

Maintaining access to maternal fetal medicine care by telemedicine during a global pandemic

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Abstract

Objective: This study aims to compare a conventional medical treatment model with a telehealth platform for Maternal Fetal Medicine (MFM) outpatient care during the global novel coronavirus pandemic.

Methods: In this study, we described the process of converting our MFM clinic from a conventional medical treatment model to a telemedicine platform. We compared clinical productivity between the two models. Outcomes were analysed using standard statistical tests.

Results: We suffered three symptomatic COVID-19 infections among our clinical providers and staff prior to the conversion, compared with none after the conversion. We had a significant decrease in patient visits following the conversion (53.35 visits per day versus 40.3 visits per day, $p < 0.0001$). However, our average daily patient visits per full-time equivalent (FTE) were only marginally reduced (11.1 visit per FTE versus 7.6 visits per FTE, $p < 0.0001$), resulting in a relative decrease in adjusted work relative value units (6987 versus 5440). There was an increase in more basic follow-up ultrasound procedures, complexity (current procedural technology [CPT] code 76816 (10.7% versus 19.5%, relative risk [RR] 1.81, 95% CI 1.60–2.05, $p < 0.0001$)) over comprehensive follow-up ultrasound procedures, CPT code 76805 (17.2% versus 7.8%, RR 0.46, 95% CI 0.39–0.53, $p < 0.0001$) after conversion. Despite similar proportions of new consults, there was an increase in the proportion of follow-up visits and medical decision-making complexity evaluation and management CPT codes (e.g. 99214/99215) after the conversion (17.2% versus 24.6%, RR 1.43, 95% CI 1.26–1.63, $p < 0.0001$). There were no differences between amniocentesis procedures performed between the two time periods (0.3% versus 0.2%, $p = 0.5805$).

Conclusion: The rapid conversion of an MFM platform from conventional medical treatment to telemedicine platform in response to the novel coronavirus pandemic resulted in protection of healthcare personnel and MFM patients, with only a modest decrease in clinical productivity during the initial roll-out. Due to the ongoing threat from the novel coronavirus-19, an MFM telemedicine platform is a practicable and innovative solution and merits the continued support of CMS and health care administrators.

Keywords

Telemedicine, pregnancy, coronavirus-19, pandemic, COVID-19, telehealth, maternal care

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Introduction

The American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal and Fetal Medicine (SMFM) have advocated the use of telehealth services to improve access for women's health.^{1,2} In response to the COVID-19 Public Health Emergency, the Center for Medicare and Medicaid Services (CMS) expanded telehealth services through an 1135 waiver.³ These policy changes allowed reimbursement rates similar to an in-person visit and

expanded use of telecommunication platforms used by providers.³

Prior to the COVID-19 pandemic, telehealth services provided by Maternal Fetal Medicine (MFM)

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specialists included consultative services, remote monitoring of ultrasound recordings including fetal echocardiogram, genetic counselling, diabetes education, fetal heart rate monitoring and management of chronic medical disease (e.g. diabetes, chronic hypertension).^{1,4-8} Despite the advantages of a telemedicine platform for access to specialty care, state-specific regulations and facility-specific credentialing and privileging requirements in telehealth have resulted in barriers to its widespread adoption.¹

The description of obstetric telehealth services for prenatal care during the COVID-19 pandemic has recently emerged.^{9,10} Innovations such as a drive-through prenatal care model highlight the importance of adaptability and outside-the-box thinking to maintain care while protecting healthcare workers and patients. While routine prenatal care can be achieved through this model, MFM care requires a different approach, as the specialty is largely procedural based, including ultrasound exams and invasive prenatal testing.

We describe our experience with rapid conversion of our MFM outpatient clinic from a conventional medical treatment model to a telehealth clinic during the COVID-19 pandemic, and compare clinical productivity between the two models, taking into account the impact to our clinical providers and staff as a result of the pandemic.

Background

Clinic characteristics

The Center for Maternal and Fetal Care (CMFC) is located on three different campuses in the greater San Antonio area. We serve as a primary treatment and referral site for South and Central Texas with a referral base of over 100 providers. In 2019, we had over 10,000 annual visits. The CMFC providers include nine MFM specialists, two certified genetic counsellors and two certified diabetic educators. Clinic staff includes 10 sonographers, two nurses, three medical assistants, four front desk staff, one patient account coordinator and one administrative coding/billing specialist. There is immediate access to certified interpreters both in-person and through a language line. Individuals with disabilities have full access to the clinics. The clinic demographics for our three different campuses characterize the population we serve (Table 1).

Pre-pandemic CMFC telemedicine platform

When we first opened our clinics in 2016 we utilized telehealth to extend patient care to one location approximately 31 miles northeast of San Antonio,

prior to establishing a physical and permanently staffed clinic in 2019. Our telehealth team consisted of an on-site front desk staff and one sonographer, a remotely located single MFM physician, and remotely located certified diabetic educator and/or genetic counsellor as needed. We used the Health Insurance Portability and Accountability Act (HIPAA)-compliant telehealth platform Zoom™ to conduct the audiovisual visits. During this time, almost all of our providers, and some of our ultrasound technicians and clinical staff, participated in our telehealth platform. In the last year, our telehealth platform has consisted mainly of telehealth visits with our genetic counsellors and certified diabetic educators. The annual data for our satellite campus in Table 1 include visits performed with our telehealth platform that was in place for the first 5 months of 2019, and visits conducted in-person and via telehealth after the opening of our new office. In 2019, approximately half (48.2%) of the visits at that location were conducted via telemedicine.

