Intrapartum Care and Experiences of Women with Midwives Versus Obstetricians in the Listening to Mothers in California Survey

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Introduction: Many studies based on hospital records or vital statistics have found that childbirth women experience benefits of lower rates of intervention with midwifery care versus obstetric care during labor and birth. Surveys of women’s views and experiences can provide a richer analysis when comparing intrapartum care of midwives and obstetricians.

Methods: This study was a secondary analysis of data from the population-based Listening to Mothers in California survey. The sample, which was representative of 2016 California hospital births, was drawn from birth certificate files and oversampled midwife-attended births. Women responded to the survey in English or Spanish on any device or with a telephone interviewer. The present analysis is based on 1421 of the 2539 participants who identified a midwife or obstetrician as their attendant at a vaginal birth. A bivariate analysis of demographic, attitudinal, and intrapartum variables was conducted. A multivariable model included sociodemographic and attitudinal variables as covariates.

Results: Bivariate analyses found significant socioeconomic differences by type of intrapartum care provider, with women in California attended by midwives more likely to be well educated and privately insured than women attended by obstetricians. Women with midwife birth attendants were less likely to report experiencing various intrapartum medical interventions, less likely to experience pressure to have epidural analgesia, and more likely to report that staff encouraged the woman’s decision making. Adjusted odds ratios found that women with midwives were less likely to experience medical interventions, including attempted labor induction; labor augmentation; and use of pain medications, epidural analgesia, and intravenous fluids; and less likely to report pressure to have labor induction or epidural analgesia. Women cared for by midwives were more likely to experience any nonpharmacologic pain relief measures and nitrous oxide and to agree that hospital staff encouraged their decision making.

Discussion: Using women’s own reports of their care experiences and adjusting for possible differences in women’s attitudes and case mix, we found that midwifery care of women who had vaginal births was associated with reduced use of medical interventions and increased women’s decisional latitude during labor and birth.

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INTRODUCTION

A growing body of evidence finds midwifery care associated with benefits to nulliparous1 or multiparous2 women during the prenatal,3 intrapartum,4,5 and postpartum6 periods. Benefits are primarily seen in lower rates of medical interventions during the intrapartum period, including less use of labor induction, epidural analgesia, and episiotomy.5 These studies have typically been based on examinations of vital statistics, administrative data, or health records. Fewer studies have examined experiences associated with pregnancy and birth care provider from the perspectives of women themselves.7 However, women’s self-reports allow for the examination of questions related to labor and birth processes that cannot be explored through other sources and allow investigators to control for maternal characteristics such as beliefs and preferences related to pregnancy and birth care. Addressing these questions could help women, policymakers and practitioners better understand the impact of their provider type practices on maternal and newborn outcomes.

The Listening to Mothers in California survey, a report of which was published in September 2018, included many questions that could be used to examine women’s experiences from their own perspectives, including identification of their birth attendant, their demographic characteristics, and maternal attitudinal factors.8 The full survey report did not include multivariate analysis of its results, and this secondary study aims to extend our understanding of the effects of different intrapartum care provider types through an analysis of the association between birth attendant and specific perinatal outcomes controlling for maternal demographic and

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Although many studies find differences in intrapartum care of midwives and obstetricians, few have been based on surveys of childbearing women themselves.

Surveys of childbearing women can provide access to covariate and outcome variables that are not available in vital statistics, administrative data, and health records.

A secondary analysis of data from the Listening to Mothers in California survey adjusted for women’s demographic characteristics and attitude toward medical intervention in childbirth.

In adjusted analyses, relative to obstetric care, midwifery care was associated with less use of interventions, less pressure to have interventions, and greater encouragement of women's own decision making.

Greater access to midwifery care could address the preferences of many childbearing women for fewer interventions and greater autonomy while giving birth.

attitudinal factors. Specifically, we investigated whether women who had midwives as their birth attendants and those who had obstetricians differed with respect to several selected intrapartum interventions and experiences, including interventions to induce or accelerate labor, the use of drug-free pain relief measures, the use of pharmaceutical pain relief, whether women felt pressured to accept certain interventions, and whether women felt that their intrapartum care providers encouraged their decision making during labor and birth.

METHODS

Sample

Survey investigators from the National Partnership for Women & Families, Boston University School of Public Health, and University of California San Francisco (UCSF) Center on Social Disparities in Health worked with Quantum Market Research to plan and carry out the Listening to Mothers in California survey. The survey of 2539 California residents who had given birth in a hospital between September 1 and December 15, 2016, examined the views and experiences of childbearing women from pregnancy through the postpartum period, including many items relating to labor and birth. The Committee for the Protection of Human Subjects of California’s Office of Statewide Health Planning and Development is the institutional review board (IRB) of record and approved the study and subsequent protocol amendments. The UCSF IRB also approved the project. The California Department of Public Health Vital Statistics Advisory Committee approved access to birth certificate data.

