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Impact of the COVID-19 Pandemic on Prenatal Care Utilization at a Public Hospital

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Abstract

Objective The aim of the study is to compare rates of prenatal care utilization before and after implementation of a telehealth-supplemented prenatal care model due to the coronavirus disease 2019 (COVID-19) pandemic.

Study Design Using electronic medical record data, we identified two cohorts of pregnant persons that initiated prenatal care prior to and during the COVID-19 pandemic following the implementation of telehealth (from March 1, 2019 through August 31, 2019, and from March 1, 2020, through August 31, 2020, respectively) at Grady Memorial Hospital. We used Pearson's Chi-square and two-tailed *t*-tests to compare rates of prenatal care utilization, antenatal screening and immunizations, emergency department and obstetric triage visits, and pregnancy complications for the prepandemic versus pandemic-exposed cohorts.

Results We identified 1,758 pregnant patients; 965 entered prenatal care prior to the COVID-19 pandemic and 793 entered during the pandemic. Patients in the pandemic-exposed cohort were more likely to initiate prenatal care in the first trimester (46.1 vs. 39.0%, $p = 0.01$), be screened for gestational diabetes (74.4 vs. 67.0%, $p < 0.001$), and receive dating and anatomy ultrasounds (17.8 vs. 13.0%, $p = 0.006$ and 56.9 vs. 47.3%, $p < 0.001$, respectively) compared with patients in the prepandemic cohort. There was no difference in mean number of prenatal care visits between the two groups (6.9 vs. 7.1, $p = 0.18$). Approximately 41% of patients in the pandemic-exposed cohort had one or more telehealth visits. The proportion of patients with one or more emergency department visits was higher in the pandemic-exposed cohort than the prepandemic cohort (32.8 vs. 12.3%, $p < 0.001$). Increases in rates of labor induction were also observed among the pandemic-exposed cohort (47.1 vs. 38.2%, $p < 0.001$).

Conclusion Rates of prenatal care utilization were similar before and during the COVID-19 pandemic. However, pregnant persons receiving prenatal care during the pandemic entered care earlier and had higher utilization of certain antenatal screening services than those receiving prenatal care prior to the pandemic.

Keywords
- COVID-19
- prenatal care
- telehealth
- antenatal screening

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Key Points

- Patients initiated prenatal care earlier during the COVID-19 pandemic.
- Uptake of telehealth services was low.
- Rates of diabetes screening and ultrasound use increased during the pandemic.

The delivery of outpatient care in the United States changed dramatically during the coronavirus disease 2019 (COVID-19) pandemic. Beginning in March 2020, many health systems nationwide rapidly adopted practice changes, such as deferring elective visits, integrating telehealth services, adjusting staffing schedules, and modifying visit spacing for low-risk patients.[1–3] This transition resulted in multiple challenges in redesigning care delivery practices that adhered to clinical standards and reduced patient and provider exposure risk while maintaining timely and appropriate health care utilization.[4] Finding this balance was particularly critical in the obstetric care setting, as pregnant patients require frequent health system contact for prenatal care yet are at increased risk for coronavirus-associated pregnancy complications and worsened disease severity.[5,6]

In the absence of formal guidelines for revising traditional prenatal visit schedules in the setting of an infectious disease pandemic, many health systems developed alternate care models that aimed to reduce the number of in-person interactions by separating the components of prenatal care and focusing on testing and procedures during in-person visits while providing routine counseling during telehealth visits.[2,7–9] However, socially vulnerable patients may lack access to the technologies needed for telehealth services and may experience language barriers that hamper remote communication.[10,11] In addition, the transition to a reduced-frequency visit schedule has the potential to disproportionately affect prenatal care adequacy in low-resource and racial and ethnic minority populations that have historically low rates of care utilization and face social and structural barriers to accessing care that have been exacerbated during the COVID-19 pandemic.[12]

Information on patterns of prenatal care utilization in the COVID-19 epoch is limited. Findings from one study indicate that nearly one-third of prenatal visits in New York City prenatal clinics were conducted via telehealth early in the pandemic with high rates of no-shows (>24%) for telehealth visits at health clinics serving predominantly Medicaid-enrolled patients.[13] Among pregnant patients receiving care in a public health system, use of audio-only telehealth visits during the COVID-19 pandemic was associated with earlier initiation of prenatal care and increased rates of prenatal care encounters when compared with traditional prenatal care prior to the pandemic.[7] The goal of the current study was to describe the impact of the COVID-19 pandemic on prenatal care utilization and receipt of guideline-concordant care, including specific components such as routine screening, immunization, and antenatal fetal surveillance,[14] at Grady Memorial Hospital, a large public hospital in Atlanta, GA.

