

Factors associated with low Apgar in newborns in birth center

Fatores associados ao baixo Apgar em recém-nascidos em centro de parto

Factores asociados al bajo Apgar en recién nacidos en centro de parto

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ABSTRACT

Objective: to analyze factors associated with Apgar of 5 minutes less than 7 of newborns of women selected for care at the Center for Normal Birth (ANC). **Method:** a descriptive cross-sectional study with data from 9,135 newborns collected between July 2001 and December 2012. The analysis used absolute and relative frequency frequencies and bivariate analysis using Pearson's chi-square test or the exact Fisher. **Results:** fifty-three newborns (0.6%) had Apgar less than 7 in the 5th minute. The multivariate analysis found a positive association between low Apgar and gestational age less than 37 weeks, gestational pathologies and interurrences in labor. The presence of the companion was a protective factor. **Conclusion:** the Normal Birth Center is a viable option for newborns of low risk women as long as the protocol for screening low-risk women is followed.

Descriptors: Apgar Score; Natural Childbirth; Obstetric Nursing; Humanizing Delivery; Labor, Obstetric.

RESUMO

Objetivo: analisar os fatores associados ao Apgar de quinto minuto menor do que sete de recém-nascidos de mulheres selecionadas para a assistência no Centro de Parto Normal (CPN). **Método:** estudo descritivo transversal com dados de 9.135 recém-nascidos, coletados entre julho de 2001 e dezembro de 2012. Na análise foi utilizada a apuração de frequências absolutas e relativas das variáveis e análise bivariada mediante o cálculo dos testes de qui-quadrado de Pearson ou exato de Fisher. **Resultados:** 53 recém-nascidos (0,6%) tiveram Apgar menor que sete no quinto minuto. A análise multivariada encontrou associação positiva entre baixo Apgar e idade gestacional menor que 37 semanas, patologias na gestação e intercorrências no trabalho de parto. A presença do acompanhante foi um fator protetor. **Conclusão:** o CPN é uma opção viável para recém-nascidos de mulheres de baixo risco desde que o protocolo de seleção das mulheres de baixo risco seja seguido.

Descritores: Índice de Apgar; Parto Normal; Enfermagem Obstétrica; Parto Humanizado; Trabalho de Parto.

RESUMEN

Objetivo: analizar los factores asociados al Apgar de quinto minuto menor que siete de los recién nacidos de mujeres, seleccionadas para la asistencia en el Centro de Parto Normal (CPN). **Método:** estudio descriptivo transversal con datos de 9.135 recién nacidos, recogidos entre julio de 2001 y diciembre de 2012. En el análisis se utilizaron el escrutado de frecuencias absolutas y relativas de las variables y el análisis bivariado mediante el cálculo de la prueba de Chi-cuadrado de Pearson o prueba exacta de Pearson Fisher. **Resultados:** cincuenta y tres recién nacidos (0,6%) tuvieron Apgar menor que siete en el quinto minuto. El análisis multivariado encontró asociación positiva entre bajo Apgar y edad gestacional menor que 37 semanas, patologías en la gestación e intercorrencias en el trabajo de parto. La presencia del acompañante fue un factor protector. **Conclusión:** el CNP es una opción viable para los recién nacidos de mujeres de bajo riesgo desde que siga el protocolo de selección de las mujeres de bajo riesgo.

Descriptorios: Puntaje de Apgar; Parto Normal; Enfermería Obstétrica; Parto Humanizado; Trabajo de Parto.

INTRODUCTION

Just as the labor constitutes, in most cases, a physiological event for women, the birth must also be understood from the same perspective. Approximately 85% of newborns have a transition to extrauterine life without any difficulty and require little or no care at this time⁽¹⁾. About 10% start breathing with stimulation and about 5% require some more complex care to start breathing after birth. Of the latter, 3% require positive pressure ventilation and 2% need to be intubated to ensure adequate ventilatory support⁽²⁾.