The population-based sampling frame for the survey was drawn from California birth certificate data and excluded women younger than 18 years, those who had out-of-hospital or multiple births, and nonresidents of California. Black women, women with midwifery-attended births, and those with vaginal births after cesarean were oversampled to have sample sizes sufficiently large to analyze the experiences, outcomes, and views of women within these groups. The survey was conducted from February 22 through August 15, 2017.

Participants were recruited using up to 4 invitation and reminder mailings with distinctive envelopes and 2 inserts: invitation cover letters incorporating elements of informed consent and cards providing information about how to access the survey. Those who did not respond to mailings were contacted via texts, messages, and telephone calls, as possible from secondary sources of information. Women who were invited to complete the survey questionnaire on their own online using any device or with an interviewer via telephone. Respondents participated from 2 to 11 months after giving birth.

Questionnaire

The survey questionnaire, as well as outreach materials inviting participation, was customized to address population and policy issues relevant to the state of California, pilot tested with varied populations, and refined over several iterations. Testing and refinement were repeated with Spanish-language materials. Although the survey could be completed online or via telephone interview, the actual questions themselves were the same regardless of medium. On average, the survey took a bit longer than 30 minutes to complete. Multiple question formats were used, including yes-no questions, Likert scales, closed-ended questions with specific options, and a series of open-ended questions. In some cases, validated screening tools were used, whereas other questions were drawn from earlier national Listening to Mothers in California surveys or were new to this survey. The complete Listening to Mothers in California survey questionnaire and related materials are available at the websites for both the National Partnership for Women & Families (http://www.nationalpartnership.org/LTMCA) and California Health Care Foundation (http://www.chcf.org/listening-to-mothers-CA).

To better reflect a statewide profile of childbearing women aged 18 years and older who gave birth to a singleton newborn in California hospitals, UCSF analysts weighted the final sample to be representative of the full year’s births using demographic and other relevant variables from the 2016 Birth Statistical Master File. A more detailed explanation of the methodology is presented in appendices to the full Listening to Mothers in California survey report.

The survey included a large number of midwifery-related questions, for example, about how women chose their intrapartum care providers; for those who used a midwife, how
important it was to have a midwife; for those who did not use a midwife, would they have preferred to have one; and women's interest in using a midwife in a future birth. The descriptive results from these questions are presented in the Listening to Mothers in California full survey report.8 The primary predictor variable was type of birth attendant, which was determined by the question “Which type of maternity care provider delivered your baby on [date]?” Possible answers included obstetrician or midwife, as well as “a doctor, but I'm not sure what type,” a nurse practitioner who was not a midwife, a family physician, or a physician assistant. This analysis only examines the relative effects of having a midwife versus an obstetrician at birth.

The investigation of possible association between intrapartum care provider type and selected intrapartum interventions reported by survey respondents included induction or augmentation of labor, specific pharmacologic (epidural analgesia, nitrous oxide, or narcotic analgesia) and nonpharmacologic (walking, use of a shower or tub, position change, birthing ball, hot or cold compresses, mental methods, massage, or breathing techniques) pain relief measures, and variables that captured any use of medical or nonmedical pain relief. We also examined perceived support for decision making and perceived pressure from hospital staff to accept medical procedures (epidural analgesia or labor induction). See Appendix 1 for specific question wording of variables. The survey questions regarding episiotomy and the use of medical procedures (epidural analgesia, nitrous oxide, or narcotic analgesia) and nonpharmacologic (walking, use of a shower or tub, position change, birthing ball, hot or cold compresses, mental methods, massage, or breathing techniques) pain relief measures, and variables that captured any use of medical or nonmedical pain relief.

Analyses

We examined sociodemographic variables, including race and ethnicity, age, marital status, women's country of birth, education, public or private insurer, parity, and whether the birth was preterm. In these analyses, Latina refers to any person who indicated “Hispanic or Latina” as her ethnicity, regardless of her self-identified race. White, Asian and Pacific Islander, and black indicate self-identified race among women who did not choose “Hispanic or Latina.” We identified women with births covered by California’s Medicaid program, Medi-Cal, by linking to paid claims in the state's database. We also examined whether the women strongly agreed that “birth is a process that should not be interfered with unless medically necessary.”

We limited the analysis to women who had vaginal births to decrease potential differences in health risk profile between women served by midwives and obstetricians. For the analysis examining induction of labor, we further restricted the data to births of at least 39 weeks’ gestation, as a labor induction prior to 39 weeks’ gestation should be associated with a medical indication for early labor induction.

To make the survey results as representative as possible of women in California meeting the inclusion criteria and who gave birth to live-born newborns during the 12 months of 2016, responses of the women in the survey were weighted to reflect the distribution of eligible women with live births in 2016. Each woman who responded to the survey was assigned a weight, which stands for the number of women in California like herself that she represents. Therefore, the tables report the weighted estimate of the population figures associated with the respective subgroup involved.

