

Neonatal outcomes associated with obstetric interventions performed during labor in nulliparous women*

Desfechos neonatais associados às intervenções obstétricas realizadas no trabalho de parto em nulíparas

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ABSTRACT

Objective: to analyze neonatal outcomes associated with obstetric interventions performed during labor in low-risk nulliparous women. **Methods:** a cross-sectional observational study of 534 low-risk nulliparous women. **Results:** interruption of skin-to-skin contact after delivery was shown to be associated with obstetric interventions such as cardiotocography at admission, oxytocin in labor, amniotomy, and episiotomy. The need for positive pressure ventilation and oxygen therapy was associated with the encouragement of the Valsalva maneuver; the performance of this maneuver was also associated with interventions such as amniotomy, episiotomy and directed pulling. **Conclusion:** the study showed that the use of obstetric interventions during labor in low-risk women is associated with unfavorable neonatal outcomes that lead to the need for further interventions after delivery.

Descriptors: Infant, Newborn; Obstetric Nursing; Labor, Obstetric.

RESUMO

Objetivo: analisar os desfechos neonatais associados às intervenções obstétricas realizadas no trabalho de parto em nulíparas de baixo risco. **Métodos:** estudo observacional de corte transversal, realizado com 534 nulíparas de baixo risco. **Resultados:** a interrupção do contato pele a pele após o parto se mostrou associado às intervenções obstétricas como cardiotocografia na admissão, ocitocina no trabalho de parto, amniotomia e episiotomia. A necessidade de ventilação por pressão positiva e oxigenoterapia tiveram associação ao incentivo à manobra de Valsalva; a realização desta manobra está associada, também às intervenções amniotomia, episiotomia e puxo dirigido. **Conclusão:** o estudo evidenciou que a utilização das intervenções obstétricas durante o trabalho de parto de mulheres de baixo risco está associada aos desfechos neonatais desfavoráveis que acarretam a necessidade de mais intervenções após o parto. **Descritores:** Recém-Nascido; Enfermagem Obstétrica; Trabalho de Parto.

Introduction

In the last two decades, to rescue the experience of birth as a family event, centered on the woman and her protagonist role, where the hospital-centered interventionist influences are minimized, strategies have been created to ensure a more humanized care in pregnancy, delivery, and puerperium. Scientific evidence shows that a considerable portion of obstetric complications can be reduced with the appropriate use of technology and interventions through the performance of qualified professionals who assume a supporting role, without controlling or interfering in the physiological process of delivery, in order not to expose healthy parturient to iatrogenic practices⁽¹⁻²⁾.

According to the World Health Organization, interventions performed by the obstetrician that accelerate the labor process without necessarily bringing benefits to the health of the pregnant woman, or without scientific support, are considered unnecessary and/or harmful interventions, especially in low risk parturient. Since the 1980s, the World Health Organization and the Brazilian Ministry of Health have been reviewing obstetric practices, proposing an assistance based on scientific evidence to promote a better delivery and birth experience with more favorable maternal and fetal outcomes⁽³⁻⁴⁾.

A study conducted in Brazil surveyed the interventions used in the Brazilian Unified Health System and the outcome indicators of care, showing that 70.0% of deaths in childhood occurred in the neonatal period due to prematurity and low birth weight. The routine use, or not based on scientific evidence, of obstetric and neonatal interventions can generate obstetric trauma and asphyxia, the latter being one of the most frequent factors in early neonatal deaths of term newborns. Thus, it evidences a high proportion of deaths from preventable causes, which would not occur if there were adequate prenatal and delivery care for pregnant women and appropriate assistance to the newborn⁽⁵⁻⁷⁾.

Researches addressing the influence of obstetric

interventions on fetal well-being are still recent initiatives and are not usually associated with such interventions and neonatal outcomes. They only analyze models of delivery care in general and their repercussions on perinatal outcomes or investigate the use of interventions individually and their association with neonatal outcomes, such as the one explained in the study that shows the association of labor analgesia with the occurrence of resuscitation maneuvers and referral to the neonatal intensive care unit⁽⁸⁻⁹⁾. Therefore, it seeks to deepen the understanding of the implementation of care practices in the scenario of delivery and birth, bringing the association of neonatal outcomes evidenced in each obstetric intervention used. To support actions that can reduce neonatal damage, ascertaining failures and weaknesses in their implementation.

