Elimination of racial disparities in postpartum hypertension follow-up after incorporation of telehealth into a quality bundle

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BACKGROUND: Black people have a disproportionately higher risk of hypertensive disorders of pregnancy and postpartum complications than White people but historically lower rates of postpartum follow-up. Few studies have investigated telehealth in the postpartum population.

OBJECTIVE: This study aimed to investigate whether rapid switch to telehealth with audio-based visits during the COVID-19 pandemic decreased racial disparities in postpartum hypertension follow-up adherence.

STUDY DESIGN: This retrospective cohort study included all the patients with hypertensive disorders of pregnancy who delivered between December 2019 and June 2020 at an urban tertiary care center. A preexisting postpartum hypertension quality improvement initiative was in place at this institution. Follow-up adherence within 6 weeks postpartum and at the 6-week visit were compared before February 15, 2020 (pretelehealth period) and following March 14, 2020 (post-telehealth period), with a 1-month implementation or washout period. The blood pressures at these visits were compared between time periods as a secondary outcome.

RESULTS: A total of 473 patients were included in this analysis, of whom 76.3% were non-Hispanic Black. There were 215 and 258 patients in the pre- and post-telehealth cohorts, respectively. Among those who attended follow-up, the proportion of visits done over telehealth went from 0% pretelehealth to 98.0% post-telehealth. The proportion of postpartum hypertension follow-up attendance changed from 48.5% to 76.3% among non-Hispanic Black people ($P<.0001$) and from 73.1% to 76.7% among non-Hispanic White people ($P=.76$), leaving only a 0.4% racial gap ($P=.97$). This resulted in an elimination of the racial disparities in the post-telehealth period.

CONCLUSION: Transition to telehealth with audio-based visits at the onset of the COVID-19 pandemic improved attendance at postpartum hypertension visits among non-Hispanic Black people. This, therefore, led to significant decreases in the racial disparities in follow-up rates at our institution in the setting of an existing quality improvement initiative. Further research should focus on the intentional use of telehealth in improving maternal outcomes, especially among the non-Hispanic Black people.

Key words: postpartum hypertension, racial disparities, telehealth

Introduction

Hypertensive disorders of pregnancy (HDP) affect approximately 10% of pregnancies in the United States[1] and confer higher risks of morbidity and mortality in the postpartum period.[2] Specifically, uncontrolled blood pressure (BP) in the postpartum period has been directly linked to stroke,[3] whereas postpartum follow-up is associated with improved BP control[4] and a lower risk of stroke.[5] Despite this, the follow-up rates remain low, especially among Black women. Specifically, up to 60% of Black people will not have a follow-up visit[6] postpartum even though there is a higher prevalence and morbidity from HDP among Black people than their White counterparts.[7] These data combined suggest that early follow-up and BP control postpartum among Black people could decrease the racial disparities in postpartum hypertension (PPHTN) outcomes.

A recently implemented program to improve the management of PPHTN at our institution (Systematic Treatment And Management of PostPartum Hypertension [STAMPP HTN]) demonstrated increased patient adherence to follow-up visits and improved BP control.[8] This bundled initiative included patient education, healthcare provider education, a dedicated nurse educator for the postpartum period, and protocols and workflows specific to both inpatient and outpatient hypertensive management throughout the postpartum period. Although we found that the postpartum follow-up rate improved from 33.5% to 59.4% ($P<.001$) following this initiative, the preexisting racial disparity in the follow-up rate did not change, with a persistent disparity in the postimplementation group (54.9% follow-up for Black people and 76.2% for non-Black people, $P=.03$).

This study aimed to investigate the performance of the STAMPP HTN program at our institution after rapid switch to telehealth using audio-based visits during the COVID-19 pandemic, with particular attention on changes in racial disparities in follow-up adherence and BP control. There has been growing awareness of the racial disparities in telehealth use, with 1 study reporting 40% lower odds of accessing care through telehealth among Black patients than among White patients during the COVID-19 pandemic.[9] However, this study still noted an absolute increase in telehealth use among Black patients during COVID-19 than before the pandemic, which was mostly driven by young Black women. As postpartum patients generally fall into this population, we hypothesized that access to telehealth during COVID-19 could have

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AJOG MFM at a Glance

Why was this study conducted?

