

Use of the partogram in labor: Analysis of its application in different care models

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ABSTRACT

Objective: To compare and identify possible differences in the use of the partogram in different models of delivery and birth care. **Design/Setting:** This was a cross-sectional study performed in two Brazilian hospitals with different models of care: Natural Birth Center (NBC) and Traditional Obstetric Center (TOC). **Data** were collected from the medical records of 112 mothers with low obstetric risk who underwent an intrapartum cesarean section. **Socioeconomic and demographic variables, obstetric history, partogram labor evolution, complications, and indication of cesarean section** were included. A significance level of 5% and a confidence interval of 95% were considered. **Data** were analyzed in accordance with the Brazilian Ministry of Health and World Health Organization recommendations. **Findings:** In the NBC, the use of the partogram follows the Ministry of Health recommendations for filling-in variables with greater frequency and significance ($p < 0.001$) beginning with the active phase of labor in the correct column in relation to the lines of alert and action ($p = 0.00$, OR = 42.2) and continuous records ($p = 0.00$, OR = 53.3). However, obstetric interventions, such as use of oxytocin, amniotomy and cesarean delivery were concentrated in area 1 of the partogram in both institutions. **Conclusions:** In this study, the NBC used the instrument most adequately; however there was no difference from the other model (TOC) and regarding the moment of interventions, many of them were early. This finding implies that, regardless of the care model, the partogram has been used bureaucratically and not as a guiding instrument of assistance envisioning safely and timely practices. In other words,

aside from a “humanized” physical structure, it is necessary that obstetric practices should be focused on best evidence, thus reducing maternal and perinatal risks.

Keywords: Partogram; Childbirth Care; Birth Center; Obstetrical Surgical Center

1. INTRODUCTION

The partogram is a tool to register maternal and fetal conditions; it also enables a quick visualization of labor progress.

In 1965, Philpott developed this instrument, based on Friedman improvements in cervicography [1]. In 1972, Philpott and Castle tested the partogram in a study performed in Rhodesia (Africa). For this study, they draw lines of “action” and “alert” in the partogram to detect potential risk labors of women who needed to be transferred from the countryside to a specialized medical center [2,3].

During the 1970's, research reaffirmed the effectiveness of the partogram for reducing long labors, caesarian sections and perinatal death during deliveries [1].

In the early 1990's, the World Health Organization (WHO) conducted a multicentric study about this instrument with more than 35 thousand women, including both nullipara and multipara, which showed a reduction of 3% in prolonged deliveries, 11% in interventions to increase delivery rhythm, 1.6% in caesarian sections, and 0.2% in stillborn children. As a consequence of these results, considering the use of the partogram as a safe and effective practice, the Organization began to recommend its use as an essential instrument to promote and control maternal and perinatal health [1,4].

The Partogram as recommended by WHO and adopted

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by the Brazilian Ministry of Health (BMH), contemplates three main labor components: fetal conditions, maternal conditions and the progress of labor. Fetal conditions consider cardiac frequency of the fetus and amniotic liquid aspect. Maternal conditions refer to vital signs, urine, bleeding, maternal position, and several intercurrent events. The progress of labor relates to the dilation of cervix, fetal presentation, and conditions of uterine contractions (frequency, intensity and duration) [1,5].

The partogram, since its idealization and prescription, has been a target of discussion. An argument, sometimes used against the partogram, is that it restricts clinical practice, since the registration of its measures presupposes the evolution of labor, based on an ideal preconceived time for the active phase of delivery care (1 cm per hour).

Systematic reviews demonstrated that routine use of the partogram, for obstetric care, has no effect on reducing intrapartum interventions (use of oxytocin, amniotomy, for example) [6,7]. Nevertheless, Brazilian studies [8,9] point to positive effects of this instrument in maternal and perinatal results, ratifying WHO recommendations of the partogram use for almost two decades [4,10].

In accordance with the WHO [4] and the Brazilian Ministry of Health [5], the proposed partogram model is valid and recommended for any models of care during childbirth.

In Brazil, the two main scenarios of delivery and birth care are the traditional Obstetric Centers and the Natural Birth Centers. An obstetrician, a midwife or an obstetric nurse provide the obstetric assistance in these two models. In the case of the City of São Paulo, where the attendance is provided by the Brazilian National Healthcare System (SUS), nurses or midwives give obstetric assistance in labors considered of low or average risk.