Given the above, the following question was raised: What are the neonatal outcomes when obstetric interventions are performed during labor in low-risk nulliparous women? Thus, the study aimed to analyze neonatal outcomes associated with obstetric interventions performed during labor in low-risk nulliparous women.

Methods

Observational, cross-sectional study, guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) tool for methodological structuring with descriptive and analytical components. This study is part of a larger project entitled "Maternal and neonatal outcomes associated with labor interventions in low-risk nulliparous women" and exclusively addresses neonatal outcomes resulting from obstetric interventions performed during labor.

This study was developed in a tertiary-level Maternity-School in the city of Fortaleza, Ceará, Brazil, linked to the Brazilian Unified Health System and recognized as a center of support for good practices in obstetrics and neonatology of the Stork Network and

as a member of the *Hospital Amigo da Criança* Initiative. The sample was delimited in a non-probabilistic, consecutive type, consisting of all patients classified as low obstetric risk and admitted to the obstetric center of the maternity hospital under study in the period from February to August 2018.

Inclusion criteria were low-risk parturient; single gestation; full-term; cephalic vertex presentation; spontaneous labor; healthy women and fetuses; no comorbidities; and experiencing labor for the first time. Exclusion criteria were parturient admitted during the expulsion period or who presented any alteration during labor and were considered high-risk.

For the evaluation of labor and delivery, the independent variables were considered, namely the interventions performed during labor and delivery, such as: cardiotocography upon admission; use of oxytocin; amniotomy; neuraxial analgesia; encouragement of Valsalva maneuver; directed pulling; episiotomy; and Kristeller maneuver. As dependent variables, the following were assessed: skin-to-skin contact for 60 minutes; reason for removing the newborn from skin-to-skin contact; Apgar score at 5 minutes of life; positive pressure ventilation (PPV); oxygen therapy and destination of the newborn after delivery; and whether the newborn remained with the mother or was referred to the intensive care or intermediate care unit.

A questionnaire with closed questions was used, applied through direct observation of all the assistance provided in the process of parturition of pregnant women admitted to the obstetric center and the data collection instrument was filled out by the researcher. In addition, the search for sociodemographic and obstetric data in medical records was carried out, in addition to the use of the monitoring forms of assistance to delivery and birth of the Stork Network, with a view to the full filling of the interventions performed during labor of these women.

The data were organized using the Redcap program and processed in R Studio version 4.0.3. They were also analyzed using descriptive and analytical statistics and the Chi-square and Fisher's exact test

were applied, being considered statistically significant the p-values <0.05 shown in tables.

The study complied with National Health Council Resolution 466/12 and was authorized in the Research Ethics Committee by opinion number 2,510,987/2018.

Results

The study obtained a sample of 534 low-risk deliveries, of which 323 were vaginal and 211 cesarean deliveries. Represented by women between 13 and 39 years of age, most of who had a partner at the time of hospitalization, were self-declared as brown, from the capital and metropolitan region, and reported having between 6 and 10 years of schooling, corresponding to elementary school. Most women in the study had no income.

Of the 534 low-risk nulliparous women assisted with interventions during labor, 323 progressed to vaginal delivery and 211 underwent cesarean section. It was observed that the majority, 482 (90.3%) had cardiotocography on admission to the obstetric center, in 203 (38.0%) amniotomy was performed, 134 (25.1%) received intravenous oxytocin, neuraxial analgesia was performed in 46 (8.6%) Neuraxial analgesia was performed in 46 (8.6%) of the women during labor, during expulsion 128 (24.0%) were encouraged to perform the Valsalva maneuver, 233 (43.6%) performed the directed pulling, 25 (4.7%) underwent episiotomy, and 11 (2.1%) underwent the *Kristeller* maneuver.

No stillbirths or neonatal deaths were observed. Regarding the management of the newborn, 377 (70.6%) had no skin-to-skin contact for 60 minutes after birth. As for the Apgar score, 5 (0.9%) newborns had a score lower than 7. After birth, 108 (20.2%) were assisted in the neonatal intensive care unit, 35 (6.6%) underwent neonatal resuscitation by positive pressure ventilation, oxygen support was offered to 76 (14.2%), and 16 (3.0%) were referred to the neonatal intensive care unit. The reasons for removing

the baby from skin-to-skin contact were lack of availability of a professional in 187 cases (35.0%); request by the professional in 88 (16.5%); and impaired fetal vitality signs in 30 (5.6%). In addition, the average time of skin-to-skin contact was 25 minutes.

