

ROBSON CLASSIFICATION FOR CAESAREAN DELIVERY RATES AND EARLY PREGNANCY OUTCOMES AT PUMWANI MATERNITY HOSPITAL-KENYA.

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ABSTRACT

Background: There has been growing concern over increasing Caesarean Section (CS) rates due to potential increase in maternal and perinatal risks. In 2011, the World Health Organization (WHO) proposed the Robson Classification system as a global standard for assessing, monitoring and comparing CS rates within health-care facilities over time, and between facilities. We used the Robson classification to analyze the CS rates in a busy County Maternity Hospital in Kenya and its association with early perinatal outcomes.

Methodology

Study design: This was a descriptive one-year retrospective cohort study in which records of 499 women who underwent caesarean section between 1st January 2016 to 31st December 2016 were reviewed at Pumwani Maternity Hospital in Nairobi County-Kenya.

Data analysis: All women were categorized into Robson groups. We estimated the CS rate and the absolute and relative contributions made by each Robson group to the overall CS rate and the association of each group with selected early maternal and perinatal outcomes. Differences were analyzed through chi-square and the Z-test with a significance level of <0.05. Data were analysed using STATA-version 12.

Results: The Robson groups with the highest contribution to the CS rates were: Group 1(the nulliparous, at term, single gestation, spontaneous labour), Group 5 (all multi-parous women, at least one previous uterine scar, single gestation, cephalic, at term), and Group 3 (multi-parous, no uterine scar, at term, single gestation, cephalic, spontaneous labour) at 36%, 24% and 24% respectively. The early pregnancy outcomes: Apgar scores <7 at 5 minutes, severe postpartum haemorrhage, maternal and neonatal death within 24 hours, were similar across all the 10 Robson groups.

Conclusion: Robson classification was easily applied and identified low-risk women as the largest contributors to the CS rates at Pumwani Maternity Hospital. Additional studies should evaluate indications for CS and identify strategies for reducing CS in this low-risk obstetric population.

INTRODUCTION

Worldwide, there is an alarming increase in Caesarean section (CS) rates. When medically indicated, a CS helps reduce adverse maternal and perinatal morbidity and mortality. The World Health Organization (WHO) set the ideal rate for CS as 10-15% at the population level, but there has been

public concern over the increasing rates (1).CS rates higher than this, are not associated with significant reductions in maternal and newborn mortality rates and may instead have potential maternal and perinatal risks (2). Globally, CS rates have increased from 6% in 1990 to 19% in 2014 while it stands at 7% ,4% and 9% in Africa, East Africa and Kenya respectively (3) (4).

A standardized universal CS classification system, would identify the trends and contributors and if possible pregnancy outcomes of these rising rates. Close to 27 different classification systems have been described in literature to assess CS rates. In 2011, the WHO proposed the Robson Classification system as a global standard for assessing, monitoring and comparing CSs rates within health-care facilities over time, and between facilities (4). This classification system has widely been used in the United Kingdom, Ireland and Scandinavia, Canada, Brazil, Ethiopia among other countries. Other types of classification systems require data not routinely collected and may not be relevant in all settings (5). The Robson classification is as described in Box 1.

In order to propose and implement effective measures to safely reduce CS rates, it is first critical to evaluate the groups of women that contribute highest to the CS rates and the underlying indications in different settings. The aim of this study therefore was, to analyze CS rates and selected early pregnancy outcomes in a busy County Maternity Hospital in Kenya, using the Robson classification.

METHODOLOGY

Study design: This was a one-year descriptive retrospective cohort study, in which 500 records of women who were delivered by CS were reviewed to determine contributors to the overall CS rates and early pregnancy outcomes within 24 hours as per the Robson classification. Basic routine obstetric information was collected, from records of patients who delivered at the Pumwani Maternity Hospital between January 2016 and December 2016. Data were collected between February and April 2018.

