

OBSTETRICS

Apgar score of 0 at 5 minutes and neonatal seizures or serious neurologic dysfunction in relation to birth setting

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OBJECTIVE: To examine the occurrence of 5-minute Apgar scores of 0 and seizures or serious neurologic dysfunction for 4 groups by birth setting and birth attendant (hospital physician, hospital midwife, freestanding birth center midwife, and home midwife) in the United States from 2007-2010.

METHODS: Data from the United States Centers for Disease Control's National Center for Health Statistics birth certificate data files were used to assess deliveries by physicians and midwives in and out of the hospital for the 4-year period from 2007-2010 for singleton term births (≥ 37 weeks' gestation) and ≥ 2500 g. Five-minute Apgar scores of 0 and neonatal seizures or serious neurologic dysfunction were analyzed for 4 groups by birth setting and birth attendant (hospital physician, hospital midwife, freestanding birth center midwife, and home midwife).

RESULTS: Home births (relative risk [RR], 10.55) and births in freestanding birth centers (RR, 3.56) attended by midwives had a significantly higher risk of a 5-minute Apgar score of 0 ($P < .0001$) than hospital births attended by physicians or midwives. Home births (RR, 3.80) and births in freestanding birth centers attended by midwives (RR, 1.88) had a significantly higher risk of neonatal seizures or serious neurologic dysfunction ($P < .0001$) than hospital births attended by physicians or midwives.

CONCLUSION: The increased risk of 5-minute Apgar score of 0 and seizures or serious neurologic dysfunction of out-of-hospital births should be disclosed by obstetric practitioners to women who express an interest in out-of-hospital birth. Physicians should address patients' motivations for out-of-hospital delivery by continuously improving safe and compassionate care of pregnant, fetal, and neonatal patients in the hospital setting.

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BACKGROUND AND OBJECTIVE

The purpose of this study was to examine the occurrence of 5-minute Apgar score of 0 and seizures or serious neurologic dysfunction for 4 groups by birth setting and birth attendant (hospital physician, hospital midwife, freestanding birth center midwife, and home midwife) in the United States in 2007-2010.

MATERIALS AND METHODS

Data were obtained from the National Center for Health Statistics (NCHS) of Centers for Disease Control and Prevention (CDC) birth certificate data for

2007-2010, the most recent data available. The CDC files contain detailed information on each of the approximately 4 million births in the United States each year. Data on patient characteristics include setting and method of delivery as well as birth attendant as reported on birth certificates filed each year with the states of the United States and compiled by NCHS. These data are publicly accessible on the internet, where detailed tables can be created and downloaded for further evaluation.

Data on patient characteristics included parity, race and ethnicity, maternal age,

and clinical factors such as neonatal weight and weeks of gestation. We included patients in the 4 CDC categories that are described by birth setting and birth attendant: hospital-based physician, hospital-based midwife, freestanding birth center midwife, and home-based midwife.

RESULTS

From 2007 to 2010, 16,693,978 births occurred in the United States. Our study population consisted of 13,891,274 singleton deliveries ≥ 37 weeks with birthweight ≥ 2500 g who were delivered in a hospital or birthing center or at home by either a physician or a midwife. In our study population 5-minute Apgar scores were available for 98.8% of all states and for neonatal seizures or serious neurologic dysfunction in 97.5% of states that had collected data on the presence or absence of neonatal seizures or serious neurologic dysfunction in their birth certificates.

We found data on 13,891,274 births by physicians or midwives in a hospital, a freestanding birthing center, or at home in 2007-2010. The majority of

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The authors report no conflict of interest.