Although all the technology necessary for resuscitation should be available in the delivery room, assistance to the healthy newborn at the time of birth should facilitate the contact between mother and child and breastfeeding shortly after delivery. Interventions should only be performed when necessary⁽³⁾. However, in Brazil, care to newborns considered healthy at the time of their birth is characterized by the excess of interventions that are mostly unnecessary, which can interfere with mother-child bonding without bringing benefits to any of them. Research, including 18,639 newborns of single pregnancies weighing $\geq 2,500$ g and Apgar at the first minute ≥ 7 , shows use of inhaled oxygen in 8.8% of the cases, upper airway and gastric aspiration in 71% and 39.5%, respectively, and use of incubator in 8.7% of the newborns. Only 28.2% were placed in skin-to-skin contact with the mother, for 16.1% the maternal breast was offered in the delivery room, 69% were in rooming-in, and 45.5% were breastfed in the first hour of life⁽⁴⁾. The discrepancy between the professional practice and the scientific evidence in the care provided to healthy newborns reaffirms the urgent need for change in the current care model.

It is necessary to adopt a balanced model, which ensures the safety of women and their newborns with interventions according to the need and that favor the physiological evolution when interurrences are not observed⁽⁵⁾. Different strategies have been adopted to achieve a model of humanized care for labor and birth with the use of appropriate technology and elimination of unnecessary interventions in the care for healthy newborns. Normal Delivery Centers (NDC) are situated in this context with care geared toward the physiology of parturition and the individuality of women, their newborns and their families⁽⁶⁾.

In Brazil, the place of extra-hospital birth is still controversial. Questions are raised regarding the safety of care in NDCs for newborns, since their team consists of obstetric nurses and nursing technicians, according to the Brazilian Ministry of Health⁽⁷⁾. The absence of pediatrician restricts the complete care for newborns who need all stages of resuscitation, a possibility also present, although less likely, in low-risk births.

The national literature on perinatal outcomes of care in NDC is scarce. Vogt et al.⁽⁸⁾ found prevalence of low Apgar score of 0.4% for newborns of women at habitual risk in two hospitals in Belo Horizonte and no case in the NDC. Other studies in NDC show prevalence of 0.1%⁽⁹⁻¹⁰⁾.

Even in low prevalence, the birth of a newborn with low Apgar score at the fifth minute and with demand for resuscitation represents an adverse event that requires immediate and precise interventions of the obstetric nurse in the NDC. A more detailed analysis of this adverse neonatal condition occurring among low-risk women may contribute to improve the safety of birth in this care space. It

should be noted that, although the NDC is a care model proposed by Brazilian public policy for women with low-risk pregnancies, it is still much discussed in academia and among service managers.

OBJECTIVE

Analyze the factors associated with low Apgar score at the fifth minute (Apgar < 7) of newborns from women selected for care in the NDC.

METHOD

Ethical aspects

The study was conducted according to the recommendations of Resolution no. 466/2012 of the National Health Council. Approved by the Research Ethics Committee of the Sofia Feldman Hospital (CAAE 11904812.2.0000.5132) which dismissed the application of the Free and Informed Consent Form, considering that the data source were the medical records and anonymity was ensured.

Type of study

This is an analytical and transversal retrospective study.

Study setting

The research was conducted in a peri-hospital NDC of a philanthropic maternity hospital located in the outskirts of Belo Horizonte. The institution has 100% of its resources coming from the Unified Health System (SUS). In the NDC, women are provided care in a proportion of one professional for one or two parturients. Care is performed by obstetric nurses who also perform shifts at the reference hospital to maintain bonding, quality, continuity of care and communication between the hospital and NDC teams. Women admission to the NDC follows a specific protocol with the following criteria: spontaneous labor in active phase, between 37 and 41 weeks of gestation, with single gestation, cephalic presentation, absence of meconium, without obstetric and/or clinical complications during pregnancy and presence of normal cardio-fetal heartbeat at admission, with rupture of membranes of up to 6 hours, without previous caesarean section or gynecological surgery, and whose fetuses present an estimated weight between 2500 g and 4000 g. These criteria characterize the women as of low risk.

Population and sample

The study analysis was by intention-to-treat principle, therefore, all women admitted to the NDC participated in the study regardless of whether the birth place was the NDC itself or the reference maternity, when transfer was required.

All deliveries performed in the period from June 2001 to December 2012 were considered to define the sample, totaling 11,194 deliveries. Due to data availability we collected information from a total of 9,585 deliveries, which ensured a proportional distribution within each year analyzed, a significance level of 1% and accuracy of 1.5%.

