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Analysis of caesarean-section rates at an Urban Municipal Maternity Hospital according to Robson's ten group classification system

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Abstract
Background: Rising caesarean rates have been a matter of concern. The WHO proposes that health care facilities should use the Robson's 10 group classification system to audit their Caesarean sections (CS) rates. This would not only help understand CS rates at individual health facilities but also to identify key population groups, indications in each group and suggest mechanisms to reduce these rates.
Methods: This was a cross sectional study for a period of 24 months at a municipal maternity care hospital in an urban setting in Maharashtra, India. Women who delivered during this period were included and classified into 10 Robson's classes and percentages were calculated for the overall rate, the representation of groups, contribution of groups and Caesarean percentage in each group.
Results: Highest contribution was by Group 5 and Group 2. Together these two groups contributed to 21.3% of the total Caesareans, followed by Group 1, 8 and 10. All five added contributed to 28.11% of the section rate. The least contribution was by Group 7.
Conclusions: The contribution of the various Robson's Group to the total CS rates needs to be analysed. Reducing primary section rates by good clinical interventions like versions, adequate counselling and encouraging for TOLAC, judiciously diagnosing dystocia and non-reassuring fetal status could reduce the contribution of Robson's groups towards the absolute CS rates.

Keywords: caesarean section, robson's classification

Introduction
The caesarean section (CS) rates have shown a rising trend in both developed and developing world over the past few decades [1, 3].
Even as the developed countries like the Unites States have shown a steep rise seen rates of Caesarean Sections from 1996 to 2011 [4], the developing world too has seen a similar increase. Countries in south East Asia and sub Saharan Africa have recorded increases in CS rates though they vary widely from one country to the other [5, 6]. In India the average C-Section rate till 2006 stands at 8% as per the World Health Organization (WHO). This is an increase over the rates recorded in 1992 (2.4%) and subsequently 1996 (6.8%) [7]. But this national rate of 8% can well mask the differences within the country and national data after 2006 is not available. India has substantial variations in the availability, quality and acceptability of health care facilities including maternal health. Tertiary care centres have high C-Section rates but areas where health care facilities are not available may have unacceptable maternal/ neonatal mortality and morbidity due to lack of C-Section facilities [8, 10].
Hence, it would be prudent to assess caesarean section rates in an urban municipal maternity hospital which could provide an estimate of CS rates in the population which is catered to by that centre.
The analysis of CS rates by Robson's 10 group classification system could be used for internal audit and as advised by WHO, suggest strategies for reduction in CS rates. This classification would also help understand the internal structure of these rates at individual health facilities and specific population groups [11, 13].
The aim of identifying the indications that lead to each group's contribution to the CS rates would help in formulating guidelines to reduce rates within groups without compromising maternal and fetal outcome. The WHO issued has issued an official statement regarding CS rates and recommended the use of the Robson classification as a tool for optimizing the CS rate at health care facilities [14].
With this in mind we framed the following objectives for our study.

AIMS and objectives
- To classify our population into the 10 Robson's groups
- To identify which among these groups have the highest C-Section rates
- To formulate plans of reducing these rates

Methods
Approval was obtained from the Institutional Review Board (IRB). This was a cross sectional study was conducted for a

period of 24 months from March 2015 to February 2017 at an urban municipal maternity hospital in Maharashtra, India. All the women delivered during this period whether booked or unbooked were included. All relevant information (see below) which would help to classify the women according to the Robson's 10 classes were entered into an excel chart on a monthly basis. Results were calculated at the end of 24 months.

Percentages were calculated for the overall rate, the representation of the group's contribution of each group to the overall rate and percentage in each group.

There are two classifications one is the original Robson's and the other is its modified version.

We used the original Robson's classification which goes as follows:

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1. Nulliparous, single cephalic, >37 wks in spontaneous labor.
2. Nulliparous, single cephalic, >37 wks, induced or CS before labor.
3. Multiparous (excluding previous CS), single cephalic, >37 weeks in spontaneous labor.
4. Multiparous (excluding previous 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 wks (including previous CS).

Results

The total number of women who delivered was 2668. There were 2727 live births as 59 were twins. The total numbers of C-Sections were 884 and the overall C- Section rate for this period of time at our hospital was 33.13 (Table 1).

Table 1: Data as per the Robson's groups in our study.

Robsons group	Total patients in group	Relative Size (%)	CS rate (%)	CS/all live births (%)
1	913	34.22	7.9 (73 C Sections)	2.67
2	540	20.23	40 (216 C Sections)	7.92
3	236	8	16.95 (40 C Sections)	1.46
4	145	84	28.9 (42 C Sections)	1.54
5	430	5.43	84.88 (365 C Sections)	13.38
6	42	16.11	100 (42 C Sections)	1.54
7	27	1.57	96.29 (26 C Sections)	.99
8	108	1.01	54.6 (59 C Sections)	2.16
9	11	4.04	72.7 (8 C Sections)	.29
10	216	.41	25 (54 C Sections)	1.98
Total	2668	8.09		

We calculated CS rates separately for booked and un- booked cases.

