

Appropriate cesarean rates using Robson's Ten-Group Classification System in a Brazilian private practice

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Abstract

Background

The increasing rates of cesarean sections (CS) in places with adequate access to health care are a global concern because they are related to higher rates of maternal and neonatal complications and do not provide a positive childbirth experience for women. The objective is to highlight the possibility of achieving CS rates acceptable by WHO standards, such as Nordic countries, following evidence-based protocols in Brazil.

Methods

A cross-sectional study evaluated CS rates by Robson Groups for women who sought vaginal delivery in a private health practice in Brazil, comparing the rates with Swedish data. A collaborative practice with midwives and obstetricians adopting evidence-based guidelines was offered. The overall CS rate, CS rate by Robson group, contribution of each Robson group to the overall CS rate, clinical and nonclinical interventions and vaginal birth, pre-labour CS and intrapartum CS proportions were estimated. The expected CS rate for the population was calculated by the WHO c-model tool. The analysis used Microsoft EXCEL and the software "R Studio" (version 1.2.1335. 2009-2019).

Results

The overall CS rate was 15.1% (as expected by the WHO c-model tool) in a population composed of 43.7% women in Robson Group 1, 11.4% in Group 2 and 14.9% in Group 5, the greatest responsible for higher rates of CS, who altogether contributed to 75.4% of all cesarean sections.

Conclusions

Multidisciplinary care following evidence-based protocols, associated with a high motivation of both women and professionals of childbirth care for a vaginal route for delivery, may lead to a significant and safe reduction of CS rates, obtaining better results even in contexts such as Brazil, where there is high medicalization of obstetric care and excess of CS.

Background

Cesarean section (CS) is a life-saving obstetric intervention for women and newborns when there are complications in childbirth, but when performed without medical reasons, it may be related to short- and long-term complications. CSs without clinical indication have grown globally, having exceptionally high levels in large urban centers' private sector, motivating the World Health Organization (WHO) and government agencies to create strategies for their control.^{1,2}

The proportion of births by CS per health service is a helpful indicator of quality in obstetric care, and its audit is essential to understand trends and associated factors. Variations in the overall rate of CSs are challenging to interpret due to heterogeneity in the infrastructure of health services, obstetric population and protocols used and to facilitate evaluation, comparison and implementation of improvements, WHO proposed using the Robson Classification, which is fully inclusive and mutually exclusive and classifies women into homogeneous groups, well-defined and clinically relevant, based on obstetric variables at the time of hospital admission for delivery.^{3,4}

In 2019, Brazil ranked second in the world, with an overall cesarean rate of 57%, and the supplementary sector (health insurance) was responsible for financing 287166 of the 2849146 deliveries, which corresponds to 10% of the births. In this sector, the proportion of births by CS was 85% that year.⁵

São Paulo is its most populous city, with a Human Development Index of 0.805 (very high. according to United Nations standards in 2000) and is in stage IV of the obstetric transition (low fertility and maternal mortality rate, mainly due to indirect causes, being the strategy recommended for this stage to improve the qualification in care and the reduction of excess interventions in childbirth) and one of the cities with the highest health insurance health coverage in Brazil (43%, 95%CI 40%-47%).^{6,7}

Appropriate interventions in childbirth, classified as clinical and nonclinical, can avoid the need for CS, but clinical interventions can be harmful when overused.^{8,9}

Clinical interventions guided by evidence-based protocols aim at individualized obstetric practice and slightly impact the rate of CSs because the proportion of CSs without clinical reasons is high in countries with high rates of this procedure, such as Brazil. Examples include external cephalic version in cases of full-term breech presentation, vaginal breech delivery for selected cases, vaginal delivery after CS, neuraxial analgesia and labour induction in selected cases.⁸

Nonclinical interventions tend to have a more significant impact on the reduction of CS rates because they influence the reduction of procedures without obstetric indication and include measures such as education for childbirth, continuous support in labour (provided by a companion of choice of the woman and by the presence of a doula) and care provided by midwives. Such interventions increase the rate of physiological deliveries and lower rates of complications, in addition to providing a positive experience of childbirth to women.¹⁰

CS rates may vary according to the complexity of the facility, epidemiological characteristics of the population attended and the care protocols used.² For this reason, a tool called c-model was developed to estimate the expected CS rate considering maternal age, obstetric characteristics used for Robson's classification and the incidence of comorbidities in the population, such as placenta previa, abruptio placentae, chronic hypertension, pre-eclampsia, kidney disease, HIV and organic dysfunction with intensive care unit (ICU) admission.^{2,11}

Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden) have maintained lower CS rates (approximately 17%) combined with good perinatal outcomes, and the region is considered a world reference for good obstetric practices; for this reason, Swedish data may be adopted as a gold standard. In these countries, childbirth care is less medicalized than in most developed countries, midwives care for habitual risk births, and obstetricians are called only when problems arise.^{2,12}

The present study presents CS rates by Robson's groups in a population of women seeking a vaginal delivery and a positive experience of childbirth and compares them with data from Sweden, demonstrating the possibility of obtaining CS rates acceptable by WHO standards in Brazil, such as those of Nordic countries, by following evidence-based protocols and offering care and follow-up by a multidisciplinary team.

Methods

This study adopted a cross-sectional design to evaluate CS rates by Robson Groups in women of a private practice (PP) of São Paulo city, assisted from 2004 to 2019.

The inclusion criteria were women who sought prenatal care and childbirth with the intention of a spontaneous vaginal delivery with appropriate use of technology, with single or multiple pregnancies, who gave birth in a hospital to a newborn or stillborn, with birth weight greater than or equal to 500 grams and/or gestational age greater than or equal to 22 weeks of gestation. Women with planned home birth were excluded.

All women were followed by a multidisciplinary team led by an obstetrician since the antenatal period. During the visits, clinical and nonclinical aspects of childbirth care and perinatal education and promotion of vaginal birth as a positive experience were broached, respecting the woman's autonomy. An obstetrician was present in all births (including low risk) and prioritized the active phase for childbirth admission. When a midwife was part of the team, there were alternate antenatal visits by her and the obstetrician, and she did the first evaluation of the birth process at the woman's home, the obstetrician coming to the birth from dilation at 6 cm on, or before if there were complications or the woman asked for analgesia.

In labour, they had continuous support, the presence of a companion and/or a doula of their choice; completion of delivery registered in their medical record; use of non-pharmacological methods for pain relief; freedom of movement during labour; free food ingestion; freedom of choice of position for delivery and no use of a peripheral venous catheter, oxytocin or routine amniotomy.¹³

The primary outcome assessed was the overall CS rate, sizes of the Robson groups of women, CS rate in each group and contribution to the overall CS rate from each group and the results were discussed. The secondary ones were the frequency of some clinical and nonclinical interventions in childbirth and sociodemographic characteristics (analyzed by a binary logistic regression model); the rate of vaginal birth, pre-labour CS and intrapartum CS; and the expected CS rate for the population by the WHO c-model tool.

The databases' construction and manipulation and tables and figures elaboration were carried out using Microsoft Excell and the software "R Studio" (version 1.2.1335. 2009-2019) ¹⁴.

The database and R-scripts were shared at the Figshare open access repository and are available at <https://doi.org/10.6084/m9.figshare.17057777.v1>.

The study received ethical approval from the Research Ethics Committee of the Faculdade de Saúde Pública da Universidade de São Paulo through national Plataforma Brasil under the Certificate of Presentation of Ethical Appreciation (CAAE) number 50733621.8.0000.5421 on September 16, 2021, based on the Helsinki declaration. The ethical committee approved that individual informed consent was not considered due to the confidential handling of the data presented without identifying the individuals.

Robson's Ten-Group Classification System

Robson's ten groups classify women according to six obstetric variables at hospital admission for delivery: the number of fetuses (single or multiple pregnancies); fetal presentation (cephalic, breech and transverse); parity (nulliparous or multiparous); gestational age (preterm or term); presence (or absence) of previous CS; and onset of labour (spontaneous, induced and pre-labour CS). (see Figure 1)

Results

From 2004 to 2019, 1481 women who came from support groups for pregnant women and internet search tools sought this PP care and were followed up. Their sociodemographic and obstetric characteristics are described in Table 1.

