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The impact on postpartum care by telehealth: a retrospective cohort study

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Abstract

BACKGROUND: During the COVID-19 pandemic, our institution turned to telehealth as the primary method of postpartum care delivery.

OBJECTIVE: We aimed to determine the impact of telehealth on completion of postpartum care goals.

STUDY DESIGN: In a single-center retrospective cohort study, we compared a 14-week period, March to June 2019, before implementation of telehealth, with the same calendar months after implementation during 2020. Patients with a postpartum visit scheduled at our institution during the study period were included. To demonstrate a 10% difference in attendance to the postpartum visit in the postimplementation compared with the preimplementation group, a power analysis calculation resulted in a requirement of at least 356 subjects per group. Our primary outcome was attendance to the postpartum visit. Secondary outcomes included completion of postpartum depression screening, contraception selection, breastfeeding status at postpartum visit, completion of 2-hour glucose tolerance test postpartum for those with gestational diabetes mellitus, and cardiology follow-up when recommended. Multivariable logistic regression with backward elimination was used to control for confounders.

RESULTS: Of the 1579 patients meeting inclusion criteria, 780 were in the preimplementation group and 799 in the postimplementation group. Subjects in the postimplementation group were at

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90% increased odds of attending a postpartum visit compared with those in the preimplementation group, even when controlling for race, prenatal care provider, parity, gestational age at delivery, and insurance status (82.9% vs 72.4%; $P<.001$; adjusted odds ratio, 1.90; 95% confidence interval, 1.47–2.46). Patients in the postimplementation group were also more likely to be screened for postpartum depression (86.3% vs 65.1%; $P<.001$). Although subjects in both groups were equally likely to choose contraception, those in the postimplementation group were less likely to select long-acting reversible contraception or permanent sterilization (26.2% vs 33.2%; $P=.03$). There was no significant difference in breastfeeding status, postpartum 2-hour glucose tolerance test completion, or cardiology follow-up between groups.

CONCLUSION: Availability of telehealth during the COVID-19 pandemic is associated with increased postpartum visit attendance and postpartum depression screening. However, telehealth was also associated with a decrease in use of long-acting reversible contraception or permanent sterilization.

Keywords

COVID-19; long-acting reversible contraception; obstetrical care; postpartum depression screening; postpartum visit attendance; telemedicine

Introduction

The postpartum period is a critical time for providing obstetrical care given that over 50% of maternal mortality occurs in the postpartum period.[1,2] However, as few as 60% of patients attend a postpartum visit.[3–5] Many barriers to attending the postpartum visit have been identified, including lifestyle changes related to caring for a newborn, lack of childcare, and lack of transportation. Increasing access to postpartum care could help overcome some of these obstacles.[4–7]

Before the COVID-19 pandemic, telehealth, defined as the use of technology to exchange medical information to improve a patient's clinical health, has been utilized to access obstetrical care. Telehealth has been used for prenatal care visits, accessing lactation consultants, remote blood pressure monitoring for postpartum hypertension, and screening for postpartum depression.[8–15] During the COVID-19 pandemic, institutions began to provide more comprehensive postpartum care via telehealth to continue delivering high-quality care while minimizing patient and provider exposure. However, there is a paucity of evidence looking at the impact of telehealth on general postpartum visit attendance and achievement of multidomain postpartum care goals. We sought to investigate how this novel method of postpartum care affects the achievement of postpartum goals.

Material and Methods

We performed a retrospective cohort study to determine the impact of telehealth availability on the achievement of postpartum care goals. This study was approved by the Penn Institutional Review Board with waiver of informed consent.

