OBSTETRICS

Childbirth-specific patient-reported outcomes as predictors of hospital satisfaction

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BACKGROUND: Under value-based payment programs, patient-reported experiences and outcomes can impact hospital and physician revenue. To enable obstetrical providers to improve the childbirth experience, a framework for understanding what women expect and desire during childbirth is needed.

OBJECTIVE: The purpose of this study was to identify key predictors of childbirth hospital satisfaction with the use of the Childbirth Experiences Survey.

STUDY DESIGN: This study builds on a larger effort that used Patient-Reported Outcomes Management Information System methods to develop a childbirth-specific preliminary patient-reported experiences and outcomes item bank. These efforts led to the development of an antepartum and postpartum survey (Childbirth Experiences Survey Parts 1 and 2). All phases of the study were conducted with the participation of a community-based research team. We conducted a prospective observational study using national survey response panels that was organized through Nielsen to identify women's antepartum values and preferences for childbirth (Childbirth Experiences Survey Part 1). Eligible participants were pregnant women in the United States (English or Spanish speaking) who were ≥18 years old and ≥20 weeks pregnant. Women were recontacted and invited to participate in a postpartum follow-up survey to collect information about their childbirth patient-reported experiences and outcomes, which included childbirth satisfaction (Childbirth Experiences Survey Part 2). In bivariate analyses, we tested whether predisposing conditions (eg, patient characteristics or previous experiences), values and preferences, patient-reported experiences and outcomes, and the "gaps" between values and preferences and patient-reported experiences and outcomes were predictors of women's satisfaction with hospital childbirth services. Multivariable logistic regression models were fitted to examine the simultaneous effect of predictors on hospital satisfaction, which were adjusted for key predisposing conditions.

RESULTS: From 500 women who anticipated a vaginal delivery at the time of the antepartum survey, who labored before delivery, and who answered the postpartum survey, key findings included the following responses: (1) the strongest predictors of women's satisfaction with hospital childbirth services were items in the domains of staff communication, compassion, empathy, and respect, and (2) 23 childbirth-specific patient-reported experiences and outcomes were identified. Examples of these patient-reported experiences and outcomes (such as being told about progress in labor and being involved in decisions regarding labor pain management) appeared especially relevant to women who experienced childbirth. A final model that predicted women's satisfaction with hospital childbirth services included a total of 8 items that could be optimized by doctors, midwives, and hospitals. These included the patient's report of how well she coped with labor pain, whether the hospital provided adequate space and food for their support person, and whether she received practical support for feeding the newborn infant.

CONCLUSION: This study identified 23 childbirth-specific patient-reported experiences and outcomes that were predictors of childbirth hospital satisfaction. The implementation of the Childbirth Experiences Survey Parts 1 and 2 in a multihospital setting may lead to the development of childbirth hospital performance measures and strategies for improvement of the childbirth experience.

Key words: childbirth, expectation, hospital satisfaction, patient-reported outcome, satisfaction

Patient-reported outcomes (PROs) are a key component of "performance measurement" of hospitals and physicians.[1–3] PROs include not only measures of clinical outcomes from the patient perspective but also measures of the patient experience of the process of care.[4,5] Two large efforts to study childbirth-specific PROs have been undertaken. The International Consortium for Health Outcomes Measurement has developed a broad set of standards for pregnancy and childbirth that include several maternity patient self-reports,[6] and Childbirth Connection has administered several "Listening to Mothers" postpartum surveys that report on women's childbirth experiences.[7] In addition, various studies have used postpartum questionnaires to report on specific services or obstetrics complications.[8,9] Although in their own right these efforts have begun to elucidate women's perspectives on their childbirth care, to date, women's reporting of their maternity experience remains largely undeveloped in the United States because of both the lack of childbirth-specific PROs and the infrastructure to measure them in the hospital setting.

The financial incentive of the federal Value-Based Purchasing Program,[10] which stipulates that Medicare reimbursement dollars be withheld from hospitals with poor satisfaction scores, creates a strong business case for hospitals to collect and use patient-reported data. As measured through the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey from the Agency for Healthcare Research and Quality,[11] hospital satisfaction scores include the aggregate response from medical, surgical, and

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AJOG at a Glance

Why was this study conducted?

The goal of this study was to identify childbirth-specific predictors of women's hospital satisfaction using paired data that were collected in antepartum and postpartum surveys.

Key findings

Of 500 women who antenatally anticipated a vaginal delivery, who labored before delivery, and who responded after delivery, the following key findings were included: (1) the strongest predictors were in the domains of staff communication, compassion, empathy, and respect; and (2) 23 childbirth-specific patient-reported experiences and outcomes were identified as highly related to childbirth hospital satisfaction.

What does this add to what is known?

This study produced the Childbirth Experiences Survey (parts 1 and 2) that can be used to identify patients who are at risk for being dissatisfied and to prioritize and monitor quality improvement processes for the childbirth experience.

maternity care service lines. This aggregated and generic approach limits hospitals' ability to use HCAHPS data to improve their maternity scores. Recognizing the preference-sensitive nature of childbirth and that it is the number 1 reason for hospital admission,[12,13] there is a need to improve knowledge regarding the components of an optimal childbirth experience and the link between this experience and satisfaction with hospital care. Our objective was to survey women to describe their expectations, experiences, and outcomes to identify predictors of hospital satisfaction that can be addressed readily within current obstetrics practices.

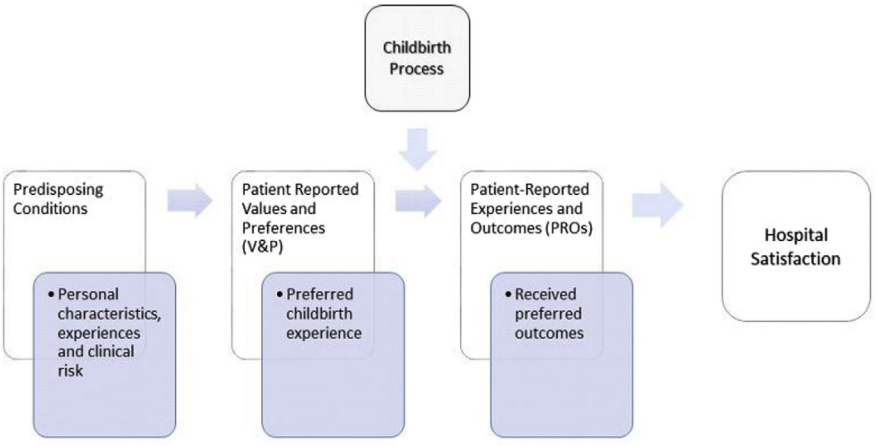
Materials and Methods

This work was conducted by the Childbirth PRO Partnership, which is a group of health services researchers, care providers, pregnant and postpartum women, advocates for pregnant women, hospital quality experts, and senior administrators.

We describe a prospective observational study. It was part of a larger study that followed Patient-Reported Outcomes Management System methods[14] to develop a conceptual framework and preliminary item bank of survey items regarding the childbirth experience.[15] In brief, the parent study included (1) a systematic and comprehensive literature search for survey items that elicited women's antenatally reported childbirth values and preferences (V&P) and postnatally reported childbirth experiences and outcomes, (2) conducting focus groups to validate the domains of the conceptual framework, (3) conducting a national antepartum survey (Childbirth Experiences Survey [CBEX] Part 1) to document pregnant women's childbirth V&P, and (4) a postpartum follow-up survey (CBEX Part 2) to document childbirth outcomes and experiences, which included hospital satisfaction. We report the analysis of data from CBEX Parts 1 and 2 to identify potential predictors of childbirth hospital satisfaction.

