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Cesarean section rates in Lithuania using Robson Ten Group Classification System

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ABSTRACT

Background and objective: The aim of this study was to analyze cesarean section (CS) rates using Robson Ten Group Classification System (TGCS) and to identify the main contributors to the overall CS rate in Lithuania.

Materials and methods: A prospective cross-sectional study was carried out. All women who delivered between January 1 and December 31, 2012, in Lithuania were classified using the TGCS. The CS rates overall and in each Robson group were calculated, as was the contribution of each group to the overall CS rate.

Results: The CS rate was 26.4% (6697 among 25,373 deliveries) in 2012. Nulliparous women with single cephalic full-term pregnancy in spontaneous labor (Group 1) or who underwent induction of labor or prelabor CS (Group 2) and multiparous women with a previous CS (Group 5) were the greatest contributors (67.7%) to the overall CS rate. In addition, significant variation of CS rates between different institutions was observed, especially in women with single cephalic full-term pregnancy without previous CS (Groups 1–4), showing big differences in obstetric care across country.

Conclusions: Women in Groups 1, 2 and 5 were the largest contributions to the overall CS rate in Lithuania. It seems that efforts to reduce the overall CS rate should be directed on increasing vaginal birth after CS and reducing CS rates in nulliparous women with single cephalic full-term pregnancy (Groups 1 and 2).

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1. Introduction

Cesarean section (CS) is the most common obstetric intervention and in some high income countries has reached the epidemic level. The WHO declares that the CS frequency of more than 10%–15% is unjustified [1]. However, the summarized data of 34 countries have shown the increase of CS rates from 14% of all births in 1990 to nearly 20% in 2000 and 26% in 2009 [2]. In recent years the CS rates in Finland was 15.7%; in Denmark, 20.6%; in Ireland, 26%, in Italy, 38.4%; and even 42.7%, in Turkey [2]. The CS rate in Lithuania has increased more than 2.5 fold from 9.6% in 1995 to 25% in 2011 [3].

The rise in CS rates is becoming a major public health concern and the factors that are causing this phenomenon as well as the strategies to reduce cesarean birth are analyzed intensively [4–6]. However, in order to propose and implement effective measures to reduce CS, it is first essential to identify what groups of women are undergoing CS and investigate the underlying reasons in different settings.

Auditing of CS rates is carried out in many countries, regions, and hospitals, comparing the primary and repeated CS rate, indications for operation or CS rate in certain groups of women [7,8]. However, each of the above mentioned CS classifications have limitations. In 2001, Robson presented a new classification system, the Ten Group Classification System (TGCS) [9], which fulfill current international and local needs, allow auditing and comparing CS rates across different settings and, the most important, help to create and implement effective strategies specifically targeted to optimize CS rates [10].

In Lithuania until now indication- and urgency-based CS classifications are used. Recently, two university hospitals published one-year analysis of cesarean births using Robson TGCS and invited other institutions within the country to consider the feasibility of organizing their data according to this classification [11,12]. The objective of this study was to analyze CS birth rates using Robson TGCS and to identify the main contributors to the overall CS rate in Lithuania.

2. Materials and methods

All birth-supervising institutions in Lithuania were invited to participate in a prospective cross-sectional study, which was carried out from January 1, 2012, until December 31, 2012. The CS Working Group of Lithuanian Society of Obstetricians and Gynecologists initiated the meeting of the heads of delivery units of Lithuanian health care institutions and presented the principles of Robson TGCS on December 21, 2011. If the head of a delivery unit was not able to participate in the meeting, all information and invitation to participate in the study were sent by email and discussed by phone.

Overall 23 of the 33 hospitals with maternity wards participated in the study and their obstetric cohorts represented the study group constituting 25,373 deliveries (91.3% of all hospital births in Lithuania in 2012). The participating hospitals were divided into three groups depending on the level of health care services provided in the institution. Two hospitals (n = 7150 deliveries) were tertiary referral centers, 5 hospitals (n = 11,116 deliveries) provided health care services of II B level (high risk pregnancies and deliveries where tertiary level care is not needed, for example uncomplicated twin pregnancy, mild preeclampsia, preterm labor after 34 weeks etc.), and 16 hospitals (n = 7107 deliveries) – health care services of II A level (low risk pregnancies and deliveries).