This study was conducted to investigate the performance of a postpartum hypertension quality improvement program following rapid change to telehealth during the COVID 19 pandemic.

Key findings

Transition to telehealth in the setting of a quality improvement initiative for hypertensive disorders of pregnancy was associated with significantly decreased racial disparities in postpartum hypertension follow-up.

What does this add to what is known?

Compared with White people, Black people have a disproportionately higher risk for hypertensive disorders of pregnancy and the associated postpartum complications, but lower rates of postpartum follow-up. The setting for this study was an urban, academic institution where an existing initiative improved postpartum follow-up for patients with hypertensive disorders of pregnancy, but did not reduce the racial disparity in this outcome. This study suggests that telehealth with audio-based visits increases postpartum hypertension visit attendance for non- Hispanic Black people, eliminating the racial disparity.

decreased the known racial disparities in postpartum follow-up at our institution, which serves predominantly Black patients.

Materials and Methods

Study design

This was a retrospective cohort study of all patients with HDP who delivered between December 2019 and June 2020 at the University of Chicago, an urban tertiary care center predominantly serving a Black and publicly insured population. Before this study period, the institution had implemented a bundled quality improvement initiative for PPHTN management called STAMPP HTN, which included provision of home BP cuffs, inpatient and outpatient protocols for PPHTN management, a designated HDP nurse educator, and scheduling of PPHTN follow-up for all patients before delivery discharge. The initial PPHTN visits were scheduled within 7 to 10 days postdischarge in newly created PPHTN clinics. All patients regardless of their primary provider were recommended to follow-up at our institution for their PPHTN follow-up appointments as per our protocol. The data collection was limited to visits happening at our institution; patients may have followed up with their primary obstetrician (OB), the data for which we did not collect. Subsequent visits were scheduled as needed on the basis of the patient's BPs, and the 6-week general postpartum visit was scheduled either with the postpartum clinic at the study hospital or the patient's primary OB provider per the patient's preference. All of the above appointments were scheduled as in-person appointments before the COVID-19 pandemic. This initiative is described in a previous publication and included all patients with any hypertensive disorder of pregnancy in our institution.[8]

With the onset of the COVID-19 pandemic, there were several protocol changes to the postpartum care of our patients in the initiative; specifically, all initial PPHTN visits were switched from in-person to telehealth visits, as all patients in the program had a home BP cuff. Capacity for video visits was being developed at the time of implementation, and therefore, the visits were primarily telephone-only without video. As per the Centers for Medicare & Medicaid Services guidelines, telephone-based visits were considered telehealth visits, had a dedicated encounter, and were billed as visits (current procedural terminology codes 99441-99443 for phone visits, telehealth.hhs.gov). As was the case before the pandemic, these PPHTN visits were in a templated PPHTN clinic that was run by physician assistants, maternal fetal medicine fellows, and maternal fetal medicine attending physicians. Similarly, patients were also still encouraged to follow-up with our institution for their PPHTN telehealth visit from days 7−10, whereas the 6-week general postpartum visit remained either in-person or telehealth with either our institution or the patient's primary OB provider per the patient's preference.

In this analysis, patients who delivered between December 1, 2019 and February 14, 2020 represented the pre-telehealth cohort, and those who delivered March 15, 2020 onward represented the post-telehealth cohort. February 15, 2020 through March 14, 2020 was considered an implementation or washout period to account for the implementation of telehealth. Telehealth was defined as appointments done via phone calls as recorded in the Epic electronic record. All other elements of the preexisting STAMPP HTN program stayed the same. For example, all the patients were given home BP cuffs at discharge and were instructed to take their BP daily by the STAMPP HTN nurse educator before discharge.[8] The protocols and workflow for PPHTN management stayed the same. The patients were given a BP log sheet on discharge to record the BP readings, and they reported their home BPs to the provider either as a range or as individual BPs on the day of the telehealth visit.