Obstetric Centers are connected to surgery centers of hospitals. Natural birth, instrumental vaginal deliveries, caesarian sections, and curettages are performed there. These centers are separated from antepartum and postpartum rooms, which, in turn, are normally collective. As for being traditional, the Obstetric Centers dispose of an obstetric table for surgery and, in this context; interventions and practices tend to be more invasive. On the other hand, Natural Birth Centers were regulated in 1999, aiming to provide humanized assistance with quality to natural births without dystocia. These centers dispose of a unique layout with unified antepartum, labor and postpartum rooms. Those using the NBC find practice based on better evidences, promotion of privacy and freedom for women and their companions.

Despite the Brazilian Health Ministry recommendation for a humanized and safe assistance during labor and birth, obstetric interventions are really high in the country and the caesarian section index during the last year

were higher than the natural delivery births (52.3% of total caesarian sections, of which 90% were in private hospitals and 35% in SUS).

Accordingly, the hereby study intended to compare the use of the partogram before caesarian section in two different scenarios of care during labor and childbirth: traditional Obstetric Center and Natural Birth Center. Therefore, the intention was to verify if the Natural Birth Centers, created in Brazil to oppose the traditional model of the Obstetric Centers in order to humanize the assistance through practices based on evidences, such as the use of partogram, is safe for mother and child. The "Intrapartum caesarian delivery" event is considered as a great indicative of quality in care during childbirth, and the partogram is a proper tool to register clinical care practices and maternal-fetal findings.

2. METHODS

This was a cross-sectional study performed in two hospitals located in the City of São Paulo, Brazil. Every mother of low obstetric risk was included, they underwent intrapartum caesarian sections in the year of 2010 and their deliveries were registered in the Partogram. Women with gestational age ≥ 37 weeks, with only one and an alive fetus in cephalic presentation, with normal clinical and obstetric examination and who were admitted in the hospital diagnosed as in labor were considered low risk. All data were registered in these women's hospital records.

In one of the hospitals, low-risk pregnant women were assisted in intra-hospital Natural Birth Center, whereas in the other hospital, the assistance is performed in the traditional Obstetric Center. The herein referred hospitals are denominated NBC (Hospital with Natural Birth Center) and TOC (Hospital with Traditional Obstetric Center) and their characteristics are described in **Chart 1**.

It is important to state that NBC is a maternal-hospital of reference for high-risk pregnancy throughout the City of São Paulo; accordingly, this is the reason why many women are not admitted to NBC when presenting high-risk conditions.

There were a total of 23 puerperal women in NBC and 89 in TOC.

Secondary data were collected in records of puerperal women, including socioeconomic information, obstetric information, hospitalization data, and labor progress registered in the partogram, as well as information about caesarian indication.

Both institutions studied have adopted the partogram recommended by the Brazilian Ministry of Health [5] (**Figure 1**) for delivery care (model with lines of alert and action already determined with intervals of 4 hours between the lines).

Chart 1. Characterization of places of study.

	NBC	TOC
Characteristics of hospital	Maternity Hospital where low-risk women are assisted, regardless their delivery stage, in intra-hospital Natural Birth Center.	General Hospital where low and high-risk women are assisted, regardless their delivery stage, at the Traditional Obstetric Center.
No. of natural birth in 2010	4462	1493
No. of caesarian section deliveries in 2010 (intrapartum and elective)	2165	702
No. of women who underwent intrapartum caesarian deliveries and had it registered in partogram	23	89
Professionals responsible for care to low-risk parturient women	Obstetric nurses, with doctors to support in case of emergency.	Obstetric nurses and doctors, simultaneously.
Antepartum environment	Antepartum, labor and Postpartum rooms.	Collective room, no curtains or panels separating beds.
Partum environment	Antepartum, labor and Postpartum rooms.	Surgery room
Puerperal environment	Rooming	Rooming

According to Brazilian Ministry of Health regulations for a correct use of the partogram, it must be fulfilled as follows:

1) The registration on the chart is started when the parturient is really in the active phase of the labor (two to three efficient contractions every 10 minutes and minimal cervix dilation of 3 - 4 cm);

2) Line of alert must be traced in the following hour to the first registration of cervix dilation. Line of action must be traced in parallel after 4 hours.

