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Assessing the impact of telehealth implementation on postpartum outcomes for Black birthing people



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BACKGROUND: The COVID-19 pandemic led to the rapid uptake of telemedicine services, which have been shown to be potentially cost-saving and of comparable quality to in-person care for certain populations. However, there are some concerns regarding the feasibility of implementation for marginalized populations, and the impact of widespread implementation of these services on health disparities has not been well studied.

OBJECTIVE: This study aimed to assess the impact of telehealth implementation on postpartum care during the COVID-19 pandemic on racial disparities in visit attendance and completion of postpartum care goals.

STUDY DESIGN: In this retrospective cohort study at a single tertiary care center, differences in outcomes between all Black and non-Black patients who had scheduled postpartum visits before and after telehealth implementation for postpartum care were compared. The primary outcome was postpartum visit attendance. The secondary outcomes included postpartum depression screening, contraception selection, breastfeeding status, completion of postpartum 2-hour glucose tolerance test, and cardiology follow-up for hypertensive disorders of pregnancy. In multivariable analysis, interaction terms were used to evaluate the differential impact of telehealth implementation by race.

RESULTS: Of 1579 patients meeting the inclusion criteria (780 in the preimplementation group and 799 in the postimplementation group), 995 (63%) self-identified as Black. In the preimplementation period, Black patients were less likely to attend a postpartum visit than non-Black patients (63.9% in Black patients vs 88.7% in non-Black patients; adjusted odds ratio, 0.48; 95% confidence interval, 0.29–0.79). In the postimplementation period, there was no difference in postpartum visit attendance by race (79.1% in Black patients vs 88.6% in non-Black patients; adjusted odds ratio, 0.74; 95% confidence interval, 0.45–1.21). In addition, significant differences across races in postpartum depression screening during the preimplementation period became non-significant in the postimplementation period. Telehealth implementation for postpartum care significantly reduced racial disparities in postpartum visit attendance (interaction $P=.005$).

CONCLUSION: Telehealth implementation for postpartum care during the COVID-19 pandemic was associated with decreased racial disparities in postpartum visit attendance.

Key words: COVID-19 pandemic, implementation science, postpartum care, racial disparities, telemedicine

Introduction

The United States has one of the highest pregnancy-related mortality rates among high-income countries. More than half of pregnancy-related deaths occur in the postpartum period, and state-level data show that 3 in 5 maternal deaths may be preventable.¹ The racial disparities in pregnancy-related mortality in the United States are deeply troubling; between 2007 and 2016, there were 40.8 pregnancy-related deaths per 100,000 live births among non-Hispanic Black mothers compared with 12.7 pregnancy-related deaths per 100,000 live births among non-Hispanic White mothers.² Increasing attention

has been given to improving and expanding postpartum care, including state-level legislation extending postpartum Medicaid coverage,^{3–5} publication of professional guidelines and checklists for the postpartum period,^{6,7} and development of innovative postpartum healthcare delivery tools.⁸

It is important to think critically about racial disparities in health outcomes or engagement with care. Holding pregnant patients responsible for poor reproductive or neonatal outcomes “ignores the circumstances, environments, and situations in which each woman seeks to maintain health, to become pregnant, and to safely give birth to children.”⁹ Structural racism, or the “ways in which societies foster racial discrimination through mutually reinforcing systems. . . [which] in turn reinforce discriminatory beliefs, values, and distribution of resources” has affected the provision of obstetrical care.¹⁰ A contemporary example of structural

racism is the relationship between the mutually reinforcing systems of residential segregation and policing; to date, communities that were subject to “redlining” or the historic segregation and disinvestment through racially motivated policies dictating housing loan provision now experience increased rates of fatal encounters with the police.^{11,12} For pregnant patients specifically, historical injustices enacted on marginalized communities not only have reduced trust and engagement with healthcare providers and their recommendations^{13,14} but also have systemically enforced resource deprivation, such as lack of transportation, stable housing, and adequate nutrition. These issues directly impact engagement with postpartum care and interpregnancy health, as populations that lack stable housing, transportation, or food resources may prioritize these needs over healthcare-related demands or may distrust healthcare providers because of

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AJOG MFM at a Glance

Why was this study conducted?

