

Analysis of obstetric care variables associated with caesarean section in low-risk pregnancy patients

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Abstract. *Background and aim of the work:* The excessive use of caesarean section (CS) is an issue that is at the core of the political and healthcare management debate. This concern is particularly relevant for low-risk pregnancies, which does not theoretically require CS. Indeed, in Robson's classification, group 1 and 3 are considered at low-risk and in these groups, CS rate should be near to zero. The aim of the present work was to evaluate whether the non-compliance with guidelines by WHO is correlated to the increase in the rate of CS in Robson's class 1 and 3 in low-risk pregnancies. *Methods:* A retrospective patient record study carried out in two hospitals of the northern Italy was used. *Results:* Admission in active phase of labour and one-to-one care significantly decreased the likelihood of CS. On the contrary, an unjustified amniorrhhexis and oxytocin administration increased the rate of CS. Other considered variables, instead, had not significant effect on CS rate. ROC curve on the computed risk index indicated a discrete sensibility and specificity, and that the better cut-off was up to 1. *Conclusions:* This research confirms the importance of one-to-one midwifery in management of low-risk pregnancy and labour. Moreover, it stress the risk that an excessive medicalization of low-risk pregnancy can drive to "unnatural" CS.

Key words: caesarean section, low-risk pregnancy, obstetric

Introduction

The excessive use of caesarean section (CS) is an issue that is at the core of the political and healthcare management debate. Since 1985, the World Health Organization (WHO) stated that the CS rate should not exceed the 10-15% of deliveries, because this would not have produced any additional benefits for mother's and baby's health (1). This concern is particularly relevant for low-risk pregnancies, which does not theoretically require CS. Nevertheless, national and international literature shows that rate of CS in low-risk pregnancy is not negligible (2-4). The aim of this study is to evaluate the role of some care-oriented behaviors in the increase or decrease of the CS rate in low-risk pregnancy.

Low-risk pregnancy and obstetric care

As is known, Robson (5) proposed a 10-group classification of pregnancy aiming to supply a methodological tool that is able to define, monitor and compare the CS rate in different hospitals and in different populations. These classes are mutually exclusive and wholly inclusive, perspective and clinically relevant. As is known, Robson's taxonomy classifies patients basing on the principal obstetric parameters which are detectable at the delivery, and that are reported in Table 1.

In Robson's classification, group 1 and 3 are considered at low-risk and in these groups, the CS rate should be near to zero. For this reason, midwives can autonomously manage pregnancies in class 1 and 3 (DM 740 of 1994). However, the CS rate is also

Table 1. Robson's Classification

No.	Groups
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)

higher in these classes (2-4). Is it then possible that some obstetric behaviors can shift a natural delivery into a CS? Literature underlines, in fact, some healthcare actions that can limit the CS rate such as One to One Midwives (6, 7), the presence of a continuity of care and midwifery led-care model (8), the presence of training courses conducted by midwives (9, 10) and multidisciplinary audits (5, 11).

Moreover, different birth centers have different CS rates despite patients belong to the same risk class. This seems to suggest that different CS rates can be due in part to different healthcare behaviors. As stated by the 12^a Commissione Igiene e Sanità del Senato della Repubblica (12), this means that detect and correct some behaviours may help to reduce the CS rate in low-risk pregnancy. Accordingly, a teamwork of the WHO (13) identified the guidelines for the care routine of women during uncomplicated labour and childbirth, which are independent from the characteristics of the context in which labour and childbirth occur. These guidelines are based on a wide analysis of available evidences in the effective care in pregnancy and childbirth and, after that, in The Cochrane pregnancy and childbirth database, and they indicate some operative actions that should be taken in order to correctly manage low-risk pregnancy.

As a consequence, the aim of the present work is to evaluate whether the non-compliance with guidelines by the WHO is correlated to the increase in the rate of the CS in Robson's class 1 and 3 in low-risk pregnancies.

Method

The study is a retrospective patient record study carried out in two hospitals of northern Italy.

Eligibility criteria

Medical records of all patients who have given birth in the first semester of 2014 have been identified. However, only medical records of patients classified in Robson's group 1 and 3 have been analyzed through a checklist. Moreover, among those, medical records of patients who had operative vaginal delivery were excluded from the analysis.