Booked cases were defined as having had three antenatal check-ups with us as defined by the Ministry of Health and Family Welfare of India guidelines [15]. The C-Section rate for un-booked cases was 57.65% (354 sections out of 614 deliveries) and that of booked cases was 25.8% (530 out of 2054 deliveries) (Table 2).

Table 2: Section rates in booked and un-booked cases.

	Total number of deliveries	Caesarean Sections	%
Booked Cases	2054	530	25.8
Un-booked cases	614	354	57.65

Contribution to the total section rates was highest by Group 5 followed by Group 2. Together these two groups contributed to 21.3% of the total Caesareans Then came group 1, 8 and 10. When all five groups were added they contributed to 28.11% of the section rate. The least contribution was by Group 7 (Table 1).

Percentage wise groups 6 and 7 had the greatest section rates, almost all had 100% section rates meaning all women in these two groups underwent CS. Followed by group 5 and 8 which had 84.88% and 54.6% respectively (Table 1).

Discussion

Overall C-section rates

Our overall C-Section is 33.13 %. WHO proposes that at a population level caesarean section rates higher than 10% are not associated with reductions in maternal and new born mortality rates. Our higher rates reflect the hospital section rate and not the population section rate. The study was carried out at a referral municipal hospital which is completely dedicated for patients of obstetrics and gynaecology. The hospital receives several referrals from centres not well equipped. To be truly representative of the population section rate we have to include the live births in all other hospitals in this district When compared to other countries our rates were comparable to those of the USA (31.1%) and Australia (30%) and to those of the Asian countries (27.3%) [16, 20].

Section rates for un-booked cases were higher than the booked cases which could be explained by last minute referrals, unavailability of section and transfusion facilities at the primary booking centre or other logistics.

For further comparisons we have used a study published in the Lancet in 2012 [21]. This study has reported deliveries in 287 facilities in 21 countries that were included in both the WHO Global Survey of Maternal and Perinatal Health (WHOGS; 2004-08) and the WHO Multi-Country Survey of Maternal and New born Health (WHOMCS; 2010-11). Using this data countries were stratified according to Human Development

Index (HDI) groups (very high/high, medium, or low) and the Robson criteria were applied to both datasets. The relative size of each Robson group, the caesarean section rate in each Robson group, and the absolute and relative contributions made by each to the overall caesarean section rate was reported.

Representation of the Robson's groups

In our population Group 1 had the greatest representation followed by Groups 2 and 3. We compared this representation with other countries categorized based on Human Development Index which also showed the same trend. India is categorised under Medium HDI.

Group 5 has the greatest absolute contribution to the C-Section rates in our study and this was echoed in the Lancet article where all three HDI category countries were compared and group 5 was found to have the largest contribution. However the next greatest contribution to the absolute C-section rate was by Group 2 in our study whereas the Lancet study uniformly finds the group 1 to be the next greatest contributor irrespective of the HDI status of the country.

Analysis of the indications for C-section in these two groups

In Group 5 out of 430 in this group 365 underwent C- Section. 65 women were fit for and were offered VBAC.

It appears that with this group counselling and preparedness for VBAC may be the means to decrease section rates. Of the ones that agreed for VBAC non progress and non- reassuring fetal status were the chief indications for section.

In Group 2 again the chief indications for C-Section were non progress and non-reassuring fetal status.

It would be therefore be prudent to address these two most important indications contributing to high C-Section rates in both these groups In this context it would be good to follow the guidelines (March 2014) developed jointly by the American college of Obstetrics and Gynaecologists and the Society for Foetal and Maternal Medicine for safe reduction of caesarean section rates [22].

Remedial measures suggested reducing rates

For dystocia

a) Consider the threshold of 6cm (not 4cm as earlier) dilatation as the beginning of the active phase.
b) Latent phase could be prolonged beyond 20 hours in primi-para (earlier 12) and 14 hours (earlier 8) in a multi-para.
c) Consider arrest only if no progress after 4 hours of adequate uterine contractions or 6 hrs with oxytocin infusion.
d) Do not apply rules of progress of labour before 6cm dilatation.
e) In second stage Allow for pushing for two hours in multipara and three hours in primipara.
f) Rotate occiput manually.
g) Try instrumental delivery.

For non-reassuring foetal status

a) Improve the documentation of the non-reassuring status.
b) Categorize foetal heart rate tracing whereby Category I is normal, Category III which is ominous requiring immediate delivery and the rest as Category II. -For Category II try, as well as.
c) Document resuscitative measure like maternal repositioning, oxygen supplementation and scalp stimulation to illicit acceleration.

Group 1 in our study had a considerably lesser contribution to the absolute C-Section rates which is of great importance in reducing primary section rates and should be maintained or even improved.

Groups 6 and 7 had lesser representation but almost 100% C-Section rates. CS rates in group nine could be reduced by versions. Both primi and multi particularly those with un-scarred uterus could undergo versions and stabilizing inductions. Also breech delivery in multis could be promoted.

Conclusion

Even though the overall CS rate in the study is not high as compared to international studies, the contribution of the various Robson's Group to the absolute C-Section rates needs to be looked into. Reducing primary section rates, adequate counselling and encouraging for VBAC, changing the norms for dystopia and non-reassuring fetal status, training and encouraging obstetricians to perform versions when not contraindicated could reduce the

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