Materials and Methods

Grady Memorial Hospital is a large safety net institution in Atlanta that serves a predominantly low-income, minority population. In response to the COVID-19 pandemic, providers at Grady Memorial Hospital's obstetric clinic transitioned to a modified prenatal care model in March 2020 with a goal of minimizing patient visits and face-to-face contact while meeting contemporary prenatal care recommendations.[14] The modified prenatal care model sought to reduce in clinic visit frequency by 50 to 65% by supplementing in-person care with telehealth, which included phone- or video-based (starting in November 2020) telehealth visits and home blood pressure monitoring. The model was designed for low-risk pregnancies and followed a structured schedule for in-person and telehealth visits in combination with a guideline-recommended schedule for laboratory testing and ultrasounds (high-risk pregnancies were followed with a modified prenatal care schedule with additional specifications for fetal surveillance; ►**Supplementary Table S1**, available in the online version). According to the algorithm, patients could have up to five telehealth visits during the course of their pregnancy. Patients receiving prenatal care prior to March 2020 received all care in-person; no telehealth visits were conducted. Consistent with current guidelines, patients with uncomplicated pregnancies in both time periods were scheduled to attend prenatal care visits every 4 until 28 weeks, every 2 weeks until 36 weeks, and weekly until delivery.[14]

The primary outcomes for this retrospective cohort study were prenatal care utilization and receipt of guideline-concordant prenatal care, as measured by prenatal testing and screening. Secondary outcomes included emergency department and obstetric triage visits, contraception and breastfeeding at discharge, and rates of pregnancy complications.

The data for the study were extracted from Grady Hospital's Obstetric and Gynecologic Outcomes database, an automated data collection system that captures electronic medical record information for all deliveries at Grady Memorial Hospital from 2011 onward. The database includes information on inpatient and outpatient encounters, including diagnoses and procedures, laboratory test results, medication orders, obstetric and surgical history, immunizations, demographics (including self-reported race and ethnicity), and vital signs. We identified a prepandemic cohort of pregnant persons who had an initial prenatal care visit between March 1, 2019 and August 31, 2019 and delivered by February 29, 2020. This cohort therefore received only in-person prenatal care. We also identified a pandemic-exposed cohort of pregnant persons who attended an initial prenatal

care visit between March 1, 2020, and August 31, 2020, and delivered by February 28, 2021, the time period during which telehealth visits were integrated into prenatal care. All pregnant persons included in the study had at least one prenatal care visit. There were no additional exclusion criteria.

