Section: Obstetrics and Gynaecology

Original Research Article

EFFECT OF THE WHO LABOUR CARE GUIDE VERSUS THE WHO MODIFIED PARTOGRAPH ON LABOUR OUTCOMES AND CAESAREAN SECTION RATE: AN OPEN-LABEL RANDOMISED CONTROLLED TRIAL

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ABSTRACT

Background: The World Health Organization (WHO) Labour Care Guide (LCG), released in December 2020, places the onset of active labour at 5 cm and replaces fixed alert and action lines with time limits for each centimetre of dilatation. Randomised evidence comparing it with the WHO modified partograph in Indian tertiary centres remains limited. **Objective:** To compare the effect of the WHO LCG and the WHO modified partograph on caesarean section rate and on maternal and neonatal outcomes in low-risk women in spontaneous labour.

Material and Methods: This open-label randomised controlled trial was conducted in the labour room of S.C.B. Medical College and Hospital, Cuttack, from July 2023 to December 2024. Of 922 women screened, 402 low-risk women at 37–40 weeks in spontaneous labour were eligible; 102 who underwent caesarean section in the latent phase were excluded, and 300 were randomised on entering active labour (permuted blocks of 10, sealed opaque envelopes). After post-randomisation exclusions, 145 women in each group were analysed. The primary outcome was mode of delivery. Categorical data were compared with Pearson's chi-square test or Fisher's exact test and continuous data with the independent t-test or Mann–Whitney U test (OpenEpi).

Results: Baseline age, gravidity and parity were similar. The caesarean section rate was 3.4% (5/145) in the LCG group and 14.5% (21/145) in the modified partograph group ($\chi^2(1) = 10.82$, $p = 0.001$; relative risk 0.24, 95% CI 0.09–0.61; absolute risk reduction 11.0%, 95% CI 4.6–17.5). The reduction was evident in nulliparous women (4.5% vs 19.3%, $p = 0.003$). NICU admission was lower with the LCG (7.6% vs 15.2%; $\chi^2(1) = 4.137$, $p = 0.042$). Oxytocin augmentation (9.7% vs 4.8%, $p = 0.11$), postpartum haemorrhage (6.9% vs 4.1%, $p = 0.30$), duration of the active phase, Apgar scores and birth weight did not differ significantly. Hospital stay was shorter with the LCG (median 2 [IQR 2–2] vs 2 [2–4] days, $p = 0.009$), a difference explained by the lower caesarean rate. There was one neonatal death in each group.

Conclusion: Labour monitoring with the WHO LCG was associated with a substantially lower caesarean section rate and fewer NICU admissions than the WHO modified partograph, without an increase in maternal or neonatal complications.

Keywords: Labour Care Guide; partograph; caesarean section; labour monitoring; intrapartum care; randomised controlled trial.

INTRODUCTION

Complications of labour and delivery account for more than a third of maternal deaths, about half of stillbirths and roughly a quarter of neonatal deaths worldwide, and most of these occur in low-resource settings where timely intervention could prevent them.[1,2] Careful monitoring of labour, with early recognition of deviation from normal progress, is therefore central to safe intrapartum care.

At the same time, caesarean section (CS) rates have risen steeply across the world without a matching improvement in maternal or perinatal outcomes, raising concern about overuse.[3,4] WHO has emphasised that CS should be available to every woman who needs it rather than aimed at a target rate.[4] In India, primary CS contributes nearly half of the total caesarean burden in tertiary units,[5] and labour dystocia is one of the main modifiable indications for a first caesarean.[6]

The partograph, derived from Friedman's cervicograph and the alert and action lines of Philpott and Castle, has guided labour management for five decades.[7,8] The WHO composite partograph and its later modification, which removed the latent phase and set the start of active labour at 4 cm, were adopted widely after a multicentre WHO trial showed fewer prolonged labours and interventions with its use.[9] Its central assumption, however, is a minimum dilatation rate of 1 cm per hour. Contemporary labour curves and WHO-commissioned systematic reviews have shown that many low-risk women with good outcomes progress more slowly than this, that active labour often begins only at about 5 cm, and that a dilatation rate slower than 1 cm per hour on its own predicts adverse birth outcomes poorly.[10-13]

These findings shaped the 2018 WHO recommendations on intrapartum care for a positive childbirth experience,[14] and in December 2020 WHO released the Labour Care Guide (LCG), described as the next-generation partograph.[15,16] The LCG starts documentation at 5 cm, replaces the alert and action lines with evidence-based time limits for each centimetre of dilatation, adds a second-stage section, and records supportive care such as companionship, pain relief, oral fluids and mobility. Each observation has a reference threshold that prompts assessment and a documented plan agreed with the woman.[15,16] Early multicountry evaluations found the tool clear, usable and acceptable to providers.[17,18]

Evidence on whether the LCG changes clinical outcomes is still emerging. A single-centre randomised trial from North India reported a large fall in CS rate with the LCG,[19] whereas a stepped-wedge pilot trial in four Indian hospitals found a smaller, non-significant reduction.[20] Further randomised data from other Indian settings are needed. We therefore conducted this trial to compare the effects of the WHO LCG and the WHO modified partograph on CS rate and on maternal and neonatal outcomes in low-risk women in spontaneous labour at a tertiary care centre in eastern India.