Table 1
Distribution of women, CS and CS rates according to maternal characteristics in a private practice. Brazil, 2004-2019

	Women		CS		CS rate
	No.	%	No.	%	%
<i>Maternal age in years</i>					
< 20	1	0.1	0	0.0	0.0
20-34	1087	73.4	152	67.9	14.0
> 34	387	26.1	69	30.8	17.8
Ignored	6	0.4	3	1.3	50.0
<i>Race/color¹</i>					
White	1333	90.0	194	86.6	14.6
Non-white	87	5.9	15	6.7	17.2
Ignored	61	4.1	15	6.7	24.6
<i>Marital status (stable union)</i>					
With	1241	83.8	184	82.1	14.8
Without	224	15.1	36	16.1	16.1
Ignored	16	1.1	4	1.8	25.0
<i>Education (tertiary education)</i>					
With	1344	90.7	201	89.7	15.0
Without	61	4.1	5	2.2	8.2
Ignored	76	5.1	18	8.0	23.7
<i>Obstetric characteristics (Robson Group)</i>					
1 and 2	815	55.0	124	55.4	15.2
3 and 4	314	21.2	2	0.9	0.6
5	220	14.9	45	20.1	20.5
6, 7 and 9	41	2.8	29	12.9	70.7
8	19	1.3	9	4.0	47.4
10	72	4.9	15	6.7	20.8
High risk pregnancy ²	120	8.1	36	16.1	30.0
<i>Provider-initiated childbirth</i>					
Spontaneous labor ³	1163	78.5	115	51.3	9.9
Induced ⁴	264	17.8	55	24.6	20.8
Pre-labour CS	54	3.6	54	24.1	100.0
<i>Intrapartum care</i>					
Presence of Doula	928	62.7	132	58.9	14.2
Presence of Midwife	1090	73.6	133	59.4	12.2
Analgesia ⁵	623	42.1	170	75.9	27.3
Notes:					

	Women		CS		CS rate
Total	1481	100.0	224	100.0	15.1
Notes:					

1: according to provider

2: placenta previa, abruptio placentae, chronic hypertension, preeclampsia, kidney disease, HIV and organ dysfunction with ICU admission.

3: on arrival, 3 contractions per 10 min with cervical effacement > 50% and dilation > 3 cm with intact or ruptured membranes.

4: use of misoprostol, Foley catheter or oxytocin in a woman who does not fulfill the criteria for spontaneous labor

5: Pre-labour CS not included

Source: PP data

For a more synthetic presentation, Robson groups were grouped according to their obstetric characteristics: groups 1 and 2, representing the nulliparous term singleton vertex (NTSV); 3 and 4 representing the multiparous term singleton vertex with no CS (MTSVnoCS); and 6, 7 and 9 representing noncephalic presentation (NCP).

Most women were between 20 and 34 years old, white race/color, with a stable union and with tertiary education. Considering the obstetrics characteristics, the largest group was of NTSV, followed by MTSVnoCS, and by multiparous term singleton vertex with CS. These three groups, altogether, were responsible for 91.1% of the population and for 76.4% of the CS.

A doula and/or a midwife were present in most cases, and during labour and delivery, women were encouraged to move around and use nonpharmacological methods for pain relief and free choice of position for delivery. Labour analgesia was performed at women's request and occurred in 623 births (42.1%).

The statistical analysis of the sociodemographic characteristics and clinical and nonclinical interventions described in Table 1 showed no influence on the probability of a CS in the binary logistic regression model while keeping the other variables constant.

The distribution of vaginal birth, pre-labour CS and intrapartum CS according to obstetrics characteristics is displayed in Table 2, which shows a very low proportion of pre-labour CS, with these more frequent in the NCP group.

Table 2
– Distribution of vaginal birth, pre-labour and intrapartum cesarean sections of a private practice by Robson Groups. Brazil, 2014-2019

Robson Groups	Women		Vaginal birth		Pre-labour CS		Intrapartum CS	
	N	%	N	%	N	%	N	%
1 + 2	815	55.0	691	84.8	10	1.2	114	14.0
3 + 4	314	21.2	312	99.4	0	0.0	2	0.6
5	220	14.9	175	79.5	9	4.1	36	16.4
6 + 7 + 9	41	2.8	12	29.3	25	61.0	4	9.8
8	19	1.3	10	52.6	2	10.5	7	36.8
10	72	4.9	57	79.2	8	11.1	7	9.7
Total	1481	100.0	1257	84.9	54	3.6	170	11.5
Source: PP data.								

Table 3 presents a Robson report table of the PP and of Sweden (S), obtained at Svensk Förening För Obstetrik Och Gynekologi (SFOG), as proposed by the WHO publication.^{2,15}

Table 3
Robson report table for a private practice (Brazil, 2014 to 2019) (PP) and Sweden (2019) (S).

