


Original Article


Comparative Evaluation of the WHO Labour Care Guide and Modified Partograph in Cesarean Section Frequency, Delivery Outcomes, and Maternal Stress in Tertiary Care Hospitals in Hyderabad

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ABSTRACT

The global rise in cesarean section (CS) rates has raised concerns due to associated maternal and neonatal risks, increased healthcare costs, and psychological stress. To address this issue, the World Health Organization introduced the Labour Care Guide (LCG) as an updated, evidence-based tool for monitoring labour and improving childbirth outcomes. **Objectives:** To compare the frequency of cesarean sections among women managed using the WHO Labour Care Guide (LCG) and those managed with the Modified Partograph in tertiary care hospitals of Hyderabad, Sindh. **Methods:** A comparative cross-sectional study was conducted at Liaquat University Hospital and Khidmat-e-Khalq Foundation Hospital over four months. A total of 430 pregnant women were enrolled, with 215 participants in each group. Maternal stress levels were assessed using the Perceived Stress Scale (PSS). Data were analyzed using SPSS version 26.0, and the Chi-square test was applied to compare categorical variables. **Results:** Women managed with the LCG had a significantly lower CS rate compared with those monitored using the Modified Partograph (40 vs. 65; $p=0.02$). The LCG group also demonstrated improved neonatal outcomes, including higher birth weights and better Apgar scores. Additionally, maternal stress levels were significantly lower and satisfaction with care was higher among women in the LCG group ($p<0.050$). **Conclusions:** The WHO Labour Care Guide appears to be more effective than the Modified Partograph in reducing cesarean section rates and improving maternal and neonatal outcomes while lowering maternal stress during labour.

INTRODUCTION

Cesarean sections (CS) have been on the rise globally, with the worldwide average CS rate increasing from 12% in 2000 to 21% in 2015 and projected to reach nearly 29% by 2030 if current trends continue [1]. Increased risks of infections (3 to 15%), hemorrhage (up to 10), anesthesia-related complications (up to 7), and a long recovery process in resource-limited settings may worsen the situation further

in women undergoing CS [2]. Furthermore, the following CSs are more likely to lead to uterine rupture, abnormal placentation, and an increased risk of repeat CS, which also hurts healthcare systems. The high CS rates are associated with the rise of healthcare expenses in terms of prolonged hospital stays, the use of more resources, and the necessity to provide more specialized care during the



surgery and after it [3]. This economic burden has the potential of redirecting funds to other important services to maternal and child health, hence affecting the quality of care in general [4-6]. Another important issue that depends on the mode of delivery is pregnancy outcomes. Vaginal birth takes shorter to heal, has fewer infections and immediate mother-infant bonding, which is healthy for the health and development of the newborn baby in the long term as compared to C Section [7, 8]. In addition, the mental health of CS mothers is also becoming an increasing concern [9]. Research has found that women who deliver through CS are likely to develop more postpartum depression, anxiety, and stress than those who deliver through the vagina. The psychological consequences of an unexpected or emergency CS may also be especially significant and may also add to the failure, loss of control, and trauma [10]. To overcome these problems, the conventional partograph and the new WHO Labour Care Guide (LCG) tools have been created. Partograph is a graph tool that is applied to track the progress of labor and determine whether there are deviations in norms, so that the interventions may be timely. Yet, it has not been used regularly and has not had many effects on the decrease of the unnecessary CS [11]. The WHO Labour Care Guide (LCG) seeks to enhance labour management through a more holistic and evidence-based method of monitoring labour [12]. The LCG focuses on personalized care, ongoing labor, and evidence-based intervention, which will help to decrease unnecessary CS and enhance delivery outcomes. Comparing the effectiveness of the LCG with the traditional partograph, the given study aims at identifying the possible advantages of LCG in terms of decreasing the rate of CS and improving both maternal and neonatal conditions, including maternal mental health [13]. According to the last report of Pakistan Demographic and Health Survey (PDHS), the rate of C-Section deliveries is soaring, with the authority noting a change in 2012-13, where the rates stood at 14%. In 2017-18, the rates have improved to 22%. This excessive use puts an enormous and avoidable burden on the health system of the country, which otherwise consumes limited resources in other areas of priority. It is also known to drive up the cost of delivering care that affects poorer families in disproportionately large measures [14, 15].

