OBSTETRICS

Unexpected complications of low-risk pregnancies in the United States

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OBJECTIVE: Determining appropriate sites of care for any type of medical issue assumes successful matching of patient risks to facility capabilities and resources. In obstetrics, predicting patients who will have a need for additional resources beyond routine obstetric and neonatal care is difficult. Women without prenatal risk factors and their newborns may experience unexpected complications during delivery or postpartum. In this study, we report the risk of unexpected maternal and newborn complications among pregnancies without identified prenatal risk factors.

STUDY DESIGN: We conducted a cross-sectional investigation utilizing US natality data to analyze 10 million birth certificate records from 2011 through 2013. We categorized pregnancies as low risk (no prenatal risk factors) or high risk (at least 1 prenatal risk factor) according to 19 demographic, medical, and pregnancy characteristics. We evaluated 21 individual unexpected or adverse intrapartum and postpartum outcomes in addition to a composite indicator of any adverse outcome.

RESULTS: Among 10,458,616 pregnancies, 38% were identified as low risk and 62% were identified as high risk for unexpected complications. At least 1 unexpected complication was indicated on the birth certificate for 46% of all pregnancies, 29% of low-risk pregnancies, and 57% of high-risk pregnancies. While the risk for unexpected or adverse outcomes was greatly reduced for the low-risk group compared to the high-risk group overall and for several of the individual outcomes, low-risk pregnancies had higher risks of vacuum delivery, forceps delivery, meconium staining, and chorioamnionitis compared to high-risk pregnancies.

CONCLUSION: Of births, 29% identified to be low risk had an unexpected complication that would require nonroutine obstetric or neonatal care. Additionally, for select outcomes, risks were higher in the low-risk group compared to the group with identified risk factors. This information is important for planning location of birth and evaluating birthing centers and hospitals for necessary resources to ensure quality care and patient safety.

Key words: labor and delivery, labor complications, obstetric delivery, pregnancy, pregnancy outcomes

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Women and their providers are presented with a range of choices with respect to the types of facilities providing obstetric care for labor and delivery. Within the hospital setting, facilities range from regional care settings offering advanced care for maternal and neonatal complications, to midwifery-attended birthing centers offering supportive care for uncomplicated pregnancies.[1,2] After decades of decreasing frequency of home births, recent trends have shown increases in out-of-hospital births, both in the home and at freestanding birthing centers.[3] The role of different birth settings in the care of pregnant women considered to be at low risk for unexpected or adverse outcomes continues to be a subject of controversy, particularly among supporters and opponents of home birth.[4-14]

The decision to deliver in any location other than a specialty-care hospital assumes that labor and delivery complications can be predicted with some degree of certainty and truly "low-risk" pregnancies can be identified.[2] In practice, this has yet to be realized and unexpected labor and delivery complications remain a concern.[15-17] Additionally, transfer rates to a hospital during labor or soon after delivery for planned births at home or in a birthing center have ranged from 15-34% in observational studies,[18-22] and 13-77% in a review of randomized or quasi-randomized controlled trials.[23] While these and other studies have compared outcomes among planned or actual nonhospital vs hospital births,[4,11,18-30] such comparisons are potentially biased by women's self-selection of location of delivery. Only a few studies have examined outcomes among women identified as low risk for adverse outcomes

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regardless of birth setting.[31,32] We expand on these studies by evaluating risk of unexpected complications in a large, population-based data set of recent births.

In this study, we assessed the risk of medical complications of labor and delivery or use of clinical resources beyond routine obstetric and neonatal care among deliveries expected to be at low risk for such outcomes based on prepregnancy and pregnancy risk factors. We quantified the absolute risk of unexpected intrapartum or postpartum complications among all pregnancies and by risk status, and compared the risk of these outcomes between low-risk and high-risk pregnancies.

Materials and Methods

We analyzed data from the 2011 through 2013 US natality files, which consists of select vital statistics information compiled from birth certificates of every birth in the United States. During 2011 through 2013, states utilized either the 1989 or 2003 revision of the US birth certificate. To be consistent and informative of current practice, we restricted the sample to records with the 2003 revision format.

