

Significant differences in cesarean section rates between a private and a public hospital in Brazil

Diferença notável nas taxas de parto cesariano em hospital público e hospital privado no Brasil

Sueli de Almeida ¹
 Heloisa Bettiol ¹
 Marco Antonio Barbieri ¹
 Antônio Augusto Moura da Silva ²
 Valdinar Sousa Ribeiro ³

Abstract

This paper evaluates the association of maternal variables and of variables related to prenatal and delivery care with cesarean sections at a public and at a private maternity. A retrospective cross-sectional study was performed at a public maternity clinic (2,889 deliveries) and at a private maternity clinic (2,911 deliveries) in the city of Ribeirão Preto, São Paulo State, Brazil. The prevalence of cesarean sections was 18.9% at the public maternity clinic and 84.3% at the private one. The factors associated with cesarean sections at both hospitals were: mothers from other cities, aged ≥ 25 years and with hypertension. Having more than one child was a protective factor. At the public hospital, cesarean sections were more frequent on Wednesdays and from 12:00 to 23:59 hours of any day of the week, whereas at the private hospital they occurred on any day, though were less common on Sundays, and at any time except in the early morning. At the private hospital, cesarean sections were more frequent when performed by the doctor who had provided the prenatal care. Non-medical factors were more associated with cesarean sections in the private maternity clinic than biological or clinical factors related to pregnancy.

Cesarean Section; Prenatal Care; Maternal Age; Maternity Hospitals

Introduction

Evidence suggests that the rates of cesarean section are high in developing countries and are increasing, with wide variation between countries and between regions of the same country ^{1,2}. They are also influenced by the type of financing provided for the event ³. These factors call for a debate about what would be the appropriate rate for providing quality care to pregnant women. In 1985 the World Health Organization (WHO) suggested that the rates of cesarean section should not exceed 15%, since no additional benefit for the newborns or for the mothers is obtained beyond this level on the basis of what is observed in developed countries ⁴. On the other hand, a rate of less than 5% would reflect difficulty in access to adequate treatment ⁵.

Brazil has cesarean section rates of more than 35% ² with unequal distribution in the population as a function of better access to medical technology due to social conditions or of the source of financing. Values exceeding 90% ^{6,7} are reached in some cities when only private hospitals are considered, suggesting that surgical interventions may be determined by the factors cited above ^{3,8}. In the South of Brazil, the rate of cesarean sections was higher among primiparae and among women with a higher purchasing power, higher educational level, and those who received at least seven prenatal visits ⁹.

¹ Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo, Ribeirão Preto, Brasil.

² Departamento de Saúde Pública, Universidade Federal do Maranhão, São Luís, Brasil.

³ Departamento de Pediatria, Universidade Federal do Maranhão, São Luís, Brasil.

Correspondence

H. Bettiol
 Departamento de Puericultura e Pediatria, Faculdade de Medicina de Ribeirão Preto, Universidade de São Paulo.
 Av. Bandeirantes 3900, Ribeirão Preto, SP
 14049-900, Brasil.
 hbettiol@fmrp.usp.br

In Ribeirão Preto, São Paulo State, Brazil, one of the most prosperous cities in Southeastern Brazil, a high rate of cesarean sections was observed in association with private care³, with a given time of day (19:00h to 24:00h), with delivery performed by the same doctor who provided prenatal care, and with a larger number of prenatal visits⁸.

In view of the great disparity of the rates of cesarean sections in Brazil between public and private maternity clinics³, the objective of the present study was to evaluate the association of maternal variables and of variables relating to prenatal and delivery care with cesarean delivery, in the context of a public maternity clinic and a private one with highly discrepant rates of cesarean sections. The hypothesis was that obstetrical practice is influenced by factors not directly related to health needs.

Material and method

A cross-sectional study was conducted with retrospective data collection. In 1999, the city of Ribeirão Preto had a population of 495,794, with 10 hospitals covering almost all of the 8,330 births for that year (only 1.1% of the deliveries occurred at home or on the way to a hospital)¹⁰.

