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Original Research Article

The Impact of the WHO Labor Guide on Reducing C-Sections at a Tertiary Care Hospital

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Abstract: *The global rise in cesarean section (CS) rates has become a major concern due to its association with increased maternal and neonatal complications without clear benefits in many cases. The World Health Organization (WHO) introduced the Labor Care Guide (LCG) in 2020 to improve labor monitoring, reduce unnecessary interventions, and promote positive birth outcomes.* ***Objective:*** *To assess the impact of the WHO LCG on reducing primary cesarean section rates and improving maternal and neonatal outcomes at a tertiary care hospital.* ***Methodology:*** *This randomized controlled trial was conducted over six months at Dow University Hospital, Ojha Campus, Karachi. Two hundred sixty pregnant women in spontaneous labor at 37–40 weeks' gestation were included. Participants were randomly allocated to the LCG group (n=130) or the control group (WHO-modified partograph; n=130). Maternal and neonatal outcomes were recorded, and healthcare provider feedback on LCG usability was collected using a 5-point Likert scale. Statistical analysis was performed using SPSS v16.* ***Results:*** *The cesarean section rate was significantly lower in the LCG group (12.3%) compared to the control group (25.4%) (p=0.007). The LCG group also showed higher rates of vaginal delivery (85.4% vs. 70.0%, p=0.003), shorter labor duration, and better postpartum hemoglobin levels. Neonatal outcomes were comparable between groups. Healthcare providers rated the LCG favorably, with high ease of use, acceptability, and satisfaction scores.* ***Conclusion:*** *The LCG of WHO significantly reduced primary cesarean sections and improved labor outcomes without compromising neonatal safety. It is a feasible, effective, and acceptable tool in clinical practice.*

Keywords: Labor Care Guide of WHO, cesarean section, labor monitoring, maternal outcomes, randomized controlled trial

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Introduction

Complications during delivery account for ≥ 1/3 of maternal fatalities, almost 50% of the stillbirths, and around a one-fourth of newborn fatalities (1, 2). A large number of these fatalities occur in low-resource hospital settings and could be prevented through timely interventions (3). In order to improve the maternal and neonatal health indicators, it is necessary to optimize proper labor monitoring, early identification of complications, and effective management. One of the major problems in obstetric care today is the overuse of cesarean sections (CS). The rising incidence of CS worldwide has not been accompanied by noticeable reductions in maternal or newborn morbidity and mortality (4). Recognizing this, the World Health Organization (WHO) strongly recommends that CS be performed based on medical necessity rather than target rates, ensuring it is provided to women who genuinely need it (5).
In the United States, for instance, the CS rate increased from 20.7% to 32% over the past three decades, with primary cesarean sections (CSS) significantly contributing to this rise (6). In response, the American College of Obstetricians and Gynecologists (ACOG) revised the definitions of labor stages in 2014 to encourage patience during labor, given new evidence suggesting that labor naturally progresses more slowly than previously believed (7,8). Earlier benchmarks, such as cervical dilation rates less than 1 cm per hour, were shown to be unreliable predictors of adverse outcomes and should not alone prompt obstetric interventions (9). (Cervical dilation refers to the cervix opening during childbirth, allowing for the baby's passage.) In light of these findings, new guidelines were established to improve the monitoring of labor progress and decision-making during childbirth (10-12).
To operationalize these updated understandings, WHO launched the LCG in December 2020 as the next generation of the partograph. The LCG includes specific clinical thresholds for timely intervention based on thorough maternofetal assessment and promotes respectful, supportive maternal care through standardized numerical documentation. It aims to facilitate better clinical decision-making and safer deliveries by encouraging more precise patient-centered labor monitoring. A cesarean section, defined as a surgical procedure involving incisions through the mother's abdomen and uterus for delivery, is ideally reserved for situations where it presents the safest option for the mother, child, or both (13).
Given the pressing need to address unnecessary cesarean deliveries and their associated risks, it is crucial to evaluate whether implementing the WHO LCG can effectively reduce the rates of cesarean sections and improve maternal and neonatal outcomes, particularly in resource-constrained settings. Therefore, the current research aims to compare the impact of the WHO LCG with the existing WHO-modified partograph in reducing cesarean section rates and assess healthcare providers' acceptance, satisfaction, and perceived difficulty associated with its use.

