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Original Research Article

Comparative evaluation of maternal and neonatal outcomes using the WHO labour care guide versus the WHO-modified partograph: a prospective observational study

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ABSTRACT

Background: Labour and childbirth remain critical phases in maternal care, with significant implications for maternal and neonatal outcomes. Despite declining global mortality rates, disparities persist, particularly in low-resource settings. Effective labour monitoring tools are essential for improving outcomes and reducing complications. This study aimed to compare maternal and neonatal outcomes using the WHO Labour Care Guide (LCG) versus the WHO-Modified Partograph (WHO-MP) for intrapartum monitoring.

Methods: This prospective observational study was conducted at GS Medical College & Hospital over 15-18 months. A total of 200 full-term pregnant women in active labour (≥4 cm cervical dilation) were randomly assigned to either the WHO-LCG group (n=100) or the WHO-MP group (n=100). Inclusion criteria encompassed singleton pregnancies with vertex presentation and no medical or obstetric complications. Labour progression, delivery mode, maternal complications, and neonatal outcomes were recorded and analysed using SPSS v27.

Results: Normal vaginal deliveries were higher in the LCG group (86%) compared to WHO-MP (78%), with lower maternal infection rates (6% vs. 18%, p=0.005) and postpartum hemorrhage (1% vs. 6%). The LCG group showed significantly shorter labour durations and NICU stays. Apgar scores and NICU admission rates were comparable, though early neonatal recovery was more favorable in the LCG group.

Conclusions: The WHO Labour Care Guide provides a structured, patient-centered approach to labour monitoring, potentially enhancing maternal and neonatal outcomes through timely and individualized care.

Keywords: Labour monitoring, Maternal outcomes, Neonatal outcomes, WHO Labour Care Guide, WHO-Modified Partograph

INTRODUCTION

Prolonged labor remains a critical determinant of adverse maternal and neonatal outcomes, especially in low-resource settings where timely intervention is often hampered by inadequate monitoring tools and clinical infrastructure. One of the most widely implemented solutions to this issue is the partograph-a visual, time-based labor monitoring tool first introduced by Friedman in 1954 through a study of cervical dilation patterns.[1] This foundational work was further refined by Philpott and Castle, whose introduction of the "alert" and "action" lines revolutionized obstetric care by enabling structured decision-making during labor progression.[2] Recognizing the limitations of the original partograph, the World Health Organization (WHO) revised it in 2000 to create the Modified WHO Partograph (WHO-MP), which initiated active labor monitoring at 4 cm cervical dilation to enable faster clinical responses.[3,4] The WHO-MP was praised for its affordability, ease of use, and contribution to reducing obstructed labor, but critiques noted that it focused predominantly on dilation and fetal heart rate, offering a

limited, one-dimensional view of maternal and neonatal health.

In response to these shortcomings, WHO launched the Labour Care Guide (WHO-LCG) as part of its broader commitment to person-centered, respectful maternity care.[5] The WHO-LCG integrates comprehensive parameters including maternal well-being, fetal status, and labor progression into a structured, dynamic format designed for continuous use throughout labor. It promotes shared decision-making and the reduction of unnecessary interventions, aligning with global maternity care standards.[6] Initial clinical evaluations of the WHO-LCG show promising outcomes in reducing cesarean sections, identifying obstructed labor early, and supporting better neonatal Apgar scores.[7,8] However, empirical comparisons between the WHO-LCG and WHO-MP in real-world obstetric environments remain sparse, leaving an evidence gap that this study aims to fill.

As WHO progressively advocates for the adoption of the Labour Care Guide across healthcare systems, it becomes imperative to evaluate whether its theoretical advantages translate into tangible, statistically significant improvements in maternal and neonatal health. Comparative studies have shown mixed results, with some indicating no significant difference in overall outcomes between the tools.[9] Therefore, this prospective observational study aims to conduct a robust, side-by-side assessment of the WHO Labour Care Guide and the WHO-Modified Partograph to determine their effectiveness in improving labor outcomes, thereby contributing vital data to inform global obstetric practice. This study aimed to compare the maternal and fetal outcome by monitoring labour with WHO - labour care guide vs WHO- modified partograph.

