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RESEARCH IN BRIEF

A risk model to predict probability of maternal intrapartum transfers from a free-standing birth centre: PROTRIP tool

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Aims

To generate a clinical model to assess the risk of intrapartum transfer in women who were admitted to a free-standing midwifery-led birth centre, using associated factors previously identified in a case–control study (da Silva *et al.* 2012).

Background

Birth care in out-of-hospital clinical settings, including alongside and free-standing midwifery-led birth centres, is a controversial topic internationally, especially with respect to issues of safety. A number of studies conducted in different country settings have found that maternal and neonatal outcomes following birth to low-risk women in out-of-hospital settings led by midwives are generally favourable when compared to results obtained from obstetric-led units (Birthplace in England Collaborative Group 2011). Notwithstanding, women who chose to give birth at these facilities and who need to be transferred to the obstetric unit represent a potential at-risk group in a population of low-risk women. Intrapartum transfers from midwifery-led birth centres have been associated with higher rates of Caesarean sections, operative vaginal births, episiotomy, lower infant Apgar scores at five minutes, higher number of infants with arterial cord blood pH values <7·10 and a higher number of infants admitted to neonatal intensive care unit (NICU) (David *et al.* 2006, Overgaard *et al.* 2011).

Few studies have investigated the outcomes of maternal transfers from birth centres, and no risk models have been identified in this area of health care. This is despite risk models being increasingly used in other areas of health, as care becomes more tailored to individual characteristics and needs. There is potential for an evaluation tool to be used when the woman arrives at the birth centre, as it will be based on her clinical presentation on admission, her pregnancy and previous medical history.

What does this paper contribute to the wider global clinical community?

- A risk model can be used as a tool, available online, into which the professional at the birth centre enters the woman's characteristics to obtain the probability of transfer during the intrapartum period.
- Estimating the probability of transfer at the admission in a birth centre could be useful when discussing the most appropriate place to give birth with the woman and her family.

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Methods

Data on 2726 women who gave birth in one free-standing birth centre (FBC) in Sao Paulo, Brazil, from March 2002–December 2009, with an overall transfer rate of 4·1%, were included in the case–control study. The birth centre is integrated with the Brazilian Health System and located in the city of São Paulo, Brazil. Care in the birth centre is provided by nurse-midwives. All women and/or their infants who require medical intervention are transferred to a tertiary hospital, located eight minutes drive from the birth centre (approximately 4 km), in an ambulance specifically available to the birth centre. Approval from ethics committee was obtained to undertake the study (Process number 223/2006/CEP/SMS).

Variables of interest included socio-demographic data, antenatal care, obstetric history, clinical findings on admission to the birth centre in labour, data on progress during labour, mode of birth and postnatal recovery of the woman and her infant. Logistic regression analysis with intrapartum transfer as the dependent variable was undertaken to identify variables associated with this event, with a *p*-value set as 0·05, using the SPSS statistical package, version 17 (SPSS Inc., Chicago, IL, USA).

For the computational implementation of the risk model, we developed a tool called PROTRIP (PRObability of TRansfer in Intrapartum Period). Prior to compute the probability, the program needs to determine the result of the correlation between the fundal height and the gestational age, which could be a normal, low or high. The core of this last calculation is codified in the header mbz_table.h, which is basically an implementation of the 10th and 90th percentiles for fundal height for the gestational age, based on a Brazilian population of women between 20–42 weeks of gestation (10). An advantage of the fact that the MBZ table is implemented as a header is that this flexible design allows the table to be revised as relevant for other populations (as the MBZ table is Brazilian specific) by replacing the header before compilation.

The suite includes an easy-to-use Web interface, which uses protrip.c as the back-end program. The Web interface is targeted at clinicians, and it is available at: [http://143.107.59.106:9620/camille/ProTrip/clear.php].

Results

We have built an online interface to be used by clinicians when examining the woman at a free-standing birth centre. Examples of simulations using the PROTRIP tool are shown in Table 1. These simulations are based on clinical situations, and one of the advantages of this tool is providing the interaction that occurs between the variables, that is, the characteristics of women who are to be admitted in a birth centre.

Table 1 Results from simulations with the tool PROTRIP. Sapopemba birth center (SBC) Sao Paulo, Brazil, 2013

	Probability of transfer in the intrapartum period			
Variables	98·7%	37·1%	21·5%	1·3%
Number of appointments on SBC	5	2	3	3
Number of previous births	0	0	0	2
Maternal age (years)	35	22	24	32
To have a partner	No	No	Yes	Yes
Dilation upon admission on SBC (cm)	2	5	4	6
Gestational age (weeks)	38	39	40	39
Fundal height (cm)	36	33	34	32
Newborn weight (g)	4·000	3·000	–	3·000

The identification of risk factors is essential to appropriately identify women at the onset of labour who are likely to complete labour and give birth in a free-standing birth centre. All birthing women included in this study were classed as low risk on admission to the FBC. In this case–control study, the outcomes of which informed the PROTRIP tool, we observed that intrapartum transfer, which could potentially be determined by a single factor during labour, is also influenced by a number of factors that may be identified when a woman is admitted in labour. The clinical decision regarding the transfer is complex and often determined by a combination of factors, such as the presence of meconium-stained amniotic fluid and abnormalities in foetal heart rate. The phase of the labour during which the potential problem was identified can also influence the clinician's decision.

Conclusions

The capacity of this tool to lower the rates of intrapartum transfers from birth centres requires larger-scale evaluation, preferably across different birth centres and populations. Further research is required for establishing a 'cut-off point' on which the probability of transfer identified in the PROTRIP tool is optimal to support a clinical decision of transfer.

Relevance to clinical practice

This risk model can be used as a tool, available online, into which the professional at the birth centre enters the

woman's characteristics to obtain the probability of transfer during the intrapartum period. To know this probability could also be useful when discussing the most appropriate place to give birth for the woman and her family.

Key words

birth centres, labour, maternal health, maternal transfers, risk model

Disclosure

The authors have confirmed that all authors meet the ICMJE criteria for authorship credit (www.icmje.org/ethical_1author.html), as follows: (1) substantial contributions to conception and design of, or acquisition of data or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content and (3) final approval of the version to be published.

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Conflict of interest

The authors have no conflict of interest to disclose.

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