The study population consisted of all mothers of liveborn singletons delivered from January 1st to December 31, 1999 at two maternity clinics that attend populations with very different socio-economic profiles: a public maternity clinic attending pregnant women with low purchasing power and of low risk, and a private maternity attending middle- and upper-class pregnant women. Seventy percent of the 1999 births in the city occurred at these two maternity clinics (5,800 deliveries).

The information was collected retrospectively from the medical records of the pregnant women, from the delivery registry books at the obstetrical centers of the two maternity clinics and from the Liveborn Birth Certificates in order to complete some information that was not available in the medical records.

The public maternity clinic is located in a peripheral neighborhood where no other hospital services are available and represents a reference service for the care of pregnant women with lower access to consumer goods across a large region of the city. In the routine of this hospital, all deliveries are performed by medical students and resident doctors (on duty physicians) under the supervision of the Medical School of a public university and of assistant physicians connected to the University Hospital of the same Medical

School. These pregnant women received prenatal care from other physicians at health stations in the public network. Since these stations and the public maternity clinic do not provide care for high-risk pregnant women, these women are referred to other hospitals, mainly the Tertiary University Hospital. However, the high-risk births belonging to the geographic area covered by this maternity clinic were also included in the present series by consulting medical records in hospitals and the Liveborn Birth Certificates at the places where the deliveries were performed.

At the private maternity clinic, the pregnant woman delivers under the care of her physician (a private doctor or a doctor from the medical insurance program) who provided prenatal care and who performs the delivery, except for emergency cases, which are attended by the obstetrician on duty. This maternity also attends high-risk pregnancies and is located in a middle class neighborhood in the municipality.

A descriptive analysis using frequency tables was carried out to characterize the newborns and their mothers. The chi-square test was used to determine an association or to compare proportions between characteristics at the two maternity clinics, with the level of significance set at $p < 0.05$. The crude relative risk (RR) and the 95% confidence intervals (95%CI) were calculated for the study of the factors associated with the risk of cesarean section at each hospital, followed by adjusted analysis by multiple Poisson regression using a robust adjustment of the standard errors with backward elimination of the variables. All statistical analyses were performed using the Stata 8.0 software (Stata Corp., College Station, USA). The following independent variables were used in univariate analysis: origin (Ribeirão Preto or another city), area (urban and rural), parity (1, 2, 3, 4 and more), maternal age (less than 20, 20-24, 25-29, 30-34, and 35 years old and over), marital status (with and without a partner), schooling (less than 8, 8-11, and 12 or more years of study), number of prenatal visits (less than 6, 6 or more), day of the week and time of day when delivery occurred (0:00h to 5:59h, 6:00h to 11:59h, 12:00h to 17:59h, and 18:00h to 23:59h), maternal infection (yes or no), arterial hypertension (yes or no), previous abortion/miscarriage (yes or no), and doctor who performed the delivery (private – the same doctor who provided prenatal care and performed the delivery – and doctor on duty). The same variables as described above were included in the adjusted model even when they were not associated with cesarean section in the non-adjusted analysis, so that they could be controlled in terms of a potential confounding effect.

The Clinical Directors of the hospitals involved were consulted before the beginning of the study in order to obtain their consent for consultation of the pregnant women's medical records, of the delivery registration books of the obstetrical centers and of the Liveborn Birth Certificates filed in the services. Anonymity was guaranteed to all patients. The study was approved by the Research Ethics Committee of the University Hospital, Faculty of Medicine of Ribeirão Preto, University of São Paulo (process n°. HCRP 8861/2001).

Results

A total of 5,800 deliveries of liveborn singletons were investigated, 2,889 (49.8%) of them at the public maternity clinic, where the cesarean rate was 18.9%, and 2,911 (50.2%) at the private clinic, where the cesarean rate was 84.3%.

With respect to the characteristics of the population studied, most of the pregnant women who attended both the public and private maternity clinics were residents of Ribeirão Preto (78.7% vs. 70.2%) and lived in the urban zone (96.5% vs. 98.9%). At the public maternity clinic, the prevalence of adolescent mothers was five times higher (27.6% vs. 5.4%), with a lower proportion of mothers aged 30 years or more (16.9% vs. 42.2%), a greater proportion of mothers with low levels of schooling (77.9% vs. 19.4%), a lower proportion of mothers with schooling ≥ 12 years (0.8% vs. 29.5%), and a greater proportion of women with no partner (68.3% vs. 15.3%) and of multiparous women (16.4% vs. 4.1%). Among the maternal diseases, a history of infections (4% vs. 1%) and of previous abortion/miscarriage (15.7% vs. 6.4%) also prevailed at the public maternity clinic. Only arterial hypertension (4.5% vs. 6%) prevailed among the pregnant women attended at the private maternity clinic (Table 1).

