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Maternal and neonatal transfers in a birthing center: a cross-sectional study

Transferências maternas e neonatais em uma casa de parto: estudo transversal

Traslados maternos y neonatales en una casa de parto: estudio transversal

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The survey data are available in the article.

Abstract

Objective: To analyze the factors associated with maternal transfer from a freestanding birth center (FBC) to the hospital and the maternal and neonatal outcomes of these transfers.

Methods: This cross-sectional study was conducted at the *Casa Angela* FBC (São Paulo, SP, Brazil) with 3,397 women admitted for birth from 2012 to 2021. This population was divided into three groups according to the primary outcome (no transfer, intrapartum transfer, and postpartum transfer). Descriptive statistics, multinomial logistic regression, and odds ratio calculation were used in the analysis.

Results: Transfer rates were calculated for intrapartum (19.2%) and postpartum (2.6%). The factors that increased the chance of intrapartum transfer were the following: advanced maternal age, labor induction with natural methods, and amniotomy. Having had a previous vaginal birth and having a bathtub bath during labor were the factors that reduced this chance. Postpartum hemorrhage and third-degree perineal laceration were the factors that increased the chance of postpartum transfer; having a bathtub bath during labor was the factor that reduced this chance. The cesarean section rate among women transferred was 43%; women transferred intrapartum (0.2%) and postpartum (0.9%) remained in the intensive care unit (ICU); 97.4% of babies born in the hospital had an Apgar score ≥7 at 5 min, and 7.3% of them were admitted to the ICU.

Conclusion: Understanding the factors associated with maternal transfers can prevent these occurrences and their complications. The outcomes in the hospital after transfer reinforce the safety of the care model provided at the FBC.

Resumo

Objetivo: Analisar os fatores associados à transferência materna de um centro de parto normal peri-hospitalar (CPNp) para o hospital e os desfechos maternos e neonatais dessas transferências.

Métodos: Estudo transversal realizado no CPNp *Casa Angela* (São Paulo, SP, Brasil) com 3.397 mulheres admitidas para o parto de 2012 a 2021. Esta população foi separada em três grupos, conforme o desfecho primário (sem transferência, transferência intraparto e transferência pós-parto). Na análise, foram adotados estatística descritiva, regressão logística multinominal e cálculo da razão de chance.

Resultados: As taxas de transferência foram calculadas para intraparto (19,2%) e pós-parto (2,6%). Os fatores que aumentaram a chance de transferência intraparto foram os seguintes: maior idade materna, indução do parto com métodos naturais e amniotomia. Os fatores que reduziram essa chance foram ter parto vaginal anterior e realizar banho de imersão em banheira no trabalho de parto. Os fatores que aumentaram a chance de transferência pós-parto foram hemorragia *pós-parto e* laceração perineal de 3º grau; o fator que reduziu essa chance foi realizar banho de imersão em banheira durante o trabalho de parto. A taxa de cesariana entre

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as mulheres transferidas foi de 43%; dentre as mulheres transferidas intraparto e pós-parto, 0,2% e 0,9%, respectivamente, permaneceram na unidade de terapia intensiva (UTI); dos bebês nascidos no hospital, 97,4% tiveram Apgar ≥7 no 5º minuto e 7,3% foram internados na UTI.

Conclusão: Conhecer os fatores associados *às* transferências maternas pode prevenir essas ocorrências e suas complicações. Os desfechos no hospital após a transferência reforçam a segurança do modelo de assistência prestado no CPNp.

Resumen

Objetivo: Analizar los factores asociados a los traslados maternos de un centro de parto normal peri-hospitalario (CPNp) al hospital y los resultados maternos y neonatales de estos traslados.

Métodos: Estudio transversal realizado en el CPNp Casa Angela (São Paulo, estado de São Paulo, Brasil) con 3397 mujeres ingresadas para dar a luz entre 2012 y 2021. Esta población se dividió en tres grupos, según el resultado primario (sin traslado, traslado intraparto y traslado posparto). En el análisis se utilizaron estadísticas descriptivas, regresión logística multinomial y cálculo de la razón de probabilidades.

