

Effect of Maternal and Pregnancy Risk Factors on Early Neonatal Death in Planned Home Births Delivering at Home

Sophia Bachilova, MD, BSc;¹ Nicholas Czuzoj-Shulman, MMA;² Haim Arie Abenhaim, MD, MPH^{1,2}

¹Department of Obstetrics and Gynecology, Jewish General Hospital, McGill University, Montréal, QC

²Centre for Clinical Epidemiology and Community Studies, Jewish General Hospital, Montréal, QC

Abstract

Objective: The prevalence of home birth in the United States is increasing, although its safety is undetermined. The objective of this study was to investigate the effects of obstetrical risk factors on early neonatal death in planned home births delivering at home.

Methods: The authors conducted a retrospective 3-year cohort study consisting of planned home births that delivered at home in the United States between 2011 and 2013. The study excluded infants with congenital and chromosomal anomalies and infants born at ≤ 34 weeks' gestation. Multivariate logistic regression models were used to estimate the adjusted effects of individual obstetrical variables on early neonatal deaths within 7 days of delivery.

Results: During the study period, there were 71 704 planned and delivered home births. The overall early neonatal death rate was 1.5 deaths per 1000 planned home births. The risks of early neonatal death were significantly higher in nulliparous births (OR 2.71; 95% CI 1.71–4.31), women with a previous CS (OR 2.62, 95% CI 1.25–5.52), non-vertex presentations (OR 4.27; 95% CI 1.33–13.75), plural births (OR 9.79; 95% CI 4.25–22.57), preterm births (OR 4.68; 95% CI 2.30–9.51), and births at ≥ 41 weeks of gestation (OR 1.76; 95% CI 1.09–2.84).

Conclusion: Early neonatal deaths occur more commonly in certain obstetrical contexts. Patient selection may reduce adverse neonatal outcomes among planned home births.

Résumé

Objectif : Même si le degré de sûreté des naissances à domicile demeure indéterminé, leur prévalence augmente aux États-Unis. Cette étude avait pour but d'évaluer l'incidence des facteurs de risque obstétricaux sur le décès néonatal précoce au cours de naissances planifiées et ayant eu lieu à domicile.

Key Words: Home birth, out-of-hospital birth, birth setting, neonatal death, obstetrical risk factors

Corresponding Author: Dr. Haim Arie Abenhaim, Department of Obstetrics and Gynecology, Jewish General Hospital, McGill University, Montréal, QC. haim.abenhaim@gmail.com

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Méthodologie : Les auteurs ont mené une étude de cohorte rétrospective de trois ans sur les naissances planifiées et ayant eu lieu à domicile aux États-Unis entre 2011 et 2013. Les bébés présentant des anomalies congénitales ou chromosomiques et ceux nés à ≤ 34 semaines d'âge gestationnel ont été exclus. Des modèles de régression logistique multivariée ont été utilisés pour estimer les effets ajustés de variables obstétricales individuelles sur les décès néonataux survenant dans les sept jours après l'accouchement.

Résultats : Durant la période à l'étude, 71 704 naissances planifiées à domicile y ont effectivement eu lieu. Le taux global de décès néonataux précoces était de 1,5 décès pour 1000 naissances à domicile planifiées. Le risque de décès néonatal précoce était significativement plus élevé lorsque la mère était nullipare (RC : 2,71; IC à 95 % : 1,71-4,31) ou avait des antécédents de césarienne (RC : 2,62; IC à 95 % : 1,25-5,52), et en cas de présentation autre que par le sommet (RC : 4,27; IC à 95 % : 1,33-13,75), de naissance multiple (RC : 9,79; IC à 95 % : 4,25-22,57), de naissance prématurée (RC : 4,68; IC à 95 % : 2,30-9,51) et de naissance à 41 semaines de gestation ou plus (RC : 1,76; IC à 95 % : 1,09-2,84).

Conclusion : Les décès néonataux précoces surviennent plus fréquemment dans certains contextes obstétricaux. La sélection des patientes pour la naissance à domicile planifiée pourrait entraîner une réduction des issues néonatales défavorables.