Conversion to an MFM telemedicine platform

San Antonio, located in Bexar County, Texas, was officially declared to have community spread of the novel coronavirus on 19 March 2020 and a shelter-in-place order was established on 25 March 2020. We started converting our MFM practice to a telehealth clinic on 23 March 2020 after we received notification that 40% of our clinic staff had an exposure to a COVID-19 case, necessitating a 2-week quarantine, including four MFM physicians, and all of our certified diabetes educators and genetic counsellors.

The process of rapid conversion of our MFM clinic from a conventional medical treatment model to a telehealth clinic during the COVID-19 pandemic was a collaborative effort involving a team comprising an operations manager (MFM physician), a clinic manager, an information technology specialist, our lead sonographer and the clinical staff. We identified several barriers that required immediate solutions. Weekend notification of the quarantine left little time (approximately 36 hours) for the conversion from in-person patient care to a telehealth platform, so we had to act quickly. While an existing footprint for telehealth services was in place, this typically had to accommodate a single telemedicine visit with one physician, certified diabetic educator or genetic counsellor at each clinic. Therefore, a rapid expansion of the telehealth platform, to include technology to accommodate eight physicians, two genetic counsellors, two diabetic educators and eight ultrasound technicians simultaneously was needed, while ensuring compliance with regulations from the CMS. In addition, we had to ensure that all MFM providers were familiar with the appropriate

Table 1. Characteristics of our clinical sites in Bexar and Comal Counties in Texas.

	Pavilion	Westover Hills	New Braunfels
Location	Central	West	Northeast
Waiting room size (sq. ft)	165	944	330
Clinic size (sq. ft)	4394	5134	4000
Clinical staff on site			
Front desk	3	2	1
RN	1	0	1
MA	2	1	0
Sonographers on site	5–6	2–3	1
GC*	1	1	0
CDE*	1	1	0
Certified interpreter	2, language line	Language line	Language line
MFM physician availability (average per day)*	2.5	2	1
Total visits in 2019	7127	3013	677
New consult visits (%)	1343 (18.8)	679 (22.5)	178 (26.3)
Payor mix (%)			
Government	4967 (69.7)	1813 (60.2)	310 (45.8)
Commercial	1653 (23.2)	1003 (33.3)	349 (51.5)
Under/uninsured	1661 (23.3)	111 (3.7)	16 (2.3)
Other	320 (4.5)	81 (2.7)	2 (3.6)
Room types			
Ultrasound	5	4	2
Exam	0	1	0
NST	2	1	1
Nursing station	3	1	1
Consultation	3	2	1
Telemedicine workspaces	2	3	3
Physician workspaces	6	2	2
Sonographer workspaces	1	3	2
Research office	1	N/A	N/A
Clinic manager office	1	1	0
Genetic Counsellor office	1	1	0
CDE office		1	1
Ultrasound equipment			
Type	GE Voluson E-10s	GE Voluson E-10s 3, GE Voluson P8	GE Voluson E-10s
Number of US machines	5	1	2
Reporting system	ViewPoint PACs	ViewPoint PACs	ViewPoint PACs

*Providers with telemedicine capability to all three clinics; RN: registered nurse; MA: medical assistant; GC: genetic counsellor; CDE: certified diabetic educator; GE: General Electric; US: ultrasound.

coding and billing for telehealth services. Finally, because the personal protective equipment (PPE) for our hospital and clinics was sparse at the time, we required discussions with the COVID-19 Incident Commander, a clinician leader charged with coordinating our institution's response to the pandemic, regarding protection of our clinical staff providing in-person patient care.

We had several virtual meetings over the 36 hours to plan for pivoting to a telemedicine platform. Because of the quarantining of nearly half the staff, we decided to open the telemedicine clinic in a single clinic location to have adequate staffing. We chose the campus with the largest waiting room and best layout for promoting

social distancing. Our clinic administrator purchased two tablets for this clinic, as the workstations in each ultrasound room were not telehealth compatible. We planned to use the HIPPA-compliant Zoom™ platform to perform the telehealth visit. In addition, we had a virtual meeting with all available providers and clinical staff the evening prior to launching to discuss details of the telemedicine clinic and ensure everyone was prepared for the transition the next morning.

We had previously been performing novel coronavirus symptom screening by phone one day prior to scheduled appointments (Figure 1). Patients who screened positive for symptoms were told to inform their OB provider, and the appointment was

Center for Maternal and Fetal Care

COVID-19 Screening Questions

Due to the COVID 19 pandemic, we will be asking the following questions to ensure everyone's safety:

Question 1: Have you (or anyone in your household) traveled outside of Texas, or to an area in the US (California, New York, Washington State, and Illinois) affected by the coronavirus (COVID-19) in the past 14 days? YES NO

Areas mandated by the 14 day Quarantine by the Governor as of 4/6/2020:

California, Connecticut, Louisiana, New Jersey, New York, Washington; Atlanta, Georgia; Chicago, Illinois; Detroit, Michigan, and Miami, Florida. Due to the Governor's Executive Order, any travelers from these jurisdictions are required to be on a 14-day quarantine. We will not schedule the appt. until after the 14th day of quarantine.