Resultados: Se calcularon los *índices* de traslado en el intraparto (19,2 %) y en el posparto (2,6 %). Los factores que aumentaron la probabilidad de traslado intraparto fueron los siguientes: mayor edad materna, inducción del parto con métodos naturales y amniotomía. Los factores que redujeron esta probabilidad fueron haber tenido un parto vaginal anterior y realizar un baño de inmersión en la bañera durante el trabajo de parto. Los factores que aumentaron la probabilidad de traslado posparto fueron la hemorragia posparto y el desgarro perineal de tercer grado. El factor que redujo esta probabilidad fue realizar un baño de inmersión en la bañera durante el trabajo de parto. El índice de cesáreas entre las mujeres trasladadas fue del 43 %. El 0,2 % de las mujeres trasladadas durante el parto permaneció en la unidad de cuidados intensivos (UCI) y de las trasladadas después del parto, el 0,9 %. De los bebés nacidos en el hospital, el 97,4 % tuvo un Apgar ≥7 en el quinto minuto y el 7,3 % fue ingresado a la UCI.

Conclusión: Conocer los factores asociados a los traslados maternos puede prevenir estos casos y sus complicaciones. Los resultados hospitalarios después de los traslados refuerzan la seguridad del modelo de atención ofrecido en el CPNp.

Introduction

Birthing centers (BC) can be defined as a place where individualized care is offered in a welcoming environment, with appropriate technology and facilities that encourage physiological birth, without routine intervention, for women with straightforward pregnancies. The BC are managed by midwives and nurse midwives who take professional responsibility for care. In case of referral or transfer, care is assumed by the hospital team.[1,2]

In Brazil, Ordinance GM 11/2015 established guidelines for implementing and qualifying this service within the Unified Health System (SUS) and defined BC as either alongside (ABC) or freestanding (FBC). An FBC, also called a "Birth House", must:[3]

> *a) be located in the vicinity of the reference hospital, at a distance that must be covered in less than 20 min from the respective establishment in suitable transport units; b) ensure the transfer of the woman and newborn to the reference hospital in the event of risk or complications, in suitable transport units, 24h a day, 7 days a week; c) have as a reference the support services of the hospital to which it belongs or is linked (...); d) ensure the woman and newborn remain in the birthing room from admission to discharge.*

A study conducted in Brazil compared the care model at a BC in Rio de Janeiro with public hospitals in the Southeast region of the state. The authors concluded that the care provided in the BC is safe, demedicalized, with a greater offer of good practices, and less use of unnecessary interventions, without any negative impact on the obstetric care outcomes.[4]

Maternal and neonatal outcomes at BC are favorable even when parturients require intrapartum transfer.[5,6] However, it is common for birth outcomes to be linked to hospital indicators when intrapartum transfer occurs, thus not appearing as indicators of BC care. As the possibility of transfer to a hospital is a component of the FBC model, it is important that the outcomes of births that occurred in the hospital are incorporated into the FBC indicators even after intrapartum transfer, as they may impact the quality and safety of the care offered in these places.

The Brazilian Guideline for Normal Birth Care recommends that women with straightforward pregnancies should be advised on the risks and benefits of giving birth in each of the possible locations (obstetric units, ABC, FBC, and home), and their decision should be supported. However, evidence with substantial elements for decision-making (such as risks of transfers and related maternal and neonatal outcomes) is from other countries.[7] In Brazil, few studies were found addressing these topics.

Transfers rate outcomes from Brazilian FBC to hospitals presented a significant heterogeneity (varying in the range of 2.8-31.5%).[8]

Regarding the causes of transfer, the most frequent reasons are the following: arrest in progression or prolonged labor, ruptured amniotic sac for a prolonged period, abnormal fetal vitality, desire for pain relief or analgesia, incomplete placenta birth, and compromised hemodynamics due to postpartum hemorrhage (PPH).[9-11]

A study on women who wanted to give birth at an FBC but needed to be transferred to a hospital could contribute to reviewing the admission and eligibility criteria for these services, as well as providing important data on childbirth safety. This can also support informed decision-making about the place of birth, promote a more structured dialogue with the referral hospital, and ensure planning and continuity of care after transfer. This agrees with Art. 16 (II FBC, b) of the Alyne Network, which reinforces the importance of a safe and adequate transfer in urgencies and emergencies, aiming for the best maternal and neonatal outcomes.