Table 1 – Ten Group Classification System.

Group	Description
1	Nulliparous, single cephalic, ≥37 weeks, in spontaneous labor
2	Nulliparous, single cephalic, ≥37 weeks, induced or CS before labor
3	Multiparous (excluding prev. CS), single cephalic, ≥37 weeks, in spontaneous labor
4	Multiparous (excluding prev. CS), single cephalic, ≥37 weeks, induced or CS before labor
5	Previous CS, single cephalic, ≥37 weeks
6	All nulliparous breeches
7	All multiparous breeches (including previous CS)
8	All multiple pregnancies (including previous CS)
9	All abnormal lies (including previous CS)
10	All single cephalic, ≤36 weeks (including previous CS)

The obstetric concepts in the TGCS are the category of the pregnancy (singleton with cephalic, breech or other malpresentation or multiple pregnancy), the previous obstetric history (nulliparous, multiparous with or without a previous CS), the course of labor and delivery (spontaneous or induced labor or planned prelabour CS), and the gestational age (preterm or term) (9). Based on these parameters all women were assigned to one of 10 groups (Table 1).

The summary data from different institutions were sent on monthly basis by e-mail or fax to the investigators. Two investigators (D.R.R and E.B) provided continuous educational assistance not only before the study but also along the course of study (personally, by e-mail or phone calls) when difficulties to classify women arise. These efforts were made in order to avoid misclassification.

Cesarean data from each hospital were analyzed using the TGCS with reference to overall cesarean delivery rate, the size of each group, cesarean delivery rate in each individual group, and the contribution of each group to the total cesarean delivery rate. Data were processed using computer software package SPSS 15.0 for Windows. The study was approved by the Ethics Committee of Kaunas (No. BEC-MF-328).

3. Results

A total of 6697 cesarean sections were performed among 25,373 deliveries, giving an average overall CS rate of 26.4% (range 16.6%–30.7%). An average overall CS rate was highest in tertiary referral centers (30.2%), followed by hospitals providing health care services of II B (27.0%, range 18.7%–29.8%) and II A level (21.6%, range 16.6%–27.8%).

Groups 1 and 3 (women with single cephalic full-term pregnancy, with spontaneous labor without previous CS) were the largest groups representing 67.2% of all obstetric population included in this study and ranged from 54.9% in tertiary referral centers to 74.2% in II A level health care institutions