In response to the COVID-19 pandemic, the Department of Obstetrics and Gynecology at the University of Pennsylvania introduced the availability of postpartum care through telehealth, either via video and audio or audio only, starting on March 16, 2020. Before this date, all postpartum visits at our institution were performed in-person. However, after this date, outpatient obstetrics clinics recommended telehealth postpartum visits as the primary modality for visits while also offering some limited in-person postpartum visits. Our exposure groups were divided into the pre–implementation of telehealth for postpartum care (March 16–June 30, 2019) and post–implementation of telehealth (March 16–June 30, 2020) groups. We included all patients with a postpartum visit of any modality scheduled at either the resident or faculty obstetrics clinics during the study period. Although some patients had an initial obstetrical encounter within the first 3 weeks after delivery, for the purposes of our study a postpartum visit was defined as a visit with an obstetrics provider for routine postpartum care scheduled between 21 and 56 days postpartum. There were no exclusion criteria for this study. We estimated a 60% rate of attendance to the postpartum visit in the preimplementation cohort on the basis of a 6-month review (July, 2019 to December, 2019) of data of the resident and faculty clinics. Because of limited data on the effect of telehealth on postpartum visit attendance at the time of study design, a 10% hypothesized increase in postpartum visit attendance was selected by investigators as a likely clinically significant difference. To demonstrate a 10% difference in attendance to the postpartum visit in the postimplementation compared with the preimplementation group, with an alpha of 0.05 and power of 80%, we would require 356 subjects per group. Approximately 90 postpartum visits are scheduled at each clinical site per month, therefore 3.5 months for each group would meet our desired sample size.

The primary outcome was a comparison of attendance to postpartum visit before and after the availability of telehealth. A sensitivity analysis was also performed comparing the preimplementation group with only those in the postimplementation group scheduled for a telehealth postpartum visit. The secondary outcomes were the following postpartum care goals described by the American College of Obstetricians and Gynecologists (ACOG) guidelines, which are routinely recorded in our clinics: postpartum depression screening (defined as completion of an Edinburgh Postnatal Depression Scale questionnaire, Patient Health Questionnaire-2, or Patient Health Questionnaire-9), contraception method (chosen after ante- or peripartum counseling if the patient had not already chosen before the postpartum visit), any breastfeeding at the postpartum visit, and, if applicable, follow-up for completion of 2-hour glucose tolerance test for patients with gestational diabetes mellitus and attendance of a cardiology follow-up appointment within 3 months after delivery for qualifying patients with a hypertensive disorder of pregnancy.

Data were collected on demographics, labor and delivery information, postpartum visit attendance, and postpartum goals through electronic health record review. Bivariate comparisons of demographic and clinical characteristics, and primary and secondary outcomes, were performed with Fisher exact tests and chi-square tests for categorical variables, and *t* tests or Wilcoxon rank-sum tests for continuous variables where appropriate. For the dichotomous primary and the secondary outcomes, all covariates associated with both the exposure (pre- vs postimplementation groups) and specific outcome at a level of $P < .20$ were considered as potential confounders. Multivariable logistic regression models

using backward stepwise elimination (with *P* value >.20 for removal) was used to create a parsimonious model for each of these outcomes using their respective covariates. Statistical analyses were performed with Stata version 15 (StataCorp, College Station, TX). All tests were 2-tailed, and *P* values <.05 were considered statistically significant.

Results

Of the 1579 subjects meeting inclusion criteria, 780 had a postpartum visit scheduled in the preimplementation period and 799 in the postimplementation period. In our population, approximately 60% of patients identified as Black, and over 50% were insured with Medicaid or uninsured.

The demographic and baseline characteristics of the 2 groups were not significantly different, except for prenatal care provider and postpartum length of stay, as shown in Tables 1 and 2. Compared with the preimplementation group, patients in the postimplementation group were more likely to have received prenatal care at a practice not affiliated with our institution and to have a slightly shorter postpartum length of stay.