Group	N CS in group		Total N in group		Group size (%) ¹		Group CS rate (%) ²		Absolute group contribution to overall CS rate (%) ³		Relative group contribution to overall CS rate (%) ⁴	
	PP	S	PP	S	PP	S	PP	S	PP	S	PP	S
1	78	2259	647	30356	43.7	27.0	12.1	7.4	5.3	2.0	34.8	11.3
2	46	4053	168	12075	11.4	10.7	27.4	33.6	3.1	3.6	20.5	20.2
2a (induced)	36	2422	158	10444	10.7	9.3	22.8	23.2	2.4	2.2	16.1	12.1
2b (Pre-labour CS)	10	1631	10	1631	0.7	1.5	100.0	100.0	0.7	1.5	4.5	8.1
3	1	577	272	37718	18.4	33.6	0.4	1.5	0.1	0.5	0.5	2.9
4	1	1799	42	10760	2.8	9.6	2.4	16.7	0.1	1.6	0.5	9.0
4a (Induced)	1	399	42	9360	2.8	8.3	2.4	4.3	0.1	0.4	0.5	2.0
4b (Pre-labour CS)	0	1400	-	1400	-	1.2	-	100.0	-	1.2	-	7.0
5	45	5680	220	10375	14.9	9.2	20.5	54.7	3.0	5.1	20.1	28.3
5.1 (1 CS)	39	-	201	-	13.6	-	19.4	-	2.6	-	17.4	-
5.2 (>1 CS)	6	-	19	-	1.3	-	31.6	-	0.4	-	2.7	-
6	25	1794	33	1940	2.2	1.7	75.8	92.5	1.7	1.6	11.2	8.9
7	4	1024	8	1176	0.5	1.0	50.0	87.1	0.3	0.9	1.8	5.1
8	9	908	19	1640	1.3	1.5	47.4	55.4	0.6	0.8	4.0	4.5
9	0	355	-	375	-	0.3	-	94.7	-	0.3	-	1.8
10	15	1616	72	4903	4.9	4.4	20.8	33.0	1.0	1.4	6.7	8.1
Total	224	20065	1481	112339	100.0		15.1	17.9	15.1	17.9	100.0	

Not classified: PP 0 cases; S 1021 cases (0.91%)

Group	N CS in group	Total N in group	Group size (%) ¹	Group CS rate (%) ²	Absolute group contribution to overall CS rate (%) ³	Relative group contribution to overall CS rate (%) ⁴
<p>1. % = n of women in the group / total N women delivered in the setting x 100</p> <p>2. % = n of CS in the group / total N of women in the group x 100</p> <p>3. % = n of CS in the group / total N of women delivered in the setting x 100</p> <p>4. % = n of CS in the group / total N of CS in the setting x 100</p> <p>Definitions used in this setting:</p> <p><i>Spontaneous labour</i>: on arrival 3 contractions / 10 min with cervical effacement > 50% and dilation > 3 cm, with intact or ruptured membranes.</p> <p><i>Induction</i>: use of misoprostol, Foley catheter or oxytocin in a woman who does not fulfill the criteria for spontaneous labour.</p>						
Source: PP data, SFOG ¹⁵						

Figure 2 displays the size and CS rates of the Robson groups grouped by common characteristics for the PP and Sweden. In the PP, the nulliparous group was larger and the multiparous group was smaller, with a greater proportion of women with a previous CS.

For both the PP and Sweden, groups 1, 2 and 5 were the ones that contributed most to the general CS rate of the studied population (relative group contribution to overall CS rate), with the CS rates being lower for the PP in groups 2 and 5.

The submission of the PP database to the WHO c-model tool generated an expected CS rate for this population of 20.7% (95% CI 15.6%-26.0%), with no statistically significant difference taking into account the 95% confidence interval of the observed rate of 15.1% (CI 13.3% - 17.1%).¹⁶

Discussion

The CS rate found in the PP was similar to that estimated by the c-model tool, as well as to a database with low CS rates and good perinatal outcomes, such as Sweden¹⁷. For countries with high CS rates, such as Brazil, differences between rates observed and estimated by the c-model are usually higher.^{16,18-20} The groups that most contributed to a lower rate in the PP were groups 2 (particularly group 2a) and 5, a result that also differs from the rates found in the WHO Global Survey of Maternal and Perinatal Health study.²¹

Women of the PP population had predominantly a single child, with a low natality rate, since they presented a proportion of NTSV greater than the expected by the WHO; this group had low rates of induction of birth and pre-labour CS, reinforcing that such interventions were performed only for medical reasons.^{2,22}

Group 5 contributed to 14.9% of the population, and its size is related to the general population CS rate. The important size of group 5 reflects a longer-than-expected history of CSs, as it is represented by women nulliparous in their previous pregnancy who underwent a CS. In places with low cesarean rates, it usually contributes to less than 10% of women².

