

Development of a novel labour monitoring tool: Improving labour care quality in the Indian setting

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ABSTRACT

Introduction: Efficient care by labour monitoring tools manages labour, identifies the abnormalities and avoids the fatalities. Various studies are being undertaken by the researchers to understand the limited use of these therapeutic tools. The present study aimed to develop a novel labour monitoring instrument after understanding the barriers and enablers of the currently used tools and using it in the health setting for improving clinical outcomes. **Materials and Methods:** Methodological research design was adopted to develop the novel tool. Item pool was generated by literature review, focus group discussions and retrospective observations of the partographs. Developed tool was evaluated by various experts by undergoing three rounds and was found to be reliable in terms of stability and equivalency. After undergoing pilot runs by researcher and nurses, tool was found to be feasible and understandable. The developed novel labour monitoring tool was used on 200 intranatal women. **Results:** Focus group discussions revealed various barriers in the current labour tools, such as lack of clarity, complexity, staff shortage, workload etc. Retrospective observation of filled partographs revealed the incomplete recording of the components of the partograph. The prepared first draft underwent rigorous review by the experts. The prepared novel tool, after being used on 200 intranatal women resulted in 90% of normal vaginal deliveries. Duration of 1st stage of labour was around 5 hours. **Conclusion:** A novel labour monitoring tool was developed after methodological approach resulting in adequate monitoring and improved labour outcomes.

Keywords: India, labour, maternal outcome, partograph

Introduction

As per National Family Health Survey 4, in the decade 2015–16, there has been an almost dual increase in institutional births from 38.7% to 78.9% in India.^[1] Various cash benefit schemes have increased facility births.^[2] Though the current maternal and newborn healthcare indicators reveal that there is a vast improvement in the mortality and morbidity rates, there still exists a lot to be achieved to attain the Sustainable Development Goals set for India.^[1]

In normal labour, the foetus and placenta along with other conceptus material get expelled spontaneously at term. Delivery occurs when this process is initiated by complex endocrine mechanisms, which lead to foetal descent and cervical dilatation.^[3] The day of delivery is the most awaited day in the woman's life, but the irony is that around 40% of stillbirths and 46% of maternal deaths occur on this day only. High-quality care can help in preventing half of these maternal deaths.^[1] From 69% in 2012 to 81% in 2018, more births are being attended by skilled health personnel,^[4] but over-medicalised and impudent care has led to poorer birth experiences by women.^[5] Most of the maternal and newborn fatalities occur in middle- and low-income countries and can be avoided to a large extent by prompt intervention.^[6] Adequate monitoring of women during the childbirth period (by labour monitoring tools) is an important component of good-quality labour care, where

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Received: 24-05-2023

Revised: 25-06-2023

Accepted: 27-07-2023

Published: 04-04-2024

Access this article online

Quick Response Code:



Website:
<http://journals.lww.com/JFMPC>

DOI:
10.4103/jfmprc.jfmprc_862_23

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How to cite this article: Sharma S, Parwez S, Batra K. Development of a novel labour monitoring tool: Improving labour care quality in the Indian setting. J Family Med Prim Care 2024;13:869-74.

the woman in labour is adequately monitored prospectively by doing regular clinical assessments.^[7,8] These tools were created to enhance women-centred care by keeping a record of the health of intranatal women and their unborn children via routine evaluations and identifying any abnormalities.^[9]

Partograph is a tool to be used to manage labour. The progress of labour along with maternal and foetal observations is plotted in this chart, which gives a pictorial view of the labour process.^[3] Health experts are giving widespread support to the partograph, but still this tool has not been able to serve its purpose of providing needed therapeutic results. As a consequence, researchers are conducting various studies to understand the obstacles and enablers to the use of this tool.^[9] Therefore, several changes are being made to this tool as the accurate use of partograph is disappointingly low.^[9,10] Several factors have come out as the barriers to routine use of partograph such as time limitation, workload, policy level lacunae, tiny writing space and complexity in filling.^[11-13]

The use of partograph is recommended to remarkably reduce the maternal mortality crisis faced by developing nations. Previously conducted studies have also stressed the ineffective usage of labour tools.^[14] To improve clinical outcomes during labour, various variations of this tool are in existence.^[15] This study aimed to develop an efficient and user-friendly labour monitoring tool, which can be a boon for maternal and newborn health.

Materials and Methods

Study design and setting

The methodological research design was used for tool development [Figure 1].