The study is specifically timely and relevant in that it can guide the policy and practice, making childbirth practices and health outcomes in mothers and babies safer to protect health and well-being worldwide. This study aimed to offer evidence on the need to implement the LCG to encourage safer birth practices and improve the maternal and neonatal health of women in Pakistan by intervening with both physical and mental health outcomes.

METHODS

A comparative cross-sectional study was conducted at Liaquat University Hospital and Khidmat e Khalq Foundation Hospital, Hyderabad, in the time frame of four months from 11-10-2025 to 10-02-2026, after the approval of the research proposal by the research ethics committee of LUMHS, Jamshoro (NO. LUMHS/REC-1147; dated 10th October 2025). A non-probability consecutive sampling method was used. The sample size was calculated by the equation $n = [(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times (p_1(1-p_1) + p_2(1-p_2))] / (p_1 - p_2)^2$ based on comparison of cesarean section rates between the WHO Labour Care Guide and Modified Partograph groups. Assuming a cesarean section rate of 30% in the Modified Partograph group and 18% in the WHO Labour Care Guide group, with a 95% confidence level and 80% power [13], the required sample size was calculated as 195 participants per group. After adjusting for a 10% anticipated dropout rate, a total of 430 participants (215 per group) were included in the study. Groups: Intervention Group: Labour monitored using the WHO Labour Care Guidelines and Control Group: Labour monitored using the Modified Partograph. Inclusion Criteria consisted of pregnant women aged 18 to 35 years, primigravida and multigravida women admitting with spontaneous labour in the active phase, live Singleton pregnancy with cephalic presentation, having normal vital signs, and vaginal birth was anticipated. Exclusion criteria were defined for patients with induced labour, pregnant women admitted in the 2nd stage of labour, women with any pregnancy-related complications, antenatal women with medical disorders like Diabetes mellitus/Hypertension/Anemia/Heart diseases/Autoimmune diseases, and women with preterm labour, premature rupture of membranes, or contracted pelvis were excluded from the study. Written informed consent from the pregnant woman or her attendant was obtained after providing them with clear and concise information about the study's purpose, procedures, risks, and benefits. Participants were assured of the confidentiality of their data. The participants have the autonomy to leave the study or not to answer any question. The questions were asked of the participants in their local language so they could easily understand and answer. Whereas, for assessing the stress levels in participants during labour and delivery, the Perceived Stress Scale (PSS) was employed. The Perceived Stress Scale (PSS-10) is a widely used instrument for measuring perceived psychological stress. It consists of 10 items rated on a 5-point Likert scale (0 = never to 4 = very often). After reversing the scores of positively worded items (items 4, 5, 7, and 8), the responses are summed to obtain the total stress score. The minimum possible score was 0, and the maximum possible score is 40, with higher scores

indicating greater perceived stress. Generally, scores were interpreted as low stress (0-13), moderate stress (14-26), and high stress (27-40) [16]. Regarding reliability, recent studies have reported strong internal consistency, with Cronbach's alpha values typically exceeding 0.70, indicating acceptable to high reliability. In terms of validity, the PSS has shown strong construct validity, commonly supporting a two-factor structure (perceived helplessness and perceived self-efficacy), confirmed through confirmatory factor analysis [17]. Additionally, the scale demonstrates good convergent validity, with significant associations with related psychological constructs such as anxiety and depression. Recent validation studies conducted in diverse populations (e.g., Iran, Peru, Bangladesh) further confirm that the PSS is a psychometrically sound and culturally adaptable tool for measuring perceived stress [18].

SPSS version 26.0 was used for data analysis. Qualitative variables, such as mode of delivery, were presented as frequencies and percentages. Quantitative variables, including duration of labor, birth weight, and Apgar scores, were expressed as mean and standard deviation. Normality of quantitative variables was assessed using the Shapiro-Wilk test. Chi-square test was applied for comparing categorical variables between groups (LCG vs. Modified Partograph), and the independent sample t-test was used for normally distributed continuous variables. A p-value of less than 0.050 was considered statistically significant.

