Continuous intrapartum support to reduce primary cesarean in Mexico

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Research article

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Abstract

Background Cesarean deliveries are effective in saving maternal and infant lives, but only when they are necessary for medical reasons. In Mexico, the average cesarean delivery rate in 2015 was reported at 45%, the high incidence of cesarean deliveries is considered a problem of public health in the country, our purpose was to reduce the cesarean delivery rate for primary cesarean, in nulliparous women, term, singleton, vertex presentation and under 40 years through continuous intrapartum support provided by a professional nurse. Methods This was a historical control study, in a health institution in Mexico, in the period de July-December 2018. The control group received the usual obstetric care, without continuous intrapartum support. The study group received the usual obstetric care plus continuous intrapartum support, it was obtained the cesarean delivery rate, estimating the risk ratio, the absolute risk reduction and odds ratio, in addition, a binomial logistic regression model was carried out and was adjusted with possible covariates. Results In the study group the cesarean delivery rate was 1.7% (1 of 60) significantly lower than in the control group (29.1% (16 of 55) [$X 2 = 17.13$, $df = 1$, $N = 115$, $p < .001$], with a risk ratio of 0.06 (95% CI: 0.01 to 0.42), the absolute risk reduction was 27.4%, (95% CI: 15% - 40%), also the hours of labor were significantly lower ($p < 0.001$) in the study group (median = 6.7 hours, 95% CI: 6.0-8.1), than in the control group (median = 13.4 hours, 95% CI: 10.7 - 16.1) and no significant covariates were found.

Keywords: Cesarean delivery rate, Continuous intrapartum support, labor

Background

Cesarean deliveries are effective in saving maternal and infant lives, but only when they are necessary for medical reasons (1), when the cesarean delivery rate exceed 15%, reproductive health risks begin to exceed the benefits (2). In Mexico, the average cesarean delivery rate in 2015 was reported at 45% (3), there is no record, which percentage corresponds to elective cesarean delivery and which to medically necessary cesarean delivery. There is a higher percentage of cesarean deliveries when the delivery is the first or second, 50.5% and 51.2% respectively (4), The high incidence of births by cesarean is considered a public health problem in the country (5). The main causes of cesarean deliveries diagnosed in Mexico are pelvic head disproportion, previous cesarean delivery and fetal distress, respectively (6), the reasons for the increase in cesarean deliveries is complex and could be related to the safety offered by the cesarean delivery itself, lack of experience of young obstetricians, pressure from the patient to the doctor, other causes that influence are age, body mass index, concomitant diseases with the pregnancy, and obstetric malpractice (5).

Different strategies have been devised to try to reduce cesarean deliveries, as continuous intrapartum support, which has been associated with better patient satisfaction and a statistically significant reduction in the cesarean delivery rate (7), (8), (9), (10), (11), in previous studies this support has been provided by a doula and the husband (12), midwives (13), female relative (14), relatives and professional staff (15). Bohren in his systematic review of the Cochrane database, indicates that it is not clear how to provide effective support in labor, since there are questions about the impact of the type of provider of labor support, about the impact under a variety of environmental conditions, about the moment of measurement of the effects (early vs active labor), also on the relative impact of the different models of labor support, as the model of support only during the intrapartum period or the model of support during the antenatal, intrapartum and postpartum periods (8).

There is a disproportionate increase of cesarean deliveries in active labor (5), in addition, the National Health and Nutrition Survey (ENSANUT) mentions that the most important strategy to reduce the cesarean deliveries in Mexico is to avoid the primary cesarean delivery (4), however, the implementation of interventions to achieve such decrease is still lacking, our purpose was to reduce the cesarean delivery rate for primary cesarean, in nulliparous women, term, singleton, vertex presentation (NTSV) and under 40 years through continuous intrapartum support provided by a professional nurse (with university degree) at the General Zone Hospital (HGZ) No. 4 of the Guanajuato Delegation of the Mexican Social Security Institute (IMSS), Mexico.

Methods

Study design: Study with historical control, the research was approved by the research and ethics committee in health research of HGZ 4.