MATERIALS AND METHODS

Study design and setting

This was an open-label, parallel-group randomised controlled trial with 1:1 allocation, conducted in the labour room of the Department of Obstetrics and Gynaecology, S.C.B. Medical College and Hospital, Cuttack, Odisha, a tertiary referral teaching hospital. Recruitment ran from July 2023 to December 2024, a total of 18 months.

Participants

Pregnant women presenting to the labour room were screened for eligibility. Women with a singleton pregnancy at 37 to 40 completed weeks of gestation, at low risk, in spontaneous labour, who gave consent were eligible. Women were excluded if they had any maternal medical or obstetric complication in the antenatal period (for example pre-eclampsia, gestational diabetes mellitus, twin pregnancy or post-dated pregnancy), required induction of labour, had an antepartum intrauterine fetal death, or had a fetus with a known congenital anomaly. Eligible women who underwent caesarean section during the latent phase of labour, before randomisation, were also excluded, because neither monitoring tool had been applied to them.

Randomisation and allocation concealment

The allocation sequence was generated in advance with a computerised random number generator using random permuted blocks of 10. Allocations were placed in sequentially numbered, sealed, opaque envelopes kept in the labour room. An eligible woman was considered randomised when she entered active labour, at which point the next envelope was opened to assign her to the LCG group or the modified partograph group. This kept the allocation concealed until the moment of assignment.

Blinding

Because the monitoring tool was visible to the labour room team, the clinicians managing labour could not be blinded. The participants, and the care providers who followed up the women and their babies in the postpartum ward, were unaware of the intrapartum monitoring tool used.

Interventions

In the LCG group, labour was monitored with the WHO Labour Care Guide from the onset of the active phase, defined as cervical dilatation of 5 cm or more. Maternal, fetal, supportive-care and labour-progress observations were recorded at the intervals recommended by the LCG user's manual.[15] Observations meeting the threshold in the "Alert" column were highlighted, and the corresponding assessment, response and plan were documented. Oxytocin augmentation was started when uterine contractions met the LCG alert criterion.

In the modified partograph group, labour was monitored with the WHO modified partograph from

a cervical dilatation of 4 cm. Progress of the cervicograph to the right of the alert line prompted re-evaluation or intervention, and oxytocin augmentation was started when contractions were inadequate and the cervicograph lay to the right of the alert line. In both groups, women were followed from the start of active labour until delivery and discharge, and the decision for caesarean section rested with the attending obstetrician.

Outcomes

The primary outcome was mode of delivery (caesarean section or vaginal delivery). Secondary outcomes were the indication for caesarean section; duration of the active phase of the first stage (hours) and of the second stage (minutes); use of oxytocin for augmentation; maternal complications (atonic and traumatic postpartum haemorrhage); duration of hospital stay; postpartum haemoglobin and total leucocyte count; birth weight; Apgar scores at 1 and 5 minutes; neonatal complications; admission to the neonatal intensive care unit (NICU) and length of NICU stay; and neonatal outcome until discharge.

Sample size

The sample size was calculated with OpenEpi software. Taking the caesarean rate with LCG use as 7.1%, as reported by Vogel et al,[18] and assuming an absolute difference of 15% in caesarean rate between the two tools, with a two-sided α of 0.05, power of 95% and a 1:1 allocation ratio, the required sample size was 145 women per group (290 in total).

Statistical analysis

Data were entered in Microsoft Excel and analysed with OpenEpi. Continuous variables are presented as mean ± standard deviation, with median and interquartile range (IQR) for skewed variables (hospital stay and NICU stay), and were compared with the independent-samples t-test or the Mann–Whitney U test, respectively. Categorical variables are presented as number and percentage and were compared with Pearson's chi-square test without continuity correction when all expected cell frequencies were 5 or more, and with Fisher's exact test otherwise. For binary outcomes, relative risk (RR) with 95% confidence interval (CI) and absolute risk difference were calculated. A two-sided p value below 0.05 was considered statistically significant. Women were analysed in the group to which they were allocated after the post-randomisation exclusions described in Results. A sensitivity analysis counted the women excluded for caesarean delivery on maternal request as caesarean deliveries. Durations of the second stage were analysed in women who delivered vaginally. One recorded birth weight of 300 g at 39 weeks in a live-born neonate with Apgar scores of 8 and 10 was judged a data-entry error and excluded from the birth-weight analysis.