The conceptual framework derived in the parent study[15] is described in Figure 1. We hypothesized that predisposing conditions (eg, women's personal characteristics, previous childbirth experience, and clinical risk) generate antenatal V&P for the services desired. After delivery, women assess whether these V&P were fulfilled. Finally, women provide summary measures of their satisfaction with hospital care and services. We hypothesized that satisfaction was dependent on (1) predisposing conditions, (2) antepartum V&P, and (3) PROs. V&P capture the concept of "value expectations" (patients' desires, hopes, or wishes concerning clinical events).[16,17] For brevity, we refer to all "value expectations" as V&P.

FIGURE
Conceptual framework for determining patient-reported outcomes in childbirth



Predisposing conditions (eg, women's personal characteristics, previous childbirth experience, and clinical risk) generate antenatal values and preferences for the services desired. After delivery, women assess whether these values and preferences were fulfilled and provide summary measures of their satisfaction with hospital care and services.

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Survey development

Development of the antepartum survey (CBEX Part 1) has been described previously.[11] It contained 60 questions regarding predisposing conditions and

TABLE 1
Frequencies of key predisposing conditions in the postpartum population and their association with women's satisfaction with hospital childbirth services[a]

Characteristic	Hospital satisfaction ≥9, n (%)	*P* value[b]
Age (n=500), y		.9515
18-24 (n=97; 19.4%)	56 (57.7)	
25-29 (n=187; 37.4%)	110 (58.8)	
30-34 (n=149; 29.8%)	91 (61.1)	
35-39 (n=49; 9.8%)	29 (59.2)	
40-54 (n=18; 3.6%)	12 (66.7)	
Race/ethnicity (n=500)		.1430
Asian (n=28; 5.6%)	19 (67.9)	
Black (n=31; 6.2%)	17 (54.8)	
Hispanic (n=74; 14.8%)	35 (47.3)	
White (n=354; 70.8%)	7 (53.8)	
Other (n=13; 2.6%)	220 (62.1)	
Education (n=500)		.6961
High school or less (n=88; 17.6%)	56 (63.6)	
Some college (n=157; 31.4%)	92 (58.6)	
College graduate or more (n=255; 51.0%)	150 (58.8)	
Multiple gestation (n=500)		.7797
Yes (n=77; 15.4%)	47 (61.0)	
No (n=423; 84.6%)	251 (59.3)	
Delivery category (n=500)		.8409
Multiparous without previous cesarean delivery (n=279; 55.8%)	166 (55.7)	
Multiparous with previous cesarean delivery (n=72; 14.4%)	41 (13.8)	
Nulliparous (n=149; 29.8%)	91 (30.5)	
United States region (n=500)		.7194
East (n=70; 14.0%)	45 (64.3)	
Midwest (n=126; 25.2%)	71 (56.3)	
South (n=193; 38.6%)	114 (59.1)	
West (n=111; 22.2%)	68 (61.3)	
Public insurance (n=478)		.3591
Yes (n=150; 31.4%)	94 (62.7)	
No (n=328; 68.6%)	191 (58.2)	
Pregnancy complications (source antepartum & postpartum; n=500)[c]		.6921
Yes (n=257; 51.4%)	151 (58.8)	
No (n=243; 48.6%)	147 (60.5)	

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63 V&P items. Eligible women were ≥18 years old, ≥20 weeks pregnant, and English- or Spanish-speaking.

The postpartum survey (CBEX Part 2) contained 93 PRO items, which largely were based on items used in CBEX Part 1. All PRO items retained the same stem used for the V&P items so that they could be compared. For example, in CBEX Part 1, pregnant women were asked whether it was important that the newborn infant be placed skin to skin immediately after birth, and CBEX Part 2 asked if the newborn infant was placed skin to skin immediately after birth. We included a specific HCAHPS item, the rating of the hospital on a scale of 0−10, as the primary outcome measure for the logistic regression models.[11] We chose this measure because it is used by the federal Value-Based Purchasing Program and is a target for hospital-based quality improvement efforts.[18]

Data collection CBEX, part 1

As previously described,[15] Nielsen[19] recruited women through their online panels and developed quotas based on anticipated demographic characteristics. Nielsen had protocols to assure survey completeness and to prevent duplication of responses by a single individual. Patients received approximately $15 cash equivalent in Nielsen points.

Data collection CBEX, part 2

Nielsen[19] contacted women approximately 3 weeks after their due date. The anticipated postpartum response rate was 30% (800 responses), based on similar surveys that involved postpartum women.[20] The actual response rate varied from 15−20% per week; hence, approximately 2 months after starting the postpartum survey, Nielsen tried efforts to increase participation. They upgraded the incentive from $10−$15, improved the survey-taking experience on mobile devices, revised invitation and reminder language, mailed e-mail alerts 5 weeks before the due date, and made phone calls to nonresponders. To collect the contracted number of postpartum responses, Nielsen initiated a second

TABLE 1
Frequencies of key predisposing conditions in the postpartum population and their association with women's satisfaction with hospital childbirth services[a] *(continued)*

Characteristic	Hospital satisfaction ≥9, n (%)	*P* value[b]
Overall health poor/fair (n=500)		.0068
Yes (n=35; 7.0%)	13 (37.1)	
No (n=465; 93.0%)	285 (61.3)	
Overall mental health poor/fair (n=500)		.0003
Yes (n=56; 11.2%)	21 (37.5)	
No (n=444; 88.8%)	277 (62.4)	
High confidence (n=489)[d]		.0019
Yes (n=342; 69.9%)	219 (64.0)	
No (n=147; 30.1%)	72 (49.0)	
Confident filling out medical/health forms (n=498)		.0177
Yes (n=397; 79.7%)	248 (62.5)	
No (n=101; 20.3%)	50 (49.5)	
Experienced discrimination (n=497)[e]		.0780
Yes (n=79; 15.9%)	40 (50.6)	
No (n=418; 84.1%)	256 (61.2)	
Has immediate help (n=489)		.0504
Yes (n=457; 93.5%)	280 (61.3)	
No (n=32; 6.5%)	14 (43.8)	
Negative memories of a previous birth (n=500)		.0844
Yes (n=114; 22.8%)	60 (52.6)	
No (n=386; 77.2%)	238 (61.7)	
Most days in last year have been stressful (n=500)		.0788
Yes (n=109; 21.8%)	57 (52.3)	
No (n=391; 61.6%)	241 (61.6)	
Worry about the birth (n=500)		.0192
Yes (n=321; 64.2%)	179 (55.8)	
No (n=179; 35.8%)	119 (66.5)	

[a] Source of the data is the antepartum survey, unless otherwise noted (N=500); [b] Chi-square test or Fisher's exact test, as appropriate; [c] An aggregate variable defined as having one or more of the following: a preexisting or chronic maternal condition, a gestational condition, a high-risk pregnancy, or a problem with the fetus; [d] A factor that combined the following 8 items: (1) I feel confident in protecting my own interests during pregnancy and childbirth; (2) I know where to get information regarding childbirth options; (3) I want to be in charge of planning my care; (4) Giving birth is a powerful experience; (5) My job as a mother is to make sure my baby is born healthy; (6) I believe I will be in control; (7) I expect my childbirth will go smoothly; and (8) Childbirth is a safe experience for the mother (Likert scale: 1 [strongly disagree] to 5 [strongly agree]; alpha=.76; "Yes" was defined as a factor-based score ≥4); [e] A factor that combined 6 items that asked whether the respondent had ever experienced discrimination because of racial, cultural, financial, insurance, gender, or disability (Likert scale: 1 [not at all] to 5 [very much]; alpha=.89; "Yes" was defined as a factor-based score >2).