Regarding the profile of care during pregnancy and delivery, we observed that at the public maternity clinic more than one third of the pregnant women had not completed six prenatal visits (38% vs. 5.7%) and all the deliveries were performed by the doctor on duty, whereas at the private clinic 95.9% of the deliveries were performed by the same doctor who had provided prenatal care. At the public maternity clinic the frequency of events was similar on the seven days of the week, with a small variation of 13.3% to 15.2%, whereas at the private maternity clinic there was a greater concentration on week days, with a marked fall on Saturdays (10.4%) and Sundays (5%). Regarding the time of day, there was a more uniform distribution along the periods, ranging from 23.7% to 26.4% at the public mater-

nity clinic, whereas at the private one there was a marked decline during the period from 0:00h to 5:59h (10.4%) and an increase during the period from 18:00h to 23:59h (36.2%) (Table 2).

When using models adjusted for the variables associated with cesarean section at the public maternity clinic, a higher risk was observed for women from other cities (RR = 1.41; 95%CI: 1.12-1.78), aged 25-29 (RR = 2.37; 95%CI: 1.55-3.62), 30-34 (RR = 2.88; 95%CI: 1.79-4.64) and 35 years or more (RR = 3.65; 95%CI: 2.13-6.25), women with arterial hypertension (RR = 2.43, 95%CI: 1.58-3.73), and women delivering on Wednesdays (RR = 1.55; 95%CI: 1.10-2.19) between 12:00h and 17:59h (RR = 2.02; 95%CI: 1.51-2.70) and between 18:00h and 23:59h (RR = 1.83; 95%CI: 1.36-2.47). A number of children equal to 2 (RR = 0.64; 95%CI: 0.48-0.85) or ≥ 4 (RR = 0.61; 95%CI: 0.42-0.86) was a protective factor (Table 3).

At the private maternity clinic, adjusted analysis showed a higher risk for pregnant women from other cities (RR = 1.46; 95%CI: 1.14-1.87), aged 25-29 (RR = 2.43; 95%CI: 1.19-4.94), 30-34 (RR = 2.72; 95%CI: 1.32-5.59) and 35 years or more (RR = 3.77; 95%CI: 1.75-8.11), with arterial hypertension (RR = 5.26; 95%CI: 2.29-12.10), who delivered on any day of the week except Sunday (RR ranging from RR = 1.68; 95%CI: 1.08-2.60 to RR = 2.71; 95%CI: 1.69-4.32). Having more than one child was a protective factor (RR ranging from RR = 0.47; 95%CI: 0.34-0.68 to RR = 0.64; 95%CI: 0.50-0.82). However, an association with cesarean delivery was observed in situations in which the same doctor provided prenatal care and performed the delivery (RR = 1.74; 95%CI: 1.07-2.84). Only deliveries in the early morning (0:00h to 05:59h) were not associated with a higher proportion of cesarean sections, whereas deliveries performed during the period from 6:00h to 23:59h had a higher chance of being cesarean sections (RR ranging from RR = 2.37; 95%CI: 1.73-3.26 to RR = 3.23; 95%CI: 2.26-4.63) (Table 4).

Discussion

The rate of cesarean delivery was 4.4 times higher at the private hospital than at the public one. Mothers from other municipalities, aged 25 or more and with arterial hypertension were more exposed to this surgical intervention at both hospitals. At the private hospital, cesarean delivery was performed at any time of day except the early morning and was more frequent when the same doctor had provided prenatal care and performed the delivery.

Among the limitations of the present study, we point out the absence of clinical data and the

Table 1

Characteristics of mothers attended at public and private maternity clinics. Ribeirão Preto, São Paulo State, Brazil, 1999.