To analyze the factors associated with maternal transfer from a FBC to a hospital and the maternal and neonatal outcomes of these transfers.

Methods

This analytical cross-sectional observational study was carried out at *Casa Angela FBC* (A Humanized Birthing Center), which is located in São Paulo (SP), Brazil. This is a non-profit institution that serves SUS users. It was founded in 2009 and is managed by the Monte Azul Community Association. It operated part-time until 2011, offering antenatal and childcare, and began to provide birth care 24 hours a day from 2012 onwards. Since 2015, it has had a partnership with the Municipal Health Department of São Paulo, serving exclusively through the SUS. It has three birthing rooms, and the permanent clinical team consists of two midwives or nurse midwives and two nursing technicians on each shift.

In 2024, monthly admission averages increased for childbirth (39) and effective childbirth (31). Only women with straightforward pregnancies are admitted for childbirth, and the antenatal care can be provided by *Casa Angela* from the 28th week of pregnancy. Births are attended by midwives and nurse midwives. When maternal or neonatal transfer to the hospital is necessary, removal to the FBC referral hospital is done by ambulance. The indication for transfer is the responsibility of the midwife or nurse midwife, based on both clinical decision and institutional care protocol. Additional information about the study location can be found on the institution's website.

The population of this study was composed of all women admitted for childbirth at *Casa Angela* from 2012 to 2021. During this period, 3,431 women were admitted. Some of them (34) were excluded from the study because their institutional records were not found in the service's archive (5) or they were admitted for immediate postpartum care (29) after birth had occurred at home or on the way to the FBC. This corresponds to a loss rate <0.2%, with no risk of underestimating the findings. Thus, 3,397 women were included.

The institution's database and women's institutional records were the sources for data. The data collection was carried out by the study authors, using an instrument designed for this purpose.

Sociodemographic and obstetric conditions were considered as exposure. Maternal transfer to a hospital facility was the primary outcome. Type of birth, perineal conditions, and maternal and neonatal complications after transfer were the secondary outcomes.

The data were analyzed in the *R* 4.3.1 statistical package. For categorical variables, absolute and relative frequencies were calculated; as for the numerical variables, mean, standard deviation, and maximum-minimum values were calculated. The population was divided into three groups (birth, intrapartum transfer, and postpartum transfer) according to the outcome. A multinomial logistic regression model was constructed. The model results were expressed as an odds ratio (OR). The confidence interval for the OR was not presented. Since the data refer to the entire population of the studied location (not a sample), OR does not apply.

The study was approved by the Research Ethics Committee (REC) of the School of Nursing of the University of São Paulo. The application of the informed consent form (ICF) was waived because the study used the institutional database and electronic health-record reports, and the data were analyzed and presented aggregated. The justification for the impossibility of obtaining the ICF was accepted by the REC and *Casa Angela*.

Results

In 10 years of service (from January 2012 to December 2021), 3,431 women were admitted to *Casa Angela*; 34 of them were excluded from the study as reported in Methods. Thus, 3,397 women participated in the study. During this period, intrapartum (651) and postpartum (87) transfers happened, and the intrapartum (19.2%) and postpartum (2.6%) maternal transfer rates were calculated. This rate has varied over the years; an increase also occurred in transfer rates with the progressive increase in the number of births. Over the past three years, variation has occurred in the intrapartum (21-22%) and postpartum (3-4%) transfer rates. Below, we present the sociodemographic characteristics of women and their births (Table 1), analysis of transfers (Table 2), and reasons for transfers (Table 3).