We conducted bivariate analyses of the association between birthing women's characteristics and intrapartum care provider types and chose covariates for inclusion in the final model for which there were significant differences across intrapartum care provider type or a plausible association with the outcomes of interest. Statistical significance was determined using 95% CIs in Tables 1 through 3. Prevalence estimates across categories of intrapartum care provider were deemed significantly different if the CIs did not overlap. Odds ratios were deemed significant if the CIs did not include the value 1.0. A logistic regression model was developed for each of the outcomes and accounted for the complex survey design.

RESULTS

The final sample size of 2539 women represented a response rate of 55%. Of the overall sample of 2539 women, a total of 1778 (70%) reported having a vaginal birth, and of these, 1421 (80%) had either a midwife or obstetrician as their birth attendant. In the weighted results, of the final sample, 81% participated in English and 19% in Spanish. Of those who completed the survey, 34% did so online, 28% did so by phone with an interviewer, and 39% used both methods (typically starting on their own and finishing with an interviewer).

Overall, among women with a vaginal birth, 12.4% reported that a midwife attended their birth, 67.2% reported that an obstetrician attended, and 20.4% reported that some other type of intrapartum care provider (family doctor, nurse practitioner who was not a midwife, physician assistant, doctor of unknown type) attended. Within each demographic category, women were most likely to report having a midwife as their birth attendant (Table 1) if they were between 30 and 34 years of age (14.9%), were married (14.8%), had a graduate-level education (17.6%), had private insurance (17.2%), and had a full-term newborn (13.0%). The use of obstetricians was significantly more common for Asian and Pacific Islander women (76.9%), women who were nulliparous (70.9%) or had private insurance (72.6%), and those with a college degree (77.7%) versus less education (Table 1).

Interventions and Experiences by Type of Intrapartum Care Provider: Bivariate Analyses

Table 2 presents the bivariate results of intrapartum practices and experiences, with type of birth attendant as the independent variable. Women who had a midwife attend their births were significantly less likely, compared with women with an obstetrician attendant, to report experiencing a number of medical interventions during labor and birth, including amniotomy after the onset of labor, augmentation of labor by amniotomy or synthetic oxytocin, and being given intravenous fluids.

The most consistent differences in women's reported experiences by birth attendant involved approaches to labor pain management. Women attended by midwives, compared with women with obstetrician attendants, were significantly less
| Characteristics                                      | Total Population | Midwife | Obstetrician |
|------------------------------------------------------|-----------------|---------|--------------|
|                                                      | Estimate, n     | Estimate, n | % (95% CI) | Estimate, n | % (95% CI) |
| All respondents                                      | 314,062         | 38,989   | 12.4 (11.3-13.5) | 210,962     | 67.2 (65.1-69.2) |
| Race and ethnicity                                    |                 |         |              |              |              |
| Latina                                               | 151,699         | 17,343  | 11.4 (9.6-13.2) | 93,620      | 61.7 (58.4-65.0) |
| White                                                | 83,213          | 12,770  | 15.3 (12.7-18.0) | 59,629      | 71.7 (67.7-75.6) |
| Asian and Pacific Islander                           | 46,569          | 5,023   | 10.8 (7.2-14.3) | 35,801      | 76.9 (71.7-82.1) |
| Black                                                | 11,669          | 1,134   | 9.7 (4.6-14.8)  | 7,569       | 64.9 (56.3-73.4) |
| Age, y                                               |                 |         |              |              |              |
| <25                                                  | 72,601          | 6,626   | 9.1 (6.7-11.5)  | 44,665      | 61.5 (56.7-66.3) |
| 25-29                                                | 80,468          | 10,288  | 12.8 (10.1-15.4) | 54,027      | 67.0 (62.7-71.3) |
| 30-34                                                | 87,031          | 12,966  | 14.9 (12.2-17.6) | 63,381      | 72.8 (69.1-76.5) |
| 35+                                                  | 60,927          | 8,326   | 13.7 (10.4-16.9) | 40,697      | 66.8 (61.8-71.8) |
| Marital status                                       |                 |         |              |              |              |
| Married                                               | 182,158         | 27,008  | 14.8 (13.1-16.5) | 128,291     | 70.4 (67.8-73.0) |
| Living with someone                                  | 83,502          | 7,662   | 9.2 (6.9-11.4)  | 52,727      | 63.1 (58.7-67.6) |
| Separated, divorced, widowed                         | 5,127           | 769     | 15.0 (2.8-27.7)  | 2,815       | 56.9 (36.2-73.6) |
| Single, never married                                | 34,465          | 2,512   | 7.3 (4.2-10.4)  | 21,010      | 61.0 (54.1-67.8) |
| Country of birth                                     |                 |         |              |              |              |
| United States                                        | 198,239         | 25,374  | 12.9 (11.4-14.4) | 134,733     | 68.7 (66.1-71.3) |
| Other country                                        | 115,823         | 12,386  | 11.6 (9.4-13.7) | 68,658      | 64.6 (60.9-68.2) |
| Education                                            |                 |         |              |              |              |
| High school or less                                  | 99,844          | 10,088  | 10.1 (7.9-12.3) | 55,807      | 56.0 (51.6-60.4) |
| Some college                                         | 98,337          | 11,834  | 12.0 (9.6-14.4) | 67,435      | 68.6 (64.7-72.5) |
| 4-y college                                          | 60,186          | 8,039   | 13.4 (10.4-16.4) | 46,780      | 77.7 (73.7-81.8) |
| At least some graduate school                        | 47,315          | 8,319   | 17.6 (13.6-21.5) | 35,214      | 74.4 (69.6-79.2) |
| Insurer                                              |                 |         |              |              |              |
| Medi-Cal                                             | 141,552         | 11,497  | 8.1 (6.4-9.8)  | 87,768      | 62.0 (58.6-65.4) |
| Private insurance                                    | 142,916         | 24,539  | 17.2 (15.1-19.3) | 103,777     | 72.6 (69.8-75.4) |
| Parity                                               |                 |         |              |              |              |
| Primiparous                                          | 127,588         | 15,339  | 12.0 (10.1-13.9) | 90,410      | 70.9 (67.7-74.0) |
| Multiparous                                          | 186,474         | 23,650  | 12.7 (11.0-14.4) | 120,551     | 64.6 (61.8-67.5) |
| Newborn born preterm? (<37 weeks’ gestation)         |                 |         |              |              |              |
| No                                                   | 298,486         | 36,097  | 13.0 (11.8-14.1) | 187,507     | 67.1 (65.0-69.3) |
| Yes                                                  | 15,576          | 316     | 2.0 (0.0-4.9)  | 9,999       | 66.9 (56.8-77.1) |
| Attitude toward birth process: birth is a process    |                 |         |              |              |              |
| that should not be interfered with unless medically   |                 |         |              |              |              |
| necessary                                            |                 |         |              |              |              |
| Agree strongly                                       | 148,187         | 19,883  | 13.4 (11.4-15.4) | 96,218      | 64.9 (61.8-68.1) |
| Agree somewhat, unsure, or disagree                  | 165,875         | 18,806  | 11.5 (9.9-13.1) | 109,366     | 69.2 (66.3-72.1) |