Question 2: Have you (or anyone in your household) had contact with someone with COVID-19 infection in the last 14 days? YES NO

Question 3: Do you have any of the following symptoms? Cough, fever, runny nose, shortness of breath, sore throat, diarrhea, vomiting, stomach pain? YES NO

Question 4: Have you been contacted by the U.S. Centers for Disease Control and Prevention (CDC) or your local Department of Health and placed under a quarantine for COVID-19 for any reason? YES NO

- For the health and safety of you and your care team, we are not allowing visitors to accompany you to your appointment at this time.
- We are requiring Universal masking at our clinic; we ask that you wear a mask to your appointment and do not take it off unless you have been instructed to do so by the clinical staff. **Examples of masks: bandana, homemade mask, medical mask. (We may have some at the screening station, but this is not guaranteed and you may be asked to reschedule your appointment).**
- Thank you for allowing us to serve your MFM's medical needs. Have a wonderful day.

If the patient answers "YES" to any of the questions, please inform their MFM physician and reschedule their appointment after 14 days.

Figure 1. Script used by clinical staff to screen for COVID-19 symptoms in clinic patients.

rescheduled for 2 weeks later. Although we had previously instituted a policy of only one support person at the visit, with the conversion to the telemedicine clinic we planned to immediately inform patients that no guests were allowed into the clinic with the patient unless there were extenuating circumstances (e.g. patients with disabilities).

To ensure protection of clinic staff, we coordinated with the hospital COVID-19 Incident Commander, who was actually an MFM physician, regarding protection of our clinical staff providing in-person patient care. At the time, the Centers for Disease Control and Prevention had not yet recommended universal masking for in-person patient care; however, we felt that continuation of a universal masking protocol for our MFM outpatient operations would be most appropriate, as social distancing could not be maintained for our staff providing in-person patient care, especially our sonographers. The Incident Commander subsequently approved our request. We asked the clinical staff to use one surgical mask every 72 hours unless it became soiled, which was consistent with hospital PPE policies. Gloves were changed after each patient encounter. Sonographers were also encouraged to wear eye protection during ultrasound examinations. All staff providing in-person patient care were briefed by the clinic manager on proper donning and doffing of PPE and social distancing guidelines.

We developed a flow chart for the patient visit process (Figure 2), and shared this with the MFM providers and clinical staff prior to launching the telemedicine visit. We planned to utilize a virtual check-in process, whereby upon arrival for their appointment, the patient would call from the parking lot to check in. When they were ready to be seen, they were notified by phone to proceed to the clinic. Upon arrival, the patient would be greeted by our nursing staff and immediately taken to a room to collect vital signs and perform the intake, thus eliminating the patient waiting room experience. If they reported any concerning symptoms, the nursing staff was instructed to contact the MFM physician for further recommendations. If they passed this screen, they were placed in the ultrasound room and underwent the indicated procedures by the PPE-equipped ultrasound technician. After the ultrasound was completed, the sonographer would communicate with the physician and review the images; if no further imaging was recommended, the sonographer initiated a Zoom™ telehealth visit with the physician, usually keeping the patient in the same ultrasound room. If needed, the providers could dial in the genetic counsellor certified diabetic or language line translator to join the Zoom™ session. Physicians were instructed to confirm the patient's identity and obtain verbal consent at the start of each visit. Documentation

of the ultrasound procedure(s) and consult, including consent for telehealth visit, was performed in GE Viewpoint™ 6 PACS system, and coded in our electronic medical record. Physicians were provided with billing codes and modifiers for telehealth visits. Consult and procedure reports were sent to the referring provider following the visit. After the provider(s) met with the patient, the ultrasound technician or medical assistant would escort the patient to the lab collection area if indicated, or to the checkout area where the front desk staff scheduled any ordered follow-up appointments. The clinical staff and patients were encouraged to maintain social distancing as much as possible during the visit. All equipment, including blood pressure cuff, waiting room chairs (if used), ultrasound equipment and cords, and ultrasound beds were wiped down with an approved germicidal disposable wipe after each patient visit, and transvaginal probes were disinfected per standard protocols with Trophon® Sonex-HL®.

A small group of our MFM physicians reviewed all appointments for the week and determined if the upcoming appointment was essential, or if the patient could be rescheduled based on guidelines adopted from a timely manuscript published by Boelig et al.¹⁰ These guidelines included recommended frequency and timing of MFM care during the novel coronavirus pandemic.⁴ The clinical staff then contacted each patient to inform them of the new telehealth process initiated to protect them, the providers and the clinic staff. The staff either provided patients with a reminder to keep the appointment or rescheduled the appointment based on the MFM physician recommendation that the appointment could be safely delayed (typically by 1–3 weeks). We also sent a letter to all of our patients explaining the need for conversion to a telehealth visit with their provider via Zoom™ platform (Appendix).

Our initial goal in implementing the telehealth platform was to maintain patient access to care while accommodating the loss of clinical staff and providers from quarantine. We also aimed to continue the telemedicine platform following the quarantine to optimize and preserve PPE needed throughout the novel coronavirus pandemic, and reduce the chance that more staff or providers would become ill with COVID-19.

