*JMS 2024;Vol 7 (1):108-116*
*UDC:618.5-089.888.61(497.7)"2016"618.5-089.888.61(497.7)"2021*
*https://doi.org/10.55302/JMS2471108s*

# IMPLEMENTATION OF ROBSON'S CLASSIFICATION SYSTEM IN THE SECOND LARGEST HOSPITAL IN NORTH MACEDONIA - FIRST RESULTS

Kristina Skeparovska[1,2], Ana Kocevska [2,3], Maja Mitevska[4], Lidija Kalanoska-Atanasovska[3], Ivan Koprivnjak[5]

[1]University Clinic of Gynecology and Obstetrics - Skopje, Republic of North Macedonia
[2]Faculty of Medicine-Skopje, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia
[3] Specialized Hospital for Gynecology and Obstetrics "Mother Teresa"-Skopje, Republic of North Macedonia
[4] PHI General Hospital-Kumanovo, Republic of North Macedonia
[5] PHI Clinical Hospital- Tetovo, Republic of North Macedonia

**Abstract**

Introduction: The number of pregnant women that gave birth via cesarean section (c-section, c/s) increases constantly through years all over the world. Analyzing and revising the major indications that urge c-section did not reduce its number. Introduction of new classification by Robson, that allows categorizing of each pregnant woman into appropriate group is a new attempt and tool for achieving this goal.

Materials and method**:** All pregnant women who gave birth in Specialized Hospital for gynecology and obstetrics "Mother Teresa" from 01.01.2021 till 31.12.2021 and from 01.01.2016-31.12.2016 were enrolled in this study. The data regarding the obstetrics characteristics, the course of labor as well as the mode of delivery and the main indications for C-Section were collected retrospectively from hospital records and the subjects were classified into appropriate Robson group.

Results: The total number of C-Section deliveries in 2021 was 13.8% higher than in 2016 reaching 41% of all deliveries. The major contribution to C/S rate with 33.4% was made by

R5A group, followed by R2B group (prelabor C/S in nulliparous women) with 16.5%, and R1 group (nulliparous women with spontaneous onset of labor) with 14.2%. The exclusive mode of delivery by c-section, with none vaginal birth was seen in R6 and R7 (along with R9 group). Almost exclusive mode of delivery with c-section, with a rate above 95% was recorded in R5 and R8 group.

The two leading causes for C-Section in women with spontaneous onset of labor regardless of parity were: failed induction and functional dystocia. The main reason in nulliparous women for prelabor c-section was pregnancy achieved by in vitro fertilization, while in multiparous (R4B group) -placenta previa was the most common cause.

Conclusion: The obstetricians should be encouraged to undertake TOLAC, and encouraged not to refrain from vaginal birth in breech presentation pregnancy and vertex twin pregnancy. The methods for induction of labor should be revised. The indications for c-section should be revised.

***Keywords:*** Robson classification, c-section, IOL, TOL.

**Introduction**

The number of pregnant women that delivered via cesarean section (C-section) increases constantly through years all over the world. The analysis and revision of the the major indications that lead to c-section did not succeed to decline its number. Introduction of new classification, so-called Robson classification appears to be a promising new tool to achieve this goal.

The Robson classification, also known as a ten-group classification system, is a system used to categorize and analyze data related to C-sections in maternity care. It was developed by Dr. Michael Robson and is widely used to classify and compare C-section rates across different healthcare facilities, regions, or countries. The classification system categorizes each pregnant women into one of ten mutually exclusive groups based on specific obstetric characteristics and the course of labor [1].

The ten groups in the Robson classification are determined by factors such as:

- Previous uterine scar (presence or absence of a previous C-section).
- Singleton or multiple pregnancies.
- Gestational age (preterm or term).
- Fetal presentation (cephalic, breech, transverse).
- Spontaneous onset of labor versus induced labor.
- Number of fetuses (single or multiple) (table 1).

