for all visit types. This was supported by the qualitative theme "Needs," in which defining when telehealth is appropriate continues to need clarification. One MD states "I am not a fan of it for high risk as seeing them in person and being able to exam them is important to me." Qualitative data from CNM respondents may provide additional insight into appropriate patient and visit type when evaluating the theme, Areas of success. This theme included the categories patient and provider satisfaction and benefits. There were several positive statements from CNMs like "Women seemed so happy to be able to stay at home, not have to travel with a newborn…I think it would really help adherence to visits" and "Most midwifery is education and listening which is easily done by telehealth."

Overall, providers who have been in practice longer were less likely to say that telehealth is feasible and acceptable. Interestingly, when looked at in isolation, the resident providers, ostensibly younger and potentially more technologically exposed, overwhelmingly agreed that virtual maternity care was feasible (100%), appropriate (100%), and acceptable (91%).

Strengths and Limitations

This study was grounded in a theoretical framework and used validated tools to create a survey with demonstrated internal reliability and had a near 100% completion rate. A representative sample, adequately reflecting the make-up of providers at our institution, was achieved despite the small sample size. While the initial response rate was only 50.4%, retention to the follow-up survey was 68%. Ideally following up with a sample of non-responders to understand why they did not respond and if they would have responded differently from survey participants would have strengthened findings. The unusual circumstances created by the pandemic and the study's short timeframe, made this a difficult task. The small sample size, over a short intervention period, likely impacted findings, but we were able to demonstrate trends in perceptions and barriers even if they lacked statistical significance. While not a true qualitative study, there were several rich responses to open-ended questions that enhanced our findings. As this study took place within an academic medical center with a robust electronic medical record platform that included a pre-existing infrastructure to quickly initiate telehealth, it may not be generalizable to other practices.

Conclusions and Implications

Maternity care providers at UCSOM and CON hastily adapted prenatal and postpartum practices by providing telehealth visits practically overnight. Overall acceptance of virtual prenatal and postpartum care increased. Virtual maternity care was found to be feasible, appropriate, and acceptable across provider types and divisions. Sentiments like "I like telehealth a lot and hope that is becomes standard even after the pandemic passes" were expressed, but certainly not by all. Taken in total, findings suggest that clincians accept providing virtual maternity care when they can feasibly and appropriately evaluate patients using reliable technology and tools. Practices wishing to successfully adopt virtual maternity care, must make efforts to provide clinicians with these tools. New technologies including patient apps and remote monitoring devices must be robustly tested as they are incorporated into the virtual visit. Improving patient and provider access to reliable equipment will increase efficiency and is imperative for provider acceptance. Future research is needed to better understand if and how quality of care is impacted, and under what circumstances providers are most willing to incorporate telehealth into maternity care. Additional studies must consider the costs and potential savings associated with providing virtual maternity care, how infrastructure and tools will be paid for, and how providers will be reimbursed for virtual services.

Appendix

Survey tool.

1. Telehealth seems easy to use
2. This system is able to do everything I would want it to be able to do.
3. Whenever I made a mistake using the system, I could recover easily and quickly.
4. Virtual prenatal visits seem suitable.
5. Virtual postpartum visits seem suitable.
6. Telehealth is an acceptable way to receive prenatal care.
7. Telehealth is an acceptable was to receive postpartum care.
8. Telehealth is a suitable way to see new patients?
9. Telehealth is only suitable for patients I have already seen?
10. I could easily talk to patients using the telehealth system.
11. I think the visits provided over the telehealth system are the same as in-person visits.
12. I felt I was able to express myself effectively.
13. I like providing virtual prenatal visit.
14. I like providing virtual postpartum visits.
15. What barriers do you see moving forward impacting your ability to continue to provide virtual prenatal and postpartum visits?

    I do not think there are any barriers.

    Inadequate training and/or IT support.

    Inadequate clinic support (scheduling issues, MA support).

    Provider lack of essential tools (e.g. working computer/phone, internet access, office space).

    Patient lack of essential tools (e.g. working computer/phone, internet access).

    Poor image/sound quality.

    EPIC interface does not work well enough for it to be effective.

    Providing telehealth is time consuming.

    Patients prefer in person visits.

    Quality of care is not as good as in person visits.

    Reimbursement/financial concerns.

    Other.

Author Contributions All authors contributed to the development and design of this project. Data Analyses were performed by Dr. Hampanda and Ms. Fasano. Dr. Hofmann and Dr. Harrison contributed to the writing and editing of the manuscript.

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Data Availability All data and analyses are available for review upon request.

Declarations

Conflict of interest We have no conflict of interest to disclose.

Ethical Approval This protocol had exempt approval from the Colorado Multiple Institutional Review Board (COMIRB #20-1534).

Informed Consent Participants were consented to participation and publication with the following statements: By completing the survey, I agree to participate in this study. Your name and other personal information about you will NOT be asked on the survey. Your answers are private and not connected with you at all.

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