This study was conducted to assess the impact of telemedicine implementation on racial disparities in postpartum care.

Key findings

In this retrospective cohort, disparities in postpartum visit attendance for Black patients resolved after telehealth implementation. Although our data on other postpartum care milestones are exploratory, the trend in postpartum depression screening indicates that there may be potential for the reduction or resolution of disparities in this domain with telehealth implementation.

What does this add to what is known?

Telemedicine had previously been shown to be of comparable quality and potentially cost-saving in select populations. This study showed that telemedicine could potentially ameliorate racial disparities in certain postpartum outcomes.

potential relationships with family regulatory systems (ie, the US child welfare system) that may act in response to significant resource deprivation, among other issues. Reinventing healthcare delivery systems to provide flexibility for patients in how and when they engage with care may mitigate and eliminate these disparities, which is an essential part of work to improve poor obstetrical outcomes in the United States.

Before the COVID-19 pandemic, limited data demonstrated that perinatal telemedicine can provide health outcomes comparable with in-person care for diabetes mellitus, hypertension, and perinatal depression.¹⁵ In addition, preliminary data demonstrated that telemedicine could potentially be cost-saving when used on a large scale.¹⁶ Moreover, the COVID-19 pandemic led to the rapid development of healthcare infrastructure and the institution of modified reimbursement structures that support the widespread implementation of telemedicine. However, it remains unclear whether telehealth models will address disparities in perinatal care, as the feasibility of these services can be limited by access to technology and availability of childcare support.¹⁷ Of note, telehealth directly addresses concerns regarding the lack of transportation that limit access to care for marginalized populations, as demonstrated by data from telemedicine programs for antenatal care for rural

populations.¹⁸ At our institution, remote blood pressure monitoring programs have also been shown to reduce racial disparities in postpartum follow-up for hypertensive disorders of pregnancy (HDPs).¹⁹ In contrast, these populations may not have access to the technology required to facilitate telehealth, such as stable Internet access or cell phones. A retrospective cohort of patients in New York City during the early portion of the COVID-19 pandemic demonstrated that patients with public insurance were significantly less likely to use telehealth for prenatal care than patients with private insurance.²⁰ Given the paucity of data on the impact of telehealth implementation on postpartum care, particularly for marginalized populations, we sought to investigate how telehealth implementation for postpartum care affected racial disparities in postpartum visit (PPV) attendance and completion of postpartum care goals during the beginning of the COVID-19 pandemic.

Materials and Methods

This was a retrospective cohort study at an urban tertiary care center with 2 clinical sites serving a diverse patient population comparing a 3-month period before telehealth implementation for postpartum care (March 16, 2019, to June 16, 2019) to the identical calendar months after telehealth implementation in 2020. This center delivers more than 4000 patients annually. Patients were

included in this analysis if they had a scheduled PPV of any modality at an outpatient obstetrical clinic affiliated with this tertiary care center between 21 and 56 days after delivery. There was no exclusion criterion.

In response to the COVID-19 pandemic, our institution transitioned most PPVs to telehealth, via either video and audio or audio only, starting on March 16, 2020. Outpatient obstetrical clinics recommended telehealth PPVs as the first-line modality for visits to limit COVID-19 transmission while offering limited in-person PPVs for specific clinical needs, such as incision checks for wound complications, Papanicolaou test completion, and initiation of long-acting reversible contraception (LARC) for patients who had made this desire clear before discharge from delivery admission. Telehealth visits were scheduled via telephone or video by office staff, between 2 and 6 weeks after delivery depending on each patient's clinical needs. Telehealth visits were preferentially performed via video telehealth platform requiring Internet (or cellular data) access; if patients had issues with the video platform, then the visit was switched to audio only via telephone. In-person follow-up visits after PPVs were scheduled for colposcopy completion and LARC initiation (if this desire became evident during their PPV). Because of infrastructure development preceding the pandemic, the widespread implementation of telemedicine at the institutional level was smooth, with minimal interruptions in service operations.