*aPercentages do not equal 100% because women who cited the following birth attendants are not included in the table: a doctor of unknown type, 13.6%; nurse practitioner or other nurse, 2.3%; family doctor, 0.9%; physician assistant, 0.5%; other, 2.5%.

*bVariables with a significant difference in intrapartum care provider type across categories within the characteristic.
| Practice or Experience                                      | Midwife (n = 38,989) | Obstetrician (n = 210,962) |
|-------------------------------------------------------------|----------------------|---------------------------|
| **Medical interventions**                                   |                      |                           |
| Any attempted labor induction                               | 39.5 (33.7-45.3)     | 47.5 (44.4-50.5)           |
| Broke water (amniotomy) after labor onset*                  | 36.7 (31.0-42.4)     | 47.9 (44.8-51.0)           |
| Synthetic oxytocin to augment labor                         | 37.5 (31.8-43.2)     | 42.3 (39.2-45.3)           |
| Either intervention to augment labor (amniotomy, synthetic oxytocin)* | 58.0 (52.2-63.9)     | 67.1 (64.2-69.9)           |
| Received intravenous fluids*                                | 75.8 (70.7-80.8)     | 86.6 (84.5-88.6)           |
| **Pain relief medications**                                 |                      |                           |
| Epidural analgesia*                                         | 59.8 (54.0-65.6)     | 73.8 (71.1-76.5)           |
| Narcotics                                                   | 19.3 (14.6-23.9)     | 14.3 (12.2-16.4)           |
| Nitrous oxide*                                              | 10.8 (7.3-14.4)      | 5.8 (4.4-7.2)              |
| Any pain medicine in labor*                                 | 71.6 (66.3-76.9)     | 81.7 (79.4-84.1)           |
| **Nonpharmacologic pain relief**                            |                      |                           |
| Walked around*                                              | 48.7 (42.8-54.6)     | 36.1 (33.2-39.0)           |
| Shower or tub*                                              | 22.7 (17.9-27.4)     | 9.2 (7.4-10.9)             |
| Position change*                                            | 55.4 (49.5-61.3)     | 40.3 (37.4-43.3)           |
| Birthing ball*                                              | 24.9 (19.9-29.9)     | 15.2 (13.1-17.4)           |
| Hot or cold compresses*                                     | 14.7 (10.5-19.0)     | 8.4 (6.8-10.1)             |
| Mental method*                                              | 23.2 (18.2-28.1)     | 13.0 (11.0-15.1)           |
| Massage*                                                    | 23.0 (18.2-27.8)     | 15.4 (13.3-17.6)           |
| Breathing technique                                         | 45.6 (39.7-51.5)     | 45.4 (42.4-48.4)           |
| Any use of nonpharmacologic pain relief*                    | 76.4 (71.4-81.4)     | 65.6 (62.7-68.5)           |
| **Experience with hospital staff**                          |                      |                           |
| Agreed somewhat or strongly that hospital staff encouraged decisions by person giving birth* | 84.9 (80.7-89.0)     | 76.7 (74.1-79.4)           |
| Felt pressure from hospital staff to have an induction of labor | 11.5 (7.9-15.2)      | 16.9 (14.6-19.2)           |
| Felt pressure from hospital staff to have epidural analgesia* | 5.3 (2.7-7.9)        | 11.8 (9.9-13.8)            |