Data collection and organization

Data were collected through review of medical records, using an instrument prepared, tested and validated by the researchers. This instrument included maternal information on age, skin color, education, parity, previous pathologies (urinary tract infection, toxoplasmosis, previous arterial hypertension, preeclampsia, eclampsia, type 1 or 2 diabetes, gestational diabetes, cardiopathy/nephropathy, violence, infertility, genitourinary surgery, among others). Intercurrence during pregnancy (urinary tract infection, toxoplasmosis, gestational diabetes with diet control, threat of preterm delivery, hemorrhage, anemia), smoking and drug use, number of prenatal consultations, obstetric conditions (gestational age, active phase of labor at admission, meconium liquid, prolonged labor), intercurrent during labor (shoulder dystocia, cord prolapse, intrapartum bleeding, nonreassuring fetal status), care characteristics (use of oxytocin, amniotomy, partogram, companion, analgesia, maternal position in the second stage of labor).

Data collection was carried out between April and October 2013 by previously trained undergraduate researchers. The data were registered directly into a digital form that fed the database. The collected data were reviewed by the researchers and any inconsistencies were checked and corrected by reviewing the corresponding medical record.

Data analysis

From the sample of 9,585 newborns, 450 newborns were excluded from the analysis due to lacking data. The final sample consisted of 9,135 newborns. We presented the absolute and relative frequencies of the variables and bivariate analysis for the variables of exposure and outcome, the Apgar score < 7 at the fifth minute of life by calculating the Pearson's chi-square or Fisher's exact tests. The exposure variables already consolidated in the literature as risk factors for the outcome, as well as those that presented statistical significance below 0.20 ($p < 0.20$) during the bivariate analysis, were considered in the preparation of the final model.

We adjusted potentially inaccurate variables by using the binary logistic regression technique through the step-by-step strategy, with inclusion of all variables selected during the bivariate analysis in descending order of statistical significance. Variables that presented $p > 0.05$ were removed one by one from the model and considered definitively excluded, if the decrease in the explanation of the outcome was not statistically significant.

The statistical significance level established for the multivariate analysis was 5% ($p < 0.05$). The data were analyzed using Stata statistical software (version 13.1).

RESULTS

Of the total 9,135 newborns included in the study, 53 newborns (0.6%) showed Apgar score below seven at the fifth minute.

Regarding sociodemographic characteristics (Table 1), most mothers analyzed had brown/black skin color and were aged 20–35 years. Educational level showed homogeneous distribution with one third of the sample distributed to elementary education, one third to secondary education, and one third to higher education.

As for the characteristics of the pregnancy (Table 2), a little more than half was multiparous and almost all were at gestational age between 37 and 41 weeks. The prevalence of pathology during pregnancy was higher compared with the clinical antecedents and almost twice as many women presented some morbidity during gestation. One third of the women did not have the adequate number of prenatal consultations as established by the Brazilian Ministry of Health.

Table 1 – Sociodemographic characteristics of the population associated with Apgar < 7 at the fifth minute, Centro de Parto Normal, Belo Horizonte, Minas Gerais, Brazil, 2001-2012

Variables	Population		Apgar < 7 at the 5th minute				
	n	%	n	%	OR	95% CI	p value
Skin color							
White	1.984	21.7	8	0.4	1.00 (ref.)	-	-
Brown/Black	4.792	52.5	33	0.7	1.71	0.79 – 3.71	0.173
Yellow/indigenous	86	0.9	0	0.0	*	*	*
No data	2.273	24.9	12	0.5	1.31	0.53 – 3.21	0.554
Educational level							
Up to 7 years	2.676	29.3	11	0.4	1.00 (ref.)	-	-
8 to 10 years	2.859	31.3	20	0.7	1.71	0.82 – 3.57	0.155
11 years or more	2.806	30.7	19	0.7	1.65	0.78 – 3.48	0.186
No data	794	8.7	3	0.4	0.92	0.26 – 3.30	0.897
Mother's age (years)							
20 to 35	6.612	72.4	36	0.5	1.00 (ref.)	-	-
10 to 14	62	0.7	1	1.6	2.99	0.40 – 22.19	0.283
15 to 19	2.123	23.2	14	0.7	1.22	0.65 – 2.25	0.542
≥ 36	338	3.7	2	0.6	1.09	0.26 – 4.53	0.909