Study setting: The study was conducted at the Pumwani Maternity Hospital, in Nairobi County-Kenya, the largest maternity hospital in East and Central Africa. The hospital offers 24-hour comprehensive obstetric care and has 2 dedicated maternity theaters. The government of Kenya since June 2013 has been providing free maternity health care across all public hospitals. Approximately, 30,000 deliveries are conducted annually, with an average of 6,000 of them being deliveries via CSs. For every 12 hour shift, the unit is ran by about 10 midwives, 3 medical doctors and 1 obstetrician.

Box 1: The Robson Classification

Group 1	Nulliparous, single, cephalic, >37weeks, spontaneous labor.
Group 2	Nulliparous, single, cephalic, >37 weeks, induced labor or Delivered by caesarean section before labor.
Group 3	Multi-parous women, no previous uterine scar, single, cephalic >37 weeks, spontaneous labor.
Group 4	Multi-parous women, no previous uterine scar,>37 weeks, either had induced labor or were delivered by elective caesarean section.
Group 5	All multi-parous women, at least one previous uterine scar, single, cephalic,>37 weeks gestation.
Group 6	All nulliparous women, single, breech pregnancy. (all nulliparous women with breech presentation)
Group 7	Multi-parous women, single, breech, Including women with previous uterine scars. (all multi-parous women with breech presentation)
Group 8	All women with multiple pregnancies ,including women with previous uterine scars. (all multiple pregnancies)
Group 9	All women with a single pregnancy, transverse, oblique, including women with previous uterine scars. (all abnormal lies)
Group 10	All women with single, cephalic, <37 weeks, including women with previous scars.

The Robson classification is a ten group classification system using 10 mutually exclusive and totally inclusive categories for caesarean section, meaning that all women can only be classified into only one group.

This classification uses 6 routinely collected obstetric information: Parity, gestational age, fetal lie and presentation, number of fetuses, previous CS, Onset of labor.

Study population: Women who had CS delivery at Pumwani Maternity Hospital at gestational age above 28 weeks, between 1st January 2016 and 31st December 2016.

Sample size and sampling criteria: Using the formula for finite population (less than 10,000), with $Z=1.96$ for 95% confidence level, E =desired precision of 0.05 and assuming highest CS rate per Robson classification of 20.5% (5), the calculated sample size was 242 records of women who underwent CS, with a contingency of 40% to compensate for incomplete records, giving a total of 403. To improve on the precision of the study, 500 medical records of women who were delivered by CS, were sampled. Sampling of the records was done in two stages: In the first stage, all CS records for the 12 months of the study period were serialized. In view of the seasonal fluctuations of the deliveries, the records were batched in quarters. Proportionate sampling was then used to identify the number of files to be picked from each quarter in the second sampling stage as demonstrated in Figure: 1

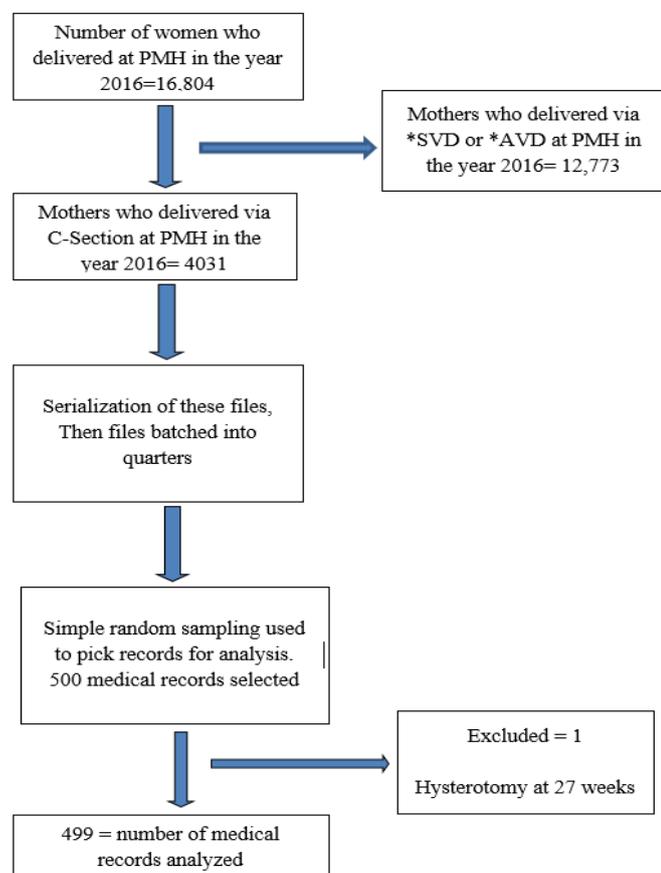


Figure 1: Study flow chart

KEY:

- *PMH-Pumwani Maternity Hospital
- *SVD-Spontaneous Vaginal delivery
- *AVD-Assisted vaginal deliveries

Data collection, management and analysis: Data were abstracted from patient files by trained assistants using a pre-tested data abstraction tool. Data were double entered into an Excel sheet, cleaned and coded. The data were analyzed using STATA-version 12. The study population was described using demographic and obstetric characteristics-as per the Robson classification system. Categorical variables were described using frequency tables. The continuous variables were described using the median and mean. Chi square test was used to test associations between maternal and neonatal outcomes and the different classifications based on Robson's classification.

Ethical considerations: Ethical and administrative approvals were obtained from the Kenyatta National Hospital/University of Nairobi-Ethics Review Committee (P712/11/2017) and Pumwani Maternity Hospital (PMH/DMOH/75/0248/2018) respectively.

RESULTS

A total of 4031 patient records were retrieved, after the two-stage sampling, 499 files were included for analysis.

Socio-demographic characteristics of the mothers who had CSs during the study period

During the study period, the CS rate was 24%. The mean age of the mothers was 25 years (22-28), majority were married at 92%, with secondary level education at 61% for those with records, while 14% of study participants with records had formal employment. Of the mothers who underwent C-Sections 6 % were referrals (Table-1).

Analysis of CS rates and early pregnancy outcomes as per the Robson classification.

The largest contributor to the overall CS rate was Group 1 with 36%, of the overall 24%. The second highest contributors were Robson groups 3 and 5, whose individual contribution to the overall CS rate was 24% each.

Descriptions of the 10 groups in the Robson classification and percentage contribution by each group to the overall C-S rate, at the Pumwani Maternity Hospital, for 2016 are as tabulated in Table-2 and demonstrated in Figure-2.

Table 1: Socio-demographic characteristics of women who had C-sections at the Pumwani Maternity Hospital between January-December 2016.

Characteristic	Frequency	Percentage (%)
Age in years		
Up to 19	47	9.4
20 – 29	352	70.5
30 – 39	97	19.4
40 and above	3	0.6
Marital Status		
Married	457	92
Single	42	08
Level of Education		
Primary	73	15
Secondary	152	30
Tertiary	24	05
Missing Data	250	50
Employment status		
Employed	28	14
Un employed	178	86
Missing data	293	59
Admission		
Primary	469	94
Referral	30	06

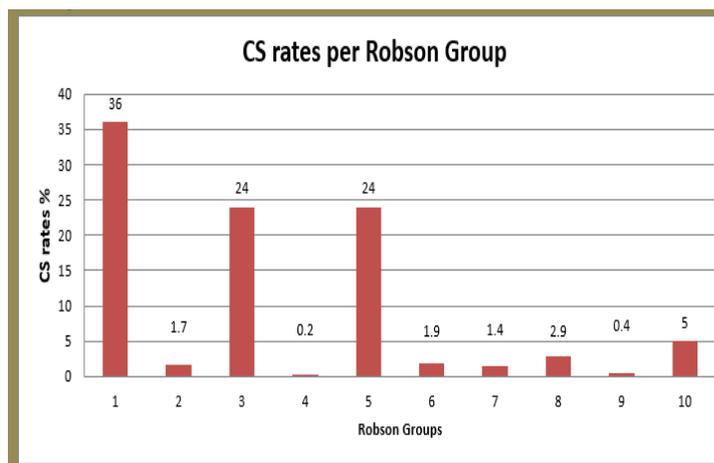


Figure 2: Distribution of CS rates as per the Robson Classification, at the Pumwani Maternity Hospital, for the year 2016

Table 2: Robson’s classification and percentage contribution by each group to the overall C-Section rate at the Pumwani Maternity Hospital, for the year 2016.