Our primary outcome was PPV attendance, defined as completion of the PPV regardless of modality (in-person or telehealth). The secondary outcomes included postpartum depression screening (defined as completion of an Edinburgh Postnatal Depression Survey, 2-Item Patient Health Questionnaire, or 9-Item Patient Health Questionnaire), contraception choice, feeding plan at the time of the PPV, and, if applicable, follow-up for completion of 2-hour glucose tolerance test (GGT; for patients with gestational diabetes mellitus), Papanicolaou test, and

colposcopy completion (for patients with cervical dysplasia), and cardiology follow-up visit (for patients with preeclampsia with severe features) by 3 months after delivery. The secondary outcomes that were documented at the PPV (ie, postpartum depression screening, feeding plan at the time of the PPV, and contraception) were only abstracted if patients completed a PPV. Other secondary outcomes, namely 2-hour GTT, Papanicolaou test and colposcopy, and cardiology follow-up, were only abstracted when completion was clinically indicated on the basis of institutional guidelines.

To minimize potential confounding, we opted to compare differences across racial groups rather than within the Black population across time. In this way, we compare groups that are subject to similar environmental factors during a rapidly evolving pandemic. We subsequently used interaction term analysis to assess whether there was a reduction in disparities because of telehealth implementation.

Data were collected by research staff on demographics, PPV attendance, and postpartum outcomes through electronic medical record review. Race and ethnicity were self-reported within the electronic medical record (EMR). Bivariate analyses were performed using Wilcoxon rank-sum tests or *t* tests for continuous variables and chi-square tests for categorical variables. Multivariate comparison and interaction term analysis were performed for our primary outcome as the remainder of the data on the secondary outcomes were exploratory. Multivariable logistic regressions comparing the odds of the primary outcome in the pre- and postimplementation groups for Black and non-Black patients included all variables with $P < .20$ in the bivariate analyses for association with both exposure and outcome. Backward stepwise regression was used to create parsimonious models using $P > .20$ for elimination. In addition, interaction analyses were performed to assess the impact of telehealth implementation on the differences in postpartum outcomes by race. Covariates initially evaluated in the

multivariable models included age (continuous variable), education (categorical variable defined as high school education or less vs greater than high school education), parity (categorical variable defined as nulliparous vs multiparous), insurance (categorical variable defined as privately insured vs publicly insured), scant prenatal care (defined as <5 prenatal visits), gestational diabetes mellitus, chronic hypertension, and HDPs. After backward stepwise regression, education, parity, insurance, and scant prenatal care remained in the models for the preimplementation group and the interaction analysis, whereas only insurance, parity, and scant prenatal care remained for the postimplementation group.

All analyses were performed using Stata (version 17; StataCorp LLC, College Station, TX). This study was approved by the institutional review board with a waiver of informed consent.

Results

Of 1579 patients meeting the inclusion criteria, 780 had a PPV scheduled in the pretelehealth period, and 799 had a PPV scheduled in the posttelehealth period. In our postimplementation group, 317 patients had audio telehealth visits, 174 patients had video telehealth visits, and 156 patients had in-person visits (data not shown; 15 missing values). Moreover, 63% of patients self-identified as Black ($n=996$). Most non-Black patients self-identified as White (26% of the overall study population). Furthermore, 16 patients (1% of the overall study population) self-identified as Latinx.

The demographic and clinical characteristics of the study groups are shown in Table 1. In both pre- and postimplementation groups, Black patients were younger and were more likely to have a high school education or less, to be publicly insured, to be multiparous, and to receive scant prenatal care (Table 1). Moreover, they were more likely to have chronic hypertension or HDPs (Table 1).

In both unadjusted and adjusted analyses, Black patients were less likely

to attend a PPV than non-Black patients before telehealth implementation (63.9% vs 88.7%; $P \leq .001$; adjusted odds ratio [aOR], 0.48; 95% confidence interval [CI], 0.29–0.79). After telehealth implementation, Black patients were still less likely than non-Black patients to attend a PPV on bivariate analysis (79.1% vs 88.6%; $P < .001$), but after controlling for insurance, education, parity, and scant prenatal care, there was no longer a significant difference in PPV attendance by race (aOR, 0.74; 95% CI, 0.45–1.21). There was a statistically significant differential impact of telehealth implementation on PPV attendance by race (interaction $P = .005$).

