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Factors associated with maternal intrapartum transfers from a freestanding birth centre in São Paulo, Brazil: A case control study

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ABSTRACT

Objectives: to identify factors associated with maternal intrapartum transfer from a freestanding birth centre to hospital.
Design: case-control study with retrospective data collection.
Participants and settings: cases included all 111 women transferred from a freestanding birth centre in Sao Paulo to the referral hospital, from March 2002 to December 2009. The controls were 456 women who gave birth in the birth centre during the same period who were not transferred, randomly selected with four controls for each case.
Methods: data were obtained from maternal records. Factors associated with maternal intrapartum transfers were initially analysed using a χ^2 test of association. Variables with $p < 0.20$ were then included in multivariate analyses. A multiple logistic regression model was built using stepwise forward selection; variables which reached statistical significance at $p < 0.05$ were considered to be independently associated with maternal transfer.
Findings: during the study data collection period, 111 (4%) of 2,736 women admitted to the centre were transferred intrapartum. Variables identified as independently associated factors for intrapartum transfer included nulliparity (OR 5.1, 95% CI 2.7–9.8), maternal age ≥ 35 years (OR 5.4, 95% CI 2.1–13.4), not having a partner (OR 2.8, 95% CI 1.5–5.3), cervical dilation ≤ 3 cm on admission to the birth centre (OR 1.9, 95% CI 1.1–3.2) and between 5 and 12 antenatal appointments at the birth centre (OR 3.8, 95% CI 1.9–7.5). In contrast, a low correlation between fundal height and pregnancy gestation (OR 0.3, 95% CI 0.2–0.6) appeared to be protective against transfer.
Conclusions and implications for practice: identifying factors associated with maternal intrapartum transfer could support decision making by women considering options for place of birth, and support the content of appropriate information about criteria for admission to a birth centre. Findings add to the evidence base to support identification of women in early labour who may experience later complications and could support timely implementation of appropriate interventions associated with reducing transfer rates.

Introduction

Birth centres (BC) either as in-hospital, free standing or alongside units are facilities which provide midwifery care for women with uncomplicated, low risk pregnancies. In Brazil, the opening of BCs has been regulated by the Ministry of Health since 1998 (Brazil, 1999) as part of a strategy to support physiological birth. The in-hospital BC is the most common model of birth facility in Brazil for low risk pregnancies.

Internationally, birth centres have been promoted as a model of care to support spontaneous birth, continuity of care and woman-centred care. Evidence from systematic reviews and recently published cohort studies demonstrates that women who give birth in a non-obstetric setting are more likely to have spontaneous vaginal birth and lower rates of intervention, including instrumental birth, episiotomy, oxytocin augmentation and epidural analgesia (Walsh and Downe, 2004; Hodnett et al., 2010;

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Overgaard et al., 2011; Birthplace in England Collaborative Group, 2011; Cheung et al., 2011).

Neonatal and perinatal outcomes of births outside of obstetric settings are still contentious for primiparous women. A recent large prospective cohort study from England, which included as the primary outcome a composite variable of perinatal mortality and intrapartum related neonatal morbidities reported that this outcome was more frequently observed among women having their first babies at home, when compared to those who gave birth in obstetric units (Birthplace in England Collaborative Group, 2011). These findings contrast with those from an earlier Australian cohort study (Tracy et al., 2007) which found that perinatal mortality in alongside birth centres was lower than that in hospitals, regardless of maternal parity.

If a woman booked to birth in a birth centre develops complications during her labour or birth or if there are any fetal or neonatal complications, it is recommended that the woman is transferred to an obstetric facility with obstetric, neonatal and anaesthetic care, with the relevant health-care professionals working together to provide appropriate and timely care (World Health Organisation, 2007). Studies have reported that premature rupture of membranes, labour dystocia, meconium stained amniotic fluid and fetal distress are common reasons for these intrapartum transfers (Fullerton et al., 1997; David et al., 2006; Nguyen et al., 2009; Laws et al., 2011). Because of the potential need to transfer, support for birth in settings outside of the hospital remains controversial, especially with regard to implications for the safety of women and neonates. Adverse events can occur in the intrapartum or postpartum period, despite careful evaluation of a woman during pregnancy and at the commencement of her labour to ensure she meets criteria to give birth in a birth centre. The time required for transfer or the distance to the referral centre could delay urgent interventions, such as emergency caesarean sections and newborn resuscitation (Overgaard et al., 2011). Furthermore, the situation may be complicated by a lack of cooperation or poor communication between the hospital and staff in the non-obstetric setting (David et al., 2006).