Characteristics	Public maternity clinic		Private maternity clinic		p
	n	%	n	%	
Origin					< 0.0001
Ribeirão Preto	2,275	78.7	2,043	(70.2)	
Other cities	614	21.2	868	868 (29.8)	
Area					< 0.0001
Urban	2,776	96.5	2,880	98.9	
Rural	102	3.5	31	1.1	
Age (years)					< 0.0001
11 - 20	794	27.6	158	5.4	
20 - 25	973	33.9	580	19.9	
25 - 30	624	21.6	947	32.5	
30 - 35	319	11.1	811	27.9	
≥ 35	164	5.8	415	14.3	
Marital status					< 0.0001
With a partner	919	31.7	2,450	84.7	
Without a partner	1,979	68.3	443	15.3	
Schooling (years)					< 0.0001
< 8	2,250	77.9	565	19.4	
8 -12	483	16.7	970	33.3	
≥ 12	23	0.8	860	29.5	
No information	133	4.6	515	17.7	
Parity					< 0.0001
First	1,181	41.0	1,451	50.1	
Second	716	24.9	995	34.3	
Third	511	17.7	327	11.5	
Fourth or more	472	16.4	121	4.1	
Maternal diseases					
Hypertension					0.006
Absent	2,755	95.5	2,628	94.0	
Present	127	4.5	168	6.0	
Infections					< 0.0001
Absent	2,762	96.0	2,796	99.0	
Present	116	4.0	27	1.0	
Previous abortion/miscarriage					< 0.0001
Absent	2,432	84.3	2,699	93.6	
Present	454	15.7	185	6.4	
Total	2,889	100.0	2,911	100.0	

Note: the total may be different for each variable because the "no information" category was excluded from the table when it was less than 10%.

fact that this was a retrospective study, with no interviews with the mothers or the obstetricians and with the data being collected from the medical records and from the Liveborn Birth Certificates. These sources are often incomplete or do not reflect reality, especially regarding the medical recommendation for surgery. Similarly, some factors that favor cesarean sections, recognized in the literature, usually are not included in these

databases, such as previous cesarean section and opinion of the pregnant women about the form of resolution of their pregnancy. The medical characteristics regarding specialization and time of professional activity were not evaluated. However, the available variables revealed important aspects related to the execution of cesarean sections not explained by medical recommendations.

Table 2

Characteristics of prenatal and delivery care at public and private maternity clinics. Ribeirão Preto, São Paulo State, Brazil, 1999.

Variables	Public maternity clinics		Private maternity clinics		p
	n	%	n	%	
Prenatal visits					< 0.0001
< 6	1,099	38.0	166	5.7	
≥ 6	1,715	59.4	2,425	83.3	
No information	75	2.6	320	11.0	
Type of delivery					< 0.0001
Vaginal	2,341	81.1	455	15.7	
Cesarean section	547	18.9	2,439	84.3	
Delivering doctor					< 0.0001
Doctor on duty	2,885	100.0	116	4.1	
Private doctor	0	0.0	2,718	95.9	
Day of the week					< 0.0001
Sunday	407	14.1	172	5.0	
Monday	395	13.7	508	17.5	
Tuesday	383	13.3	469	16.1	
Wednesday	440	15.2	545	18.7	
Thursday	420	14.5	450	15.5	
Friday	419	14.5	463	15.9	
Saturday	425	14.7	304	10.4	
Time of day (hours)					< 0.0001
0:00 to 5:59	707	24.6	305	10.5	
6:00 to 11:59	682	23.7	892	30.7	
12:00 to 17:59	759	26.4	660	22.7	
18:00 to 23:59	726	25.3	1,054	36.2	
Total	2,889	100.0	2,911	100.0	

Note: the total may be different for each variable because the "no information" category was excluded from the table when it was less than 10%.

In the present study, particularly noteworthy was the high rate of cesarean sections at the private maternity clinic, four times higher than at the public clinic. This prevalence is exceptional even within the context of the high rates observed in Brazil¹, greatly exceeding what may be justified by recommendations based on scientific knowledge⁴. However, this prevalence is similar to that observed at private maternity clinics in the same city in the 1980s, which was more than double the prevalence observed at public maternity clinics¹¹.