**Table 1.** The Robson's classification group

| Groups | Clinical characteristics |
|---|---|
| 1 | Nulliparous, singleton, cephalic, ≥ 37 weeks, spontaneous labor |
| 2 | Nulliparous, singleton, cephalic, ≥ 37 weeks, induced labor or cesarean section before labor |
| 3 | Multiparous without previous cesarean section, singleton, cephalic, ≥ 37 weeks, spontaneous labor |
| 4 | Multiparous without previous cesarean section, singleton, cephalic, ≥ 37 weeks, induced labor or caesarean section before labor |
| 5 | Multiparous with prior cesarean section, singleton, cephalic, ≥ 37 weeks |
| 6 | All nulliparous breeches |
| 7 | All multiparous breeches (including previous cesarean section) |
| 8 | All multiple pregnancies (including previous cesarean section) |
| 9 | All pregnancies with transverse or oblique lie (including those previous cesarean section) |
| 10 | Singleton, cephalic, ≤ 36 weeks (including previous cesarean section) |

By classifying women into these groups, healthcare providers and researchers can better understand and compare C-section rates for specific patient populations. This classification helps identify areas where interventions or improvements in care may be needed to reduce unnecessary C-sections and improve overall maternity care outcomes.

In 2015, WHO (World health organization) proposed using of the Robson classification in order to optimize the use of caesarean section in maternity care [2].

WHO has taken a step forward providing this platform for research and sharing of data on caesarean sections. The platform provides access to global data on caesarean section rates and associated maternal

and perinatal outcomes at the healthcare unit and country level, allowing monitoring and comparison of caesarean section rates, processes of care and outcomes across facilities and countries [3]. The platform is open for all countries that are will to share the collected data.

First results regarding Robson classification in North Macedonia were published in 2021 [4].

Aim of the study: To evaluate cesarean section rate in Specialized Hospital for Gynecology and Obstetrics "Mother Teresa" – Skopje (SHGO Mother Theresa Skopje) by using the Robson's classification system for 2021, and compare the results with results of: the same hospital for 2016, University Clinic for Obstetrics and Gynecology-Skopje and with researchers abroad.

**Methods and materials**

This research was conducted at a Specialized Hospital for Gynecology and Obstetrics "Mother Teresa" – Skopje (SHGO "Mother Theresa" Skopje)- the second largest hospital in North Macedonia with about 4000 deliveries per year. It was a retrospective – comparative study. The subjects were all pregnant woman admitted for childbirth in SHGO "Mother Theresa" Skopje in 2021 and 2016. Retrospectively, we collected patients data from the medical history. Then, we used the Robson's classification system to sort the patients into groups and then analyzed the pregnancy outcome in terms of mode of delivery and compared the results with other researchers.

Exclusion criteria were:

- Fetal demise prior admission
- Lack of information and data for categorization

**Results**

In summary, the results of the study are presented in the following tables (table 2 and table 3) for 2021 and 2016 respectively.

**Table 2.** Robson classification for 2021

| **2021** | Total number of deliveries **3872**<br>• 59% vaginal deliveries<br>• 41% cesarian sections | | Absolute contribution to C/S rate per group | **Relative contribution to C/S rate per group** |
|---|---|---|---|---|
| **Robson's Classification group** | **Type of delivery** | **Two most common indications for cesarean section** | | |
| **R1 group - 30%** of total deliveries | 81% vag.deliveries | | | |
| | **19% C/S** | Functional dystocia<br>Abnormal FHR (fetal heart rate) | 5.7 | **14.2** |
| **R3 group - 31% of total deliveries** | 96% vag.deliveries | | | |
| | **4% C/S** | Functional dystocia<br>Abnormal FHR | 1.2 | **3** |
| **R2A group - 4.8%** of total deliveries | 41% vag.deliveries | | | |
| | **59% C/S** | Functional dystocia<br>Failed induction | 2.8 | **7** |
| **R2B group - 6.6%** of total deliveries | **100% C/S** | IVF<br>Infertility | 6.6 | **16.5** |
| **R4A group - 1.4%** of total deliveries | 81% vag.deliveries | | | |
| | **19 % C/S** | Failed induction<br>Functional dystocia | 0.3 | **0.7** |
| **R4B group - 1.3 %** of total deliveries | **100% C/S** | Fibroid<br>Placenta previa | 1.3 | **3.2** |
| **R5.1 group - 14%** of total deliveries | 4 % vag.deliveries | | | |
| | **96% C/S** | Previous C/S | 13.4 | **33.4** |
| **R5.2 group – 3%** from total birth | / | Previous C/S | | |
| | **100% C/S** | | **3** | **7.5** |
| **R5.3 group -0.2 %** of total deliveries | / | Previous C/S | | |
| | **100% C/S** | | **0.2** | **0.5** |
| **R6 group - 2.3%** of total deliveries | / | | | |
| | **100% C/S** | Breech presentation | 2.3 | **5.7** |
| **R7 group - 1.5%** of total deliveries | / | | | |
| | **100% C/S** | Breech presentation | 1.5 | **3.7** |
| **R9 group - 0.4%** of total deliveries | / | | | |
| | **100% C/S** | Transverse lie | 0.4 | **1** |
| **R8 group - 1%** of total deliveries | 2.6% vag.deliveries | | | |
| | **97.3% C/S** | Twin pregnancy | 1 | **2.5** |
| **R10 group - 1.2%** of total deliveries | 70% vag.deliveries | | | |
| | **30% C/S** | Previous C/S<br>PROM | 0.4 | **1** |