In this context, women using these services and who require transfer represent a potential 'at risk' group. David et al. (2006) in a German study which compared outcomes of 366 women transferred from birth centres and 92,756 women who gave birth in a BC or hospital reported that more than 40% of women who were transferred in labour had an operative birth and of these, 9.4% of the babies required admission to a neonatal unit. Despite the fact that an increased number of interventions during labour and birth are associated with intrapartum transfers from a BC to a hospital, no studies have analysed factors associated with these events, which require in-depth investigation. This study aimed to identify the factors associated with intrapartum transfers from a FBC to the referral hospital.

Methods

Study design

A case-control study was conducted, using retrospective data collected from March 2002 to December 2009 inclusively. This study design was selected as it is suitable to investigate the prevalence of relatively rare events, such as maternal transfer. Case-control studies are also particularly useful to investigate multiple risk factors for the outcome of interest (Hennekens and Buring, 1987a).

Study setting

The study was conducted at the Sapopemba FBC, São Paulo, Brazil. Arrangements were in place at the FBC to transfer women who required medical support to the referral hospital, the State Hospital of Vila Alpina (Hospital Estadual de Vila Alpina – HEVA). Both health facilities are within the Brazilian public health system (SUS – Sistema Único de Saúde) which provides health-care free at the point of access.

The Sapopemba FBC is based in the south-eastern region of São Paulo city and located 4 km from the referral hospital. It was opened in September 1998 to assist pregnant women whose care was provided as part of the Family Health Programme of the Brazilian Health System. Most of the women who use the FBC are referred there from their local health clinic where they will receive antenatal care prior to being referred to the birth centre, with referrals made by nurses and doctors. Planned care at the FBC commences during the 37th week of a woman's pregnancy, with an appointment with the obstetric nurse to enable the woman's pregnancy and pregnancy history to be assessed and to check that there are no potential complications which would require obstetric input. Hypertension and cardiac disease are examples of conditions which would require obstetric referral. These appointments also have the objective of allowing women to become acquainted with the staff and care offered within the FBC. Weekly appointments at the FBC are scheduled up to the 40th week of pregnancy and every 2–3 days after the 41st week of pregnancy. After this, the woman is referred to the hospital nearest her home for an evaluation by an obstetrician. The FBC service is available to women 24 hrs a day, so they can be admitted or call the unit at any time. At each contact at the FBC, the woman will be seen by a nurse midwife and information on the process of labour and birth, abnormal symptoms, breast feeding and newborn care are offered. If complications requiring medical attention are identified, the woman is referred to the hospital. Following birth in the FBC, women are referred back to the community clinic and she and her baby are followed for a month by the same FBC staff.

Care in the FBC is exclusively provided by nurse midwives, supported by auxiliary nurses. A supportive and holistic approach to birth is the overriding philosophy of the centre. All women are encouraged to mobilise and adopt active non-supine positions during labour and birth, and non-pharmacological methods for pain relief are offered, including immersion baths and massages. Cardiotocography is performed on all women on admission to the FBC and before transferring the woman to the hospital. During the labour, intermittent auscultation of the fetal heart is undertaken. Episiotomy and oxytocin infusion are used in the FBC, if indicated, in line with the FBC protocols. These are commonly performed interventions in Brazilian obstetric units (Diniz and Chacham, 2004). If a maternal or neonatal transfer is required, transport is provided by an ambulance specifically for the use of the FBC.

The HEVA is a tertiary hospital and a referral centre for high-risk pregnancies in the region. It has an in-hospital BC, a neonatal and adult intensive care unit and facilities for blood transfusion. Nurse midwives, obstetricians and paediatricians provide care in a multi-professional team practice.

Participants

The current study population included all intrapartum women who were booked to receive care at the FBC who were transferred to the referral hospital from March 2002 until December 2009 inclusively. Cases and controls were not matched, as these were based on women from the same population. The distribution of

potential confounders was therefore considered similar in both study groups (Hennekens and Buring, 1987b).

