



Full Report

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PROVIDER AND PRACTICE-BASED PERCEPTIONS OF TELEHEALTH FOR MATERNITY CARE DURING THE COVID 19 PANDEMIC



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BACKGROUND

The COVID-19 pandemic has required a rapid shift in the provision of maternity care. Given this, clinical settings in North Carolina and across the United States urgently adapted telehealth technologies from March 15, 2020 to present day in order to promote social distancing and decrease the spread of the novel coronavirus.

Prior to this time, telehealth for maternity care has been met with variable success and barriers to implementation.¹ Existing data suggests that telehealth may increase access to general and specialized healthcare services, assist in delivery of care to rural areas, provide greater flexibility for patient and provider scheduling, and save patients' time and money in seeking care.² Preliminary data from the obstetric literature suggests that telehealth may be an equally acceptable and satisfactory modality of providing prenatal care, yielding equivalent maternal and neonatal outcomes while meeting criteria defined as essential by the in-person standard of care.³ Additionally, *telehealth* collaboration for high-risk perinatal care may improve regional and statewide maternal and neonatal morbidity and mortality. Finally, telehealth may also provide an opportunity to provide satisfactory care in the setting of high-risk pregnancies, such as those complicated by diabetes, hypertension, perinatal mood disorders, advanced maternal age, or fetal anomalies.^{5,6,7,8,9}

Despite such successes, several barriers have precluded adaptation of telehealth to maternity care prior to the pandemic, particularly payer policies and lack of reimbursement. Additionally, technical challenges, resistance to change, perceived cost, telemedicine policies, and patient factors are challenges to implementation.^{2,3,4} During the COVID-19 pandemic, several policy changes have enabled use and expansion of telehealth: specifically, changes in payment policies for telehealth-administered maternity care, social distancing protocols within clinical sites, and strategies for hybrid in-person and telehealth-based maternity care.

OBJECTIVES

This was a descriptive study of maternity care providers during the COVID-19 pandemic using surveys and focus group discussions. The objective of this study was to assess patterns and perceptions of telehealth use among maternity care providers and practice managers during the COVID-19 pandemic. We accomplished this through several aims that were assessed at an institutional, state, and national level:

Aim 1

Determine the satisfaction of providers and practice managers with telehealth use for the provision of maternity care.

Aim 2

Identify the preferences and future needs of providers and practices for continued telehealth use.

Aim 3

Illustrate perceptions of individual providers on the implementation of telehealth.

METHODS



We conducted a mixed-methods study to achieve the above objectives. For purposes of our study, telehealth was defined as the use of telecommunications technologies and electronic information to provide clinical care and health-related education, and to perform activities related to health administration.

Our study was composed of two parts. First, surveys were designed to assess provider demographics, practice characteristics, use and satisfaction with telehealth during the COVID-19 pandemic, preferences for continued use and perceived future needs. Surveys were adapted from existing, validated survey tools looking at the use of telehealth for maternity care¹⁰ and reviewed by a survey methodologist. Surveys were distributed to obstetric providers at the University of North Carolina at Chapel Hill and through national professional organizations. Surveys were additionally sent to practice managers in the state of North Carolina. Data were collected from July 14-September 21, 2020. Survey distribution and data collection was facilitated through the assistance of the Cecil G. Sheps Center for Health Services Research at the University of North Carolina.

Second, focus group discussions among obstetric providers and staff were conducted at the University of North Carolina at Chapel Hill. A trained moderator was used to facilitate discussions regarding the transition to telehealth, perceptions of its use, barriers, and desires for future use. Focus group discussions were transcribed and key themes extracted from the data.

Survey results were analyzed using descriptive statistics and t-test and chi-square, as appropriate. All analyses were completed using STATA 15. Qualitative data obtained from semi-structured interviews and focus groups were analyzed with a thematic content analysis strategy. Interviews were recorded and transcribed by a trained qualitative researcher and secondary reader to ensure transcript integrity and consistency in coding.

Characteristics of responding practices, including provider-reported estimated patient demographics, are shown in Table 1.

Table 1. Characteristics of Practices Surveyed in NC State Practice Managers Survey

Practice Characteristic	n (%) (N=98) ^b
Provider Types in Clinic	
Midwives	47 (48)
General Ob-Gyn Physicians	83 (85)
Family Medicine Physicians	16 (16)
Advanced Practice Providers	74 (76)
Maternal Fetal Medicine Physicians	8 (8)
Other	2 (2)
Number of Providers in Clinic (Median, IQR)	4 (2,7)
Clinic Type	
County Health Department	37 (38)
Federally Qualified Health Center	8 (8)
Community Health Center	3 (3)
Academic Medical Center	4 (4)
Independently Owned Community Practice	22 (22)
Health System Owned Community Practice	32 (33)
Other	5 (5)
Percent Patient Panel Covered by Medicaid	
Less than 25%	16 (16)
26-50%	30 (29)
51-75%	39 (38)
76-100%	14 (14)
No Medicaid Patients	1 (1)
I don't know	2 (2)
Percent Patient Panel who are Non-English Speaking	
None	3 (3)
Less than 25%	66 (65)
26-50%	24 (23)
51-75%	6 (6)
76-100%	4 (4)
Estimated Racial/Ethnic Composition in Patient Panel^a	
Caucasian	40 (24)
African American/Black	30 (21)
Hispanic/Latina/Latin-X	26 (22)
Asian	3 (3)
Native American	3 (4)
Other	5 (6)

Note: Data shown as n (%) unless noted otherwise

^a44/98 (45%) of clinics thought they could estimate racial composition of their clinical patient panels.

^b98 (88%) of 111 participating practices provided information regarding practice and patient characteristics

One hundred and seven practices responded to the question “Did you use telehealth prior to the COVID-19 pandemic?” Of those, 11 (10%) reported that they used telehealth prior to March 15, 2020. By contrast, 68/107 (64%) reported using telehealth after March 15, 2020 (p<0.001). There was a significant increase in telehealth utilization by all practice types except for community health centers. Changes in telehealth utilization by practice type are shown in table 2.