In the analysis of intrapartum transfers, increases were observed in the chance of parturients being transferred after having received induction of labor with natural methods (2 times); amniotomy (3 times) and each year of maternal age (6%); conversely, reductions were observed in the chance of parturients being transferred after having a bathtub immersion during labor (52%) and each previous vaginal birth (79%). For postpartum transfers, increases in the chance of parturients being transferred were observed after they had had PPH (38 times) and third-degree perineal tear (262 times); differently, a reduction was observed in the chance of parturients being transferred after having a bathtub immersion bath during labor (61%) (Table 2).

Table 1. Distribution of women without and with intrapartum or postpartum transfer according to their sociodemographic and obstetric characteristics

Categorical variables	No transfer n(%)	Transfer	
		Intrapartum n(%)	Postpartum n(%)
Skin color and/or ethnicity	2063(100)	648(100)	85(100)
White	1154(55.8)	391(60.4)	46(54.1)
Brown	598(29.0)	164(25.3)	23(27.1)
Black	232(11.3)	67(10.3)	11(12.9)
Yellow	63(3.1)	18(2.8)	4(4.7)
Indigenous	16(0.8)	8(1,2)	1(1,2)
Education	2119(100)	649(100)	86(100)
Incomplete elementary school	49(2.3)	10(1.5)	2(2,3)
Complete elementary school	117(5.5)	38(5.9)	7(8.1)
Complete high school	972(45.9)	281(43.3)	32(37.2)
Completed higher education	981(46.3)	320(49.3)	45(52.4)
Bathtub in labor	2645 (100)	584 (100)	86 (100)
Yes	1724(65.2)	305(52.2)	52(60.5)
No	921(34.8)	279(47.8)	34(39.5)
Labor Induction with natural methods*	1990 (100)	565 (100)	76 (100)
Yes	468(23.5)	251(44.4)	22(29.0)
No	1522(76.5)	314(55.6)	54(71.0)
Oxytocin in labor	2659 (100)	651 (100)	87 (100)
Yes	127(4.8)	41(6.3)	6(6.9)
No	2532(95.2)	610(93.7)	81(93.1)
Amniotomy	2659 (100)	651 (100)	87 (100)
Yes	297(11.2)	116(17.8)	12(13.8)
No	2362(88.8)	535(82.2)	75(86.2)
Perineal conditions	2659(100)	-	87(100)
Intact	890(33.5)	-	26(29.9)
1st-degree tear	1096(41.2)	-	27(31.0)
2nd-degree tear	668(25.1)	-	26(29.9)
3rd-degree tear	5(0.2)	-	8(9.2)
Postpartum hemorrhage	2689(100)	-	87(100)
Yes	191(7.2)	-	58(66.7)
No	2468(92.8)	-	29(33.3)
Numerical variables			
Age (years)			
N	2659	651	87
Mean (SD)	27.5(5.3)	28.1(5.4)	28.1(5.5)
Minimum-maximum	14-46	14-42	14-42
Previous vaginal births			
N	2659	651	87
Mean (SD)	0.4(0.7)	0.1(0.4)	0.3(0.6)
Minimum-maximum	0-8	0-5	0-3

* Stimulating tea, castor oil, abdominal massage, traditional Chinese medicine (acupuncture, acupressure, and moxa); SD: standard deviation

Discussion

The data from this study showed the factors associated with maternal transfer and the maternal and neonatal outcomes of these transfers in 10 years of care at a BC. The reasons identified for intrapartum transfers were the same as those found in other Brazilian BC, but with different percentages.[12-15]

Table 2. Multivariate analysis of the relationship between the occurrence of intrapartum and postpartum transfers and sociodemographic and obstetric variables

Transfer types	OR	p-value
Intrapartum		
Skin color		
Brown and/or black and/or yellow and/or indigenous	1.44	0.082
White	1.00	
Education		
Higher education	0.87	0.715
High school	0.65	0.208
Complete and/or incomplete elementary education	1.00	
Bathtub in labor		
Yes	0.48	<0.001
No	1.00	
Labor induction by natural methods		
Yes	2.10	<0.001
No	1.00	
Amniotomy		
Yes	2.64	0.002
No	1.00	
Age (years)	1.06	0.004
Previous vaginal births	0.21	<0.001
Postpartum		
Skin color		
Brown and/or black and/or yellow and/or indigenous	1.07	0.829
White	1.00	
Education		
Higher education	0.38	0.068
High school	0.43	0.085
Complete and/or incomplete elementary education	1.00	
Bathtub in labor		
Yes	0.39	0.002
No	1.00	
Labor induction by natural methods		
Yes	1.85	0.059
No	1.00	
Amniotomy		
Yes	1.10	0.831
No	1.00	
PPH		
Yes	37.58	<0.001
No	1.00	
Perineal tear		
1st degree	1.62	0.407
2nd degree	0.85	0.807
3rd degree	261.50	<0.001
Age (years)	1.04	0.209
Previous vaginal births	0.70	0.200