Methodology

This randomized controlled trial was conducted from April 2023 to October 2023 at Dow University Hospital, Ojha Campus, Karachi, Pakistan.
A randomized controlled trial design was employed. Participants meeting the eligibility criteria were randomly assigned to either the intervention group, monitored using the WHO LCG, or the control group, managed with the WHO-modified partograph. The impact of these monitoring methods on the cesarean section rate, maternal outcomes, and neonatal outcomes was assessed.
The sample size was calculated using the OpenEpi online calculator. Based on a cesarean delivery rate of 1.5% in patients managed with the WHO LCG, as reported by Pandey et al., a minimum of 124 participants per group was required to achieve 95% study power at a 5% significance level. To minimize the margin of error, 260 participants were included, with 130 patients assigned to each group.

A non-probability consecutive sampling technique was used to recruit participants. Women who fulfilled the inclusion criteria and consented to participate were enrolled consecutively until the required sample size was completed. Women aged 18 to 40 who presented in 37 to 40 weeks of pregnancy in spontaneous labor with a singleton fetus presenting in a cephalic position were included. Spontaneous labor was defined as labor that commenced without medical or surgical induction.

Women were excluded if they had medical comorbidities such as hypertension, diabetes mellitus, renal diseases, or pulmonary diseases. Obstetric exclusions included a history of cesarean section, preterm birth, postdated pregnancy, multiple gestations, breech presentation, bad obstetric history, previous myomectomy, or the presence of cervical fibroids. Women who received intrapartum epidural analgesia were also excluded. After obtaining written informed consent, eligible participants were enrolled and randomized. The medical team responsible for labor monitoring received standardized training through a one-day session on the application and use of the WHO LCG. This training was repeated monthly at the start of each new resident team's posting. The investigators provided continuous supervision to ensure accurate and complete documentation. Depending on the group assignment, labor was monitored by following either the WHO LCG or the WHO-modified partograph. The LCG emphasized an "assess-record-check-plan" approach, where clinical parameters were systematically assessed, recorded, and verified against predefined thresholds to guide labor management decisions.

Participants were monitored from the onset of active labor until six weeks postpartum. Maternal hemoglobin levels and total leucocyte counts were recorded on the first postnatal day. Women were followed up at six weeks postpartum or earlier if they reported any complications. Maternal and neonatal outcomes were recorded, including mode of delivery, length of the active phase of labor, postpartum complications such as hemorrhage or infections, length of hospital stay, Apgar score at five minutes, NICU admissions, and neonatal outcomes. Additionally, healthcare providers monitoring the monitoring process rated the difficulty, acceptability, and satisfaction of using the WHO LCG through a 5-point Likert scale.

Data were entered into Microsoft Excel and analyzed using SPSS version 16. Quantitative variables such as maternal age, hemoglobin levels, and labor duration were reported as means and standard deviations. In contrast, qualitative variables such as mode of delivery, incidence of complications, and NICU admissions were expressed as frequencies and percentages. The independent samples t-test was used to compare means between groups, and the Chi-square test was applied to compare categorical variables. A p-value of less than 0.05 was considered statistically significant.

Results

Two hundred sixty participants were included, 130 assigned to the WHO LCG group and 130 to the WHO-modified partograph group. Both groups were comparable in terms of baseline characteristics.

Table 1 shows no significant difference in the demographic and clinical profiles of the participants. The mean age in the LCG group was 27.9 ± 4.3 years, while the control group was 28.2 ± 4.5 years (p = 0.58). The mean gestational age at delivery was similar between the two groups (38.5 ± 0.6 weeks vs. 38.4 ± 0.7 weeks, p = 0.30). Nulliparity was observed in 55.4% of the LCG group and 57.7% of the control group (p = 0.71). The mean body mass index (BMI) was 27.3 ± 2.1 kg/m² in the LCG group and 27.6 ± 2.0 kg/m² in the control group (p = 0.28) (Table 1).

Table 2 reflects improved labor progress and lower cesarean rates among patients monitored with the WHO LCG. The rate of normal vaginal delivery was significantly higher in the LCG group compared to the control group (85.4% vs. 70.0%, p = 0.003). The cesarean section rate was significantly lower in the LCG group (12.3% vs. 25.4%, p = 0.007). Postpartum hemorrhage occurred in 3.8% of the LCG group versus 7.7% of the control group (p = 0.21). Mean hemoglobin level on the first postnatal day was slightly higher in the LCG group (11.2 ± 0.8 g/dL vs. 10.8 ± 0.9 g/dL, p = 0.001). Oxytocin use during labor was lower in the LCG group but not statistically significant (Table 2).

There was no statistically significant difference in the neonatal outcomes between the groups. The Apgar scores at 5 minutes were comparable. NICU admission rates were slightly lower in the LCG group but not statistically significant (Table 3).

