Attributes of nulliparous women who have a spontaneous vaginal birth in Queensland: a retrospective cohort study

Dr Monique Hamilton, Dr Lauren Kearney RM PhD, Prof John M D Thompson, Dr Rachael Nugent

Background: Decreasing rates of spontaneous vaginal birth (SVB) in countries like Australia have not shown corresponding improvements in outcomes such as stillbirth, neonatal deaths, and maternal mortality. Recognizing and implementing interventions to promote SVB, especially in first-time mothers, is crucial, considering it strongly predicts birthing outcomes in subsequent pregnancies.

Hypothesis: Analyzing data from births in Queensland may uncover factors influencing SVB in nulliparous women, potentially guiding policy and practice for optimized care.

Objective: To identify factors associated with SVB in nulliparous women.

Design: Retrospective cohort study.

Setting: All public and private maternity units in Queensland, Australia.

Population: All nulliparous women birthing a singleton at term from 1st January 2017 – 31st December 2018.

Methods: Data from Perinatal Data Collection and Queensland Admitted Patient Data Collection were extracted. Participants were categorized by labour onset (spontaneous or induced). Multivariable stepwise regression models were used to identify independent predictive factors associated with spontaneous vaginal birth. Ethics approval: LNR/2019/QRBW/60209.

Main Outcome Measure: Non-instrumental spontaneous vaginal birth.

Variables: Antepartum: maternal age, body mass index (BMI), Indigenous status, marital status, remoteness, social disadvantage recorded by Socio-Economic Indexes for Areas (SEIFA), number of pregnancy visits, number of previous pregnancies, gestation at first visit, nuchal translucency scan, morphology scan, conception (assisted or spontaneous), antenatal Edinburgh Postnatal Depression Scale screening, smoking status, sex of baby, gestation at delivery, model of care (public/private), availability of healthcare facility, pre-existing medical conditions and pregnancy complications.
Intrapartum: fetal presentation, cardiotocography use, fetal scalp blood sampling, oxytocin use, amniotomy, mobility, water immersion, epidural, nitrous and other pharmacological analgesia.

Characteristic	Spontaneous OR (95% CI)	Induced OR (95% CI)
Maternal age group (40+ comparison group)		
<20	**3.723 (2.507, 5.53)**	**4.345 (3.304, 5.713)**
20-24	**2.545 (1.744, 3.714)**	**3.031 (2.361, 3.891)**
25-29	**2.062 (1.418, 2.998)**	**2.031 (1.589, 2.597)**
30-34	**1.522 (1.047, 2.213)**	**1.641 (1.282, 2.1)**
35-39	1.206 (0.822, 1.771)	1.268 (0.978, 1.644)
Single vs not single	1.1 (1.01, 1.197)	#
Public vs Private	1.418 (1.31, 1.535)	#
Assisted vs spontaneous conception	0.854 (0.733, 0.995)	#
Gestational age (38 comparison group)		
37	1.182 (1.02, 1.369)	1.079 (0.955, 1.22)
39	1.076 (0.974, 1.187)	0.843 (0.767, 0.928)
40	0.931 (0.844, 1.027)	0.741 (0.67, 0.82)
41	0.72 (0.636, 0.814)	0.653 (0.587, 0.727)
42	**0.445 (0.255, 0.775)**	**0.334 (0.211, 0.53)**
Female baby sex (vs male sex)	1.294 (1.213, 1.379)	1.332 (1.247, 1.422)
Fetal factors Yes vs No	#	1.21 (1.117, 1.311)
GDM Yes vs No	#	1.128 (1.033, 1.232)
Hypothyroidism Yes vs No	#	0.764 (0.642, 0.908)
Breech vs cephalic	**0.067 (0.051, 0.087)**	**0.179 (0.122, 0.263)**
No CTG vs CTG	**3.444 (3.123, 3.797)**	#
Scalp lactate No vs Yes	**3.885 (3.121, 4.836)**	**3.081 (2.606, 3.641)**
Prostaglandins No vs Yes	#	1.315 (1.223, 1.413)
Oxytocin No vs Yes	1.457 (1.352, 1.57)	1.191 (1.087, 1.304)
ARM No vs Yes	1.129 (1.053, 1.21)	#
Mobility Yes vs No	1.161 (1.087, 1.24)	1.185 (1.106, 1.27)
Immersion Yes vs No	1.23 (1.108, 1.366)	#
Epidural No vs Yes	**2.981 (2.766, 3.212)**	**2.552 (2.374, 2.744)**
Opioid Yes vs No	#	1.141 (1.052, 1.239)
Nitrous Yes vs No	1.134 (1.058, 1.214)	1.35 (1.256, 1.45)

Table: characteristics significantly associated with spontaneous vaginal birth, side-by-side comparison for spontaneous compared to induced labour. Characteristics with largest magnitude of effect are highlighted**.** # denotes factors that were not statistically significant.

Results:

- 37569 nulliparous women birthed in Queensland during the study period.
- Considering all antepartum and intrapartum factors, characteristics with the largest magnitude of effect on SVB were similar in both the spontaneous and induced labours (see Table).
- Factors significantly associated with increased odds of SVB include:
    - Younger maternal age
    - Advanced gestation of 42 or more completed weeks
    - Absence of CTG use (in women with spontaneous labour onset)
    - Absence of fetal scalp lactate
    - Absence of augmentation of spontaneous labour
    - Absence of epidural use

Several factors appeared significant in the initial model considering only antenatal characteristics (EPDS score, mental health diagnosis and maternal BMI) but lost significance once intrapartum factors were also considered in the model. This replicates the real word in which we aim to optimise and prepare for delivery through antepartum care but demonstrates that factors with the biggest magnitude of effect usually arise during labour.

Discussion & Conclusions: This study assessed the factors associated with spontaneous vaginal birth for women having their first baby, at term, in Queensland. The antepartum factors with the largest magnitude of effect were maternal age and gestation at birth. This was similar for women with induced or spontaneous labour. During spontaneous labours, less intervention (fetal monitoring, epidural, amniotomy, oxytocin) was associated with higher odds of SVB.

Our study is limited by the retrospective nature of the data. Despite a multivariate analysis that attempts to account for confounding factors, this is not completely eliminated and it is possible that other unexamined factors may account for findings.

A key strength of our study is that we have a large cohort from a state-wide routine data set which included all clinical settings and all-risk nulliparous pregnancies, thus broadening the applicability of our findings. This is particularly relevant for public maternity facilities in Queensland, where most Queensland women birth, as there are statewide clinical guidelines that these findings may be able to influence. The findings of this study should prompt further scrutiny of the cost of labour interventions and whether there is any impact on neonatal outcomes.

RANZCOG SYMPOSIUM 2024 Sunshine Coast

RANZCOG Excellence in Women's Health