It was observed that the interventions cardiotocography at admission, use of oxytocin in labor, amniotomy and episiotomy were associated with the outcome skin-to-skin contact for 60 minutes and that most patients who experienced these interventions did not have skin-to-skin contact with their newborns. It was also possible to observe that the variables of intervention in labor did not show association with the outcome Apgar score at the 5th minute of life (Table 1).

Table 2 shows that the variable Valsalva maneuver encouragement was associated with the outcome need for positive pressure ventilation and, in terms of frequency, most newborns did not need to be submitted to positive pressure ventilation at birth. The interventions amniotomy, Valsalva maneuver incentive, directed pulling, and episiotomy were associated with the outcome oxygen therapy, with $p < 0.05$.

Regarding the destination of the newborn after delivery, an association was perceived with the variables amniotomy, encouragement of Valsalva maneuver and episiotomy. According to the distribution of this variable, it was observed that most patients stayed with their children in a rooming-in unit (Table 3).

Table 1 – Interventions performed during labor and the association with the outcome skin-to-skin contact for 60 minutes and with the outcome Apgar score at the 5th minute. Fortaleza, CE, Brazil, 2020

Labor Interventions	Skin-to-skin contact for 60 minutes		p	Apgar in the 5 th minute		p
	Yes n (%)	No n (%)		<7 n (%)	≥7 n (%)	
Cardiotocography on admission			0.000*			0.075*
Yes	129 (24.1)	353 (66.1)		3 (0.5)	479 (89.7)	
No	28 (5.2)	24 (4.5)		2 (0.3)	50 (9.3)	
Oxytocin use			0.000*			0.602*
Yes	40 (7.4)	94 (17.6)		2 (0.3)	132 (24.7)	
No	117 (21.9)	283 (52.9)		3 (0.5)	397 (61.0)	
Amniotomy			0.000*			0.167*
Yes	74 (13.8)	129 (24.1)		0 (0.0)	203 (38.0)	
No	83 (15.5)	248 (46.4)		5 (0.9)	326 (61.0)	
Analgesia Neuraxial			0.314*			1.009*
Yes	17 (3.1)	29 (5.4)		0 (0.0)	46 (8.6)	
No	140 (26.2)	348 (65.1)		5 (0.9)	483 (90.4)	
Encouraging the Valsalva Maneuver			0.310*			0.563*
Yes	49 (15.1)	79 (24.4)		2 (0.6)	126 (39.0)	
No	105 (32.5)	90 (27.8)		1 (0.3)	194 (60.0)	
Directed pull			0.050*			1.000*
Yes	103 (31.8)	130 (40.2)		2 (0.6)	231 (71.5)	
No	51 (15.7)	39 (12.0)		1 (0.3)	194 (60.0)	
Episiotomy			0.000 [†]			0.211*
Yes	4 (1.2)	21 (6.5)		1 (0.3)	24 (7.4)	
No	150 (46.4)	148 (45.8)		2 (0.6)	296 (91.6)	
Kristeller's maneuver			0.541 [†]			1.000*
Yes	4 (1.2)	7 (2.1)		0 (0.0)	11 (3.4)	
No	150 (46.4)	162 (50.1)		3 (0.9)	309 (95.6)	

*Chi-square test; [†]Fisher's exact test

Table 2 – Interventions performed during labor and the association with the outcomes Positive Pressure Ventilation and oxygen therapy. Fortaleza, CE, Brazil, 2020