3) Subsequent vaginal examinations should be taken every two hours, however each column of the chart must correspond to 1 hour.

For data analysis, the following variables were studied: the partogram starting moment in relation to the phase of labor, start of fulfilling the partogram in relation to line of alert (correct column), continuous registration (1 hour per column), registration of maternal and fetal findings and registration of interventions.

Data were processed in *Stata*[®], version 11.0, taking into consideration the significance level of 5% ($p < 0.05$) and Confidence interval (CI) of 95%. For statistical analysis, test χ^2 Mantel-Haenszel was used; and the Fischer exact test was adopted for intervals lower than five. *Odds Ratio* (OR) was calculated to estimate risk.

The results were described in the attached tables.

This study respected ethical aspects of the Brazilian regulation regarding research involving human beings (Regulation nr. 196/96), and the Research Ethical Committees approved the institutions involved (Protocols 2218; 0010.0.207.162-11; e 004/11).

3. RESULTS

Twenty-three (23) women of NBC and eighty-nine (89) of TOC had, respectively, the following characteristics:

between 14 and 40 years of age; 61.4% and 63.6% were housewives; 50% and 37.9% had white complexion. In regard to education, despite the amount of reports without this information, 38.5% of the women at NBC declared to have concluded High School, against 28% at TOC.

In respect to obstetric history, parturient women were between 37 and 42 weeks of pregnancy, in that most of them were primigravidae (69.2% at NBC and 55% at TOC).

In reference to filling-in variables of the partogram, the device started, in 100% of the NBC cases, when women were in the active phase of labor, whereas in TOC, 76.4% of the in-labor women were not in the active phase of labor (**Table 1**).

Additionally for the beginning of the partogram registration, 89.9% of NBC cases against 17.4% of TOC cases occurred in an incorrect column in relation to line of alert. This data was statistically significant ($p = 0.000$ /OR = 42.2/IC = 10.3 - 191.5) when both institutions were compared (**Table 1**).

A discontinuation in registration was observed in 71.8% of the cases at TOC and, therefore, this result was statistically significant ($p = 0.000$ /OR = 53.3/IC = 7 - 1117) (**Table 1**).

In relation to clinical findings and interventions, the fetal heart beat (FHB), uterine contraction patterns, water-bag integrity, and amniotic liquid aspects were registered in 100% of the NBC cases. Such registrations were present for most of the population studied in the TOC. However, despite its statistical significance ($p = 0.004$ /OR = 9.2/IC = 1.3 - 78.7), both institutions had few registrations about variation in positioning (17.4% at NBC and 2.2% at TOC) (**Table 1**).

Registration of non-pharmacological methods for pain relief was statistically significant when both institutions

