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RESEARCH ARTICLE

CAESAREAN SECTION RATES AT THE HOSPITAL MATERNITY: A CASE STUDY IN MOROCCO USING THE ROBSON CLASSIFICATION SYSTEM

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Abstract

Caesarean section rates continue to rise worldwide, although the reasons appear to be multiple and complex. To better understand and control the phenomenon, many countries have started to use the 10-group classification of Caesarean sections, also known as the Robson classification. This classification will monitor and compare standardized, reliable, consistent, and indication-oriented Cesarean section rates. As part of a quality improvement initiative aimed at rationalizing Caesarean section rates, our descriptive and retrospective study was conducted on a population of parturients who had given birth by Caesarean section at the maternity ward of the CheikhKhalifa Hospital in Casablanca. Our study was conducted over ten months. We listed all Caesarean deliveries and classified them into ten groups (Robson's classification) to identify the contribution of each group to the overall Caesarean rate and to explain potential discrepancies, the analysis of which enabled us to propose recommendations. Our study involved 890 cases, 541 of which required a Caesarean section, a rate of 61%, which is higher than the rate recommended by the WHO (15%) and the national rate (21%). This classification system allowed us to identify group 10 as the most contributing to the overall Caesarean section rate (43.4%). This group included singleton pregnancies with the cephalic presentation, gestational age < 37 weeks, and a scarred uterus. This group's relative size and Caesarean section rate were 68% and 63%, respectively. Caesarean section is a non-negligible surgical procedure with both maternal and neonatal risks. Robson's classification helps to ensure that women who need Caesarean sections receive them.

Introduction:-

Several efforts have been made to improve maternal and neonatal health in Morocco. Thus, achieving a successful pregnancy and giving birth to a healthy child is now a health priority to reduce maternal and neonatal mortality [1].

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It must be said that pregnancy and childbirth put women at mortal risk [2]. And this risk has not ceased to haunt obstetricians. It has led to ongoing research to achieve the best conditions for a favorable outcome of pregnancy and childbirth [3]. The possibility of using several medical techniques, such as Caesarean section, has allowed Morocco to make significant progress in the field [4].

The main objective of a Caesarean section is to prevent maternal and neonatal mortality and morbidity [3]. It used to be reserved for significant dystocia and has become a standard intervention. Indeed, its frequency has been steadily increasing in recent decades despite the World Health Organization (WHO) recommendations not to exceed 15% [5].

In Morocco, the Caesarean section rate has increased significantly from 8.6% to 21% between 2005 and 2018. According to National Population and Family Health Survey data [6], the C-section rate in Morocco was 21% (26.3% in urban areas and 12.9% in rural areas). It should be noted that Caesarean sections are much more practiced in the private sector than in the public sector (62.2% in the private sector and 12.2% in the public sector) [6]. More specifically, at the Grand Casablanca site of Sheikh Khalifa Hospital, the location of this study, this rate rose from 13.6% to 20.5% between 2005 and 2018 [6,7]. It should be noted that this rate varies not only from one country to another but also from one hospital to another and even from one team to another within the same hospital.

Faced with an alarming increase in the rates, which inevitably lead to increased costs, several questions are being asked about the abuse of Caesarean sections. In Morocco, the rise in Caesarean deliveries is a cause for concern, given the additional and unnecessary risk they represent as a surgical intervention [5]and their potential risks for maternal and neonatal health [8,9]. Unnecessary caesarean sections represent a significant expense for overburdened and weakened health systems. As a result, their cost is a barrier to ensuring equitable maternal and newborn care access.

The lack of an internationally accepted classification with a standard system for monitoring and comparing Caesarean section rates in a consistent and action-oriented manner prevented a better understanding of the trend of increasing Caesarean Sections (CS)[10].

The Robson classification has been adopted since 2015 as a universal classification system for Caesarean sections[5,10]. It consists of classifying Caesarean sections into ten groups and remains based on simple obstetric parameters (previous CS parity, gestational age, onset of labor, fetal presentation, and severalfetuses).

In this sense, our study used Robson's classification to study doctors' practices regarding Caesarean sections in the maternity ward of Sheikh Khalifa Hospital and to identify areas for improvement that could rationalize the method of Caesarean sections.