This study was approved by the institutional review board at the study institution (#IRB20-1167) with a waiver for consent. The study data were collected via chart review by trained research staff on a standardized data form and then entered in a Research Electronic Data Capture database. The data collected included the baseline demographics, antepartum and intrapartum characteristics, HDP diagnosis, antepartum and postpartum antihypertensive medication use, postpartum maternal outcomes, postpartum outpatient follow-up within 6 weeks, and BPs at these visits. Hypertension was defined as a systolic BP (SBP) of 140 to 159 or diastolic

BP (DBP) of 90 to 109, and severe hypertension was defined as a BP greater than or equal to 160 systolic or 110 diastolic on the basis of the American College of Obstetrics and Gynecology guidelines.[1]

Race and ethnicity were recorded on the basis of what was entered and displayed in the patients' medical charts. Data on race and ethnicity are generally self-reported by the patient when they first register at the hospital. However, if the patient does not report race and ethnicity themselves, the staff may inquire or presume these demographic data and enter it on their behalf. Race or ethnicity was aggregated into non-Hispanic (NH) White, NH Black, Hispanic, Asian, and other or unknown, where each patient was only in 1 group. As "multiracial" was an option for race in the medical chart, we put these patients in the "other or unknown" category. Any patient with ethnicity recorded as Hispanic was assigned to the Hispanic category only. If no ethnicity was documented but a race was, such patients were categorized into the race and were assumed to be NH.

Statistical analysis

For all descriptive statistics, the normality of continuous variables was assessed with a Shapiro–Wilk test. The continuous variables are presented as median (interquartile ranges [IQR]) and assessed for differences between the groups using either a Wilcoxon rank-sum or Kruskal–Wallis test. The categorical data are presented as frequencies and proportions and assessed for differences with a chi-square test.

The primary outcome was the change in racial disparity for the first PPHTN visit attendance between the pre- and post-telehealth periods. The racial disparity was measured as the difference in attendance rates between NH Black and NH White patients. Any follow-up in the PPHTN clinic within 6 weeks of discharge was considered a PPHTN visit. The secondary outcomes included the proportion of patients who attended a 6-week general postpartum visit and the proportion with hypertensive-range BP (≥140/90) at the time of the first PPHTN visit and the general 6-week postpartum visit. This latter proportion was analyzed separately for pregnancy-related hypertension (preeclampsia [PE] and gestational hypertension) and for those with chronic hypertension.

The attendance was compared in both time periods using chi-squared analysis. Multivariable logistic regression was used to determine whether associations persisted after adjusting for covariates. This included race (NH Black or not), presence of prenatal care, location of the primary obstetrician at the study hospital, history of PE, severe features, cesarean delivery, postpartum hemorrhage, and any use of ante- and postpartum antihypertensive use during delivery admission. The variables included in the model were based on those determined to be significantly different between the time periods and established factors associated with postpartum follow-up.[6] An interaction term was then included in the logistic regression models to specifically assess the effect of race. All *P*-values are reported between the 2 time periods unless otherwise stated. For all analyses, a 2-sided *P* value <.05 was considered statistically significant. No a priori power calculation was performed.

Results

Study characteristics

A total of 473 patients were included in the analysis. The demographic characteristics are reported in Table 1. The median age of the study group was 29 (IQR, 24–34) years; 64.8% of the patients were publicly insured and 76.3% were NH Black. The patients most frequently had a diagnosis of gestational hypertension or PE without severe features (56.7%) or PE with severe features or Hemolysis, Elevated Liver enzymes, and Low Platelets (31.0%), whereas 12.3% of the patients had a delivery diagnosis of chronic hypertension.

A total of 215 patients delivered in the pretelehealth period and 258 patients in the post-telehealth period. As expected, in the pretelehealth period, none of the completed follow-up appointments were by telehealth. In the post-telehealth period, 98.0% of the completed PPHTN visits were by telehealth (Table 1), and 55.6% of general 6-week postpartum visits were by telehealth.