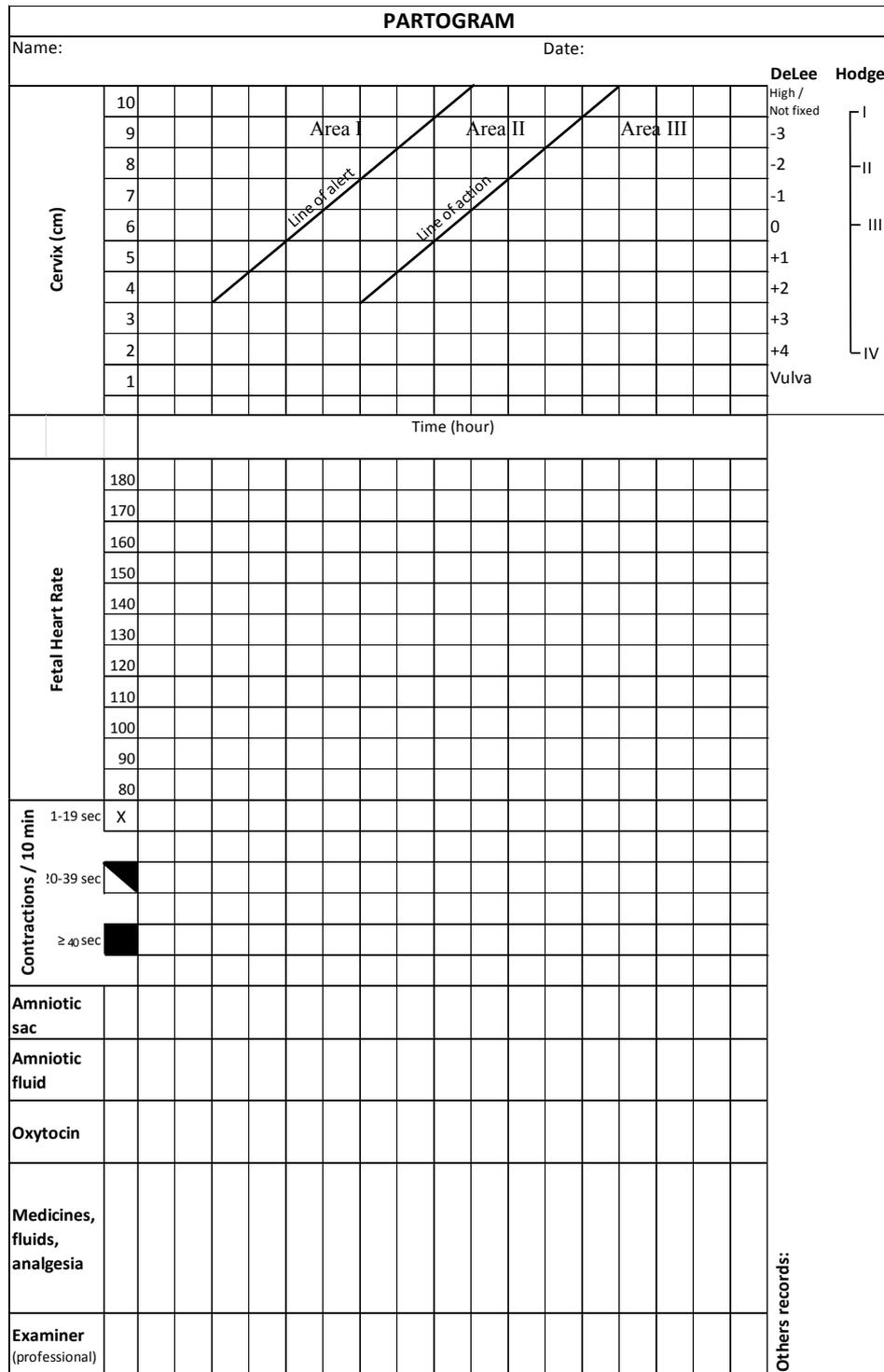


Figure 1. Model of partogram recommended by the Brazilian Ministry of Health [5].

are compared ($p = 0.000/OR = 93.2/IC = 11.8 - 1987$), which demonstrated that a better result was achieved at NBC (Table 1).

Another relevant data with statistical significance ($p = 0.000/OR = 300/IC = 20.1 - 11451$) was the use and control of oxytocin infusion. Fifty-two (52) women at TOC

underwent the use of this drug, and only 02 (3.8%) of them had this fact registered in the partogram (Table 1).

With reference to the moment of obstetric interventions, they occurred, primarily, in area I of the partogram (before line of alert), either at TOC or NBC (Tables 2 and 3).

Table 1. Frequency, value of *p*, Odds Ratio (OR) and confidence interval (CI) in regard to filling-in the partogram variables by health institutions. São Paulo, Brazil (2010).