Methods:-

The design of our study is descriptive and retrospective on the population of parturients who gave birth by caesarean section at the maternity ward of the Sheikh Khalifa Hospital in Casablanca. The choice of the Sheikh Khalifa Hospital in Casablanca was guided by the considerable increase in the caesarean section rate in the Greater Casablanca region. Indeed, this rate increased from 13.6% to 20.5% between 2005 and 2018 [6, 7, 11, 12].

Our study used Robson's 10-group classification at Sheikh Khalifa Hospital in Casablanca, the largest private hospital in the Kingdom, to investigate caesarean section practices.

First, we listed all deliveries performed at Sheikh Khalifa Hospital, including caesarean sections. According to Robson's classification, we classified the caesarean deliveries into ten groups. We then identified the contribution of each group to the overall caesarean section rate while noting potential discrepancies.

Data were extracted from the operating theatre and delivery room registers. Using a questionnaire containing socio-demographic data (identity, age, socio-economic level, etc.), gynaeco-obstetrical history (specifying parity, previous modes of delivery, etc.), and Robson's classification criteria, the ten categories of women who had a caesarean section were defined. Following a pre-test of the questionnaire it was filled out for all women who gave birth at the maternity ward of the Sheikh Khalifa Hospital in Casablanca.

Note that Robson's classification, recognized by several experts as the most reproducible and most accessible to use [13,14], allows the comparison of caesarean section rates within ten mutually exclusive groups and is based on five obstetrical characteristics:

1. parity (nulliparous, multiparous with and without previous caesarean);
2. onset of labor (spontaneous, induced, or no labor after a scheduled caesarean section)
3. gestational age;
4. fetal presentation;
5. and severalfetuses.

All the information collected was categorized into variables, entered into SPSS v22, and analyzed according to the Robson classification. The Review Board Institution approved our study under No. 8245/2020.

Results:-

Our study recruited 890 parturients, with an average age of 30 years 15; 47. Approximately 90% of the women were Moroccan, with 2.2% of the women sub-Saharan. Casablanca women represent 92% of Moroccan women giving birth. More than 98% of women in labor are married, and 94% of women in labor have medical coverage.

All women in labor have less than two children. It should be noted that 48% of women in labor are primiparous and that 86% of women in labor have never had a caesarean section.

This section will present the results relating to the epidemiological aspects specific to our study population, whose most predominant age group, 75%, is 20-34 years.

Groups	Classification of 10 Robson groups	Number of CS out of total women in each group	Relative group size (%)	CS rate in each group (%)	Contribution of each group to the overall CS rate of 61 %
Group 1	Nulliparous, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks, spontaneous labor	13/59	59/890 (6,6%)	22%	13/890(1,5%)
Group 2	Nulliparous, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks, with an induction of labor or scheduled caesarean section before labor	42/52	52/890 (6%)	81%	42/890 (4,7%)
Group 3	Multiparous, no scarred uterus, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks, spontaneous labor	3/47	47/890(5,3%)	6,4%	3/890(0,3%)
Group 4	Multiparous, no scar uterus, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks, with induction of labor or scheduled caesarean section before labor	12/27	27/890(3%)	44,4%	12/890(1,3%)
Group 5	All multiparous women with at least one uterine scar, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks	43/51	51/890 (5,7%)	84%	43/890(4,8%)
Group 6	All nulliparous, single pregnancy, breech presentation	18/18	18/890(2%)	100%	18/890(2%)
Group 7	All multiparous, single pregnancy, breech presentation, including scar uterus	7/7	7/890(0,8%)	100%	6/890 (0,8%)
Group 8	All multiple pregnancies, including scar uterus	16/19	19/890 (2,1%)	84%	16/890 (1,8%)

Group 9	All single pregnancies with a transverse or oblique presentation, including women with a history of caesarean section	1/1	3/890 (0,1%)	100%	3/890(0,1%)
Group 10	All singleton pregnancies with a cephalic presentation, gestational age < 37 weeks, including scar uterus	386/609	609/890(68%)	63%	386/890(43,4%

Table N°1:- Ranking of caesarean women in our series according to Robson's ten ranking groups.