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TABLE

5-minute Apgar scores = 0 by birth setting, birth attendant, and parity

Outcome/Birth setting	n/Total (per 1000)	RR (95% CI)
5-minute Apgar 0 (all)		
Hospital MD	1,943/12,615,994 (0.16)	1.00
Hospital midwife	95/1,115,794 (0.09)	0.55 (0.45–0.68)
Freestanding BC midwife	23/42,000 (0.55)	3.56 (2.36–5.36)
Home midwife	98/60,296 (1.63)	10.55 (8.62–12.93)
5-minute Apgar 0 ($P = 0$)		
Hospital MD	856/5,155,779 (0.17)	1.00
Hospital midwife	37/440,642 (0.84)	0.51 (0.36–0.70)
Freestanding BC midwife	11/15,226 (7.22)	4.35 (2.40–7.89)
Home midwife	35/14,801 (2.36)	14.25 (10.16–19.96)
5-minute Apgar 0 ($P > 0$)		
Hospital MD	1087/7,460,215 (0.15)	1.00
Hospital midwife	58/675,152 (0.09)	0.59 (0.45–0.77)
Freestanding BC midwife	12/26,772 (0.45)	3.08 (1.74–5.43)
Home midwife	63/45,495 (1.35)	9.5 (7.37–12.25)

Hospital MD is the reference group.

BC, birth center; CI, confidence interval; MD, doctor; RR, relative risk.

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term singleton births (91.16%; $n = 12,663,051$) were physician hospital births. Midwife hospital births constituted 8.05% of births ($n = 1,118,678$), although 0.49% ($n = 67,429$) were midwife home deliveries. Patients delivering at home attended by midwives were significantly more likely to be multiparous, non-Hispanic white, ≥ 30 years of age, delivering beyond 41 and 42 weeks, and having macrosomic infants over 4000 and 4500 g ($P < .0001$).

The Table shows the outcomes and relative risks (RRs) by the 4 groups of settings and attendants for 5-minute Apgar scores of 0, by parity. The RR of a 5-minute Apgar score of 0 for midwife home deliveries was 10.55 (95% confidence interval [CI], 8.62–12.93). The RR of a 5-minute Apgar score of 0 for midwife home deliveries further increased to 14.24 (95% CI, 10.16–19.96) for nulliparous patients. The RR for freestanding birth center midwife deliveries was less than home deliveries (3.56 vs 10.55) but it was increased relative to hospital deliveries by physicians or midwives. Within the

hospital, midwife-attended deliveries had a lower RR (0.55; 95% CI, 0.45–0.68) compared with physicians.

The RR of seizures or serious neurologic dysfunction for midwife home deliveries was 3.80 (95% CI, 2.80–5.16). The RR of seizures or serious neurologic dysfunction for midwife home deliveries further increased to 6.28 (95% CI, 4.08–9.67) for nulliparous patients. Freestanding birthing center midwife deliveries showed an increased risk of 1.88 (95% CI, 1.11–3.17) for seizures or serious neurologic dysfunction and an increased risk of 2.77 (95% CI, 1.48–5.15) for seizures or serious neurologic dysfunction for nulliparous patients. Within the hospital, midwife-attended deliveries had a lower RR compared to those attended by physicians (0.74; 95% CI, 0.62–0.89).

COMMENT

These data reveal a pattern for the outcomes of singleton term births: home birth is associated with a significantly increased risk of 5-minute Apgar score of 0 and neonatal seizures or serious

neurologic dysfunction compared to hospital birth. When it comes to home birth vs hospital birth, setting is strongly associated with worse outcomes. The increased rate of adverse outcomes of home births exists despite the reported lower risk profile of home birth. The pattern for freestanding birth centers is also identifiable: this setting is associated with increased risk compared to hospital delivery, although the risk is lower than for home birth. For freestanding birth center vs hospital, setting is strongly associated with worse outcomes.

It is essential to note that these significantly increased risks of adverse outcomes from the setting of home and freestanding birth centers reported here may be serious underestimations of clinical complications.