METHODS

This prospective comparative study was conducted in the Labor Room of the Department of Obstetrics & Gynaecology at GS Medical College & Hospital, Pilkhuwa, Hapur from January 2024 to March 2025. The study aimed to evaluate and compare maternal and fetal outcomes using two labor monitoring tools: the WHO Labour Care Guide (WHO-LCG) and the WHO-Modified Partograph (WHO-MP). The study population comprised full-term pregnant women who were admitted in labor, either with spontaneous onset or induced labor. Each eligible woman admitted in active labor (cervical dilatation ≥4 cm) and meeting the study criteria was considered as a single study unit. Participants were included if they had a singleton pregnancy with a vertex presentation, were either primigravida or multigravida, had an adequate pelvis, and were between 21 to 35 years of age with a gestational age ranging from 37 to 40 weeks. Women were excluded if they had any medical or obstetric complications such as antepartum hemorrhage, hemoglobin level below 8 g/dL, oligohydramnios, IUGR, malpresentation, history of previous uterine surgery, or if they were scheduled for elective cesarean section.

The study was conducted over a period of 15 months. A total of 200 participants were enrolled after obtaining written informed consent, with 100 women randomly allocated to each of the two monitoring groups (WHO-LCG and WHO-MP). The sampling frame included all eligible full-term pregnant women admitted during the study period, and random allocation was used to assign participants to the respective groups. Sample size was calculated using a web-based calculator from the University of British Columbia, based on preliminary pilot data, assuming a 90% power and 5% precision error to detect a 20% or more difference in cesarean delivery rates. The study tools used were the WHO Labour Care Guide and the WHO Modified Partograph, which were filled out by residents posted in the labor room. Residents were trained in the correct method of plotting each monitoring tool. The data collection involved recording labor progress, maternal condition, fetal well-being, and labor outcomes for all participants.

Ethical clearance for the study was obtained from the Institutional Ethics Committee of GS Medical College & Hospital. Written informed consent was obtained from each participant after explaining the objectives, procedures, risks, and benefits of the study. Confidentiality and anonymity were maintained throughout. Operational definitions were clearly established: the WHO-LCG was defined as a structured tool by WHO for comprehensive labor monitoring with a focus on both maternal and fetal parameters, while the WHO-MP represented the conventional partograph focused primarily on labor progression and fetal heart monitoring. All collected data were entered and analyzed using IBM SPSS version 27. Continuous variables such as maternal age and duration of labor were presented as means with standard deviations and compared using the independent t-test. Categorical variables such as mode of delivery and fetal outcomes were expressed as frequencies and percentages and analyzed using the chi-square test. A p value of less than 0.05 was considered statistically significant.

RESULTS

The demographic characteristics of the study population included parity, literacy status, and maternal age distribution across the LCG and WHO Modified Partogram groups as shown in Table 1. Among participants in the LCG group, 56 (28.0%) were multiparous and 44 (22.0%) were primigravida, while the WHO Modified Partogram group had 46 (23.0%) multiparous and 54 (27.0%) primigravida women. In terms of literacy status, the LCG group included 28 (14.0%) graduates, 29 (14.5%) illiterate participants, 10 (5.0%) postgraduates, and 33 (16.5%) with education up to the 12th standard. In comparison, the WHO Modified Partogram group had 20 (10.0%) graduates, 27 (13.5%) illiterate participants, 28 (14.0%) postgraduates, and 25

(12.5%) with education up to the 12th standard. The maternal age distribution showed that in the LCG group, 33 (16.5%) were aged 21-24 years, 54 (27.0%) were aged 25-28 years, and 13 (6.5%) were aged 29-32 years. Similarly, in the WHO Modified Partogram group, 35 (17.5%) were in the 21-24-year range, 49 (24.5%) were aged 25-28 years, and 16 (8.0%) were aged 29-32 years.

Table 1: Demographic characteristics of study population.

Category		Labour care guide		WHO Modified Partograph	
		Frequency	Percentage	Frequency	Percentage
Age (in years)	21-24	33	16.5	35	17.5
	25-28	54	27.0	49	24.5
	29-32	13	6.5	16	8.0
Parity	Primigravida	44	22.0	54	27.0
	Multiparous	56	28.0	46	23.0
Literacy	Illiterate	29	14.5	27	13.5
	Up to 12th Stdard	33	16.5	25	12.5
	Graduate	28	14.0	20	10.0
	Postgraduate	10	5.0	28	14.0

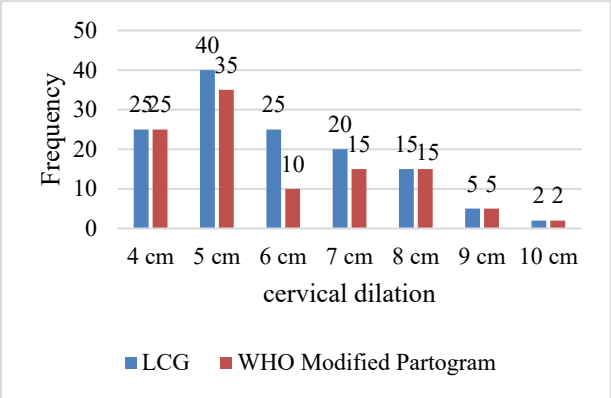

Figure 1: Comparison of cervical dilation at admission.