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round of antepartum and postpartum surveys.

Data analysis

Nielsen[19] provided a de-identified dataset that linked the antepartum and postpartum responses. All data were self-reported. The investigative team derived "gap data" to reflect differences between the V&P and PRO data items. With few exceptions, we dichotomized V&P items to reflect whether a respondent did or did not want the service, outcome, or staff interaction that was associated with that item.[21] For example, the V&P item regarding whether the woman wanted the baby placed skin to skin immediately after delivery was originally a 5-point ordinal score that was dichotomized into "very" or "extremely" important vs the other responses. We also dichotomized the majority of PRO items to reflect whether a respondent stated that she did or did not get the service, outcome, or staff interaction that was associated with that item. For example, in the postpartum survey we asked whether a woman "got" the item, in this case, the baby placed skin to skin. We defined "gap data" in 4 categories: (1) respondent did not want the item and did not get it; (2) respondent did not want the item but got it; (3) respondent wanted the item and got it; and (4) respondent wanted the item and did not get it.

The current study is focused on participants who stated antepartum that they anticipated having a vaginal delivery in a hospital and who stated postpartum that they labored and delivered in a hospital (either by cesarean or vaginal birth). We chose this group of women to maximize data interpretability because the antepartum survey had different items for women who anticipated a scheduled cesarean delivery and those who anticipated a vaginal delivery. Women who stated they anticipated delivery at home or in a birth center were excluded from this analysis.

We tested data for bivariate association with hospital satisfaction, which was dichotomized with the use of a score of 9−10 (satisfied) vs 0−8 (unsatisfied). Hospitals are familiar with this scoring practice and rely on the premise that any score below 9 is meaningful.[18]

Means are reported ± the standard deviation. Multivariable logistic regression models were fitted to examine the simultaneous effect of potential PRO predictors on hospital satisfaction, adjusted for key predisposing conditions. The following predisposing conditions were included as controls: maternal age, race/ethnicity, educational level, parity/previous cesarean birth, United States region, pregnancy complications before admission (by either antepartum or postpartum survey), overall health

TABLE 2
Clinical variables and women's satisfaction with hospital childbirth services[a]

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
Postpartum					
Transfusion (N=500)		.6349			.8345
Yes (n=19; 3.8%)	10 (52.6)		57.4 (33.6–78.2)	0.90 (0.33–2.44)	
No (n=481; 96.2%)	288 (59.9)		60.0 (55.4–64.4)	Reference	
Maternal intensive care unit (N=497)		.6062			.5286
Yes (n=15; 3.0%)	8 (53.3)		51.6 (26.8–75.5)	0.71 (0.24–2.09)	
No (n=482; 97.0%)	288 (59.8)		60.1 (55.6–64.5)	Reference	
Neonatal intensive care unit (N=496)		.9122			.8499
Yes (n=58; 11.7%)	35 (60.3)		58.8 (45.0–71.3)	0.94 (0.52–1.71)	
No (n=438; 88.3%)	261 (59.6)		60.1 (55.3–64.8)	Reference	
Healthy normal baby (N=500)		.0146			.0575
Yes (n=407; 81.4%)	253 (62.2)		62.0 (57.0–66.8)	1.60 (0.99–2.61)	
No (n=93; 18.6%)	45 (48.4)		50.5 (39.8–61.1)	Reference	
Baby home with mom (N=494)		.6215			.4559
Yes (n=448; 90.7%)	270 (60.3)		60.8 (56.1–65.3)	1.28 (0.67–2.45)	
No (n=46; 9.3%)	26 (56.5)		54.8 (39.6–69.1)	Reference	
Baby length of stay >3 d (N=498)		.2126			.1078
Yes (n=69; 13.9%)	46 (66.7)		69.5 (57.1–79.6)	1.61 (0.91–2.86)	
No (n=429; 86.1%)	252 (58.7)		58.7 (53.8–63.4)	Reference	
Readmission baby (N=490)		.0587			.0730
Yes (n=43; 8.8%)	20 (46.5)		6.4 (31.2–62.3)	0.54 (0.27–1.06)	
No (n=447; 91.2%)	274 (61.3)		61.7 (57.0–66.3)	Reference	
Admit to delivery time over 24 hr (N=500)		.1417			.0927
Yes (60; 12.0%)	41 (68.3)		70.5 (57.2–81.1)	1.70 (0.92–3.15)	
No (440; 88.0%)	257 (58.4)		58.5 (53.7–63.1)	Reference	
Readmission mother (N=497)		.4601			.5480
Yes (n=44; 8.9%)	24 (54.5)		55.5 (39.7–70.3)	0.81 (0.41–1.60)	
No (n=453; 91.1%)	273 (60.3)		60.5 (55.8–65.1)	Reference	
Cesarean delivery (N=500)		.0344			.0785
Yes (n=58; 11.6%)	42 (72.4)		71.5 (57.7–82.2)	1.79 (0.94–3.41)	
No (n=442; 88.4%)	256 (57.9)		58.4 (53.5–63.1)	Reference	
Gap data: expect vaginal birth (N=467)		.0240			.0710
Wanted: did not get (n=49; 10.5%)	37 (75.5)		74.0 (58.9–85.0)	1.95 (0.95–4.00)	
Wanted: got (n=418; 89.5%)	246 (58.9)		59.4 (54.5–64.2)	Reference	
Uncertainty regarding the planning of a vaginal birth: antepartum (N=500)		.0866			.2180
Yes (n=33; 6.6%)	15 (45.5)		48.7 (31.1–66.7)	0.62 (0.28–1.33)	
No (n=467; 93.4%)	283 (60.6)		60.7 (56.0–65.2)	Reference	

[a] Results are adjusted for maternal age, educational level, race/ethnicity, United States region, delivery category, pregnancy complications, overall health, and overall mental health; [b] Chi-square test or Fisher's exact test, as appropriate; [c] Wald Chi-square test.

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TABLE 3
Final list of items that were eligible for the model of women's satisfaction with hospital childbirth services[a]

Item type	Association with satisfaction	Item
Predisposing condition	Positive	High confidence (factor)[b]
Patient-reported values and preferences	Positive	Wanted partner in the room
Gap items[c]	Positive	Wanted and got massage, or wanted and got pain treatment massage or received pain treatment massage
	Positive	Wanted and got to use shower/tub
	Negative	Wanted and did not get narcotics
	Negative	Wanted to be, but was not, involved in decisions regarding labor pain management, or involved in decisions regarding labor pain management
Patient-reported outcomes	Positive	Received reassurance/comfort from nurse
	Positive	Coped well with labor pain, or pain relief in labor was adequate
	Positive	Doula was in the room
	Positive	Had a choice of who was in the room
	Positive	Had assistance with positions
	Positive	Had continuous electronic fetal monitoring
	Positive	Adequate space/food for support person
	Positive	Used labor stool
	Positive	Was told about progress in labor
	Positive	Satisfied with support person
	Positive	Debriefed regarding events of labor
	Positive	Debriefed regarding patient's feelings after delivery
	Positive	Newborn infant placed skin to skin immediately after birth
	Positive	Was given breastfeeding information within 24 hours
	Negative	Had too much breastfeeding encouragement from provider
	Positive	Got practical support feeding baby
	Positive	Received information regarding newborn infant daily care
	Positive	Received information regarding vaccines
	Positive	Received information regarding newborn infant sleep position
	Positive	Felt comfortable holding the baby
	Positive	Felt safe holding the baby
	Negative	Planned, but did not get, tubal sterilization
	Negative	Short postpartum hospital stay

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(antepartum survey), and overall mental/emotional health (antepartum survey). Adjusted odds ratios with 95% confidence intervals are reported.