The CS rates of this PP were lower than those of other Brazilian studies published for all Robson groups, considering both the public and private sectors, including teaching hospitals, that should adopt the evidence-based protocols of the Brazilian Ministry of Health.²³⁻²⁶ Studies that evaluated the quality of obstetric care practiced in the country evinced an excessively interventionist practice, e.g., absence of evidence-based protocol use, with intervention rates even higher in high-income locations, with no improvement in the quality of maternity services and with increases in both the risk of iatrogenic harm and costs.²⁷⁻³⁰

According to the WHO, half of all CSs occur in group 5; PP Group 5 displayed a CS rate of 20.5%, representing 20% of all CSs performed. For Group 5, cesarean rates between 50 and 60% are expected.^{2,22}

This rate contrasts even more when compared to a private population of cases eligible for vaginal birth after a cesarean section, which had an elective CS rate of 95.3% and 39,2% of intrapartum CS in this group, suggesting that nonclinical factors are leading to CS iteration in these services.²³

The significantly lower rates obtained in the PP may be due to: use of evidence-based protocols; women's desire for a vaginal birth, professionals enabling all measures to facilitate it; continuous support for women during childbirth; and, for women in group 5, the willingness of both the woman and the professionals to allow a trial of labour; and the absence of obstetric indication for the previous CS, typical of populations with high cesarean rates³¹.

The collaborative and multidisciplinary model, involving obstetricians and midwives, is an effective and successful model for the improvement of obstetric care (including high-risk cases), reducing adverse perinatal events and increasing safety and women's satisfaction with her birth; it encourages a patient- and family-centered practice and is tuned to the WHO recommendations for a positive childbirth experience. A study that compared the prevalence of CS and neonatal outcomes in two models of childbirth care in Brazilian private hospitals showed a lower CS rate, with no difference in neonatal outcomes, with the model of care offered by the multidisciplinary team.^{30,32-35}

This study's strengths rely on the fact that all interventions were performed for medical reasons, following evidence-based protocols and guidelines; the motivation for a vaginal birth and a positive childbirth experience, both from the women and the multidisciplinary team; and the quality of the data, a great concern of these PP professionals, supported by the fact that no woman was left out of Robson's groups classification.

Potential limitations include: its population is composed majorly of women seeking a vaginal birth and women with a higher risk for a CS or a contraindication for a vaginal birth might have been excluded; all women were from the private sector and, in this town, this represents less than half of the population; all patients were cared by a team with the same professional as a leader and, given this database was collected throughout various years, changes in the team and in the conducts were not considered, Besides, maternal and neonatal outcomes were not object of this study, as well as the evaluation of the women's experience. Another limiting factor is the low coverage of midwives given the additional fee charged by them: this might have discouraged women who had their follow-up during the antenatal care to hire them for the birth. Low coverage of such midwifery services is described as a barrier to the implementation of collaborative care in the US.³⁶

This study results, although in a small population, demonstrate the real possibility of obtaining CS rates according to those displayed in WHO publications by offering multidisciplinary childbirth care that follows evidence-based protocols and proposes to provide a positive childbirth experience as recommended by the WHO. Health policies should promote health education to the population and health professionals, focusing on disseminating and implementing such practices both in the public and private sectors.

Conclusion

Multidisciplinary care following evidence-based protocols, associated with a high motivation of both women and professionals of childbirth care for a vaginal route for delivery, may lead to a significant and safe reduction of CS rates, obtaining better results even in contexts such as Brazil, where there is high medicalization of obstetric care and excess CS.

Such professionals' and women's motivation may be improved by government educational campaigns that would promote childbirth care towards a positive childbirth experience as recommended by the WHO, as well as by the implementation of the collaborative care model with midwives, both in the public. and the private sectors.