Cases included all women transferred to the hospital after admission to the FBC from March 2002 to December 2009. Controls included women from the same population (i.e., admitted in labour to receive birth care in the FBC) but not transferred to the HEVA during or after birth and whose infants had not been transferred. The number of controls was set as four to each case, as a larger number of controls would not have increased the study's statistical power to detect differences between case and control groups (Gail et al., 1976). The controls were randomly selected within the same year that the transfer occurred using a computer generated list.

Data collection

Data were obtained from the transfer register maintained at the FBC and from the maternal records held in the FBC by the lead author (FMBS) and a trained undergraduate nursing student, using a form specifically developed for this study. The same form was used to collate data for cases and controls, which included socio-demographic, antenatal care, obstetric history and admission data. Data collection was conducted from January to March 2010 in the FBC and from June to September 2010 in the hospital. The maternal transfers were identified on the maternal records of the FBC which are completed by the attending nurse midwife. Data were double entered in a database developed using the Epi-Data programme (www.epidata.dk), and validated to ensure consistency.

Dependent variable

Maternal transfers from FBC to HEVA were categorised as 'yes' or 'no' and formed the dependent variable.

Independent variables

Socio-demographic data

The following socio-demographic data were collected: maternal age, age at leaving full-time education, marital status, maternal occupation, area of residence, health-care provision and smoking.

Antenatal care, obstetric history and admission to the FBC

Data on antenatal care, relevant obstetric history and admission to the FBC included the following; parity, gestational age, number of antenatal contacts at the local clinic, number of antenatal contacts at the FBC, problems in pregnancy, cervical dilation on admission in labour and condition of the amniotic membranes on admission. Fundal height was measured to assess fetal size against gestation of pregnancy to identify potentially growth restricted or large for dates pregnancies (Martinelli et al., 2001). The data used for this assessment were obtained from the admission examination notes in the woman's records. This variable was categorised as normal (between the 10th and 90th percentiles of the curve), low (below the 10th percentile) and high (above the 90th percentile).

Problems in pregnancy comprised minor health problems that the women had experienced, including urinary infection and abnormal vaginal discharge. Data on these were obtained from the antenatal maternal records and first appointment data at the FBC.

Data analysis

Statistical analysis was conducted using SPSS version 17.0. Analysis of the factors potentially associated with intrapartum transfer was initially undertaken using the χ^2 test of association. Based on the results of the χ^2 tests, variables which reached $p < 0.20$ on univariate analysis were included in logistic regression analysis (Hosmer and Lemeshow, 2000). The variables were tested in order of decreasing statistical significance using a stepwise forward selection method. This approach was used because the outcome being studied was relatively new, important covariates were not well known and associations with the outcome were not well understood. A variable was kept in the final multiple model whenever it was statistically significant ($p < 0.05$). It was not possible to perform a sample size calculation due to the a lack of information on anticipated prevalence or odds ratios of factors associated with intrapartum transfer.

Ethical considerations

The study protocol was approved by the Ethics Committee of the Municipal Health Board of São Paulo (Process number 223/2006/CEP/SMS) for data collection in the FBC and by the HEVA Ethics Committee in Research for the data collection in the hospital (Protocol number 03/2010). All maternal data were anonymised and the Ethics Committee accepted that it was not necessary to obtain women's consent to use their data.

Findings

During the study data collection period there were 111 maternal transfers from the FBC to the referral hospital in the intrapartum period, among 2,736 women who were admitted for intrapartum care (a transfer rate of 4.0%). Four controls (non transferred women) for each 'case' (woman transferred) were identified, in the same year during which the transfer had occurred. As some controls might have to be replaced (as a woman who was postpartum or a woman whose infant was transferred may have been randomly assigned as a control), more controls were included for each year. This resulted in 456 controls, with 12 additional controls which would not influence outcomes of statistical analysis.

In the initial selection of control cases, a woman with a pregnancy gestation of 36 weeks had been included in error. Although she was not eligible to be admitted to the FBC due to prematurity, she had arrived at the Centre in the second stage of labour and proceeded to give birth. Her data were excluded however, leaving 455 women as controls, whose data were analysed with data from the 111 transferred women (Fig. 1).

Univariate analysis was performed on cases and controls to identify a possible relationship between the independent and dependent variables. Results are presented by socio-demographic characteristics (Table 1) and antenatal care, obstetric history and condition on admission to the centre (Table 2). Compared with non-transferred women, women who were transferred in the intrapartum period were more likely be older than 35 years, to not have a partner, to be employed, to be nulliparous, to have attended the FBC on five or more unscheduled occasions (this included the admission in labour as well) and to be admitted in the FBC with a cervical dilation up to 3 cm. On the other hand, women who had a low match between gestational age and fundal height were less likely to be transferred (Tables 1 and 2).