Unadjusted analyses for secondary outcomes are shown in Table 2. Before telehealth implementation, Black patients were significantly less likely than non-Black patients to receive a postpartum depression screen, complete a Papanicolaou test, breastfeed their infants, and attend cardiology follow-up visits. In addition, before telehealth implementation, Black patients were more likely than non-Black patients to obtain LARC or present to the emergency department (ED) for care postpartum. After telehealth implementation, differences by race were no longer significant for postpartum depression screening, Papanicolaou test completion, cardiology follow-up visit attendance, and LARC initiation. Black patients remained less likely to breastfeed and more likely to visit the ED for postpartum care after telehealth implementation.

Adjusted analyses are shown in Table 3. After adjusting for education, parity, insurance status, and scant prenatal care, Black patients were significantly less likely than non-Black patients to complete postpartum depression screening (aOR, 0.48; 95% CI, 0.29–0.80) before telehealth implementation. After telehealth implementation, differences in postpartum depression screening by race were no longer significant (aOR, 0.72; 95% CI, 0.43–1.24).

Discussion

Principal findings

In this retrospective cohort study, telehealth implementation in postpartum

TABLE 1

Demographic and clinical characteristics of patients receiving postpartum care before and after telehealth implementation

Characteristics	Before intervention (n=780) ^a			After intervention (n=799) ^b		
	Black (n=513)	Non-Black (n=267) ^c	P value	Black (n=483)	Non-Black (n=316) ^d	P value
Maternal age	27.9 (24.0–32.6)	32.7 (29.8–36.1)	<.001	28.0 (23.5–33.4)	32.3 (29.6–35.1)	<.001
Education			<.001			<.001
High school or less	379 (76.1)	64 (24.2)		385 (80.7)	74 (23.9)	
Greater than high school	119 (23.9)	201 (75.6)		92 (19.3)	236 (76.1)	
Insurance			<.001			<.001
Private	119 (24.3)	195 (75.6)		121 (25.6)	239 (76.4)	
Public	370 (75.6)	63 (24.4)		347 (74.2)	74 (23.6)	
Nulliparous	175 (34.1)	141 (52.8)	<.001	177 (36.7)	182 (57.6)	<.001
Scant prenatal care (<5 visits)	70 (13.8)	14 (5.3)	<.001	80 (16.8)	17 (5.5)	<.001
Gestational diabetes mellitus	25 (4.9)	20 (7.5)	.14	34 (7.0)	25 (7.9)	.65
Pregestational diabetes mellitus	12 (2.5)	7 (2.8)	.76	16 (3.6)	7 (2.4)	.38
Chronic hypertension	55 (10.7)	7 (2.6)	<.001	54 (11.2)	13 (4.1)	<.001
Hypertensive disorder of pregnancy	189 (36.8)	64 (24.0)	<.001	157 (32.5)	73 (23.1)	.004
Mental health disorder	122 (23.8)	59 (22.1)	.60	110 (22.8)	64 (20.3)	.40

Data are presented as median (interquartile range) or number (percentage) unless otherwise indicated.

^a Missing values for the preintervention group: education (n=763), insurance (n=747), scant prenatal care (n=773), and pregestational diabetes mellitus (n=735); ^b Missing values for the postintervention group: education (n=787), insurance (n=781), scant prenatal care (n=786), and pregestational diabetes mellitus (n=740); ^c White (188/780 [24.0%]), Asian (65/780 [8.3%]), Latinx (7/780 [1.0%]), and Native American (9/780 [1.2%]); ^d White (227/799 [28.4%]), Asian (72/799 [9.0%]), Latinx (9/799 [1.1%]), and Native American (5/799 [0.6%]).

Kumar. Telehealth implementation and racial disparities. *Am J Obstet Gynecol MFM* 2023.

