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Association of Obstetrician Gender With Obstetric Interventions and Outcomes

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Abstract

OBJECTIVE—To estimate whether there are differences in obstetric interventions or outcomes by the gender of the delivering physician.

METHODS—We conducted a retrospective cohort study of all nulliparous women delivering singleton, vertex, live births at 37 weeks of gestation at a tertiary care institution (2014–2015). Patient clinical characteristics were analyzed by delivering physician gender. The primary outcomes were delivery mode and episiotomy. Secondary outcomes included major perineal laceration, postpartum hemorrhage, 5 minute Apgar <7, cord umbilical artery pH <7.0, and neonatal intensive care unit admission. Univariable and hierarchical multivariable analyses including physician as a random effect were utilized for analyses.

RESULTS—Of the 7,027 women who met inclusion criteria, 81.3% (N=5,716) were delivered by a female physician. Women delivered by female physicians were slightly younger than those delivered by male providers and were more likely to be publicly insured (11.7% vs 7.1%, $p<0.001$). Mode of delivery did not differ by physician gender; the cesarean delivery rate was 20.6% for male physicians and 20.5% for females ($p=0.61$). Although the episiotomy rate did differ by physician gender, with 5.9% of patients delivered by male physician undergoing episiotomy compared with 3.6% of patients delivered by female physician ($p=0.001$), this finding did not persist in the multivariable model after accounting for potential confounders (adjusted odds ratio 0.87, 95% CI 0.49–1.56). There were no differences by physician gender regarding any of the examined secondary outcomes in univariable or multivariable analyses.

CONCLUSIONS—Outcomes of nulliparous women undergoing a trial of labor did not differ by delivering physician gender.

Keywords

mode of delivery; episiotomy; obstetric outcomes; quality of care; gender; physician gender

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INTRODUCTION

Women now comprise the majority of practicing obstetrics and gynecology specialists in the United States.¹ The rise in proportion of women entering obstetrics and gynecology has been steady over recent decades.² Concurrent with this change in the demographics of practicing obstetricians, provider-based aspects of obstetrical care provision have become recognized as critical determinants of patient outcomes. Although some data, including from our group, have suggested that provider-centric factors such as coping skills and system for night call are associated with obstetric decision making and outcomes,³⁻⁶ one area that has been inadequately addressed is the role of physician gender.

There is evidence to suggest male and female physicians differ in how they provide care. For example, female physicians have been demonstrated to more often use patient-centered communication.^{7,8} In addition, female physicians have been found to be more likely to engage in preventive care and adhere to clinical guidelines.^{9,10} Multiple studies have demonstrated that female physicians may generate better patient outcomes compared to their male counterparts. For example, female physicians achieve better outcomes for diabetes^{11,12} and heart failure care.¹³ Regarding mortality, Tsuguwa et al examined post-hospital discharge mortality and readmission rates for a large sample of elderly Medicare patients and found that patients treated by female internists had lower 30-day mortality and readmission rates than patients treated by male internists, including when findings were restricted to hospitalist physicians.¹⁴ Similar trends have been observed in surgical fields where, for example, breast cancer patients are more likely to have breast conserving surgery and more likely to have adjuvant chemotherapy when cared for by female breast surgeons.^{15,16} Recently, a large study of Canadian surgical patients found that patients operated on by female surgeons had lower postoperative mortality within 30 days, even after adjusting for potential confounding factors.¹⁷

Yet, limited obstetrical data on the topic of outcomes related to physician gender exist. Thus, our objective was to use a contemporary obstetric cohort to evaluate whether there are differences in obstetric interventions and maternal and neonatal adverse outcomes by the gender of the delivering physician.

MATERIALS AND METHODS

This is a retrospective cohort study of nulliparous women who were delivered by obstetricians at a single large volume academic center from 1/2014 to 12/2015. Inclusion criteria included women with term (≥ 37 weeks gestational age), singleton, vertex, live births. Women who were ineligible for trial of labor (e.g. placenta previa) or who underwent a planned cesarean delivery were excluded. All data were abstracted directly from the electronic medical record used for clinical care. Missing or incomplete data were re-reviewed by a member of the study team to ensure reliability.