For each cohort, we extracted information on maternal demographic and clinical characteristics, timing and frequency of prenatal care visits, prenatal screening tests (urine culture, 1-hour glucose tolerance test, and infectious disease screening), timing and frequency of ultrasounds, maternal immunizations (influenza and tetanus, diphtheria, and pertussis [Tdap]), exclusive breastfeeding at discharge, and provision of contraception (tubal ligation, long-acting reversible contraceptives, or depot medroxyprogesterone acetate) prior to discharge. Chronic conditions and pregnancy complications were identified using International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10, ►Supplementary Table S2, available in the online version) codes reported at the delivery hospitalization or during prenatal care visits. We calculated adequacy of prenatal care utilization using the Kotelchuck index and included telehealth visits for patients in the pandemic-exposed cohort.[15] The Kotelchuck index, also known as the Adequacy of Prenatal Care Utilization Index, assesses timing of prenatal care initiation as well as the total number of prenatal care visits from initiation to delivery. Adequacy of care is categorized into inadequate (<50% expected visits), intermediate (50–79%), adequate (80–109%), and adequate plus (110% or more).[15] Infectious disease screening was considered present if there was documentation of laboratory testing for human immunodeficiency virus (HIV), Hepatitis B surface antigen, Hepatitis C antibody, syphilis, trichomonas vaginalis, gonorrhea, chlamydia, and a urine culture during pregnancy. HIV, Hepatitis B, and syphilis tests were only included if they occurred at least twice during the pregnancy, unless a patient entered prenatal care after 24 weeks of gestation. Immunizations received during the delivery hospitalization were not counted as our study sought to examine prenatal care practices consistent with the recommendations of the American College of Obstetricians and Gynecologists.[14] Exclusive breastfeeding at discharge was defined as newborns that were fed only breastmilk since birth. We also ascertained emergency department visits and obstetric triage visits occurring within the health system any time between the initiation of prenatal care and delivery, delivery mode, labor induction, and gestational age at delivery. Operative vaginal deliveries included vacuum and forceps deliveries. Trimesters were defined as 0 to 13 weeks and 6 days (first), 14 to 26 weeks and 6 days (second), 27 to 40 weeks (third). Ultrasound visits were identified using visit type information as reported in the EMR and included both inpatient and outpatient visits. Dating ultrasounds included those taking place before 12 weeks gestation. Anatomy ultrasounds included those taking place between 18 and 22 weeks of gestation. Long-acting reversible contraceptives and depot medroxyprogesterone acetate were identified using medication administration information in the EMR. Tubal ligation was identified used ICD-10 diagnosis and procedure codes (►Supplementary Table S2, available in the online version). We included contraceptive methods most reliably captured in the EMR.

We compared distributions of maternal characteristics, care utilization and testing, and outcomes for pregnant patients in the prepandemic and pandemic-exposed groups using Pearson's Chi-square and two-tailed *t*-tests for categorical and continuous outcomes, respectively. When more than 20% of cells had expected frequencies <5, Fisher's exact tests were used. *p*-Values <0.05 were considered statistically significant. Data were missing for ≤3% of the population and are reported in the table footnotes. We used SAS, version 9.4 (SAS Institute Inc., Cary, NC) for all analyses. This study was approved by the Institutional Review Board at Emory University and Grady Memorial Hospital's Research Oversight Committee.

We conducted two post-hoc sensitivity analyses. To assess potential racial/ethnic variations in prenatal care seeking behaviors due to the COVID-19 pandemic, we also calculated the distribution of race/ethnicity among all deliveries discharged between March 1, 2019, to February 29, 2020, and March 1, 2020, to February 28, 2021, including patients with no prenatal care and those receiving all of their prenatal care outside of Grady Health System. In a separate sensitivity analysis, we restricted the study population to low-risk patients, defined as singleton pregnancies without documented diagnosis of chronic hypertension, diabetes mellitus, cardiac disease, HIV/AIDS, or sickle cell disease, and compared utilization and outcomes for the prepandemic and pandemic-exposed groups within this low-risk population.

Results

We identified a total of 1,680 pregnant persons, including 933 (55.5%) in the prepandemic cohort and 747 (44.5%) in the pandemic-exposed cohort. (►Table 1) Patients in the pandemic-exposed group were less likely to be Hispanic (13.7 vs. 20.5%, respectively, $p = 0.01$) and more likely to be non-Hispanic Black (77.5 vs. 72.1%, respectively, $p = 0.01$) than patients in the prepandemic cohort. Similar trends were seen among all deliveries during the study period (►Supplementary Table S3, available in the online version). The mean age of patients in both cohorts was approximately 27 years (pandemic-exposed: 27.6 [SD = 6.3], prepandemic: 27.6 [SD = 6.7], $p = 0.22$). The majority of both cohorts used Medicaid/Medicare for health insurance (prepandemic: 86.7%, pandemic-exposed: 86.9%, $p = 0.71$). There was a little difference in the prevalence of chronic health conditions, with the exception of obesity, which was higher in the pandemic-exposed cohort than the prepandemic cohort (29.6 vs. 22.9%, $p = 0.002$). Among pregnant persons in the pandemic-exposed cohort 61 (8.2%) tested positive for COVID-19 during prenatal care or at delivery.

