Patient-Perceived Pressure from Clinicians for Labor Induction and Cesarean Delivery: A Population-Based Survey of U.S. Women

Judy Jou, Katy B. Kozhimannil, Pamela Jo Johnson, and Carol Sakala

Objective. To determine whether patient-perceived pressure from clinicians for labor induction or cesarean delivery is significantly associated with having these procedures.

Data Sources/Study Setting. *Listening to Mothers III*, a nationally representative survey of women 18–45 years who delivered a singleton infant in a U.S. hospital July 2011–June 2012 ($N = 2,400$).

Study Design. Multivariate logistic regression analysis of factors associated with perceived pressure and estimation of odds of induction and cesarean given perceived pressure.

Principal Findings. Overall, 14.8 percent of respondents perceived pressure from a clinician for labor induction and 13.3 percent for cesarean delivery. Women who perceived pressure for labor induction had higher odds of induction overall (adjusted odds ratio [aOR]: 3.51; 95 percent confidence interval [CI]: 2.5–5.0) and without medical reason (aOR: 2.13; 95 percent CI: 1.3–3.4) compared with women who did not perceive pressure. Those perceiving pressure for cesarean delivery had higher odds of cesarean overall (aOR: 5.17; 95 percent CI: 3.2–8.4), without medical reason (aOR: 6.13; 95 percent CI: 3.4–11.1), and unplanned cesarean (aOR: 6.70; 95 percent CI: 4.0–11.3).

Conclusions. Patient-perceived pressure from clinicians significantly predicts labor induction and cesarean delivery. Efforts to reduce provider–patient miscommunication and minimize potentially unnecessary procedures may be warranted.

Key Words. Cesarean delivery, labor induction, shared decision making, provider–patient communication

Cesarean delivery and labor induction rates have risen in the United States over the past two decades. In 2012, 32.8 percent of all births were via cesarean, compared with 20.7 percent in 1996 (Martin et al. 2013). Similarly, 23.4 percent of all women who gave birth in 2010 had their labor induced, up from 10.5 percent in 1991 (Martin et al. 2012). While these procedures can be

necessary and even life-saving in complicated births, increased use has consequences for medical outcomes and costs (Ecker and Frigoletto 2007). Compared to vaginal delivery, cesarean delivery is associated with higher risks of maternal mortality; rehospitalization within 30 days; neonatal asphyxia and other respiratory problems; and chronic childhood diseases such as allergies, asthma, obesity, and type 1 diabetes (Bailit et al. 2002; Belizán, Althabe, and Cafferata 2007; Declercq et al. 2007; Thavagnanam et al. 2007; Bager, Wohlfahrt, and Westergaard 2008; Cardwell et al. 2008; MacDorman, Declercq, and Zhang 2010; Li, Zhou, and Liu 2013). The average length of hospital stay for an uncomplicated primary cesarean (4.3 days) is longer than for a planned vaginal birth (2.4 days), with higher associated costs (\$7,983 vs. \$6,117 for Medicaid and \$16,673 vs. \$12,520 for commercial insurers) (Declercq et al. 2007; Truven Health Analytics 2013). Labor induction is associated with longer labor and hospital stays; higher costs due to related interventions such as electronic fetal monitoring, amniotomy, and epidural use; and higher risk of cesarean delivery (Maslow and Sweeny 2000; Rayburn and Zhang 2002; Heffner, Elkin, and Fretts 2003; Simpson and Atterbury 2003; MacDorman, Declercq, and Zhang 2010).

Recent evidence suggests that cesarean rates have risen faster than the rates of clinical risk factors for cesarean delivery (National Collaborating Centre for Women's and Children's Health's 2011). Between 1996 and 2003, cesarean rates increased at a similar pace for low-risk women (+6.4 percent) and overall (+6.8 percent). However, the percentage change in risk factors for cesarean was small: -2.0 percent for breech/malpresentation, +5.0 percent for premature birth, and -7.0 percent for high birthweight (>4,000 g) in primiparous women. More women with medical risk factors gave birth by cesarean in 2002 compared to 1996, with the change in percentage being as high as +20.0 percent for women with chronic hypertension, +19.0 percent for diabetes, and +18.0 percent for high birthweight (Menacker 2005; Declercq, Menacker, and MacDorman 2006). This suggests that the rise in cesarean rates may be attributed not to an increase in

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risk factors for cesarean delivery, but to cesareans being increasingly used in conjunction with these conditions.