Models

To investigate the relationship among predisposing conditions, V&P, PROs, and gap data with women's satisfaction with hospital childbirth services, we used information from the bivariate frequency tables to build the final multivariate models. In these models, women's satisfaction with hospital childbirth services was the dependent variable, and independent variables were chosen from the items for predisposing conditions, V&P, PROs, and gaps. We chose 9 variables (maternal age, race/ethnicity, educational level, multiple gestation, delivery category [combination of multiparity and previous cesarean delivery], United States region, complicated pregnancy [based on a

TABLE 3
Final list of items that were eligible for the model of women's satisfaction with hospital childbirth services[a] *(continued)*

Item type	Association with satisfaction	Item
HIgh-level items	Positive	Felt spiritual and cultural needs were respected
	Positive	Felt that the childbirth went smoothly
	Positive	Felt safe
	Positive	Left all choices to the provider
	Positive	Felt in control or anticipated being in control, or Gap: anticipated being in control and was not (negative)
	Positive	Felt reassured by her provider
	Positive	Felt nurses treated respondent with courtesy and respect
	Positive	Felt doctors/midwives treated respondent with courtesy and respect
	Positive	Felt doctors/midwives explained things in a way respondent could understand
	Positive	Felt that she knew how to care for self and baby at discharge
	Positive	Felt that she saw doctor/midwife enough
	Positive	Felt that she saw nurse enough
	Negative	Felt that the staff did not always explain what was happening
	Negative	Felt that she could not question providers
	Negative	Felt ignored by staff
	Positive	Felt staff were compassionate
	Positive	Felt staff were pleasant

[a] In addition to the 9 forced items: maternal age, educational level, race/ethnicity, multiple gestation, United States region, delivery category, pregnancy complications, overall health, and overall mental health; [b] A factor that combined the following 8 items: (1) I feel confident in protecting my own interests during pregnancy and childbirth; (2) I know where to get information regarding childbirth options; (3) I want to be in charge of planning my care; (4) Giving birth is a powerful experience; (5) My job as a mother is to make sure my baby is born healthy; (6) I believe I will be in control; (7) I expect my childbirth will go smoothly; and (8) Childbirth is a safe experience for the mother. (Likert scale: 1 [strongly disagree] to 5 [strongly agree]; alpha=.76; "Yes" was defined as a factor-based score $\geq$4); [c] Gap item: These items occurred in 4 categories: (1) respondent did not want the item and did not get it; (2) respondent did not want the item but got it; (3) respondent wanted the item and got it; and (4) respondent wanted the item and did not get it.

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positive response to either the antepartum or postpartum items regarding clinical risk], antepartum overall health, and antepartum mental/emotional health) to be included in all models as a standard control set (irrespective of their significance). To limit respondent attrition in multivariate models, we excluded all variables with $\geq$20 missing responses.

For all other potential predictors of satisfaction with hospital childbirth services, we used a hierarchic regression approach that controlled for the order-of-entry of blocks of covariates to improve interpretability of the results. This approach allows addition and removal of model covariates in a manner that prioritizes certain covariates (such as other predisposing conditions) over others. To select the most important and significant covariates in each block, we used backwards variable selection techniques to enter and remove covariates at each step. The first step tested the block of predisposing conditions (not already included in the standard control set) that had a probability value of $<$.10 for bivariate analysis. The second step tested the block of all V&P, PRO, and gap items having a probability value of $<$.05 in bivariate analysis, which controlled for the standard control set and included as eligible covariates any of the predisposing conditions that were identified as contributing to the model in the first step. Items with a nonsignificant 10% difference in categories that were also eligible for inclusion, given that a 10% difference might be clinically relevant. In the case of competing similar items, we retained the model with the highest c-statistic.

While building the models, we recognized that most of the retained items apart from the forced standard control set explicitly did not suggest actions hospital staff could take to improve the patient experience. For example, 1 of these items was that the patient believed that the staff was compassionate, which is a quality that may not be translated easily or consistently into a prescribed set of staff behaviors. On the other hand, use of a labor stool, a specific piece of equipment that was highly associated with women's hospital satisfaction, could be accommodated easily by staff. From the items that were eligible for inclusion in the models, we subjectively labeled 17 as "high level" items (ie, conceptual items that were respondent-specific, personality-dependent perceptions and therefore not necessarily "actionable,"

TABLE 4
Model for predictors of women's satisfaction with hospital childbirth services, including high-level items[a] (N = 479, with c-statistic = 0.845)

Variable	Odds ratio (95% confidence interval)	*P* value[b]
Age (reference: 40–54 y), y		.9578
18–24	0.52 (0.09–2.90)	.4531
25–29	0.55 (0.10–2.86)	.4727
30–34	0.58 (0.11–3.11)	.5268
35–39	0.97 (0.55–1.68)	.4763
Education (reference: some college)		.5855
College graduate or more	0.97 (0.55–1.68)	.8988
High school or less	1.41 (0.57–2.98)	.3620
Race (reference: white)		.7785
Asian	1.30 (0.44–3.86)	.6333
Black	0.81 (0.27–2.43)	.7053
Hispanic	0.65 (0.31–1.36)	.2503
Other	0.75 (0.12–4.80)	.7634
Region (reference: West)		.2340
East	1.03 (0.43–2.44)	.9494
Midwest	0.53 (0.26–1.07)	.0760
South	0.80 (0.42–1.52)	.4929
Delivery category (reference: nulliparous)		.2537
Multiparous without previous cesarean delivery	0.67 (0.38–1.19)	.1682
Multiparous with previous cesarean delivery	0.54 (0.24–1.23)	.1407
Multiple gestation	0.88 (0.40–1.92)	.7411
Perceived health problem (composite)	1.64 (0.97–2.77)	.0634
Overall health poor fair	0.50 (0.18–1.40)	.1870
Overall mental health poor fair	0.33 (0.14–0.79)	.0124
Postpartum: used labor stool	5.47 (1.33–22.55)	.0186

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generalizable, or readily addressed without significant changes in hospital structure and processes, or investment in staff training.

The respondent believed that (1) staff respected her spiritual and cultural needs, (2) the childbirth went smoothly, (3) she was safe, (4) she left all choices to her provider, (5) she was in control, (6) she was reassured by her provider, (7) she was treated by nurses with courtesy and respect, (8) she was treated by doctors/midwives with courtesy and respect, (9) the doctor/midwife explained things in a way she could understand, (10) she knew how to care for herself and baby upon discharge, (11) she saw the doctor/midwife enough, (12) she saw the nurses enough, (13) staff did not always explain what was happening, (14) she could not question providers, (15) she was ignored by staff, (16) staff was compassionate, and (17) staff was pleasant. Models were constructed with and without the high level items to allow for "actionable" items to be identified.