**Table 3.** Robson classification for 2016

| **2016** | Total number of deliveries **3397**<br>• 64% vaginal deliveries<br>• 36% cesarian sections | | Absolute contribution to C/S rate per group | **Relative contribution to C/S rate per group** |
|---|---|---|---|---|
| **Robson's Classification group** | **Type of delivery** | **Two most common indications for cesarean section** | | |
| **R1 group – 28%** of total deliveries | 78% vag.deliveries | | | |
| | **22% C/S** | Functional dystocia<br>Abnormal FHR | 6.2 | **17.5** |
| **R3 group – 36%** of total deliveries | 96% vag.deliveries | | | |
| | **4% C/S** | Functional dystocia<br>Abnormal FHR | 1.4 | **3.9** |
| **R2A group -6%** of total deliveries | 50% vag.deliveries | | | |
| | **50% C/S** | Functional dystocia<br>Failed induction | 3 | **8.8** |
| **R2B group 4%** of total deliveries | **100 % C/S** | IVF<br>Infertility | 4 | **11.3** |
| **R4A group- 2.7%** of total deliveries | 88% vag.deliveries | | | |
| | **12% C/S** | Failed induction<br>Functional dystocia | 0.3 | **0.8** |
| **R4B group -0.7%** of total deliveries | **100% C/S** | Fibroid<br>Placenta previa | 0.7 | **2** |
| **R5.1 group -14%** of total deliveries | 13 % vag.deliveries | | | |
| | **87% C/S** | Previous C/S | 12.2 | **34.5** |
| **R5.2 group- 3%** from total deliveries | / | Previous C/S | | |
| | **100 % C/S** | | **3** | **8.5** |
| **R5.3 group - 0.2%** of total deliveries | / | Previous C/S | | |
| | **100 % C/S** | | **0.2** | **0.6** |
| **R6 group -2.3%** of total deliveries | 2.5 % vag.deliveries | | | |
| | **97.5% C/S** | Breech presentation | 2.2 | **6.2** |
| **R7 group -0.9%** of total deliveries | 13 % vag.deliveries | | | |
| | **87% C/S** | Breech presentation | 0.8 | **2.3** |
| **R9 group – 0.2%** of total deliveries | / | | | |
| | **100% C/S** | Transverse lie | 0.2 | **0.6** |
| **R8 group -0.8%** of total deliveries | 3 % vag.deliveries | | | |
| | **97 % C/S** | Twin pregnancy | 0.8 | **2.3** |
| **R10 group -1.6%** of total deliveries | 77% vag.deliveries | | | |
| | **23% C/S** | Previous C/S<br>Placental abruption | 0.4 | **1.1** |

In 2016 there were 3397 births from which 2184 were vaginal spontaneous deliveries and the remaining 1213 were performed by cesarean section (64 % spontaneous vaginal deliveries vs 36% cesarean sections).

Among nulliparas who underwent induction of labor (IOL), 50% had spontaneous vaginal birth, while the remaining 50 % of women gave birth by cesarean section. Among multiparas with IOL, 88% of inductions resulted in spontaneous vaginal birth. The remaining 12 % women gave birth by CS. In both groups, most common indications for cesarean section were failed induction and functional dystocia.

Every 9$^{th}$ nulliparous (11%) had pre-labor C/S due to a pregnancy achieved by IVF or after prolong period of infertility.

77 out of 79 pregnancies in breech presentation in nulliparous women were completed by cesarean -section. The remained 2 women delivered spontaneously. Among the 55 multiparous women with pregnancies in breech presentation, 51 of them delivered by cesarean section. The remaining 4 delivered spontaneously.

13% of women with one previous cesarean section gave birth vaginally on subsequent pregnancy.

2021 was a year with 3872 deliveries of which 2284 were vaginal spontaneous deliveries and 1588 of pregnancy were ended by cesarean section (59 vs 41% respectively).