The distribution of vaginal deliveries without a preferential day or time, in contrast to what occurs with cesarean sections, suggests that the latter are performed according to a previously made decision. At the private maternity clinic there is a reduction of the rate of deliveries on Saturdays and Sundays, as well as between 0:00h and 5:59h. At this maternity clinic there is also a greater in-

cidence of deliveries between 18:00h and 23:59h, after the end of the physicians' working day in their private offices, suggesting that non-medical factors predominate, as also observed in other Brazilian cities^{6,12}. In support of this finding, another study demonstrated that in Ribeirão Preto, as well as in the city of São Luís in Maranhão State, Northeastern Brazil, factors related to doctors and to health services have a greater explanatory power for the chance of cesarean section than maternal factors⁷.

On the other hand, there was a similar distribution of deliveries during the different days of the week, with a discrete increase of cesarean sections on Wednesdays and Saturdays at the public maternity clinic. This increase may be explained by the more interventional conduct of doctors on duty on these days, since these doctors have fixed days when they are on duty. The preference for the time of day between 12:00h and 23:59h may

Table 3

Adjusted and non-adjusted models for the variables associated with cesarean section at public maternity clinics. Ribeirão Preto, São Paulo State, Brazil, 1999.

Variables	n	%	Non-adjusted model		Adjusted model	
			RR	95%CI	RR	95%CI
Origin						
Ribeirão Preto	405	17.8	1.00	-	1.00	-
Other cities	142	23.1	1.38	1.11-1.72	1.41	1.12-1.78
Mother's age (years)						
11 18	48	12.5	1.00	-	1.00	-
18 20	63	15.4	1.27	0.85-1.91	1.50	0.98-2.30
20 25	158	16.2	1.36	0.96-1.92	1.62	1.10-2.39
25 30	149	23.9	2.20	1.54-3.14	2.37	1.55-3.62
30 35	78	24.5	2.27	1.52-3.37	2.88	1.79-4.64
≥ 35	49	29.9	2.94	1.90-4.69	3.65	2.13-6.25
Parity						
First	211	17.8	1.00	-	1.00	-
Second	109	15.2	0.82	0.64-1.06	0.64	0.48-0.85
Third	130	25.4	1.57	1.22-2.01	1.03	0.76-1.39
Fourth or more	96	20.3	1.17	0.89-1.53	0.61	0.42-0.86
Arterial hypertension						
Absent	498	18.2	1.00	-	1.00	-
Present	48	38.4	2.80	1.93-4.07	2.43	1.58-3.73
Day of the week						
Sunday	66	16.3	1.00	-	-	-
Monday	73	18.5	1.16	0.80-1.68	-	-
Tuesday	65	17.0	1.05	0.72-1.53	-	-
Wednesday	102	23.2	1.55	1.10-2.19	-	-
Thursday	80	19.0	1.21	0.84-1.73	-	-
Friday	70	16.7	1.03	0.71-1.49	-	-
Saturday	91	21.4	1.40	0.98-1.99	-	-
Time of day (hours)						
0:00 to 5:59	94	13.3	1.00	-	1.00	-
6:00 to 11:59	104	15.3	1.17	0.86-1.58	1.18	0.86-1.63
12:00 to 17:59	186	24.5	2.11	1.61-2.78	2.02	1.51-2.70
18:00 to 23:59	160	22.1	1.84	1.39-2.44	1.83	1.36-2.47
Previous abortion/miscarriage						
No	437	18.0	1.00	-	-	-
Yes	108	23.8	1.42	1.12-1.80	-	-

Note: the total may be different for each variable because the "no information" category was excluded from the table when it was less than 10%.

be related to the hours during which medical visits are held, always at the end of the morning, when decisions are made about conduct.

Regarding the clinical variables evaluated in the present study, associations were observed between arterial hypertension and a history of previous abortion/miscarriage (the latter only at the public maternity clinic) and the risk for a cesarean section, as also reported in the literature^{13,14}. However the risk of the occurrence of

surgical delivery among women without arterial hypertension was twice as high at the private maternity clinic, showing that other factors in addition to those that pose a risk to the health of the mother and of her child may mediate the recommendation for surgery.