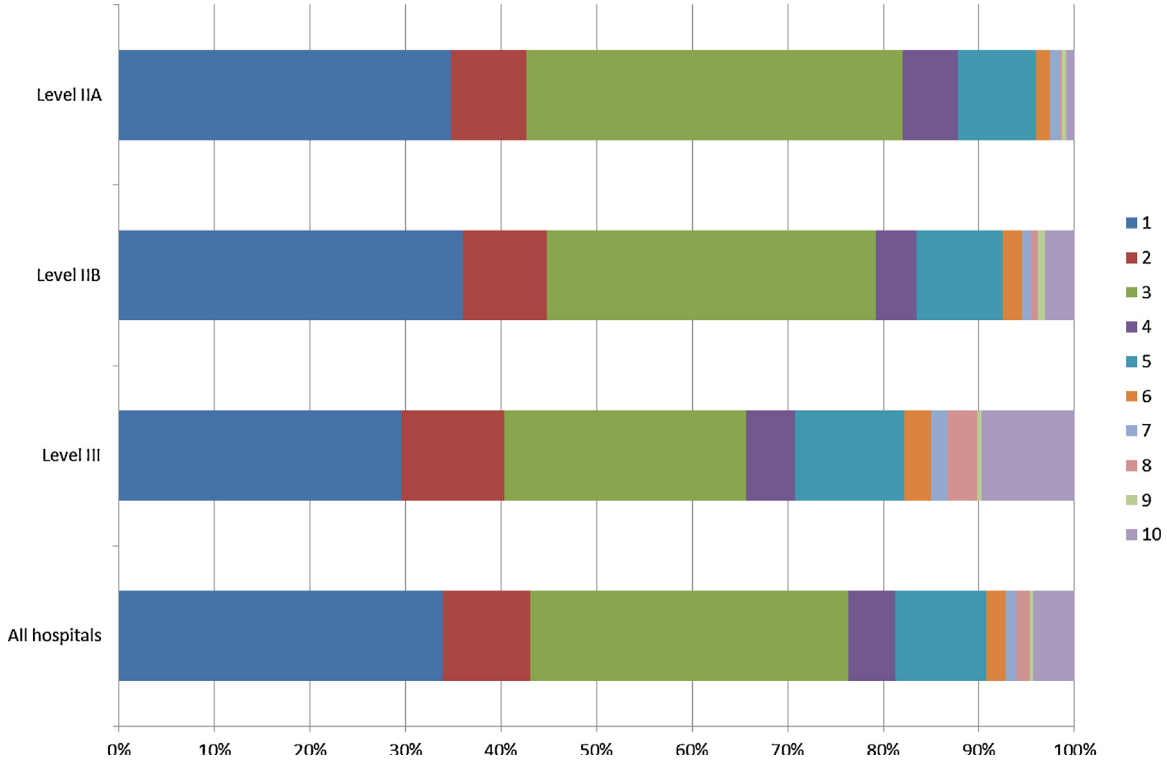

Fig. 1 – Contribution of each Robson group to overall population in hospitals providing health care of different level.

(Fig. 1). The third largest is Group 5 (women with single cephalic full-term pregnancy, who have already undergone at least one CS), which represented 9.5% of the obstetric population (8.2% in II A level and 11.5% in III level hospitals). The proportion of nulliparous (Group 2) and multiparous women (Group 4) with single cephalic full-term pregnancy who underwent induction of labor or prelabor CS accounted for 14%. Groups 6–10 made up 9.3% of all deliveries (smaller proportion (3.9%) in IIA level health care institutions and larger proportion (17.7%) in tertiary referral centers) (Fig. 1).

CS rates in each individual group in all obstetric cohort and hospitals providing health care of different level is documented in Table 2. The mean CS rates in three largest groups in all hospitals were 15.9% (Group 1), 3.9% (Group 3) and 80.6% (Group 5). However, the largest contributions to the total CS rate were Groups 1, 2 and 5 which were responsible for 67.6% of overall CS rate in this study (Fig. 2). Groups 2 and 4 presented relatively high rates of CS (52.6% and 35.4%, respectively) and Group 2 was the third highest contributor to the overall CS rate (Fig. 2). Groups 6–10 presented high rates of CS due to the

Table 2 – Analysis of variation of CS rates in each Robson group in hospitals providing health care of different level.

Group	Level IIA hospitals		Level IIB hospitals		Level III hospitals		All hospitals	
	%, mean (range)	Ratio of highest to lowest CS rate	%, mean (range)	Ratio of highest to lowest CS rate	%, mean (range)	Ratio of highest to lowest CS rate	%, mean (range)	Ratio of highest to lowest CS rate
1	16.0 (1.5–33.3)	22.2	16.0 (3.2–25.0)	7.8	15.5 (15.1–16.1)	1.1	15.9 (1.5–33.3)	22.2
2	43.9 (15.1–74.2)	4.9	61.1 (35.9–93.9)	2.6	48.1 (44.6–53.1)	1.2	52.6 (15.1–93.9)	6.2
3	3.6 (0–7.1)	–	4.2 (0.6–6.7)	11.2	3.8 (3.5–4.1)	1.2	3.9 (0–7.1)	–
4	27.6 (7.4–69.2)	9.4	49.5 (17.5–83.3)	4.8	26.2 (25.1–27.2)	1.1	35.4 (7.4–83.3)	11.3
5	80.0 (58.1–100.0)	1.7	85.4 (68.9–93.9)	1.4	75.0 (72.6–77.1)	1.1	80.6 (58.1–100.0)	1.7
6	96.9 (50.0–100.0)	2.0	97.3 (91.9–100.0)	1.1	93.4 (91.6–94.7)	1.0	95.7 (50.0–100.0)	2.0
7	89.3 (0–100.0)	–	88.2 (75.0–100.0)	1.3	88.6 (82.8–93.7)	1.1	88.6 (0–100.0)	–
8	46.7 (0–100.0)	–	79.5 (46.2–100.0)	2.2	62.7 (60.8–64.4)	1.1	66.4 (0–100.0)	–
9	100.0	–	100.0	–	94.3 (90.9–100.0)	1.1	98.2 (90.9–100.0)	1.1
10	24.6 (0–100.0)	–	22.6 (11.0–28.0)	2.5	31.8 (29.8–30.7)	1.0	28.5 (0–100.0)	–
Overall	21.6 (16.6–27.8)	1.7	27.0 (18.7–29.8)	1.6	30.2 (29.8–30.7)	1.0	26.4 (16.6–30.7)	1.8