Filling-in partogram variables (Brazilian Ministry of Health model)	NBC		TOC		Value of <i>p</i>	OR	CI
	Yes	No	Yes	No			
	N (%)	N (%)	N (%)	N (%)			
Beginning of the partogram in active phase	23 (100%)	-	21 (23.6%)	68 (76.4%)	*	*	*
Opening in correct column in relation to line of alert	19 (82.6%)	4 (17.4%)	9 (10.1%)	80 (89.9%)	0.000	42.2	10.3 - 191.5
Continued registration (1 hour per column)	22 (95.6%)	1 (4.4%)	26 (29.2%)	63 (71.8%)	0.000	53.3	7 - 1117
Registrations of findings and interventions:							
Cervix dilation ^A (cm)	22 (95.6%)	1 (4.4%)	63 (71.8%)	26 (29.2%)	0.013	9.1	1.2 - 190.0
Descent of presentation ^A	22 (95.6%)	1 (4.4%)	63 (71.8%)	26 (29.2%)	0.013	9.1	1.2 - 190.0
Variation of positioning	4 (17.4%)	19 (82.6%)	2 (2.2%)	87 (97.8%)	0.004	9.2	1.3 - 78.7
FHB ^B	23 (100%)	-	87 (97.8%)	2 (2.2%)	*	*	*
Uterine contraction patterns ^C	23 (100%)	-	73 (82.0%)	16 (18.0%)	*	*	*
Integrity of water-bags	23 (100%)	-	88 (98.9%)	1 (1.1%)	*	*	*
Aspect of amniotic liquid	23 (100%)	-	84 (94.4%)	5 (5.6%)	*	*	*
Oxytocin (drip method/quantity) ^D	12 (92.3%)	1 (7.7%)	2 (3.8%)	50 (96.2%)	0.000	300	20.1 - 11451
Non-pharmacological methods	22 (95.6%)	1 (4.4%)	17 (19.1%)	72 (80.9%)	0.000	93.2	11.8 - 1987

^AEvery 2 hours, at least; ^BEvery hour, at least; ^CQuantity and duration, at least, before and during oxytocin infusion and during registration of cervix dilation and descent of fetal presentation; ^DReferred to women who received oxytocin (NBC N = 13/TOC N = 73); *Value of *p*, CI and OR not defined for not having been observed during one of the events.

Table 2. Initial use of obstetric interventions, in relation to Partogram Area in Tradicional Obstetric Center (HOC). São Paulo, Brazil (2010).

TOC interventions	Partogram areas						Total of women who underwent the procedure	
	I		II		III		N	%*
	N	%	N	%	N	%		
Use of oxytocin	52	100.0	00	0.0	0	0.0	52	58.4
Use of amniotomy	38	95.0	02	5.0	0	0.0	40	44.9
Use of non-pharmacological methods	21	95.5	01	4.5	0	0.0	22	24.7
Caesarian delivery indication	79	88.8	10	11.2	0	0.0	89	100.0

*Percentage in relation to the total number of women (*n* = 89).

Table 3. Initial use of obstetric interventions, in relation to Partogram Area in Natural Birth Center (NBC). São Paulo, Brazil (2010).

NBC interventions	Partogram areas						Total of women who underwent the procedure	
	I		II		III		N	%*
	N	%	N	%	N	%		
Use of oxytocin	13	100.0	0	0.0	0	0.0	13	56.5
Use of amniotomy	13	92.9	1	7.1	0	0.0	14	60.9
Use of non-pharmacological methods	17	100.0	0	0.0	0	0.0	17	73.9
Caesarian delivery indication	14	60.9	6	26.1	3	13.0	23	100.0

*Percentage in relation to the total of women of the sample (*n* = 23).

4. DISCUSSION

In this study, the restricted amount of numbers was a limitation, primarily in regard to NBC data. This restriction may be responsible for the large dispersion of *Odds Ratio* in some results. However, it is important to emphasize that the data refer only to a one-year period and that, even so, does not invalidate this study.

In accordance with the WHO [11] and the Brazilian Ministry of Health recommendations [5], partogram registration must start at the beginning of the active phase of labor, that is to say, after more than 3 - 4 cm of cervix dilation, with 2 or 3 efficient uterine contractions every 10 minutes. When this occurs, in latent phase (period when, physiologically, cervix dilation and descent of fetal presentation slowly develop), lines of alert and action are easily surpassed and further interventions can be applied.

Unlike NBC that started partogram registration when every in-labor woman was in active phase of labor, TOC drew attention for having started 76.4% of the partograms during the latent phase of labor, although these women had been admitted and diagnosed as in the active phase of labor. This data is significant because an early start of partogram registrations predicts equally early interventions or, even, an elective caesarian delivery, due to a higher probability of an incorrect recognition of dystocia.

Obstetric interventions during latent phase of labor have undesirable effects. New interventions are frequently performed to ease or abolish such effects and, hence, a “splurge of interventions” is established, namely, a chain of events that include, among others, artificial rupture of membranes (amniotomy) and the use of hormones to accelerate delivery [12].