During the study period, 890 parturients attended the maternity ward of Sheikh Khalifa Hospital in Casablanca for delivery, i.e., a monthly average of 49 deliveries, which corresponds to 1.6 deliveries per 24 hours. The number of caesarean sections performed during this period was 541, or 61%. This is still higher than that recommended by the World Health Organization.

By adopting Robson's classification, out of 890 parturients, 541 caesareans were classified according to Robson's ten classification groups, as shown in Table N°1.

We obtained a different caesarean rate in each of the 10 Robson groups, as follows: Group1(22%), Group2(81%), Group3(6.4%), Group4 (44.4%), Group5(84%), Group6 (100%), Group7(100%), Group8(84%), Group9(100%), Group10(63%). The contribution of each group to the overall caesarean rate is: Group1(1.5%), Group2(4.7%), Group3(0.3%), Group4(1.3%), Group5(4.8%), Group6(2%), Group7(0.8%), Group8(1.8%), Group9(0.1%), Group10(43.4%).
Group 10 contributed the most to the overall caesarean rate, with 43.4%.

Discussion:-

The increase in the caesarean section rate

The caesarean section rate in our study is 61%. It remains very high compared to several national series (Rabat, Casablanca) [6,12], i.e., out of 10 deliveries, 6 are caesarean sections with expenses increasing by ten times from 2006 to 2017 with estimated losses of 70 MDH per year.

Compared to international series, especiallyin African countries, this rate remains very high [15]. Moreover, according to the OECD report published in 2017, unnecessary caesarean sections and the waste they generate represent 20% of health expenditure.

Indeed, this rate contrasts with the WHO recommendations (maximum rate of 15%), the average of the 36 countries adhering to the Organisation for Economic Co-operation and Development (27.9%) according to a WHO report published in 2018 with their expenditure rising from 13 MDH in 2006 to 130 MDH in 2017 [16]. We note that caesarean deliveries are gaining ground in Morocco. They have thus evolved from 13.6% to 20.5% between 2005 and 2018 [6, 12].

Internationally, this trend is also marked by variations in the increase in the caesarean section rate across different countries worldwide. In Africa, for example, the rate is only 3.5% on average, and for structural reasons, these rates remain abnormally low and therefore dangerous [17,18]. However, in other countries, such as Latin America, these rates are becoming unusually high (29.2%) due to a particular fashion effect [19].

In this sense, and according to a WHO report published in 2018, the average of the 36 countries adhering to the Organisation for Economic Co-operation and Development is 27.9%, including Turkey, France, Japan, Germany, Spain, etc. and countries such as Egypt (55.5%), Argentina (43.1%) or Colombia (36.9%)[16].

The increase in the caesarean section rate is a phenomenon that is now a public health priority because it influences social security and health insurance funds but also on the state of health of particular women; caesarean sections are considered, when not indicated, as morbidity according to the international classification ICD-11 (Code 034.21).

Indeed, a caesarean section is a surgical act that exposes the woman to the risk of maternal and sometimes even neonatal complications. A caesarean section in a primiparous woman condemns her to undergo other caesarean sections for future pregnancies [20].

The inflation of the C-section rate can be explained by factors other than medical causes. These factors can be explained by poor practices of doctors and social pressure from the patient and her relatives [21]. Other determinants may be related to the fear of malpractice penalties associatedwith possible negative results in a standard delivery [22, 23].

Interpretation of the results with the reference framework:-

To better interpret the results of our study, we used Robson's ten-group classification [24]as a framework. This table details the comparison of our results to this framework.

Table N°2:- Comparative table with a reference framework.

Groups	Number of CS out of total women in each group	Relative group size (%)	Norm	CS rate in each group (%)	Norm	Contribution of each group to the overall CS rate of 61%	Norm
Group 1	13/59	59/890 (6,6%)	GR1+GR2= 35-42%	22%	<10%	13/890(1,5%)	Groups 1, 2, and 5 usually contribute to two-thirds of the overall caesarean rate.
Group 2	42/52	52/890 (6%)		81%		42/890 (4,7%)	
Group 3	3/47	47/890(5,3%)	GR3+GR4= 30 to 40%	6,4%	< or equal to 3%	3/890 (0,3%)	
Group 4	12/27	27/890(3%)		44,4%	5 à 8%	12/890(1,3%)	
Group 5	43/51	51/890 (5,7%)	A rate<10% means a low caesarean rate	5,7%	50 à 60%	43/890(4,8%)	
Group 6	18/18	18/890(2%)	GR6+GR7= 3-4%	100%		18/890(2%)	
Group 7	7/7	7/890(0,8%)		100%		6/890 (0,8%)	
Group 8	16/19	19/890 (2,1%)	1,5 to 2% of women	84%	shouldbe 60%	16/890 (1,8%)	
Group 9	1/1	3/890 (0,1%)	0,4 to 0,8%	100%		3/890(0,1%)	The contribution to the overall rate is small but essential for assessing the quality of data collection.
Group 10	386/609	609/890(68%)	4 to 5%	63%	100%	386/890(43,4%)	