For the primary outcome, patients in the postimplementation group were at 90% increased odds of attending their postpartum visit compared with those in the preimplementation group, even when controlling for race, prenatal care provider, parity, gestational age at delivery, and insurance status (n=662 [82.9%] vs n=565 [72.4%]; *P*<.001; adjusted odds ratio [aOR], 1.90; 95% confidence interval [CI], [1.47–2.46]), as shown in Table 3. Of the patients in the postimplementation group that attended their postpartum visit, 156 (23.6%) had an in-person postpartum visit, whereas 506 (76.4%) had a telehealth visit. Of those who underwent telehealth visits, 175 (34.4%) patients used video and audio, 319 (62.8%) had audio only, and 14 (2.8%) had a telehealth visit of unknown format. In a sensitivity analysis comparing the preimplementation group with only those in the postimplementation group scheduled for a telehealth visit, the postpartum visit attendance remained significantly improved in the postimplementation group (*P*=.01).

When evaluating secondary outcomes (Table 3), subjects in the postimplementation group were more likely to receive postpartum depression screening than those in the preimplementation group (86.3% vs 65.1%; *P*<.001; aOR, 4.61; 95% CI, [3.38–6.28]). Patients in the postimplementation group were as likely to choose some form of contraception as those in the preimplementation group, but less likely to select a long-acting reversible contraception (LARC) method or permanent sterilization at their postpartum visit (26.2% vs 33.2%; *P*=.03; aOR, 0.70; 95% CI, [0.51–0.96]). There was no statistically significant difference in breastfeeding at the postpartum visit or the completion rate of postpartum 2-hour glucose tolerance test between the 2 groups. Although 9.2% more postimplementation patients attended their follow-up cardiology appointments, this was not a statistically significant finding (61.02% vs 51.79%; *P*=.32; aOR, 1.80; 95% CI, [0.79–4.11]).

Comment

Principal findings

Our study demonstrates that telemedicine increased the odds of attending a postpartum visit by 90%. In addition, telehealth was associated with an increase in postpartum depression screening and a decrease in use of LARC or permanent sterilization.

Results

The availability of telehealth in the postimplementation group was associated with increased attendance to the postpartum visit, which is likely attributable to the ability of telehealth to overcome various barriers of the in-person postpartum visit, such as lack of childcare, difficulties in managing new lifestyle changes, and unavailability of transportation.[4–7] Although 23.6% of patients in the postimplementation group had a scheduled in-person visit because of provider discretion, these patients were not excluded to prevent introduction of bias considering the patients requiring in-person evaluation are likely of a higher-risk population.

When analyzing patients who attended their postpartum visits, those in the postimplementation cohort were significantly more likely to receive postpartum depression screening. This contrasts the findings in the retrospective cohort of Sakowicz et al,[16] which demonstrated a decrease in postpartum depression screening for patients who delivered during the COVID-19 pandemic. Other literature has also suggested a potential benefit to providing postpartum depression screening via telehealth because it allows comparable rates of positive screens with the added flexibility of screening earlier, more frequently, and through multiple modalities during the postpartum period.[13,17,18]

Our data demonstrated that patients in the postimplementation cohort who decided on a contraception method during their postpartum visit were less likely to select LARC or permanent sterilization. This is consistent with Sakowicz's findings showing that women who delivered during the start of the pandemic were less likely to use LARC methods.[19]

There was no statistically significant difference in completion of the 2-hour glucose tolerance test between the 2 groups. Interestingly, there was an increase in attendance to cardiology follow-up visits for management of hypertensive disorders of pregnancy in the postimplementation group, although likely not statistically significant because of being an underpowered outcome. This potential increase of cardiology follow-up is consistent with the positive impact telehealth has on management of hypertensive disorders of pregnancy in the postpartum period, with multiple studies reporting increased compliance, retention, and patient satisfaction with postpartum remote blood pressure monitoring programs, and decreased disparity in hypertension follow-up.[11,12,20,21]

Our findings further support other recent examples of the positive impact telehealth has on different aspects of postpartum care. Offering lactation consulting services via telehealth has been associated with increased success and maintenance rates of exclusive breastfeeding.[15] Similarly, in a systematic review, DeNicola et al[9] demonstrated that telehealth interventions

overall improved obstetrical outcomes, including breastfeeding status and continuation of oral and injectable contraception.

