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## CLINICAL ARTICLE

## The Robson ten-group classification system for appraising deliveries at a tertiary referral hospital in Brazil



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## ABSTRACT

**Objective:** To evaluate the distribution of women according to the Robson 10-group classification system (RTGCS) and the occurrence of severe maternal morbidity (SMM) by mode of delivery at a tertiary referral hospital. **Methods:** A retrospective cross-sectional study was conducted of all women admitted to the Women's Hospital at the University of Campinas (Campinas, Brazil) for delivery between January 2009 and July 2013. Women were grouped according to RTGCS. Mode of delivery and SMM (defined as need for admission to the intensive care unit) were assessed. **Results:** Among 12 771 women, 5957 (46.6%) delivered by cesarean. Overall, 3594 (28.1%) women were in group 1 (nulliparous, single pregnancy, cephalic, term, spontaneous labor), 2328 (18.2%) in group 5 ( $\geq 1$  previous cesarean, single pregnancy, cephalic, term), and 2112 (16.5%) in group 3 (multiparous excluding previous cesarean, single pregnancy, cephalic, term, spontaneous labor). Group 5 contributed the most cesarean deliveries (1626 [27.3%]), followed by group 2 (nulliparous, single pregnancy, cephalic, term, induced labor or cesarean before labor; 1049 [17.6%]). SMM was more common among women undergoing cesarean delivery than among those delivering vaginally in groups 1–5. **Conclusion:** The RTGCS allowed the identification of groups with the highest frequency of cesarean delivery and an assessment of SMM. This should be considered in related health policies.

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## 1. Introduction

The rate of cesarean delivery is increasing worldwide. It has become a public health problem and is the subject of much debate because of the associated maternal and perinatal risks [1–3]. WHO has recommended that the rate of cesarean delivery should not exceed 15% in any region or country; however, this goal is still far from being achieved in high-, middle-, and low-income countries [4,5].

According to recent data [1], the proportion of deliveries performed by cesarean is approximately 25% in North America, approximately 30% in Central America, more than 30% in European countries, and 40% in many Latin American countries. In Brazil, the rate of cesarean delivery has reached 44% [6]. In general, cesarean rates differ considerably among countries, as well as between regions and institutions of the same country, and especially between the public and private sector [7,8]. Women who use supplementary health care or receive private care undergo operative delivery more frequently than do those who are managed by the public health system [9].

Implementation of effective measures to lower the rate of cesarean in diverse obstetric units initially demands a thorough study of each

case to identify the most frequent patient groups undergoing this procedure [10,11]. For this purpose, different classification systems have been described. However, the lack of a universally used standard of care hinders both a comparison between studies and adequate characterization of the rising rates of cesarean [12].

The Robson 10-group classification system (RTGCS), proposed in 2001 [13], aims to divide women into clinically relevant groups to allow assessment of the frequency of cesarean delivery in each. Rather than focusing on the indication for operative delivery, this classification is based on distinct individual characteristics of each woman and her pregnancy, including single or multiple pregnancy, parity, previous cesareans, presentation, mode of onset or cesarean before onset of labor, and gestational age at delivery [13].

The 10 groups are mutually exclusive and totally inclusive—i.e. all women can be classified, but each woman belongs to one and only one group [13]. A systematic review was carried out in 2011 to analyze the diverse classifications of cesarean delivery [12] and showed that the RTGCS takes local and international needs into account, facilitating the analysis and comparison of cesarean delivery rates among different hospitals, cities, countries, and regions. In addition, this classification system permits evaluation in the same unit over time [12].

Since its creation in 2001, the RTGCS has been used in several studies. A WHO worldwide study conducted in 2005 and involving 14 462 women in eight Latin American countries [14] showed that most of these women belonged to RTGCS group 3 (30.9%; multiparous,

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single fetus, cephalic pregnancy at  $\geq 37$  weeks, spontaneous labor, no previous cesarean delivery), followed by group 1 (28.6%; nulliparous, single fetus, cephalic pregnancy at  $\geq 37$  weeks, spontaneous labor) and group 5 (11.1%; multiparous, at least one previous cesarean, single fetus, cephalic pregnancy at  $\geq 37$  weeks). The highest relative rate of cesarean delivery was observed in group 5 (28.7%), followed by group 2 (22.0%; nulliparous, single fetus, cephalic pregnancy at  $\geq 37$  weeks, induced labor or cesarean before labor) and group 1 (13.5%), indicating that previous cesarean (group 5) is the greatest predictor of cesarean delivery [14].

The Women's Hospital at the University of Campinas, Brazil, is a public university hospital and a high-complexity referral center for maternal and neonatal care in high-risk pregnancies. Approximately 3000 deliveries occur there annually. The rate of cesarean delivery has surpassed 40% in the past 5 years, raising some concerns [15].

The primary aim of the current study was to evaluate the distribution of deliveries occurring in this institution from January 2009 to July 2013 according to the RTGCS. A secondary aim was to assess the distribution of cesarean delivery across the different classification groups among obstetric patients with severe maternal morbidity (SMM)—as defined by the need for admission to the intensive care unit (ICU)—by comparison with women without SMM.

## 2. Materials and methods

The present retrospective descriptive cross-sectional study evaluated data from all women admitted for delivery at the Women's Hospital at the University of Campinas between January 1, 2009, and July 31, 2013. Before data collection began, the study protocol was approved by the institutional review board of the hospital. The requirement for informed consent was waived because the data were retrospectively collected from clinical records.