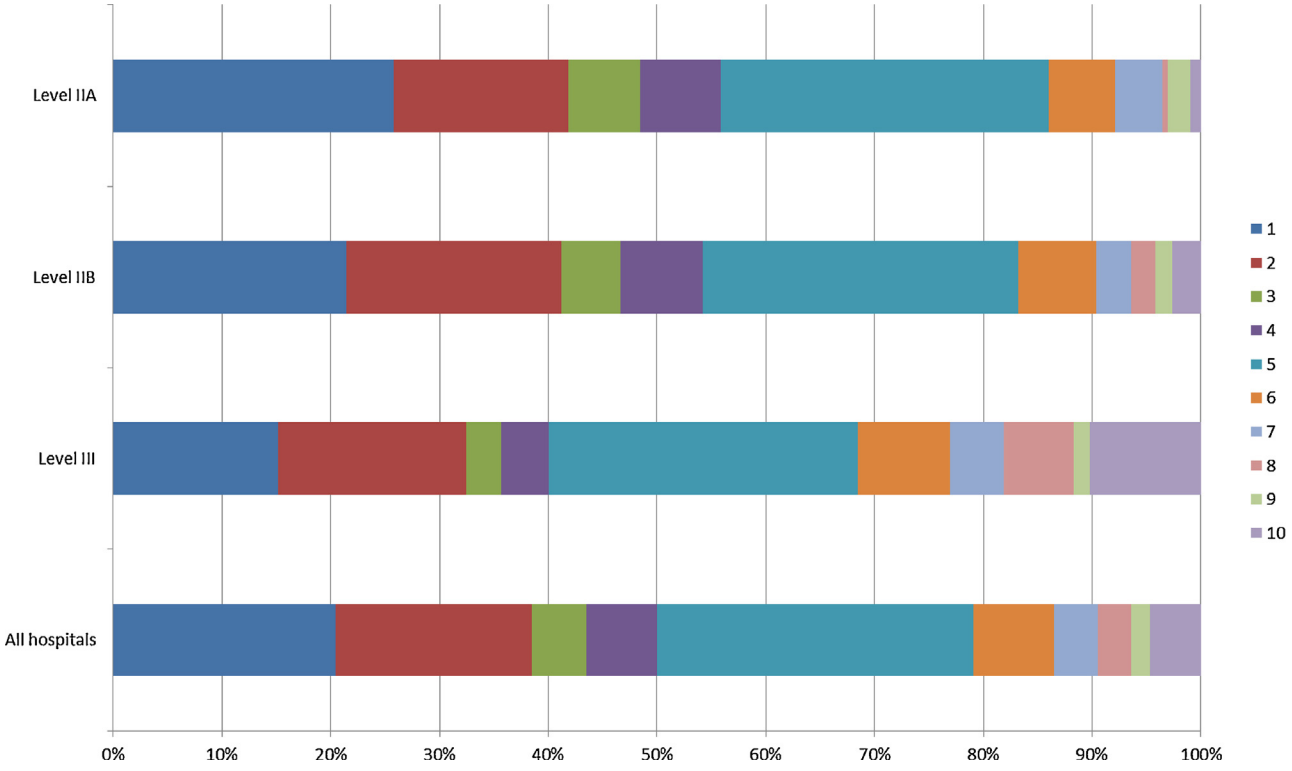

Fig. 2 – Contribution of each Robson group to overall CS rates in hospitals providing health care of different level.