Methods

The study was approved by the Institutional Review Board (IRB) of the Baylor College of Medicine (H-47839). We reviewed outpatient clinic metrics for all patient visits for the 8-week period (40 clinic days between 23 March 2020 and 18 May 2020)

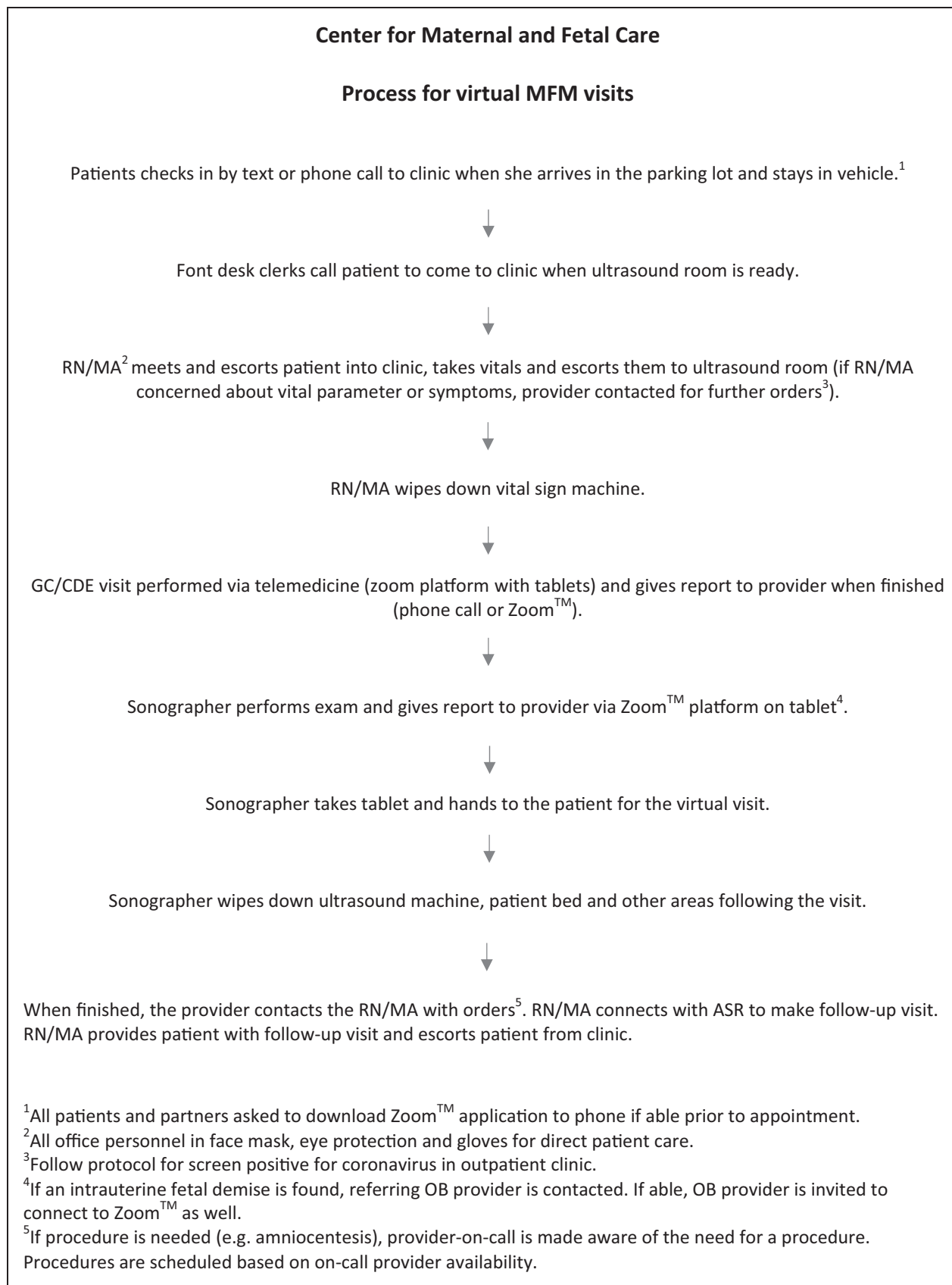


Figure 2. Flowchart for telemedicine visits to the MFM clinics (RN: registered nurse; MA: medical assistant, ASR: ambulatory service representative).

following implementation of the telemedicine platform, compared with the 8-week period (40 clinic days between 27 January 2020 and 20 March 2020) of pre-pandemic conventional medical care immediately prior to the telehealth platform conversion. We performed a search of our outpatient electronic health record (AthenaHealth™) for the pre-specified time period for total patient visits, total no-shows, evaluation and management (E&M) current procedural technology (CPT) codes, and ultrasound and invasive procedure CPT codes. Statistical analyses were performed with Microsoft® Excel for Mac version 16.36 and MedCalc for Windows, version 15.0 (MedCalc Software, Ostend, Belgium). A *t*-test comparison of means was performed to detect differences in observed means between the pre- and post-conversion cohorts, and reported as the difference \pm standard errors of mean with 95% confidence intervals. A relative risk (RR) ratio was used to detect differences in productivity outcomes between the two cohorts with 95% confidence intervals. A chi-square test of independence was done to evaluate patient satisfaction scores between the two cohorts. A two-tailed *p*-value <0.05 was considered significant.