Results

Descriptive results

Appendix A describes the data collection process for Rounds 1 and 2. Data were collected between November 2015 and October 2016. For Round 1, of 2757 antepartum respondents, 399 women (14.5%) responded postpartum. For Round 2, of 2098 antepartum respondents, 439 women (20.9%) responded postpartum. Of the total 838 respondents to both surveys, 500 women (59.7%) met inclusion criteria (anticipated vaginal delivery and labored/delivered in a hospital), and 58 women (11.6%) had a cesarean delivery. The mean number of weeks from delivery to completion of the postpartum response was 6.7±5.0. All responses in the final study population were from English-speaking women.

The mean response for women's satisfaction with hospital childbirth services for the study group was 8.6±1.6 (median, 9.0). Approximately 60% (59.6%; n=298) had a "high" satisfaction score (≥ 9). We list predisposing conditions and their association with women's satisfaction with hospital childbirth services in Table 1. In bivariate analyses, fewer women with the following predisposing conditions rated their hospital experience ≥9 (ie, women with these conditions were less likely to be satisfied): those reporting overall health or mental health as poor, those not confident about the birth process or about their ability to complete medical forms, and those who had experienced discrimination or were worried about the birth process.

We tested the association of each V&P, PRO, and gap item with women's satisfaction with hospital childbirth services (Appendix B shows details regarding variables potentially eligible for the models). Variables that describe intrapartum and postpartum clinical complications appear in Table 2. After adjustment, none of the clinical PROs were significantly associated with hospital satisfaction.

Models

In addition to the standard control set of covariates used for model adjustment,

TABLE 4
Model for predictors of women's satisfaction with hospital childbirth services, including high-level items[a] (N = 479, with c-statistic = 0.845)
(continued)

Variable	Odds ratio (95% confidence interval)	*P* value[b]
Gap data		
Wanted and got massage	2.74 (1.32–5.68)	.0069
Felt providers ignored by staff	0.28 (0.11–0.74)	.0099
Respondent left choices to provider	2.32 (1.37–3.92)	.0018
Felt staff respected spiritual and cultural needs	2.50 (1.39–4.48)	.0022
Felt that the doctor explained things in a way she could understand	2.59 (1.50–4.45)	.0006
Felt that she was treated by the nurses with courtesy and respect	4.02 (2.17–7.45)	<.0001
Felt staff was compassionate	6.12 (2.49–15.09)	<.0001
Respondent knew how to care for self and baby at discharge	17.64 (1.98–157.48)	.0102

[a] High-level items: (1) the respondent felt that staff respected her spiritual and cultural needs; (2) the childbirth went smoothly; (3) the respondent felt safe; (4) the respondent left all choices to her provider; (5) the respondent felt in control; (6) the respondent was reassured by her provider; (7) the respondent felt that she was treated by nurses with courtesy and respect; (8) the respondent felt that she was treated by doctors/midwives with courtesy and respect; (9) the respondent felt that the doctor/midwife explained things in a way she could understand; (10) the respondent knew how to care for herself and baby upon discharge; (11) the respondent saw the doctor/midwife enough; 12) the respondent saw the nurses enough; (13) the respondent felt that staff did not always explain what was happening; (14) the respondent felt that she could not question providers; (15) the respondent felt ignored by providers; (16) the respondent felt staff was compassionate; and (17) the respondent felt staff was pleasant; [b] Wald Chi-square test.

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the first model (which included predisposing conditions) yielded "high confidence" (Table 1) as the only predictor of women's satisfaction with hospital childbirth services. This variable was retained in subsequent models (N=489; c-statistic=0.637; data not shown).

Table 3 describes the variables that were eligible for inclusion in the final model of women's satisfaction with hospital childbirth services.

Table 4 describes the final model of women's satisfaction with hospital childbirth services and considers all the variables in Table 3 as potential covariates (N=479; c-statistic=0.845). Variables associated with hospital satisfaction included overall mental health, use of a labor stool, wanting and getting a massage, and 7 "high level" variables.

Given that resolving problems indicated by the high level items may not be achieved readily, Table 5 describes an alternative model of women's satisfaction with hospital childbirth services based on the items in Table 3 with the exclusion of the high level items (N=465; c-statistic=0.762). Although this model had a lower c-statistic, it appeared to be more explicit, informative, and actionable. Variables associated with hospital satisfaction included overall mental health, wanting and getting a massage, and 7 variables specific to the labor or the postpartum process.

Comment

This study yielded several important results. First, items from each of the potential predictor categories (ie, predisposing conditions, V&P, gaps, and PROs) were associated independently with women's satisfaction with childbirth hospital services. This confirms our hypothesis that all the predictor categories include important items and raises the potential for the identification and possibly mitigation of some of the important predisposing conditions and V&P in advance.

Second, commonly measured predisposing conditions were not associated independently with women's satisfaction with hospital childbirth services. Demographics, parity, and reported pregnancy complications had no demonstrable association with women's satisfaction in bivariate or multivariate analyses. Some bivariate associations did occur for reports of overall health and overall mental health, which is a result that is well-described in satisfaction literature for other patient populations.[22] However, only mental health reported as poor or fair remained consistently (and negatively) associated with satisfaction in all postpartum models. Other less frequently measured predisposing conditions, which include high maternal confidence and literacy (confidence in filling out medical/health forms), were associated significantly with hospital satisfaction.

Third, although fewer of those who reported clinical complications appeared highly satisfied with the hospital, these differences rarely reached statistical significance because of insufficient statistical power.

Fourth, high-level items dominated the full model for women's satisfaction with childbirth hospital services that confirmed the importance of such items. Although many of these items are respondent-dependent intrinsic perceptions that may not be assessed or modified consistently[23] (eg, the respondent believed the childbirth went smoothly, or the respondent felt safe), other items are based on perceptions external to the respondent that hospitals could impact by changing their structure or process or investing in staff training. For example, our alternative model (Table 5) excluded these high level variables and was more explicit by featuring 6 PRO items ("coped well with labor pain," "had continuous electronic fetal monitoring," "had adequate space/food for support person," "got debriefed regarding events during labor," "received practical support for feeding the newborn infant,"

TABLE 5
Model for predictors of women's satisfaction with hospital childbirth services[a]

Variable	Odds ratio (95% confidence interval)	*P* value[b]
Age (reference: 40–54y), y		.5656
18–24	0.29 (0.07–1.27)	.1010
25–29	0.31 (0.07–1.28)	.1048
30–34	0.34 (0.08–1.46)	.1468
35–39	0.31 (0.07–1.43)	.1319
Education (reference: some college)		.3837
College plus		.3006
High school or less	0.77 (0.46–1.27)	.6632
Race (reference: white)	1.16 (0.59–2.28)	.6003
Asian	1.00 (0.38–2.60)	.9969
Black	0.58 (0.22–1.52)	.2662
Hispanic	0.65 (0.34–1.24)	.1916
Other	0.75 (0.19–3.02)	.6873
Region (reference: West)		.4757
East	0.90 (0.42–1.93)	.7903
Midwest	0.62 (0.33–1.16)	.1319
South	0.79 (0.44–1.40)	.4162
Delivery category (reference: nulliparous)		.3616
Multiparous without previous cesarean delivery	1.01 (0.61–1.66)	.9851
Multiparous with previous cesarean delivery	0.63 (0.31–1.30)	.2134
Multiple gestation	0.83 (0.43–1.61)	.5788
Perceived health problem (composite)	1.18 (0.76–1.85)	.4630
Overall health poor fair	0.77 (0.32–1.88)	.5645
Overall mental health poor fair	0.45 (0.21–0.96)	.0384
Postpartum		
Coped well with labor pain	1.71 (1.09–2.71)	.0207
Continuous electronic fetal monitoring	2.40 (1.38–4.19)	.0021
Adequate space/food for support person	2.26 (1.20–4.23)	.0113
Debriefed regarding events during labor	1.91 (1.22–2.99)	.0050
Practical support feeding newborn	3.32 (1.76–6.26)	.0002
Told about progress in labor	2.56 (1.29–5.07)	.0071
Gap data: wanted and got massage	1.97 (1.05–3.17)	.0369
Values and preferences: wanted partner/support person in the room	5.56 (1.12–27.71)	.0364