Study population: Women in spontaneous labor with the following characteristics: nulliparous, term, singleton, vertex presentation, under 40 years and in active phase, without any comorbidity, who wanted to participate and were treated in the labor and delivery unit, from Monday to Sunday, during the three shifts in HGZ No.4 of the IMSS, patients with maternal and / or fetal indications of cesarean delivery were excluded.

Sample: The sample size was calculated with the G-Power 3.1.9.2 program, for difference of proportions in two independent proportions (z test), with two tails, assuming, according to local statistical data, that the outcome of Cesarean deliveries in nulliparous with usual obstetric care was 45% and in nulliparous with emotional support it was 20%, with 95% confidence and 80% of power, the sample size was 54 patients per group, the control group was worked in the July-September 2018 period and the study group in the October-December 2018 period.

Procedure: The control group received the usual obstetric care, without continuous intrapartum support. The study group received the usual obstetric care plus continuous intrapartum support that was provided by a Bachelor of Nursing and Obstetrics.

A professional doula provided training to the Bachelor of Nursing and Obstetrics so that they could provide the support effectively, this training covered three fundamental aspects: 1) emotional support, 2) physical support and comfort measures and 3) information and advice. The emotional support consisted in establishing an effective communication between the patient and the nurse in order to dispel fears and doubts and instill security in an environment of understanding, availability, respect and intimacy.

The physical support and comfort measures were provided through massage, tactile contact, assistance to adopt different positions for pain relief.

The information and advice was characterized by providing the patient with information about the development of labor and the medical procedures used, as well as guiding the woman in breathing and relaxation techniques.

Measurement of variables: The primary outcome was the cesarean delivery rate, the characteristics of interest for the initial homogeneity of the control group and the study group were maternal age, dilation at the time of admission, Body Mass Index (BMI) before and during delivery, years of education, as secondary outcomes in labor and delivery, labor time was measured, oxytocin application, obstetric analgesia and Apgar score in the first and fifth minute and indication for cesarean.

Statistical analysis. In the verification of the initial characteristics between the control group and the study group, and of the secondary outcomes, the statistical tests used depended on the scale of measurement of the variables and the statistical assumptions of each test (Student's t test or Mann-Whitney U test, Chi-square test or Fisher's exact test), in the numerical data to check the assumption of normality the Shapiro-Wilk test was used, the Mann-Whitney U test was used only when the assumption of normality was clearly violated, otherwise the student's t test was used, since it is a robust test for the assumption of normality, to evaluate the primary outcome, the clinical usefulness of the intrapartum continuous support the rate (%) of cesarean deliveries was used, estimating the risk ratio, the absolute risk reduction and odds ratio, all the statistical tests were contrasted with a significance of $p < 0.05$ for two tails with 95% confidence intervals, In addition, a binomial logistic regression model was carried out taking as dependent variable the result of labor (vaginal or cesarean) and as independent variable the group (control or study), the model was adjusted with possible covariates, the statistical analysis was performed in the Statistical Package for Social Sciences IBM SPSS version 24.

Results

The total sample was 115 pregnant women, 55 in the control group without continuous intrapartum support and 60 in the study group with continuous intrapartum support.

Baseline characteristics. The two groups were homogeneous with respect to the initial interest characteristics (Table 1), since no statistically significant differences were found for maternal age (p = 0.436), dilatation on admission (p = 0.120), BMI before (p = 0.214) and during delivery (p = 0.058), and years of education greater than or equal to 10 years (p = 0.596).

Table 1 Baseline characteristics of the groups

	Study group n = 60	Control group n = 55	P value
Maternal age (years, mean ± SD)	23.1 (14 - 34)	23.0 (14 - 39)	0.424
Admission dilation (cm, median, range)	4 (1 - 9)	3 (0 - 8)	0.141
BMI before delivery (kg/m^2, mean ± SD)	24.1 ± 4.1	25.3 ± 4.8	0.144
BMI during delivery (kg/m^2, mean ± SD)	28.6 ± 4.1	29.9 ± 4.4	0.087
Years of education (>= 10 years, n, %)	36 (60.0)	35 (63.6)	0.689

Student's t test was performed for BMI before and during delivery, Mann-Whitney U-test for maternal age and admission dilation, Chi-square for years of education.