RESULTS

Participant flow

Of 922 pregnant women presenting to the labour room who were screened, 520 were excluded: 350 were high-risk (pre-eclampsia, gestational diabetes, twin or post-dated pregnancy and similar conditions) or not in labour, 110 underwent induction of labour, 20 had an antepartum intrauterine fetal death, 10 had a fetal congenital anomaly and 30 declined consent. Of the 402 eligible low-risk women in spontaneous labour at 37–40 weeks, 102 underwent caesarean section in the latent phase and were excluded. The remaining 300 women were randomised on entering active labour: 148 to the LCG group and 152 to the modified partograph group. After allocation, 3 women in the LCG group opted for caesarean delivery on maternal request and were excluded; in the modified partograph group, 5 women opted for caesarean delivery on maternal request and 2 neonates were found to have congenital anomalies, and these 7 were excluded. Thus 145 women in each group were analysed. [Figure 1]

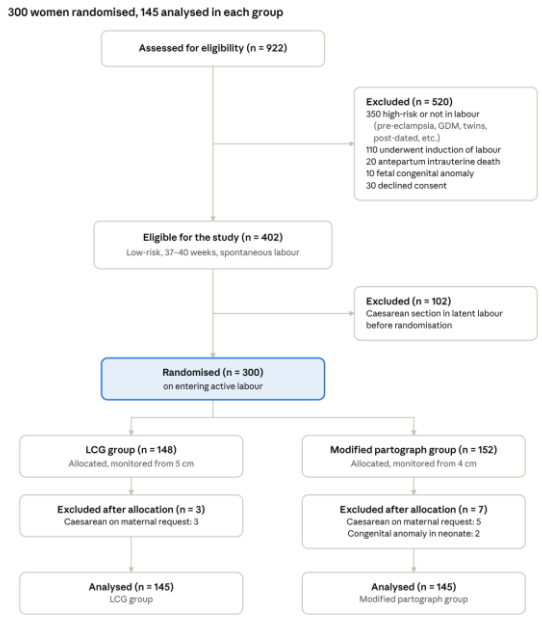


Figure 1: CONSORT flow diagram of participants

Baseline characteristics

The two groups were similar in maternal age, age distribution, gravidity, parity and previous abortion (Table 1). Mean gestational age was higher in the LCG group (38.5 vs 38.1 weeks, p = 0.001). Mean cervical dilatation at the start of monitoring was 5.8 cm in the LCG group and 5.3 cm in the modified partograph group (p = 0.006), as expected from the different definitions of active labour used by the two tools (5 cm and 4 cm).

Table 1: Baseline characteristics of the participants

Characteristic	LCG (n = 145)	Modified partograph (n = 145)	p value
Maternal age, years, mean ± SD	25.70 ± 4.63	25.94 ± 4.29	0.645[a]
Age < 21 years	21 (14.5)	16 (11.0)	0.678[b]
Age 21–30 years	106 (73.1)	110 (75.9)	
Age 31–40 years	18 (12.4)	19 (13.1)	
Primigravida	85 (58.6)	81 (55.9)	0.635[b]
Multigravida (including grand multigravida)	60 (41.4)	64 (44.1)	
Nullipara	88 (60.7)	88 (60.7)	1.000[b]
Multipara	57 (39.3)	57 (39.3)	
Previous abortion, one or more	15 (10.3)	24 (16.6)	0.121[b]
Gestational age, weeks, mean ± SD	38.54 ± 1.05	38.13 ± 1.09	0.001[a]
Cervical dilatation at start of monitoring, cm, mean ± SD	5.80 ± 1.00	5.33 ± 1.75	0.006[a]

Values are n (%) unless stated. [a] Independent t-test. [b] Pearson's chi-square test. LCG, Labour Care Guide.

Primary outcome: mode of delivery

Caesarean section was performed in 5 of 145 women (3.4%) in the LCG group and 21 of 145 (14.5%) in the modified partograph group (Pearson $\chi^2(1) = 10.82$, p = 0.001; Figure 2). The relative risk of caesarean section with the LCG was 0.24 (95% CI 0.09–0.61), an absolute reduction of 11.0 percentage points (95% CI 4.6–17.5), giving a number needed to treat of 10 women monitored with the LCG to avoid one caesarean section. Among nulliparous women, the caesarean rate was 4.5% (4/88) with the LCG and 19.3% (17/88) with the modified partograph (p = 0.003; RR 0.24, 95% CI 0.08–0.67). Among multiparous women it was 1.8% (1/57) and 7.0% (4/57), respectively (Fisher's exact p = 0.364). In a sensitivity analysis that counted the women who had a caesarean on maternal request after allocation as caesarean deliveries, the rates were 5.4% (8/148) and 17.3% (26/150) ($\chi^2(1) = 10.49$, p = 0.001).