Table 2 – Characteristics related to the pregnancy and antecedents of the population associated with Apgar score < 7 at the fifth minute, Centro de Parto normal, Belo Horizonte, Minas Gerais, Brazil, 2001-2012

Variables	Population		Apgar < 7 at the 5th minute				
	n	%	n	%	OR	95% CI	p value
Parity							
Primiparous	3.988	43.7	29	0.7	1.00 (ref.)	-	-
Multiparous	5.138	56.3	24	0.5	0.64	0.37 – 1.10	0.108
Gestational age (weeks)							
37 to 40	8.625	94.4	50	0.6	1.00 (ref.)	-	-
< 37	64	0.7	2	3.1	5.53	1.32 – 23.24	0.019
≥ 41	446	4.9	1	0.2	0.39	0.05 – 2.80	0.346
Smoker							
No	7.774	84.8	43	0.6	1.00 (ref.)	-	-
Yes	948	10.4	5	0.5	0.95	0.38 – 2.40	0.913
No data	443	4.8	5	1.1	2.04	0.81 – 5.19	0.132
Antecedent pathology							
None	8.360	91.5	45	0.5	1.00 (ref.)	-	-
Some	775	8.5	8	1.0	1.93	0.91 – 4.10	0.089
Current pathology							
None	7.740	84.7	39	0.5	1.00 (ref.)	-	-
Some	1.395	15.3	14	1.0	2.00	1.08 – 3.70	0.027
Prenatal consultations							
≥ 6	6.376	69.8	41	0.6	1.00 (ref.)	-	-
< 6	2.759	30.2	12	0.4	0.67	0.35 – 1.29	0.232

Table 3 – Birth-related characteristics of the population associated with Apgar score < 7 at the fifth minute, Centro Parto Normal, Belo Horizonte, Minas Gerais, Brazil, 2001-2012

Variables	Population		Apgar < 7 at the 5th minute		OR	95% CI	p value
	n	%	n	%			
Meconium liquid							
No	7.500	82.1	41	0.6	1.00 (ref.)	-	-
Yes	893	9.8	8	0.9	1.64	0.77 – 3.52	0.200
No data	742	8.1	4	0.5	0.99	0.35 – 2.76	0.979
Oxytocin							
No	6.326	69.3	36	0.6	1.00 (ref.)	-	-
Yes	2.809	30.7	17	0.6	1.06	0.60 – 1.90	0.834
Partogram							
Yes	7.042	77.1	44	0.6	1.00 (ref.)	-	-
No	2.093	22.9	9	0.4	0.69	0.33 – 1.41	0.306
Companion							
Yes	7.204	78.9	32	0.4	1.00 (ref.)	-	-
No	1.931	21.1	21	1.1	2.46	1.42 – 4.28	0.001
Intercurrence in labor							
No	8.734	95.6	41	0.5	1.00 (ref.)	-	-
Yes	401	4.4	12	3	6.54	3.41 – 12.54	< 0.001
Analgesia							
No	8.563	93.7	47	0.6	1.00 (ref.)	-	-
Yes	572	6.3	6	1.1	1.92	0.82 – 4.51	0.134
Childbirth position							
Vertical	3.338	36.5	12	0.4	1.00 (ref.)	-	-
Horizontal	4.787	52.4	34	0.7	1.98	1.03 – 3.83	0.042
Tub	1.010	11.1	7	0.7	1.93	0.76 – 4.92	0.167
Type of delivery							
Vaginal	8.917	97.6	47	0.5	1.00 (ref.)	-	-
Forceps	67	0.7	2	3	5.81	1.38 – 24.41	0.016
Cesarean	151	1.7	4	2.7	5.14	1.83 – 14.43	0.002
Prolonged labor							
No	8.995	98.5	52	0.6	1.00 (ref.)	-	-
Yes	140	1.5	1	0.7	1.23	0.17 – 9.01	0.834

Table 4 – Final model of logistic regression of variables associated with Apgar < 7 at the fifth minute, Centro de Parto Normal, Belo Horizonte, Minas Gerais, Brazil, 2001-2012