Results

We found that 100% of providers utilized the telehealth platform, with nine of our 11 providers using audiovisual interactions from their homes and the other two providers utilizing offices within the clinics. Phone consultation was available if audiovisual interaction was not feasible; phone consultation was generally limited to telehealth consultations to the patient's home for follow-up discussion regarding testing results and/or for counselling with our diabetes educator or genetic counsellor when the patient did not have access to a HIPPA-secure audiovisual platform. A single on-call MFM provider was available for in-person patient care in the event procedures such as an amniocentesis or cervical examination were required. All clinical staff rendering in-person patient care wore surgical masks and gloves starting the day of the conversion. Our health system instituted a policy of masking the patient on 3 April 2020, which was reinforced by our local government who implemented a universal face covering policy for all citizens on 17 April 2020.

We initially consolidated all of our visits to a single clinical site with the largest footprint, mainly due to the initial lack of clinical staffing to run three clinics. However, we realized on the first day of the telemedicine clinic visits that it was hard to promote social distancing for staff, so we requested additional clinical support from across our hospital system, and on day

two we were able to open up a second clinic location. By the end of the first week, we had resumed operations at all three clinics, allowing for improved social distancing and increased patient access, corresponding with increased efficiency with telehealth operations. Fortunately, the second and third clinics were already equipped with much of the necessary audiovisual capability to perform telehealth. The additional equipment cost for conversion to telehealth from our conventional model platform to a telemedicine platform was US \$2150.00 (two tablets, five cameras), making it a very cost-effective transition.

There was a total of 40 clinic days in the 8 weeks prior to the clinic conversion from the novel coronavirus, and a total of 40 clinic days in the 8-week period after conversion to a telemedicine platform. Total physician visits were 2134 prior to conversion, and 1570 post-conversion. Average visits per day were 53.35 (range, 24–71) prior to conversion, and 40.33 (range 24–58) after the conversion to a telemedicine platform.

Prior to the conversion three of our clinical staff were diagnosed with the novel coronavirus, with two being some of the first cases of community spread in San Antonio. In the 8 weeks following conversion to a telemedicine clinic, we had no symptomatic cases of the novel coronavirus, although we did not perform universal testing for clinical staff to assess for asymptomatic or pre-symptomatic cases. About half of our MFM providers and one-quarter of our clinical staff were tested during the quarantine period and were found to be negative. Some 40% of our perinatal sonographer staff was unable to provide in-person patient care following exposure due to required quarantine; therefore, only six sonographers were available for in-person patient care during the telemedicine clinic period. All certified genetic counsellors and certified diabetic educators were quarantined. Also, during the telemedicine period, capacity to provide in-person MFM physician full-time equivalent (FTE) staffing for clinics was reduced by 21% (4.8 FTE to 3.8 FTE). Reductions resulted from quarantine (two MFM providers), acute COVID-19 infection (one MFM provider) and redirection of clinical efforts to COVID-19 hospital leadership response (one MFM provider). In response to this immediate and dramatic reduction in in-person patient care clinical capacity, all clinically available physicians (including those in quarantine) provided telehealth care, and those who had previously been allocated for less than one FTE of clinical work expanded their clinical efforts, resulting in an average net increase of clinical capacity of 9.4% (4.8 FTE to 5.3 FTE) during the telemedicine period (Table 2). While the average visits per day decreased, the average number of daily patients seen per FTE only modestly decreased from an average of 11.1 visits per FTE versus 7.6 visits

Table 2. Change in clinic productivity prior to and following conversion to a telemedicine MFM clinic.

	Pre-conversion	Post-Conversion	Difference +/-SEM (95% confidence interval)	Relative risk (95% confidence interval)	p-Value
Total clinic days	40	40			
Total physician visits	2134	1570			
Average clinical FTEs (physician)	4.8	5.3			
Average visits per day (range)	53.35 (24–71)	40.33 (24–58)	-13.0 ± 0.28 (-12.4 to -13.6)		<0.0001*
Average visits per day per average clinical FTE	11.1 (5.0–14.8)	7.6 (4.5–10.9)	-3.50 ± 0.30 (-2.92 to -4.08)		<0.0001*
Total no-shows (%)	878 (29.2)	427 (21.4)		0.66 (0.60–0.73)	<0.0001*
Ultrasound CPT codes	3564	2717			
Total count (%)					
76801	114 (3.2)	86 (3.2)			0.9896
76802	6 (0.2)	6 (0.1)			0.638
76805	613 (17.2)	213 (7.8)		0.46 (0.39–0.53)	<0.0001*
76810	14 (0.4)	10 (0.4)			0.8748
76811	410 (11.5)	338 (12.4)			0.2562
76812	17 (0.5)	9 (0.3)			0.3755
76813	70 (2.0)	59 (2.2)			0.5659
76814	5 (0.1)	3 (0.1)			0.7428
76815	51 (1.4)	18 (0.1)		0.46 (0.27–0.79)	0.0048*
76816	383 (10.7)	529 (19.5)		1.81 (1.60–2.05)	<0.0001*
76817	105 (2.9)	113 (4.2)		1.41 (1.09–1.83)	0.0096*
76818	29 (0.8)	24 (0.9)			0.7651
76819	1186 (33.3)	834 (30.7)		0.92 (0.86–0.99)	0.0305*
76820	279 (7.8)	160 (5.9)		0.75 (0.62–0.91)	0.0030* ¹
76821	49 (1.4)	35 (1.3)			0.7671
76825	111 (3.1)	131 (4.8)		1.55 (1.21–1.98)	0.0005*
76826	18 (0.5)	18 (0.7)			0.4142
93325	104 (2.9)	131 (4.8)		1.65 (1.28–2.13)	0.0001*
E&M CPT codes	2134	1570			
Total count (%)					
99243	126 (7.6)	53 (0.3)		0.57 (0.42–0.78)	0.0005*
99244	122 (7.1)	51 (0.3)		0.57 (0.41–0.78)	0.0005*
99245	68 (4.0)	33 (2.1)		0.66 (0.44–0.99)	0.0471*
99212	150 (6.6)	17 (1.1)		0.15 (0.09–0.25)	<0.0001*
99213	1209 (51.0)	833 (53.1)		1.07 (1.01–1.13)	0.0308*
99214	346 (17.0)	340 (21.7)		1.34 (1.17–1.53)	<0.0001*
99215	20 (1.1)	46 (2.9)		2.30 (1.37–3.87)	0.0017*
99203	20 (1.2)	43 (2.7)		2.16 (1.28–3.65)	0.0041*
99204	54 (3.2)	99 (6.3)		2.49 (1.80–3.45)	<0.0001*
99205	19 (1.1)	55 (3.5)		3.93 (2.35–6.60)	<0.0001*
99244/45 vs. 99204/05	190 (8.9)	154 (9.8)			0.348
99214/99215	366 (17.2)	386 (24.6)		1.43 (1.26–1.63)	<0.0001*
Amniocentesis CPT codes					
59000	6 (0.3)	3 (0.2)			0.5806