Patients in the pandemic-exposed cohort were more likely to initiate prenatal care in the first trimester compared with patients in the prepandemic cohort (46.1 vs. 39.0%, $p = 0.01$) and they initiate care at an earlier gestational age (17.0 weeks, SD = 8.3, vs. 18.0 weeks, SD = 8.6,

Table 1 Characteristics of women who entered prenatal care at Grady Memorial Hospital before and during the COVID-19 pandemic

	Total population $N = 1,680$	Prepandemic cohort[a] $N = 933$	Pandemic-exposed cohort[b] $N = 747$	*p*-Value
	N (%)	*N* (%)	*N* (%)	
Characteristic				
Race/ethnicity				
Hispanic	293 (17.4)	191 (20.5)	102 (13.7)	0.01
Non-Hispanic White	42 (2.5)	21 (2.3)	21 (2.8)	
Non-Hispanic Black	1,252 (74.5)	673 (72.1)	579 (77.5)	
Asian	30 (1.8)	18 (1.9)	12 (1.6)	
Multiracial	25 (1.5)	10 (1.0)	15 (2.0)	
Non-Hispanic other	22 (1.3)	13 (1.4)	9 (1.2)	
Unknown	16 (1.0)	7 (0.8)	9 (1.2)	
Age (y)				
< 20	184 (11.0)	104 (11.2)	80 (10.7)	0.56
20–34	1,219 (72.6)	665 (71.3)	554 (74.2)	
35–39	208 (12.4)	123 (13.2)	85 (11.4)	
40+	69 (4.1)	41 (4.4)	28 (3.8)	
Age (mean, SD)		27.6, 6.7	27.2, 6.3	0.22
Health Insurance				
Private	178 (10.6)	97 (10.4)	81 (10.8)	0.71
Medicaid/Medicare	1,458 (86.8)	809 (86.7)	649 (86.9)	
Uninsured/self-pay	44 (2.6)	27 (2.9)	17 (2.3)	
Parity[c]				
0	581 (34.7)	311 (33.4)	270 (36.2)	0.45
1	458 (27.3)	256 (27.5)	202 (27.1)	
2+	636 (38.0)	363 (39.0)	273 (36.6)	
Plurality				
Singleton	1,649 (98.2)	914 (98.0)	735 (98.4)	0.51
Multiple	31 (1.9)	19 (2.0)	12 (1.6)	
Chronic conditions				
Diabetes mellitus	60 (3.6)	38 (4.1)	22 (3.0)	0.21
Hypertension	217 (12.9)	115 (12.3)	102 (13.7)	0.42
Asthma	316 (18.8)	172 (18.4)	144 (19.3)	0.66
Obesity	435 (25.9)	214 (22.9)	221 (29.6)	0.002
Cardiac disease	46 (2.7)	23 (2.5)	23 (3.1)	0.44
HIV/AIDS	19 (1.1)	10 (1.1)	9 (1.2)	0.80
Mental health disorder	167 (9.9)	93 (10.0)	74 (9.9)	0.97
Renal disease	14 (0.8)	7 (0.8)	7 (0.9)	0.68
Sickle cell disease	7 (0.4)	4 (0.4)	3 (0.4)	1.00
Any chronic condition[d]	761 (45.3)	405 (43.4)	356 (47.7)	0.05

Abbreviations: COVID-9, coronavirus disease 2019; SD, standard deviation.
[a]Entered prenatal care between March 1, 2019, and August 31, 2019.
[b]Entered prenatal care between March 1, 2020, and August 31, 2020.
[c]Data missing for five women.
[d]Includes the chronic conditions listed in the table.