Variables	OR	95% CI	p value
Gestational age (weeks)			
37 to 40	1.00 (ref.)	-	-
< 37	6.12	1.44 – 26.07	0.014
≥ 41	0.36	0.05 – 2.66	0.319
Intercurrence in labor			
No	1.00 (ref.)		
Yes	5.85	3.02 – 11.33	< 0.001
Presence of companion			
Yes	1.00 (ref.)		
No	2.24	1.28 – 3.92	0.005
Current pathology			
None	1.00 (ref.)		
Some	1.87	1.01 – 3.48	0.047

Note: model fit p-value = 0.71

Regarding the factors directly related to labor and childbirth (Table 3), good practices, such as the use of partogram and the presence of companion, were used in most deliveries, while the horizontal position (lithotomy, recumbent and semirecumbent on bed) was adopted by half of the women. Acceleration with oxytocin by a third. Intercurrence during labor, prolonged labor, analgesia and meconium fluid occurred in less than 10% of deliveries. The rate of assisted delivery (forceps) and cesarean section totalled 2.4%.

Of the total number of women admitted to the NDC, 10.5% were transferred to the reference maternity hospital: 6.3% due

to desire for analgesia and 4.2% due to interurrences in labor.

Regarding the factors associated with Apgar score below seven at the fifth minute, in the bivariate analysis, no sociodemographic variable was related to the outcome (Table 1). On the other hand, higher prevalence of Apgar score below seven at the fifth minute ($p < 0.05$) was observed among newborns of mothers with some pathology during pregnancy (Table 2), with gestational age below 37 weeks, without presence of companion and interurrence during labor and childbirth, as well as those who had delivery in the horizontal position, use of forceps or caesarean section (Table 3).

According to the results of the multivariate model (Table 4), a mother with gestational age below 37 weeks had a six-fold higher chance of having a baby with altered Apgar score than one with gestational age between 37 and 40 weeks. In addition, the occurrence of interurrence in labor increased the chance of altered Apgar by five times. The absence of companion was associated with an increase of 124% in the chance of Apgar score below seven at the fifth minute. Finally, mothers with some pathology during pregnancy had an 87% higher chance of having a newborn with Apgar score below seven at the fifth minute.

DISCUSSION

The prevalence of Apgar < 7 at the fifth minute is 0.6%. Gestational age < 37 weeks, interurrences in labor, pathologies during pregnancy, and absence of companion had negative impact on Apgar score, increasing the chance of the newborn receiving Apgar score < 7. No sociodemographic factor was associated with low Apgar

score at the fifth minute. Analysis of the associated factors suggests that women who did not fit the NDC protocol were served, which directly impacted the vitality of the newborn.

Since the occurrence of unexpected interurrences during labor can never be completely disregarded, the correct selection of women constitutes an indispensable element to maintain the prevalence of unfavorable conditions that threaten the health of newborns at a minimum level.

A systematic review with 11,795 women showed no significant difference in neonatal outcomes, comparing care modes in which

newborn care was performed by obstetric nurse or obstetrician and hospital units that had the presence of physician⁽¹¹⁾.

Regarding the prevalence of Apgar score < 7 at the fifth minute, the international literature shows lower prevalences, but with no significant differences for care in Normal Birth Center, when compared with the care for low-risk women in the hospital⁽¹²⁻¹⁵⁾. However, the prevalences are higher than in the present study. In extra-hospital NDC in Australia and New Zealand, the prevalence was 1.2% and 2%, respectively⁽¹²⁻¹³⁾. In Denmark, the prevalence of Apgar score < 7 at the first minute is below 2.5%⁽¹⁴⁾. A Dutch study that included in the evaluation the care in intra-, peri- and extra-hospital NDC found Apgar score < 9 at the fifth minute of life in 1.5%⁽¹⁵⁾. The prevalence of 3.2% reported by Ferrazzi et al.⁽¹⁶⁾ for an intra-hospital NDC in Italy is an exception among the results of all the studies found. The prevalence of low Apgar scores in this institution may raise doubts regarding the objectivity of the Apgar method, as well as be related to a more flexible and less rigorous admission protocol.

Randomized international studies found prevalences between 0.7% and 1% with no significant differences for care in intra-hospital NDC, a mode that has a more immediate service for emergencies than an extra-hospital unit⁽¹⁷⁻¹⁹⁾. National studies⁽⁸⁻¹⁰⁾, with prevalences of low Apgar score between 0.1% and 0.5%, are consistent with international studies involving low-risk women, pointing to the NDC as appropriate place for labor and birth.