PPH: postpartum hemorrhage; OR: odds ratio.

Table 3. Distribution of transferred women according to its indications and outcomes after transfer

Variables	n(%)
Indication for intrapartum transfer	651(100)
Alteration in FHR	219(33.6)
Arrest of labor	177(27.2)
Prolonged ruptured membranes	119(18.3)
Maternal request	60(9.2)
Meconium stained	34(5.2)
Hypertensive peak	26(4.0)
Hypertensive peak and/or change in vital signs	12(1.8)
Abnormal fetal presentation	2(0.3)
Antepartum vaginal bleeding	1(0.2)
Tachysystole	1(0.2)
Type of birth in the hospital	651(100)
Normal	336(51.6)
Caesarean section	280(43.0)
Forceps	35(5.4)
Place of admission for women after childbirth in the hospital	533(100)
Rooming room	531(99.6)
ICU	2(0.4)
Apgar 1st minute	650(100)
<7	80(12.3)
≥7	570(87.7)
Apgar 5th minute	650(100)
<7	17(2.6)
≥7	633(97.4)
Conditions of newborns in the hospital	550(100)
Admitted to rooming room	489(88.9)
Admitted to the ICU	40(7.3)
Admitted to the NHDU	19(3.5)
Stillbirth	2(0.4)
Indications for postpartum transfer	87(100)
Anemia	21(24.0)
Placental retention	18(20.7)
PPH	8(9.2)
Hypertensive peak	8(9.2)
Changes in vital signs after PPH	6(6.9)
3rd degree tear	6(6.9)
Cervical laceration	6(6.9)
Perineal hematoma	4(4.6)
Suspected infection	4(4.6)
Change in vital signs	3(3,4)
Skin allergy	1(1,2)
Suspected IS during the second stage of labor	1(1,2)
Condition of women after postpartum transfer	84(100)
Admitted to rooming room	68(80.9)
Return to *Casa Angela*	13(15.5)
Admitted to the ICU	3(3.6)

IS: ischemic stroke; FHR: fetal heart rate; PPH: postpartum hemorrhage; NHDU: neonatal high-dependency unit; ICU: intensive care unit

In international birthing centers, labor arrest has been the main cause of transfer.[6,9]

Intrapartum transfer rates have been varied in Brazilian (5.5-25.3%) and international (7.0-27.0%) FBC.[6,9-18] The heterogeneity of these rates may be related to local policies and differences between institutional protocols. Higher transfer rates may be related to the increase in the number of births, leading to the need to hire more professionals. They begin their work partially trained according to the model specificities and care protocols of BC. In addition, previous and more recent studies have shown that the increase in rates may be related to changes in protocols. Over time, teams and

leaders may adopt stricter criteria to promote or preserve the quality and safety of the model in BC.

The postpartum maternal transfer rate found in this study agrees with the rates observed in other studies (0.3-7.0%) conducted in Brazil and abroad.[9,12,13,15,17,19]

Regarding the association between women's sociodemographic characteristics and transfers, our findings agree with the literature regarding maternal age. In older women, transfers have been more frequent.[13,18] In England, an association was found in relation to age and parity: those who have their first child at an older age have a greater chance of being transferred. In multiparous women, this association does not occur.[6]

Regarding skin color and/or ethnicity, a study conducted in New Zealand found no association. Conversely, having Indian origins increased the chance of transfer in England.[6,9] For education, studies analyzing its association with transfer rates were not found. However, women who seek care at BC tend to be more educated.[4,18,19]

Regarding the data on labor and transfers, the use of labor induction with natural methods is indicated for both advanced gestational age and prolonged ruptured membranes.[20] This was the third reason for intrapartum transfer. Therefore, it is possible that the use of the natural method is not associated with transfer, but with the reason it was used, although with borderline significance. To evaluate this association, further studies are needed.