*Denotes statistical significance. SEM: standard error of the mean; N/A: not applicable; FTE: full-time equivalent; CPT: current procedural technology; E&M: evaluation and management.

per FTE, $p < 0.0001$ (Table 2). The immediate financial impact of the conversion was a net reduction in adjusted work relative value units (wRVUs) of 22%, resulting in a 17% reduction in net payment in professional fees despite fewer denials during the post-conversion period (Table 3).

All of the contacted patients agreed to the telehealth visit. In the first 3 weeks after conversion, an average of 2–3 patients a day would present for a visit who we were unable to contact, and in these instances the patient was immediately taken to a private room to promote social distancing and worked into the

Table 3. Comparison of professional component financial data during the pre-conversion period versus the post-conversion (telemedicine) period in response to the COVID-19 pandemic.

	Pre-conversion	Post-conversion
Adjusted Work RVUs	6987	5440
Claims	3941	2634
Denials	417	215
Net payment (USD)	\$224,483	\$185,565

RVU: relative value units. Ultrasound technical component and facility fees are not reflected.

schedule. Our patient no-show rate decreased by 34% during the telemedicine period (Table 2).

The rates of several E&M codes and ultrasound procedures also changed following implementation of the telemedicine clinic. As expected, the use of telehealth E&M codes for new consults (e.g. CPT codes 99203–99205) exceeded E&M codes for in-person new consults (e.g. CPT codes 99243–99245) after implementation of the telemedicine clinic. Ultrasound CPT code 76805 decreased (17.2% versus 7.8%, RR 0.46, 95% CI 0.39–0.53, $p < 0.0001$) while ultrasound CPT code 76816 increased (10.7% versus 19.5%, RR 1.81, 95% CI 1.60–2.05, $p < 0.0001$). There was an 85% decrease in established low-complexity visits (E&M CPT code 99212) after implementation of the telemedicine clinic (6.6% versus 1.1%, RR 0.15, 95% CI 0.09–0.25, $p < 0.0001$). We decided to not include the low-complexity telemedicine visit codes in the analysis as each group had fewer than 10 patients, and they were roughly equal sized between time periods. There were significantly more established visits, and more established visits coded at a higher medical decision-making complexity, after conversion to a telemedicine platform compared with the pre-pandemic period (e.g. E&M CPT 99214/99215), (17.2% versus 24.6%, RR 1.43, 95% CI 1.26–1.63, $p < 0.0001$). The numbers of invasive procedures for both time periods were not significantly different ($p = 0.5805$). Curiously, there was a relative increase in the proportion of fetal echocardiograms performed during the telemedicine platform versus pre-pandemic period (4.8 versus 3.1%, RR 1.55, 95% CI 1.21–1.98, $p = 0.0005$).

We had 31 responses to our Press Ganey® patient satisfaction surveys during the pre-conversion period versus 23 responses during the telemedicine period. Patients rated six domain items the pre-conversion period, including access, care provider, nurse/assistant, moving through your visit, telemedicine technology, personal issues and overall assessment. In the post-conversion period, a survey of telemedicine technology was added for a total of seven domain items assessed. Table 4 outlines the results. The majority of items were

rated as positive in both periods. There were five positive comments that specifically mentioned the safety precautions that the clinic took to keep patients safe during the pandemic period. The majority of negative comments had to do with wait times in both periods, but there were two comments disagreeing with our policy of not allowing partners to accompany the patient into the clinic for the visit following the telemedicine conversion. There were also four comments observing incorrect mask wearing (below the nose) and/or social distancing practice during the telemedicine conversion. A chi-square test of independence showed that there was no significant association between pre- and post-conversion and patient satisfaction in any domain (p -value > 0.05 , Table 4).