[a] This model has excluded high-level items (N=465, with c-statistic=0.762): (1) the respondent felt that staff respected her spiritual and cultural needs; (2) the childbirth went smoothly; (3) the respondent felt safe; (4) the respondent left all choices to her provider; (5) the respondent felt in control; (6) the respondent was reassured by her provider; (7) the respondent felt that she was treated by nurses with courtesy and respect; (8) the respondent felt that she was treated by doctors/midwives with courtesy and respect; (9) the respondent felt that the doctor/midwife explained things in a way she could understand; (10) the respondent knew how to care for herself and baby upon discharge; (11) the respondent saw the doctor/midwife enough; (12) the respondent saw the nurses enough; (13) the respondent felt that staff did not always explain what was happening; (14) the respondent felt that she could not question providers; (15) the respondent felt ignored by providers; (16) the respondent felt staff was compassionate; and (17) the respondent felt staff was pleasant; [b] Wald Chi-square test.

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and "was told about progress in labor"), 1 gap item ("wanted and got a massage"), and 1 V&P item ("wanted the spouse/partner in the room"). These are "actionable" items that could be addressed readily to improve women's satisfaction with hospital childbirth services. The differences between the results in Tables 4 and 5 suggest the need for further exploration of these high level variables to determine whether there is variation across and within hospitals.

Our results are consistent with multiple studies that posit or demonstrate that fulfillment of value expectations (ie, what patients desire, prefer, expect, think is important, or think should be[16,17]) is 1 of the determinants of satisfaction with hospital services.[24–27] In addition, labor and pain management, the supportive services provided, and quality of communication appeared to be relevant.

Key findings of this study include identification of 23 PROs (Table 3) that describe explicit childbirth-related services and experiences that were associated with women's satisfaction with hospital childbirth services. Such items are potential candidates for a menu of "universally desired" components of the childbirth experience.

Strengths of this work include the use of Patient-Reported Outcomes Management System methods to develop the conceptual framework and the community-based research approach. However, this study is an early effort and, consequently, has multiple limitations. Most of these limitations will be addressed through future development of CBEX, with the use of Patient-Reported Outcomes Management System,[14] National Quality Forum,[28] or Agency for Healthcare Research and Quality methods.[29] These limitations include (1) the narrowed scope that is limited to the immediate childbirth experience in the hospital, (2) the lack of power to model V&P/PROs for women who anticipate cesarean delivery or out-of-hospital births, (3) potential recruitment bias, (4) the difficulty in recruiting women both antepartum and postpartum (time

1−time 2 study), (5) the low participation of Spanish-speaking women, and (6) the inability to include women speaking other languages. Generalization to other populations is restricted by the limitations listed earlier, and further use of the survey in specific hospital populations may provide more relevant population-based samples for better understanding of women's experiences.

This work brings us to step 4 of the National Quality Forum Pathway for the development of PROs as hospital performance measures.[28] The National Quality Forum outlines a clear research path for implementation of PROs in the hospital environment, comparisons across hospitals to determine PRO variation, and the potential of tracking PROs to lead to quality improvement. The next meaningful and logical step is to demonstrate the feasibility of the implementation of the CBEX in a multihospital setting. ■

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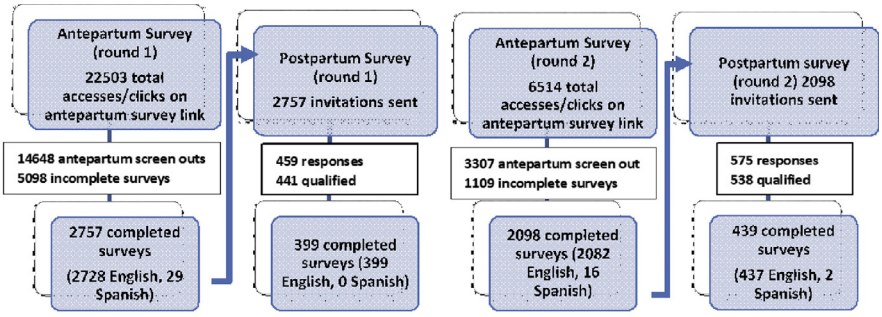
APPENDIX A
Nielsen survey administration flow diagram



Screen outs determined by the following criteria: country, US region, gender, age, pregnancy status, gestation. Qualified participants completed antepartum survey and matched on screening criteria

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APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a]

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
Patient-reported values and preferences items					
Wanted partner/support person in the room (N=481)[d]		.0036			.0162
Yes (n=465; 96.7%)	285 (61.3)		61.6 (56.9–66.0)	4.39 (1.31–14.6)	
No (n=16; 3.3%)	4 (25.0)		26.7 (10.0–54.5)	Reference	
Gap data					
Wanted and got massage (N=500)		.0173			.0079
Yes (n=96; 19.2%)	68 (70.8)		71.1 (58.6–81.0)	2.00 (1.20–3.32)	
No (n=404; 80.8%)	230 (57.1)		55.2 (44.3–65.6)	Reference	
Wanted and got pain treatment: massage (N=500)		.0033			.0079
Yes (n=80; 16.0%)	60 (75.0)		77.3 (64.3–86.6)	2.62 (1.48–4.63)	
No (n=420; 84.0%)	238 (56.7)		56.5 (46.1–66.4)	Reference	
Wanted and got shower/tub (n=500)		.0753			.0327
Yes (n=36; 7.2%)	27 (75.0)		77.6 (59.3–89.1)	2.42 (1.08–5.43)	
No (n=464; 92.8%)	271 (58.4)		58.8 (48.6–68.3)	Reference	
Wanted and did not get narcotics (N=500)		.0510			.0464
Yes (n=74; 14.8%)	36 (48.6)		49.1 (34.5–63.9)	0.59 (0.36–0.99)	
No (n=426; 85.2%)	262 (61.5)		61.9 (51.7–71.1)	Reference	
Wanted but did not get to be involved in decisions regarding labor pain (N=498)		.0001			.0008
Yes (n=38; 7.6%)	11 (28.9)		31.8 (17.2–51.2)	0.27 (0.13–0.58)	
No (n=460; 92.4%)	286 (62.2)		63.4 (53.3–72.5)	Reference	
Patient-reported outcomes					
PP Nurse comfort (N=498)		.0023			.0401
Yes (n=486; 97.6%)	294 (60.5)		60.5 (56.0–64.9)	5.34 (1.08–26.5)	
No (n=12; 2.4%)	2 (16.7)		22.3 (5.5–58.4)	Reference	
PP Pain treatment massage (N=500)		.0089			.0024
Yes (n=103; 20.6%)	73 (70.9)		73.5 (64.0–81.3)	2.15 (1.31–3.54)	
No (n=396; 79.4%)	225 (56.7)		56.3 (51.2–61.3)	Reference	
PP Coped well with labor pain (N=499)		.0004			.0013
Not well or moderately well (n=289; 57.9%)	153 (52.9)		53.4 (47.4–59.3)	Reference	
Very to extremely well (n=210; n=42.1%)	144 (68.6)		68.6 (61.7–74.8)	1.91 (1.29–2.83)	