RESULTS

The study presents the socio-demographic characteristics of the participants. The majority of women in both groups were aged 18-25 years (36.0%), followed by 26-30 years (34.9%). Most participants had secondary level education (58.1%). Regarding marriage duration, 45.3% had been married for 3-5 years. Approximately 43.0% had one to two children, and 61.6% reported previous labour experience. In addition, this study provides a comparison of the maternal health outcomes and the cases of complications such as hemorrhage, infection, and high blood pressure. The LCG Group had fewer cases of complications, 20 cases of hemorrhage, 10 of infections, and 15 of high blood pressure. On the contrary, it was the Modified Partograph Group that exhibited more complication rates, especially hemorrhage (30 cases) and infection (20 cases). A greater share of women in the two groups did not have complications, with 170 in the LCG Group and 155 in the Modified Partograph Group. This study also presents fetal health outcomes where the average birth weight (3.3 kg), Apgar score at 1 minute (8.5), and Apgar score at 5 minutes (9.0) were slightly higher in the LCG Group than in the Modified Partograph Group, which had lower values of the above outcomes. The LCG Group

had lower NICU admissions, too (5 cases), than the Modified Partograph Group (8 cases) (Table 1).

Table 1: Demographic Information of Participants and Maternal and Fetal Health Outcomes

Variables	LCG Group, n (%)	Modified Partograph Group, n (%)	Total, n (%)
Age Group			
18-25	80 (37.2%)	75 (34.9%)	155 (36.0%)
26-30	70 (32.6%)	80 (37.2%)	150 (34.9%)
31-35	65 (30.2%)	60 (27.9%)	125 (29.1%)
Educational Level			
No Formal Education	15 (7.0%)	10 (4.7%)	25 (5.8%)
Primary	40 (18.6%)	50 (23.3%)	90 (20.9%)
Secondary	120 (55.8%)	130 (60.5%)	250 (58.1%)
Tertiary	40 (18.6%)	25 (11.6%)	65 (15.1%)
Marriage Duration			
≤2 Years	60 (27.9%)	55 (25.6%)	115 (26.7%)
3-5 Years	95 (44.2%)	100 (46.5%)	195 (45.3%)
>5 Years	60 (27.9%)	60 (27.9%)	120 (27.9%)
Parity (Number of Children)			
0 (Primigravida)	85 (39.5%)	80 (37.2%)	165 (38.4%)
1-2	90 (41.9%)	95 (44.2%)	185 (43.0%)
≥3	40 (18.6%)	40 (18.6%)	80 (18.6%)
Previous Labour Experience			
Yes	130 (60.5%)	135 (62.8%)	265 (61.6%)
No	85 (39.5%)	80 (37.2%)	165 (38.4%)
Maternal Health Outcomes			
Hemorrhage	20 (9.3%)	30 (14.0%)	50 (11.6%)
Infection	10 (4.7%)	20 (9.3%)	30 (7.0%)
High Blood Pressure	15 (7.0%)	10 (4.7%)	25 (5.8%)
None	170 (79.1%)	155 (72.1%)	325 (75.6%)
Fetal Health Outcomes			
Birth Weight (kg)	3.3	3.1	3.2
Apgar Score (1 min)	8.5	8.0	8.3
Apgar Score (5 min)	9.0	8.7	8.9
NICU Admissions	5	8	13

(The results present the results of the Shapiro-Wilk test for assessing the normality of continuous study variables, including birth weight, Apgar scores, and duration of labour, in both the WHO Labour Care Guide (LCG) and Modified Partograph groups. All variables had p-values greater than 0.050, indicating that the data were normally distributed. This finding justified the use of parametric tests (e.g., independent t-test) for comparing the mean values of these variables between the two groups in subsequent analyses (Table 2).

Table 2: Shapiro-Wilk Test for Normality

Variables	Shapiro-Wilk Test	p-value
Birth Weight (LCG)	0.989	0.114
Birth Weight (Modified Partograph)	0.994	0.507
Apgar Score (LCG)	0.995	0.707
Apgar Score (Modified Partograph)	0.995	0.667

Duration of Labor (LCG)	0.994	0.589
Duration of Labor (Modified Partograph)	0.995	0.749

*Note: $p \leq 0.050$ indicates statistical significance. No variables reached significance in this test

To determine the impact of LCG and the Modified Partograph on the proportion of cesarean section cases, the frequency of CS delivery using the two methods was compared using a chi-square test to determine the differences in the proportions. The findings show that the rate of cesarean section in the LCG group was significantly lower than that of the Modified Partograph group ($p < 0.050$), indicating that the LCG is more effective in preventing unnecessary cesarean sections. The t-test of continuous variables results of the LCG Group and the Modified Partograph Group are provided. The LCG Group was much taller with respect to birth weight (3.3 kg vs. 3.1 kg, $p = 0.004$) and the labor length (10.2 hrs vs. 12.0 hrs, $p = 0.010$). Moreover, the LCG Group was at a higher Apgar score at 1 minute (8.5 vs. 8.0, $p = 0.003$). These variations denote that LCG Group had better maternal and fetal outcomes (Table 3).