Table 4 reflects positive feedback from healthcare providers regarding the usability of the WHO LCG. Most rated it as "easy" or "very easy" to use, with high acceptability and satisfaction scores.

Table 1. Clinical and Demographic Characteristics

Variable	LCG Group (n=130)	Control Group (n=130)	p-value
Mean Age (years)	27.9 ± 4.3	28.2 ± 4.5	0.58
Gestational Age (weeks)	38.5 ± 0.6	38.4 ± 0.7	0.30
Nulliparous (%)	72 (55.4%)	75 (57.7%)	0.71
BMI (kg/m²)	27.3 ± 2.1	27.6 ± 2.0	0.28
Cervical Dilatation (cm)	4.2 ± 0.8	4.1 ± 0.7	0.42

Table 2. Maternal Outcomes

Outcome	LCG Group (n=130)	Control Group (n=130)	p-value
Normal Vaginal Delivery (%)	111 (85.4%)	91 (70.0%)	0.003
Operative Vaginal Delivery (%)	3 (2.3%)	6 (4.6%)	0.31
Cesarean Section (%)	16 (12.3%)	33 (25.4%)	0.007
Postpartum Hemorrhage (%)	5 (3.8%)	10 (7.7%)	0.21
Infection (%)	2 (1.5%)	5 (3.8%)	0.24
Mean Hemoglobin (g/dL)	11.2 ± 0.8	10.8 ± 0.9	0.001
Total Leukocyte Count (cells/mL)	9800 ± 1200	10050 ± 1100	0.09
Oxytocin Used (%)	49 (37.7%)	58 (44.6%)	0.27
Duration of Active Phase (hours)	5.1 ± 1.2	5.8 ± 1.3	0.002
Second Stage Duration (minutes)	32.5 ± 9.8	38.2 ± 10.1	0.001
Length of Stay (days)	2.1 ± 0.4	2.4 ± 0.5	0.001

Table 3. Neonatal Outcomes

Outcome	LCG Group (n=130)	Control Group (n=130)	p-value
Mean Birthweight (g)	2980 ± 310	2955 ± 295	0.46

Apgar Score at 5 minutes (mean)	8.6 ± 0.6	8.5 ± 0.7	0.27
Live Birth (%)	(130). (100%)	129 (99.2%)	0.32
Stillbirth (%)	0 (0%)	1 (0.8%)	0.32
NICU Admission (%)	7 (5.4%)	10 (7.7%)	0.44
Average NICU Stay (days)	3.2 ± 1.1	3.5 ± 1.3	0.21
Discharged in Satisfactory Condition (%)	123 (94.6%)	119 (91.5%)	0.34

Table 4. Healthcare Provider Feedback on WHO LCG Use

Parameter	Very Difficult (%)	Difficult (%)	Neutral (%)	Easy (%)	Very Easy (%)
Difficulty	3 (4.6%)	5 (7.7%)	10 (15.4%)	72 (55.4%)	30 (46.2%)
Acceptability	2 (3.1%)	4 (6.2%)	8 (12.3%)	75 (57.7%)	41 (63.1%)
Satisfaction	1 (1.5%)	3 (4.6%)	7 (10.8%)	77 (59.2%)	42 (64.6%)

Discussion

The global increase in cesarean delivery (CD) rates without corresponding improvements in maternal and neonatal outcomes continues to be a concern in obstetric care (14). Our study evaluated the impact of the WHO LCG compared to the WHO-modified partograph on cesarean delivery rates and overall labor outcomes in a tertiary care setting.

The baseline demographic and clinical characteristics were comparable between the two groups. The mean maternal age was 27.9 ± 4.3 years in the LCG group and 28.2 ± 4.5 years in the control group (p = 0.58). Gestational age (38.5 ± 0.6 vs. 38.4 ± 0.7 weeks), BMI (27.3 ± 2.1 vs. 27.6 ± 2.0 kg/m²), and initial cervical dilatation (4.2 ± 0.8 vs. 4.1 ± 0.7 cm) also did not differ significantly. Nulliparity was similar (55.4% vs. 57.7%, p = 0.71). This parity between the groups in baseline parameters aligns with the methodology recommended by previous studies to reduce confounding bias in clinical trials (15).

The primary cesarean section rate was significantly lower in the LCG group (12.3%) compared to the control group (25.4%) (p = 0.007). This supports existing literature that recommends redefining the onset of active labor to reduce unnecessary cesarean deliveries (16, 17). The LCG initiates active labor at 5 cm cervical dilatation, compared to 4 cm in the WHO-modified partograph, and avoids the rigid application of a 1 cm/hour dilatation threshold (18). These changes allow for more individualized monitoring and prevent premature diagnoses of labor arrest (20), contributing to the observed reduction in cesarean deliveries. Our findings mirror those of earlier implementation trials, including studies that reported significant drops in CD rates after LCG adoption (19, 16).