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(continued)

APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a] *(continued)*

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
PP Pain relief during labor inadequate (N=500)		.0008			.0007
Yes (n=86; 17.2%)	37 (43.0)		42.7 (32.4–53.6)	0.43 (0.26–0.70)	
No (n=413; 82.8%)	261 (63.2)		63.5 (58.6–68.1)	Reference	
PP Doula in room (N=500)		.1345			.0428
Yes (n=38; 7.6%)	27 (71.1)		67.1 (59.8–87.2)	2.26 (1.03–4.97)	
No (n=265; 92.4%)	271 (58.7)		58.5 (53.8–63.1)	Reference	
PP Had choice of who was in the room (N=500)		.0025			.0050
Yes (n=440; 88.0%)	273 (62.0)		62.3 (57.6–66.9)	2.30 (1.28–4.10)	
No (n=60; 12.0%)	25 (41.7)		41.9 (29.6–55.3)	Reference	
PP Had assistance with positions (N=500)		.0001			.0002
Yes (n=396; 79.2%)	253 (63.9)		64.3 (59.3–69.0)	2.38 (1.51–3.76)	
No (n=104; 20.8%)	45 (43.3)		43.1 (33.6–53.1)	Reference	
PP Continuous electronic fetal monitoring (N=500)		.0054			.0164
Yes (n=408; 81.6%)	255 (62.5)		62.5 (57.6–67.2)	1.79 (1.11–2.87)	
No (n=92; 18.4%)	43 (46.7)		48.3 (37.9–58.8)	Reference	
PP Involved in decisions regarding labor pain management (N=500)		.0003			.0021
Yes (n=446; 89.2%)	278 (62.3)		62.5 (57.7–67.0)	2.69 (1.43–5.05)	
No (n=54; 10.8%)	20 (37.0)		38.3 (25.5–52.9)	Reference	
PP Adequate space and food for support person (N=494)		<.0001			<.0001
Yes (n=425; 86.0%)	272 (64.0)		64.3 (59.5–68.8)	3.60 (2.06–6.28)	
No (n=69; 14.0%)	23 (33.3)		33.4 (23.0–45.6)	Reference	
PP Used labor stool (N=494)		.2360			.0139
Yes (n=30; 6.1%)	21 (70.0)		81.5 (64.6–91.4)	3.12 (1.26–7.74)	
No (n=464; 93.9%)	274 (59.1)		58.5 (53.8–63.1)	Reference	
PP Told about progress in labor (N=499)		<.0001			<.0001
Yes (n=436; 87.4%)	275 (63.1)		63.5 (58.7–68.0)	3.31 (1.86–5.88)	
No (n=63; 12.6%)	22 (34.9)		34.6 (23.5–47.4)	Reference	
PP Satisfied with support person (N=495)		.0008			.0044
Yes (n=455; 91.9%)	282 (62.0)		62.1 (57.4–66.5)	2.78 (1.38–5.63)	
No (n=40; 8.1%)	14 (35.0)		37.0 (23.0–53.6)	Reference	

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APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a] *(continued)*

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
PP Debriefed regarding events of labor (N=498)		<.0001			.0002
Yes (n=310; 62.2%)	207 (66.8)		66.5 (56.0–75.4)	2.09 (1.41–3.08)	
No (n=188; 37.8%)	90 (47.9)		48.6 (36.8–60.5)	Reference	
PP Debriefed regarding patient's feelings (N=500)		.0002			.0005
Yes (n=268; 53.6%)	180 (67.2)		67.3 (61.3–72.8)	1.96 (1.34–2.86)	
No (n=232; 46.4%)	118 (50.9)		51.3 (44.6–57.9)	Reference	
PP Newborn infant placed skin to skin (N=500)		.0116			.0148
Yes (n=383; 76.6%)	240 (62.7)		63.0 (57.9–67.9)	1.74 (1.11–2.71)	
No (n=117; 23.4%)	58 (49.6)		49.5 (40.1–59.0)	Reference	
PP Given breast feeding info within 24 hours (N=499)		.0145			.0177
Yes (n=462; 92.6%)	282 (61.0)		61.4 (56.7–65.9)	2.39 (1.16–4.90)	
No (n=37; 7.4%)	15 (40.5)		40.0 (25.1–57.1)	Reference	
PP Breastfeeding encouragement from provider (N=499)		.0001			.0005
Just right (n=408; 81.8%)	261 (64.0)		64.2 (59.3–68.8)	Reference	
Too little (n=44; 8.8%)	15 (34.1)		35.1 (21.9–51.0)	0.31 (0.15–0.60)	.0007
Too much (n=47; 9.4%)	22 (46.8)		46.3 (32.2–61.1)	0.48 (0.25–0.91)	.0245
PP Got practical support feeding baby (N=497)		<.0001			<.0001
Yes (n=423; 85.1%)	275 (65.0)		65.5 (60.7–70.0)	4.30 (2.48–7.47)	
No (n=74; 14.9%)	23 (31.1)		30.6 (21.0–42.3)	Reference	
PP Received information regarding newborn infant daily care (N=500)		.0513			.0316
Yes (n=436; 87.2%)	267 (61.2)		61.8 (57.0–66.4)	1.84 (1.06–3.20)	
No (n=64; 12.8%)	31 (48.4)		46.9 (34.6–59.6)	Reference	
PP Received info regarding vaccines (N=498)		.0005			.0004
Yes (n=388; 77.9%)	248 (63.9)		64.5 (59.5–69.3)	2.26 (1.44–3.54)	
No (n=110; 22.1%)	50 (45.5)		44.6 (35.3–54.3)	Reference	
PP Received information regarding newborn infant's sleep position (N=500)		.0036			.0072
Yes (n=435; 87.0%)	270 (62.1)		62.3 (57.5–66.9)	2.14 (1.23–3.73)	
No (n=65; 13.0%)	28 (43.1)		43.6 (31.6–56.5)	Reference	
PP Comfortable holding baby (N=496)		.1136			.1894
Yes (n=458; 92.3%)	277 (60.5)		60.7 (56.0–65.2)	1.61 (0.79–3.28)	
No (n=38; 7.7%)	18 (47.4)		48.9 (32.6–65.4)	Reference	

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APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a] *(continued)*