The following characteristics were used to identify pregnancies as low risk: maternal age 20-39 years, gestational age at delivery 37-42 weeks as defined by the obstetric/clinical estimate of gestation, prepregnancy body mass index <30, prenatal care initiated by the sixth month of pregnancy, singleton pregnancy, and cephalic presentation.[25,33,34] Additionally, we required low-risk mothers to have no evidence of any of the following conditions: prepregnancy diabetes, gestational diabetes, prepregnancy hypertension, history of preterm birth, history of poor pregnancy outcome, history of cesarean delivery, cervical cerclage, premature rupture of membranes, receipt of tocolytics, congenital anomalies (including anencephaly, meningomyelocele/spina bifida, congenital diaphragmatic hernia, omphalocele, gastroschisis, limb reduction defect, cleft lip with or without cleft palate, cleft palate alone, and Down syndrome), syphilis, hepatitis B, and hepatitis C.[35] Pregnancies meeting all of the aforementioned definitions were classified as low risk, and all remaining pregnancies were classified as high risk, having at least 1 prenatal risk factor. For each variable examined, responses of "unknown/not stated" resulted in assignment to the high-risk group, to maintain a strict definition of low risk.

Adverse medical outcomes and additional clinical resource use beyond routine care included the following: eclampsia, chorioamnionitis, meconium staining, uterine rupture, forceps delivery, vacuum delivery, cesarean delivery, maternal transfusion, unplanned hysterectomy, unplanned other maternal operation, admission to adult intensive care unit, mother transfer, birthweight <2500 g, 5-minute Apgar score 0-3, assisted ventilation for the newborn, admission to neonatal intensive care unit, newborn surfactant use, newborn antibiotic use, newborn seizures, birth injury, and infant transfer. A composite indicator of at least 1 unexpected or adverse outcome divided births with any of the individual outcomes and births with none of the individual outcomes. For each outcome variable, responses of "unknown/not stated" were assumed not to have the outcome.

Analyses were performed using software (SAS 9.3; SAS Institute Inc, Cary, NC). We tabulated frequencies of each low-risk characteristic, overall low-risk designation, each unexpected complication, and the composite outcome indicator. We determined the frequency of unexpected complications among low-risk and high-risk pregnancies. We calculated the relative risk and 95% confidence interval (CI) for the relationship between low-risk vs high-risk pregnancy and unexpected or adverse outcomes. We repeated the analysis stratifying by parity: no prior live births (primipara) vs at least 1 prior live birth (multipara). Finally, we conducted a sensitivity analysis to assess the impact of missing data by excluding observations with missing or unknown responses for any of the risk or outcome variables and repeating the analysis. The study was exempt from review by the Women and Infants Hospital of Rhode Island Institutional Review Board (#12-0040).

Results

Among the 11,862,780 births in the United States from 2011 through 2013, 10,458,616 (88%) submitted vital records data using the 2003 revision of the birth certificate and were included in our analysis. For each of the 19 risk characteristics, between 73-100% of women were classified as low risk, and for 12 of the 19 characteristics, at least 95% of women were classified as low risk (Table 1). However, only 38% of pregnancies met the low-risk criteria for each of the 19 characteristics and were classified overall as low risk based on prenatal risk factors (Table 1).

We examined 21 individual unexpected complications in addition to the composite outcome indicator. Among all births, the most common outcomes were cesarean delivery (33%), low birthweight (8%), admission to the neonatal intensive care unit (8%), and meconium staining (5%) (Table 2). The remaining unexpected complications each occurred in <5% of births. Of births, 46% had at least 1 unexpected complication reflected in the composite outcome measure.

Among the 4,011,139 low-risk pregnancies, 29% had at least 1 of the 21 unexpected complications studied (Table 2). The most common outcomes in the low-risk group were cesarean delivery (15%), meconium staining (5%), and vacuum delivery (4%). Among the 6,447,477 births with at least 1 risk factor identified during pregnancy, 57% had at least 1 of the 21 unexpected complications. As expected, low-risk pregnancies had a lower risk of unexpected complications than high-risk pregnancies; however, there were 4 individual outcomes where the risk was actually higher for the low-risk group than the high-risk group: vacuum delivery (risk ratio [RR], 1.60; 95% CI, 1.59−1.61), forceps delivery (RR, 1.50; 95% CI, 1.48−1.53), positive meconium staining (RR, 1.16; 95% CI, 1.15−1.16), and chorioamnionitis (RR, 1.10; 95% CI, 1.09−1.11) (Table 2).