Table 2. Telehealth Utilization Before and During COVID 19 Pandemic by Practice Type

	Use Before (n=11)	Use After (n=68)	P-Value
Practice Type			
County Health Department	3 (37)	13 (19)	<0.001
Federally Qualified Health Center	1 (9)	6 (9)	<0.001
Community Health Center	1 (9)	1 (1)	1.00
Academic Medical Center	0	3 (4)	<0.001
Independently Owned Community Practice	3 (27)	16 (24)	<0.001
Health System Owned Community Practice	3 (27)	27 (43)	<0.001

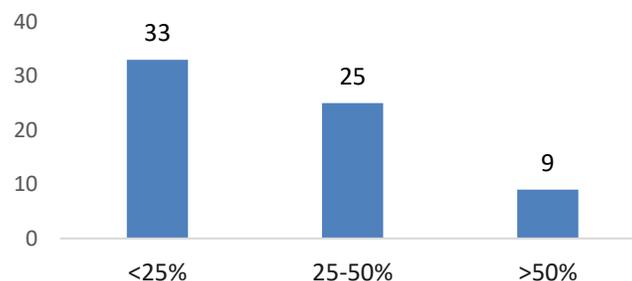
^ANote: data shown as n (%) Percentages may not add to 100% as respondents could leave selections blank

The telehealth modalities most frequently implemented were telephone visits and virtual video visits (Table 3). There was no significant difference in modality of telehealth used by practice type or provider type available in the clinic. Additionally, there was no significant difference between use of telephone or video visits based on percent of patient panel covered by Medicaid (p=0.26) or estimated percentage who were non-English speaking (p=0.18).

Table 3. Telehealth Modalities Used During COVID-19 Pandemic in NC

Visit Type	N=68 (%)
Telephone Visits	61 (90)
Virtual Video	52 (76)
Provider to Provider Consult	9 (13)
Remote Pregnancy Monitoring	12 (18)
Use of Electronic Patient Portal	8 (12)
Remote Imaging Interpretation	5 (7)

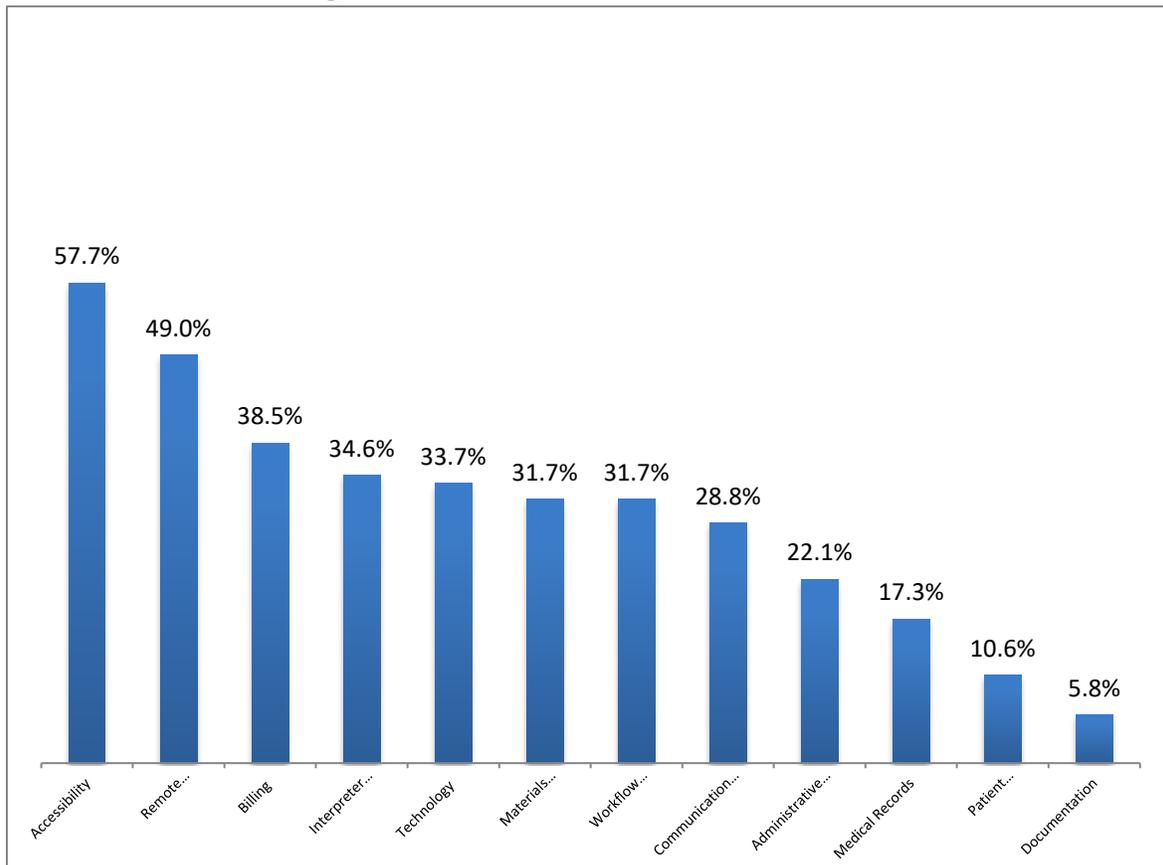
Figure 2. Percent Prenatal Visits Via Telehealth since March 15, 2020 (n=68)



One hundred and four practices responded to the question “Should telehealth continue to be offered for maternity care after the COVID-19 pandemic?” Of those, 47 (45%) responded “yes,” 13 (13%) responded “no,” and 44 (42%) responded “I’m not sure.” In order to continue telehealth use, the most commonly cited need by all practices in the sample included assistance with patient accessibility such as use of a patient navigator and assistance with remote monitoring, such as blood pressure cuffs or non-stress tests (Figure 3). County health departments more frequently reported need amongst all categories compared to other types of practices, however this was not statistically significant. Overall, there was no significant difference in reported future telehealth needs by any practice characteristics.

One hundred and four practices responded to questions regarding the use of telehealth services for high-risk obstetric consultation, such as use of a maternal fetal medicine hotline or maternal fetal medicine tele-consultation service for patients and providers. Of those, 48/104 (46%) responded “yes” to interest in a maternal fetal medicine hotline and 46 (44%) responded “yes” to interest in maternal fetal medicine tele-consultation services. There was no significant difference in interest in hotline or teleconsultation services based on type of practice ($p=0.42$ and $p=0.14$, respectively) or if proportion of Medicaid patients in clinic was greater than 50% ($p=0.90$ and $p=0.42$, respectively).

Figure 3. Future Telehealth Needs in North Carolina



Use of telehealth during the pandemic and needs for continued use were assessed based on metropolitan versus rural/micropolitan clinic location. Of the 98 practices that provided county information, 17 (17%) were from rural counties, 48 (49%) were from metropolitan counties, and 33 (34%) were from micropolitan counties. For this analysis, rural and micropolitan counties were analyzed together.

There was no statistically significant difference in telehealth use before or during the COVID-19 pandemic or modality of telehealth by metropolitan versus rural/micropolitan practice location, though a trend toward less use in rural/micropolitan locations was noted. Amongst all practice locations, telephone and virtual video visits were the most frequently used modality for telehealth maternity care (Table 4).