*Interventions with a significant difference in prevalence between midwife and obstetrician providers.

likely to report receiving any medical pain relief measure—71.6% (95% CI, 66.3%-76.9%) versus 81.7% (95% CI, 79.4%-84.1%)—and specifically epidural analgesia: 59.8% (95% CI, 54.0%-65.6%) versus 73.8% (95% CI, 71.1%-76.5%). However, they were significantly more likely to report using nitrous oxide: 10.8% (95% CI, 7.3%-14.4%) versus 5.8% (95% CI, 4.4%-7.2%). By contrast, women attended by midwives were significantly more likely than those attended by obstetricians to report using any nonpharmacologic comfort measures overall—76.4% (95% CI, 71.4%-81.4%) versus 65.6% (95% CI, 62.7%-68.5%)—and specifically walking around at the hospital during labor, using a shower or tub, changing position, using a birthing ball, using hot or cold compresses, and using a mental method like relaxation, visualization or hypnosis, and massage.

Women who reported being attended by midwives were significantly more likely than those attended by obstetricians to agree that the hospital staff encouraged them to make decisions during labor and birth—84.9% (95% CI, 80.7%-89.0%) versus 76.7% (95% CI, 74.1%-79.4%)—and less likely to report that they felt pressure to have epidural analgesia: 5.3% (95% CI, 2.7%-7.9%) versus 11.8% (95% CI, 9.9%-13.8%).

Interventions and Experiences by Type of Intrapartum Care Provider: Multivariable Models

Each of the interventions and experiences we modeled was significantly associated with the birth attendant in both the unadjusted and adjusted models (Table 3). The adjusted model included race and ethnicity, maternal age, marital status, maternal birthplace, maternal education, parity, preterm birth, type of insurance, and, importantly, maternal attitude toward interference with birth. In the fully adjusted models, having a midwife compared with an obstetrician birth attendant was associated with lower risk of attempted labor induction, labor augmentation, use of any pharmacologic pain medications, use of intravenous fluids, and use of epidural analgesia (adjusted odds ratio [aOR], 0.50; 95% CI, 0.36-0.69).
Having a midwife was associated with higher likelihood of using any type of nonpharmacologic pain relief or comfort measures, using a narcotic, using nitrous oxide, and agreeing that hospital staff encouraged the respondent to make decisions during labor and birth (aOR, 1.52; 95% CI, 1.03-2.24). Women who had a midwife attendant were less likely to report feeling pressure to either induce their labor (aOR, 0.53; 95% CI, 0.34-0.82) or have epidural analgesia (aOR, 0.46; 95% CI 0.26-0.83).

**DISCUSSION**

The study was based on a sample of 1421 vaginal, singleton hospital births attended by obstetricians or midwives in California to women 18 years and older in 2016. It explored the role of birth attendant from the perspective of women’s reported experiences. Because the analysis was limited to hospital births and because certified nurse-midwives (CNMs) attended 99.7% of all midwife-attended hospital births in California in 2016, the data we report here essentially constitute a study of CNM hospital practice in California. Multiple prior studies have examined pregnancy and birth care provided with obstetric care. Multiple prior studies have examined pregnancy and birth care provided with nonpharmacologic pain relief measures, feeling less pressured to accept medical procedures, and feeling more encouraged to make decisions during labor and birth, compared with women with obstetric care.

An ongoing challenge in the study of midwifery care is selection bias, which can manifest itself in 2 respects. First, midwifery care typically involves risk selection, with women having planned cesareans and those experiencing complications or conditions considered higher risk (eg, malpresentation, multiple fetuses) more likely to be cared for by obstetricians either throughout pregnancy or as transfers from midwives during the course of care. These risk factors can be addressed in the studies relying on vital statistics or administrative and health records data through matching, propensity scores, or examination of a selected low-risk population. Our study partially accounts for this bias by restricting the analysis to vaginal births. The second selection bias challenge is more subtle. It involves the likelihood that women who seek to have midwives as their intrapartum care provider have a different attitude toward birth that involves a desire for less intervention and more reliance on nonpharmacologic approaches to pain relief in labor. The advantage of the study presented here is the opportunity to use an attitudinal question that addresses views about intervention in childbirth processes, that is, how much the respondent agreed or disagreed that “birth is a process that should not be interfered with unless medically necessary.” To address the second type of bias, the multivariable model adjusted for women’s beliefs about childbirth intervention as a covariate.