Recognizing that characteristics of extra-hospital and hospital modes may influence neonatal outcomes, some studies compare the results according to the specificity of the extra-hospital and hospital mode⁽²⁰⁻²¹⁾. Prevalences of Apgar score < 7 in deliveries of low-risk women, for 2006–2010 in New Zealand, were higher than those found in our study: 1.5% for home delivery, 1.7% for extra-hospital NDC, 2.3% for care in secondary hospital, and 2.8% in tertiary hospital. There was a gradual increase in the prevalence of low Apgar proportional to the increase in the complexity of the care mode⁽²¹⁾. Davis et al.⁽²⁰⁾ observed risk of Apgar score < 7 at the fifth minute in secondary and tertiary hospital 43% and 59% higher, respectively, than in delivery in primary care. These results may be related to subjectivity in the attribution of the Apgar score or to the bias of the professionals, who routinely deal with high-risk situations, in overvaluing slower, albeit physiological adaptations of some newborns. Another hypothesis for this difference would be the inappropriate and harmful use of interventions to accelerate labor. This practice may be present more routinely in hospital services of greater complexity.

A comparative study with information from the US Center for Disease Control (CDC) on care by obstetric nurse and obstetrician in hospital, normal delivery center, and home birth observed prevalence of Apgar at the fifth minute of 0.16% and 0.09% for hospital care by obstetrician and obstetric nurse, respectively, and higher prevalences for extra-hospital care⁽²²⁾. It should be noted that the difference in the prevalence of Apgar between hospital care by obstetrician and obstetric nurse is significant and may suggest differences in the conduct of labor between both professionals.

Women with clinical conditions that did not correspond to the admission criteria established by the protocol were served in the NDC studied, as evidenced by the prevalence of 0.7% of

prematurity, 8.5% of antecedent pathologies, and 15.3% of morbidities in the pregnancy. This same situation was documented in an English survey, which observed the presence of women with some risk factor (diabetes, preeclampsia, asthma, epilepsy, positive streptococci, IUGR, postdatism, among others) among the women who planned their delivery in an extra-hospital mode by obstetric nurse or obstetrician. Among those who planned a home birth, 7% presented some risk factor, 4% among the women admitted to a peri-hospital NDC and 3% among those who planned their delivery in an extra-hospital or community NDC⁽²³⁾.

The existence of pathologies during pregnancy is a criterion for choosing the place of delivery⁽²⁴⁾. The selection of women for the NDC must comply strictly with the established protocol that excludes any maternal morbidity before or during pregnancy, since maternal morbid conditions can cause damage to the health of the newborn. Both the conscious choice of the mother for extra-hospital care and failures of the professionals such as transgression of the protocol or lack of attention in the admission and inadequate transfer of information in the admission process may be the causes for this fact.

The association, found in our study, between pathologies during pregnancy and low Apgar scores reinforces the importance of the correct selection of women for care in the NDC. The NDC is a delivery place specific for low-risk pregnant women and, in order to obtain the expected results with this care model, it is necessary to comply with the admission criteria. Although the more familiar ambience and the reduction of interventions in this environment are favorable characteristics for a worry-free evolution of labor, neonatal emergencies that threaten life can occur and in these situations the newborn requires appropriate care. Obstetric nurses should be highly trained for work in NDC, which includes training in neonatal resuscitation and early recognition of labor abnormalities.

Prematurity was present in the NDC studied in 0.7% of the deliveries served and was one of the factors associated with Apgar < 7, corroborating other studies⁽²⁵⁻²⁶⁾. It constitutes serious risk to the survival of the newborn, requires care by a specialized team and access to appropriate technology feasible only in hospital institutions. To be admitted to the NDC, the parturient should present reliable data for calculation of gestational age, which enables excluding the admission of women with premature gestation. The birth of 64 preterm infants in the Normal Delivery Center indicates errors in the calculation of gestational age, since the conscious admission of women in preterm labor to the NDC is unlikely.