The bar graph in Figure 1 illustrates the distribution of cervical dilation at admission for both groups. No women in the LCG group were admitted at 4 cm, whereas 25.0 (25.0%) of WHO cases were. LCG had a higher concentration of admissions at more advanced dilations 41.0 (41.0%) at 5 cm and 25.0 (25.0%) at 6 cm, compared to 33.0 (33.0%) and 10.0 (10.0%) in the WHO group, respectively. This figure supports the observation that the LCG model encourages later hospital admission with more established labor, aligning with WHO's newer clinical recommendations.

Table 2 shows the maternal outcome comparisons between the LCG group and the WHO Modified Partogram group. In terms of delivery mode, 14.0 (14.0%) women in the LCG group underwent LSCS compared to 22.0 (22.0%) in the WHO group. The majority in both groups had normal vaginal deliveries 86.0 (86.0%) in LCG and 78.0 (78.0%) in WHO. Maternal infections were reported in 6.0 (6.0%) of the LCG group versus 18.0 (18.0%) in the WHO group, with a statistically significant chi-square value of 7.92 ($p = 0.005$). Postpartum hemorrhage occurred in 1.0 (1.0%) in LCG and 6.0 (6.0%) in WHO ($p = 0.05$). Oxytocin was required in 47.0 (47.0%) of LCG cases compared to 39.0 (39.0%) in WHO. In terms of labor duration, 59.0 (59.0%) of the LCG group completed the first stage of labor in under 4 hours compared to 39.0 (39.0%) in WHO. Conversely, 41.0 (41.0%) in LCG and 60.0 (60.0%) in WHO took 4-8 hours, and only 1.0 (1.0%) case in WHO exceeded 8 hours. The difference in first-stage duration was statistically significant ($\chi^2 = 6.22$, $p=0.013$), indicating faster labor progression in the LCG group.

Table 2: Statistical comparison of maternal outcomes between LCG and WHO modified partogram groups.

Outcome Measure	LCG Group (n=100)	WHO modified partogram Group (n=100)	Chi² / t-Statistic	P value
LSCS	14	22	1.57	0.21
Normal vaginal delivery	86	78		
Maternal infection cases	6	18	7.92	0.005
Postpartum hemorrhage (PPH)	1	6	3.83	0.05
Oxytocin required	47	39	1.53	0.216
First stage duration <4 hrs	59	39	6.22	0.013
First stage duration 4-8 hrs	41	60		
First stage duration >8 hrs	0	1		

*Chi square test

Table 3: Statistical comparison of neonatal outcomes between LCG and WHO modified partogram groups.

Outcome measure	LCG Group (n=100)	WHO modified partogram Group (n=100)	Chi² / t-Statistic	P value
NICU admission	11	18	1.45	0.228
Mean birth weight (kg)	3.04	2.98	21.17	0.001
Apgar score < 8 at 1 min	7	9	0.07	0.794
Apgar score < 9 at 5 min	20	28		
NICU stay duration: 2 days	43	40	4.73	0.03
NICU stay duration: 3 days	25	11		
NICU stay duration: >3 days	32	49		

*Chi square and Independent t test

Table 3 presents neonatal outcomes. NICU admissions were slightly lower in the LCG group at 11.0 (11.0%) compared to 18.0 (18.0%) in WHO, but this was not statistically significant ($\chi^2 = 1.45$, $p = 0.228$). The mean birth weight was higher in the LCG group at 3.04 kg compared to 2.98 kg in WHO, with a statistically significant t-value of 21.17 ($p = 0.001$). Low Apgar scores at 1 minute (<8) were reported in 7.0 (7.0%) of LCG and 9.0 (9.0%) of WHO cases, showing no significant difference ($p = 0.794$). Similarly, Apgar scores <9 at 5 minutes were seen in 20.0% of LCG and 28.0% of WHO. Regarding NICU stay duration, 43.0 (43.0%) of LCG neonates stayed 2 days, slightly higher than 40.0% in WHO. However, longer NICU stays (>3 days) were more frequent in the WHO group 49.0 (49.0%) versus 32.0 (32.0%) in LCG with a significant chi-square value of 4.73 ($p = 0.03$).