Robson's classification distinguishes women according to several levels of obstetrical risk. The first 4 groups can be considered women at low risk of the caesarean section, while the other 6 are at high risk [20,25].

In our study, the relative size of parturients with spontaneous labor is 6.6%, which is a small size rate. Its contribution to the overall caesarean section rate was 1.5%. The small size of this group can be explained by dysfunction (under-reporting) and by very restrictive indications for caesarean section.The caesarean section rate of this group 1 should be less than 10%. However, it is 22% in our study, corresponding to a high caesarean rate.

According to the standards, groups 1, 2, and 5 contribute to two-thirds of the overall caesarean section rates. In our study, they contribute 11%.

Women with labor induction or caesarean section before labor have a caesarean section rate of 81%, which means more labor inductions or scheduled caesarean sections before labor. This group 2 contributes 4.7% to the overall caesarean rate.

According to standards, group 1 plus 2 usually contains 35-42%. This rate is 12.6% of the total number of parturients in our study. This small size may be due to inappropriate data collection. The standard caesarean section rate should be less than 3% in multiparous women without a scarred uterus with spontaneous labor. In our study, it is 6.4% indicating a high caesarean rate.

According to the standard, groups 3 and 4 combined usually contain 30-40% of parturients. In our study, these groups represent a rate of 8.3%.

In multiparous women, without a scarred uterus, with an induction of labor or scheduled caesarean section before labor, the caesarean section rate should be 5 to 8%. Our study corresponds to 1.3%. This indicates that the number of pre-labor caesarean sections is low in this group 4. This may be due to inappropriate data collection.

In parturients with at least one previous caesarean section, the size of this group 5 is 5.7%, less than 10%, signifying a low caesarean section rate in the history. This group represents the 2nd highest C-section rate contributing to the overall C-section rate during the study period. The C-section rate should be 50-60%, but it is 84% in our study.

In nulliparous women, the caesarean rate is 2%, and the contribution to the overall caesarean rate is low, at 2%. The norm is that groups 6 and 7 combined rates should be between 3-4%. In our study, the relative size is 2.63%.

In multiparous, single pregnancy, breech presentation, scar uterus included, the caesarean rate is similar to group 6.

The group of parturients with multiple pregnancies, including the scarred uterus, is heterogeneous. The relative size of this group is 2.1%, in line with the norm of 1.5-2%. The caesarean rate should be 60% in this group, but 84% in our study. It contributes to the overall caesarean rate with a rate of 1.8%.

In parturients with single pregnancies and transverse or oblique presentation, including women with a history of caesarean section, the relative size of this group should be 0.2 to 0.6%, and the caesarean section rate should be 100%. The relative height is 0.1% in our study, but the caesarean rate is similar to the norm (100%).

The contribution to the overall rate is small but essential for assessing the quality of data collection.

In parturients with singleton pregnancies, cephalic presentation, gestational age < 37 weeks, and scarred uterus included, the size of this group is 3.58%, which is lower than the average 4-5%.

The caesarean rate in this group is 63%. It is considered excessive as this rate should not usually exceed 10%. It contributes with a rate of 43.4% to the overall caesarean rate in our study.

Our results show that collecting the necessary data and applying Robson's classification can be done simply and efficiently.

Indeed, the Robson classification of the obstetric dataset allows an assessment of trend factors in the use of caesarean section and an evaluation of the quality of the data available in the medical records [24].

In this sense, efforts to reduce unnecessary obstetric interventions and wait for spontaneous labor should be considered [24,26]. Therefore, actions should be taken at this level to have an optimal caesarean section rate adapted to the characteristics of Sheikh Khalifa Hospital.

