OBSTETRICS

Two practice models in one labor and delivery unit: association with cesarean delivery rates

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OBJECTIVE: The objective of the study was to examine the association between labor and delivery practice model and cesarean delivery rates at a community hospital.

STUDY DESGIN: This was a retrospective cohort study of 9381 singleton live births at 1 community hospital, at which women were provided labor and delivery care under 1 of 2 distinct practice models: a traditional private practice model and a midwife-physician laborist practice model. Cesarean rates were compared by practice model, adjusting for potential sociodemographic and clinical confounders. Statistical comparisons were performed using the χ^2 test and multivariable logistical regression.

RESULTS: Compared with women managed under the midwife/laborist model, women in the private model were significantly more likely to have a cesarean delivery (31.6% vs 17.3%; $P < .001$; adjusted odds ratio [aOR], 2.11; 95% confidence interval [CI], 1.73–2.58). Women with nulliparous, term, singleton, vertex gestations also were more likely to have a cesarean delivery if they were cared for in the private model (29.8% vs 15.9%; $P < .001$; aOR, 1.86; 95% CI, 1.33–2.58) as were women who had a prior cesarean delivery (71.3% vs 41.4%; $P < .001$; aOR, 3.19; 95% CI, 1.74–5.88).

CONCLUSION: In this community hospital setting, a midwife-physician laborist practice model was associated with lower cesarean rates than a private practice model.

Key words: cesarean delivery, labor and delivery practice, midwife-physician laborist practice, private practice

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Approximately 1 in 3 pregnant women in the United States undergoes cesarean delivery each year.[1] Numerous patient-specific factors, including maternal obesity and advanced age, may be contributing to the rapid increase in cesarean delivery rates over the past 2 decades.[2,3] However, health care provider and system factors also likely play important roles. Because cesarean delivery is associated with increased maternal morbidity and mortality, identifying modifiable risk factors is critical to addressing growing concerns about the cesarean rate in this country.[4,5]

The significant variation in rates between hospitals across the United States supports the concept that institutional policies, hospital staffing structure, and the culture around birth may impact cesarean delivery rates.[6-8] Little is known, however, about specific modifiable hospital-level factors that directly influence cesarean rates.

We sought to investigate the extent to which model of care is one such factor by examining the differences in cesarean delivery rates between 2 different models of care in the same hospital. We hypothesized that a model involving in-house 24 hour provider coverage is associated with a lower cesarean delivery rate than a traditional private practice model.

Materials and Methods

We conducted a retrospective cohort study of singleton live births delivered at Marin General Hospital between Jan. 1,

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2005, and Dec. 31, 2010. Approval for this study was obtained from the Institutional Review Boards of Marin General Hospital (no number; Sept. 12, 2011) and the University of California, San Francisco (number 11-07-916).

Marin General Hospital is a 235 bed community hospital that houses the only labor and delivery (L&D) unit in the county. During the study period, the L&D unit had 2 distinct models of care: a midwife-obstetrician laborist model (subsequently referred to as midwife/laborist) and a traditional private practice model (subsequently referred to as private). Women receiving care from private obstetrical providers with privileges at Marin General Hospital were managed under the private model, whereas women receiving prenatal care from the County of Marin Health and Human Services obstetrical care program were managed under the midwife/laborist model. All other women presenting for L&D care, including those with a non-Marin prenatal care provider, those who had undergone an unsuccessful home birth attempt and those who had no prenatal care, were managed under the midwife/laborist model. Because the hospital's neonatal intensive care unit is level 2, the study cohorts contain only women less than 33 weeks who were considered unstable for transfer to a tertiary care center.

Under the midwife/laborist model, L&D care was provided by a 24 hour, in-hospital team of 1 certified nurse-midwife and 1 obstetrician. The care was midwife led, with the extent of physician involvement determined by standard protocols reflective of the patient's obstetrical and medical risk factors.

Under the private model, women received prenatal care from providers who were either solo practitioners or part of a group practice. In this model, the private practitioner or one of his/her call partners was responsible for all aspects of L&D care, with no involvement from the midwife/laborist providers except on rare occasions when urgent physician involvement was needed in the context of obstetric or medical emergencies.

During the study period, there were 20 private practitioners who provided in-hospital care to women under the private model: 18 obstetricians and 2 certified nurse-midwives who worked in physician-owned practices. Under the midwife/laborist model, 20 certified nurse-midwives and 25 obstetricians provided in-hospital care. All nurses were assigned to patients independent of provider practice type.

Data for this study, including maternal sociodemographic and clinical characteristics and perinatal outcomes, were obtained from the hospital's perinatal data collection system (Perinatal Data Center by Site of Care Systems).

Our primary outcomes included any cesarean delivery, cesarean delivery among nulliparous women at term with singleton, vertex gestations (NTSV), and elective repeat cesarean deliveries. The secondary outcomes were operative vaginal delivery, delivery mode (cesarean or vaginal) among women with a prior cesarean delivery, 5 minute Apgar score less than 7, umbilical cord arterial pH less than 7.1, and umbilical cord base deficit less than −12. The definitions of these outcomes are included in Table 1.

Our primary exposure was the practice model, which was based on the prenatal care provider on record and not the delivering provider of record. Intrapartum management of patients was according to the managing provider's clinical judgment and interpretation of case presentation.

We used the χ^2 test and multivariable logistic regression analysis to examine the association between model of care and delivery mode. The covariates included in the multivariable logistic regression model included maternal age, race/ethnicity, education, parity, and insurance status; maternal pregestational or gestational diabetes, maternal hypertensive disorder, and other maternal medical condition; adequacy of prenatal care visits (>8 visits); use of epidural analgesia, induction of labor, and gestational age at delivery; and birthweight. The midwife/laborist group was designated as the reference comparison in the multivariable logistic regression analysis.

To further investigate the difference in NTSV cesarean delivery rates between the midwife/laborist and private groups, we examined the indications for operative delivery. In this analysis, we sought to distinguish between cesarean deliveries performed for indications that are not well defined, and therefore may be affected by model of care, and those performed for well-defined indications that should not change based on provider setting.

Indications that we considered well defined were maternal request and absolute obstetrical indication (prior noncesarean hysterotomy, placenta previa, active herpes, cord prolapse, and uterine rupture). Indications that we considered to be not well defined included arrest disorder, fetal heart rate abnormality, and indications other than absolute obstetrical indication (Table 1).

RESULTS

There were 9381 singleton live births at Marin General Hospital during the study period, with 3987 (42.5%) managed under the midwife/laborist model and 5394 (57.5%) managed under the private model. Compared with women in the midwife/laborist group, women in the private group were more likely to be white, aged 35 years or older, nulliparous, privately insured, and to have attended college ($P < .001$ for all; Table 2). They also weighed more on average (median 77.7 kg vs 73.6 kg; $P < .001$).

In addition, compared with women cared for under the midwife/laborist model, women managed under the private model were more likely to have had a prior cesarean delivery, to undergo induction of labor in the current pregnancy, and to use an epidural during labor ($P < .001$ for all). They were also less likely to carry a diagnosis of preexisting or gestational diabetes mellitus (3.2% vs 9.3%, $P < .001$) but more likely to have a medical condition other than hypertension or diabetes (9.2% vs 4.1%, $P < .001$). Finally, the proportion of women who delivered in each gestational age range differed by group (Table 2).

The overall rate of cesarean delivery differed dramatically between the 2