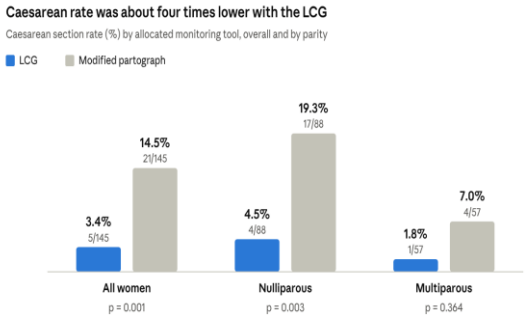


Figure 2: Caesarean section rate by monitoring tool, overall and by parity (source: master chart, n = 290)

Labour and maternal outcomes

The duration of the active phase and of the second stage did not differ significantly between groups (Table 2, Figure 3). Oxytocin augmentation was used in 9.7% of women in the LCG group and 4.8% in the modified partograph group (p = 0.113). Postpartum haemorrhage occurred in 6.9% and 4.1%, respectively (p = 0.304); atonic haemorrhage was more frequent in the LCG group (8 vs 2) and traumatic haemorrhage in the modified partograph group (2 vs 4), but neither difference was significant. Hospital stay was shorter in the LCG group (p = 0.009); among women who delivered vaginally, stay was similar in the two groups (2.48 ± 1.64 vs 2.60 ± 1.77 days, p = 0.428), indicating that the overall difference reflected the lower caesarean rate. Mean postpartum haemoglobin was slightly higher in the LCG group (10.68 vs 10.39 g/dL, p = 0.033).

Table 2: Labour characteristics and maternal outcomes

Outcome	LCG (n = 145)	Modified partograph (n = 145)	RR (95% CI)	p value
Vaginal delivery	140 (96.6)	124 (85.5)		
Caesarean section	5 (3.4)	21 (14.5)	0.24 (0.09–0.61)	0.001[b]
Caesarean section, nulliparous women	4/88 (4.5)	17/88 (19.3)	0.24 (0.08–0.67)	0.003[b]
Caesarean section, multiparous women	1/57 (1.8)	4/57 (7.0)	0.25 (0.03–2.17)	0.364[c]
Active phase duration, h, mean ± SD	4.77 ± 1.24 (n = 145)	4.43 ± 1.74 (n = 143)		0.058[a]
Second stage duration, min, mean ± SD (vaginal deliveries)	25.11 ± 7.98 (n = 140)	27.08 ± 8.40 (n = 121)		0.053[a]

Oxytocin augmentation	14 (9.7)	7 (4.8)	2.00 (0.83–4.81)	0.113[b]
Postpartum haemorrhage, any	10 (6.9)	6 (4.1)	1.67 (0.62–4.47)	0.304[b]
Atonic postpartum haemorrhage	8 (5.5)	2 (1.4)		0.103[c]
Traumatic postpartum haemorrhage	2 (1.4)	4 (2.8)		0.684[c]
Hospital stay, days, median (IQR)	2 (2–2)	2 (2–4)		0.009[d]
Hospital stay, days, mean ± SD	2.63 ± 1.82	3.12 ± 2.07		
Postpartum haemoglobin, g/dL, mean ± SD	10.68 ± 1.18	10.39 ± 1.07		0.033[a]
Total leucocyte count, cells/mm³, mean ± SD	13,875 ± 3,542	14,361 ± 3,851		0.265[a]

Values are n (%) unless stated. [a] Independent t-test. [b] Pearson's chi-square test without continuity correction. [c] Fisher's exact test. [d] Mann–Whitney U test. Active phase duration was not recorded for 2 women and second stage duration for 3 vaginal deliveries in the modified partograph group. RR, relative risk.

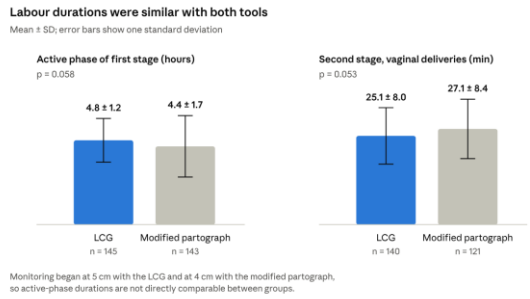


Figure 3. Duration of the active phase and second stage of labour, mean ± SD (source: master chart)

Indications for caesarean section

Thick meconium-stained liquor was the commonest indication in the modified partograph group (7 of 21 caesareans, 4.8% of all women in that group) and did not occur as an indication in the LCG group (Fisher's exact p = 0.015 across all women). Labour-progress indications (non-progress of labour, obstructed labour and early features of obstruction) accounted for 3 caesareans (2.1% of women) in the LCG group and 10 (6.9%) in the modified partograph group. [Table 3, Figure 4]

Table 3: Indications for caesarean section

Indication	LCG (n = 5)	Modified partograph (n = 21)
Thick meconium-stained liquor	0	7 (33.3)
Fetal distress	2 (40.0)	4 (19.0)
Non-progress of labour	1 (20.0)	5 (23.8)
Obstructed labour	1 (20.0)	5 (23.8)
Early features of obstruction	1 (20.0)	0

Values are n (% of caesarean sections in that group). Indications are as recorded in the master chart.