Clinical implications

The versatility of telehealth explains the increase in screening for postpartum depression seen in our study; telehealth allows more mediums of screening, including previsit questionnaires through phone calls or application notifications, and increased privacy to answer the questions. This added flexibility makes the modality of telehealth ideal to for postpartum depression screening during the postpartum period.

The decrease of LARC or permanent sterilization method in the postimplementation group is supported by the fact that these methods require an additional in-person encounter to receive, whereas most other methods could be delivered via electronic prescription. The incentive to minimize COVID-19 exposures during the pandemic makes methods that did not require additional in-person management more advantageous. Importantly, although this finding is concerning, this study took place during the beginning of the pandemic before studies proved personal protective equipment and social distancing guidelines as effective measures against viral spread. The motivation to reduce patient exposures could further explain the statistically significant decrease in postpartum length of stay for subjects in the postimplementation group.

When analyzing follow-up for chronic maternal complications of gestational diabetes mellitus, we would have expected the rate of completion of the 2-hour glucose tolerance test to be lower in the postimplementation group given the possible restrictions of laboratory scheduling during the COVID-19 pandemic; however, there was no significant difference in the completion of the laboratory tests between the 2 groups. Interestingly, there was an overall low completion rate in both groups at approximately 25% compliance. The increase in cardiology follow-up attendance in the postimplementation group could be explained by the cardiology department also incorporating telehealth for these visits.

Research implications

In this study, telehealth was associated with a decrease in selection of LARC or permanent sterilization at the postpartum visit. Future work focusing on reevaluation of this outcome in a postpandemic setting would be integral in differentiating the effect of telehealth from the effect of the COVID-19 pandemic on long-term contraceptive options.

In addition, our analyses on postpartum follow-up for both gestational diabetes mellitus and hypertensive disorders were limited by small sample size. A larger study focusing on the effect of telehealth availability on follow-up for chronic maternal complications of gestational diabetes mellitus and hypertensive disorders of pregnancy would further improve our understanding of telehealth’s effect on long-term postpartum care.

Strengths and limitations

Our study has several strengths and some limitations. Our data are based on a large, diverse sample, allowing generalizability to other urban settings. Standardized electronic medical

records between inpatient and outpatient care allowed consistent clinical documentation and data collection. We could also obtain detailed patient-level data because of extensive individual chart review. Limitations of this study include its retrospective nature. Our reporting period was limited to 1 season; however, we compared the same season in the pre- and postimplementation groups. We could not assess all the postpartum care goals described by the ACOG guidelines because not all these data points are routinely recorded. A higher rate of postpartum visit attendance was noted in the preimplementation group than determined by chart review used in the sample size calculation, likely attributable to the small sampling of charts reviewed. We also could not control for other impacts the pandemic may have on factors outside of telehealth; COVID-19 has led to rapid implementation and deimplementation of changing practices, even within our postintervention period, which could not be fully assessed by this work. Given that the study period was at the start of the pandemic, certain behaviors or processes could limit the generalizability of our findings. Because of the difficulty in distinguishing a pure telehealth impact from a COVID-19 effect, it would be beneficial to reevaluate these outcomes in a postpandemic setting given that telemedicine will likely remain a critical tool for patient care.

Conclusions

The availability of telehealth as a means for delivering postpartum care is associated with increased postpartum visit attendance. Postpartum telehealth is also associated with increased postpartum depression screening, and similar increases in rates of contraception uptake, breastfeeding, and management of maternal complications, mainly gestational diabetes mellitus and hypertensive disorders of pregnancy. However, delivering postpartum care via telehealth was associated with decreased selection of LARC or permanent sterilization.

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AJOG MFM at a Glance

Why was this study conducted?

During the COVID-19 pandemic, institutions turned to telehealth as the primary method of postpartum care delivery.

There is a paucity of evidence describing the impact of telehealth on attendance to postpartum visits and achievement of multimodal postpartum care goals.