There were notable differences in the characteristics of patients across periods. Between the pre- and post-telehealth period, there was a decrease in the proportion of patients whose primary obstetrician was based in the study hospital (63.7% vs 49.6%; *P*=.002) (Table 1), the proportion of patients with a history of chronic hypertension (31.6% vs 22.9%; *P*=.03), and the proportion reporting PE in a previous pregnancy (17.2% vs 8.5%; *P*=.004). The final diagnosis, gestational age at delivery, mode of delivery, and rates of postpartum complications did not change significantly between the study periods.

Telehealth and the racial disparity in postpartum follow-up

Among all the patients, adherence with at least 1 PPHTN visit increased significantly from the pre- to the post-telehealth period (53.5% vs 76.7%; *P*<.0001) (Table 1). In the pretelehealth period, the visit adherence for NH Black patients was 48.5% and for NH White patients it was 73.1%, leaving a racial gap of 24.6% (*P*=.02) (Figure 1). By the post-telehealth period, the visit adherence for NH Black patients increased to 76.3% and for NH White patients it increased to 76.7%, leaving only a 0.4% racial gap (*P*=.97). Specifically, adherence improved significantly for NH Black patients (48.5% vs 76.3%; *P*<.0001) (Table 2), but not for NH White patients (73.1% vs 76.7%; *P*=.76), resulting in elimination of the racial disparity.

In a multivariable model adjusting for race, prenatal care, location of the primary obstetrician, history of PE, severe features, mode of delivery, postpartum hemorrhage, and ante- and postpartum antihypertensive use during delivery admission, the association between the post-telehealth time period and attendance of at least 1 PPHTN visit remained robust (*P*<.0001). When an interactive term between time period and race was added to this same multivariate model, its association with

TABLE 1
Patient characteristics and outcomes, across study period

Clinical characteristic	Entire cohort n=473	Preperiod Dec. 2019–Feb. 14, 2020 n=215	Postperiod March 15, 2020–June 2020 n=258	*P* value
Demographic				
Age, y	29 (24–34)	29 (24–33)	30 (24–34)	.94
Public insurance	302 (64.8)	137 (65.2)	165 (64.5)	.86
Race/ethnicity				.15
NH White	56 (11.8)	26 (12.1)	30 (11.6)	
NH Black	361 (76.3)	171 (79.5)	190 (73.6)	
Asian	11 (2.3)	2 (0.9)	9 (3.5)	
Hispanic or Latinx	29 (6.1)	12 (5.6)	17 (6.6)	
Other/unknown	16 (3.4)	4 (1.9)	12 (4.7)	
Registered for prenatal care	458 (97.0)	210 (98.1)	248 (96.1)	.20
Primary obstetrician at the study hospital	265 (56.0)	137 (63.7)	128 (49.6)	.002[a]
Nulliparous	206 (43.6)	92 (43.0)	114 (44.2)	.79
Preexisting chronic hypertension	127 (26.9)	68 (31.6)	59 (22.9)	.03[a]
Gestational diabetes mellitus	42 (8.9)	17 (8.0)	25 (9.7)	.52
Preexisting diabetes mellitus	30 (6.4)	14 (6.5)	16 (6.3)	.91
Current smoker	24 (5.2)	10 (4.7)	14 (5.7)	.65
Preeclampsia in previous pregnancy	59 (12.5)	37 (17.2)	22 (8.5)	.004[a]
Cardiac disease	11 (2.3)	4 (1.9)	7 (2.7)	.76
Ante-/intrapartum				
Diagnosis				.17
Gestational hypertension	194 (41.2)	81 (37.7)	113 (44.1)	
Preeclampsia/HELLP	152 (32.3)	67 (31.2)	85 (33.2)	
Superimposed preeclampsia	67 (14.2)	38 (17.7)	29 (11.3)	
Chronic hypertension	58 (12.3)	29 (13.5)	29 (11.3)	
Severe features[b]	146 (66.7)	71 (67.6)	75 (65.8)	.36
Gestational age at delivery, wk	38.4 (37.0–39.4)	38.4 (37.0–39.3)	38.4 (37.0–39.4)	.70
Cesarean delivery	173 (36.9)	87 (40.5)	86 (33.9)	.47
Intrauterine growth restriction	30 (6.3)	16 (7.4)	14 (5.4)	.37
Antepartum antihypertensive use	131 (27.9)	70 (33.0)	61 (23.7)	.03[a]
Antepartum antihypertensive use[c]	104 (71.7)	48 (68.6)	56 (74.7)	.42
Antepartum magnesium[c]	120 (82.2)	51 (71.8)	69 (92.0)	.002[a]
NICU admission	162 (34.9)	70 (33.5)	92 (36.1)	.56
Length of stay, d	4 (3, 5)	4 (4, 5)	4 (3, 4)	<.0001[a]
Postpartum antihypertension use	119 (25.5)	64 (30.2)	55 (21.6)	.03[a]
Postpartum				
PPHTN follow-up within 6 wk	313 (66.2)	115 (53.5)	198 (76.7)	<.0001[a]
Telehealth[d]	194 (62.0)	0 (0)	194 (98.0)	<.0001[a]