In case of low-risk pregnancies, the latent phase of labor must be conducted with expectation, guaranteeing vitality for mother and fetus. For monitoring labor, the phase or functional division of interest to apply the partogram is dilation, also referred to as the active phase during which the expected progression for cervix dilation is 1 cm/hour approximately. Accordingly, partogram registration in the latent phase or at the beginning of dilation (before 3 - 4 cm) could lead to unnecessary and iatrogenic interventions [5].

Other possibilities of incorrect use of the partogram are: registration of data in a wrong column in relation to lines of alert and action and of evolution in intervals longer than 1 hour per column¹. In analysis of records, there was statistical significance when both institutions

¹In situations when cervix assessment is not performed in the subsequent hour, the partogram column remains blank. This means that vaginal examination can be performed in intervals longer than 1 hour however; the space for this hour in partogram must be preserved (each column of the instrument corresponds to 1 hour).

were compared ($p = 0.000$, OR = 42.2 and $p = 0.000$, OR = 53.3, respectively), showing that the use of the partogram at NBC follows, more frequently, the filling-in of data as recommended by the Brazilian Ministry of Health.

Philpott and Castle [2] established that a line of alert in the partogram should be in the same line of the first register of cervix dilation, however in the following hour. After four hours, the line of action must be taken. Consequently, when the partogram has entries in the wrong column in relation to the lines, it can result in an incorrect identification and correction of a dystocia. On the other hand, as observed in **Tables 2** and **3**, the fact that, most interventions were performed in Area I of the partogram, reveals that, in both institutions, there was little influence of lines of alert and action regarding the intervention clinical decision.

In-labor women must undergo subsequent vaginal examinations every two hours in accordance with the Brazilian Ministry of Health [5], except in situations of interurrences, considering the time expressed in chart for each registration. Cervix dilation, height of fetal presentation, positioning variety, and water-bag conditions are necessary to be evaluated and registered in the partogram for each one of the gynecologic examinations. The best result attributed to the NBC, in relation to registrations of labor progress (cervix dilation, descent of presentation, uterine contractions pattern, water-bag integrity) and fetal conditions (FHB and aspect of amniotic liquid) indicate that the model adopted in this Natural Birth Center respects the basic care recommendations regarding the use of the partogram.

Recent systematic review [13] compared NBC (named as “alternatives”) with “conventional institutional settings for birth”. They concluded that the alternative model does not present risk to mother or baby, is associated with reduced risk of medical interventions, has a higher probability of spontaneous vaginal delivery, has an increase in maternal satisfaction, and leads to a higher probability of breast-feeding after labor.

The registrations of usage of oxytocin are considered data of extreme relevance because of the imminence of risks in the indiscriminate use of this drug. This synthetic hormone was included in the list of the 11 high-alert medications of the *Institute for Safe Medication Practices* (ISMP)—a nonprofit organization that evaluates safety of medication available worldwide. This institute indicates that oxytocin result in further risks of damages when misused [14].

In accordance with the Brazilian Ministry of Health [5], the use of oxytocin must be registered in a partogram—instrument that favors the rational use of oxytocics, to wit, in the active phase or long pelvic periods. As a result, 5UI of hormone in 500 ml of physiological se-

rum or glucose serum at 5% is recommended at initial infusion of 4 drops/minute (2 μ U/minute), two-folding the dripping method every 30 minutes until the desired uterine contraction is obtained. It was observed in this study that, 58.4% of TOC women and 56.5% of NBC women underwent oxytocin use. However, TOC presented less concern in registering the infusion velocity, as well as the dosage of oxytocin infused. This event proves to be worrisome as the lack of registration does not endorse professionals of possible maternal-fetal interurrences resultant of oxytocin infusion, and it likewise hinders the communication between teams in hospital shift changes, increasing maternal and fetal risks.