Comparative status of the different Robson groups in other series:-

In this country comparison, the CS rate is higher in our series (61%), close to that of the Indian study with a rate of 60.52%, followed by Brazil and Ethiopia with respectively recorded rates of (55.6% and 34.7%).

In our series, group 10 (composed of all singleton pregnancies with the cephalic presentation, gestational age < 37 weeks, including scar uterus) contributed significantly to the overall CS rate with 43.4% and a caesarean rate in this group of 63%.

Compared to Brazil and Ethiopia, this rate does not exceed 6%, let alone India, where the rate does not even exceed 4%. This could be explained by CheikhKhalifa Hospital being a private hospital. Namely, in Morocco, the C-section rate in private clinics is relatively high, with an average of 61% [6].

Group 5 (composed of all multiparous women with at least one uterine scar, single pregnancy, cephalic presentation, gestational age ≥ 37 weeks) is the group that contributed with the highest proportion to the overall caesarean section rate in Brazil (21.40%), India (9.09%), Ethiopia (5.90%), and Morocco (4.80%) with caesarean section rates of 83.73%, 95.67%, 62.70%, and 5.70% respectively.

Countries		**Ethiopia[27]**	**Brazil[28]**	**India[29]**	**Morocco (studyseries)**
Overall C-section rate (%)		**34.7**	**55.6**	**60.52**	**61**
Group 1	**Relative size (%)**	26.7	17.21	38.08	6.6
	CS rate (%)	13.9	19.10	41.75	22
	Contribution to the overall CS rate (%)	3.7	3.29	15.9	1.5
Group2	**Relative size (%)**	8.8	21.69	6.69	6
	CS rate (%)	72.6	74.59	60.52	81
	Contribution to the overall CS rate (%)	6.4	16.18	4.04	4.7
Group 3	**Relative size (%)**	22.2	14.05	23	5.3
	CS rate (%)	7.1	5.50	24.48	6.4
	Contribution to the overall CS rate (%)	1.6	0.77	5.63	0.3
Group 4	**Relative size (%)**	7.8	5.45	3.28	3
	CS rate (%)	70.6	42.6	33.92	44.4
	Contribution to the overall CS rate (%)	5.5	2.32	1.11	1.3
Group 5	**Relative size (%)**	9.5	25.56	9.5	5.7
	CS rate (%)	62.7	83.73	95.67	5.7
	Contribution to the overall CS rate (%)	5.9	21.40	9.09	4.8
Group 6	**Relative size (%)**	2.2	1.80	1.87	2
	CS rate (%)	51.1	92.86	65.62	100
	Contribution to the overall CS rate (%)	1.1	1.68	1.23	2
Group 7	**Relative size (%)**	2.4	1.84	1.34	0.8
	CS rate (%)	55.4	94.74	56.52	100
	Contribution to the overall CS rate (%)	1.3	1.74	0.8	0.8
Group 8	**Relative size (%)**	4.2	2.22	1.76	2.1
	CS rate (%)	54.0	89.86	60	84
	Contribution to the overall CS rate (%)	2.3	2.00	1.05	1.8
Group 9	**Relative size (%)**	0.3	0.23	0.41	0.1
	CS rate (%)	100.0	100.0	100.0	100
	Contribution to the overall CS rate (%)	0.3	0.23	0.41	0.1
Group 10	**Relative size (%)**	15.9	9.96	14.02	68

	CS rate (%)	41.6	60.52	27.61	63
	Contribution to the overall CS rate (%)	6.6	6.03	3.87	43.4

Table N°3:- Comparative status of the different Robson groups in other series.

Usually, groups 1, 2, and 5 contribute to the overall caesarean section rates in one way or another depending on the countries present in this comparison with different rates. Indeed, we found that this contribution did not exceed 20% for Morocco, while in Brazil, it is over 60% with a rate of 75%, followed by India and Ethiopia with respective rates of 50% and 46%.

This low proportion in our series is explained by the predominance of group 10 in the contribution to the overall caesarean rate. This group represents non-indicated caesarean sections. This situation could be related to non-medical factors. These factors would be related to bad practices and especially social pressure often exerted by the patient and her relatives [21]concerning desired pregnancies and the increasingly delayed age of marriage [30]. Also, other determinants may be related to the fear of malpractice penalties related to possible untoward consequences in a standard delivery [22].