Factors associated with maternal transfer

The following factors were identified amongst the independent variables using multivariate analysis; nulliparity, number of antenatal appointments in the FBC, cervical dilation on admission to the FBC and low correlation between fundal height and

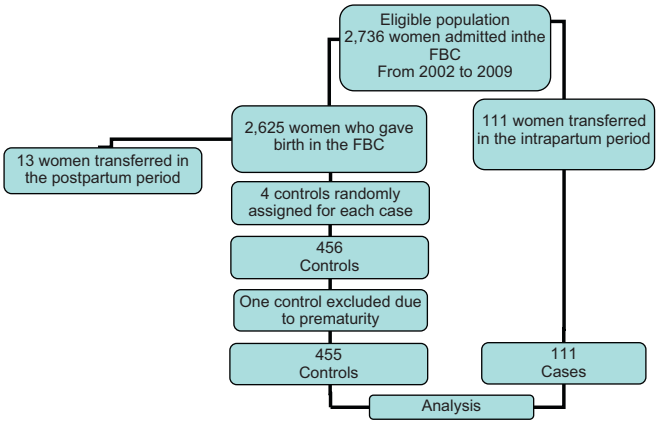

Fig. 1. Selection of cases and controls flowchart.

Table 1
Distribution (number and percentage) of transferred (cases) and not transferred (controls) women by socio-demographic characteristics.

Variable	Cases (women transferred)		Controls (women not transferred)		*p*-Value
	n	%	n	%	
Age (years)					
From 14 to 19	27	(24.3)	102	(22.4)	
From 20 to 34	72	(64.9)	333	(73.2)	
From 35 to 42	12	(10.8)	20	(4.4)	
Total	111	(100)	455	(100)	0.024
Education (years)					
From 1 to 3	3	(2.8)	18	(4.0)	
From 4 to 7	26	(24.3)	130	(28.6)	
From 8 to 11	68	(63.6)	286	(62.9)	
More than 11	10	(9.3)	21	(4.6)	
Total	107*	(100)	455	(100)	0.222
Marital status					
With a partner	79	(71.2)	392	(86.2)	
Without a partner	32	(28.8)	63	(13.8)	
Total	111	(100)	455	(100)	< 0.001
Occupation					
Unpaid	68	(61.8)	337	(74.6)	
Paid	42	(38.2)	115	(25.4)	
Total	110†	(100)	452‡	(100)	0.008
Catchment area					
Yes	80	(72.1)	350	(76.9)	
No	31	(27.9)	105	(23.1)	
Total	111	(100)	455	(100)	0.283
Health system					
Brazilian Health System	98	(90.7)	427	(94.1)	
Insurance or private	10	(9.3)	27	(5.9)	
Total	108‡	(100)	454†	(100)	0.212
Smoking					
No	90	(82.6)	363	(80.3)	
Yes	19	(17.4)	89	(19.7)	
Total	109§	(100)	452‡	(100)	0.685

Pearson's χ^2 test.

* 4 missing records.
† 1 missing record.
‡ 3 missing records.
§ 2 missing records.

gestational age all showed a statistically significant association with intrapartum transfer ($p < 0.05$).

Primiparity was highly associated with maternal intrapartum transfer, showing a five times higher chance of transfer. Maternal age over 35 years was also associated with a five times higher chance of transfer. A low match between fundal height and gestational age in weeks appeared to be a protective factor for transfer (the odds of a woman with low match were 0.3 times the odds of a transfer for a woman with a normal match). On the other hand, a high match between fundal height and gestational age in weeks did not represent increased odds for transfer (Table 3).

Women admitted to the centre with a cervical dilation of up to 3 cm had nearly twice the chance of transfer during the intrapartum period. Not having a partner represented nearly a three times greater chance of transfer. Women who attended the centre on between 5 and 12 unscheduled occasions antenatally had a four times greater chance than women who attended on four occasions or less of being transferred.

Table 2
Distribution (number and percentage) of transferred and not transferred women, by obstetric characteristics.