Furthermore, the rate of normal vaginal delivery was significantly higher in the LCG group (85.4%) compared to controls (70.0%) (p = 0.003), reinforcing the role of physiologic, supportive care during labor in promoting spontaneous vaginal births (18, 20). Operative vaginal deliveries were slightly less common in the LCG group (2.3% vs. 4.6%) but did not reach statistical significance (p = 0.31).

Labor progression indicators also favored the LCG group. The duration of the active phase of labor was significantly shorter (5.1 ± 1.2 vs. 5.8 ± 1.3 hours, p = 0.002), and the second stage of labor was reduced (32.5 ± 9.8 vs. 38.2 ± 10.1 minutes, p = 0.001). These findings suggest that the LCG may facilitate more efficient labor management without compromising outcomes, possibly by improving clinical decision-making through structured thresholds (16, 21).

Postpartum outcomes further support the use of the LCG. Although the incidence of postpartum hemorrhage (3.8% vs. 7.7%) and infections (1.5% vs. 3.8%) did not differ significantly between groups, the mean hemoglobin level was higher in the LCG group (11.2 ± 0.8 g/dL vs. 10.8 ± 0.9 g/dL, p = 0.001). This difference may reflect the lower surgical intervention rate in this group. These results are consistent with prior research showing that minimizing unnecessary CDs can reduce maternal morbidity (22, 23).

The use of oxytocin was also lower in the LCG group (37.7%) compared to controls (44.6%), although not statistically significant (p = 0.27). This supports the principle of physiological labor progression as emphasized in the LCG framework, where oxytocin augmentation is reserved for defined clinical indications, reducing unnecessary pharmacological interventions (20). Additionally, the average hospital stay was significantly shorter in the LCG group (2.1 ± 0.4 days vs. 2.4 ± 0.5 days, p = 0.001), offering practical healthcare system benefits.

Neonatal outcomes were similar between groups. Apgar scores at 5 minutes (8.6 ± 0.6 vs. 8.5 ± 0.7, p = 0.27), birthweight (2980 ± 310 vs. 2955 ± 295 g), NICU admissions (5.4% vs. 7.7%), and satisfactory discharge rates (94.6% vs. 91.5%) all showed no statistically significant differences. Importantly, there were no stillbirths in the LCG group, and only one in the control group (0.8%). These findings reinforce that more conservative labor monitoring with the LCG does not negatively impact neonatal safety, consistent with earlier reports from low- and high-resource settings (18, 20, 25).

Feedback from healthcare providers indicated high levels of acceptance and satisfaction with the LCG. Over 55% rated it as "easy," and 46.2% as "very easy" to use. Satisfaction was reported as "easy" or "very easy" by 59.2% and 64.6%, respectively. These findings align with previous studies, which found that with brief training and practical exposure, clinicians became comfortable using the LCG and found it more intuitive than previous tools (26, 27). The challenge of adapting to the non-linear "alert line" was reported in earlier phases but became manageable with experience (26).

This study confirms that the WHO LCG significantly reduces cesarean delivery rates, shortens labor duration, and improves maternal recovery metrics without compromising neonatal outcomes. With structured implementation and provider training, the LCG can effectively promote respectful, individualized, and evidence-based intrapartum care (18, 27).

Limitations

This study was conducted at a single tertiary care hospital, which may limit the generalizability of the findings. The sample size, although adequate, was relatively small. In addition, labor management was influenced by rotating medical teams, which may have introduced some variability in practice. Long-term maternal and neonatal outcomes were not assessed beyond six weeks postpartum.

Future Directions

To confirm these results, multicenter studies with larger and more diverse populations are recommended. Future research should also assess the long-term impact of LCG on maternal satisfaction, repeat cesarean rates, and neonatal development. Incorporating digital or electronic versions of the LCG may further improve usability and data accuracy.

Conclusion

The WHO LCG effectively reduced primary cesarean deliveries and improved labor outcomes without increasing risks to mothers or

newborns. Healthcare providers have accepted it well. The LCG is a safe and practical tool that supports better decision-making during labor and should be adopted more widely in maternity care settings.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department concerned. (IRB-2915/DUHS/Approval/2023/128)
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Conflict of interest

The authors declared the absence of a conflict of interest.

Author Contribution

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NH (Associate Professor)
Review literature and manuscript review critical input
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All authors reviewed the results and approved the final version of the manuscript. They are also accountable for the integrity of the study.

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