This rate needs to be analyzed deeply to identify the determinants of this trend and consequently find adequate solutions to correct this situation in the framework of an improvement plan.Increasing caesarean section rates may be linked to increased maternal and perinatal morbidity. This is because caesarean delivery is associated with short- and long-term risks that can persist even years after delivery and affect the health of the woman and her child and subsequent pregnancies.In addition, high caesarean section rates are also associated with increased health care costs.

Recommendations:-

This study provided an analysis that clarified that there are areas where relevant interventions and preventive actions can be taken to reduce the caesarean section rate, including:

Table N°4:- The primary interventions recommended for reducing the caesarean section rate in the KH.

Critical interventions are recommended for reducing caesarean section rates at KHC.
Prenatal follow-up of parturients (at least 04 prenatal consultations).
Reminder and adoption of "good practices" with the harmonization of practices.
To safely reduce the rate of primary caesarean deliveries [31].
The daily discussion of obstetrical files on a case-by-case basis by the obstetricians and their staff [32].
Implementing the internal clinical audit is essential in the quality approach to parturient care activities, especially for primiparous women, thus contributing to the management of perinatal care.
More open acceptance of vaginal delivery trials.
Questioning our definitions of stagnation of dilation, failure to trigger, etc., in the light of new data in the literature [33].
Limitation convenience deliveries through open communication with parturients by explaining the issues and risks. The mother-caregiver dialogue is essential to understand the underlying maternal demand and provide the most appropriate response, not necessarily a caesarean section [34].
Setting up an information system to collect the databases useful for Robson's classification.
Staff training on data collection and analysis.
Training of gynaeco-obstetricians and midwives on the indications for caesarean section[35].
Communication and awareness-raising with staff and parturients.
Providing legal advice to health professionals in malpractice cases during and after childbirth.

Strengths of the study:-

Despite some limitations, this classification is characterized by its ease of implementation and interpretation, simplicity, and clinical relevance. Also, mutually exclusive and fully inclusive population classes based on the characteristics of parturients, routinely collected in maternity hospitals when women are admitted for delivery, make it easy to monitor and evaluate caesarean sections. This makes it easy to monitor and assess caesarean sections and compares rates in both institutional and population settings. In addition, Robson's classification allows women to be

distinguished according to different levels of obstetrical risk. Indeed, the first four groups are women at low risk of caesarean section, while the other 6 are high-risk women at high-risk[20].

The routinely collected data set showed excellent quality in terms of completeness and consistency. The method of adopting Robson's classification itself can be adapted universally.
Diagnostic codes (ICD) and standardized variables such as gestational age are used in the obstetric record.

Limitations of the study:-
Manual extraction of information relevant to Robson's classification from the parturient's medical record must be considered, given the potential for error in data collection.

The verification of the method is based on data and groups of parturients from a single hospital.

The design limitation is that only the group of parturients who had a caesarean section was analyzed. Therefore, the study is limited to conclusions regarding the distribution of Robson's classes within the caesarean section group. To this end, conclusions cannot be drawn regarding the distribution of caesarean sections in all birth modes.

Conclusion:-

The increase in the caesarean section rate has contributed to improving maternal-fetal prognosis. Still, it remains a non-negligible surgical procedure with both maternal and neonatal complications and risks.

Robson's classification is not essential for health facilities striving to achieve a specific rate but rather to ensure that caesarean sections are provided to women who need them.

Specifically, Robson's classification system allowed us to detect group 10 (comprising all singleton pregnancies with the cephalic presentation, gestational age < 37 weeks, including a scarred uterus), which contributed significantly to the overall caesarean section rate (43.4%) at Sheikh Khalifa Hospital in Casablanca.

This is why the adoption of Robson's classification within maternity units should be extended, as it is a simple to use tool that can optimize caesarean section practices. It allows assessment, monitoring, and comparison of caesarean section rates within maternity units. And ultimately, it helps to improve caesarean section practices by identifying groups of women with abnormally high caesarean section rates.

Declaration of interest:-
We do not declare any conflicts of interest.

Patient consent for publication:-
It is not required.

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