(continued)

TABLE 1
Patient characteristics and outcomes, across study period *(continued)*

Clinical characteristic	Entire cohort n=473	Preperiod Dec. 2019–Feb. 14, 2020 n=215	Postperiod March 15, 2020–June 2020 n=258	*P* value
Total number of PP visits within 6 wk[d]	1 (1–2)	1 (1–1)	1 (1–2)	.01[a]
General 6-wk PP attendance	241 (51.09)	108 (50.2)	133 (51.6)	.78
Telehealth[d]	87 (36.1)	13 (12.0)	74 (55.6)	<.0001[a]
Readmission within 6 wk	83 (17.6)	38 (17.8)	45 (17.4)	.91

Data are presented as median (quartile 1–quartile 3), or number (percentage) depending on data type and distribution.

HELLP, Hemolysis, Elevated Liver enzymes and Low Platelets; *NH*, non-Hispanic; *NICU*, neonatal intensive care unit; *PP*, postpartum; *PPHTN*, postpartum hypertension.

[a] Statistically significant ($p < 0.05$); [b] Reported among those with preeclampsia; [c] Reported among those with severe features; [d] Among those who followed up at PPHTN visit.

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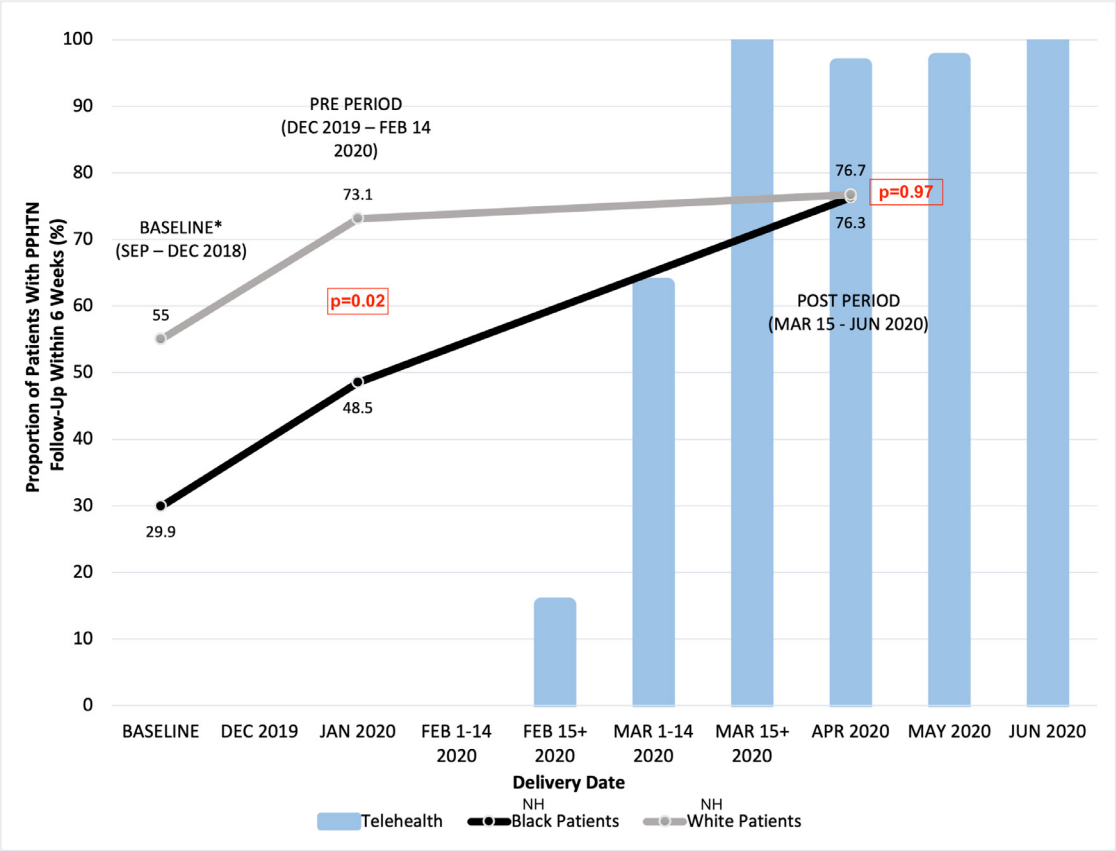
FIGURE
Trends in postpartum follow-up over the study period



The rates of postpartum hypertension follow-up within 6 weeks of delivery are depicted along with the rates of telehealth use among those who followed up. The rates are further stratified by race. The asterisk symbol represents the historic baseline includes the rates of follow-up before the implementation of a STAMPP HTN bundle as previously published.