The same happened in relation to amniotomy; the association between amniotomy and intrapartum transfer may be directly related to the reason why amniotomy was performed. In FBC, labor arrest is usually the reason. Furthermore, its performance may reveal the presence of meconium in the amniotic fluid; this may be the reason for transfer when associated with other factors. This possibility was considered because both arrest of labor and meconium stained are reasons for intrapartum transfer. Thus, this relationship between the reasons should be better studied in the future.

A study conducted in England showed that using a bathtub during labor decreased the chance of intrapartum transfer.[21] This finding is associated not only with the benefits of hydrotherapy already described in the literature[20,22] but also with the exclusion criteria for using a bathtub during labor.[23] They suggest that women with physiological progress in labor take immersion baths in a bathtub more frequently.

Regarding postpartum transfers, the institutional protocol of the FBC under study considers 3rd- and 4th-degree lacerations a reason for transfer. The management and treatment of PPH can be carried out at the FBC itself, depending on the case.[23] Even so, the data from this study agree with the literature, as most transfers were performed due to PPH or complications, such as abnormalities in birthing the placenta, and uterine hypotonia, which can lead to PPH.[12,14,15,19]

Regarding the outcomes of transfers, the results reinforce the safety of the care model in FBC, where the majority of women admitted at the site in labor have a normal birth.[13,24] This is extremely important in Brazil due to the high rate of cesarean sections.[25]

Regarding maternal complications, five admissions occurred in the ICU. This represents a fraction of the total 3,397 women admitted to the FBC (0.15%), transferred intrapartum (0.4%), and transferred after delivery (3.6%). Other studies showing rates of maternal admission to the ICU were not found.

Apgar scores indicate good vitality of the babies born in the hospital after transfer, in agreement with the scores observed in other Brazilian FBC and slightly below those found in São Paulo.[10,12,13,15] The data from this study on neonatal ICU admission are consistent with those found in other studies.[11,15]

The stillbirth rate was higher than that found in the systematic review of studies conducted in high-income countries (0.02%), but lower than that found in Rio de Janeiro (0.14%).[14,24]

The limitations of this study resulted from its cross-sectional design, with secondary data sources (databases and institutional records), and potential confounding factors and information bias. For future studies, we recommend emphasizing admission data, helping to better analyze the reasons for transfer. This is important because questions about the reasons for transfer remained in relation to the

methods of labor natural induction and amniotomy. It is possible that the result was influenced by confounding factors such as length of hospital stay and ruptured membranes (for induction) and labor length (for amniotomy). These aspects were not studied in this research.

Despite the limitations of this study, the results reinforce the benefit of FBC for society. They showed that this is a safe model and can thus be replicated as a strategy to increase normal birth rates in Brazil. Considering the families served, our results can contribute to helping decide on the place where the birth will take place.

Conclusion

Older maternal age, induction of labor with natural methods, and amniotomy increase the chance of intrapartum transfer. Having a greater number of previous vaginal birth and taking an immersion bath in a bathtub during labor reduce this chance. PPH and third-degree perineal tear are factors that increase the chance of transfer after birth. Taking an immersion bath in a bathtub during labor reduces this chance. Hospital outcomes after transfer reinforce the safety of the care model used in FBC. Understanding the factors associated with maternal transfers can prevent this occurrence and its complications, thus contributing to increasing the rates of vaginal births in Brazil.

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Collaborations

Iguchi COF contributed to the study design, data collection, analysis, and interpretation of data, writing of the manuscript, relevant critical review of the intellectual content, and approval of the final version to be published. Leister N and Riesco MLG contributed to the analysis and interpretation of the data, writing of the manuscript, relevant critical review of the intellectual content, and approval of the final version to be published.

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