Evidence on labor induction suggests similar patterns. One study found that nearly two-thirds of all labor inductions in the United States were performed without definitive medical indication, and elective induction rates have increased more rapidly than rates of medically indicated inductions (Ramsey, Ramin, and Ramin 2000; Zhang, Yancey, and Henderson 2002; Glantz 2003). In addition, wide regional and hospital-level variations have been found in the use of both interventions. Cesarean delivery rates vary fourfold across counties and nearly tenfold across hospitals, while labor inductions vary by 30–50 percent across states and counties and are more common in community than in teaching hospitals (Beebe et al. 2000; Zhang, Yancey, and Henderson 2002; Baicker, Buckles, and Amitabh 2006; Kozhimannil, Law, and Virnig 2013).

One crucial factor influencing procedure use during childbirth is patient–clinician interaction. Shared decision making is increasingly emphasized as a goal of high quality of care, with many recent clinical decision making models emphasizing the importance of patient knowledge regarding their condition and the possible benefits and harms of treatment options, along with consideration of the patient’s values and preferences (Emanuel and Emanuel 1992; Elwyn, Edwards, and Kinnersley 1999; Barry and Edgman-Levitan 2012; Mayo Clinic 2012). However, patients often rely heavily on clinician guidance and input while making decisions and may not have or embrace evidence-based knowledge to inform their decisions (Emanuel and Emanuel 1992; Goldberg 2009; Mayo Clinic 2012). Several studies suggest that patient decision making in maternity care is a complex process with high cognitive burden, where knowledge competes with other considerations and pressures in shaping decisions made by women and their clinicians (Simpson, Newman, and Chirino 2010; Moore and Low 2012).

This paper focuses on one aspect of medical decision making in maternity care: patient perception of pressure from health care professionals to use labor induction or cesarean delivery during childbirth. We used data from a nationally representative survey of childbearing women to examine the extent to which perceived pressure is associated with the use of these procedures.

METHODS

Data and Study Sample

Data for this study are from the *Listening to Mothers III (LTM III)* survey, conducted among a national sample of women ages 18–45 years who gave

birth to a singleton infant in a U.S. hospital between July 1, 2011 and June 30, 2012 ($N = 2,400$). The survey was commissioned by Childbirth Connection and funded by the Kellogg Foundation. Harris Interactive, a leading market research firm, administered the survey between October and December 2012 via Internet using a panel survey methodology, where potential participants were drawn from the Harris Poll Online, Research Now/E-Rewards, GMI, and Offerwise Hispanic panels and screened for eligibility according to the above criteria (Childbirth Connection 2013). Harris Interactive used a probability-based quota sampling method to recruit eligible participants from national panels until an adequate base sample was obtained. Propensity score weighting for the propensity to be online was applied to the *Listening to Mothers III* data to offset any potential selection biases due to attitudinal and behavioral factors associated with use of the Internet (Couper 2000; Harris Interactive, Inc 2011). The data were also weighted by demographic variables including age, race/ethnicity, geographic region, educational attainment, and household income to more accurately reflect the target population. This type of survey methodology does not provide a traditional participation rate. Additional detailed information about the survey questionnaire, methodology, and related materials are publicly available online at www.childbirthconnection.org/listeningtomothers/ (Childbirth Connection 2013). The survey took approximately 30 minutes to complete, on average, and respondents were asked questions related to pregnancy and childbirth, including questions about choices, knowledge, and decision making during labor and delivery.

Variable Measurement

Perceived pressure was coded as a 0/1 variable from a series of questions asking, "Did you feel pressure from any health professional to have. . .?" Respondents answered "Yes" (1) or "No" (0) for "labor induction" and "a cesarean"; there were no missing responses to these questions. While no in-depth cognitive testing was done with this survey item to determine whether women would report perceiving pressure even when procedures were clearly medically indicated, the question was pretested for clarity, coherence, completeness, and respectfulness by women who fit the eligibility criteria prior to the launch of the survey. Prior research indicates that it is not uncommon for women to experience pressure in the context of childbirth procedures, and maternity care is specifically highlighted in national quality efforts to reduce overuse of services, such as the Choosing Wisely campaign (Lyerly et al. 2007; Cassel and Guest 2012; ABIM Foundation 2013). Within the *LTM III*

survey, for instance, a series of questions on shared decision making indicated that women were systematically steered toward having interventions, such as labor induction and cesarean section, rather than being offered to wait for labor (Childbirth Connection 2013). In addition, issues related to the organization of care, such as staffing or payment systems, have been shown to influence rates of procedures such as cesarean delivery (Iriye et al. 2013). While the variable for perceived pressure may not capture all aspects of pressure in maternity care settings, it is unique in systematically measuring the perception of pressure among childbearing women through a question designed to be clear and coherent to survey respondents.