Table 2 Health care utilization for women who entered prenatal care at Grady Memorial Hospital before and during the COVID-19 pandemic

	Prepandemic cohort[a] $N = 933$	Pandemic-exposed cohort[b] $N = 747$	*p*-Value
	N (%)	*N* (%)	
Trimester prenatal care initiated			
First (0 to $13^{6/7}$ wk)	364 (39.0)	344 (46.1)	0.01
Second (14–$26^{6/7}$ wk)	392 (42.0)	279 (37.4)	
Third (27–40 wk)	177 (19.0)	124 (16.6)	
Number of prenatal visits (mean, SD)	7.1, 3.6	6.9, 3.2	0.18
Gestational age at first visit (mean, SD)	18.0, 8.6	17.0, 8.3	0.02
Number of telehealth visits			
0	N/A	444 (59.4)	
1	–	182 (24.4)	
2	–	81 (10.8)	
3+	–	40 (5.4)	
Prenatal care utilization (Kotelchuck)			
Adequate plus	119 (12.8)	97 (13.0)	0.20
Adequate	224 (24.0)	184 (24.6)	
Intermediate	131 (14.0)	130 (17.4)	
Inadequate	459 (49.2)	336 (45.0)	
Prenatal screening			
Urine culture	818 (87.7)	636 (85.1)	0.13
Diabetes screen (1-h GTT)	625 (67.0)	556 (74.4)	<0.001
Infectious disease screening[c]	437 (46.8)	359 (48.1)	0.62
Ultrasound			
Dating ultrasound (<12 wk)	121 (13.0)	133 (17.8)	0.006
Anatomy ultrasound (18–22 wk)	441 (47.3)	425 (56.9)	<0.001
Total number of ultrasounds			
0	50 (5.4)	27 (3.6)	0.006
1–2	342 (36.7)	267 (35.7)	
3–4	403 (43.2)	298 (39.9)	
5+	138 (14.8)	155 (20.8)	
Immunizations			
Tetanus, diphtheria, and pertussis	679 (72.8)	511 (68.4)	0.05
Influenza	393 (42.1)	303 (40.6)	0.52
Emergency department visits			
0	818 (87.7)	502 (67.2)	<0.001
1	89 (9.5)	165 (22.1)	
2+	26 (2.8)	80 (10.7)	
Obstetric triage visits			
0	315 (33.8)	233 (31.2)	0.51
1	241 (25.8)	209 (28.0)	
2	156 (16.7)	116 (15.5)	
3+	221 (23.7)	189 (25.3)	
Delivery length of stay (mean days, SD)	3.4, 2.4	3.4, 2.6	0.99

Table 2 (*Continued*)

	Prepandemic cohort[a] $N = 933$	Pandemic-exposed cohort[b] $N = 747$	*p*-Value
	N (%)	*N* (%)	
Contraception at discharge	411 (44.1)	317 (42.4)	0.51
Exclusive breastfeeding[d]	222 (24.5)	113 (15.8)	<0.001

Abbreviations: COVID-9, coronavirus disease 2019; N/A, not available; SD, standard deviation.
[a]Entered prenatal care between March 1, 2019, and August 31, 2019.
[b]Entered prenatal care between March 1, 2020, and August 31, 2020.
[c]Includes testing for HIV, Hepatitis B, Hepatitis C, syphilis, trichomonas vaginalis, gonorrhea, chlamydia, and a urine culture. (HIV, syphilis, and Hepatitis B testing had to occur at least twice during the pregnancy, except for patients entering care after 24 weeks gestation).
[d]Data missing for 57 women.

$p = 0.02$; ►Table 2). Most patients in the pandemic-exposed cohort had no telehealth visits (59.4%), and 24.4% had only one telehealth visit.

There were no differences in the rates of prenatal care utilization, as demonstrated by mean number of prenatal visits for the pandemic-exposed and prepandemic cohorts (6.9, SD = 3.2 vs. 7.1, SD = 3.6, $p = 0.18$). While most patients in both cohorts had less than adequate prenatal care utilization as described by the Kotelchuck index, there was little difference in the proportion of patients with inadequate prenatal care utilization during and before the pandemic (45.0 vs. 49.2%, $p < 0.20$). There were no differences in urine culture and infectious disease screening between the two groups. The rate of diabetes screening increased from 67.0% in the prepandemic cohort to 74.4% in the pandemic-exposed cohort ($p < 0.001$). There was also an increase in the proportion of patients who received dating ultrasounds (13.0 vs. 17.8%, $p = 0.006$) and anatomy ultrasounds (47.3 vs. 56.9%, $p < 0.001$) during the pandemic. Additionally, there was an increase in the proportion of patients who received five or more ultrasounds (14.8 vs. 20.8%, $p = 0.006$). The proportion of pregnant persons receiving a Tdap immunization declined over the two time periods, although the difference did not reach statistical significance (72.8 vs. 68.4%, $p = 0.05$). A greater proportion of patients in the pandemic-exposed cohort had one or more visit to the emergency department compared with patients in the prepandemic cohort (32.8 vs. 12.3%, $p < 0.001$). There was no difference in the number of obstetric triage visits, hospital length of stay, or provision of contraception at discharge for the two groups. Rates of exclusive breastfeeding decreased from 24.5% in the prepandemic cohort to 15.8% in the pandemic-exposed cohort ($p < 0.001$). When the study population was restricted to 1,354 low-risk pregnancies, patterns of health care utilization were consistent with those observed in the full study population (►Supplementary Table S4, available in the