particular obstetric conditions, but their contribution to the overall CS rate was smaller (20.9% of total CS rate) due to the relatively small size of these groups. Among these groups, the larger contributor to the overall CS was Group 6 which includes all nulliparous women with single breeches pregnancy (Fig. 2).

Analysis of CS rates in each individual group in hospitals providing health care of different level showed significant variation of CS rate between different institutions in Groups 1–4 (Table 2). For example, in hospitals providing IIA level health care the CS rate differed more than 22-fold (from 1.5% to 33.3%) in Group 1, almost 5-fold (from 15.1% to 74.2%) in Group 2 and more than 9-fold (from 7.4% to 69.2%) in Group 4. Meanwhile, variation of CS rate between different hospitals in Groups 5–10 was less significant and the ratio of the highest to the lowest CS rate in these groups was only up to 2.5 (Table 2).

It was found that Groups 1, 2 and 5 made the largest contribution to the overall CS rate not only in all institutions, but also in hospitals providing health care of different level and accounted from 60.9% of overall CS rate in tertiary level hospitals to 72.1% in IIA level hospitals (Fig. 2). In addition, CS rate in nulliparous women with single cephalic full-term pregnancy (Groups 1 and 2) had a greater impact on the total CS rate than CS performed for women with previous cesarean birth (Group 5) in all institutions as well as in hospitals providing health care of different level (Fig. 2).

4. Discussion

The analysis of more than 25,000 deliveries (91.3% of all deliveries in 2012) in 23 institutions providing health care of different level showed that Groups 1, 2 and 5 were the largest contributors to the overall CS rate and accounted for two thirds of total CS rate in Lithuania. Moreover, CS rate in nulliparous women with single cephalic full-term pregnancy (Groups 1 and 2) had a greater impact on the overall CS rate than CS rate in women with previous cesarean birth (Group 5). Similar findings were reported by other investigators [13–17].

Nulliparous women with single cephalic full-term pregnancy, who entered into labor spontaneously (Group 1) was the largest group among all delivering women representing one third of the obstetric population. This is a "normal" pregnancy group, therefore, CS is usually performed for complications of labor such as dystocia or fetal distress and CS rate in this group should be relatively low. There is opinion that the intrapartum care of the spontaneously laboring, single cephalic nulliparous women at term is a key indicator of obstetric care in the delivery ward [18]. In our study average CS rate in Group 1 (15.9%) was comparable to rates reported in other studies, in which it ranged from 7.5% to 23% [13,16,19,20]. However, the finding that the CS rate in this group in health care institutions differed as much as 22-fold (from 1.5% to 33.3%) clearly shows the big differences in obstetric practice in relation to the management of spontaneous labor across Lithuania.

Group 2 (nulliparous women with single cephalic full-term pregnancy, who underwent induction of labor or prelabor CS) was the fourth in this study (9.1% women), but CS rate (52.6%) in this group was higher than other published rates such as the 34.5% in the National Maternity Hospital in Dublin or 44.5% in Canada region [13,19]. Thus, Group 2 was the third largest

contributor to the overall CS rate. The CS rate in this group varied more than 6-fold (from 15.1% to 93.9%) between different institutions. These high CS rates in Group 2 indicate that a considerable proportion of women either had a high incidence of conditions that required labor induction or prelabor CS or had ending of pregnancy for other potentially non-medical reasons. The last mentioned explanation especially possible in hospitals providing health care of lower level, where the majority of delivering women should present low risk in general, thus without reasons for labor induction or prelabor CS. Recent research showed that the overall CS rate and its variation in 97%–99% depend on the CS rates in Group 1 and 2 [16,21,22]. It is also found that more often induction of labor in nulliparous women (Group 2) would have a negative impact on overall CS rates [16,21].