Women were also asked to report whether they experienced labor induction or a cesarean and, if so, to identify the reasons for these procedures. Respondents whose maternity care provider tried to induce labor were asked the method used to do so. For this analysis, we defined labor induction as attempted induction by a clinician through sweeping or rupturing membranes, giving intravenous Pitocin, or applying medication to the cervix. Cesarean birth was measured by self-reported mode of delivery. Women who reported cesarean delivery were asked whether the cesarean was planned (i.e., decision made prior to going into labor) or unplanned. Outcome variables included (1) labor induction, (2) induction without medical reason, (3) cesarean delivery, (4) cesarean without medical reason, and (5) unplanned cesarean.

Respondents who indicated they had a labor induction or cesarean delivery were asked to select the reason(s) for the procedure from a given list, using lay terminology, with “some other reason” also being an option. Women’s self-reported reasons for induction and cesarean were categorized as “medical” according to professional standards used for accreditation measures from The Joint Commission, clinical guidelines from the National Institute for Health and Clinical Evidence in the United Kingdom, and best-evidence reviews of existing literature (Mozurkewich et al. 2009; National Quality Forum 2012; The Joint Commission 2013); we also verified our definitions with a clinician member of our research team. Medical reasons for labor induction included clinician concern about any of the following: the infant being too large or overdue when gestation exceeded 41.5 weeks, the infant not doing well and needing to be born soon, the woman’s water having broken and resulting fear of infection, low amniotic fluid, gestational diabetes, or any other maternal health condition requiring a quick delivery. Inductions were categorized as being performed without definitive medical reason if they were due to clinician concern over infant

size or due date when gestation was under 41.5 weeks, being full term or close to the due date, wanting the pregnancy to be over, wanting to control the timing of birth, wanting to give birth with a specific doctor, or no reason cited.

Medical reasons for cesarean included the infant being in the wrong position for birth, problems with the placenta, fetal distress during labor, or any maternal health condition requiring a quick delivery. A cesarean without medical reason could not include any of the above criteria but may have included the following reasons: having had a prior cesarean, labor taking too long, clinician concern regarding the size of the infant, fear of labor and vaginal delivery, the infant having trouble fitting through the pelvis, being past the due date, or citing no medical reason for the cesarean.

We recognize the active debate and role of clinical expertise in determining medical need for these procedures. As such, we conducted multiple sensitivity analyses of these categorizations, and our findings remained broadly consistent across alternative specifications. In particular, we created two different versions of the variable for cesarean delivery without definitive medical reason—one including prior cesarean as a medical reason and one excluding it, the latter of which was used in our final analyses—and ran each statistical model using both; again, this produced consistent findings across all versions. Appendix A contains the results of this and the other sensitivity analyses we conducted around the categorization of reasons as “medical” for both labor induction and cesarean delivery.

We included covariates controlling for sociodemographic characteristics, including the respondents’ age, race/ethnicity, educational attainment, four-category census region, marital status, birthplace, and insurance type, along with birth-related factors, including parity and mode of prior birth, pregnancy intention, agreement with the statement, “Giving birth is a process that should not be interfered with unless medically necessary,” delivery provider type, and whether the woman had met her delivery provider prior to labor and birth.

Statistical Analysis

Two-way tabulation was used to examine perceived pressure for induction and cesarean by sociodemographic and pregnancy characteristics, with chi-square tests used to identify any significant differences between groups. We then assessed whether any covariates significantly predicted the odds of reporting perceived pressure for induction and cesarean using multivariate

logistic regression. We also used multivariate logistic regression to estimate the odds of labor induction overall and without a medical reason by perceived pressure for labor induction, as well as the odds of cesarean delivery overall, without medical reason, and unplanned by perceived pressure for cesarean, adjusting for sociodemographic and birth-related characteristics. All analyses were weighted to be nationally representative and were conducted using *Stata SE version 12* (Stata Corporation, College Station, TX). This study was granted exemption from review by the University of Minnesota Institutional Review Board (Study Number 1011E92983).