In another way, when **Tables 2** and **3** are observed, both institutions presented initial infusion of oxytocin in Area I of the partogram. This means that in all cases the labor progress occurred apparently in accordance with normal expected patterns, which do not justify the possibility of trying to correct uterine contractions with oxytocin². Justifications for isolated professional conduct are to accelerate delivery and shorten mother suffering, although the use of oxytocin, for this end, increases the pain of contractions (women frequently complain about this effect) and it can contribute to a “splurge of interventions” [12,14]. Additionally, other studies [15] have shown that the use of oxytocin is associated with the way of birth. According to these authors, there is twice the risk of caesarian delivery when in-labor women undergo oxytocin use.

Non-pharmacological methods to relieve pain are on the WHO evidence list of useful practices to be stimulated during labor [5,10]. Several studies were performed to ratify the efficiency of such methods. In systematic review where 38 studies about the use of pain-relief techniques were included, among them, the bath, movement and massage concluded that they are safe, efficient and satisfactory for many women [16].

The bath momentarily reduces uterine contraction pains. In the first phase of labor, moving, remaining in vertical positions and freely changing positions can speed-up the active labor, as well as, women with low obstetric risk can have some comfort in the squatting position during the expulsion period [16,17]. Mamede [18] studied the deambulation effect on labor, verifying that the longer the walks at the beginning of active labor are, the shorter the labor period is.

TCO used non-pharmacological methods in only 19.1% of in-labor/pregnant women, and this data had no

statistical significance, demonstrating that the NBC care model has a higher potential to stimulate non-invasive methods to relieve pain and, consequently, promote delivery. The layout of a Natural Birth Center, with antepartum, labor and post-partum rooms, for example, encourages women to walk about the room or remain in the bath. Contrarily, professionals (obstetricians, obstetric nurses and doctors) are believed to be able to stimulate non-pharmacological methods to women even in small unfavorable spaces.

When also considering the use of the partogram with its tracked lines in hospitals, “*there is no need of interventions when dilation is achieved or crosses the line of alert. Alert simply implies the necessity of a better clinical observation*” ([5]: p. 48). Only in cases when the cervix dilation curve achieves the line of action, a medical intervention, not necessarily surgical, must be taken to improve the labor progression and/or correct possible dystocias that have been already started.

In the study of Rocha [9] performed in a natural birth center, obstetric interventions timely occurred, like in the case of amniotomy, for example, when a higher frequency occurred in the Areas II and III of the partogram. In this research, on the contrary, as described in **Tables 2** and **3**, there was a predominance of invasive interventions (oxytocin, amniotomy and caesarian section) in Area I of the partogram. For a population of low obstetric risk, hospitalized with an in-labor diagnosis, a higher number of registrations for intrapartum caesarian deliveries were expected in Area III of the partogram. This finding leads to questioning about obstetric practices in both institutions, regardless of the possible interurrences occurred at the beginning of the labor registration.

5. CONCLUSIONS

As a conclusion of this study, the hospital with Natural Birth Center presented better results in regard to filling-in data the partogram, but did not present different results in comparison to the hospital with Traditional Obstetric Centers in relation to the moment of the interventions. Accordingly, regardless of the care model, the partogram is being used bureaucratically and not as a care guiding instrument aimed toward safe and opportune practices.

In populations considered low obstetric risk, these invasive interventions are expected to be more present in Areas II and III of the partogram (after line of alert). When they are present mainly in Area I of this instrument, even before using non-pharmacological methods, it is inferred that a rapid outcome of labor was sought and, as a consequence, often unnecessary or inappropriate technologies/interventions were used earlier than necessary.

This study questions safety, efficiency and efficacy of care practices, which are insufficiently guided in scien-

²It is worth emphasizing that the population studied is compound of women who were diagnosed in labor; therefore it does not apply for women who received indication of oxytocin to induce labor (for example, post-term pregnancy with favorable conditions of the cervix). In this situation, such intervention should be registered in the partogram from the beginning of the process respecting the track of lines of alert and action only when the active phase of labor is achieved (6).

tific evidence. It points out that, in traditional models of labor and birth care, as in Obstetric Centers, good practices recommended by the WHO and the Brazilian Ministry of Health must be incentivized. Diversely, even in models that had its physical structure idealized according to “humanized labor and birth” models, such as Natural Birth Centers, the presence of practices, not always based on better evidence are verified, suggesting that, more than the physical structure, human actions play an essential role in guaranteeing maternal and perinatal safety.

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