Table 3 Pregnancy complications for women who entered prenatal care at Grady Memorial Hospital before and during the COVID-19 pandemic

	Prepandemic cohort[a] $N = 933$	Pandemic-exposed cohort[b] $N = 747$	*p*-Value
	N (%)	*N* (%)	
Hypertensive disorders[c]	289 (31.0)	258 (34.5)	0.12
Gestational hypertension	191 (20.5)	172 (23.0)	0.21
Preeclampsia (severe)	56 (6.0)	53 (7.1)	0.37
HELLP syndrome	6 (0.6)	3 (0.4)	0.74
Gestational diabetes	74 (7.9)	57 (7.6)	0.81
Mode of delivery:			
Vaginal	574 (61.5)	435 (58.2)	0.30
Vaginal operative	65 (7.0)	50 (6.7)	
Cesarean section	294 (31.5)	262 (35.1)	
Induction of labor	356 (38.2)	352 (47.1)	<0.001
Gestational age at delivery			
< 32 wk	38 (4.1)	30 (4.0)	0.96
< 37 wk	137 (14.7)	115 (15.4)	0.67

Abbreviations: COVID-19, coronavirus disease 2019; HELLP, hemolysis, elevated liver enzymes, and low platelet count.
[a]Entered prenatal care between March 1, 2019, and August 31, 2019.
[b]Entered prenatal care between March 1, 2020, and August 31, 2020.
[c]Includes gestational hypertension, preeclampsia (with and without severe features), HELLP syndrome, and eclampsia.

online version). Notably, only 45.8% of low-risk patients had one or more telehealth visits during the pandemic.

Overall rates of pregnancy complications were similar for patients receiving prenatal care before and during the COVID-19 pandemic (►Table 3). The one exception was labor induction, which increased from 38.2% in the prepandemic cohort to 47.1% in the postpandemic cohort ($p < 0.001$). Results were generally consistent when restricted to low-risk pregnancies, except for a significant increase in the rate of gestational hypertension in the pandemic-exposed cohort relative to the prepandemic cohort (26.7 vs. 21.7%, $p = 0.03$) (►Supplementary Table S5, available in the online version)

Discussion

Principal Findings

Overall, among patients receiving any prenatal care, we found no differences in prenatal care adequacy (as defined by the Kotelchuck index) or pregnancy-related complications following the implementation of a modified prenatal care model at Grady Memorial Hospital. In addition, a greater proportion of pregnant persons entered prenatal care during the first trimester and received recommended services during the COVID-19 pandemic, including diabetes screening and ultrasounds, suggesting that heightened health concerns related to the pandemic may have altered maternal health care seeking behaviors. Our findings are consistent with another study in a public health care system that found that women presented for care earlier during the pandemic had similar rates of prenatal care utilization before and after the implementation of phone telehealth services in the wake of COVID-19.[7] No other studies to date have described increases in rates of antenatal screening and fetal monitoring in the context of the COVID-19 pandemic. This finding was unexpected and may reflect closer adherence to screening timelines when following the combined in-person/telehealth visit schedule that was implemented during the pandemic, including efforts to schedule ultrasounds on the same day as in-person visits.

Results

The proportion of pregnant patients having at least one prenatal telehealth visit in our population is lower than the estimate reported by Duryea et al (41 vs. 67%, respectively) but consistent with Madden et al's rate in health clinics (41%). The low rate of telehealth uptake was apparent even among low-risk pregnancies (46%), suggesting that patient preferences may be an important driver of telehealth utilization in our population.