STAMPP HTN, Systematic treatment and management of postpartum hypertension.

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TABLE 2
Racial differences in postpartum follow-up and blood pressure by study period

	NH Black			NH White		
	Preperiod n=171	Postperiod n=190	*P* value	Preperiod n=26	Postperiod n=30	*P* value
PPHTN follow-up within 6 wk	83 (48.5)	145 (76.3)	<.0001[a]	19 (73.1)	23 (76.7)	.76
Telehealth[b]	0 (0)	143 (98.6)	<.0001[a]	0 (0)	22 (95.7)	<.0001[a]
Total number of PP visits within 6 wk[b]	1 (1–1)	1 (1–2)	.03	1 (1–1)	1 (1–1)	.32
Systolic, mm Hg[b]	133 (124–142)	130 (124–139)	.35	132 (122–137)	126 (120–135)	.25
Diastolic, mm Hg[b]	79 (72–88)	87 (80–92)	.0003[a]	80 (76–87)	81 (78–88)	.55
SBP ≥ 140/90[b]	30 (36.6)	49 (38.9)	.74	5 (26.3)	6 (26.1)	.99
General follow-up at 6 wk	79 (46.2)	87 (46.0)	.97	19 (73.1)	25 (86.2)	.22
Systolic, mm Hg[c]	127 (119–135)	126 (120–135)	.65	124 (117–135)	120 (112–127)	.17
Diastolic, mm Hg[c]	77 (70–85)	80 (72–86)	.25	77 (71–85)	75 (64–81)	.11
SBP ≥ 140/90[c]	19 (25.3)	17 (22.1)	.64	4 (23.5)	0 (0)	.03[a]
Readmission within 6 wk	33 (19.5)	37 (19.5)	.99	3 (11.5)	3 (10.00)	.85

Data are presented as mean±standard deviation, median (quartile 1–quartile 3), or number (percentage) depending on data type and distribution.