The association between cesarean deliveries and older mothers agrees with what is found in other countries. This may result from the medical belief that older women are a risk group for com-

Table 4

Adjusted and non-adjusted models for the variables associate with cesarean section at private maternity clinics. Ribeirão Preto, São Paulo State, Brazil, 1999.

Variables	n	%	Non-adjusted model		Adjusted model	
			RR	95%CI	RR	95%CI
Origin						
Ribeirão Preto	1,680	82.9	1.00	-	1.00	-
Other cities	757	87.5	1.44	1.14-1.82	1.46	1.14-1.87
Maternal age (years)						
11 - 18	39	75.0	1.00	-	1.00	-
18 - 20	89	84.0	1.74	0.77-3.93	1.75	0.73-4.16
20 - 25	454	79.0	1.25	0.64-2.41	1.42	0.70-2.90
25 - 30	803	85.4	1.95	1.01-3.75	2.43	1.19-4.94
30 - 35	691	85.4	1.95	1.01-3.76	2.72	1.32-5.59
≥ 35	363	88.0	2.46	1.23-4.94	3.77	1.75-8.11
Parity						
First	1,239	86.1	1.00	-	1.00	-
Second	823	83.1	0.80	0.64-0.99	0.64	0.50-0.82
Third	264	80.7	0.68	0.49-0.92	0.47	0.34-0.68
Fourth or more	97	81.5	0.71	0.43-1.16	0.52	0.30-0.89
Arterial hypertension						
No	2,174	83.3	1.00	-	1.00	-
Yes	161	96.4	5.30	2.36-12.2	5.26	2.29-12.10
Day of the week						
Sunday	122	71.4	1.00	-	1.00	-
Monday	415	82.2	1.85	1.23-2.76	1.68	1.08-2.60
Tuesday	408	87.6	2.82	1.83-4.34	2.71	1.69-4.32
Wednesday	452	83.6	2.03	1.36-3.04	1.98	1.27-3.08
Thursday	391	86.9	2.66	1.73-4.09	2.41	1.51-3.86
Friday	398	86.7	2.62	1.70-4.01	2.40	1.51-3.83
Saturday	253	83.8	2.07	1.32-3.25	2.02	1.24-3.29
Time of day (hours)						
0:00 to 5:59	209	69.2	1.00	-	1.00	-
6:00 to 11:59	771	86.9	2.95	2.16-4.04	3.00	2.16-4.19
12:00 to 17:59	576	87.9	3.24	2.31-4.15	3.23	2.26-4.63
18:00 to 23:59	883	84.1	2.35	1.75-3.16	2.37	1.73-3.26
Previous abortion/miscarriage						
No	2,256	84.1	1.00	-	-	-
Yes	155	84.7	1.04	0.68-1.58	-	-
Delivering doctor						
Doctor on duty	86	74.1	1.00	-	1.00	-
Same doctor as seen at the prenatal visits	2,286	84.7	1.92	1.25-2.95	1.74	1.07-2.84

Note: the total may be different for each variable because the "no information" category was excluded from the table when it was less than 10%.

plications and that surgical intervention may reduce such risks¹⁵. Since the rate of cesarean delivery increases with age and since the mean age for delivery has increased, it is possible that the increased prevalence of cesarean section is also due to this reason¹⁶. The greater proportion of

adolescent mothers observed at the public maternity agrees with published data, with a higher frequency of births among adolescents of less privileged classes¹⁷.

The absence of an association between cesarean section and maternal schooling may be

related to the low variability of schooling among mothers from the two groups, since this association has been well documented in Brazil, where only 13% of uneducated women have a history of cesarean delivery compared to 81% of women with higher education^{18,19}.

Other important risk factors for cesarean delivery are prenatal care and delivery with the same doctor and the number of visits made during pregnancy. In Brazil, the relationship between the obstetrician and the patient is very close in private practice. Only one doctor monitors the pregnancy and performs the delivery, usually with a large number of visits (more than six), a fact that greatly strengthens the tie⁸. In addition, this type of delivery can be transformed into a consumption item that is accessible according to the patient's purchasing power, a fact that explains its prevalence among the higher income social strata, although with lower obstetrical risk^{11,18,20}. This observation is reinforced if we consider that in Brazil, side by side with the high prevalence of cesarean deliveries, there are high maternal mortality rates², with an average of 60 deaths/100,000 liveborns according to the Brazilian Ministry of Health (Departamento de Informática do SUS. Estatísticas Vitais: Mortalidade e Nascidos Vivos. <http://www.datasus.gov.br>, accessed on 12/Oct/2006).