Abbreviations

CI
confidence interval
CS
caesarean section
ICU
intensive care unit
MTSVnoCS
multiparous term singleton vertex whithout CS
NCP
non cephalic presentation
NTSV
nulliparous term singleton vertex

PP
private practice
SFOG
Svensk Förening För Obstetrik Och Gynekologi
S
Sweden
WHO
World Health Organization

Declarations

- **Ethics approval and consent to participate**

The study received ethical approval from the Research Ethics Committee of the Faculdade de Saúde Pública da Universidade de São Paulo through national Plataforma Brasil under the Certificate of Presentation of Ethical Appreciation (CAAE) number 50733621.8.0000.5421 on September 16, 2021, based on the Helsinki declaration. The ethical committee approved that individual informed consent was not considered due to the confidential handling of the data presented without identifying the individuals.

- **Consent for publication**

Not applicable

- **Availability of data and materials**

The datasets generated and/or analysed during the current study are available in the Figshare repository at <https://doi.org/10.6084/m9.figshare.17057777.v1>.

- **Competing interests**

The authors declare that they have no competing interests.

- **Funding**

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- **Authors' contributions**

ASQC, CSGD and DR were involved in the conception and study design, analysis and interpretation of data and drafting of the article. ASQC was involved with data acquisition, and DR was involved with critical revision of the article. All authors read and approved the final manuscript.

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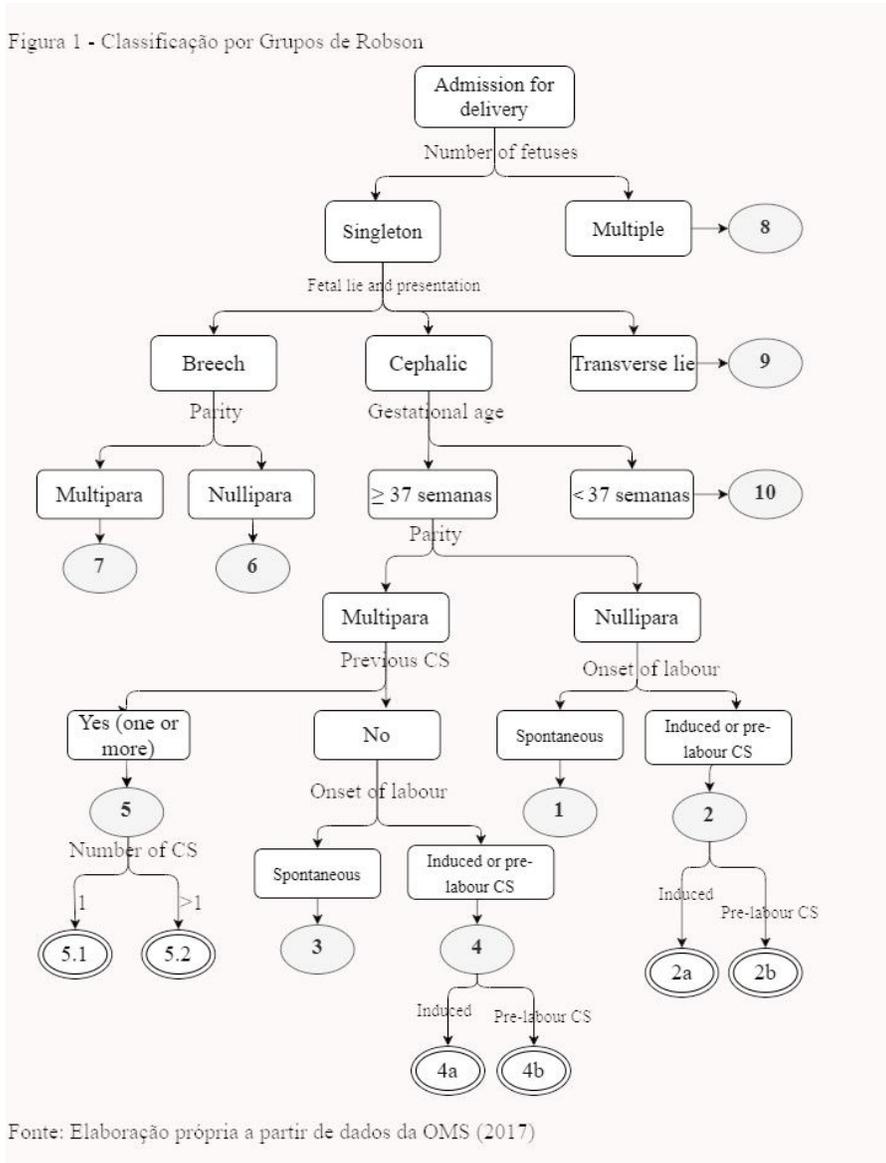
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Figures