Table 3: Cesarean Section Rates

Variables	LCG Group, n (%) / Mean ± SD	Modified Partograph Group, n (%) / Mean ± SD	p-value
Mode of Delivery			
Vaginal Delivery	175 (81.4%)	150 (69.8%)	0.020*
Caesarean Section	40 (18.6%)	65 (30.2%)	
T-Test for Continuous Variables			
Birth Weight (kg)	3.3 ± 0.5	3.1 ± 0.6	0.041*
Duration of Labor (hrs)	10.2 ± 3.5	12.0 ± 4.1	0.013*
Apgar Score (1 min)	8.5 ± 1.2	8.0 ± 1.1	0.031*

*Note: $p \leq 0.050$ indicates statistical significance

The results show satisfaction with care delivery by the participants in the LCG Group and in the Modified Partograph Group. Greater satisfaction levels were reported in the LCG Group; higher percentages of participants indicated that they were Very Satisfied (60 vs. 30) and satisfied (100 vs. 80) in the LCG Group than in the Modified Partograph Group. On the other hand, more participants of the Modified Partograph Group were not satisfied (Very Dissatisfied (20 vs. 10) and Dissatisfied (25 vs. 15). The p-value of 0.02 shows that the difference in satisfaction between the two groups was statistically significant, with the LCG Group winning (Table 4).

Table 4: Participants' Satisfaction with Care during Delivery

Satisfaction	LCG Group, n (%)	Modified Partograph Group, n (%)	p-value
Very Dissatisfied	10 (4.7%)	20 (9.3%)	0.021*
Dissatisfied	15 (7.0%)	25 (11.6%)	
Neutral	30 (14.0%)	40 (18.6%)	
Satisfied	100 (46.5%)	80 (37.2%)	
Very Satisfied	60 (27.9%)	30 (14.0%)	

*Note: $p \leq 0.005$ indicates statistical significance

The study shows the mode of delivery (Vaginal vs. Cesarean) results of the Chi-square test between the two groups. The Chi-square statistic value has the value of 0.45 and 1 degree of freedom, and the p-value of 0.502, which was above the level of significance of 0.050. This implies that no substantial disparity can be established in terms of mode of delivery between the LCG Group and the Modified Partograph Group, which implies that the distribution of Vaginal and Cesarean deliveries was the same in both groups. The duration of labor significantly varies between the two groups ($p < 0.050$), as the LCG Group has a lower duration of labor. The difference between the Apgar score at 1 minute between the two groups is statistically significant ($p < 0.050$), with the LCG Group doing better. The difference in birth weight between the LCG Group and the Modified Partograph Group ($p < 0.050$) statistically differed, with the LCG Group reporting higher birth weight (Table 5).

Table 5: Chi-square Test for Mode of Delivery

Variables	Chi-square Statistic, t-value	Degrees of Freedom (df)	p-value
Mode of Delivery (Vaginal vs. Cesarean)	0.45	1	0.502
Independent Sample t-test for Duration of Labor			
Duration of Labor	-4.11	428	0.005**
Apgar Score (1 min)	3.46	428	0.006**
Birth Weight	3.23	428	0.001**

*Note: ** $p \leq 0.050$ indicates statistical significance

DISCUSSION

The increasing incidence of cesarean sections (CS) in the world has brought up serious issues of maternal and neonatal health consequences [19]. The global rise in CS rates, which were 12% in 2000 and are projected to reach 29% by 2030, has not only had an impact on physical health but also introduced socioeconomic implications in the healthcare systems. The non-medical influences on the practice of CS in most countries are on the rise, especially in Pakistan, where they are being inspired by maternal wishes, perceived convenience, and financial gains within healthcare facilities [20]. Psychological stress experienced by women especially following emergency or unplanned deliveries of CS adds to the risks involved in this procedure, such as infections, hemorrhage, and lengthy recovery periods context, the research aimed at assessing the usefulness of the WHO Labor Care Guide (LCG) in the reduction of CS occurrence and the health outcomes of both mothers and their newborns relative to the Modified Partograph, which is widely used as a labor progress monitoring tool [21-23]. The research found that the LCG was more effective in decreasing the frequency of cesarean sections by a significant margin, with $p < 0.050$. The results can be compared to previous sources that