Labor Interventions	Positive Pressure Ventilation		P	Oxygen Therapy		P
	Yes n (%)	No n (%)		Yes n (%)	No n (%)	
Cardiotocography on admission			0.764*			0.199 [†]
Yes	31 (5.8)	451 (84.4)		65 (12.1)	417 (78.0)	
No	4 (0.7)	48 (8.9)		11 (2.0)	41 (7.6)	
Oxytocin use			1.000 [†]			0.870 [†]
Yes	9 (1.6)	125 (23.4)		18 (3.3)	116 (21.7)	
No	26 (4.8)	374 (70.0)		58 (10.8)	342 (64.0)	
Amniotomy			0.177 [†]			0.000 [†]
Yes	9 (1.6)	194 (36.3)		16 (2.9)	187 (35.0)	
No	26 (4.8)	305 (57.1)		60 (11.2)	271 (50.4)	
Analgesia Neuraxial			1.000*			1.007 [†]
Yes	3 (0.5)	43 (8.0)		7 (1.3)	39 (7.3)	
No	32 (5.9)	456 (85.3)		69 (12.9)	419 (78.4)	
Encouraging the Valsalva Maneuver			0.038*			0.000 [†]
Yes	13 (4.0)	115 (35.6)		26 (8.0)	102 (31.5)	
No	8 (2.4)	187 (57.8)		12 (3.7)	183 (56.6)	
Directed pull			0.200*			0.015*
Yes	18 (5.5)	215 (66.5)		34 (10.5)	199 (61.6)	
No	3 (0.9)	87 (26.9)		4 (1.2)	86 (26.6)	
Episiotomy			0.679*			0.020 [†]
Yes	2 (0.6)	23 (7.1)		7 (2.1)	18 (5.5)	
No	19 (5.8)	279 (86.3)		31 (9.5)	267 (82.6)	
Kristeller's maneuver			0.522*			0.128*
Yes	1 (0.3)	10 (3.0)		3 (0.9)	8 (2.4)	
No	20 (6.1)	292 (90.4)		35 (10.8)	277 (85.7)	

*Fisher's exact test; [†]Chi-square test**Table 3** – Interventions performed during labor and the association with the outcome of newborn destination after delivery. Fortaleza, CE, Brazil, 2020

Labor Interventions	Rooming-in Accommodation	Mediate Care Unit	Intensive Care Unit	Intermediate care unit	p
	n (%)	n (%)	n (%)	n (%)	
Cardiotocography on admission					0.305*
Yes	384 (71.9)	56 (10.4)	13 (2.4)	29 (5.4)	
No	42 (7.8)	3 (0.5)	3 (0.5)	4 (0.7)	
Oxytocin use					0.804*
Yes	108 (20.2)	13 (2.4)	3 (0.5)	10 (1.8)	
No	318 (59.5)	46 (8.6)	13 (2.4)	23 (4.3)	
Amniotomy					0.000*
Yes	175 (32.7)	20 (3.7)	2 (0.3)	6 (1.1)	
Não	251 (47.0)	39 (7.3)	14 (2.6)	27 (5.0)	
Analgesia Neuraxial					0.236*
Yes	40 (7.4)	2 (0.3)	0 (0.0)	4 (0.7)	
No	386 (72.2)	57 (10.6)	16 (2.9)	29 (5.4)	
Encouraging the Valsalva Maneuver					0.011*
Sim	105 (32.5)	12 (3.7)	3 (0.9)	8 (2.4)	
Não	181 (56.0)	6 (1.8)	4 (1.2)	4 (1.2)	
Directed pull					0.240*
Sim	201 (63.2)	15 (4.6)	6 (1.8)	11 (3.4)	
Não	85 (26.3)	3 (0.9)	1 (0.3)	1 (0.3)	
Episiotomy					0.010*
Yes	20 (6.1)	0 (0.0)	2 (0.6)	3 (0.9)	
No	266 (82.3)	18 (5.5)	5 (1.5)	9 (2.7)	
Kristeller's maneuver					0.109*
Yes	8 (2.4)	1 (0.3)	1 (0.3)	1 (0.3)	
No	278 (86.0)	17 (5.2)	6 (1.8)	11 (3.4)	

*Fisher's exact test

Discussion

The study presented limitations related to the very design of cross-sectional studies, for having less capacity to establish causal relations, verifying only the association between the variables of interventions and the outcome. The association results identified bring a rich contribution to obstetric practice by offering useful information about the implications generated by interventions in the health of the newborn, providing theoretical foundations for a humanized and safe care, avoiding the use of unnecessary and/or harmful interventions.

The use of obstetric interventions such as cardiotocography, amniotomy, Valsalva maneuver, and directed pulling was very prevalent during the assistance to low-risk parturient women. These results were like those found in a cross-sectional study conducted with 768 postpartum in 11 maternity hospitals in the state of Sergipe, and in a multicenter study conducted in three tertiary hospitals in Shanghai. Both showed that the use of cardiotocography, greater exposure of nulliparous women to oxytocin infusion, episiotomy, Kristeller maneuver, and performance of amniotomy also occurred at high rates⁽¹⁰⁻¹¹⁾.