Financial incentives may also influence the rates of cesarean section. The deliveries at the public maternity clinic are financed by the federal government, which pays the hospital about US\$ 210 for a vaginal delivery and US\$ 280 for a cesarean section, independently of the cost of hospital material. The assistant physicians have

institutional ties with the University Hospital by means of an agreement between the two institutions, receiving a fixed monthly salary of about US\$ 1,000 for 20 hours of work per week. On the other hand, at the private maternity clinic, the user is responsible for the financing of delivery, which is done in two different ways: by means of service and/or insurance companies which pay between US\$ 285 and US\$ 350 as the obstetrician's honorarium for a cesarean delivery, and between US\$ 302 and US\$ 380 for vaginal delivery²¹. The other form of financing is the direct responsibility of the user and the values vary according to the laws of market regulation. In Australia the prevalence of elective cesarean sections was double in private hospitals, especially after financial incentives were granted in order to increase the coverage of private insurance companies in the national health system²². This association between private financing and a high prevalence of elective cesarean sections can be observed in Ribeirão Preto, since, in view of the small difference in medical bills between vaginal and cesarean deliveries, the latter (which take less time) may be deliberately scheduled in order to make a financial gain.

In conclusion, biological or clinical maternal factors were not the only ones associated with the high rate of cesarean delivery detected at the private maternity clinic. Non-medical factors such as the greater occurrence of cesarean deliveries on specific days and at specific times and the greater risk of cesarean delivery observed when the doctor who performs the delivery was the same who provided prenatal care were more associated with surgical deliveries.

Resumo

Este artigo avalia a associação de variáveis maternas e aquelas relacionadas ao cuidado pré-natal e ao parto com a ocorrência de cesáreas em um hospital público e em um hospital privado. Um estudo de corte transversal, retrospectivo, foi desenvolvido em uma maternidade pública (2.889 partos) e em uma maternidade privada (2.911 partos) em Ribeirão Preto, São Paulo, Brasil. A prevalência de cesárea foi 18,9% e 84,3%, respectivamente, na maternidade pública e na particular. Os fatores associados ao parto cesariano nos dois hospitais foram: mães procedentes de outras cidades, com idade ≥ 25 anos e hipertensas. Ter mais de um filho foi fator protetor. No hospital público, a cesárea foi mais freqüente às quartas-feiras e das 12h00min às 23h59min de qualquer dia da semana, enquanto no hospital privado prevaleceram em qualquer dia, exceto aos domingos, e em qualquer horário, exceto de madrugada. Neste hospital, a cesárea foi mais freqüente quando realizada pelo médico que acompanhou o pré-natal. Fatores não médicos foram mais associados com os partos operatórios na maternidade privada do que fatores biológicos ou clínicos das gestantes.

Cesária; Cuidado Pré-Natal; Idade Materna; Maternidades

Contributors

S. Almeida participated in delineating the study, reviewed the literature, carried out data analysis, discussed the results, and was responsible for the drafting and reviewing of the final version. H. Bettiol and M. A. Barbieri participated in delineating the study, in data analysis, in the discussion of the results and revised the final version of the paper. A. A. M. Silva participated in data analysis, in the discussion of the results and revised the final version of the paper. V. S. Ribeiro collaborated in the discussion of the results and revised the final version of the paper.