Discussion

Due to a quarantine of 40% of our staff and focus on expanding telehealth services for MFM patients during the novel coronavirus pandemic, our MFM clinic rapidly expanded to HIPAA-compliant, interactive audiovisual telehealth visits. Advantages of this new telehealth platform included promotion of social distancing, a reduction in healthcare visits for the patient, conservation of PPE, and protection of more healthcare workers from contracting the novel coronavirus.

There were several observed changes in the E&M and procedures performed during patient visits following the conversion. The increase in medical decision-making complexity in follow-up visits during the telemedicine platform likely resulted from increased time given for each patient encounter on the telemedicine platform, coupled with scaling back of the clinic to the most essential (highest complexity) patient visits. The shift to keeping appointments for higher complexity patients only may also explain the relative increase in fetal echocardiograms performed in our telemedicine clinic, and the significant reduction in low-complexity visits (E&M CPT code 99212). The observed reduction in comprehensive anatomic follow-up procedures (CPT code 76805) and increase in basic follow-up procedures (CPT code 76816) was anticipated, and expected, as prior to the pandemic, we had made an internal decision to change our approach to follow-up visits and deliberately perform and subsequently use the ultrasound CPT code 76816 for the majority of follow-up scans. This serendipitous change also provided the benefit of reducing in-person patient exposure to our front-line sonographer staff. Our analysis only captured E&M and procedure-based CPT codes and not cost revenue, so we did not perform a cost utility analysis of the telemedicine MFM clinic.

Despite the reduction in patient access after conversion to a telemedicine clinic, we only saw a modest

Table 4. Comparison of Press Ganey® patient satisfaction survey responses during the pre-conversion period versus the post-conversion (telemedicine) period in response to the COVID-19 pandemic.

Domain	Total # responses (n)	Responses			p-value
		Positive	Neutral/Mixed	Negative	
Access					
Pre-conversion	31	77%	6%	16%	0.8629
Post-conversion	23	83%	4%	13%	
Care Provider					
Pre-conversion	10	60%	30%	10%	1.0000
Post-conversion	10	70%	20%	10%	
Nurse/Assistant					
Pre-conversion	10	80%	20%	0%	0.6440
Post-conversion	6	83%	17%	0%	
Moving Through Visit					
Pre-conversion	7	43%	28%	29%	0.7247
Post-conversion	9	67%	0%	33%	
Telemedicine Technology					
Pre-conversion	0	0%	0%	0%	N/A
Post-conversion	1	0%	0%	100%	
Personal Issues					
Pre-conversion	5	60%	40%	0%	0.5614
Post-conversion	3	67%	0%	33%	
Overall Assessment					
Pre-conversion	3	33%	66%	0%	0.5614
Post-conversion	5	40%	0%	60%	

decrease in our clinical productivity per FTE with the initial roll-out. This was partly due to our quarantined providers and clinical staff easily and quickly adapting to the expanded telemedicine platform because of their prior experience with telehealth, and partly due to the significant decline in the patient no-show rate by 34% in the 8 weeks after implementation of the telemedicine clinic. We speculate that the no-show rate dropped dramatically due to scaling back of the clinic to the most essential visits during this time, which may have self-selected for more compliant, higher risk patients. Sheltering-in-place ordinances and decreased economic activity likely resulted in fewer work-related time constraints, allowing patients to answer phone calls reminding them of the scheduled visit and have greater flexibility to come for their clinic visit. Finally, the increased need for patient reassurance during the early days of the pandemic, when fear and uncertainty were highly prevalent, may have also contributed to a reduction in the no-show rate.

The impact of the immediate conversion and staffing reductions due to the pandemic ultimately resulted in a decrease in adjusted work RVUs and claims dropped during the post-conversion period. This was to be expected with the anticipated reduced efficiency of the

initial immediate roll-out of expanded telemedicine services, and the intentional reduction in the numbers of patient visits in the early weeks of the conversion in anticipation of a potential influx of COVID-19 patients. Net payment decreased by 22%, but this difference may be exaggerated due to pending payment for denials from the post-conversion period. Also, our financial analysis only reflected the professional component financial data; technical and facility financial data were not provided. While not included in this analysis, the efficiency of our telehealth platform continues to improve, and in July 2020 the volume of clinical visits was the highest since January 2020, despite a surge in COVID-19 cases in our community.

Feedback from patients on the use of telehealth platforms was generally positive. At the very beginning of the transition, several patients did not respond to our phone calls or voicemails describing the rapid transition and our new policy that only the patient would be allowed to attend the visit. Specifically, there were two separate instances where security had to be called by our front desk staff to intervene and/or escort an upset partner from the premises. Based on these interactions, we quickly pivoted to invite loved ones to join the Zoom™ session if desired, and participate in the

telehealth consultation including physician-guided review of the ultrasound. In addition, based on negative feedback on mask wearing and social distancing practices on our Press Ganey® patient satisfaction surveys early on, we now routinely reinforce the correct procedures for mask wearing and social distancing to our staff.