In total, 132 obstetrics and gynecology physicians were responsible for obstetrical care during the study period; approximately 12,000 women deliver at this hospital per year. Of the 132 physicians, 107 (81%) were female. During the study period, 10 to 12 maternal-fetal

medicine subspecialists were practicing, all of whom participated in labor and delivery care. The remainder of patients were delivered by general obstetrics and gynecology specialists. At this institution, residents are involved in the care of all patients although may not be present at each delivery. In particular, residents participate in the majority of deliveries in which women have medical complications, undergo operative vaginal delivery, or undergo cesarean delivery, although house staff are not universally present for deliveries of uncomplicated term patients and may not be participants in delivery decision making. This care model does not differ during the day versus night. Faculty are involved in intrapartum decision making for all patients, regardless of the year of resident. Given the complexity of the labor and delivery structure and the nature of house staff involvement at this institution, it was not possible to quantify house staff involvement for this analysis. Further, given the ultimate responsibility of the attending physician for all deliveries, the delivering attending physician was always considered the delivering physician for this analysis.

Maternal demographic and clinical characteristics were analyzed by physician gender. Characteristics included age at delivery, maternal self-reported race and ethnicity, insurance status, body mass index (BMI) at delivery, gestational age at delivery, use of neuraxial analgesia in labor, induction status, and neonatal birthweight. Additionally, physician age was hypothesized to be a potential confounder of the relationship between physician gender and obstetric interventions, given the growing proportion of women in obstetrics and gynecology in recent years and the concurrent changes in practice patterns during this time.¹ Thus physician age was abstracted based on publicly available data, and age was subsequently dichotomized at 50 years at the time of study completion. Age was dichotomized in this fashion in order to estimate the possible “generational effect” of performance of certain obstetrical interventions.

Obstetric interventions and outcomes were analyzed by physician gender. The primary outcomes of the study were obstetric interventions: mode of delivery and episiotomy. Evaluation of episiotomy was restricted to women who underwent vaginal delivery. Secondary outcomes included: major (3rd or 4th degree) perineal laceration, postpartum hemorrhage (defined as >500ml estimated blood loss for vaginal deliveries and >1000ml estimated blood loss for cesarean deliveries), 5 minute Apgar <7, cord umbilical artery pH <7.0, and neonatal intensive care unit (NICU) admission. Outcomes were evaluated individually.

Maternal characteristics and obstetric and neonatal outcomes were compared using the Student's *t* test or Mann-Whitney *U* test where applicable for continuous variables, and χ^2 or Fisher exact test where applicable for categorical variables. Hierarchical multivariable logistic regression with inclusion of the provider as a random effect to control for clustering by provider was used to identify outcomes that remained independently associated with provider gender after adjusting for patient demographic and clinical characteristics that were significant in univariable analysis. The initial models included only patient factors that met the above criteria. However, since physician age is a potential confounder and differed between male and female physicians, the final multivariable logistic regression models included delivering physician age as a potential confounder. We additionally assessed for the presence of effect modification between physician gender and physician age. All tests were

two-tailed and $p < 0.05$ denoted significance. All statistical analyses were performed with Stata v. 14 (StataCorp, College Station, TX). This study was approved by the Institutional Review Board of Northwestern University.

RESULTS

A total of 7,027 women met inclusion criteria during the study period. Of these, 81.3% ($N=5,716$) were delivered by a female physician. The majority of patients in this study were non-Hispanic white women with private insurance and received an intrapartum epidural analgesia (Table 1). Women delivered by female physicians were slightly younger than those delivered by male physicians and were more likely to be publicly insured (11.7% vs 7.1%, $p < 0.001$). In total, 27.7% of patients were delivered by a physician at or over age 50 years; women delivered by male physicians were more likely to have a physician at or over age 50 years (71.0% vs 17.8%, $p < 0.001$). There were no statistically significant differences between patients delivered by male versus female physicians with regard to maternal race and ethnicity, BMI, gestational age at delivery, epidural use, induction status, or neonatal birth weight.