The checklist

The checklist used in this study was composed by 14 items describing an action which has been indicated by the WHO (13) as useful for a good obstetric care. For each item, researchers stated whether the described action was indicated in the medical record (yes, no, not reported). Amniorrhexis and oxytocin administration were coded as unjustified when they were reported in the clinical record, but a justification for these procedures was not indicated. In the same way, partograph was coded as complete when all parameters were reported. In addition, the outcome of the labour, (CS vs. vaginal delivery) was also coded.

Procedure

Researchers scored each patient a medical record according to the checklist. Moreover, for each checklist, patient's nosological number was registered in order to give the possibility to identify the patient's medical record without compromising patients' privacy.

Results

Descriptive results from checklist

Five hundred and seventy nine medical records were analysed. Overall, the CS had a relatively low incidence of 8% (odds = 0.09, OR = 0.007). For what

concerns the checklist, table 2 shows frequencies and occurrences of each item. In order to analyse their effect on the likelihood to CS, we considered only items which have NR (not reported) frequencies lower than 5%. In the same way, we considered only variables which had “yes” or “no” frequencies higher than 5%. Thus, in the analysis, we considered only variables that are marked with an asterisk in table 2.

Obstetric actions predicting CS

These variables were then inserted as predictor in a probit logistic regression analysis in which the dependent variable was the outcome of birth (CS vs. natural). Results indicated that the regressive model was better fitted to the data than the null model ($\chi^2(7) = 52.08, p < .001$) indicating that considered vari-

ables were associated with likelihood of CS., as more precisely shown in table 3.

As indicated, admission in active phase of labour and one-to-one care significantly decreased the likelihood of CS. On the contrary, an unjustified amniorrhesis and oxytocin administration increased the rate of CS. Other considered variables, instead, had not significant effect on the CS rate.

In order to build a risk index, the items which were significantly linked to CS in probit regression have been scored as 1 (increase of the CS rate) and 0 (decrease of the CS rate) and then summed. More precisely, the presence of unjustified amniorrhesis and oxytocin administration received a score of 1, while their absence received a score of 0. Conversely, the absence of One-to-one care and of Admission in active phase of labour received a score of 1 and their presence

Table 2. Raw count and percentage of response for each item in the checklist

	NO		YES		NR	
	n	%	n	%	n	%
Shared care plan	579	100,00	0	0,00	0	0,00
Early prenatal risk assessment program	14	2,42	565	97,58	0	0,00
Continuous cardiotocography (CTG)	2	0,35	577	99,65	0	0,00
Intermittent auscultation of fetal heart rate*	522	90,16	57	9,84	0	0,00
Admission in active phase of labour*	326	56,30	253	43,70	0	0,00
Unjustified amniorrhesis*	455	78,58	124	21,42	0	0,00
One-to-one care*	79	13,64	491	84,80	9	1,55
Non-pharmacological Pain Management in labor	6	1,04	287	49,57	286	49,40
Frequent changes of position during labor	1	0,17	482	83,25	96	16,58
Eating and drinking in labour	1	0,17	20	3,45	558	96,37
Supine position for giving birth	182	31,43	212	36,61	185	31,95
Complete partograph*	190	32,82	389	67,18	0	0,00
IV cannula during labour	0	0,00	579	100,00	0	0,00
Unjustified oxytocin administration*	445	76,86	134	23,14	0	0,00
Epidural analgesia*	485	83,77	94	16,23	0	0,00

Table 3. Results from probit logistic regression (CS rate as dependent variable)

	B	S.E.	Z	p
Intercept	-1.18	0.23	-5.21	0.00
Intermittent auscultation of fetal heart rate	-0.23	0.39	-0.57	0.57
Admission in active phase of labour	-0.69	0.21	-3.25	0.00
Unjustified amniorrhesis	0.40	0.19	2.12	0.03
One-to-one care	-0.53	0.21	-2.47	0.01
Complete partograph	0.12	0.19	0.62	0.53
Epidural analgesia	0.00	0.23	0.01	0.99
Unjustified oxytocin administration	0.60	0.21	2.88	0.00

received a score of 0. In this way, each medical document receives a score ranging from 0 (lower CS risk) to 4 (higher CS risk). For example, the presence of unjustified amniorrhesis and oxytocin administration and the absence of one-to-one care and of admission in active phase of labour represented the higher CS risk condition. In this way, 171 record (30%) had score 0, 230 (40%) had score 1, 113 (20%) had score 2, 53 (9%) had score 3 and 12 (2%) had score 4.