Table 4. Telehealth Use Before and During the COVID19 Pandemic

	Metropolitan (n=48)	Rural/Micropolitan (n=50)	P-Value
Telehealth Prior to Pandemic	7 (14.6)	1 (2)	0.87
Telehealth During Pandemic	35 (74.9)	24 (48)	0.06
Modality			
Telephone Visit	33 (68.8)	21 (42)	0.09
Virtual Video Visit	27 (56.5)	18 (36)	0.17
E-consultation	7 (14.6)	2 (4)	0.95
Remote Monitoring	5 (10.4)	6 (12)	0.90
Electronic Portal	5 (10.4)	2 (4)	0.97
Remote Imaging Interpretation	4 (8.3)	0	n/a

Note: Data are shown as n(%). Percentages may not add to 100% as responses were not mutually exclusive

In terms of future telehealth use, preferences for continuation were not significantly different between practices in metropolitan versus rural/micropolitan counties. More than half of practices in metropolitan counties wanted to continue using telehealth in the future (Table 5). The greatest needs for future telehealth implementation among practices in micropolitan and rural counties included assistance with electronic medical records (88.0%), patient access (54.8%), and remote patient monitoring (26.2%). Practices in urban counties expressed greatest need for assistance with patient access (53.2%), remote patient monitoring (51.1%), and interpreter services (44.7%). There was no statistically significant difference in future needs by metropolitan versus rural/micropolitan practice location (Table 5).

**Table 5. Interest in Continued Use of Telehealth and Needs for Future Use
By Metropolitan versus Rural/Micropolitan Practice Location**

	Metropolitan N=48	Rural/Micropolitan N=50	P-Value
Telehealth Yes	26 (54.2)	15 (30)	0.22
Telehealth No	3 (6.3)	8 (16)	0.92
I don't know	16 (33.3)	25 (52)	0.21
Electronic Medical Records			
Electronic Medical Records	9 (19)	6 (12)	0.83
Telecommunication Technology			
Telecommunication Technology	19 (39.5)	12 (24.2)	0.36
Communication Training			
Communication Training	12 (25)	16 (32)	0.40
Clinical Workflow			
Clinical Workflow	18 (37.5)	14 (28)	0.33
Billing			
Billing	17 (35.4)	18 (36)	0.28
Patient Access			
Patient Access	25 (52.1)	29 (58)	0.09
Remote Monitoring			
Remote Monitoring	24 (50)	22 (44)	0.15
Interpreter Services			
Interpreter Services	21 (43.8)	12 (24)	0.33
Documentation Assistance			
Documentation Assistance	1 (2.1)	3 (6)	0.99
Administrative Assistance			
Administrative Assistance	10 (20.1)	11 (22)	0.68
Material Goods (iPADS, camera)			
Material Goods (iPADS, camera)	15 (31.3)	13 (26)	0.40
Patient education materials			
Patient education materials	8 (16.6)	3 (6)	0.77

Note: Data shown as n(%) unless noted otherwise

National Survey

A national survey was electronically distributed to maternity care providers throughout the United States using a similar distribution and data accrual methodology as the NC State Practice Manager's Survey. Survey links were provided to partnering professional organizations, who then distributed the survey to appropriate contact lists in their organizations. Partnering professional organizations included the American Academy of Family Physicians (AAFP), American College of Obstetricians and Gynecologists (ACOG), and the American College of Nurse Midwives (ACNM). Additionally, survey links were distributed through personal networks to purposefully expand the sample beyond those affiliated with professional organizations.

Two hundred and ten maternity care providers from 46 states responded to the survey (Figure 4). The survey response rate is not available given the method of survey distribution and the lack of information on all eligible providers in the U.S. Demographic characteristics of the responding maternity care providers are shown below. Notably, sixty percent of providers stated that greater than half of their patient panels are insured by Medicaid (Table 6).

Figure 4. States represented by Responding Maternity Care Providers



Table 6. Characteristics of Providers Responding to the National Survey

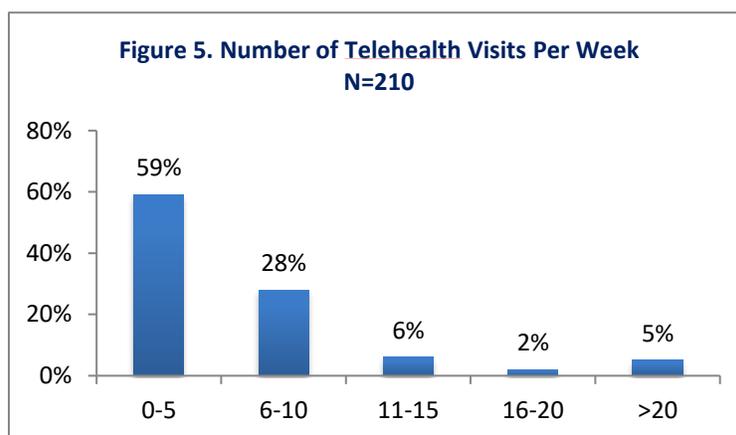
Provider Characteristic	N=210
Location	
Small Town/Rural	84 (40)
Suburban/Urban	126 (60)
Provider Specialty	
General Ob/Gyn	44 (21)
Maternal Fetal Medicine	35 (17)
Family Medicine	90 (43)
Certified Nurse Midwife	36 (17)
Other	5 (2)
Years Providing Pregnancy Care (mean, SD)	14 (10)
Practice Size (# Providers)	
1-3	48 (24)
4-6	58 (28)
7-10	21 (10)
> 10	77 (38)
Percent Patient Panel Covered by Medicaid	
< 25%	21 (10)
26-50%	56 (27)
51-75%	64 (31)
76-100%	59 (29)
None	4 (2)
Provider Age (mean, SD)	45 (11)
Provider Gender	
Male	35 (18)
Female	160 (82)
Estimated Racial/Ethnic Composition of Practice (mean, SD)	
%White	51 (28)
% African American/Black	23 (21)
% Latin-X	22 (22)
% Asian	5 (5)
% Native American	7 (19)

Note: Data shown as n(%) unless noted otherwise

Forty-three individuals (21%) reported using telehealth prior to the COVID-19 pandemic; the majority of these individuals were from urban settings (65%). By contrast, 170 (84%) of respondents reported uptake of telehealth during the pandemic; the majority of these individuals were also from urban settings (60%). The most common modalities of telehealth used were telephone visits (64%) and virtual video visits (61%) (Table 7). Most providers reported having between 0-10 telehealth visits per week (Figure 5).