NH, non-Hispanic; *SBP*, systolic blood pressure; *PP*, postpartum; *PPHTN*, postpartum hypertension.

[a] Statistically significant (p< 0.05); [b] Among those who followed up at PPHTN visit; [c] Among those who followed up at a six-week postpartum visit.

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PPHTN follow-up attendance did not reach significance (*P*=.12).

In terms of the general 6-week postpartum visit, the overall attendance did not change significantly from the pre- to the post-telehealth period (50.2% vs 51.6%; *P*=.78) (Table 1). In addition, 73.1% of the NH White people had general postpartum follow-up compared with 46.2% of NH Black people during preimplementation (racial gap 26.9%, *P*<.0001). During postimplementation, 86.2% of the NH White people had general postpartum follow-up compared with 46.0% of NH Black, maintaining a racial gap at 40.2% (*P*<.0001). This was because there was no significant improvement in the general postpartum visit attendance from pre- to postimplementation for either racial group (*P*=.97 for NH Black and *P*=.22 for NH White) (Table 2).

Telehealth and blood pressure control

At the first PPHTN visit, the mean DBP was higher in the post-telehealth period (85 mm Hg [80–91]) than pretelehealth (78 mm Hg [71–85]; *P*<.0001) (Supplemental Table 1) for those with pregnancy-related hypertension. Therefore, specifically for those with pregnancy-related hypertension, the proportion with elevated BP (≥140/90 mm Hg) at that first PPHTN visit was higher during the post-telehealth period (38.4%) than during pretelehealth (24.7%; *P*=.04) even though the mean SBP did not differ (*P*=.20). The rates of severe hypertension were very small and not significantly different between the 2 periods (Supplemental Table 1).

For the general 6-week postpartum visit, none of the BP measures differed between the time periods even among only those with pregnancy-related hypertension.

Impact of telehealth on readmission rates

The postpartum readmission rates within 6 weeks of delivery did not change significantly between the pre- and post-telehealth periods (17.84% vs 17.44%, respectively, *P*=.91) (Table 1). This was also true when broken down by NH Black (*P*=.99) and NH White patients (*P*=.85) (Table 2).

Comment

Principal findings

In this study comparing people who had HDP before and after the start of the COVID-19 pandemic, we found that a rapid shift from in-person to telehealth using audio-based visits in the setting of a preexisting quality improvement bundle was associated with significantly increased attendance at PPHTN follow-up among NH Black people but not NH White people. This eliminated the racial disparity in postpartum hypertension follow-up. We found no effect and a persistent disparity at the 6-week visit, which was offered as either in-person or by telehealth and either with the study hospital or with the patient's primary OB.

There was a higher mean DBP and a higher proportion of patients with elevated BP at the first PPHTN visit after switching to telehealth but no statistical difference in any BP measures at the 6-week general postpartum visit.

Results

The current American College of Obstetricians and Gynecologists guidelines recommend follow-up within 10 days of delivery for people whose pregnancy was affected by HDP.[10] Despite that, only 40% to 70% of postpartum people attend a follow-up at all. As published previously, our institution implemented a postpartum quality improvement initiative in 2019 called STAMPP HTN. At a "historical baseline" before this program (September 2018 through December 2018), the rate of attending at least 1 PPHTN visit was only 29.9% among NH Black people and 55.0% among NH White people as shown in Figure 1. STAMPP HTN had a significant improvement in the PPHTN visit adherence, but the racial disparity in follow-up was maintained (48.5% for NH Black and 73.1% for NH White).[8] In this study, it was shown that the switch to telehealth with audio visits while maintaining the STAMPP HTN bundle resulted in elimination of this racial disparity in PPHTN follow-up (76.3% NH Black and 76.7% NH White) (Figure 1), resulting in very high rates of follow-up for both groups of patients.