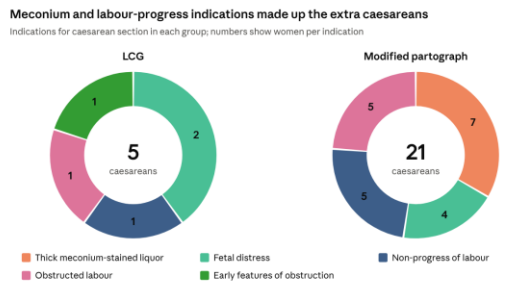


Figure 4: Indications for caesarean section in the LCG (n = 5) and modified partograph (n = 21) groups (source: master chart)

Neonatal outcomes

All babies were live born. Birth weight, sex distribution and Apgar scores at 1 and 5 minutes were similar in the two groups (Table 4). NICU admission was lower in the LCG group (7.6% vs 15.2%; Pearson $\chi^2(1) = 4.137$, p = 0.042; RR 0.50, 95% CI 0.25–0.99). As all expected cell frequencies exceeded 5, the uncorrected Pearson test was used; with Yates' continuity correction the result was $\chi^2(1) = 3.419$, p = 0.064. Among the babies admitted, NICU stay was longer in the LCG group (median 5 vs 3.5 days, p = 0.017). At least one neonatal complication was recorded in 6.9% of LCG babies and 13.8% of modified partograph babies (p = 0.054). Neonatal sepsis (0 vs 4) and meconium aspiration (0 vs 4) were seen only in the modified partograph group, but these differences were not statistically significant on Fisher's exact test (p = 0.122 for each) (Table 5, Figure 5).

There was one neonatal death in each group (p = 1.000). In the LCG group, the baby was born vaginally at 39 weeks with a birth weight of 1,900 g and Apgar scores of 7 and 9, was admitted to the NICU for 10 days and died; no case of neonatal sepsis occurred in this group, and the cause of death was not recorded in the available records. In the modified partograph group, a baby born vaginally at 37 weeks weighing 2,000 g, with low birth weight and neonatal sepsis, died in the special newborn care unit.

Table 4: Neonatal outcomes

Outcome	LCG (n = 145)	Modified partograph (n = 145)	RR (95% CI)	p value
Male sex	79 (54.5)	71 (49.0)		0.347[b]
Birth weight, g, mean ± SD	2,774 ± 424 (n = 144)	2,748 ± 442		0.613[a]
Birth weight < 2,500 g	28/144 (19.4)	33 (22.8)		0.490[b]
Apgar score at 1 min, mean ± SD	7.89 ± 0.62	7.92 ± 0.53		0.686[a]
Apgar score at 5 min, mean ± SD	9.28 ± 0.77	9.26 ± 0.76		0.759[a]
Apgar score at 1 min < 7	5 (3.4)	6 (4.1)		0.759[b]
Apgar score at 5 min ≤ 7	5 (3.4)	7 (4.8)		0.555[b]
NICU admission	11 (7.6)	22 (15.2)	0.50 (0.25–0.99)	0.042[b]
NICU stay among admitted babies, days, median (IQR)	5 (4–10) (n = 11)	3.5 (3–5) (n = 22)		0.017[d]
Any neonatal complication	10 (6.9)	20 (13.8)	0.50 (0.24–1.03)	0.054[b]
Neonatal death	1 (0.7)	1 (0.7)		1.000[c]

Values are n (%) unless stated. [a] Independent t-test. [b] Pearson's chi-square test without continuity correction. [c] Fisher's exact test. [d] Mann–Whitney U test. One recorded birth weight of 300 g was treated as a data-entry error and excluded. NICU, neonatal intensive care unit.

Table 5: Neonatal complications

Complication	LCG (n = 145)	Modified partograph (n = 145)	p value
Birth asphyxia	6 (4.1)	4 (2.8)	0.520[b]
Low birth weight (recorded as a complication)	4 (2.8)	5 (3.4)	1.000[c]
Neonatal jaundice	3 (2.1)	5 (3.4)	0.723[c]
Neonatal sepsis	0	4 (2.8)	0.122[c]
Meconium aspiration	0	4 (2.8)	0.122[c]
Neonatal convulsion	0	1 (0.7)	1.000[c]
Transient tachypnoea of the newborn	0	1 (0.7)	1.000[c]

Values are n (%). A neonate could have more than one complication. [b] Pearson's chi-square test. [c] Fisher's exact test.