The effect of this new risk score on the CS rate was analyzed through the ROC curve. Results indicated a discrete sensibility and specificity as confirmed by the AUC = 0.793 (85% C.I. 0.729-0.856), according to Swets (14) recommendations. Analyzing specificities (true positive rate) and 1-sensitivities (false positive rate) of each considered threshold, it appeared that the better cut-off was up to 1. In this case, indeed, the test seems to be able to correctly detect a high percentage of CS (True positive = 78%) and a relatively low portion of false positives (27%). Table 4 shows sensitivity and specificity for each threshold, and Figure 1 shows ROC curve.

Discussion and conclusion

The present research tried to analyse the correlation between the non-compliance with the WHO's guidelines for a correct management of low-risk labour, childbirth and the CS rate. To our knowledge, this is one of the first studies to investigate the role of obstetric behavior on the increase or decrease of the CS rate.

The Results indicated that four obstetric behaviors are associated with the CS rate. More precisely, Unjus-

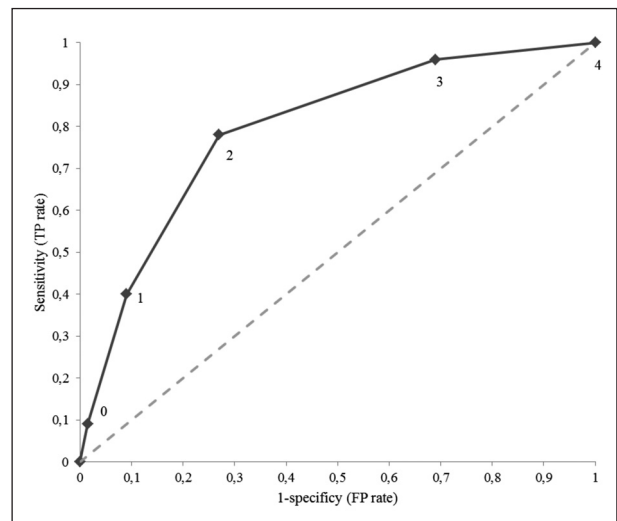


Figure 1. ROC curve

tified amniorrhesis and Unjustified oxytocin administration are associated with an increased CS rate, while One-to-one care and an admission in active phase of labour are associated with a decreased CS rate.

Amniorrhesis is one of the most used procedures by midwives in order to quick the labour (15). In spontaneous labour, the use of amniorrhesis can be evaluated when cervical dilation slows down or stops and when other obstetric actions have failed. Accordingly, our results suggest that an unjustified use of amniorrhesis can increase the likelihood of CS. Also oxytocin administration can occur when cervical dilation is normal, being thus a choice of professionals which manage the labour. This however, may increase the risk of CS. Accordingly, oxytocin has been inserted by the Institute for Safe Medication Practices in the list of the twelve drugs which can cause a damage when improperly used (15).

The Present results also show that epidural analgesia is not linked to CS rate. This is congruent with evidences showing that epidural analgesia increases the likelihood of CS when fetal distress is observable, but it does not alter the CS rate in normal labours (16). Contrary to literature (13), the present results indicate that intermittent auscultation of fetal heart rate seems to have no effect on the CS rate (even if the relation is negative but not significant). This result is somewhat surprising and need to be further investigated.

Table 4. Sensitivity, specificity and 1-specificity for each threshold

Thresholds	Sensitivity (TP)	Specificity (TN)	1-Specificity (FP)
-inf	1,00	0,00	1,00
0	0,96	0,31	0,69
1	0,78	0,73	0,27
2	0,40	0,91	0,09
3	0,09	0,98	0,02
4	0,00	1,00	0,00

In conclusion, this research confirms the importance of one-to-one midwifery in the management of low-risk pregnancy and labour. Moreover, it stresses the risk that an excessive medicalization of low-risk pregnancy can drive to an “unnatural” CS. Indeed, unjustified amniorrhesis and oxytocin administration, as well as admission outside the active phase of labour – which could be considered as proxies of medicalization – seem to increase the CS likelihood.

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