5 years after the previous results, the number of induced nulliparous women who gave birth spontaneously decreased to 41%. Remaining 59 % nullips were delivered by cesarean section due to failed induction. Even in multiparous, the number of successful IOL decreased from 88% to 81%. The two main causes for C/S remained unchanged.

13% of all nullips had pre-labor C/S with same indications as in 2016 (IVF or pregnancy achieved after long period of infertility).

All nulliparous with pregnancies in breech presentation, had cesarean delivers. Among the 55 multiparous pregnancies in breech presentation, we report no vaginal delivery.

4% of women with one previous cesarean section had spontaneous vaginal delivery. The remaining 96% gave birth by C/S.

**Discussion**

The overall c-section rate increased by 13.8% from 2016 to 2021, reaching a rate of 41% of all deliveries in 2021. This is much higher than the rate of 15% -defined by the WHO as the rate beyond which there is no improvement in maternal and neonatal outcomes [2]. Compared to other countries, we have twice as many cesarean sections as Slovenia, 2,4 times more than Netherlands, three times more than Norway (figure 1).

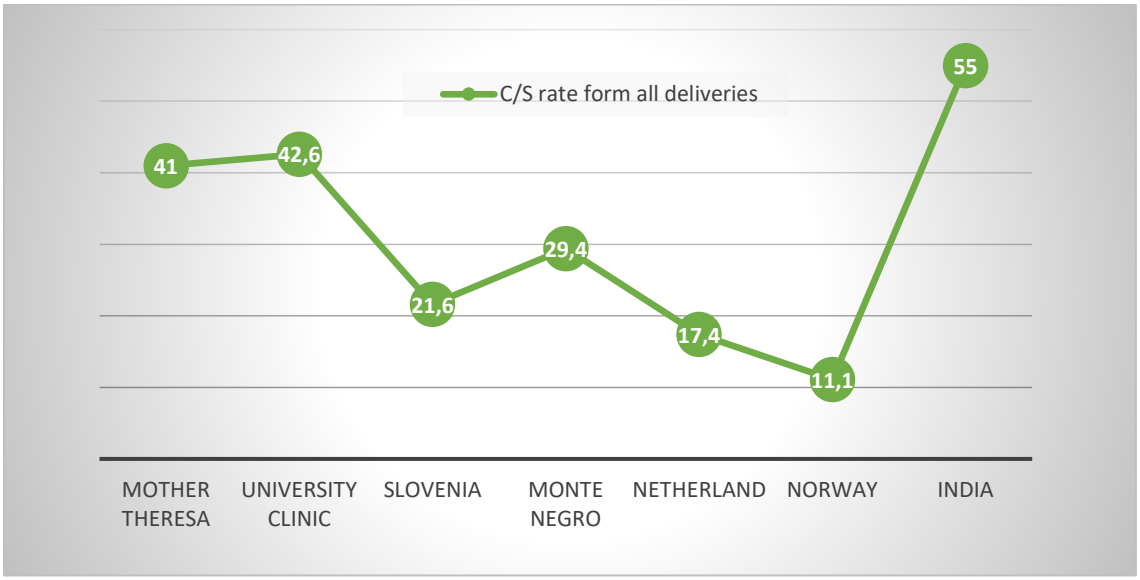


**Fig 1.** Overall rate of cesarean section among different countries

This increasing of overall C/S rate was distributed in almost all Robson's groups except for the R1 group where it showed a decrease (22% to 19%), while the R3 and R8 groups remained unchanged. Of particular concern was the result that the highest increase was observed among the women with induction of labor equally, regardless of parity (R2A -18%, R4A -18%). Delivery almost exclusively by c-section was observed in women with one previous C/S (96%) which was not the case 5 years earlier (87%). The same outcome was found in multiparous in breech presentation (100 vs 87 %) (figure2).