Table 7. Telehealth Modalities Used during COVID-19 pandemic nationally

Visit Type	N=68 (%)
Telephone Visits	138 (64)
Virtual Video	133 (61)
Provider to Provider Consult	17 (8)
Remote Pregnancy Monitoring	19 (9)
Use of Electronic Patient Portal	14 (6)
Remote Imaging Interpretation	10 (5)



Among the 170 respondents who reported using telehealth during the COVID-19 pandemic, there were no significant differences in modality used based on reported practice location (Table 8) or provider type (Table 9).

Table 8. Telehealth Utilization by Provider Practice Location

	Small Town/Rural (n=64)	Urban/Suburban (n=103)	P-Value
Telephone Visit	52 (81)	85 (83)	0.41
Virtual Video Visit	48 (75)	84 (82)	0.16
E-consultation	9 (14)	8 (8)	0.26
Remote Monitoring	8 (13)	11 (11)	0.84
Electronic Portal	5 (8)	8 (8)	0.91
Remote Imaging Interpretation	4 (6)	6 (6)	0.99

Note: Data shown as n(%) unless noted otherwise. Total sample is 167 for this analysis as 3 respondents did not provide information regarding practice location

Table 9. Telehealth Utilization by Provider Specialty

	General Ob/Gyn N=44	Maternal Fetal Medicine N=35	Family Medicine N=90	Midwifery N=36	P- Value
Telephone Visit	30 (68)	21 (60)	58 (64)	27 (75)	0.47
Virtual Video Visit	30 (68)	20 (57)	54 (60)	27 (75)	0.32
E-consultation	3 (7)	4 (11)	7 (8)	3 (8)	0.90
Remote Monitoring	3 (7)	1 (3)	11 (12)	4 (11)	0.45
Electronic Portal	2 (5)	1 (3)	6 (7)	5 (14)	0.34
Remote Imaging Interpretation	1 (2)	8 (23)	1 (1)	0	<0.001

Note: Data shown as n(%) unless noted otherwise. Total sample size is 205 for this table as 5 respondents listed “other” for maternity care specialty and were excluded from this analysis.

Overall, most providers agreed or strongly agreed with positive statements regarding telehealth (Table 10). However, maternal fetal medicine providers were least likely to agree or strongly agree to the statement “Telehealth is an acceptable way to provide healthcare services” (15% vs. 24%, 37%, 21% for other specialties, p=0.002) (Table 11).

Table 10. Telehealth Satisfaction Within the National Sample

	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
Telehealth improves patient access to healthcare services.	3 (2)	11 (7)	153 (92)
Telehealth provides for some of the healthcare needs of my patients.	2 (1)	n/a	164 (99)
Telehealth significantly improves the lives of my patients.	15 (9)	37 (22)	114 (69)
Telehealth is a convenient way for my patients to access medical, obstetrical and neonatal specialists	8 (5)	13 (8)	145 (87)
I think the visits provided through telehealth are adequate replacements when in-person visits are difficult or impossible.	19 (12)	34 (21)	112 (68)
I like using the telehealth to complete the functions of my job.	30 (18)	26 (16)	109 (66)
I like communicating with my patients through telehealth services.	26 (16)	35 (21)	104 (63)
Telehealth is an acceptable way to provide healthcare services.	12 (7)	29 (18)	123 (75)
Overall, I would rate services through telehealth as excellent.	37 (22)	35 (21)	93 (56)
Overall, I believe telehealth is a positive thing for my clinic.	12 (13)	16 (17)	68 (70)

^aSurvey adapted from Bhandari *et al* 2019. Validation of Newly Developed Surveys to Evaluate Patients’ and Providers’ Satisfaction with Telehealth Obstetric Services. *Telemedicine and e-Health*.

Note: Data shown as n(%) unless noted otherwise

Table 11. Telehealth Satisfaction Among Maternal Fetal Medicine Providers in the National Sample (N=35)

	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
Telehealth improves patient access to healthcare services.	0	3 (8.6)	21 (60)
Telehealth provides for some of the healthcare needs of my patients.	0	0	24 (68.6)
Telehealth significantly improves the lives of my patients.	1 (2.9)	5 (14.3)	18 (51.4)
Telehealth is a convenient way for my patients to access medical, obstetrical and neonatal specialists	0	0	24 (68.6)
I think the visits provided through telehealth are adequate replacements when in-person visits are difficult or impossible.	2 (5.7)	6 (17.1)	16 (45.7)
I like using the telehealth to complete the functions of my job.	4 (11.4)	6 (17.1)	14 (40)
I like communicating with my patients through telehealth services.	4 (11.4)	7 (20)	13 (37)
Telehealth is an acceptable way to provide healthcare services.	0	5 (14.3)	19 (54.3)
Overall, I would rate services through telehealth as excellent.	3 (8.6)	5 (14.3)	16 (45.7)
Overall, I believe telehealth is a positive thing for my clinic.	1 (2.9)	2 (5.7)	21 (60)

Data are shown as n(%) unless noted otherwise.

Data are not mutually exclusive; some respondents identifying as MFM did not answer all questions in survey.

Table 12. Telehealth Satisfaction Among General Obstetrics & Gynecology Providers in the National Sample (N=44)

	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
Telehealth improves patient access to healthcare services.	0	1 (2.3)	34 (77.3)
Telehealth provides for some of the healthcare needs of my patients.	0	0	35 (79.6)
Telehealth significantly improves the lives of my patients.	1 (2.3)	7 (15.9)	27 (61.4)
Telehealth is a convenient way for my patients to access medical, obstetrical and neonatal specialists	0	3 (6.8)	32 (72.7)
I think the visits provided through telehealth are adequate replacements when in-person visits are difficult or impossible.	4 (9.1)	5 (11.4)	25 (56.8)
I like using the telehealth to complete the functions of my job.	5 (11.4)	5 (11.4)	24 (54.6)
I like communicating with my patients through telehealth services.	4 (9.1)	9 (20.5)	21 (47.7)
Telehealth is an acceptable way to provide healthcare services.	1 (2.3)	3 (6.8)	30 (68.2)
Overall, I would rate services through telehealth as excellent.	3 (6.8)	7 (15.9)	24 (54.6)
Overall, I believe telehealth is a positive thing for my clinic.	1 (2.3)	3 (6.8)	30 (68.2)

Data are shown as n(%) unless noted otherwise.

Data are not mutually exclusive; some respondents identifying as General Ob-Gyn did not answer all questions in survey.