A large study conducted in New York during the first few months of the COVID-19 pandemic emphasized the ongoing lack of equal access to telehealth, with Black people who sought healthcare having 60% less likelihood of engaging in a telehealth visit than White people who sought healthcare.[9] However, this disparity in telehealth use actually decreased compared with before the pandemic, and the uptick in telehealth use by young Black females accounted for most of this change. Other studies suggest that postpartum interventions specifically implemented via technology have equal use across race.[11]

Our study supports the positive influence of technology in the reduction of racial disparities in follow-up for PPHTN appointments. Low follow-up rates before the telehealth visits may reflect barriers to in-person visits, including the need to return to work soon after delivery, newborn at home, childcare for other children (56% were multiparous), and limited transportation options. The high acceptance rate of the telehealth audio-based visit may indicate that pregnant patients value follow-up when offered accessibly.

Clinical and research implications

Our study suggests that the introduction of telephone-based telehealth visits, specifically among a reproductive-age population, may help decrease disparate outcomes. We did not find a difference in the general postpartum visits. This is likely because of 3 reasons: (1) although scheduling of the PPHTN visit before discharge was part of the STAMPP HTN quality bundle, scheduling of the 6-week postpartum visit was not; (2) both in-person and telehealth were offered for the 6-week visit; and (3) patients had the option of completing the 6-week visit with their primary OB, wherever they may be. In this manner, the improvement in PPHTN attendance only may demonstrate the unique benefits of offering telehealth in the context of this quality improvement framework.

PPHTN follow-up and BP control within 6 weeks is associated with a lower risk of hemorrhagic stroke[5] and lower BP sustained at 6 months even without treatment.[4] BP control within 6 weeks may have future benefits for overall maternal health such as cardiovascular disease (CVD) prevention. Our study showed improved compliance with appointments and no significant change in BPs with use of telehealth. The only difference was found at the first PPHTN visit, where the mean DBP was higher among those with pregnancy-related hypertension in the post-telehealth period. However, the difference was small with unclear clinical significance. It is possible that this actually reflects the impacts of the COVID-19 pandemic on prenatal care and on the delivering population at the study hospital (Table 1). For example, in the post-telehealth period, there was a lower proportion of patients with chronic hypertension, a history of PE, and with antepartum use of antihypertensives, all of which could actually be reflective of late or scant prenatal care that made it impossible to identify and treat hypertension risks during the antepartum period. Another explanation is that the preexisting quality bundle had already improved postpartum BP management, and the addition of telehealth was not helpful in further improving BP control in the postpartum period. It is reassuring to note that implementation of telehealth did not worsen BP control. Further studies are needed to investigate the impact of postpartum telehealth follow-up BP control outside of the context of a pandemic.

Strengths and limitations

Given the retrospective design of the study, the association between telehealth use and follow-up adherence may be via other effects of the COVID-19 pandemic. For example, during a "lockdown" period, it is possible that patients were more available to attend the visit than they would be outside a lockdown period. As noted previously, telephone-based telehealth visits were implemented on top of an existing quality bundle. It is unknown if telehealth alone would be sufficient to improve postpartum outcomes without an existing framework as we had at our institution. In addition, many providers and institutions primarily use video visits as their telehealth platform because of differences in reimbursement. Our study is limited to telephone-based telehealth visits, and therefore, it is not known if this is generalizable to institutions primarily using video-based visits only. In addition, outcomes based on race are limited by the collection of race data, which are not always self-reported as described in the methods.

The study had key strengths in a strong time-based association with a telehealth intervention because of the COVID-19 pandemic and standardized protocols for the management of PPHTN. In addition, the bundle was implemented universally on all patients with HDP, and all data were collected in a standardized fashion.

Conclusions

Conversion to telehealth during the COVID-19 pandemic in conjunction with a preexisting quality improvement

bundle led to significant decreases in racial disparity in PPHTN follow-up. Further research should focus on whether telehealth combined with quality bundles decreases racial disparities for maternal outcomes such as BP control and reduction of serious maternal morbidity and mortality. As a next step at our institution, we are currently examining if an automated remote home BP monitoring system can lead to further improvement of BP control in the postpartum period than patient-reported BPs. ■

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Supplementary materials

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