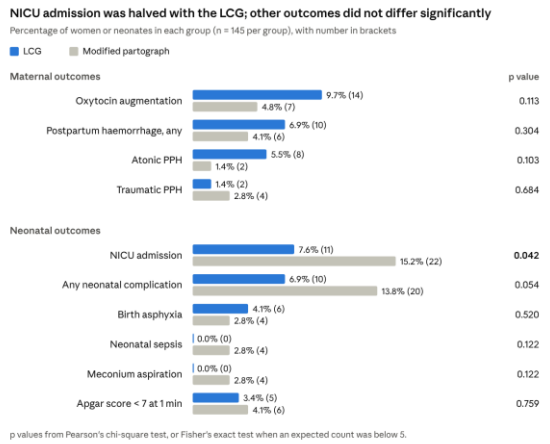


Figure 5: Maternal and neonatal secondary outcomes by monitoring tool (source: master chart, n = 145 per group)

DISCUSSION

In this randomised trial of low-risk women in spontaneous labour at term, monitoring with the WHO Labour Care Guide was associated with a caesarean section rate less than a quarter of that seen with the WHO modified partograph (3.4% vs 14.5%). The reduction was of similar relative size in nulliparous women, who carry most of the primary caesarean burden. It was not accompanied by any significant increase in postpartum haemorrhage, low Apgar scores or neonatal complications, and NICU admissions were lower in the LCG group. The result held when caesareans performed on maternal request after allocation were counted as caesarean deliveries.

Comparison with other studies

Our findings agree closely with the open-label randomised trial by Pandey et al. from New Delhi, which used the same comparison, also excluded women delivered by caesarean in the latent phase, and reported caesarean rates of 1.5% with the LCG and 17.8% with the modified partograph, with similar maternal complications, hospital stay and Apgar scores.[19] The size of the effect in both single-centre trials is larger than that seen in the stepped-wedge, cluster-randomised pilot trial by Vogel et al. in four Indian hospitals, where implementation of an LCG strategy produced a crude fall in caesarean rate among nulliparous women in spontaneous term labour from 45.2% to 39.7%, a relative risk of 0.85 with a wide confidence interval.[20] That trial measured the effect of introducing the LCG into routine care across whole hospitals with high baseline caesarean rates, whereas individually randomised trials such as ours compare the two tools under closer supervision. The true effect in routine practice may therefore be smaller than the one observed here.

Studies from African settings have reported different patterns. A quasi-experimental study in Dar es Salaam found similar caesarean rates (about 10% and 11%) and similar maternal and newborn outcomes with the LCG and the composite partograph.[21] In rural, midwife-led facilities in south-western Uganda, an ambispective cohort study found that the LCG identified six times as many cases of prolonged

or obstructed labour as the partograph, with higher rates of caesarean section and augmentation and no difference in stillbirth, maternal death or postpartum haemorrhage.[22] In facilities where referral decisions are made on the basis of a monitoring tool, more sensitive alert thresholds can increase interventions. The effect of the LCG therefore seems to depend on baseline practice and on how its alerts are acted upon.

Possible mechanisms

The most likely explanation for the lower caesarean rate is the way the LCG defines and judges labour progress. It begins at 5 cm, the point after which the median rate of dilatation in low-risk women with good outcomes exceeds 1 cm per hour, and it replaces the alert and action lines with time limits for each centimetre.[11,15,16] A slow but normal early active phase is therefore less likely to be labelled as dystocia. Systematic reviews have shown that partograph use has no clear effect on caesarean rate and that the alert and action lines predict adverse outcomes poorly,[23,24] and a more permissive labour-progress guideline alone did not lower caesarean rates in the Norwegian Labour Progression Study.[25] This suggests that the other components of the LCG, such as structured reassessment against reference thresholds, a written plan and shared decision-making, may also contribute. In our trial, labour-progress indications accounted for 3 caesareans in the LCG group and 10 in the modified partograph group. The largest single difference in indication was thick meconium-stained liquor, which led to 7 caesareans in the modified partograph group and none in the LCG group, and meconium aspiration was also seen only in the modified partograph group. The LCG grades meconium-stained liquor and flags only thick meconium as an alert, which may have reduced caesareans for lesser degrees of staining. Because the numbers are small and the trial was open-label, this explanation should be treated as a hypothesis.