Variable	Cases (women transferred)		Controls (women not transferred)		*p*-Value
	n	%	n	%	
Nulliparity					
No	26	(23.4)	267	(58.7)	
Yes	85	(76.6)	188	(41.3)	
Total	111	(100)	455	(100)	< 0.001
Gestation					
37–40	99	(91.7)	414	(91.8)	
41–42	9	(8.3)	37	(8.2)	
Total	108‡	(100)	451§	(100)	0.965
Antenatal appointments (primary care unit)					
Up to 6	6	(5.9)	14	(3.1)	
7 or more	95	(94.1)	440	(96.9)	
Total	101**	(100)	454††	(100)	0.231
FBC appointments					
0	25	(23.4)	99	(21.8)	
From 1 to 4	57	53.3	317	(69.7)	
From 5 to 12	25	(23.4)	39	(8.6)	
Total	107§	(100)	455	(100)	< 0.001
Problems in pregnancy					
No	88	(79.3)	382	(84.0)	
Yes	23	(20.7)	73	(16.0)	
Total	111	(100)	455	(100)	0.259
Cervical dilation on admission					
1–3	58	(53.7)	121	(26.7)	
4–6	47	(43.5)	245	(54.0)	
7–10	3	(2.8)	88	(19.4)	
Total	108‡	(100)	454††	(100)	< 0.001
Amniotic membranes on admission					
Íntact	75	(68.2)	342	(77.0)	
Ruptured	35	(31.8)	102	(23.0)	
Total	110††	(100)	444***	(100)	0.064
FH* measure and GA†					
Normal	73	(74.5)	229	(54.7)	
Low	19	(19.4)	181	(43.2)	
High	6	(6.1)	9	(2.1)	
Total	98‡‡	(100)	419§§	(100)	< 0.001

Pearson's χ^2 test, FBC: Freestanding Birth Centre.

* FH: fundal height.
† GA: gestational age.
‡ 3 missing records.
§ 4 missing records.
** 10 missing records.
*** 11 missing records.
†† 1 missing records.
‡‡ 13 missing records.
§§ 36 missing records.

Table 3
Multiple logistic regression analysis of factors associated with intrapartum transfers.

Variable	Crude OR	CI 95%	*p*-Value	AdjustedOR	CI 95%	*p*-Value
Nulliparity						
No	1.0			1.0		
Yes	4.6	2.9–7.4	< 0.001	5.1	2.7–9.8	< 0.001
Maternal age						
14–19	1.2	0.7–2.0	0.423	0.6	0.3–1.2	0.179
20–34	1.0			1.0		
35–42	2.8	1.3–5.9	0.008	5.4	2.1–13.4	0.001
Partner						
Yes	1.0			1.0		
No	2.5	1.5–4.1	< 0.001	2.8	1.5–5.3	0.001
FH* measure and GA**						
Normal	1.0			1.0		
Low	0.3	0.2–0.6	< 0.001	0.3	0.2–0.6	< 0.001
High	2.1	0.7–6.1	0.175	2.1	0.6–7.2	0.235
Cervical dilation on admission						
1–3	2.5	1.6–3.9	< 0.001	1.9	1.1–3.2	0.021
4–6	1.0			1.0		
7–10	0.2	0.1–0.6	0.005	0.4	0.1–1.5	0.161
Number of appointments on FBC						
0	1.4	0.8–2.4	0.202	1.8	0.9–3.4	0.090
1–4	1.0			1.0		
5–12	3.6	2.0–6.3	< 0.001	3.8	1.9–7.5	0.001
0.5						

FBC: Freestanding Birth Centre.

* FH: fundal height.

** GA: gestational age.

Discussion

This case-control study sought to identify factors associated with intrapartum transfers to hospital from a free standing birth centre in the city of São Paulo, Brazil, highlighting socio-demographic, maternal and obstetric factors. The identification of these factors is essential to inform admission criteria and provide robust evidence based information for women who wish to give birth in a midwifery led birth centre, especially a free standing birth centre where obstetric support is not immediately available. In this study, nulliparity, maternal age ≥ 35 years, not having a partner, cervical dilation ≤ 3 cm on admission to the FBC, and attending for an unscheduled appointment on between 5 and 12 occasions were associated with transfer. In contrast, a low correlation between fundal height and pregnancy gestation appeared to be protective against transfer.