Mode of delivery did not differ by physician gender (Table 2). Specifically, the cesarean delivery rates were 20.6% for male providers and 20.5% for female physicians, and the operative vaginal delivery rates were 1.6% and 1.3% for males and females, respectively ($p = 0.609$). However, in bivariable analysis, the episiotomy rate did differ by physician gender, with 5.9% of patients delivered by male physicians undergoing episiotomy compared with 3.6% of patients delivered by female physicians ($p = 0.001$) (Table 2). In the preliminary multivariable logistic regression models accounting for only potential patient confounders, the odds of episiotomy remained lower for patients delivered by female physician (adjusted odds ratio 0.58, 95% CI 0.34-0.99). However, in the final models, which accounted for patient age, patient race and ethnicity, patient insurance status, and physician age, the odds of episiotomy did not differ by delivering physician gender (aOR 0.87, 95% CI 0.49-1.56; Table 2). Additionally, there was no statistically significant interaction between physician gender and physician age (p -value for interaction term in regression model = 0.69).

On both univariable and multivariable analyses, there were no statistically significant differences by physician gender with regard to major perineal laceration, postpartum hemorrhage, 5 minute Apgar score < 7 , cord umbilical artery pH < 7.0 , or neonatal admission to the NICU (Table 3).

DISCUSSION

Understanding gender-based differences in medical care provision and outcomes is increasingly important as the medical workforce diversifies. Currently, over one third of the overall physician workforce are women²¹ and 54.5% of practicing obstetricians and gynecologists are women.¹ This trend is even more pronounced among young obstetricians and gynecologists; in 2016, 83.1% of obstetrics and gynecology residents and fellows were women.¹ Despite ample data demonstrating that male and female physicians practice

differently and that these differences may be associated with differences in outcomes, such analyses have not yet been extended to obstetrics. Thus, this analysis was designed to evaluate for a similar phenomenon in obstetrics as has been observed in other specialties. In this large cohort of nulliparous women who delivered at a single academic institution, we identified no differences in frequency of cesarean delivery, operative vaginal delivery, episiotomy, or adverse maternal and neonatal secondary outcomes based on delivering physician gender after accounting for potential confounding variables.

Our data, which suggest that women may experience no difference in obstetric interventions based on their delivering physician's gender, differ somewhat from limited existing literature on the role of gender differences in obstetrics. For example, in one investigation of a single center in Japan, patients were less likely to undergo operative vaginal delivery when delivered by female physicians (19.0% for males versus 15.7% for females, $p=0.01$).¹⁸ Similarly, in a Taiwanese investigation, female physicians in district hospitals were less likely to perform cesarean deliveries upon maternal request (i.e., no medical indication) compared to male physicians (district hospital aOR 1.53, 95% CI 1.38-1.71; district clinic aOR 2.26, 95% CI 1.99-2.58 for males versus females).¹⁹ At one center in the United States, in data from deliveries in 1990 and 1995, female physicians were less likely to perform cesarean deliveries overall (university practice setting aOR 2.82, 95% CI 1.43-5.55; private practice setting aOR 1.65, 95% CI 1.05-2.60).²⁰ Collectively, these data suggest male and female physicians may differentially assess risk and the need for obstetrical interventions. In fact, work by our group has found that women physicians score higher on assessment of proactive coping skills,²² and greater proactive coping skills have been associated with greater likelihood of patients undergoing a trial of labor after cesarean.⁴ However, our data do not corroborate these reports. The mechanisms for provider decision making are not well understood, and these findings suggest that differential risk tolerance or clinical judgement warrant further exploration based on physician factors other than gender. Ultimately, despite the growing body of recent literature suggesting differences in patient outcomes by physician gender in other medical specialties, our data are actually more consistent with older U.S. data which suggested there may not be differences in cesarean delivery rates between male and female physicians.^{23,24}

Strengths of this study include its performance at a large academic medical center with a large number of obstetric providers. However, our study also has a number of limitations to consider. First, this analysis was restricted to physician gender and although it accounts for age as a proxy for generation of training, it does not incorporate other provider demographic, personal, or training characteristics, such as provider race and ethnicity, parity or prior birth experiences, or training location, although physician was accounted for as a random effect which should account for some of this variation. Such data were unavailable for this analysis but interactions between these characteristics with physician gender represent important potential future avenues for exploration. Additionally, physician gender was dichotomized as male versus female; we were unable to account for gender identity. Second, this study was not powered to detect differences in infrequent outcomes such as 5-minute Apgar score <7 or umbilical artery pH <7.0. Further, as in any retrospective analysis, the study is limited by the potential for confounding bias. Additionally, as the study was performed at an academic medical center with resident physicians present and obstetric protocols designed to facilitate

adherence to contemporary evidence-based practice, its generalizability to other settings cannot be known.