Augmentation and maternal outcomes

The reduction in caesareans was not achieved through less use of oxytocin. Augmentation was used in 9.7% of women in the LCG group and 4.8% in the modified partograph group; this difference was not significant. In the LCG group, oxytocin was started when uterine contractions met the alert criterion, and correcting inadequate contractions may have allowed some labours that would otherwise have been judged non-progressive to end vaginally. In a cluster-randomised trial comparing Zhang's guideline with the WHO partograph, overall oxytocin use also did not differ, although its timing did.[26] Atonic postpartum haemorrhage was numerically more frequent in the LCG group (8 vs 2), which may be related to the higher use of oxytocin; the trial was not powered for this outcome, and it deserves attention in larger studies.

Hospital stay was shorter in the LCG group, but this difference disappeared when only vaginal deliveries were compared, so it reflects the lower caesarean rate rather than a separate effect of the monitoring tool. The higher postpartum haemoglobin in the LCG group (a difference of 0.3 g/dL) was statistically significant but is unlikely to be clinically important. Durations of the active phase are not directly comparable between the groups, because monitoring started at 5 cm in one and 4 cm in the other; second-stage duration was similar.

Neonatal outcomes

NICU admission was halved in the LCG group (7.6% vs 15.2%). This difference was significant on Pearson's chi-square test, which was appropriate because all expected cell frequencies exceeded 5, but it was of borderline significance with continuity correction ($p = 0.064$), and the confidence interval for the relative risk reached 0.99. It should therefore be interpreted with caution. Fewer caesareans and the absence of meconium aspiration in the LCG group are the most plausible reasons. Apgar scores, birth weight and birth asphyxia were similar, and there was one neonatal death in each group. Sun et al. reported less birth asphyxia with a more flexible labour guideline than with the WHO partograph,[27] whereas the Tanzanian and Ugandan studies found no differences in newborn outcomes.[21,22] Taken together, the available evidence suggests that the LCG reduces caesarean section without compromising neonatal safety, although no trial so far, including ours, has been powered for serious neonatal outcomes.

Strengths and limitations

The strengths of this trial are individual randomisation with a computer-generated, block-randomised sequence and concealed allocation in sealed opaque envelopes, achievement of the planned sample size, the blinding of participants and postnatal care providers, and complete recording of the primary outcome for every analysed woman.

The trial also has limitations. It was conducted in a single tertiary centre, which limits generalisability. Clinicians managing labour knew the allocated tool, so their decisions may have been influenced by expectations about it. Ten women were excluded after randomisation, so the main analysis was per protocol rather than by intention to treat, although a sensitivity analysis including the caesareans on maternal request gave the same conclusion. Women who had a caesarean in the latent phase (102 of 402 eligible women) were excluded before randomisation, so the results apply only to women who reached active labour and do not represent the overall caesarean rate of the unit. Monitoring started at different cervical dilatations in the two arms by design, and gestational age differed slightly between groups. Several secondary outcomes were compared without adjustment for multiple testing, and the trial was not powered for maternal haemorrhage, neonatal morbidity or mortality. Provider satisfaction and the acceptability of the LCG, and women's experience of care, were not reported. Finally, the cause of one neonatal death was not recorded in the available data.

CONCLUSION

In low-risk women in spontaneous labour at term, labour monitoring with the WHO Labour Care Guide was associated with a caesarean section rate about one quarter of that seen with the WHO modified partograph, with fewer NICU admissions and no increase in maternal or neonatal complications. These results support wider use of the LCG in Indian tertiary care, together with structured training of labour room staff. Multicentre trials analysed by intention to treat, and powered for maternal haemorrhage and serious neonatal outcomes, are needed to confirm the effect in routine practice.