Table 13. Telehealth Satisfaction Among Family Medicine Providers in the National Sample (N=90)

	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
Telehealth improves patient access to healthcare services.	1 (1.11)	3 (3.3)	68 (75.6)
Telehealth provides for some of the healthcare needs of my patients.	0	0	71 (78.9)
Telehealth significantly improves the lives of my patients.	6 (6.7)	18 (20)	47 (52.2)
Telehealth is a convenient way for my patients to access medical, obstetrical and neonatal specialists	3 (3.3)	6 (6.7)	62 (68.9)
I think the visits provided through telehealth are adequate replacements when in-person visits are difficult or impossible.	6 (6.7)	18 (20)	47 (52.2)
I like using the telehealth to complete the functions of my job.	12 (13.3)	9 (10)	50 (55.6)
I like communicating with my patients through telehealth services.	11 (12.2)	14 (15.6)	46 (51.1)
Telehealth is an acceptable way to provide healthcare services.	4 (4.4)	20 (22.2)	46 (51.1)
Overall, I would rate services through telehealth as excellent.	22 (24.4)	15 (16.7)	34 (37.8)
Overall, I believe telehealth is a positive thing for my clinic.	5 (5.6)	7 (7.8)	59 (65.6)

Data are shown as n(%) unless noted otherwise.

Data are not mutually exclusive; some respondents identifying as Family Medicine did not answer all questions in survey.

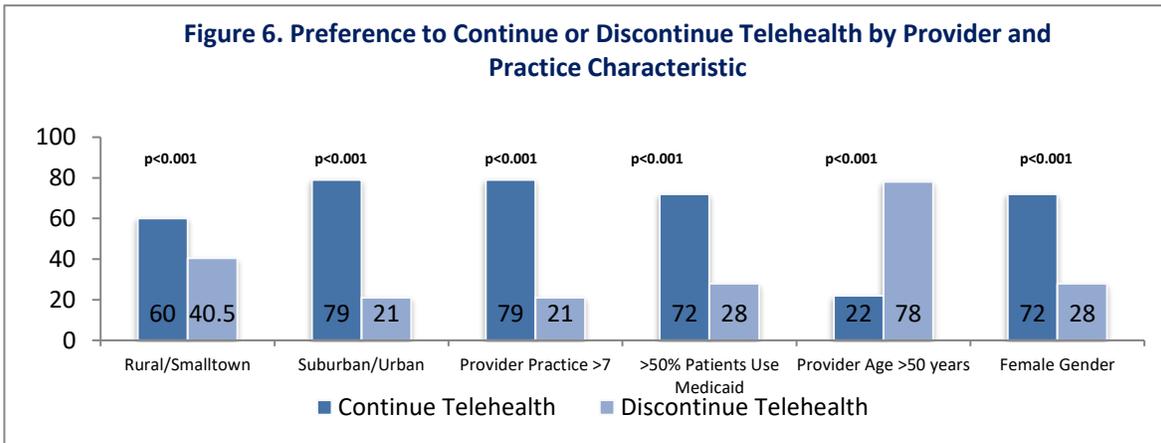
Table 14. Telehealth Satisfaction Among Midwifery Providers in the National Sample (N=36)

	Disagree/Strongly Disagree	Neutral	Agree/Strongly Agree
Telehealth improves patient access to healthcare services.	2 (5.6)	4 (11.1)	28 (77.8)
Telehealth provides for some of the healthcare needs of my patients.	2 (5.6)	0	32 (88.9)
Telehealth significantly improves the lives of my patients.	7 (19.4)	7 (19.4)	20 (55.6)
Telehealth is a convenient way for my patients to access medical, obstetrical and neonatal specialists	5 (13.9)	4 (11.1)	25 (69.4)
I think the visits provided through telehealth are adequate replacements when in-person visits are difficult or impossible.	7 (19.4)	5 (13.9)	22 (61.1)
I like using the telehealth to complete the functions of my job.	9 (25)	6 (16.7)	19 (52.8)
I like communicating with my patients through telehealth services.	7 (19.4)	5 (13.9)	22 (61.1)
Telehealth is an acceptable way to provide healthcare services.	7 (19.4)	1 (2.8)	26 (72.2)
Overall, I would rate services through telehealth as excellent.	9 (25)	8 (22.2)	17 (47.2)
Overall, I believe telehealth is a positive thing for my clinic.	5 (13.9)	4 (11.1)	25 (69.4)

Data are shown as n(%) unless noted otherwise.

Data are not mutually exclusive; some respondents identifying as Midwifery did not answer all questions in survey.

Seventy percent (70%) of respondents wanted to continue telehealth use after the COVID-19 pandemic. A higher proportion of providers prefer continue telehealth use rather than discontinue telehealth use among most identified provider and practice characteristics, including practice location, practice size, percent Medicaid in practice, and provider gender ($p<0.001$). In contrast, providers aged 50+ significantly preferred to discontinue using telehealth after the pandemic (78% vs. 22%, $p<0.001$) (Figure 6).



Among all respondents, the most preferred telehealth modalities for continuation were telephone visits (62%) and virtual video visits (75%); however, preference for one telehealth modality over another did not differ based on practice location (Table 12).

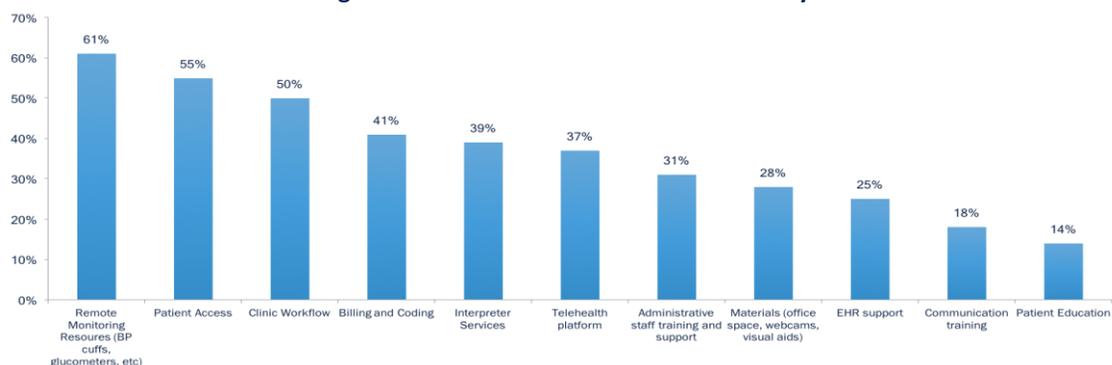
Table 15. Preferred Continuation of Telehealth Modalities by Provider Location

	Rural/small town (n=84)	Urban/Suburban (n=126)	P-Value
Telephone Visit	49 (58)	81 (64)	0.38
Virtual Video Visit	61 (73)	95 (75)	0.65
E-consultation	20 (24)	33 (26)	0.70
Remote Monitoring	46 (55)	70 (56)	0.91
Electronic Portal	33 (39)	48 (38)	0.86
Remote Imaging Interpretation	17 (44)	22 (56)	0.61

^ANote: Data are shown as n(%). Percentages may not add to 100% as responses were not mutually exclusive

When asked about continuing telehealth, most respondents requested assistance with remote monitoring (blood pressure cuffs, glucometers, etc.) (61%) and patient access (55%) (Figure 7). There was a significant difference in perceived needs between rural/small town practices and urban/suburban practices: the latter noted significantly greater need for assistance with clinical workflow, billing and coding, interpreter services, and telehealth platforms.