References

1. Belizán JM, Althabe F, Barros FC, Alexander S. Rates and implications of caesarean section in Latin America: ecological study. *BMJ* 1999; 319:1397-400.
2. Stanton CK, Holtz SA. Levels and trends in caesarean birth in the developing world. *Stud Fam Plann* 2006; 37:41-8.
3. Yazlle MEHD, Rocha JSY, Mendes MC, Patta MC, Marcolin AC, Azevedo GD. Incidência de cesáreas segundo fonte de financiamento de assistência ao parto. *Rev Saúde Pública* 2001; 35:202-6.
4. World Health Organization. Appropriate technology for birth. *Lancet* 1985; 2:436-7.
5. World Health Organization. Indicator to monitor maternal goals: report of a technical working group. Geneva: World Health Organization; 1994.
6. Potter JE, Berquó E, Perpétuo IHO, Leal OF, Hopkins K, Souza MR, et al. Unwanted caesarean sections among public and private patients in Brazil: prospective study. *BMJ* 2001; 323:1155-8.
7. Ribeiro VS, Figueiredo FP, Silva AA, Bettiol H, Batista RF, Coimbra LC, et al. Why are the rates of caesarean section in Brazil higher in more developed cities than in less developed ones? *Braz J Med Biol Res* 2007; 40:1211-20.
8. Gomes UA, Silva AA, Bettiol H, Barbieri MA. Risk factors for the increasing caesarean section rate in Southeast Brazil: a comparison of two birth cohorts, 1978-1979 and 1994. *Int J Epidemiol* 1999; 28:687-94.
9. Béhague DP, Victora CG, Barros FC. Consumer demand for caesarean sections in Brazil: informed decision making, patient choice, or social inequality? A population based birth cohort study linking ethnographic and epidemiological methods. *BMJ* 2002; 324:942-5.

10. Secretaria Municipal da Saúde de Ribeirão Preto. Estatísticas. Dados referentes a nascidos vivos no Município de Ribeirão Preto: tabulações para nascimentos entre 1994 e 1999. <http://www.saude.ribeiraopreto.sp.gov.br/ssaudef/i16principal.asp?pagina=/ssaude/vigilancia/vigep/tabnet/i16indice.htm> (accessed on 14/Dec/2006).
11. Rocha JSY, Ortiz PC, Fung YT. A incidência de cesáreas e a remuneração da assistência ao parto. *Cad Saúde Pública* 1985; 1:457-66.
12. Silveira DS, Santos IS. Fatores associados à cesariana entre mulheres de baixa renda em Pelotas, Rio Grande do Sul, Brasil. *Cad Saúde Pública* 2004; 20 Suppl 2:S231-41.
13. Kabir AA, Steinmann WC, Myers L, Khan MM, Herrera EA, Yu S, et al. Unnecessary cesarean delivery in Louisiana: An analysis of birth certificate data. *Am J Obstet Gynecol* 2004; 190:10-9.
14. Zhang J, Meikle S, Trumble A. Severe maternal morbidity associated with hypertensive disorders in pregnancy in the United States. *Hypertens Pregnancy* 2003; 22:203-12.
15. Bell JS, Campbell DM, Graham WJ, Penney GC, Ryan M, Hall MH. Do obstetric complications explain high caesarean section rates among women over 30? A retrospective analysis. *BMJ* 2001; 322:894-5.
16. Ecker JL, Chen KT, Cohen AP, Riley LE, Lieberman ES. Increased risk of cesarean delivery with advancing maternal age: indications and associated factors in nulliparous women. *Am J Obstet Gynecol* 2001; 185:883-7.
17. Moraes MS, Goldenberg P. Cesáreas: um perfil epidêmico. *Cad Saúde Pública* 2001; 17:509-19.
18. Gentile FP, Noronha Filho G, Cunha AA. Associação entre a remuneração da assistência ao parto e a prevalência de cesariana em maternidades do Rio de Janeiro: uma revisão da hipótese de Carlos Gentile de Mello. *Cad Saúde Pública* 1997; 13: 221-6.
19. Silva AA, Lamy-Filho F, Alves MT, Coimbra LC, Bettiol H, Barbieri MA. Risk factors for low birth-weight in north-east Brazil: the role of caesarean section. *Paediatr Perinat Epidemiol* 2001; 15: 257-64.
20. Villar J, Valladares E, Wojdyla D, Zavaleta N, Carroli G, Velazco A, et al. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. *Lancet* 2006; 367:1819-29.
21. Conselho Federal de Medicina. Classificação brasileira hierarquizada de procedimentos médicos. Resolução CFM nº. 1673/03. São Paulo: Associação Médica Brasileira; 2004.
22. Shorten B, Shorten A. Impact of private health incentives on obstetric outcomes in NSW hospitals. *Aust Health Rev* 2004; 27:27-38.

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