Primary outcome. In the study group, the cesarean delivery rate was 1.7% (1 of 60) [Table 2], significantly lower than that of the control group, which was 29.1% (16 of 55) [X^2 = 17.13, df = 1, N = 115, p < .001], with a risk ratio of 0.06 (95% CI: 0.01 to 0.42), the absolute risk reduction was 27.4%, (95% CI: 15% to 40%).

Table 2 Outcome of labor

Group	Cesarean delivery	Vaginal delivery	Total
Study n (%)	1 (1.7)	59 (98.3)	60 (100)
Control n (%)	16 (29.1)	39 (70.9)	55 (100)

X^2 = 17.13, df = 1, n = 115, p < .001

Secondary outcomes. The indication for cesarean with the highest percentage was prolonged labor with 18.2% (10 of 55) in the control group and 1.7% (1 of 60) in the study group, the hours of labor were significantly lower (p = 0.0001) in the study group (median = 6.7 hours, 95% CI: 6.0-8.1), than those in the control group (median = 13.4 hours, 95% CI: 10.7 - 16.1), with respect to the others variables were not found statistically significant differences between the groups (Table 3), application of oxytocin (p = 0.206), obstetric analgesia (p = 0.475), apgar score <7 in minute 1 (p = 1,000) and minute 5 (none statistical test was performed since there were no cases),

Table 3 Results of indication for cesarean and labor of the groups

	Study group n = 60	Control group n = 55	P value
Indication for cesarean			
Prolonged labor n (%)	1 (1.7)	10 (18.2)	0.003
Fetal distress n (%)	0 (0)	5 (9.1)	0.023
Labor dystocia n (%)	0 (0)	1 (1.7)	0.478
Labor (hours, median, range)	6.7 (0.9 - 22.2)	13.3 (1.4 - 30.0)	0.0001
Application of oxytocin n (%)	47 (78.3)	48 (87.3)	0.206
obstetric analgesia n (%)	8 (13.3)	10 (18.2)	0.475
Apgar score <7 at 1 minute (n,%)	1(1.7)	0 (0%)	1
Apgar score <7 at 5 minute (n,%)	0 (0%)	0 (0%)	+

Fisher´s exact test for apgar score <7 at minute and indication for cesarean, Mann-Whitney U-test for labor, Chi-square test was performed for oxytosin application and obstetric analgesia, +Apgar score < 7 at 5 minute no statistical test was performed

The logistic regression model for the result of labor (vaginal as reference) with respect to the group (control as reference) was statistically significant, (X^2=19.85, df=1, N=115, p<0.001), the model explained 28% (Nagelkerke R^2) of the variance, had a OR 0.041, 95% CI (0.005-0.324) statistically significant (table 4), indicating a reduction in the odds of having cesarean with continuous intrapartum support (protective effect). In the adjusted model, the “intro” procedure was used to take into account all possible covariates at the same time, the model was statistically significant (X^2=20.52, df=1, N=115, p<0.001), the adjusted model explained 29% (Nagelkerke R^2) of the variance, had a aOR 0,040, 95% IC (0,00-0,00) statistically significant, this indicates that the effect of the covariates considered is very small. In addition, their aOR had no statistical significance (table 3), adjusted models were generated with the stepwise regression and forward selection procedures with similar results.

Table 4 Logistic regression for cesarean delivery regarding continuous intrapartum support

	Estimated separately		Adjusted for covariates	
	Odds ratio	95% CI	Odds ratio	95% CI
Group	0.041	(0.005 - 0.324)*	0.040	(0.005 - 0.325)*
BMI before pregnancy			0.919	(0.673 - 1.253)
BMI during delivery			1.103	(0.787 - 1.545)
Grouped Scholarship			1.176	(0.351 - 3.947)
Admission dilation (cm)			1.095	(0.759 - 1.579)
Application of oxytocin			1.138	(0.200 - 6.461)

* $p < 0.05$, group (control as referent), grouped scholarship (<= 9 years as referent), application of oxytocin (no as referent).