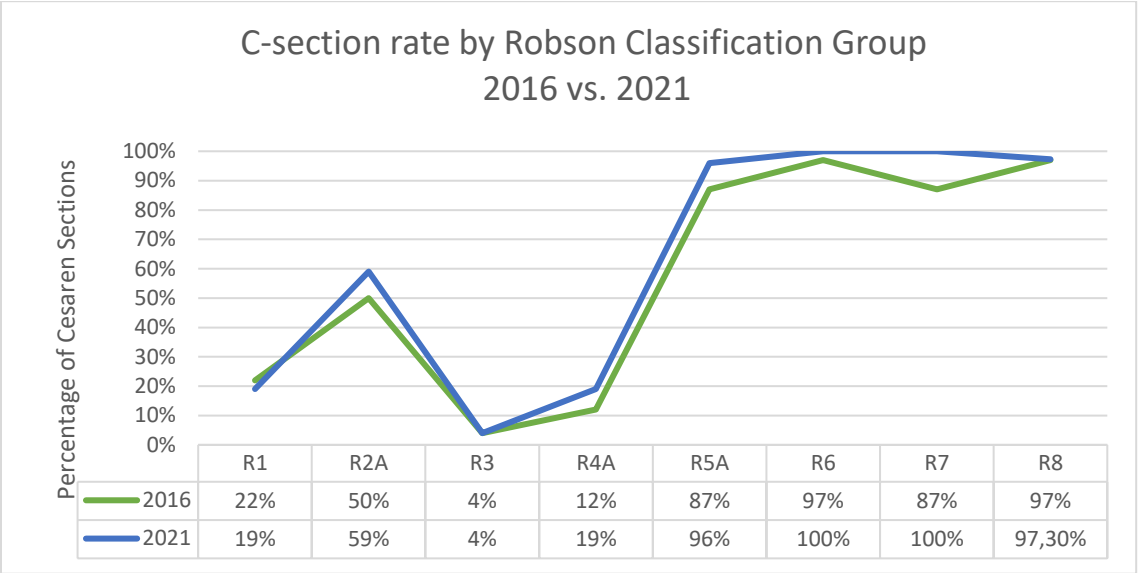


**Fig 2.** Cesarean section rate: 2021 vs 2016

The main contribution to overall C/S rate in 2021 was R5A group, meaning that 33.4% of all c-sections were performed in patients with one previous C/S. With a C/S rate of 96% in all patients with one previous C/S, a reasonable assumption was made that this hospital does not attempt a TOLAC (trial of labor after caesarean).

The next contributor to overall C/S rate, with a rate of 16.5 % of all caesarean deliveries was R2B group. That means that every sixth woman who underwent C-Section was a nulliparous with pre-labor (elective) c-section. The most common indication for elective surgery was a pregnancy achieved by some assisted reproductive technique, or even a pregnancy achieved spontaneously after a certain period of infertility.

The third contributor was R1 group. The results showed that 14.1% of nulliparous with spontaneous onset of labor, underwent C/S, with main indication being functional dystocia or abnormal FHR.

The comparison of ours with the results of the University Clinic for Gynecology and Obstetrics (UCOG) in Skopje (obtained through a similar study conducted by Kjaev et al) [4] is shown in figure 3.