We observed an overall decrease in the number of women receiving prenatal care and a 33% decline in the proportion of Hispanic patients entering prenatal care during the pandemic. The reasons for these changes in our Hispanic population are not known but may be due to differences in perceptions regarding the health threat posed by COVID-19, contributing to lower overall rates of prenatal care utilization or a shift in care preferences.[16–18] It is possible that some patients who would have entered prenatal care later in pregnancy decided to opt out of prenatal care entirely, although the results of our sensitivity analysis suggest similar declines in the total proportion of Hispanic deliveries during the pandemic. Findings from some studies indicate that the use of telemedicine during the pandemic was lower among Hispanic patients than non-Hispanic White patients, suggesting that some Hispanic patients may have switched to prenatal care providers that did not adopt telehealth practices due to language barriers or other factors.[18–20] Another possibility is that because Hispanic families were disproportionately affected by the economic impacts of the COVID-19 pandemic and Hispanic women in the state of Georgia are often ineligible for Medicaid due to citizenship requirements, they may have chosen to forgo all prenatal care to avoid incurring health care costs.[21–25]

In contrast with national data among all U.S. adults, we found that the number of emergency department visits among pregnant persons increased during the COVID-19 pandemic.[26] This increase could be attributed to Grady Memorial Hospital's use of the emergency department as a dedicated COVID-19 evaluation and testing site during a portion of the study period. In addition, given the high rate of COVID-19 infection among the pandemic-exposed cohort (8%), pregnant patients may have presented to the emergency department due to COVID-19 symptoms. Another potential explanation is heightened fear of pregnancy complications and overall anxiety due to COVID-19.[27–29] Rates of labor induction were also significantly higher among the pandemic-exposed cohort, an expected finding given a widespread increase in scheduled inductions in an attempt to control a portion of hospital volume during this high-transmission risk time period.[30] During the pandemic, our institution's policy shifted to encourage 39-week elective labor induction. Some portion of this increase could also be explained by an increased need for labor induction secondary to the increased incidence of gestational hypertension found among our pandemic-exposed cohort.

Clinical Implications

Our findings suggest that implementation of a telehealth supplemented prenatal care model was not associated with changes in prenatal care utilization or adverse perinatal outcomes. Our results also demonstrated increased utilization of ultrasounds and diabetes screening among the pandemic-exposed cohort. Protocols that streamlined prenatal care services during the pandemic may have reduced inequities in care delivery and contributed to increased delivery of prenatal screening observed in this study. Other possible reasons for increased diabetes screening during the pandemic include heightened anxieties regarding pregnancy complications during the pandemic[27–29] and less travel time and costs for patients utilizing telehealth. This could increase attendance at the reduced number of essential in-person appointments where patients can receive recommended services such as diabetes screening and ultrasounds during the course of prenatal care. Notably, we observed an increased number of patients with obesity in the pandemic-exposed cohort, which is consistent with national reports of increasing rates of prepregnancy obesity over time.[31]

We also observed a decreased rate of breastfeeding during the pandemic. As workplace restrictions shifted, more mothers were able to work from home, which may have had a positive effect on breastfeeding.[32] However, varied social and family support, mixed information from providers and community received on breastfeeding in the pandemic (whether it is safe for the baby or not), as well as emotional effects of the pandemic could have contributed to a negative increase in breastfeeding initiation.[32] Although hospital protocols and clinical recommendations were there to encourage breastfeeding in COVID-19 positive mothers, fewer may have initiated due to safety concerns. However, only 65 patients in our pandemic-exposed cohort (8.2%) tested positive for COVID-19 during prenatal care or at delivery. Future studies of the impacts of the COVID-19 pandemic on postpartum breastfeeding behavior are warranted.