Group	Description	N	Contribution to the overall CS rate (%)
1	Nullipara: single cephalic term pregnancy*; spontaneous labour	180	36.1
2	Nullipara: single cephalic at term; planned CS or induced labour	08	1.6
3	Multipara without uterine scar: single cephalic at term*; spontaneous labour	118	24
4	Multipara without uterine scar: single cephalic term pregnancy*; planned CS or induced labour	01	0.2
5	Multipara with a scarred uterus: single cephalic term pregnancy*	120	24
6	All nulliparous: singleton breech presentation	09	1.8
7	All multipara: singleton breech presentation (including women with a scarred uterus)	07	1.4
8	All multiple pregnancies (including women with a scarred uterus)	14	2.8
9	All women with single oblique or transverse pregnancy (including women with a scarred uterus)	02	1.4
10	All women with a singleton cephalic preterm pregnancy <37 weeks’ gestational age at delivery	25	05

*At least 37 completed weeks of pregnancy

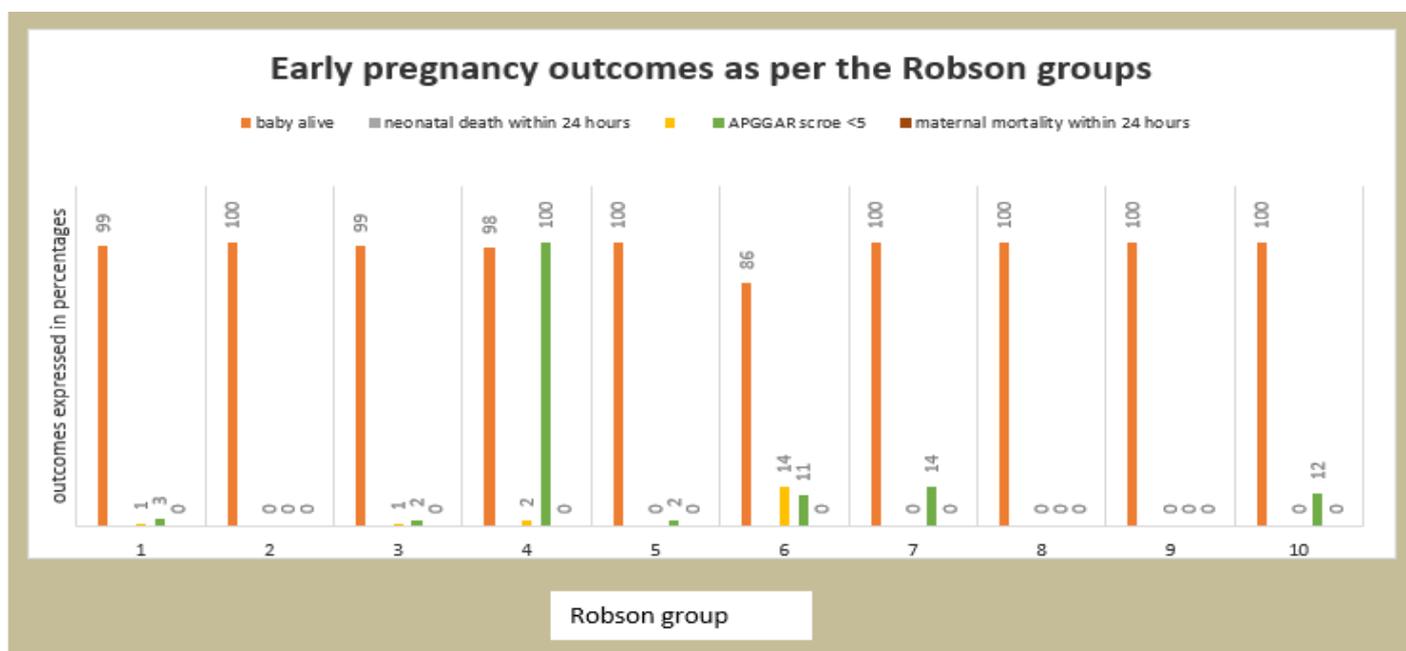


Figure 3: Early pregnancy outcomes as per the Robson Classification, at the Pumwani Maternity Hospital, for the year 2016

Analysis of early pregnancy outcomes, per Robson classification.