RESULTS

Table 1 displays sample characteristics. Overall, 21.5 percent of respondents reported feeling pressure for either labor induction or cesarean delivery. Approximately 14.8 percent perceived pressure for induction, while 13.3 percent reported perceiving pressure for cesarean. Over one-third of women (37.5 percent) had their labor induced, and 49.9 percent of these inductions were without medical reason. The overall cesarean rate was 31.0 percent, of which 67.1 percent were without medical reason (as prior cesarean was overwhelmingly the most common reason cited for cesarean delivery) and 39.6 percent unplanned. Around 40.7 percent were first-time mothers, and 35.4 percent described their pregnancy as unintended. A small percentage (8.0 percent) had no insurance, and 46.5 and 45.5 percent reported private or public health insurance coverage, respectively.

Table 2 shows perceptions of pressure for induction and cesarean by sociodemographic and pregnancy characteristics. Women of age 18–24 years constituted a significantly higher percentage of those reporting pressure for induction ($p < .001$), as did first-time mothers ($p < .001$) and privately insured women ($p < .001$). Significant differences in perceived pressure for induction were also found by race/ethnicity ($p = .04$), place of birth ($p = .01$), level of education ($p = .03$), attendance at childbirth education classes ($p < .001$), and delivery provider type ($p < .001$). For cesarean delivery, significant differences in perceived pressure were found by parity and mode of delivery ($p < .001$), attendance at childbirth education classes ($p < .001$), meeting the delivery provider prior to labor and birth ($p = .02$), and insurance type ($p = .001$).

Table 3 shows the results of multivariate models predicting the odds of reporting perceived pressure for induction and cesarean, by sociodemo-

Table 1: Characteristics of Sample ($n = 2,400$)

	%
Perceived pressure from health professional	
Pressure for either induction or cesarean	21.5
Labor induction	14.8
Cesarean delivery	13.3
Childbirth-related care	
Labor induction by clinician using medical techniques	37.5
Labor induction without defined medical indication	49.9
Cesarean delivery	31.0
Cesarean delivery without defined medical indication	67.1
Unplanned cesarean delivery	39.6
Sociodemographic characteristics	
Age category (years)	
18–24	31.8
25–29	28.3
30–34	24.8
35+	15.1
Race	
White	54.5
Black	15.3
Hispanic	23.1
Other/multiple race	7.0
Foreign born	7.1
Married at time of birth	60.4
Education	
H.S. or less	42.3
Some college/associate's degree	28.5
Bachelor's degree	17.8
Graduate education/degree	11.4
Region	
Northeast	15.2
Midwest	22.7
South	39.7
West	22.4
Insurance type	
Private	46.5
Public (Medicaid or CHIP)	45.5
No insurance	8.0
Pregnancy characteristics	
Mode of delivery	
No prior deliveries	40.7
Most recent prior birth was vaginal	42.2
Most recent prior birth was by cesarean	17.0
Unintended pregnancy	35.4
Belief that childbirth is a process that should only be interfered with if medically necessary	58.4

continued

Table 1: *Continued*

	%
Attended childbirth education classes during pregnancy	34.2
Delivery provider	
OB/GYN	68.8
Family medicine doctor	6.2
Midwife	9.9
Other (or missing)	15.0
Never met delivery provider until time of labor and birth	21.1

graphic and pregnancy characteristics. Controlling for other factors, women with no health insurance were more likely than women with private insurance to perceive pressure for both induction and cesarean (95 percent CI: 1.02–2.79 and 1.07–3.14, respectively), as were women who attended childbirth education classes (95 percent CI: 2.23–4.93 and 1.74–3.80, respectively). Women with public insurance were 40 percent less likely to perceive pressure for induction compared to women with private insurance. Women whose most immediate prior birth was by cesarean were 3.6 times more likely to perceive pressure (95 percent CI: 2.15–6.14) for cesarean. Pressure for cesarean was also more commonly perceived among women with bachelor’s degrees (95 percent CI: 1.01–2.95) and pressure for induction among women with graduate degrees (1.21–3.67), compared to women with high school degrees or less.