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
PP Felt safe holding baby (N=477)		.0079			.0050
Yes (n=431; 90.4%)	270 (62.6)		63.3 (63.1–72.5)	2.19 (1.27–3.77)	
No (n=46; 9.6%)	19 (41.3)		44.1 (29.9–59.4)	Reference	
PP Length of stay <24 hours (N=500)		.0137			.0176
Yes (n=40; 8.0%)	16 (40.0)		40.9 (26.3–57.3)	0.43 (0.22–0.86)	
No (n=460; 92.0%)	282 (61.3)		61.5 (56.9–66.0)	Reference	
PP Tubal sterilization (N=498)		.0457			.0281
Yes (n=34; 6.8%)	26 (76.5)		79.9 (62.7–90.4)	2.71 (1.11–6.59)	.0283
Planned but not done (n=32; 6.4%)[e]	15 (46.9)		46.5 (29.3–64.7)	0.59 (0.27–1.28)	.1838
No (n=432; 86.8%)	257 (59.5)		59.5 (54.7–64.2)	Reference	
PP Staff respected spiritual/cultural needs (N=500)		<.0001			<.0001
Yes (n=390; 78.0%)	258 (66.2)		65.9 (60.9–70.6)	3.16 (1.98–5.02)	
No (n=110; 22.0%)	40 (36.4)		38.0 (29.0–47.9)	Reference	
PP Childbirth went smoothly (N=500)		<.0001			<.0001
Yes (n=391; 78.2%)	254 (65.0)		65.0 (60.0–69.7)	2.61 (1.65–4.13)	
No (n=109; 21.8%)	44 (40.4)		41.6 (32.3–51.5)	Reference	
PP Felt safe (N=500)		<.0001			<.0001
Yes (n=444; 88.8%)	282 (63.5)		63.8 (59.0–68.2)	4.27 (2.24–8.13)	
No (n=56; 11.2%)	16 (28.6)		29.2 (18.3–43.1)	Reference	
PP Left choices to provider (N=500)		.0001			<.0001
Yes (n=187; 37.4%)	132 (70.6)		70.5 (59.8–79.4)	2.31 (1.54–3.47)	
No (n=313; 62.6%)	166 (53.0)		50.9 (39.7–61.9)	Reference	
Gap data: Wanted to stay in control but did not (N=499)		<.0001			<.0001
Yes (n=53; 10.6%)	17 (32.1)		34.5 (21.1–50.8)	0.28 (0.15–0.53)	
No (n=446; 89.4%)	280 (94.3)		65.0 (54.8–74.0)	Reference	
PP Lost control (N=498)		.0443			.0382
Yes (n=125; 25.1%)	65 (52.0)		51.7 (42.6–60.7)	0.64 (0.41–0.98)	
No (n=373; 74.9%)	232 (62.2)		62.7 (57.5–67.7)	Reference	
PP Believed to be in control (N=500)		<.0001			<.0001
Yes (n=397; 79.4%)	256 (64.5)		64.8 (59.8–69.5)	2.65 (1.66–5.23)	
No (n=103; 20.6%)	42 (40.8)		41.0 (31.5–51.2)	Reference	
PP Got reassurance from the provider (N=500)		.0002			.0003
Yes (n=455; 91.0%)	283 (62.2)		62.7 (58.0–67.1)	3.47 (1.78–6.79)	
No (n=45; 9.0%)	15 (33.3)		32.6 (20.3–47.8)	Reference	

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APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a] *(continued)*

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
Gap data: Wanted but did not get reassurance from the provider (N=499)		.0002			.0002
Yes (n=39; 7.8%)	12 (30.8)		29.2 (15.6–48.0)	0.25 (0.12–0.52)	
No (n=460; 92.2%)	286 (62.2)		62.3 (62.2–71.4)	Reference	
HCAHPS Nurse showed respect "top box" (N=497)[f]		<.0001			<.0001
Yes (n=381; 76.7%)	267 (70.1)		70.8 (65.9–75.3)	7.31 (1.50–2.48)	
No (n=116; 23.3%)	30 (25.9)		24.9 (17.8–33.8)	Reference	
HCAHPS Doctor showed respect "top box" (N=496)		<.0001			<.0001
Yes (n=388; 78.2%)	268 (69.1)		69.6 (64.8–74.1)	6.80 (4.13–11.18)	
No (n=108; 21.8%)	28 (25.9)		25.2 (17.8–34.4)	Reference	
HCAHPS Doctor explained "top box"		<.0001			<.0001
Yes (n=359; 71.9%)	252 (70.2)		70.6 (65.5–75.2)	5.10 (3.29–7.92)	
No (n=140; 28.1%)	45 (32.1)		31.9 (24.5–40.4)	Reference	
Knew how to care for self and newborn infant at discharge		<.0001			.0001
Yes (n=469; 94.0%)	296 (63.1)		63.5 (58.9–67.8)	55.42 (7.23–424.9)	
No (n=30; 6.0%)	1 (3.3)		3.0 (0.4–19.2)	Reference	
PP Saw doctor enough (N=496)		<.0001			<.0001
Yes (n=303; 61%)	211 (69.6)		70.2 (64.6–75.2)	3.11 (2.10–4.60)	
No (n=193; 39%)	84 (43.3)		43.1 (36.1–50.4)	Reference	
PP Saw nurse enough (N=497)		<.0001			<.0001
Yes (n=440; 89%)	277 (62.8)		63.3 (58.6–67.8)	3.76 (2.02–6.99)	
No (N=57; 11%)	19 (33.3)		31.5 (20.4–45.2)	Reference	
PP No one explained what was happening (N=499)		<.0001			<.0001
Yes (n=106; 21%)	43 (40.6)		40.1 (30.8–50.2)	0.36 (0.22–0.57)	
No (n=393; 79%)	255 (64.7)		65.2 (60.2–69.9)	Reference	
PP Could not question providers (N=499)		<.0001			<.0001
Yes (n=61; 12%)	18 (29.5)		29.9 (19.4–43.1)	0.24 (0.13–0.44)	
No (n=438; 88%)	280 (63.8)		64.0 (59.3–68.5)	Reference	

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APPENDIX B

Patient-reported values and preferences, patient-reported outcome, and gap data statistically significantly associated with women's satisfaction with hospital childbirth services (N = 500)[a] *(continued)*

Characteristic	Crude hospital satisfaction ≥9, n (%)	*P* value[b]	Adjusted hospital satisfaction ≥9, % (95% confidence interval)	Odds ratio (95% confidence interval)	*P* value[c]
PP Felt providers ignored me (N=498)		<.0001			<.0001
Yes (n=57; 11%)	19 (33.3)		32.3 (21.1–46.1)	0.27 (0.15–0.51)	
No (n=441; 89%)	279 (63.1)		63.6 (58.8–68.1)	Reference	
PP Staff were compassionate (N=497)		<.0001			<.0001
Yes (n=441; 89%)	286 (64.7)		64.9 (60.2–69.3)	7.34 (3.59–15.00)	
No (n=56; 11%)	11 (19.6)		20.1 (11.3–33.3)	Reference	
PP Staff were pleasant (N=497)		<.0001			<.0001
Yes (n=458; 92%)	287 (62.5)		62.9 (58.3–67.4)	5.09 (2.34–11.05)	
No (n=39; 8%)	10 (25.6)		25.0 (13.7–41.3)	Reference	

HCAHPS, Hospital Consumer Assessment of Healthcare Providers and Systems; *PP*, postpartum.

[a] Results are adjusted for maternal age, educational level, race/ethnicity, United States region, delivery category, pregnancy complications, overall health, and overall mental health; [b] Chi-square test or Fisher's exact test as appropriate; [c] Wald Chi-square test; [d] Of 19 participants with missing data, 8 women stated they had no partner; [e] Women who planned for a tubal sterilization and got it were more likely than those who planned for it and did not have it to be satisfied with the hospital: odds ratio, 4.58 (95% confidence interval, 1.48–14.14); *P*=.0082; [f] "Top box" refers to the most positive response to HCAHPS survey items.

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