The increased risk of 5-minute Apgar score of 0 and increased rates of seizures or serious neurologic dysfunction of out-of-hospital birth must be acknowledged by all obstetric practitioners and should be disclosed to all pregnant women who express an interest in out-of-hospital birth. In addition, physicians have the professional responsibility to recommend against planned out-of-hospital births to women who express an interest in it and not to refer their patients to randomized controlled clinical trials of hospital vs out-of-hospital birth as ethically unacceptable. Physicians also have the professional responsibility to address the root cause of patients' motivations for out-of-hospital delivery through continuous efforts to address patient concerns about interventions and to improve compassionate and safe care of pregnant, fetal, and neonatal patients in the hospital setting.

CLINICAL IMPLICATIONS

- Home birth and birth in freestanding birthing centers are associated with a significantly increased risk of 5-minute Apgar score of 0 and neonatal seizures or serious neurologic dysfunction compared with hospital birth.

- The increased risks of home birth should be disclosed by all obstetric practitioners to all pregnant women who express an interest in out-of-hospital birth.
- Physicians have a professional responsibility to recommend against planned out-of-hospital birth.
- Physicians also have a professional responsibility to address the root cause motivating patients to desire out-of-hospital birth by improving compassionate and safe hospital care and addressing concerns about interventions. ■

Selected perinatal outcomes associated with planned home births in the United States

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OBJECTIVE: More women are planning home birth in the United States, although safety remains unclear. We examined outcomes that were associated with planned home compared with hospital births.

STUDY DESIGN: We conducted a retrospective cohort study of term singleton live births in 2008 in the United States. Deliveries were categorized by location: hospitals or intended home births. Neonatal outcomes were compared with the use of the χ^2 test and multivariable logistic regression.

RESULTS: There were 2,081,753 births that met the study criteria. Of these, 12,039 births (0.58%) were planned home births. More planned

home births had 5-minute Apgar score <4 (0.37%) compared with hospital births (0.24%; adjusted odds ratio, 1.87; 95% confidence interval, 1.36–2.58) and neonatal seizure (0.06% vs 0.02%, respectively; adjusted odds ratio, 3.08; 95% confidence interval, 1.44–6.58). Women with planned home birth had fewer interventions, including operative vaginal delivery and labor induction/augmentation.

CONCLUSION: Planned home births were associated with increased neonatal complications but fewer obstetric interventions. The trade-off between maternal preferences and neonatal outcomes should be weighed thoughtfully.

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BACKGROUND AND OBJECTIVE

The literature on the safety of home birth consists of large population-based studies, mostly outside the United States. The proportion of women who choose to deliver outside hospitals increased by 29% from 2004-2009; this trend appears to continue. In 2009, approximately 1 in 90 births to non-Hispanic white women occurred at home.

Our objective was to compare neonatal outcomes in women who had a planned home birth vs birth in hospitals.

MATERIALS AND METHODS

For this retrospective cohort study of low-risk women at term with singleton vertex live births that were delivered in 2008 in the US, we used Vital Statistics Natality Data provided by the Centers for Disease Control and Prevention. We included only births in the 27 states that used the 2003 revision of the US Standard Certificate of Live Birth, which delineates the location of birth as hospital, freestanding birthing center, or home that is further specified as accidental, intended, or unknown if intended.

We compared outcomes of neonates whose mothers had planned home births with those who delivered in hospitals. We included term, singleton, and vertex live births. We also included women with previous cesarean delivery, because US vaginal birth after cesarean delivery at home increased from 1% in 1996 to 4% in 2008.

We examined the risk of a 5-minute Apgar score <4 as a primary outcome. Secondary outcomes included 5-minute Apgar score <7 , assisted ventilation for >6 hours, neonatal seizure, and neonatal intensive care unit (NICU) admission. We also examined maternal obstetric interventions.

RESULTS

In 2008, 2,081,753 women gave birth in the United States in 2008 and met the study criteria. Among them, 12,039 women (0.58%) had planned home births, and 2,069,714 women delivered in hospitals. Compared with women who delivered in hospitals, women who had planned home births were more likely to be multiparous, ≥ 35 years

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