All the sampled mothers were alive within the first 24 hours after delivery while 96% of the newborns scored APGAR scores more than 7 at minute 5. There was no statistically significant post-partum hemorrhage or neonatal deaths within the first 24 hours after CS as shown in Figure 3.

DISCUSSION

The aim of this study was to analyze CS rates and selected early pregnancy outcomes at Pumwani Maternity Hospital in Kenya, using the Robson classification. The classification was easily applied and demonstrated Robson groups 1, 3 and 5, (in descending order), to be the key drivers to the overall reported CS rate of 24% in this facility. This indicates high CS rates in low risk, primary obstetric groups (Robson groups 1 and 3).

Pumwani Maternity Hospital is run by a team of non-specialized medical officers and midwives backed up by a few obstetricians. Lack of robust fetal monitoring equipment in labor such as cardiotocographs (CTG), high patient: nurse ratio, and the lack of obstetrician review for each CS prescribed due to the high parturient: obstetrician ratio, may have led to increased performance of CSs in this low risk primary obstetric groups of women.

Our study findings are congruent to findings in Palestine (Robson groups 1, 3 and 5) (7); and almost similar to what was documented in Senegal (Robson groups 1, 5 and 3) (8) and Ethiopia (Robson groups 3, 5 and 1) (9). Study findings in Ghana (Robson groups 5, 4 and 2) (11), India (Robson groups 5, 2 and 6) and Australia (Robson groups 5, 2 and 4) (12) were disparate from our study findings. This could be explained by the policy in place at the Pumwani Maternity hospital to refer out pre-labor repeat elective CSs, and hence explaining why Robson group 5 was not the leading driver for C-Sections in our study site. The different key drivers of CS rates in particular set ups, perhaps is due to the diverse obstetric case mix in different obstetric units.

The number of CS as a percentage of all live births is used as an indicator for measuring access to CSs. We present our study findings to encourage other obstetric units in low middle income countries, to adopt this classification which is simple to apply. Each obstetric unit will then know which group is responsible for the increased CS rate and targeted interventions at mitigating this without compromising on pregnancy outcomes can be implemented.

Several countries have implemented the Robson classification as part of their clinical audit tool to monitor their CS rates. An assessment of the

effectiveness of applying the Robson classification in auditing CS rates was done in a systematic review that included literature from low and high income countries such as Brazil, Chile, Italy and Sweden (13). The four countries reported a reduction in the CS rates without compromising on maternal and fetal outcomes. Some of the interventions implemented by these 4 countries, included, regular audits and feedback using the Robson classification and increased training of the midwives to reduce unnecessary CSs. Therefore, we recommend the use of Robson classification for auditing of CSs in the country.

The main limitation in this study was the inability to compute the relative size of each Robson group, and we therefore cannot compare the women who delivered via vaginal or assisted vaginal delivery with women who delivered via C-Sections. Perhaps future studies will be able to provide this information. A multi-center national study would provide a large sample size allowing regression analysis to correlate Robson groups and pregnancy outcomes. This study was conducted at a facility that mirrors the running and performance of C-Sections in Kenya, making the study findings generalizable to most of the county hospitals, and hence the implementation of the Robson classification can be adopted with ease.

Targeted interventions at Pumwani maternity hospital should be implemented to monitor, the performance of CSs in these primary low risk group of women, because if unchecked may end up subsequently as the Group 5. Obstetricians' review for each CS prescribed, training on interpretation of the CTG by the midwives and proper use of partographs are measures that can be strengthened to reduce these primary CSs. The Robson classification however, does not address the satisfaction or positive birth experience parturients need to be offered as one of its inherent weaknesses.

CONCLUSION

Robson classification was easily applied and identified Robson Group 1 as the largest contributor to the CS rates at Pumwani Maternity Hospital. Early pregnancy outcomes were similar across the ten groups.

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