Multiparous women with single cephalic full-term pregnancy, who have not had a CS before and who entered into labor spontaneously (Group 3) was the second largest group, but the CS rate in this very low risk women group in this study was 3.9%. The CS rate in this group was slightly higher than in the National Maternity Hospital in Dublin (1.2%) or in nine perinatal centers (2.7%) and lower than in the medical institutions in Latin America (9.9%) [15,16,19]. The CS rate in Group 3 is usually small and constant and is used as the indicator to assess the quality of the data collection. If it is found to be greater than 3%, that figure is more likely to be due to inaccurate data collection or indicates that the CS was carried out in the absence of medical reason.

The CS rate in Group 4 (35.4%), in which women, unlike in Group 3, had induction of labor or prelabor CS, was significantly higher than other published rates, which ranged from 12.3%–23% [13,15,19,20]. In addition, the CS rate in this group in Lithuanian health care institutions differed more than 11-fold (from 7.4% to 83.3%). A high CS rate in this group (the same as in Group 2) shows a high incidence of high risk pregnancies or labor induction and prelabor CS for non-medical reasons.

Group 5 (women with single cephalic full-term pregnancy, who have already undergone at least one CS) was the third largest in this study (9.5% of the delivering women) and the high rate of CS in this group (80.6%) resulted that Group 5 was the highest contributor to the overall CS rate (around one third of total CS rate). In this study, the CS rate in Group 5 was comparable to published rates in the Latin America (83%) and higher than in other parts of the world, where it ranged from 60% to 63% [15,16,19]. Recent studies have shown that the size of this group is increasing and accounted for 11.3% to 18.8% of all delivering women [13,16,23]. A large number of CS in other groups, particularly in Group 1 and 2, will inevitably increase Group 5 and, as reducing CS in this group is likely to be very difficult, this group will become an even more important contributor to the overall CS rate. Therefore, the effort to reduce the overall CS rate should be directed not only on increasing vaginal birth after CS, but in order to avoid the first CS.

In case of breech presentation, multiple pregnancies, abnormal fetal lies or preterm deliveries (Groups 6–10), the CS rate is likely to significantly exceed the average number of operations, but these groups are small and contribute relatively little to overall CS rates. In this study CS in Groups 6–10 accounted for one-fifth of the overall CS rate.

Robson TGCS has been used in a number of institutions and regions worldwide over the past decade [13,16,17,19,20,23,24]. In this study, for the first time we analyzed the CS birth data of all medical institutions in Lithuania and identified the main groups of women who most contributed to the overall CS rate in 2012. Moreover, significant variation of CS rates between different institutions was observed, especially in women with single cephalic full-term pregnancy without previous CS (Groups 1–4), showing big differences in obstetric care across country. We provided continuous educational assistance along the course of study in order to avoid misclassification, but inaccurate data collection in some hospitals might happen. However, unusually high CS rates in Groups 2, 3 and 4 in some hospitals [25] and significant variation of CS rates between different institutions, shows differences in obstetric care and that the CS was carried out for potentially non-medical reasons. In order to attempt to understand practices in certain obstetrics groups, closer monitoring and more in-depth analysis are needed and relevant effective actions to optimize CS rates are advised. It seems that efforts to reduce the overall CS rate should be focused on increasing vaginal birth after CS and reducing CS rates in nulliparous women with single cephalic full-term pregnancy (Groups 1 and 2). In order to continue monitoring and analysis of CS rates and to evaluate the strategies to decrease CS rates, TGCS should be used continuously in all health care institutions in Lithuania.

5. Conclusions

Women in Groups 1, 2, and 5 were the largest contributions to the overall CS rate in Lithuania. It seems that efforts to reduce the overall CS rate should be directed on increasing vaginal birth after CS and reducing CS rates in nulliparous women with single cephalic full-term pregnancy (Groups 1 and 2).

Conflict of interest

The authors state no conflict of interest.

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