Discussion

The continuous intrapartum support provided by professional nursing staff is an intervention that reduced the cesarean delivery rate, favoring the vaginal birth and decreasing the time of labor in pregnant women, under 40 years (NTVS).

In the study conducted by McGrant (12) the doula group had a statistically significantly lower cesarean delivery rate than the control group (13.4% versus 25.0%, p = 0.002), and fewer women in the group of doulas received epidural analgesia (64.7% versus 76.0%, p = 0.008), in our study a more significant reduction in the cesarean delivery rate was observed (1.7% versus 29.1% p = 0.0001), and lower percentages of obstetric analgesia use, 13.3% (8 of 60) for the study group and 18.2% (10 of 55), for the control group, although without statistical significance.

In the randomized trial reported by Kashanian (13) the number of deliveries per cesarean was 8% in the study group versus 24% in the control group with p = 0.026. Khresheh (14) found no statistically significantly differences between the groups for the mode of delivery and the duration of labor.

Wang (15) showed that the cesarean rate was significantly lower in women with supportive care compared to women with routine maternal care in the hospital (3.3% versus 24%), the duration of labor in the group with delivery care was significantly lower compared with that of the group with routine hospitalization (median: 1.5 h versus 3.05 h, p <0.0001). these results were much lower than those found in the present study (median: 6.7 h versus 13.4 h) and those reported by Borhen, that of 13 studies taken into account for the duration of labor, 6 had significantly lower means in the support group and an average of 6.97 h for the groups with support and an average of 8.46 h for groups without support (8).

This research has the weakness that the groups were not concurrent, another weakness is that in Mexico the administration of oxytocin is common after the start of spontaneous labor, this explains the high percentage of application of oxytocin, a strength was to focus on the active phase (3 cm to 4 cm dilation) until delivery, due to a disproportionate increase in caesarean section during that period in Mexico, Bohren (8) mentions that the period of support is very varied, some programs of duolas begin during pregnancy and end after three months' post-partum, other programs begin from admission and end in childbirth, another characteristic important was that the intrapartum continuous support was given only by a trained health professional (nurse with a bachelor's degree), Bohren (8) indicated a wide variety of people who provide support, from health professionals (nurses, midwives) to friends or strangers with some or no training in labor support.

It is recommended a standardization in the operational definition of the concepts to be measured, so that the results in clinical trials are more comparable, like the Robson classification system, recommended by the WHO, in addition, it is recommended to carry out more randomized clinical trials, with large samples, in countries with medium and low income, focused on the active phase and with support provided by a professional nurse giving priority to humanized delivery.

Conclusions

Continuous intrapartum support provided by a professional nurse (with a university degree) in the active phase is an effective intervention to reduce the rate of cesarean deliveries, and the time of labor in pregnant women under 40 years, (nulliparous, term, singleton, vertex).

List Of Abbreviations

NTSV: Nulliparous, Term, Singleton, Vertex.

HGZ 4: General Hospital of Zone 4.

IMSS: Mexican Institute of Social Security.

Declarations

Ethics approval and consent to participate: An informed consent was signed by all participants in the study. The study was approved by the committee of research and ethics in health research of the IMSS, with registration 15 CI 11 007 027 in the Federal Commission for the Protection against Sanitary Risks of the Government of Mexico, according to its ethical standards that meet the standards of the Declaration of Helsinki of 1964 and its subsequent amendments.

Consent to publication: Not applicable.

Availability of data and materials: All the data generated in this study is available in the following link https://i0000.clarodrive.com/s/B87gCxXmS4DgyqK or be required to the author by correspondence (email: cardonaluzmaria@outlook.com).

Competing interests: The authors declare that they have no competing interests

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Authors' contributions: LC conceived and designed this study, collected data and prepared the manuscript; L C and R L analyzed and interpreted the results; All authors read and approved the final manuscript.