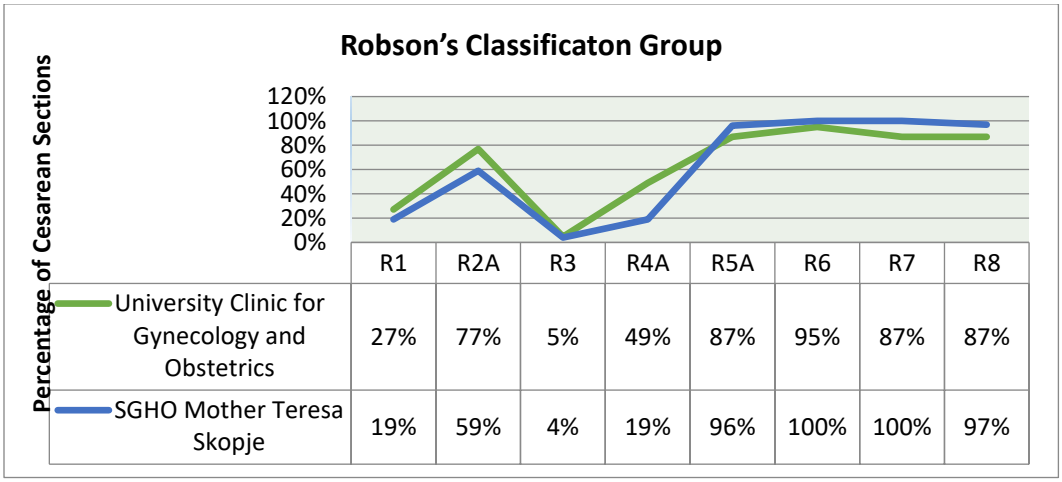


**Fig 3.** SHOG "Mother Teresa"-Skopje vs UCOG -Skopje

**Table 4.** C/S rate in different countries by using Robson classification

| | R1 | R2A | R3 | R4A | R5 | R6 | R7 | R8 |
|---|---|---|---|---|---|---|---|---|
| "Mother Teresa" -Skopje | **19** | 59 | **4** | **19** | **96** | **100** | **100** | **97** |
| UCOG- Skopje | **27** | 77 | **5** | **49** | **87** | **95** | **87** | **87** |
| Slovenia* | 10 | 26 | 1.5 | 9 | 85 | 87 | 70 | 53 |
| Montenegro | 11 | 75 | **1** | 11 | 94 | 92 | 80 | 69 |
| Netherland | 11 | 22 | 2 | 7 | 51 | 65 | 63 | 46 |
| Norway | **6** | **19** | **1** | **3** | **41.5** | **61** | **44** | **23** |
| India | 17.5 | 50 | 4 | 10 | 86.5 | 94 | 93 | 50 |

We found that Special Hospital for Gynecology and Obstetrics "Mother Teresa" has 1.3 and 2.6 times better performance in IOL in nulliparous and multiparous respectively. However , "Mother Teresa" does not perform TOLAC, nor attempt vaginal delivery in breech presentation and in twin pregnancy while UCOG does to some extent [4]

We also compared our results with those of other countries. To gather information we used the database available on the WHO - Robson's classification platform [3].

We specifically selected countries from different regions around the world, such as Norway from Scandinavia, the Netherlands from Central Europe, Slovenia, Montenegro and North Macedonia from the Balkans, and India as a representative of the Asian continent. We selected public hospitals with a number of approximately 4000 deliveries per year, which was similar with our hospital as well as with UCOG.

The extracted results from the platform (given in integer) are shown in table 4.

The analysis showed that among selected countries, "Mother Teresa" has the highest number of c-sections in nulliparous women who had spontaneous onset of labor , twice as high as Slovenia, three times higher than Norway.

The same applies to multiparous with spontaneous onset of labor: the highest number of c- sections, almost three times higher than Slovenia, 4 times higher than Montenegro and Norway. IOL in nulliparous failed more than twice as compared to Slovenia. More over, we have three times the failure rate of Norway. IOL in multiparous had even worse results: 19% failure vs 9% for Slovenia, vs 7% for Netherlands, or 3% for Norway.

Only 4% of women with one previous C/S had a successful VBAC (vaginal birth after cesarean), which is a result similar to Monte Negro (6%), but in contrast to India (13.5%) and Slovenia (15%).

The outcome, in favor of vaginal birth, was far better in Netherlands where one in two women with one previous C/S (or 49%) gave birth vaginally, or in Norway which has a vaginal delivery rate of 58.5%.

"Mother Teresa" had 100% caesarean rate for breech pregnancies regardless of parity and for twin pregnancies which is incomparable with Norway or Netherlands. Slovenia showed a 30 % vaginal delivery rate for multiparous breech and 47% for twin pregnancies.

In Montenegro, every fifth multiparous woman with breech pregnancy and every third (30%) twin pregnancy achieved vaginal delivery [3].

**Conclusion**

Cesarean section rate tends to increase over time. Considering that the greatest increase in the cesarean rate was in the R2A and R4A group, the methods and protocols for induction of labor must be revised. Given the highest contribution to the cesarean rate of the R5A group, the obstetricians should be encouraged to perform TOLAC in eligible patients with one previous c-

section. Obstetricians must be well trained to assist in vaginal delivery of a fetus in breech presentation and offer the same, especially to well-selected multiparous women. The obstetricians should be emboldened not to refrain from vaginal delivery in twin vertex pregnancy.

The indications for pre-labor C/S should be revised and narrowed. Considering that "functional dystocia" was the leading indication for cesarean section in women with spontaneous onset of labor, revision should be done when labor meets the criteria for this condition.

Considering the frequent citation of abnormal fetal heart rate as an indication for c-section, a thorough search for possible iatrogenic causes of such condition should be conducted in order to eliminate them.

The introduction and implementation of the Robson classification can be a useful tool to decrease cesarean rate.

**References**

1. Robson M, Murphy M, Byrne F. Quality assurance: The 10-Group Classification System (Robson classification), induction of labor, and cesarean delivery, Int J Gynecol Obstet 2015;131:23-7.
2. World Health Organisation.: WHO Statement on Caesarean Section Rates 2015; 7 (3): 4-7.
3. World Health Organization; The Robson Classification Platform; 2021 https://Robson-classification-platform.srhr.org/hospital-listing
4. Kjaev I, Daneva A, Asani P, et al. Robson classification of cesarean section in North Macedonia - current trends. Mac. Med. Preview 2021; 8(3): 4-6.