Table 4 shows the results of multivariate logistic regressions for induction and cesarean by perceived pressure, controlling for sociodemographic and pregnancy characteristics. Women who perceived pressure from a health care professional for labor induction had 3.51 times higher odds of having an induction (95 percent CI: 2.49–4.95) compared with similar women who did not perceive pressure. These odds decrease, but remain significant for labor induction without medical reason (aOR: 2.13; 95 percent CI: 1.34–3.38). Perceived pressure from a health care professional is also associated with higher odds of cesarean delivery. Women who report perceiving pressure for cesarean delivery were more likely to have a cesarean overall (aOR: 5.17; 95 percent CI: 3.19–8.39). In contrast to our findings for labor induction, the magnitude of association increases for cesareans without medical reason (aOR: 6.13; 95 percent CI: 3.38–11.10 [aOR: 6.62; 95 percent CI: 3.84–11.41 when prior cesarean is included as a

Table 2: Characteristics of Sample (*n* = 2,400) by Perceived Pressure for Induction and Cesarean

	<i>Pressure for Induction</i>			<i>Pressure for Cesarean</i>		
	<i>Yes</i> <i>(n = 352)</i>	<i>No</i> <i>(n = 2,048)</i>	<i>p-value</i>	<i>Yes</i> <i>(n = 293)</i>	<i>No</i> <i>(n = 2,107)</i>	<i>p-value</i>
Sociodemographic characteristics						
Age category (years)						
18–24	46.9	29.2	<.001	30.6	39.7	.06
25–29	24.2	29.0		28.8	25.0	
30–34	18.6	25.9		24.8	24.7	
35+	10.2	16.0		15.8	10.6	
Race						
White	48.5	55.5	.04	45.5	55.9	.16
Black	18.9	14.7		18.7	14.8	
Hispanic	21.4	23.4		26.9	22.6	
Other/multiple race	11.2	6.3		8.9	6.7	
Foreign born	3.0	7.8	.01	6.6	7.1	.81
Married at time of birth	54.3	61.5	.07	57.3	60.9	.39
Education						
H.S. or less	38.0	43.0	.03	38.8	42.8	.20
Some college/ associate's degree	25.0	29.2		25.6	29.0	
Bachelor's degree	20.7	17.3		22.8	17.1	
Graduate education/ degree	16.3	10.5		12.7	11.2	
Region						
Northeast	16.0	15.1	.65	16.7	15.0	.10
Midwest	19.3	23.3		15.0	23.9	
South	42.5	39.2		44.5	38.9	
West	22.1	22.5		23.8	22.2	
Insurance type						
Private	46.3	46.6	<.001	47.2	46.5	.001
Public (Medicaid or CHIP)	36.6	47.0		37.9	46.6	
No insurance	17.1	6.4		14.9	6.9	
Pregnancy characteristics						
Mode of delivery						
No prior deliveries	58.4	37.7	<.001	48.0	39.6	<.001
Most recent prior birth was vaginal	31.6	44.1		20.9	45.5	
Most recent prior birth was by cesarean	10.0	18.3		31.1	14.9	
Unintended pregnancy	40.6	34.5		38.5	34.9	

continued

Table 2: *Continued*

	<i>Pressure for Induction</i>			<i>Pressure for Cesarean</i>		
	<i>Yes</i> (<i>n</i> = 352)	<i>No</i> (<i>n</i> = 2,048)	<i>p-value</i>	<i>Yes</i> (<i>n</i> = 293)	<i>No</i> (<i>n</i> = 2,107)	<i>p-value</i>
Belief that childbirth is a process that should only be interfered with if medically necessary	57.0	58.7	.67	63.0	57.7	.22
Took childbirth education classes	62.8	29.3	<.001	53.4	31.3	<.001
Delivery provider						
OB/GYN	50.4	72.0	<.001	61.3	69.9	.05
Family medicine doctor	9.3	11.1		5.9	12.4	
Midwife	10.4	9.9		10.5	9.8	
Other (or missing)	29.8	7.1		22.2	7.8	
Never met delivery provider until labor and birth	16.5	21.9	.09	14.7	22.1	.02

definitive medical reason]) and those that were unplanned (aOR: 6.70; 95 percent CI 3.97–11.32).