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Figures

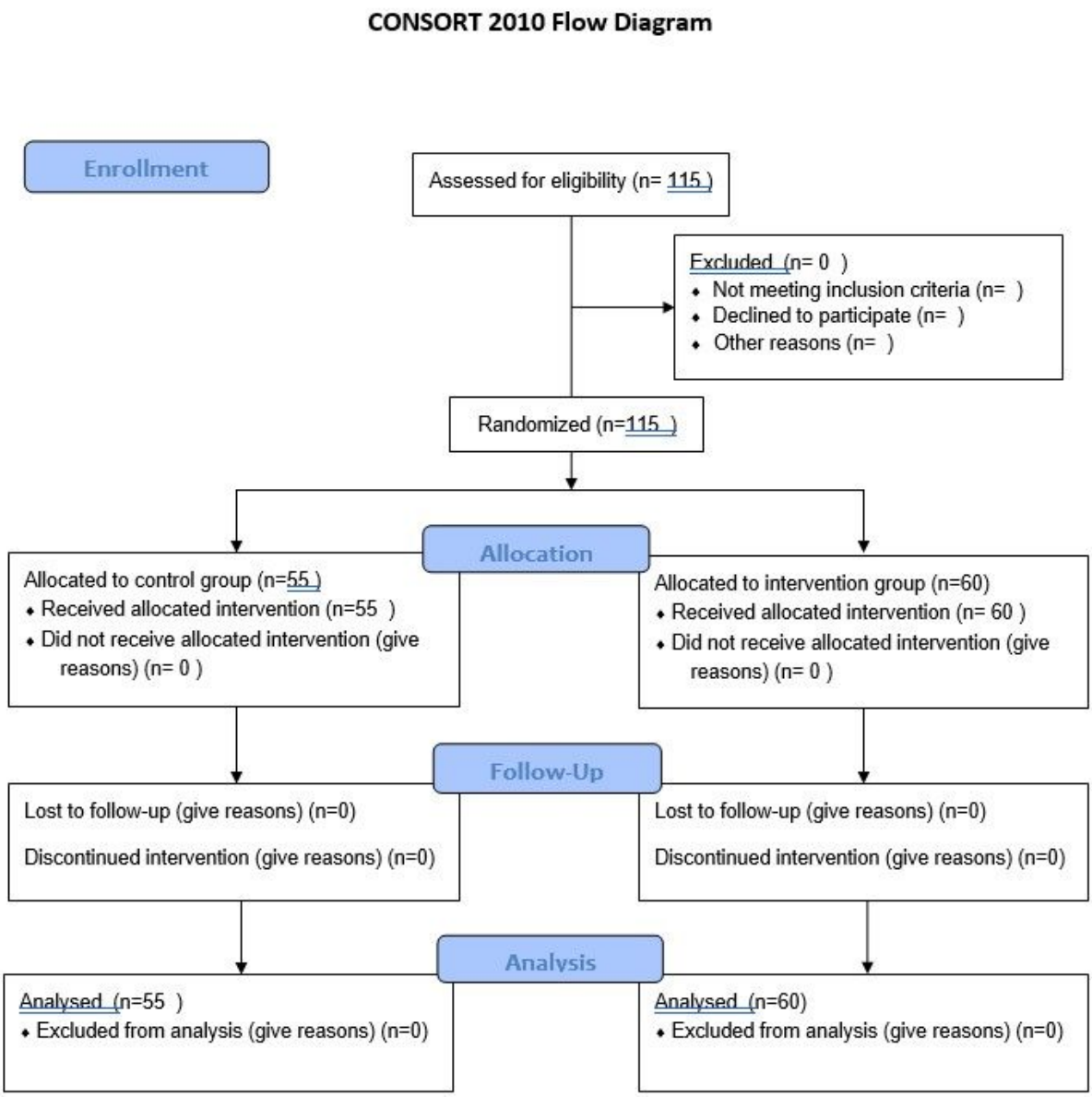

Figure 1

SORT 2010 Flow Diagram

Supplementary Files

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- CONSORT2010Checklist.doc