Women were classified according to the RTGCS by considering parity, number of fetuses, fetal presentation, gestational age at time of delivery, previous cesarean delivery, type of labor onset, and termination of labor. Data were compiled from the computerized database of the institution, with subsequent judicious confirmation of consistency and review of medical charts when necessary.

Data analyses were conducted in Excel (Microsoft, Redmond, WA, USA) and Epi Info version 3.5.4 (Centers for Disease Control and Prevention, Atlanta, GA, USA). The percentage distribution of all cases among the ten groups of the RTGCS was determined, along with the overall and percentage contribution of each group to the rate of cesarean delivery. In addition, the percentage distribution of women among the different groups was further assessed by the occurrence or not of SMM, which was operationally defined as the need for ICU admission.

The results were also compared with data from a similar large study conducted in different contexts and countries including Brazil, which were available within the WHO global survey [14,16]. Lastly, comparisons between the overall prevalence of cesarean delivery and each RTGCS group were made for each year of the study to identify any trends from 2009 to 2013. Differences between groups were evaluated by the  $\chi^2$  test for trend.  $P < 0.05$  was taken as statistically significant.

## 3. Results

The total number of women who delivered in the study hospital during the 4.5-year study period was 12 771. Most women belonged to group 1, followed by group 5, group 3, and group 10 (Table 1). The proportional contribution of each RTGCS group did not alter with time (Fig. 1).

The total number of cesarean deliveries was 5957, corresponding to 46.6% of all women admitted for delivery. During the study period, there was no significant change in the cesarean delivery rate (Table 2). Women with breech or abnormal fetal presentation (groups 6, 7, and 9) had the highest cesarean rates, followed by those with a multiple pregnancy (group 8) (Table 1). This finding was consistent across all years of study (data not shown). The lowest rates of cesarean delivery occurred in groups 3 and 1 (Table 1). Group 5 contributed the highest number of cesarean deliveries, followed by group 2, group 1, and group 10 (Table 1).

Among the whole study population, the risk of ICU admission increased six-fold for women undergoing cesarean delivery (odds ratio 6.24; 95% confidence interval 5.06–7.69). For most RTGCS groups, more women admitted to the ICU had delivered by cesarean than vaginally (Table 3). The estimated risk of ICU admission increased significantly after cesarean deliveries in groups 1–5 (Table 3).

Table 4 shows comparative data from the WHO global survey [14], which evaluated 14 462 deliveries that occurred in various Brazilian institutions according to the RTGCS. In that study, the most prevalent groups were groups 3, 1, and 5. The overall cesarean rate in the global survey was 29.6%, with the largest contributions from group 5, followed by group 2, group 1, and group 4. Group 10 was the fifth most prevalent, occupying the same position in the overall cesarean delivery rate [14].

## 4. Discussion

The current study has demonstrated that Robson groups 1 and 5 formed the largest groups of women admitted for labor. By contrast, other studies have categorized groups 3 and 1 as the most prevalent [17–20]. However, groups 3 and 1 in the present study had the lowest proportion of cesarean deliveries, as in other studies [14,17–20].

**Table 1**  
Distribution of cesarean delivery according to the Robson 10-group classification system.<sup>a</sup>

Group	Characteristics	No. of deliveries	Cesarean deliveries		
			Proportion of deliveries in group	Proportion of all cesarean deliveries	Proportion of all deliveries
1	Nulliparous, single pregnancy, cephalic, $\geq 37$ weeks, spontaneous labor	3594/12 771 (28.1)	948/3594 (26.4)	948/5957 (15.9)	948/12 771 (7.4)
2	Nulliparous, single pregnancy, cephalic, $\geq 37$ weeks, induction or cesarean before labor	1435/12 771 (11.2)	1049/1435 (73.1)	1049/5957 (17.6)	1049/12 771 (8.2)
3	Multiparous (excluding previous cesarean), single pregnancy, cephalic, $\geq 37$ weeks, spontaneous labor	2112/12 771 (16.5)	215/2112 (10.2)	215/5957 (3.6)	215/12 771 (1.7)
4	Multiparous (excluding previous cesarean), single pregnancy, cephalic, $\geq 37$ weeks, induction or cesarean before labor	654/12 771 (5.1)	375/654 (57.3)	375/5957 (6.3)	375/12 771 (2.9)
5	Previous cesarean, single pregnancy, cephalic, $\geq 37$ weeks	2328/12 771 (18.2)	1626/2328 (69.8)	1626/5957 (27.3)	1626/12 771 (12.7)
6	All nulliparous breeches	330/12 771 (2.6)	287/330 (87.0)	287/5957 (4.8)	287/12 771 (2.2)
7	All multiparous breeches (including previous cesarean)	268/12 771 (2.1)	233/268 (86.9)	233/5957 (3.9)	233/12 771 (1.8)
8	All multiple pregnancies (including previous cesarean)	310/12 771 (2.4)	269/310 (86.8)	245/5957 (4.5)	245/12 771 (1.9)
9	All abnormal lies (including previous cesarean)	29/12 771 (0.2)	29/29 (100.0)	29/5957 (0.5)	29/12 771 (0.2)
10	All single pregnancies, cephalic, $\leq 36$ weeks (including previous cesarean)	1711/12 771 (13.4)	926/1711 (54.1)	926/5957 (15.5)	926/12 771 (7.3)

<sup>a</sup> Values are given as number/total number (percentage).

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