Exceptions in admission may have occurred in extreme situations, as well as discrepancies between the methods for calculating gestational age. Factors contributing to calculation error include late start of prenatal care and, consequently, access to ultrasound after the first trimester hindering the accurate estimation of gestational age. Again, it is highlighted the adequate selection of women for the delivery place as an important condition to ensure positive neonatal outcomes in non-hospital or small hospital modes. In this context, it is essential to ensure the presence of trained professional and adequate infrastructure to initiate immediate care for newborns and, if necessary, neonatal resuscitation.

Intercurrences during labor, which may influence perinatal outcomes, are unpredictable and may arise even when there is correct selection of parturients. They occur both in hospital care and in NDC care. Data from hospital-based studies found association between cardiocography alterations indicating nonreassuring fetal status and low Apgar scores. These studies did not find significant association between interurrences that constitute emergencies such as cord prolapse, true knot, meconium, shoulder dystocia and placental abruption and low Apgar score at birth⁽²⁷⁻²⁸⁾. However, the interurrences mentioned above constitute intrapartum emergencies that may require immediate intervention and availability of a specialized team, conditions which are limited or absent in the NDC.

The companion as a protection factor for low Apgar is supported by a systematic review⁽²⁹⁾ with 22 clinical trials involving 15,288 women. In the study, the duration of labor of women who received continuous support was shorter, their probability of having cesarean delivery was lower (RR = 0.78; 95%CI = 0.67 to 0.91), as well as of having instrumental vaginal delivery (fixed effect, RR = 0.90; 95%CI = 0.85 to 0.96), of requiring regional analgesia (RR = 0.93; 95%CI = 0.88 to 0.99), or of having a newborn with low Apgar score at the fifth minute (RR = 0.69; 95%CI = 0.50 to 0.95).

Inclusion of companion in delivery care, although ensured by law, is not yet routine in the country. In the research *Nascer no Brasil*, Diniz et al.⁽³⁰⁾ recorded total absence of companion for 24.5% of the 23,879 women in the sample and presence at all times of care for 18.8%. The continuous presence of a companion in our country is associated with the most favored social class and more frequent among white women with higher educational level, indicating the presence of inequalities in hospital care⁽³⁰⁾. In the case of NDCs, which are included in the humanization of care, it is less likely that the presence or absence of companion is determined by institutional routines, but rather by the availability/unavailability of the companion at the time of delivery. The association between absence of companion and low Apgar score highlights the importance of the companion for positive outcomes of care.

This study is the first nationwide study involving 9,135 women served in a NDC. Its value lies in the high number of participants and in the possibility of evaluation over the 12 years of operation of the NDC. Since low Apgar score is an infrequent result, the sample of 9,135 women enabled a consistent analysis. Moreover, it shows a care model that is little prevalent and in opposition to the national context, since it consists in a care environment outside the hospital that proposes the obstetric nurse's autonomy as primary provider in labor and delivery.

Limitations

The data were collected retrospectively, based on the medical records of the puerperal women, newborns and do not involve other institutions.

An analysis of neonatal outcome including only women with labor and delivery in the NDC may present better results of neonatal Apgar scores when compared with an analysis by intention-to-treat principle, which includes women transferred in the intrapartum and which may present a potential for increased unfavorable neonatal outcomes.

Contributions to the field of nursing, health or public policies

It is considered that the quality of childbirth care is the object of discussion in different spheres of society, including the academic sphere and, also, a goal of public policies in Brazil, conferring high importance to the article. Care in a Normal Delivery Center is still innovative and the issue is quite controversial in academia and in the discussion among professional corporations. There are still few national studies examining the issue in depth. In this care space, obstetric nurses have a prominent role, being responsible for the entire labor, delivery, and birth process. The results presented may contribute to their work in NDCs, as well as show that this is a safe practice.

CONCLUSION

Newborns of low-risk women find in the NDC one more option for their birth with safety and quality. The low prevalence of newborns with Apgar < 7 supports the national policy of implementation of NDCs, in pursuit of changing the care paradigm towards a care focused on the care for women and newborns. According to the results, obstetric nurses seemed to be professionals capable of providing safe care to this population in a differentiated environment of childbirth care. However, women selection according to protocol, excluding those with pathologies during pregnancy or prematurity, should be ensured in order to reduce the risk of damage to newborns. Access to more complex care should be ensured, as well as the competence of professionals working in the NDC. The baby's conditions at birth depend – in addition to maternal clinical history – on infrastructure for transfer and on constant training of human resources.

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