TABLE 2

Bivariate analysis of postpartum milestone completion for patients receiving postpartum care before and after telehealth implementation

Variable	Preintervention group (n=780) ^a			Postintervention group (n=799) ^b		
	Black	Non-Black	P value	Black	Non-Black	P value
Postpartum visit attendance	328/513 (63.9)	237/267 (88.7)	<.001	382/483 (79.1)	280/316 (88.6)	<.001
Depression screening ^a	169/328 (51.5)	199/237 (84.0)	<.001	324/382 (84.8)	247/280 (88.2)	.21
Any breastfeeding ^a	221/327 (67.6)	199/237 (84.0)	<.001	243/382 (63.6)	230/278 (82.7)	<.001
Glucose screening ^b	6/25 (24.0)	6/20 (30.0)	.65	7/34 (20.6)	8/25 (32.0)	.32
Cardiology follow-up ^b	19/43 (44.2)	10/13 (76.9)	.04	26/43 (60.5)	10/16 (62.5)	.89
ED presentations	47/513 (9.2)	12/267 (4.5)	.02	34/483 (7.0)	10/316 (3.2)	.02
Hospital readmissions	36/513 (7.0)	19/267 (7.1)	.96	46/483 (9.5)	16/316 (5.1)	.02
Any contraception ^a	197/231 (85.3)	191/224 (85.3)	1.00	213/253 (84.2)	238/261 (91.2)	.02
LARC or BTL	89/193 (46.1)	64/180 (35.6)	.04	70/206 (34.0)	61/229 (26.6)	.10
Papanicolaou test completion ^b	49/86 (57.0)	41/47 (87.2)	<.001	31/74 (41.9)	21/39 (53.9)	.23
Colposcopy completion ^b	1/7 (14.3)	10/40 (25.0)	.54	3/8 (37.5)	12/27 (44.4)	.72

BTL, bilateral tubal ligation; ED, emergency department; LARC, long-acting reversible contraception.

^a These outcomes were collected for all patients who completed a postpartum visit; ^b These outcomes were collected for all eligible patients: Papanicolaou test (n=246), colposcopy (n=82), glucose screening (n=104), and cardiology follow-up (n=115).

Kumar. Telehealth implementation and racial disparities. *Am J Obstet Gynecol MFM* 2023.

TABLE 3

Multivariable analysis comparing the odds of accomplishing postpartum milestones between Black and non-Black patients

Variable	Preimplementation group ^a	Postimplementation group ^b
Postpartum visit attendance	0.48 (0.29–0.79)	0.74 (0.45–1.21)
Depression screening	0.48 (0.29–0.80)	0.72 (0.43–1.24)
Any contraception	1.38 (0.72–2.66)	0.57 (0.30–1.06)
LARC or BTL	0.90 (0.52–1.55)	1.62 (1.01–2.61)
Papanicolaou test completion	0.33 (0.10–1.04)	0.99 (0.36–2.68)
Colposcopy completion	0.78 (0.03–18.37) ^c	8.08 (0.59–110.70)
Any breastfeeding	0.69 (0.41–1.15)	0.58 (0.31–0.89)
Glucose screening	1.34 (0.26–6.91) ^c	0.55 (0.14–2.18) ^c
Cardiology follow-up	0.57 (0.09–3.57)	0.52 (0.13–2.15)
ED presentations	1.06 (0.49–2.28)	2.15 (0.93–4.99)
Hospital readmissions	0.89 (0.43–1.89)	1.92 (0.98–3.77)

BTL, bilateral tubal ligation; ED, emergency department; LARC, long-acting reversible contraception.

^a Regressions for the preimplementation group controlled for insurance, education, parity, and scant prenatal care based on backward stepwise selection; ^b Regressions for the postimplementation group controlled for insurance, parity, and scant prenatal care based on backward stepwise selection; ^c Scant prenatal care was not included in multivariable logistic regression because of collinearity.

Kumar. Telehealth implementation and racial disparities. *Am J Obstet Gynecol MFM* 2023.

care was associated with the amelioration of disparities in PPV attendance between Black and non-Black patients. Although our data on the secondary outcomes are exploratory, the trends in postpartum depression screening indicate that there may be potential for reduction of disparities in these domains with telehealth implementation as well.