Figura 1 - Classificação por Grupos de Robson



Fonte: Elaboração própria a partir de dados da OMS (2017)

Figure 1

The Robson Classification with subdivisions. Source: Authors' elaboration based on WHO data (2017)²

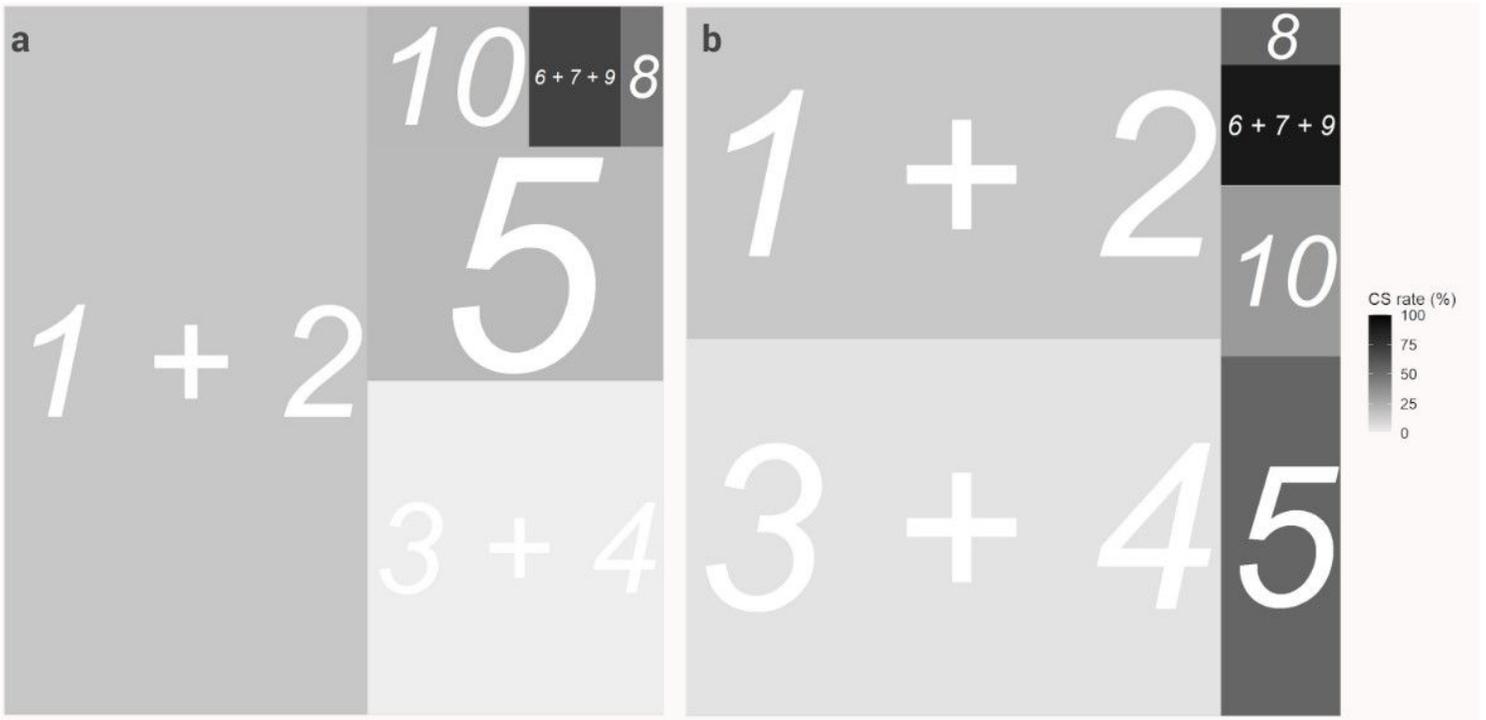


Figure 2

Robson's Groups size and CS rates, grouped by common characteristics, private practice, Brazil (2014 to 2019) (a) and Sweden (2019) (b).
 Source: PP data and SFOG15