The MFM providers were initially worried about the lack of robust in-person care diminishing the quality of care. However, after the roll-out most thought that the quality of care provided during the telehealth visit was superior to that of a conventional model; they were able to provide a more focused visit with fewer of the external distractions that are present in daily, in-person operations of the clinic. MFM providers were also concerned about the lack of efficiency and patient access with a telemedicine platform, and this was observed in the initial roll-out of the clinic in total number of patient visits, which ultimately reflected the loss of in-person clinical productivity. However, as we gained experience in the telemedicine platform, we gained increased efficiency and patient access per FTE. Finally, many MFM providers expressed more personal satisfaction due to lack of commute times and increased after-hours personal time.

MFM physician leaders must continue to implement innovative solutions for the delivery of ambulatory care during the pandemic, centred on access to care and the promotion of patient safety and quality while maintaining a healthy workforce. The conversion of the MFM clinical operations from providing in-person care to telemedicine care is an innovative and necessary solution. The continued support for expansion of telehealth services from CMS, and from organizations such as ACOG and SMFM, is critical to the continued promotion of health and safety of MFM patients and healthcare providers during the novel coronavirus pandemic and beyond.

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References

1. ACOG Committee Opinion No. 798. American College of Obstetricians and Gynecologists. Implementing telehealth in practice. *Obstet Gynecol* 2020; e73–e79.
2. Rad S, Smith D, Malish T, et al. SMFM Coding White Paper: Interim Coding Guidance: Coding for Telemedicine and Remote Patient Monitoring Services during the COVID-19 Pandemic. <https://www.smfm.org/covid-19-white-paper> (2020, accessed 15 May 2020).
3. Medicare Telemedicine Health Care Provider Fact Sheet. <https://www.cms.gov/newsroom/fact-sheets/medicare-telemedicine-health-care-provider-fact-sheet> (2020, accessed 30 May 2020).
4. Magann E, McKelvey S, Hitt W, et al. The use of telemedicine in obstetrics: A review of the literature. *Obstetr Gynecol Survey* 2011; 66: 170–178.
5. Odibo I, Wendel P and Magann E. Telemedicine in obstetrics. *Clin Obstetr Gynecol* 2013; 56: 422–433.
6. Lowery C and Ott R. Statewide telehealth program enhances access to care, improves outcomes for high-risk pregnancies in rural areas. AHRQ Health Care Innov Exchange. <https://innovations.ahrq.gov/profiles/statewide-telehealth-program-enhances-access-care-improves-outcomes-high-risk-pregnancies> (2014, accessed 9 July 2020).
7. Greiner A. Telemedicine applications in obstetrics and gynecology. *Clin Obstetr Gynecol* 2017; 60(4): 853–866.
8. Fryer K, Delgado A, Foti T, et al. Implementation of obstetric telehealth during COVID-19 and beyond. *Matern Child Health J* 2020; 24: 1104–1110. DOI: 10.1007/s10995-020-02967-7
9. Turrentine M, Ramirez M, Monga M, et al. Rapid deployment of a drive-through prenatal care model in response to the coronavirus disease 2019 (COVID-19) pandemic. *Obstetr Gynecol* 2020; 136: 29–32.
10. Boelig RC, Saccone G, Bellussi F, et al. MFM guidance for COVID-19. *Am J Obstetr Gynecol* 2020; 2 (Suppl.): Article 100106. DOI: 10.1016/j.ajogmf.2020.100106

Appendix. Sample letter to patients explaining the transition to a telehealth clinic due to novel coronavirus 2019 pandemic.



To Our Valued Patients,

As you are aware, the World Health Organization has declared Coronavirus (COVID-19) a global pandemic. In an effort to protect our patients and their families, as well as our staff and their families, we will be making adjustments to our clinic schedules and incorporating telemedicine visits to follow the current guidelines. The goal of this is to reduce the patient risk through healthcare exposure and to reduce the overall burden of COVID-19 transmission throughout the community.

Our physicians are devoted to making sure we continue a high level of care by reviewing your case on an individual basis and scheduling your visits in accordance with the latest evidence-based guidelines for the care of high-risk pregnancies during this time. Elective or non-urgent visits are being postponed and/or done by telemedicine. All of our patients are being contacted as quickly as we can to alert them of any changes and provide them with guidance around their visit. We appreciate your patience with us as we navigate this challenging time.

When coming for an office visit, there are some other changes as well.

- Significant others are being asked to wait in the car or at home. We are also asking that you leave children at home under appropriate supervision.
- Please be aware that all patients seen in clinic are being screened for fever, cough or other signs of illness. If you know you are sick, please call the clinic before coming and we will be happy to direct you on where to go for evaluation and will reschedule your appointment.
- Once you have arrived and parked, call the office to let us know you are here. The front office staff will then call you back when the provider is ready to see you. We are doing this to prevent patients from congregating in the waiting room. If you have notified the front desk that you are here, but do not receive a call back within 15 minutes, please call the front desk again. The numbers are provided below.

More information on prevention of coronavirus, and frequently asked questions, can be found at www.pregnancy covid19.com. Scroll down the page and follow the link to [patient information]. We encourage you to visit this website for the latest information on coronavirus and pregnancy, and a detailed description on social distancing to prevent spread of the infection.

We are truly grateful to have you as our patient. We are dedicated to doing what is in the best interest for keeping you and your family healthy and safe. Thank you very much for your patience during this time.

Sincerely,
Your Health Care Team at
Center for Maternal Fetal Care

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