Results in context of what is known

Overall, existing data on telehealth provision of postpartum care have been reassuring,²¹ demonstrating equivalent or sometimes improved quality of care relative to in-person care. Offering lactation consulting services via telehealth has been associated with increased success and maintenance of exclusive breastfeeding.²² Moreover, a systematic review demonstrated that telehealth interventions improve obstetrical outcomes, including breastfeeding status and continuation of oral and injectable contraception.²³ Remote blood pressure monitoring has led to increased compliance, retention, and patient satisfaction.^{24–26}

Our data showed a reduction in racial disparities in PPV attendance with telehealth implementation. Existing literature showed mixed effects of telehealth implementation on disparities. Of note, studies have demonstrated improvement in postpartum outcomes, such as breastfeeding and contraception initiation, with telehealth implementation, independent of race.²³ A limited number of studies have examined the impact of telehealth implementation on racial disparities in postpartum outcomes, such as hypertension follow-up, demonstrating improvement with the incorporation of telehealth.²⁷ In contrast, several studies show decreased uptake of telehealth implementation by Black and Latinx patients,^{28,29} including retrospective cohort demonstrating decreased engagement with prenatal care by publicly insured patients after telehealth implementation.²⁰ Unsurprisingly, the literature examining the impact of telehealth implementation on marginalized populations does not demonstrate consistent impact across interventions, as marginalized communities vary widely in their needs and preferences. Although our initial findings are promising, ongoing research—likely requiring

qualitative work in addition to quantitative analysis—will be required to assess the impact of implementation. Additional questions regarding patients' experience with care provided via telehealth also must be addressed in future research; for example, patients without adequate childcare support may be able to attend a telehealth PPV, thus satisfying a quantitative metric assessing access to care, but may have a very different experience of that care than they would with in-person care because they are caring for their children while attending the appointment.

Clinical and research implications

Our exploratory data on other postpartum outcomes showed a mixed effect of telehealth implementation on racial disparities. The trend in postpartum depression screening indicates the potential for reduction of disparities in this domain as differences in the preimplementation period became nonsignificant in the postimplementation period. Although our study did not assess differences across time within racial groups, the absolute rates of Papanicolaou test completion and LARC initiation may have declined for both Black and non-Black patients from before implementation to after implementation, raising concerns about the impact of telehealth implementation on the achievement of postpartum care goals that require in-person examination by providers; however, this effect was not observed for postpartum colposcopy. Future studies examining the impact of telehealth implementation on health disparities should focus on patient experiences and quality of care for outcomes that ultimately required in-person care.

Strengths and limitations

Our study has several strengths and some limitations. Our data included a sizable cohort of Black patients. Standardized EMRs between inpatient and outpatient settings at our institution allowed for consistent clinical documentation and extensive individual medical record review facilitated the collection of detailed patient-level data. The comparison of Black to non-Black patients, rather than White patients, supports an equity-focused

framework supported by reproductive justice advocates and health equity researchers by not establishing the White population as an aspirational norm.³⁰ The limitations of this study included its retrospective nature. Our assessment of the secondary postpartum outcomes was limited by the data available in the EMR. Our analysis cannot account for the overall impact of the COVID-19 pandemic, which led to the rapid implementation and deimplementation of evolving practices for our postimplementation group. Because the postimplementation study period was at the start of the pandemic, our findings may not be generalizable to current practice. Further research should explore whether the findings of this article remain applicable to current practices in telehealth. Given the difficulty in distinguishing the impact of telehealth implementation from other less definitive effects of the COVID-19 pandemic, the impact of telehealth on racial disparities in postpartum outcomes may need to be reevaluated outside of the pandemic. Moreover, we were unable to independently report on ethnicities, such as the Latinx population, because of the limitations of our sample size. Characterizing care in other marginalized communities should be a focus of future research.

Conclusions

As the COVID-19 pandemic has led to the widespread adoption of telehealth models of prenatal and postpartum care, it is crucial to evaluate the impact of these interventions on access to and quality of care for marginalized populations. Our study indicated that telehealth implementation may ameliorate disparities in postpartum care for Black patients. Encouraging ongoing support for innovative delivery mechanisms, such as telehealth, may lead to more equitable obstetrical care during the postpartum period. ■

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