REFERENCES

1. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Glob Health. 2014;2(6):e323–33.
2. Lawn JE, Blencowe H, Waiswa P, Amouzou A, Mathers C, Hogan D, et al. Stillbirths: rates, risk factors, and acceleration towards 2030. Lancet. 2016;387(10018):587–603.
3. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Health. 2021;6(6):e005671.
4. World Health Organization. WHO statement on caesarean section rates. Geneva: World Health Organization; 2015 (WHO/RHR/15.02).
5. Mittal P, Pandey D, Suri J, Bharti R. Trend prediction for cesarean deliveries based on Robson classification system at a tertiary referral unit of North India. J Obstet Gynaecol India. 2020;70(2):111–8.
6. American College of Obstetricians and Gynecologists; Society for Maternal-Fetal Medicine; Caughey AB, Cahill AG, Guise JM, Rouse DJ. Safe prevention of the primary cesarean delivery. Am J Obstet Gynecol. 2014;210(3):179–93.
7. Friedman E. The graphic analysis of labor. Am J Obstet Gynecol. 1954;68(6):1568–75.
8. Philpott RH, Castle WM. Cervicographs in the management of labour in primigravidae. I. The alert line for detecting abnormal labour. J Obstet Gynaecol Br Commonw. 1972;79(7):592–8.
9. World Health Organization maternal health and safe motherhood programme. World Health Organization partograph in management of labour. Lancet. 1994;343(8910):1399–404.
10. Zhang J, Landy HJ, Branch DW, Burkman R, Haberman S, Gregory KD, et al. Contemporary patterns of spontaneous labor with normal neonatal outcomes. Obstet Gynecol. 2010;116(6):1281–7.
11. Oladapo OT, Diaz V, Bonet M, Abalos E, Thwin SS, Souza H, et al. Cervical dilatation patterns of 'low-risk' women with spontaneous labour and normal perinatal outcomes: a systematic review. BJOG. 2018;125(8):944–54.
12. Abalos E, Oladapo OT, Chamillard M, Díaz V, Pasquale J, Bonet M, et al. Duration of spontaneous labour in 'low-risk' women with 'normal' perinatal outcomes: a systematic review. Eur J Obstet Gynecol Reprod Biol. 2018;223:123–32.
13. Souza JP, Oladapo OT, Fawole B, Mugerwa K, Reis R, Barbosa-Junior F, et al. Cervical dilatation over time is a poor predictor of severe adverse birth outcomes: a diagnostic accuracy study. BJOG. 2018;125(8):991–1000.
14. World Health Organization. WHO recommendations: intrapartum care for a positive childbirth experience. Geneva: World Health Organization; 2018.
15. World Health Organization. WHO labour care guide: user's manual. Geneva: World Health Organization; 2020.
16. Hofmeyr GJ, Bernitz S, Bonet M, Bucagu M, Dao B, Downe S, et al. WHO next-generation partograph: revolutionary steps towards individualised labour care. BJOG. 2021;128(10):1658–62.
17. Pingray V, Bonet M, Berrueta M, Mazzoni A, Belizán M, Keil N, et al. The development of the WHO Labour Care Guide: an international survey of maternity care providers. Reprod Health. 2021;18(1):66.
18. Vogel JP, Comrie-Thomson L, Pingray V, Gadama L, Galadanci H, Goudar S, et al. Usability, acceptability, and feasibility of the World Health Organization Labour Care Guide: a mixed-methods, multicountry evaluation. Birth. 2021;48(1):66–75.
19. Pandey D, Bharti R, Dabral A, Khanam Z. Impact of WHO Labor Care Guide on reducing cesarean sections at a tertiary center: an open-label randomized controlled trial. AJOG Glob Rep. 2022;2(3):100075.
20. Vogel JP, Pujar Y, Vernekar SS, Armari E, Pingray V, Althabe F, et al. Effects of the WHO Labour Care Guide on cesarean section in India: a pragmatic, stepped-wedge, cluster-randomized pilot trial. Nat Med. 2024;30(2):463–9.
21. Sospeter PF, Al-Beity FMA, Kidanto HL, Said A, Kikula A, Godfrey S. Labour outcomes among low-risk women using WHO next-generation partograph versus WHO composite partograph: a quasi-experimental study. Research Square [Preprint]. 2023.
22. Mugyenyi GR, Tumuhimbise W, Atukunda EC, Tibaijuka L, Ngonzi J, Kayondo M, et al. Effectiveness of the modified WHO Labour Care Guide to detect prolonged and obstructed labour among women admitted at eight publicly funded, midwife-led community health facilities in rural Mbarara district, Southwestern Uganda: an ambispective cohort study. Int J Womens Health. 2025;17:271–85.
23. Lavender T, Cuthbert A, Smyth RM. Effect of partograph use on outcomes for women in spontaneous labour at term and their babies. Cochrane Database Syst Rev. 2018;8(8):CD005461.
24. Bonet M, Oladapo OT, Souza JP, Gülmezoglu AM. Diagnostic accuracy of the partograph alert and action lines to predict adverse birth outcomes: a systematic review. BJOG. 2019;126(13):1524–33.
25. Bernitz S, Dalbye R, Zhang J, Eggebø TM, Frøslie KF, Olsen IC, et al. The frequency of intrapartum caesarean section use with the WHO partograph versus Zhang's guideline in the Labour Progression Study (LaPS): a multicentre, cluster-randomised controlled trial. Lancet. 2019;393(10169):340–8.
26. Dalbye R, Bernitz S, Olsen IC, Zhang J, Eggebø TM, Rozsa D, et al. The Labor Progression Study: the use of oxytocin augmentation during labor following Zhang's guideline and the WHO partograph in a cluster randomized trial. Acta Obstet Gynecol Scand. 2019;98(9):1187–94.
27. Sun C, Su S, Song W, Jiang H. Use of the WHO partograph and Zhang's guideline for labor and delivery in China: implications for clinical practice. BMC Pregnancy Childbirth. 2024;24(1):799.