A further advantage of using women’s reports of their childbirth experiences is the ability to capture care practices and self-reports of other experiences and perspectives that would typically not be documented in health records.

| Intrapartum Experiences                                                                 | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|----------------------------------------------------------------------------------------|------------------------|----------------------|
| Intrapartum care provider attempted to induce labor                                  | 0.65 (0.47-0.89)       | 0.67 (0.47-0.94)     |
| Any medical intervention to augment labor                                               | 0.68 (0.52-0.89)       | 0.69 (0.51-0.93)     |
| Any use of nonpharmacologic pain relief methods                                         | 1.70 (1.25-2.31)       | 1.49 (1.07-2.09)     |
| Any use of pharmacologic pain medications                                              | 0.56 (0.42-0.76)       | 0.56 (0.40-0.79)     |
| (epidural analgesia, narcotic or nitrous oxide)                                        |                        |                      |
| Epidural analgesia                                                                     | 0.53 (0.40-0.70)       | 0.50 (0.36-0.69)     |
| NARCOTIC                                                                               | 1.43 (1.01-2.02)       | 1.60 (1.09-2.33)     |
| Nitrous oxide                                                                          | 1.98 (1.26-3.10)       | 2.39 (1.44-3.97)     |
| Intravenous fluids                                                                     | 0.36 (0.25-0.52)       | 0.35 (0.24-0.53)     |
| Perceived pressure for induction of labor                                              | 0.64 (0.43-0.95)       | 0.53 (0.34-0.82)     |
| Perceived pressure for epidural analgesia                                              | 0.42 (0.24-0.72)       | 0.46 (0.26-0.83)     |
| Hospital staff encouraged decisions by woman                                           | 1.70 (1.19-2.42)       | 1.52 (1.03-2.24)     |

Abbreviation: OR, odds ratio.

1. All findings were statistically significant at P < .05.
2. Adjusted for race and ethnicity, maternal age, marital status, maternal birthplace, maternal education, parity, preterm birth, type of insurance, maternal attitude toward interference with birth.
3. Restricted to vaginal births at or after 39 weeks’ gestation.
4. Includes amniotomy after onset of labor and synthetic oxytocin to augment labor.
5. Includes walking around, shower or tub, position change, birthing ball, hot or cold compresses, mental method, massage, and breathing techniques.

Relative Likelihood of Selected Intrapartum Experiences and Treatments in Vaginal Births, by Midwife versus Obstetrician Birth Attendant

| Intrapartum Experiences                                                                 | Unadjusted OR (95% CI) | Adjusted OR (95% CI) |
|----------------------------------------------------------------------------------------|------------------------|----------------------|
| Intrapartum care provider attempted to induce labor                                  | 0.65 (0.47-0.89)       | 0.67 (0.47-0.94)     |
| Any medical intervention to augment labor                                               | 0.68 (0.52-0.89)       | 0.69 (0.51-0.93)     |
| Any use of nonpharmacologic pain relief methods                                         | 1.70 (1.25-2.31)       | 1.49 (1.07-2.09)     |
| Any use of pharmacologic pain medications                                              | 0.56 (0.42-0.76)       | 0.56 (0.40-0.79)     |
| (epidural analgesia, narcotic or nitrous oxide)                                        |                        |                      |
| Epidural analgesia                                                                     | 0.53 (0.40-0.70)       | 0.50 (0.36-0.69)     |
| NARCOTIC                                                                               | 1.43 (1.01-2.02)       | 1.60 (1.09-2.33)     |
| Nitrous oxide                                                                          | 1.98 (1.26-3.10)       | 2.39 (1.44-3.97)     |
| Intravenous fluids                                                                     | 0.36 (0.25-0.52)       | 0.35 (0.24-0.53)     |
| Perceived pressure for induction of labor                                              | 0.64 (0.43-0.95)       | 0.53 (0.34-0.82)     |
| Perceived pressure for epidural analgesia                                              | 0.42 (0.24-0.72)       | 0.46 (0.26-0.83)     |
| Hospital staff encouraged decisions by woman                                           | 1.70 (1.19-2.42)       | 1.52 (1.03-2.24)     |

Abbreviation: OR, odds ratio.

1. All findings were statistically significant at P < .05.
2. Adjusted for race and ethnicity, maternal age, marital status, maternal birthplace, maternal education, parity, preterm birth, type of insurance, maternal attitude toward interference with birth.
3. Restricted to vaginal births at or after 39 weeks’ gestation.
4. Includes amniotomy after onset of labor and synthetic oxytocin to augment labor.
5. Includes walking around, shower or tub, position change, birthing ball, hot or cold compresses, mental method, massage, and breathing techniques.
or in hospital discharge records, which are based on billing codes. In this case, we could examine an important array of nonpharmacologic pain relief approaches, use of synthetic oxytocin after the onset of labor, experiencing pressure to have interventions, and other childbirth experiences.