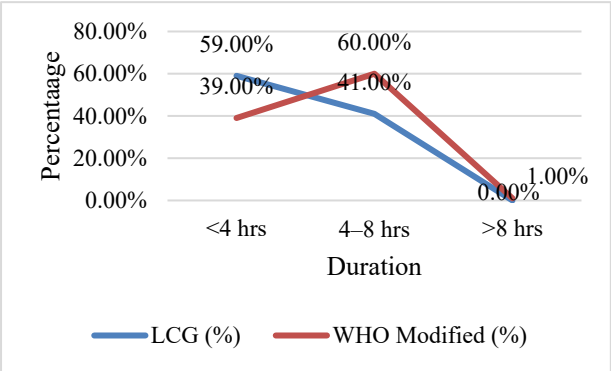

Figure 2: Duration of 1st stage of labour,

Figure 2 compares the percentage distribution of labor durations across both groups. A significantly higher percentage of LCG participants (59.0%) experienced a shorter labor duration of less than 4 hours compared to 39.0% in the WHO group. Meanwhile, a greater portion of WHO participants (60.0%) had labors lasting 408 hours versus 41.0% in the LCG group. The incidence of labor exceeding 8 hours was rare, with only one case in the WHO group. The plot confirms that labor proceeded more quickly in the LCG group. Figure 3 shows the number of neonates according to NICU stay length. In the LCG group, more neonates were discharged within 2-3 days (43.0% and 25.0%) than in the WHO group (40.0% and 11.0%, respectively). Longer NICU stays (5-7 days) were more frequent in the WHO group (15.0% for 5 days, 6.0% for 7 days) compared to LCG (4.0% and 0.0%, respectively). This indicates potentially better early neonatal outcomes in the LCG group.

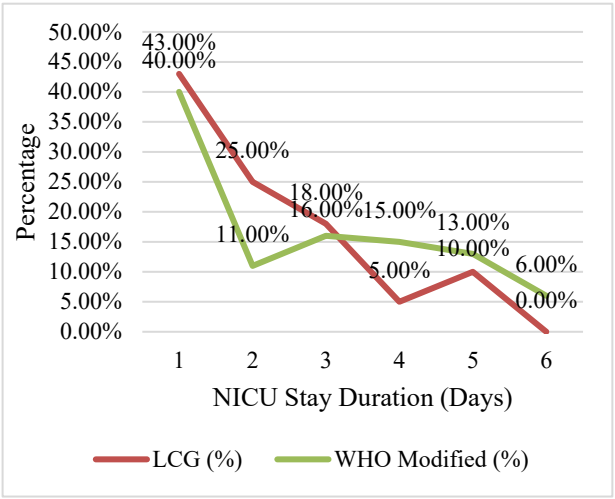

Figure 3: Duration of NICU stay.

DISCUSSION

Historical perspectives on partographic monitoring, such as those presented by Lavender et al.[10] highlighted how modifications in action line thresholds could significantly influence birth outcomes and clinical interventions, establishing the foundation for ongoing partograph innovations. Emerging evidence continues to refine the comparative understanding of labor monitoring tools, particularly as the WHO Labour Care Guide (LCG) gains traction as a replacement for the conventional WHO-Modified Partograph (WHO-MP). A recent analysis by Hofmeyr et al emphasized that the LCG addresses critical limitations of earlier models by eliminating rigid definitions of labor onset and enabling individualized clinical responses, thus supporting safer maternal transitions.[11] In a 2022 article, Ghulaxe et al noted that the LCG's modular structure allowed for dynamic updates during labor, improving both maternal surveillance and fetal outcome predictability.[12] Complementary findings by Patabendige and Wickramasooriya et al positioned the

LCG as a revolution in intrapartum care, citing significant improvements in early complication detection and intervention timeliness.[13] A pilot implementation study by Lee et al demonstrated that revised monitoring formats such as the LCG enhanced detection of labor dystocia while also being feasible for routine clinical use.[14] These findings are supported by global calls to adopt individualized, respectful maternity care tools, reinforcing the LCG's clinical relevance across varying resource settings.