Figure 7. Future Telehealth Needs Nationally



There were significant differences in needs based on provider location. Providers in urban/suburban practice locations were more likely to request assistance with clinical workflow, billing and coding, interpreter services, and telehealth platforms compared to those in rural/small town locations (Table 13).

Table 16. Future Needs for Continued Telehealth Use by Provider Location

	Rural/small town (n=84)	Urban/ Suburban (n=126)	P-Value
Remote Patient Monitoring	47 (56)	82 (65)	0.18
Patient Access	46 (55)	73 (58)	0.65
Clinic Workflow	34 (41)	72 (57)	0.02
Billing and Coding	27 (32)	60 (48)	0.03
Interpreter Services	25 (30)	57 (45)	0.02
Telehealth platforms	22 (26)	57 (45)	<0.01
Administrative staff support	24 (41)	34 (59)	0.80
Materials	21 (25)	38 (30)	0.42
EMR support	16 (19)	36 (29)	0.12
Communication	14 (17)	24 (19)	0.66
Patient education	16 (19)	19 (15)	0.45

Note: Data are shown as n(%). Percentages may not add to 100% as responses were not mutually exclusive.

University of North Carolina (UNC) Survey

An electronic survey was disseminated via e-mail to all maternity care providers in the University of North Carolina at Chapel Hill system (UNC) using the same distribution and data accrual processes used for the state and national-level surveys. Sampling maternity care providers from UNC yielded a large provider sample representing the multiple specialties that participate in maternity care. They serve a racial/ethnic diverse population requiring variable levels of care, including high risk care only offered at a large, regional perinatal center. Additionally, UNC partners with neighboring community clinics such that the sample captures a range of experience of maternity care provision including high and low resource settings. Methodology for the local survey included a mixed-methods approach (see Methods Section) in order to provide both quantitative and qualitative data about provider experience with and preferences regarding telehealth during the COVID19 pandemic.

Two hundred and thirty-five providers were surveyed, and 116 participated (response rate: 50%). Respondents included: general Ob/Gyn (30%), MFM and genetics (25%), family medicine (34%), midwifery (7%), and perinatal psychiatry (2%). Provider characteristics are shown below.

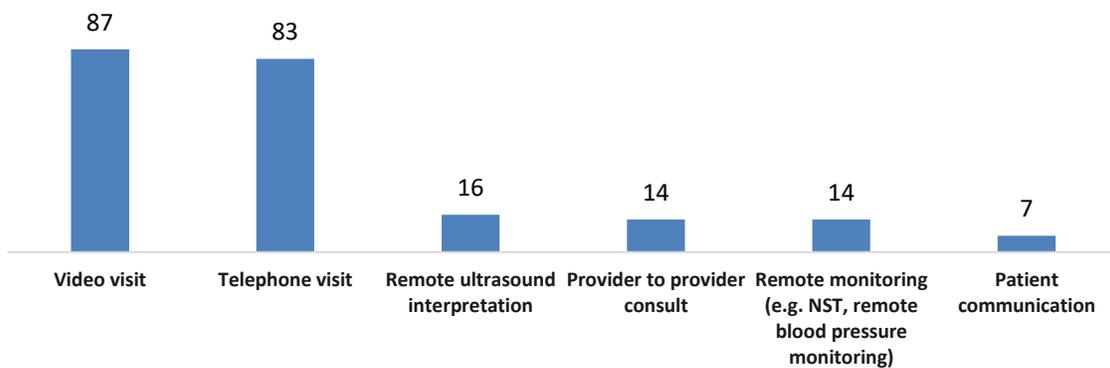
Table 17. Characteristics of Maternity Care Providers at UNC

Provider Characteristic	N=116
Specialty	
General Obstetrics & Gynecology	35 (32)
Maternal Fetal Medicine	29 (25)
Family Medicine	39 (34)
Midwifery	9 (8)
Perinatal Psychiatry	2 (2)
Provider Type	
Resident	33 (30)
Fellow	5 (5)
Attending	44 (40)
Certified Nurse Midwife	12 (11)
Advanced Practice Provider	9 (8)
Genetic Counselor	7 (6)
Perinatal Psychiatry	2 (2)
Years Practicing (mean, SD)	8 (8)
Prior Telehealth Experience	18 (16)
Age (mean, SD)	40 (11)
Female gender	83 (72)

Note: Data presented as n(%) unless noted otherwise

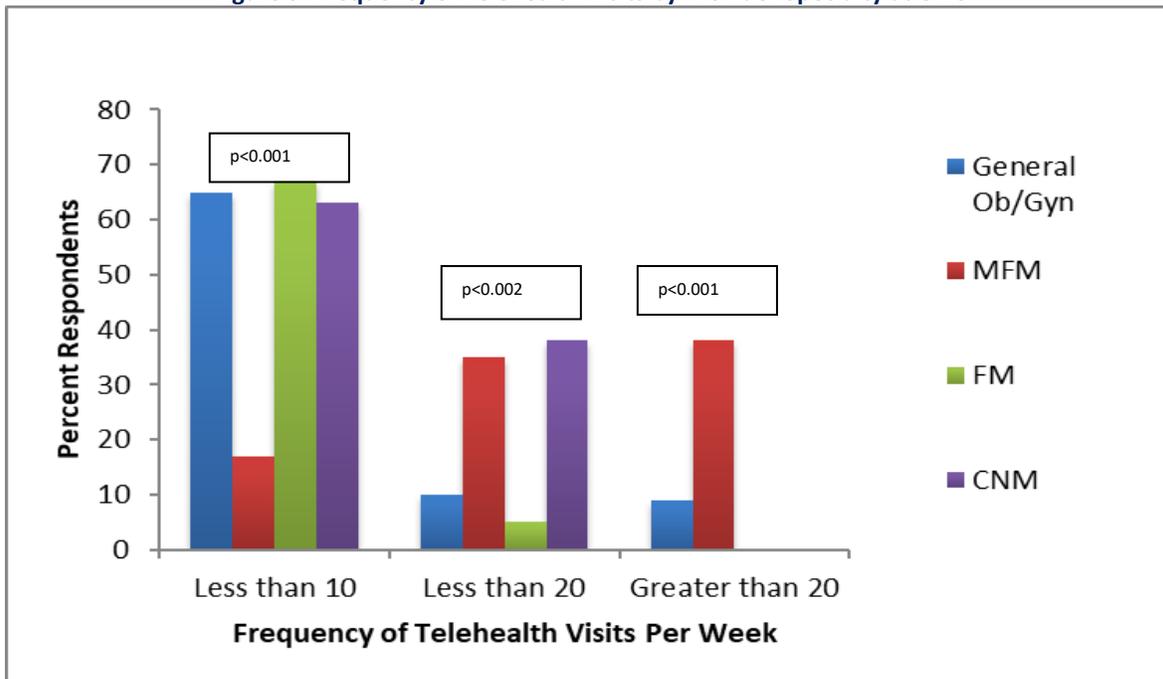
Eighteen (16%) respondents reported that they had used telehealth prior to the COVID-19 pandemic; 93 (84%) reported using telehealth during the pandemic. The most commonly used modalities of telehealth prior to the pandemic were virtual video visits (9/18, 50%) and remote ultrasound interpretation (7/18, 38%). The most commonly used modalities of telehealth during the pandemic included virtual video visits (87%) and telephone visits (83%) (Figure 8).