DISCUSSION

The results of our analysis suggest that over one-fifth of women who gave birth in U.S. hospitals may perceive pressure from a clinician to induce labor or deliver by cesarean, and that perceived pressure from health care professionals is associated with significantly higher odds of labor induction and cesarean delivery among these women. These findings are consistent with previous research that finds clinician preferences, opinions, and information are important to women making decisions about labor induction or cesarean (McCourt et al. 2007; Moore and Low 2012; Johnson and Rehavi 2013). Such pressure may be appropriate when intervention is medically necessary, and women have an extremely high level of trust in their maternity care providers (Childbirth Connection 2013). By uncovering a significant effect of perceived pressure on procedures used without medical reason, this study's findings are suggestive of potential undue pressure, overuse of procedures, and/or miscommunication in maternity care decision making.

Table 3: Odds of Perceived Pressure, by Patient Characteristics (*n* = 2,400)

	<i>Pressure for Induction</i>		<i>Pressure for Cesarean</i>	
	<i>aOR</i>	<i>95% CI</i>	<i>aOR</i>	<i>95% CI</i>
Sociodemographic characteristics				
Age category (Ref = 35+)				
18–24	1.49	(0.82, 2.73)	1.49	(0.80, 2.79)
25–29	1.05	(0.62, 1.79)	1.24	(0.71, 2.18)
30–34	1.08	(0.64, 1.82)	1.38	(0.79, 2.39)
Race (Ref = White)				
Black	1.27	(0.62, 1.84)	1.10	(0.65, 1.86)
Hispanic	0.90	(0.59, 1.37)	1.28	(0.83, 1.98)
Other/multiple race	1.33	(0.78, 2.29)	1.11	(0.52, 2.36)
Foreign born	0.36*	(0.16, 0.84)	0.74	(0.35, 1.59)
Married at time of birth	1.09	(0.74, 1.60)	0.96	(0.63, 1.47)
Education (Ref = H.S. or less)				
Some college/associate’s degree	0.95	(0.62, 1.45)	1.02	(0.65, 1.59)
Bachelor’s degree	1.59	(0.98, 2.58)	1.73*	(1.01, 2.95)
Graduate education/degree	2.11**	(1.21, 3.67)	1.44	(0.78, 2.66)
Region (Ref = Northeast)				
Midwest	0.78	(0.46, 1.31)	0.59	(0.33, 1.05)
South	0.90	(0.54, 1.51)	0.94	(0.55, 1.58)
West	0.84	(0.50, 1.43)	0.93	(0.52, 1.67)
Insurance (Ref = Private)				
Public insurance	0.59*	(0.39, 0.88)	0.70	(0.45, 1.08)
No insurance	1.69*	(1.02, 2.79)	1.84*	(1.07, 3.14)
Pregnancy characteristics				
Mode of delivery (Ref = No prior deliveries)				
Most recent prior birth was vaginal	1.01	(0.66, 1.57)	0.68	(0.42, 1.11)
Most recent prior birth was by cesarean	0.80	(0.41, 1.56)	3.64***	(2.15, 6.14)
Unintended pregnancy	1.30	(0.90, 1.85)	1.05	(0.71, 1.55)
Belief in birth as a natural process	1.01	(0.72, 1.42)	1.44	(1.00, 2.06)
Took childbirth education classes	3.31***	(2.23, 4.93)	2.57***	(1.74, 3.80)
Delivery provider (Ref = OB/GYN)				
Family medicine doctor	1.25	(0.74, 2.12)	0.83	(0.42, 1.65)
Midwife	1.34	(0.75, 2.40)	1.48	(0.80, 2.77)
Other (or missing)	2.73***	(1.75, 4.27)	1.86**	(1.21, 2.88)
Never met delivery provider until labor and birth	0.72	(0.46, 1.14)	0.71	(0.46, 1.11)

****p* < .001, ***p* < .01, **p* < .05.

While the odds of labor induction without a medical reason given perceived pressure are elevated compared with women who did not perceive pressure, the magnitude of the association between perceived pressure and any labor induction is greater than the magnitude of the association between perceived pressure and induction without medical reason. This

Table 4: Odds of Labor Induction or Cesarean Delivery by Perceived Pressure from Health Care Provider