Telehealth uptake among our pandemic-exposed population was lower than expected, even among low-risk pregnancies. Preliminary data from our qualitative work with this population suggests that some pregnant patients preferred in-person visits because they found them to be more useful (e.g., provided an opportunity to hear the fetal heartbeat).[33] In addition, lack of clinical guidelines may have contributed to provider hesitancy to adopt telehealth services as part of routine prenatal care.[34] Inaccurate coding of telehealth visits in the electronic medical record or a high rate of no-show appointments may also have contributed to undercounting of the visits. Finally, it is possible that our population may have low mobile phone literacy, despite high rates of mobile phone ownership.[35] While additional studies with populations of higher telehealth adherence are needed to verify increased uptake of certain antenatal screening procedures with a similar prenatal care model, a positive relationship between telehealth utilization and increased routine antenatal screening is possible. Increased access to telehealth may translate to less travel time and cost for patients. This economic benefit as well as reduced time allowance may promote attendance at smaller number of essential in-person visits during the course of prenatal care.

Existing prenatal guidelines could be expanded to include telehealth as an option for prenatal visits, particularly given that current evidence suggests perinatal outcomes are comparable with the traditional care model.[36] However, additional support for staff and patients at safety net hospitals may be needed to fully support the integration and acceptance of telehealth, especially among patient populations with language or other socioeconomic barriers. The benefits of increased access to telehealth must also be balanced against privacy concerns and the need for appropriate regulations.[37] Although telehealth has generally been found to be acceptable to pregnant women and providers, factors such as patient preferences as well as access to and comfort with telehealth technology may influence uptake and should be considered as a part of patient-focused care.[9,13,38–41]

Research Implications

Future studies are needed to better understand maternal health care seeking behaviors in the context of an infectious disease pandemic, including the predisposing characteristics and enabling resources that influence health behaviors during a time of heightened stress and anxiety. While results from some studies indicate that reduced prenatal visit schedules improve care satisfaction among privately insured populations,[42] there is limited information on the use of such approaches in low resource populations. Further study of factors that influence acceptance of telehealth services during pregnancy in diverse populations, such as language barriers, digital literacy, and privacy concerns, is also warranted.

Strengths and Limitations

The primary strength of our study is our focus on a predominantly Black, Medicaid-enrolled population in Atlanta, Georgia that is disproportionately affected by comorbid conditions, maternal morbidity and mortality, and structural barriers to accessing care. As the results from some studies suggest that the use of telehealth could increase health inequities among marginalized groups, examining the impact of a prenatal care model that integrates telehealth services in this population is particularly important.[43–45] In addition, our study adds to the limited literature on this topic by evaluating critical components of prenatal care such as routine infectious disease testing and ultrasounds, which have not been assessed in other studies and provide information on receipt of prenatal care in accordance with current recommendations.

Our findings are also subject to several limitations. Because our study involves only a single center, our findings may not be generalizable to other populations. The pandemic varied widely with regard to case numbers, shutdowns, and recommendations for remote prenatal care, therefore, our results are less generalizable to places where COVID-19 had less of an impact on health care practices and decreased telehealth implementation. Another limitation includes the use of ICD-10 codes for the identification of pregnancy complications; however, studies in our population suggest high rates of sensitivity (>80%) and specificity (>90%) for hypertensive disorders of pregnancy and chronic and gestational diabetes.[46,47] We did not separately evaluate outcomes for high-risk pregnancies that may be most affected by COVID-19 related barriers to care. In addition, our findings may be affected by selection bias if greater proportions of women avoided prenatal care entirely during the pandemic; however, we are unable to accurately estimate the proportion of deliveries to individuals who did not have any prenatal care as we are not able to distinguish between those receiving no prenatal care and those receiving care outside of our health system. Finally, we did not account for underlying temporal trends in rates of prenatal care utilization in the population.

Conclusion

In the context of the COVID-19 pandemic, the transition to a modified prenatal care model with telehealth services was

associated with earlier prenatal care initiation as well as increased delivery of certain prenatal care services, including diabetes screening and dating and anatomy ultrasounds in a diverse population of pregnant patients at Grady Memorial Hospital. Additionally, there was no significant impact on pregnancy complications and perinatal outcomes in our population, except for an expected increase in labor inductions. Overall use of telehealth services was low and may reflect patient preferences for in-person visits, patient- and provider-level barriers to telehealth visits, or low mobile phone literacy.

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Conflict of Interest

None declared.

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