In summary, our study provides initial evidence that delivering physician gender is not associated with obstetrical interventions or outcomes. Additional work in larger cohorts and diverse settings is required to confirm these findings which are of potential importance for several reasons. From a clinician perspective, our observed absence of any gender-based difference in maternal and neonatal outcomes highlights concerns surrounding the existing inequity in pay for female versus male obstetricians.^{29,30} In the absence of compelling differences, there is no justifiable reason for failing to achieve equal pay for equal work. From a patient perspective, reassurance can be provided that care does not appear to differ based on the gender of their delivering physician.

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Table 1

Patient and physician characteristics by delivering physician gender

	Female physician (N=5,716)	Male physician (N=1,311)	p value
Patient characteristics			
Age, years	31 (29-34)	32 (29-34)	0.017
Race/ethnicity			
Non-Hispanic white	3174 (55.5%)	754 (57.5%)	0.070
Non-Hispanic black	477 (8.3%)	99 (7.6%)	
Hispanic	395 (6.9%)	63 (4.8%)	
Asian	506 (8.9%)	118 (9.0%)	
Other	615 (10.8%)	137 (10.5%)	
Declined to answer	549 (9.6%)	140 (10.7%)	
Public insurance	671 (11.7%)	93 (7.1%)	<0.001
Body mass index at delivery, kg/m ²	29.0 (26.4-32.4)	28.6 (26.4-32.1)	0.053
Gestational age at delivery, weeks	39.6 (±1.1)	39.6 (±1.1)	0.751
Epidural analgesia	5461 (95.5%)	1252 (95.5%)	0.951
Induction of labor	1,146 (20.0%)	252 (19.2%)	0.499
Birthweight, kilograms	3.36 (3.08-3.66)	3.36 (3.09-3.65)	0.940
Physician characteristics			
Age 50 years	1018 (17.8%)	931 (71.0%)	<0.001

Data displayed as median (interquartile range), N (%), or mean (± standard deviation).

Table 2

Obstetric interventions by delivering physician gender

	Female physician (N=5,716)		Male physician (N=1,311)	Unadjusted OR	95% CI	Adjusted OR*	95% CI
Mode of delivery (N=7,027)							
Spontaneous vaginal delivery	4473 (78.3%)		1020 (77.8%)	1.03	0.88-1.19	(Ref)	(Ref)
Operative vaginal delivery	73 (1.3%)		21 (1.6%)	0.79	0.48-1.30	0.84	0.44-1.60
Cesarean delivery	1170 (20.5%)		270 (20.6%)	0.99	0.86-1.15	0.89	0.69-1.15
Episiotomy (N=5,587)	165 (3.6%)		61 (5.9%)	0.61	0.44-0.82	0.87	0.49-1.56

OR = odds ratio; CI=confidence interval

* Final model: random effects model accounting for clustering by physician and adjusted for maternal age, maternal payer status, and delivering physician age.

Table 3

Secondary maternal and neonatal outcomes by delivery physician gender

	Female physician (N=5,716)	Male physician (N=1,311)	Unadjusted OR	95% CI	Adjusted OR*	95% CI
Maternal outcomes						
3 rd or 4 th degree perineal laceration	284 (6.2%)	71 (6.8%)	0.91	0.69-1.19	0.98	0.68-1.43
Postpartum hemorrhage	332 (5.8%)	73 (5.6%)	1.05	0.81-1.36	1.02	0.64-1.62
Neonatal outcomes						
Five minute Apgar < 7	87 (1.5%)	17 (1.3%)	1.18	0.70-1.99	1.11	0.61-2.00
Umbilical artery pH < 7.0	80 (1.8%)	17 (1.6%)	1.12	0.66-1.89	1.07	0.59-1.94
NICU admission	139 (2.4%)	32 (2.4%)	1.00	0.68-1.47	0.95	0.61-1.48

OR = odds ratio; CI= confidence interval; NICU = neonatal intensive care unit

* Final model: random effects model accounting for clustering by physician and adjusted for maternal age, maternal payer status, and delivering physician age.