The comparative analysis between the WHO Labour Care Guide (WHO-LCG) and the WHO Modified Partograph (WHO-MP) revealed significant differences in maternal and neonatal outcomes, many of which are consistent with recent findings in the global literature. The lower rate of cesarean sections observed in the WHO-LCG group aligns with the work of Pandey et al, who demonstrated that WHO-LCG implementation significantly reduced surgical interventions by encouraging more physiological labor monitoring and reducing unnecessary escalation.[6] Similar outcomes were noted by Godfrey et al, who reported a notable reduction in emergency cesarean deliveries when LCG protocols were followed in rural, publicly funded health settings.[15] Maternal complications such as infections and postpartum hemorrhage were also lower in the WHO-LCG group. This supports findings by Mugyenyi & Tumuhimbise, who emphasized the LCG's role in early identification of prolonged or obstructed labor, thereby reducing maternal morbidity.[7] Moreover, Ranjan et al highlighted that structured and dynamic monitoring using the LCG led to faster decision-making, particularly in high-risk labors, reducing duration and complications. One of the most notable findings in the current study was the significantly shorter first stage of labor in the LCG group, mirroring observations by Ahmed et al, who demonstrated that structured partographic monitoring enhanced labor efficiency.[4] Although their study focused on traditional partographs, they acknowledged the need for more integrated systems-like the LCG-that capture maternal and fetal variables together, supporting decision-making in real-time. Neonatal outcomes, while slightly more variable, generally favored the WHO-LCG group. The lower NICU admission rates and shorter NICU stays in the LCG group are consistent with findings by Bhatt et al, who observed that partographic tools that detect abnormal labor early tend to be associated with improved perinatal outcomes.[3] However, the difference in Apgar scores was not statistically significant, echoing results from Jogi et al, who found improved maternal outcomes with WHO-LCG but only modest neonatal benefits.[8] Training and implementation fidelity also appear to be major contributors to these outcome differences. For example, Yisma et al identified poor adherence to partograph completion guidelines in public institutions in Ethiopia, significantly affecting both maternal and neonatal outcomes.[2] This suggests that while tool design is critical, its efficacy ultimately depends on how well it is understood and applied in clinical settings. Additionally, qualitative studies have emphasized that the WHO-LCG, by being more person-centered, facilitates respectful maternity care. Pingray et al found that providers favored the LCG over the traditional partograph for its usability and its alignment with global care standards, including real-time maternal input and pain assessments, which were missing in earlier tools.[5] Overall, the current findings confirm that the WHO Labour Care Guide presents clear advantages over the WHO Modified Partograph in terms of maternal safety, labor efficiency, and early neonatal recovery. While neonatal indicators such as Apgar scores remain institution-dependent, broader adoption of the WHO-LCG could offer substantial improvements in obstetric care quality, especially when accompanied by robust training, monitoring, and infrastructure support.

Despite its strengths, this study has several limitations. First, being a single-center observational study, the findings may not be generalizable to all healthcare settings, especially those with varying resource availability or differing clinical protocols. The sample size, while statistically powered for key outcomes like cesarean section rates, may not have been sufficient to detect smaller but clinically meaningful differences in less frequent outcomes such as postpartum hemorrhage or prolonged NICU stays. Additionally, although efforts were made to standardize data collection through training, variability in resident proficiency and adherence to labor monitoring protocols could have introduced observer bias. The study also did not assess long-term neonatal outcomes beyond initial NICU stay, which may be relevant for fully evaluating the tools' effectiveness. Finally, since the LCG is a relatively new tool, differences in provider familiarity and comfort may have influenced its application compared to the more widely used WHO-Modified Partograph.

CONCLUSION

The present study compared the WHO Labour Care Guide (LCG) and the WHO-Modified Partograph to assess their effectiveness in monitoring labor progression and influencing maternal and neonatal outcomes. The results indicate that the LCG allows for later admissions with higher cervical dilatation, enabling more flexible and physiologically aligned labor management without compromising safety. Labor duration, particularly the first stage, was significantly shorter in the LCG group, and normal vaginal delivery rates were higher, though not statistically significant. Maternal complications such as infections and postpartum hemorrhage were notably lower in the LCG group, emphasizing the value of continuous and personalized monitoring. While neonatal outcomes, including Apgar scores and NICU admission rates, were largely comparable between the groups, the LCG group exhibited shorter NICU stays, suggesting better postnatal transitions. Both tools remain clinically relevant, yet the LCG demonstrates advantages in enhancing maternal safety and neonatal recovery through structured, individualized care. These findings support the broader implementation of the WHO Labour Care Guide and call

for larger, multi-center studies to confirm its clinical benefits and inform future obstetric guidelines.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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