Figure 8. Types of Telehealth Used at UNC (n=110)



Maternal fetal medicine providers conducted more telehealth visits than other providers, with 11/29 (38%) of MFM providers reporting more than 20 telehealth visits per week ($p<0.001$). In contrast, 22/34 (65%) general Ob/Gyn clinicians, 26/39 (67%) family medicine clinicians, and 5/8 (63%) midwives reported fewer than 10 virtual visits per week ($p<0.001$) (Figure 9). There was no significant difference in modality of telehealth used by provider type (Table 15).

Figure 9. Frequency of Telehealth Visits by Provider Specialty at UNC



Abbreviations: Ob/Gyn = obstetrics & gynecology; MFM= maternal fetal medicine; FM = family medicine; CNM = certified nurse midwife

Table 18. Telehealth Modality Used During the COVID19 Pandemic by Provider Type at UNC

	Physician (Attending, resident, fellow) (n=82)	Certified Nurse Midwife (n=12)	Advanced Practice Provider (n=9)	Genetic Counselor (n=7)	P- Value
Billable telephone visit	59 (72)	9 (75)	8 (89)	7(100)	0.40
Billable video visit	61 (74)	11 (92)	8 (89)	7 (100)	0.30
Billable provider to provider consult	12 (15)	2 (17)	0	0	0.57
Billable remote monitoring (e.g. NST, remote blood pressure monitoring)	11 (13)	2 (17)	1 (11)	0	0.84
Billable patient communication via patient portal	5 (6)	0	1 (11)	1 (14)	0.06
Billable remote ultrasound interpretation	16 (20)	0	0	0	n/a

Note: Data shown as n(%) unless noted otherwise

Overall, a high percentage of providers reported that telehealth was a positive thing for providing obstetric care (83%), improved access to care (94%) and was convenient for patients (92%); a lower percentage enjoyed completing their jobs (59%) or communicating with patients (60%) through telehealth. Physicians were less likely than other provider types to agree that telehealth enabled them to complete the functions or their jobs ($p=0.03$) or agree that telehealth improves patients' lives ($p=0.03$) (Table 16).

Table 19. Percent participants that “Agree” or “Strongly Agree” with Positive Telehealth Statement by Provider Type at UNC

Question	MD/DO (n=82)	CNM (n=12)	APP (n=9)	GC (n=7)	P-Value
Telehealth improves patient access to healthcare services.	59 (69)	10 (91)	8 (100)	7 (100)	0.34
Telehealth provides for some of the healthcare needs of my patients.	61 (75)	11 (92)	8 (89)	7 (100)	0.33
Telehealth significantly improves the lives of my patients.	33 (40)	9 (75)	7 (78)	5 (71)	0.03
Telehealth is a convenient way for my patients to access medical, obstetrical, and neonatal specialists	57 (70)	10 (83)	8 (89)	7 (100)	0.23
I think the visits provided over telehealth are adequate replacements when in-person visits are difficult or impossible.	45 (55)	8 (67)	7 (78)	6 (85)	0.30
I like using telehealth to complete the functions of my job.	33 (40)	7 (58)	7 (78)	6 (86)	0.03
I like communicating with my patients through telehealth services.	35 (43)	7(58)	6 (67)	6 (85)	0.10
Telehealth is an acceptable way to provide healthcare services.	52 (63)	8 (67)	7 (78)	6 (85)	0.64
Overall, I would rate services through telehealth as excellent.	33 (40)	6 (50)	5 (56)	6 (86)	0.13
I believe telehealth is a positive thing for obstetric care.	51 (63)	8 (67)	8 (89)	7 (100)	0.15

Note: Data shown as n(%) unless noted otherwise

^aSurvey adapted from: Bhandari et al 2019. Validation of Newly Developed Surveys to Evaluate Patients' and Providers' Satisfaction with Telehealth Obstetric Services. *Telemedicine and e-Health*.

^cMD = Medical Doctor; DO = Doctor of Osteopathy; CNM = Certified Nurse Midwife; APP = Advanced Practice Provider; GC = Genetic Counselor

Overall, 81% of providers expressed interest in continuing to use telehealth beyond the COVID19 pandemic. Across all specialties, providers were most likely to prefer continuing virtual video visits (Table 17) Modality preferences were similar across provider specialties. Needs to improve future telehealth use were identified in the following areas: clinical workflow efficiency (57%), patient accessibility (53%), remote monitoring resources (56%), interpreter services (59%), and administrative support (57%). Needs for assistance were similar across provider specialties, with the exception of interpreter services where the highest percentage of providers who reported needing assistance with these services was general Ob/Gyn providers (Table 17).