The analysis of the results related to the outcome uninterrupted skin-to-skin contact for 60 minutes showed an association between cardiotocography upon admission and the occurrence of skin-to-skin contact. Skin-to-skin contact soon after birth, as recommended by the Brazilian Pediatric Society, is important for the newborn's adaptation to extrauterine life by reducing the risk of neonatal hypoglycemia, favoring thermoregulation, increasing the chances of successful breastfeeding, and stabilizing the airways. Recent studies show that admission cardiotocography in low-risk parturient does not confer benefits to the woman or the fetus; furthermore, it may increase cesarean section rates by approximately 20% and does not guarantee any improvement in perinatal outcomes⁽¹²⁻¹⁴⁾.

It is sometimes understood that safe delivery

care is associated with the use of interventions to prevent negative maternal and neonatal outcomes to shorten labor, even in women classified as low risk. In a study on advances in delivery care, it was shown that the persistent use of procedures not recommended by scientific evidence and the inappropriate use of technologies in labor can have repercussions on perinatal outcomes. Thus, they show the importance of seeking to reduce unnecessary interventions, such as the use of episiotomy and Kristeller maneuver, to ensure better maternal-fetal care⁽¹⁵⁾.

The use of oxytocin, amniotomy and episiotomy were also associated with the outcome skin-to-skin contact, but the results may underestimate the association if these interventions occurred to accelerate labor due to unsatisfactory evolution or signs of impaired fetal vitality. A possible answer to the association between the breaking of the bond between mother and child in the first hours of life and the performance of episiotomy is the fact that this intervention is a risk factor for postpartum hemorrhage, considered one of the complications that usually causes the withdrawal of the newborn from skin-to-skin contact⁽¹⁶⁾.

The outcome Apgar score at the 5th minute of life was not associated with interventions performed during labor. One factor to be considered may be the fact that the variable presents an unbalanced distribution, i.e., a large difference in the distribution in the categories listed. The 1- and 5-minute Apgar score is recognized as a predictor of neonatal morbidity; scores less than 7 at the 5 minutes are associated with neurological damage and cognitive impairment, respiratory distress, gastrointestinal morbidity, feeding problems, hypothermia, and sepsis, increasing the occurrence of neonatal and infant mortality. These adverse outcomes increase considerably as the 5-minute Apgar score decreases⁽¹⁷⁾.

An association between the need for neonatal resuscitation by positive pressure ventilation and the encouragement of the Valsalva maneuver by the parturient woman was observed. A randomized clinical trial in Iran with low-risk nulliparous women conclu-

ded that use of the Valsalva maneuver was related to lower levels of oxygen in the umbilical cord blood of newborns when compared to spontaneous pulling, thus increasing the chances of neonatal resuscitation. Such effects are not usually observed during spontaneous pulling since there is no exaggerated and forced inspiration and the efforts to push are shorter⁽¹⁸⁾.

Although an association between the need for oxygen therapy and the use of amniotomy has been identified, a study of nulliparous parturient who underwent this intervention showed no association between its occurrence and adverse perinatal outcome⁽¹⁹⁾. As to the occurrence of directed pulling, a study carried out with 42,539 parturient in Sweden showed that the rates of umbilical cord acidosis in vaginal deliveries increase with the performance of this intervention, which may cause asphyxia in the newborn and, consequently, admission to the intensive care unit⁽²⁰⁾.

Conclusion

This study showed that the use of interventions such as cardiotocography, oxytocin use, amniotomy, encouragement of Valsalva maneuver, directed pulling, and episiotomy during labor in low-risk women are associated with unfavorable neonatal outcomes that lead to the need for further interventions after delivery.

The cautious use of these obstetric interventions, especially in low-risk parturient is an obstacle that must be overcome to promote the improvement of the labor and birth assistance process.

Collaborations

Monteiro PGA and Coelho TS participated in the project conception, data analysis and interpretation, and article writing. Lima AM, Ferreira UR and Monteiro MSB contributed to the writing of the article. Esteche CMGCE and Damasceno AKC contributed to the relevant critical review of the intellectual content and approval of the final version to be published

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