Nulliparity has been identified in several studies as a factor associated with maternal intrapartum transfer from a birth centre or home to hospital in the intrapartum period. A prospective cohort study from Denmark compared results of two FBCs and two hospital obstetric units. The intrapartum transfer rate from the birth centres was 11.5%, but primiparous women were transferred in greater numbers (36.7%) compared to multiparous women (7.2%) (Overgaard et al., 2011). An American study which included 84 BCs reported an intrapartum transfer rate four times higher among nulliparous compared with multiparous women (Rooks et al., 1992). The location of these facilities was not stated. Similar findings were reported in a trial of an in-hospital BC in Stockholm, Sweden, with 1,860 women, which showed an intrapartum transfer rate of 29.4% among nulliparous women, almost five times higher than among multiparous women (4.2%) (Waldenstrom et al., 1997). Findings from the FBC study in Germany reported earlier identified an intrapartum transfer rate of 14.4% among nulliparous women and 5.4% among multiparous (David et al., 2006). The results of the current study confirmed the findings of a previous descriptive study undertaken in the same birth centre which reported that 78.6% of the women transferred to the referral hospital were nulliparous (Bonadio et al., 2011).

Norwegian researchers who completed a two year prospective study of births in maternity homes (FBCs) reported lower rates of primiparous women requiring intrapartum transfer (36.2%) to hospital, but fewer primiparous women were admitted to the maternity homes in the first instance (11.2% of admissions were primiparous women and 88.8% multiparous, Schmidt et al., 2002). In a study which evaluated intrapartum transfers from FBCs in the USA, primiparous women had twice the odds of transfer during the antepartum and intrapartum periods (Nguyen et al., 2009), compared to multiparous women. This was lower than the findings of the present study in which nulliparous women had an almost six times greater odds of transfer than multiparous women. Nulliparous women might need a more careful approach when choosing to give birth at a FBC, considering the association of this variable with other variables. The approach might include earlier transfer from the FBC to the hospital, if problems arise during labour.

Older maternal age (35 years and older) represented an odds five times greater for transfer in the current study. Pregnancy in women over 35 years has been associated with poor obstetric outcomes, including increased infertility, miscarriage, chromosomal abnormalities, hypertensive complications and fetal death (Heffner, 2004), as well as increased risk for operative birth because of postulated deterioration in myometrial function (Jolly et al., 2000). A prospective cohort study from England reported that nulliparous women aged 35 years or over had 7.4 times the odds of transfer from a free standing midwifery unit (OR: 7.40; 95% confidence interval [CI]; 5.40–10.10), compared to multiparous women aged from 25 to 29 years (Rowe et al., 2012). However, a population-based Swiss study found no association between women aged over 39 years who had a planned home birth and intrapartum transfer (Lindgren et al., 2008).

In the current study, not having a partner was an independent factor for intrapartum transfer, despite the small number of women included in this category. These findings contrast with those of the aforementioned English cohort study, in which single or unsupported women were less likely to be transferred from a free standing midwifery unit to the hospital (OR 0.68, 95% CI: 0.48–0.96) (Rowe et al., 2012). Having a partner may indicate social structure and support for women, although a recent case-control study from Israel did not detect differences in birth outcomes between married and unmarried women (who were assumed to have no partner, Lurie et al., 2010).These results contrast with a Finnish study which found that women who did not have a partner were more likely to experience adverse pregnancy outcomes including perinatal death, preterm and low birthweight infants. Women who had a partner but were unmarried had more low birthweight infants when compared to married women, but had similar rates of preterm infants and perinatal deaths (Manderbacka et al., 1992).

Women who are not currently in a relationship or in a poor quality relationship with their partner could experience other potential adverse health impacts. A study of the impact of the quality of relationships of unmarried pregnant women on their behaviour and obstetric outcomes observed that women who reported their relationships as poor had more depressive symptoms, stress, drug use and smoking (Bloch et al., 2010).

In our study, outcomes of the assessment of fundal height by gestational age, suggested that a potential macrosomic infant, did not represent an increased odds for intrapartum maternal transfer. This could be explained by the fact that no women in this population was at risk of gestational diabetes, as all were screened in pregnancy. Moreover, an increased fundal height

could represent a slightly increased amount of amniotic liquid and not a macrosomic fetus. On the other hand, a low correlation between fundal height and gestational age, which might suggest intrauterine growth restriction, appeared to be protective against intrapartum transfer, in the present study. This clinical indication has been associated with complications such as low Apgar scores, seizures in the second day of life, especially for fetuses with weight below the 75th percentile (McIntire et al., 1999), and risk for meconium aspiration (Bernstein et al., 2000). However, a systemic review which included data from one trial with 1,639 women found no difference between the use of symphysis-fundal height measurements and palpation to detect complications associated with fetal growth restriction ('IUGR') or macrosomia (Neilson, 2002).