Table 20. Preferences for Future Use of Telehealth and Additional Needs by Provider Specialty at UNC

	General Ob/Gyn (n=34)	Maternal Fetal Medicine (n=29)	Family Medicine (n=39)	Midwifery (n=8)	P-Value
Telephone Visits	24 (71)	14 (48)	24 (61)	3 (38)	0.25
Video Visits	26 (77)	22 (76)	26 (67)	6 (75)	0.89
Provider to Provider Consultation	7 (21)	10 (35)	9 (23)	1 (13)	0.44
Remote Monitoring	11(32)	9 (31)	10 (26)	3 (38)	0.95
Patient Portal Use	11 (32)	7 (24)	11 (28)	2 (25)	0.84
Remote Ultrasound Interpretation	3 (8)	10 (35)	1 (3)	0	0.001
“I would like assistance with...”					
	General Ob/Gyn (n=34)	Maternal Fetal Medicine (n=29)	Family Medicine (n=39)	Midwifery (n=8)	P-Value
Electronic Medical Record	9 (27)	7 (24)	8 (21)	2 (25)	0.98
Telecommunication Technology Assistance	10 (29)	9 (31)	13 (33)	6 (75)	0.16
Communication Training	3 (34)	3 (10)	8 (20)	1 (13)	0.58
Clinical Workflow	14 (41)	17 (59)	16 (41)	5 (63)	0.39
Billing	11 (32)	16 (55)	12 (31)	4 (50)	0.24
Accessibility Issues (Patient Navigator, etc)	13 (38)	12 (41)	19 (49)	3 (38)	0.90
Remote Monitoring	20 (59)	9 (31)	19 (49)	4 (50)	0.08
Interpreter Services	21 (62)	17 (59)	15 (38)	2 (25)	0.03
Administrative Support	11 (33)	11 (38)	6 (15)	2 (25)	0.17
Telehealth Materials (iPAD, Camera, etc.)	12 (35)	11 (38)	9 (23)	3 (38)	0.69
Patient Education Materials	1 (3)	5 (17)	1 (3)	1 (13)	0.12

Note: Data presented as n(%) unless noted otherwise.

Qualitative study: University of North Carolina

In August 2020, five focus groups and three in-depth interviews were conducted with providers who made the shift to using telehealth to provide prenatal care because of the onset of the COVID-19 pandemic. The objective of this research was to gain an understanding of these practitioners' experiences and insights about telehealth visits during this period.

After a difficult transition, practitioners found it valuable for certain patients, including those tech-savvy patients who have access to computers/devices and sufficient Internet bandwidth. Telehealth is less accessible to non-English speakers, those with limited internet or bandwidth and those who don't have computers or other devices or who need to share them with family members. They said that telehealth lends itself to information-gathering sessions like counseling, consults for single-issue management, follow-up visits, decision-making conversations, patient questions and centering groups.

Practitioners said that the advantages of telehealth include:

- Reduced risk of exposure to COVID-19;
- Convenience for patients, especially those who live far away;
- The opportunity for practitioners to gain insights from seeing patients in their home environments;
- The ability of women's partners to take part in prenatal visits, since UNC is allowing only patients for in-person visits;
- Opportunity for practitioners to work at home some days;
- Gathering information so that subsequent in-person visits can be shorter and more efficient; and
- The ability to bill for telehealth visits.

Some of the challenges to telehealth include:

- Lack of body-language cues, since patients are only visible from the neck up;
- Lack of access by non-English speakers;
- Less access for people who live in rural areas;
- Patient distractibility during virtual visits;
- Privacy issues when sharing sensitive information on telehealth with others close by; and
- Visits that run beyond scheduled time limits.

All of the participants said they believe that telehealth will continue even once the pandemic is under control. They made the following suggestions for the success of telehealth in the future:

- Have a health-care navigator teach first-time patients the logistics of telehealth sessions;
- Address the digital divide by having a seamless and consistent Wi-Fi access for every patient;
- Arrange for interpreters for non-English speaking patients;
- Create scheduling guidelines for in-person vs. virtual visits, including how long telehealth sessions should last;
- Incorporate a timer that pops up on the patients' and practitioners' screens that indicates five minutes remaining in the session, so practitioners can end the visit on time and less awkwardly;
- Set up a dedicated room in the clinic or hospital with two screens and a strong Wi-Fi connection for telehealth visits. Have a nursing assistant set up the logistics of the video call and have the patient on-screen before calling in the practitioner. This will save practitioners time and frustration and allow them to concentrate on the medical aspects of the visit rather than solving potential technical problems; and

In summary, practitioners said that telehealth, especially in combination with in-person medical visits, is a very viable option for prenatal care and that it can save patients a great deal of time, energy and resources. Although there is a steep learning curve, once the system is up and running, many of the remaining problems can be easily resolved.

Going forward, the majority of those interviewed said they would like to be involved in telehealth in the post-COVID era and, ideally, see patients in a hybrid model of telehealth and in-person visits. A minority saw the value of telehealth, but, in post-pandemic times, would rather see all patients in the clinic as a matter of personal preference.

SUMMARY & RECOMMENDATIONS



The results of a local, state, and national survey on the use of telehealth for maternity care have demonstrated several common themes in utilization, preferences for continuation, and future needs. Overall, the use of telehealth for maternity care dramatically increased throughout the COVID-19 pandemic amongst all provider specialties, provider types, and practice locations. The most utilized modalities of telehealth reported across all three surveys included virtual video and telephone visits. Providers more often agreed and strongly agreed with positive telehealth statements, suggesting that the majority of maternity care providers view telehealth favorably. Additionally, most maternity care providers expressed interest in continuing to use telehealth, with little variation by provider type, specialty, or practice location. Reported future needs for telehealth focused on support for remote patient monitoring (e.g. blood pressure cuffs, glucometers) and improving patient access (using a patient navigator, assisting with smart technology). These needs were reflected across all three surveys, suggesting that this is a common deficit that exists in telehealth-based maternity care.

The study has many strengths, including use of a multi-tiered survey strategy, inclusion of a wide range of providers, practice types and practice locations, and purposeful sampling of representative populations in maternity care. Additionally, questions asked across surveys allow us to generate generalizable data, as reflected by common themes elucidated among the survey responses. However, this study should be interpreted within the context of its design and its limitations. First, participants self-selected to participate in the study after receipt of an e-mail. Additionally, those practices that are not connected to UNC, Community Care of North Carolina, or professional organizations or personal healthcare quality networks may not be well-represented in this study. Additional granularity of data that may help to explain the quantitative findings are available in the qualitative report. Finally, provider impressions of telehealth utilization should be corroborated with community assessment in order to provide patient centered and provider-supported recommendations for maternity care.

Ultimately, recommendations from this multilevel survey of maternity care providers are as follows:

- Providers and clinics should be provided with the technology and infrastructure to provide efficient and patient-centered telehealth.
- Patients should be provided with healthcare navigators and education to help them prepare and get the most out of their telehealth visits.
- Material remote monitoring resources, such as blood pressure monitors and glucometers, should be made available to enable continued use of telehealth.
- Clinics should ensure that patients have adequate access to wireless capabilities or the technology/platforms before offering telehealth services.
- Policy makers should address the digital divide ensuring adequate broadband access that will enable equity in access to telehealth services.

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