In the bivariate comparison, women who had midwives as their birth attendant did not have significantly different attitudes toward intervention in birth than those attended by obstetricians, although they were consistently more likely to utilize nonpharmacologic pain relief measures. In the multivariable analysis, when both intrapartum care provider type and attitude were included in the analysis, women attended by midwives were nearly half as likely to use pharmacologic pain relief and 49% more likely to use nonpharmacologic pain relief measures.

Because the results presented here are limited to vaginal births in hospitals, the outcomes of this study are a conservative estimate of differences in practice style by type of birth attendant. The parent study from which these data are drawn found that differences in total cesarean rates by type of prenatal care provider (32% obstetrician, 18% midwife; \( P < .01 \)) persisted when the authors limited the comparison to low-risk women having their first birth (28% obstetrician, 17% midwife; \( P < .01 \)). The parent study also found that many more women were interested in a midwife for a future birth than had experienced one in the index birth. There was also considerable interest in community birth settings, both free-standing birth centers and home births, where midwives are the dominant practitioner type.8

This study has some limitations. First, it is a study of births in a single state that, despite its size, is not representative of the United States as a whole. Half of our survey respondents self-identified as “Hispanic or Latina,” a figure that, although close to the California proportion of Hispanic and Latinx births of 48%, is more than double that of the percentage of Latinx in the US birthing population in 2016, which was 23%.8 Although there may also be some concerns with the quality of women’s recall of the events relating to their childbirth experience, prior studies have found that recall of birth events have generally been accurate,15–18 with some exceptions. We were able to validate self-identification of Medi-Cal coverage against the gold standard of a Medi-Cal-paid childbirth claim and found the women’s reports were quite accurate and more accurate than birth certificate items for either source of payment for prenatal care or anticipated source of payment for the birth. Although the use of a measure of maternal attitudes toward less interventionist birth can help sort out the degree to which it is midwifery care or the women who choose midwifery care that makes the difference in rates of intervention, there is considerable nuance to that relationship that may not be captured in a single measure. Additionally, the authors did not have access to information about the various health care providers who may have provided care from the beginning of labor up to the time of birth. It would be useful to know whether a labor was initially attended by a midwife but was later attended by an obstetrician, and vice versa.

Finally, the ability of midwives to avoid medical interventions, implement nonpharmacologic comfort measures, and support birthing women’s decision making may vary substantially according to the norms and policies of the institutions in which they work. Many intrapartum care practices described in this study are used at quite high rates by both midwives and obstetricians in these hospital births. Because of limitations in sample size, we excluded home births and births in freestanding birth centers, where lower rates of intervention are common.19 It is possible that hospital culture dominates practice in a given setting,20 and midwives have limited opportunities to diverge from the practices of obstetricians in the same locale. It is also possible that midwives who have a more interventionist practice style are more comfortable working in hospital settings, and midwives who practice with less reliance on interventions would seek out community birth practice settings. Although we found that women attended by midwives did experience birth differently from those attended by obstetricians in a variety of ways, even greater differences may have occurred with potentially greater freedom of practice. To further explore these matters, future studies should consider using the Labor Culture Survey to compare microculture of midwives practicing in different settings,21 along with the Listening to Mothers “birth is a process” item and other indicators of the childbearing attitudes of women receiving care in different settings.

Midwifery care can increase birthing women’s sense of agency over the birth process and reduce the use of certain medical interventions that have been associated with increased risk of cesarean birth.22 Future studies should seek to examine the impact of having early labor attended by a midwife, regardless of the attendant at birth, to better understand intrapartum processes that lead to medical interventions. Accounting for attendants at both early and later labor would also allow for examining the impact of midwifery care on the likelihood of unplanned cesarean birth.

In the end, measuring the individual impact of women’s attitudes or midwifery practice on pregnancy and birth care may be less important than we think. It may well be the combination of the 2 factors that makes the greatest difference, and midwives’ primary role is to potentiate a woman’s interest in a less interventionist birth. Indeed, adding to earlier studies, many recent US studies of quality, outcomes, experiences, and costs lend strong support to increasing access to midwifery care in all settings.23–25 The best test of the impact midwifery care can have on US women’s birthing experiences will come when all those women who would like to have a midwife can actually choose that option in settings that are supportive of midwifery care.

CONFLICT OF INTEREST
The authors have no conflicts of interest to disclose.