The admission of women to the FBC with cervical dilation up to 3 cm was associated with a two times greater odds for intrapartum transfer. The reasons why these women were admitted to the FBC in early labour could be gestational age greater than 41 weeks or premature rupture of amniotic membranes, but these variables were not independent factors for intrapartum transfer. Birth centre staff discusses with women how they will manage early admission, including the timing of reassessment of progress of labour. This is implemented when the initial assessment indicates that labour has yet to become established, for example in the case of a primiparous woman who has a cervical dilation of 3 cm but with little effacement, and sporadic uterine contractions. In this situation, the woman may benefit from waiting at the centre for a few hours prior to further examination (Austin, 1996). Information for pregnant women on sign and symptoms of labour, and how to cope in early labour offered during antenatal appointments and telephone contacts could also offer reassurance (Barnes and Dossey, 1999).

A systematic review which included data on 209 women showed that programmes which sought to delay the admission of woman to intrapartum care during the active phase of labour, resulted in less time spent in the labour ward (OR 5.20 hrs; 95% CI 7.06, 3.34), less use of oxytocin during labour (OR 0.45; 95% CI 0.25, 0.80) and less use of analgesia (OR 0.36; 95% CI 0.16, 0.78) (Lauzon and Hodnett, 2004). It could be postulated that the admission of women in the early phase of labour may increase maternal and family anxiety about the outcome of labour.

Women who sought FBC care more frequently (i.e. five or more unscheduled antenatal contacts) had a higher chance of intrapartum transfer in the current study. This higher number of antenatal visits could be a benchmark for maternal anxiety, which can be associated to problems during labour. One study which included 1,495 women reported that a higher number of antenatal visits was associated with maternal depression or anxiety, with women identified with these symptoms having more planned c-sections (odds ratio 1.76; CI 95% 1.05–2.93) and epidural analgesia (odds ratio 1.56; CI 95% 1.08–2.56) in their labours (Andersson et al., 2004). This is an area of care which would benefit from further research.

The variables used in the current study provided information on maternal demographic and clinical characteristics associated with intrapartum transfers in one BC in Brazil. The generalisability of these findings is limited by the fact that maternal transfers, as with other obstetric events, may have different risk factors across and within countries, reflecting differences in staffing, the organisation, context and funding of care as well as women's choices. These could all influence the outcomes of transfer and would have to be carefully considered.

The use of a case-control approach in the current study was appropriate to inform the identification of independent factors associated with intrapartum transfer, based on robust approaches to analysis. The fact that the cases were from a clearly defined population and the controls were from the same population of cases decreased the possibility of selection bias, which is the biggest problem associated with this type of study (Hennekens and Buring, 1987b).

The retrospective data collection was impaired by the poor quality of some maternal records which may have introduced bias, especially among variables such as fundal height and cervical dilatation which depend on the clinical skills, competencies and interpretation of findings by a range of clinical staff. However, considering the importance of including the largest possible number of transfers, a prospective study design would not have been feasible within the time available to complete the research, because of the low number of transfer events.

In this study, we observed that intrapartum transfer, although it could be determined by a single factor during labour, could also be influenced by factors which may be present on admission of the women to the centre. Clinical decision making is complex and may have to take account of a number of complications, such as the presence of meconium stained amniotic fluid, abnormalities in the fetal heart rate and phase of the labour (Rooks et al., 1992). To be aware of potential factors associated with transfer prior to labour may assist clinical decision making about need for intrapartum transfer, as well as support evidence based information provision when discussing the most appropriate place to give birth with a woman and her family.

Although the findings of the current study have reported a very low maternal transfer rate, identifying factors associated with maternal transfer will contribute to further refining criteria for admission of women to free standing birth centres, and identify cases which may face potential complications. The low intrapartum transfer rate might be due to the strict admission protocol of the FBC. Further large cohort studies are needed to compare the outcomes of labour among low risk mothers who birth in non-obstetric settings in a range of countries, similar to the one recently carried out in England (Birthplace in England Collaborative Group, 2011).

Conflict of interests

The author RHO was the founder of the Birth Centre where this study was carried out.

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