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INTRODUCTION

Home birth is becoming increasingly popular in the United States (U.S.). Between 2004 and 2014, the frequency of home births increased by 71% from 0.56% to 0.96% of all births.¹ The American College of Obstetricians and Gynecologists (ACOG) supports patient choice and education about home birth, but cautions that home birth is associated with a greater than two-fold increase in perinatal death. Moreover, ACOG emphasizes the need for appropriate patient selection for home birth to decrease risk

factors for complicated delivery and specifically singles out a history of CS, fetal malpresentation, and multifetal gestations as contraindications to home birth.²

Planned home births in the U.S. have been associated with a greater risk of adverse neonatal outcomes including low Apgar scores,³⁻⁵ neonatal seizures,³⁻⁶ and neonatal death.⁵⁻¹⁰ The basis of most of the evidence on the adverse outcomes of home birth is a comparison of home births with hospital births. However, these studies are comparing two inherently different populations because hospital populations often have greater risk factors for poor neonatal outcomes from the start. Evidence comparing home birth patients with each other is sparse and, to our knowledge, only two such studies set in the U.S. have examined the risk factors affecting outcomes in home births. Using data about planned home births from the Midwives Alliance of North America Statistics Project data registry, it was found that breech deliveries were associated with increased rates of early neonatal deaths, but the investigators failed to find significantly increased rates of neonatal death for births following a prior CS, nulliparous births, or multiple gestations.^{11,12} A larger study limited to home birth patients, stratified by their risk factors, could provide the information needed when counselling patients on the likelihood of adverse outcomes of certain pre-existing conditions when pursuing a home birth.

Our objective was to determine the degree to which various obstetrical factors increase the risk of early neonatal death in planned home births. We hypothesized that exposures such as advanced maternal age, nulliparity, vaginal birth after CS, preterm birth, non-vertex fetal presentation, and non-singleton gestations will significantly increase the risk of early neonatal death.

MATERIAL AND METHODS

The National Center for Health Statistics branch of the Centers for Disease Control and Prevention (CDC) publishes annual Period Linked Birth/Infant Death databases. The databases link birth and death certificates from all births to all infant deaths in the same year. Annually, these databases track approximately 4 million births and 23 000 infant deaths within 1 year of birth.¹³ The most recent database at the time of our study reported births and infant deaths from 2013. We compiled the data from 2011 to 2013 to create a 3-year cohort of linked births and infant deaths.

From the cohort of births that occurred between 2011 and 2013, we selected for home births that were planned (code bfacil-birth place =3). Hence, we did not consider births

occurring in hospitals, freestanding birthing centers, doctors' offices, clinics, other locations, or at an unknown location. Home births that were accidental or not planned were also not included. From the planned home births cohort, we excluded births that occurred at ≤ 34 completed weeks gestation and also infants born with congenital or chromosomal anomalies, including anencephaly, Down syndrome, congenital diaphragmatic hernia, congenital heart disease, omphalocele, gastroschisis, cleft lip and/or palate, and limb defects. Note that coding for planned home births is available only from states using the 2003 revised birth certificate, which records planned and unplanned home births separately. In 2011, 36 states had implemented the revised birth certificate¹⁴; this rose to 41 states in 2013.¹⁵ Thus, our cohort does not include births from all 50 states, but it does capture an increasingly greater proportion of the population over time.

Our statistical analysis started with a description of the demographic and clinical characteristics of the study population. Next, multivariate logistic regression analyses were conducted to evaluate which exposures of interest were associated with early neonatal death. Our outcome of interest was early neonatal deaths occurring within the first 0 to 6 days of life. We hypothesized that the following pregnancy and maternal exposures could adversely affect early neonatal death in our cohort: (1) prior CSs, defined as subjects who had a history of one or more previous CSs regardless of whether a previous successful vaginal delivery had occurred in the interim; (2) fetal presentation (vertex or non-vertex); (3) gestational plurality (singleton or non-singleton gestations); (4) maternal age (<25, 25 to 34, ≥ 35 years); (5) GA (<37, 37 to 40, 41, ≥ 42 completed weeks); and (6) parity (nulliparous, multiparous). A separate logistic regression model was run for each exposure. Potential confounders considered within these models were maternal age, parity, and history of previous CS. When the dependent variable of a specific model was one of these confounding variables, then the model was adjusted for only the other confounding variables. For example, when the effect of maternal age on early neonatal death was examined, the regression model was adjusted for parity and history of previous CS. Outcome definitions are compiled by a committee of federal and state health statistics into a guide on completing birth and death certificates.¹⁶

Because this study used publicly available data, the Jewish General Hospital (Montréal, QC) Medical/Biomedical Research Ethics Committee deemed this study to be exempt from approval in accordance with the 2010 Tri-Council Policy statement. All analyses were conducted using SAS enterprise guide 4.2 (SAS Institute, Cary, NC).

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