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## Appendix 1: Question Wording for Variables Used in Study

| Variable         | Question                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Birth attendant  | **Which type of maternity care provider delivered your baby on [date]?:**<br>  - An obstetrician-gynecologist doctor (OB or ob/gyn)<br>  - A family medicine doctor<br>  - A doctor but I'm not sure what type<br>  - A midwife (CNM)<br>  - A nurse practitioner (NP) or other nurse who is not a Midwife<br>  - A physician assistant (PA)<br>  - Other, please tell us: |
| Race and ethnicity| **Blending of two questions:**<br>  - **Which of the following best describes how you identify yourself? Please select all that apply.**<br>    - White<br>    - Black or African American<br>    - Asian<br>    - American Indian or Alaskan Native<br>    - Native Hawaiian or Other Pacific Islander<br>    - Something else. Please tell us:<br>  - **Are you of Hispanic, Latina or Spanish descent?**<br>    - Yes<br>    - No |
| Age              | **How old were you when your recent baby was born?**                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Marital status   | **At the time you gave birth, were you…?**<br>  - Married<br>  - Living with someone as if married<br>  - Separated, divorced or widowed<br>  - Single, never married                                                                                                                                                                                                                                                                                                                                                          |
| Birthplace       | **In what country were you born?**<br>  - United States<br>  - Some other country but born as US citizen<br>  - Some other country                                                                                                                                                                                                                                                                                                                                                                         |
| Education        | **What is the highest level of education you have completed or the highest degree you have received?**<br>  - Less than high school<br>  - Some high school<br>  - High school diploma or GED<br>  - Some college, but no degree<br>  - Associate's degree<br>  - College (such as B.A., B.S.)<br>  - Some graduate school, but no degree<br>  - Graduate school (such as M.S., M.D., Ph.D.)                                                                                                                                                                                                                                                                                        |
| Insurer          | **At the time of your recent birth, what insurance did you have to pay for your maternity care (including provider and hospital bills)? Select all that apply.**<br>  - Medi-Cal<br>  - A health plan paid for by Medi-Cal<br>  - Private insurance through your job or the job of your spouse, partner or parent<br>  - Private insurance bought from a health insurance company or plan, or through Covered CA<br>  - Other [Name of plan:]

**NOTE:** In all analyses, Medi-Cal as insurer was based on a paid childbirth claim in the state Medi-Cal database.
| Variable | Question |
|----------|----------|
| Parity   | In all, how many babies have you had? Please include your new baby. |
| Preterm birth | Based on cross-referencing answers to questions on due date and date of delivery |
| Attitude toward birth process | How much do you agree or disagree with the following statement? Childbirth is a process that should not be interfered with unless medically necessary. Do you …? |
| Agreed strongly | Agree somewhat |
| Neither agree nor disagree | Disagree somewhat |
| Disagree strongly | |
| Any attempted labor induction | By ”inducing labor,” we mean using medicine or some other method to try to start the regular contractions of childbirth — before they start on their own. Did your maternity care provider try to induce your labor in any way? |
| Yes | No |
| Broke water | During your labor, did someone break your bag of water after labor contractions had begun? |
| (amniotomy) after labor onset | Yes |
| No | Not sure |
| Synthetic oxytocin to augment labor | During your labor, did someone give you the drug Pitocin (“pit” or oxytocin) to speed up labor after labor contractions had begun? |
| Yes | No |
| Not sure | |
| Either intervention to augment labor (amniotomy, synthetic oxytocin) | Combination of above two questions |
| Received IV fluids | During your labor, did someone give you IV fluids through a vein in your arm or hand? |
| Yes | No |
| Not sure | |
| Pain relief medications | Did you use any of the following medicines for pain relief when you recently gave birth? Please select all that apply. |
| Epidural or spinal (medicine inserted into spinal column in your back) | Narcotics such as Demerol or Stadol (by a shot, spray in nose, or IV line in your arm) |
| Nitrous oxide gas (not oxygen) breathed through a mask or mouthpiece while you were awake | |
| Nonpharmacologic pain relief | Did you use any of the following “drug-free” methods for pain relief during your recent labor and birth? Please select all that apply. |
| A shower, tub, or pool | Change of position or moving around |
| A large, inflated ball (round or peanut-shaped) for support | Putting hot or cold objects on your body (e.g. heating pad or ice pack) |
| A mental method like relaxation, visualization or hypnosis | A hands-on method (such as massage, stroking or acupressure) |
| A breathing method | |
| Variable                                      | Question                                                                 |
|-----------------------------------------------|--------------------------------------------------------------------------|
| Hospital staff encouraged decisions          | How much do you agree with the following statements about your recent experience of labor and birth? The delivery room staff encouraged me to make decisions about how I wanted my birth to progress |
|                                               |                                                                          |
| Felt pressure from hospital staff to have an induction of labor | Did you feel pressure from any health professional to induce labor (use medicine or some other method to start your labor)? |
|                                               |                                                                          |
| Felt pressure from hospital staff to have an epidural | Did you feel pressure from any health professional to use epidural for pain relief? |

Abbreviation: IV, intravenous.