	<i>Labor Induction</i>					
	<i>All (n = 2,400)</i>		<i>Nondefinitive Indication (n = 1,966)</i>			
	<i>aOR</i>	<i>95% CI</i>	<i>OR</i>	<i>95% CI</i>		
Perceived pressure						
No pressure	1.00		1.00			
Pressure for induction	3.51***	(2.49, 4.95)	2.13**	(1.34, 3.38)		
	<i>Cesarean Delivery</i>					
	<i>All (n = 2,400)</i>		<i>Nondefinitive Indication (n = 2,175)</i>		<i>Unplanned (n = 2,039)</i>	
	<i>aOR</i>	<i>95% CI</i>	<i>aOR</i>	<i>95% CI</i>	<i>aOR</i>	<i>95% CI</i>
Perceived pressure						
No pressure	1.00		1.00		1.00	
Pressure for cesarean	5.17***	(3.19, 8.39)	6.13***	(3.38, 11.10)	6.70***	(3.97, 11.32)

Note. All models adjusted for age, race/ethnicity, place of birth, marital status, education, insurance type, Census region, parity, pregnancy intention, belief in birth as a natural process, delivery provider type, and timing of meeting delivery provider.

*** $p < .001$; ** $p < .01$.

indicates that some of the pressure that women perceive for labor induction is based on medical reasons for this procedure. However, the reverse is true for cesareans, where the magnitude of the association between pressure and procedure is actually higher for cesarean without medical reason. This suggests that the pressure women perceive from clinicians to have a cesarean may not be based entirely on medical necessity. As noted above, a potential explanation for this finding may be provider–patient miscommunication, that is, women may consent to induction or cesarean in response to perceiving pressure from health care professionals for these procedures, whereas clinicians may not realize when their words or actions are being interpreted as pressure (Ong et al. 1995). In addition, the specific medical indications that necessitate labor induction and cesarean are the subject of continued debate in the profession, and clinicians commonly use (and patients commonly accept) reasons for these procedures that may lack definitive support from the existing evidence base (Mozurkewich et al. 2009; Barber et al. 2011; Spong et al. 2012).

This analysis identified several groups with higher odds of perceiving pressure for induction and cesarean, including women with higher levels of educational attainment, women who attended childbirth education classes, and uninsured women. Perceptions of pressure also differ significantly by mode of delivery; in particular, women whose previous birth was by cesarean have much higher odds of reporting pressure for cesarean during their following pregnancy. First-time mothers, meanwhile, report perceiving pressure for both induction and cesarean at higher percentages, but this association is partially explained by attendance at childbirth education classes, which is significantly more common among women who have not previously given birth. These groups may have different reasons for perceiving pressure for obstetric procedures. It is possible that first-time mothers, with limited experience and perhaps greater uncertainty in making decisions during labor, may be more sensitive to pressure; access to and content of childbirth education may play a role in future efforts to enhance women's involvement in decision making. Uninsured women, meanwhile, may be reluctant to have inductions or cesareans due to cost concerns. Highly educated women and women who attended childbirth classes may be more informed about their potential and anticipated choices during labor and be more likely to perceive pressure when those choices are not available to them (Attanasio, McPherson, and Kozhimannil 2014). While women whose delivery provider was listed as "other" (which includes doctor of unknown specialty, nonphysician nurse, and missing responses) also had higher odds of perceiving pressure, it is difficult to draw conclusions about this group without more information, which we acknowledge as a limitation of our analysis.

Targeted interventions may be designed and implemented to address patients' perceptions of pressure and communication around reasons for use of obstetric procedures. For instance, providing educational materials and communication skills training for midwives and physicians has been shown in controlled trials to be effective at increasing women's sense of involvement and control in prenatal care (Rowe et al. 2002). Expanding these initiatives to intrapartum care may produce similar outcomes, especially if targeted toward groups more susceptible to perceiving pressure. Decision aid tools have also been shown to improve patient knowledge, decrease anxiety and decisional conflict, and improve patients' satisfaction with their decision when applied to topics such as prenatal screening, birth options after cesarean delivery, and labor analgesia (Shorten et al. 2005). These may include interactive, electronic tools that present patients with treatment options, risks, and benefits; computer- or paper-based informa-