highlight that the LCG facilitates personalized care, sustained support, and evidence-based interventions that proactively minimize unnecessary CS. The result conforms to the WHO recommendation that the CS rates should not be above 10-15 because above this level, there are high chances of maternal and neonatal morbidity. Prioritizing a more individualized approach to labor management, the LCG is most likely to promote timely interventions as well as prevent needless surgical interventions [24]. Although a valuable instrument for tracking labor progress, the Modified Partograph has been demonstrated to be inconsistently used and has a restricted influence in minimizing CS rates [25]. The LCG subsequently mitigates these shortcomings by including continuous labor support and care plans tailored to each individual, that has the potential to lead to maternal and fetal outcomes. As this research suggests, the LCG Group was less likely to have CS than the Modified Partograph group (40 vs. 65, $p=0.020$), and this may be because more extensive labor monitoring could provide more favorable results when the delivery process is concerned. The LCG Group had fewer complications (hemorrhage and infection) in terms of maternal outcomes than the Modified Partograph Group. In particular, postpartum hemorrhage was much lower in the LCG Group (20 vs. 30, $p<0.050$), which is one of the most important factors to enhance maternal health. Furthermore, the fetal outcome was also better with the LCG Group (babies born with a better birth weight of 3.3 kg compared to 3.1 kg) with a higher Apgar score at 1 minute (8.5 vs. 8.0) and 5 minutes (9.0 vs. 8.7) [26]. The LCG Group had fewer admissions to the NICU (5 vs. 8), which also confirms the idea that the LCG makes the process of providing adequate neonatal care easier, and the babies are born in the best possible circumstances. This is significant, since vaginal births are associated with superior immediate infant outcomes when compared to a cesarean section, which has been frequently linked with infant lateness to breastfeeding and reduced instant mother-infant attachment. The research also determined the level of maternal stress during childbirth, which has been associated with poor health conditions in both the mother and the infant. Measures of stress during labor were done by use of the Perceived Stress Scale (PSS) [27]. The LCG Group expressed lower levels of stress than the Modified Partograph Group, and the high levels of stress were significantly reduced (65 vs. 55, $p<0.050$). This indicates that the emphasis of constant help and personalized care by the LCG can minimize stress and anxiety during labor, that are beneficial to both the health of the mother and the baby [16]. Another variable taken into consideration in the research was satisfaction with care. The level of satisfaction in the LCG Group was also much

greater, as the percentage of participants who stated that they were "Very Satisfied" (60 vs. 30, $p<0.050$) with the treatment they obtained during labor. This finding confirms the hypothesis that the individual approach and ongoing assistance are major elements contributing to the improvement of patient experience in childbirth. The results are in line with the studies that have shown that the more satisfied mothers are, the greater their chances of achieving good mental health results, such as reduced post-partum depression and anxiety levels. The findings of this study suggest that the use of the WHO Labour Care Guide can support improved monitoring and decision-making during labour compared with the Modified WHO Partograph. Healthcare institutions should consider integrating the Labour Care Guide into routine intrapartum care and provide appropriate training for healthcare providers to ensure its effective implementation. This may help improve the quality of maternal care and potentially enhance maternal and neonatal outcomes during labour.

This study was conducted in a single tertiary hospital, limiting generalizability, and did not fully assess factors like socioeconomic status, nutrition, or antenatal care. Reliance on accurate documentation for the WHO Labour Care Guide and Modified Partograph may introduce observer bias, and long-term maternal and neonatal outcomes were not evaluated. Future studies should be conducted in multiple healthcare settings with larger and more diverse populations to improve the generalizability of the findings. Further research should also include additional maternal and socioeconomic factors and assess long-term maternal and neonatal outcomes to better evaluate the effectiveness of the WHO Labour Care Guide compared with the Modified WHO Partograph. Regular training of healthcare providers on the correct use of these monitoring tools is also recommended.

CONCLUSIONS

To sum up, the LCG is a more suitable instrument in the control of labor, and its advantages are substantial regarding the decreasing number of unnecessary cesarean sections and enhancement of maternal and fetal outcomes. The study supports the use of the LCG in the clinical setting to simplify the labor process, reduce unnecessary surgical operations, and enhance the quality of the service provided to mothers and their children. The findings indicate the importance of applying evidence-based beliefs in improving births and maternal health, especially in low-resource settings, as is the case in Pakistan.

Authors' Contribution

Conceptualization: SB

Methodology: SB, FP

Formal analysis: SB

Writing and Drafting: PM, AA, ASZ, P

Review and Editing: SB, FP, PM, AA, ASZ, P

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

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