Key findings

In this retrospective cohort study (n=1579), subjects in the postimplementation group were at 90% increased odds of attending a postpartum visit compared with those in the preimplementation group.

Patients in the postimplementation group were also more likely to be screened for postpartum depression.

Although subjects in both groups were equally likely to choose contraception, those in the postimplementation group were less likely to select long-acting reversible contraception or permanent sterilization.

What does this add to what is known?

This knowledge is critical given that telehealth is a modality that is increasingly used in the field of obstetrics to deliver postpartum care and highlights the increasing significance of antepartum contraception counseling.

TABLE 1

Baseline demographics

Characteristic	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value
Age, median (IQR)	30.07 (25.47–34.17)	30.35 (25.49–34.29)	.53
Race			
Black	496 (63.6)	470 (58.8)	.16
White	178 (22.8)	221 (27.7)	
Asian	61 (7.8)	71 (8.9)	
Other	36 (4.6)	30 (3.8)	
Unknown	9 (1.2)	7 (0.9)	
Ethnicity			
Non-Hispanic or non-Latino	739 (94.7)	747 (93.5)	.61
Hispanic or Latino	39 (5.0)	49 (6.1)	
Unknown	2 (0.3)	3 (0.4)	
Insurance coverage			
Private	314 (40.3)	360 (45.1)	.05
Public	433 (55.5)	421 (52.7)	
Other	17 (2.2)	11 (1.4)	
Unknown	16 (2.1)	7 (0.9)	
Education level			
Less than high school	85 (10.9)	74 (9.3)	.48
High School Diploma/ GED degree	358 (45.9)	385 (48.2)	
Advanced degree	320 (41.0)	328 (41.1)	
Unknown	17 (2.2)	12 (1.5)	
Prenatal care provider:			
Resident Clinic	443 (56.8)	427 (53.4)	.01
Faculty Clinic	303 (38.8)	308 (38.5)	
Other	34 (4.4)	64 (8.0)	

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Characteristic	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value
Number of prenatal visits			
Scant care (<5 visits)	84 (10.9)	97 (12.3)	.36
Adequate care (>5 visits)	689 (89.1)	689 (87.7)	
Gestational age at first prenatal visit, median (IQR)	11 (9.14–15.14)	10.86 (8.87–14.86)	.29
Number of fetuses			
1	761 (97.6)	776 (97.1)	.60
2	19 (2.4)	21 (2.6)	
3	0 (0.0)	2 (0.3)	
Gestational diabetes	45 (5.8)	59 (7.4)	.20
Pregestational diabetes	19 (2.6)	23 (3.1)	.55
Chronic hypertension	62 (7.9)	67 (8.4)	.75
Hypertensive disorder of pregnancy	253 (32.4)	230 (28.8)	.12
Cardiomyopathy	1 (0.1)	4 (0.5)	.37
Depression	122 (15.6)	120 (15.0)	.73
Anxiety	64 (8.2)	77 (9.6)	.32
Bipolar	26 (3.3)	20 (2.5)	.33
Schizophrenia	4 (0.5)	5 (0.6)	1.00
Eating disorder	3 (0.4)	3 (0.4)	1.00
Contraception method decided during prenatal care	449 (65.6)	443 (62.8)	.28
Feeding plan decided during prenatal care			
None	94 (12.1)	123 (15.4)	.30
Breastfeeding	519 (66.5)	527 (66.0)	
Formula	59 (7.6)	54 (6.8)	
Both	40 (5.1)	37 (4.6)	

Characteristic	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value
Unknown	68 (8.7)	58 (7.3)	

GED, General educational development; *IQR*, interquartile range.