tion such as booklets and pamphlets or videos and touch-screen information systems; and individual or group counseling sessions (Say, Robson, and Thomson 2011; Dugas et al. 2012; Vlemmix et al. 2012). Adopting these tools more widely and systematically could help women better understand their choices during labor and childbirth and make decisions that align with their values and preferences. Improving education for women and clinicians about medical indications for induction and cesarean could also help decrease the use of nondefinitively indicated procedures. For example, the American Board of Internal Medicine Foundation's Choosing Wisely campaign lists "elective, non-medically indicated inductions of labor or Cesarean deliveries" before 39 gestational weeks as one of 10 common practices that clinicians should reconsider—A statement endorsed by both the American Congress of Obstetricians and Gynecologists and the American Academy of Family Physicians (ABIM Foundation 2013).

In addition to efforts at improving education and communication, other policy interventions to address potential overuse of obstetric procedures without medical reason may target clinical practice environments and incentives. These may include innovative payment and care delivery systems based on revised standards for quality of care, as well as mechanisms for measuring and reporting clinician performance that emphasize patient-clinician communication. Efforts aimed at reducing perceived pressure and promoting shared decision making have potential to not only decrease use of obstetric procedures without medical reason but also lead to women's increased satisfaction and trust of their maternity care providers, an increased sense of responsibility for their own and their infants' health, and shorter recovery periods after birth (Green and Baston 2003; Harrison et al. 2003; Krupat et al. 2004).

Most previous studies on these issues have explored informed consent and decision making in the context of regional, hospital-based, or non-US settings, or reported nonadjusted survey results (Graham et al. 1999; Moffat et al. 2007; Childbirth Connection 2013). This study builds on existing literature by exploring this question using adjusted regression models to analyze data from a nationally representative sample of women giving birth in the United States. While the *Listening to Mothers III* survey provides unique data on childbirth experiences, this analysis has important limitations. All responses were based on retrospective self-report rather than diagnostic clinical data, which entails potential recall bias and directional uncertainty in the association between variables. It is difficult to

determine whether perceptions of pressure influenced women's decisions to have labor induction or cesarean delivery, or whether patients who had these procedures were more likely to recall having experienced pressure. Future research into the directionality of the association between perceived pressure and obstetric interventions is recommended. We were also unable to specify from our data who exerted the pressure perceived by respondents because the survey question asked women if they felt pressure from any health care professional, in general. Pinpointing the source of pressure could allow for more targeted interventions. In addition, these survey data include only the perspective of patients, and information on clinicians' experiences and perceptions would also be valuable. Further research may shed light on the degree of concordance between women's and clinicians' experiences of pressure and how pressure, in turn, influences patients' perceptions and consent for obstetric procedures. Despite these drawbacks, this analysis represents one of the first to examine the use of common obstetric procedures based on an important aspect of shared decision making, using nationally representative data on women who have recently given birth.

CONCLUSION

Women who perceive pressure from clinicians for induction of labor or cesarean have significantly higher odds of experiencing these procedures, even in cases without a definitive medical reason for the procedure. Improving communication between clinicians and patients, broader use of decision aid tools, and reform of delivery, payment, and quality measurement systems may help improve women's knowledge and understanding of their options during labor and birth, promote shared decision making, reduce unnecessary overuse of labor induction and cesarean delivery, and improve women's satisfaction with their maternity and obstetric care.

ACKNOWLEDGMENTS

Joint Acknowledgment/Disclosure Statement: This project was funded by a grant from the Eunice Kennedy Shriver National Institutes of Child Health and Human Development (NICHD; grant number R03HD070868), as well as the Building Interdisciplinary Research Careers in Women's Health Grant

(grant number K12HD055887) from NICHD, the Office of Research on Women's Health, and the National Institute on Aging, at the National Institutes of Health, administered by the University of Minnesota Deborah E. Powell Center for Women's Health. We thank Laura B. Attanasio, B.A. (University of Minnesota); Eugene Declercq, Ph.D. (Boston University); Dwenda Gjerdingen, M.D. (University of Minnesota); and Pat McGovern, Ph.D. (University of Minnesota), for their helpful feedback on the statistical analysis, results interpretation, and earlier drafts of the manuscript.

Disclosures: None.

Disclaimers: None.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA2: Author Matrix.

Appendix SA2: Odds of Labor Induction or Cesarean Delivery by Perceived Pressure: Sensitivity Analysis.