TABLE 2

Labor and delivery data

Characteristic	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value
Gravida, median (IQR)	2 (1–4)	2 (1–4)	.14
Parity			
First delivery	316 (40.5)	359 (44.9)	.08
Not first delivery	464 (59.5)	440 (55.1)	
GA at delivery, median (IQR)	39.14 (37.86–39.86)	39.14 (37.71–39.71)	.09
Type of delivery			
Spontaneous vaginal delivery	521 (66.8)	505 (63.2)	.29
Operative vaginal delivery	26 (3.3)	26 (3.3)	
Cesarean delivery	233 (29.9)	268 (33.5)	
Shoulder dystocia	23 (2.9)	24 (3.0)	.95
Perineal tear			
None	502 (64.4)	518 (64.8)	.60
First or second degree	256 (32.8)	252 (31.5)	
Third or fourth degree	22 (2.8)	29 (3.6)	
Estimated blood loss, median (IQR)	400 (250–700)	400 (300–700)	.17
Transfusion of blood products	21 (2.7)	24 (3.0)	.71
Chorioamnionitis	47 (6.0)	50 (6.3)	.85
Endometritis	7 (0.9)	11 (1.4)	.37
Contraception started before discharge after delivery			
None	485 (62.2)	476 (59.6)	.15
Nexplanon	85 (10.9)	80 (10.0)	
IUD	21 (2.7)	11 (1.4)	
Depo-provera	49 (6.3)	58 (7.3)	

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Characteristic	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value
Tubal ligation	46 (5.9)	50 (6.3%)	
POPs, COCs, patch, ring, etc.	94 (12.1)	124 (15.5)	
Feeding status before discharge after delivery			
None	8 (1.0)	11 (1.4)	.54
Breastfeeding	592 (75.9)	585 (73.2)	
Formula	81 (10.4)	84 (10.5)	
Both	99 (12.7)	119 (14.9)	
Postpartum hospital length of stay in days, median (IQR)	2 (2–3)	2 (2–2)	<.001
Fetal death	11 (1.4)	13 (1.6)	.72
ICN admission	102 (13.1)	115 (14.4)	.45

Units in number (percentage) unless otherwise stated.

ICN, stands for Intensive Care Nursery; *IQR*, interquartile range; *IUD*, intrauterine device.

TABLE 3

Primary and secondary outcomes

Outcomes	Preimplementation group (n=780)	Postimplementation group (n=799)	*P* value	aOR
Primary outcomes				
Postpartum visit attendance rate	565 (72.4)	662 (82.9)	<.001	1.90 (1.47–2.46)[a]
Secondary outcomes				
Postpartum depression screening	368 (65.1)	571 (86.3)	<.001	4.61 (3.38–6.28)[b]
Contraception decision made at postpartum visit	388 (85.3)	451 (87.7)	.26	1.23 (0.85–1.79)[c]
LARC or permanent sterilization	124 (33.2)	114 (26.2)	.03	0.70 (0.51 −0.96)[d]
Other method	249 (66.8)	321 (73.8)		
Any breastfeeding at postpartum visit	420 (75.3)	473 (72.3)	.25	0.09 (0.68–1.18)[e]
Completion of postpartum glucose tolerance test[g]	12 (26.7) (n=45)	15 (25.4) (n=59)	.89	0.99 (0.37–2.68)[f]
Cardiology follow-up visit attendance rate[h]	29 (51.8) (n=56)	36 (61.0) (n=59)	.32	1.80 (0.79–4.11)[b]

Units in number (percentage) unless otherwise stated.

aOR, adjusted odds ratio; *LARC*, long acting reversible contraception.

[a]Adjusted for race, prenatal care provider, parity, gestational age at delivery and insurance status;

[b]Adjusted for prenatal care provider only;

[c]Adjusted for race and insurance status;

[d]Adjusted for race, parity, and length of hospital stay;

[e]Adjusted for race, prenatal care provider, hypertensive disorders of pregnancy and insurance status;

[f]Adjusted for race, insurance status, and length of hospital stay;

[g]Out of patient's diagnosed with gestational diabetes;

[h] Out of patients diagnosed with a hypertensive disorder of pregnancy.