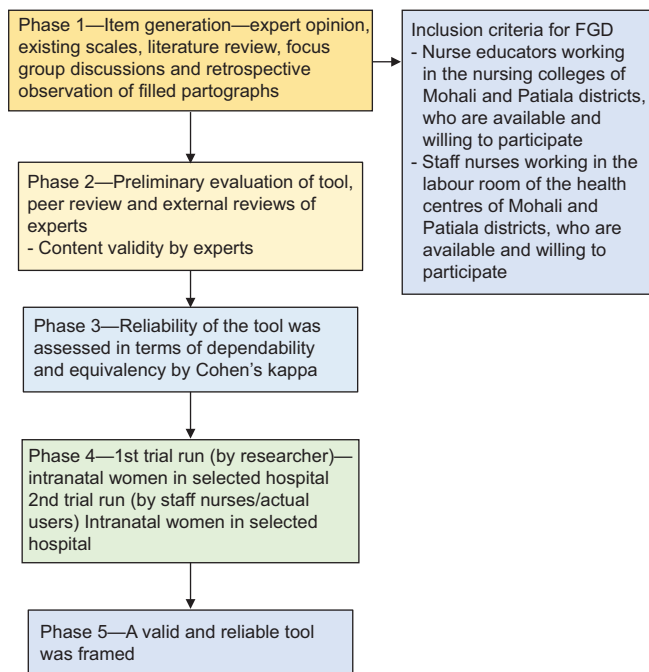


Figure 1: Framework for tool development

Phase 1: Conceptualisation and item generation

Below mentioned steps were followed for generating the items and development of preliminary draft.

Step 1: Literature review—A detailed and comprehensive literature review was performed using electronic databases. Search terms include partograph implementation, labour progress tool, new labour graph, barriers in using partograph, labour outcomes and partograph utilisation. A review of existing scales was also conducted.

Step 2: Focus group discussions—To understand the existing practices of partograph utilisation along with its utility barriers, focus group discussions were planned till data saturation using the maximum variation sampling technique. A total of 34 participants participated in seven discussions, with each session having an average duration of 40–50 minutes. Nurses with more than one-year working experience in labour rooms of various hospitals and nursing teachers having master's degree in obstetrics and gynaecological nursing were requested to participate in discussions [Table 1]. The discussion was started by asking an icebreaker question, and all the discussions were audiotaped.

Step 3: Retrospective observation of partographs—To have better clarity of the practices followed by the nurses while filling the partographs and identify the components which they find difficult to fill, a retrospective observation of partographs was done. The inclusion criteria for the graph sheets were as follows: the sheets of all the mothers admitted to the hospital at any gestational age, having cervical dilatation of 4 cms or more and who have undergone vaginal delivery between January and February 2019. The sample size for the graph sheets was determined by applying the formula $n = 4pq/d^2$. In this, n = needed sample size, P = proportion of the completed partographs (estimation from previous study), $q = 100-p$ and d = relative error (20% of P). In a study conducted by Palo *et al.*,^[16] the adherence to partograph was found to be 48.7%. Hence, by applying the given formula, the required sample size was estimated to be 106. An observation checklist was developed for assessing the completeness and correctness of the various parameters of partograph. It had ten items divided into four sections: maternal, foetal, progress of labour and other parameters. 'Completely filled' means when a particular parameter is recorded at the correct time interval. 'Incompletely filled' signifies that a parameter is randomly filled and left incomplete, and 'not filled' means when that parameter was left blank. The content validity of the tool was found to be

Table 1: Detail of focus group discussions

FGD number	Group	No. of participants
FGD 1	Nursing teachers	5
FGD 2	Nursing teachers	8
FGD 3	Nursing teachers	6
FGD 4	Staff nurses	8
FGD 5	Staff nurses	6
FGD 6	Nursing teachers	6
FGD 7	Staff nurses	5

0.97. The inter-rater reliability of the tool was 0.76. Convenient sampling was used.

Phase 2—Preliminary evaluation of the tool

The preliminary draft was prepared in the first phase and circulated amongst 13 experts. Inclusion criteria for experts were as follows: tutor or associate professors or professors in obstetric and gynaecological nursing with more than 5 years of experience, obstetricians and paediatricians involved in direct care to intranatal mothers and newborn and those who were willing to validate the content. A draft was circulated thrice amongst the experts. The Scale-Content Validity Index (CVI) of the final developed tool was 0.97.

Phase 3—Reliability of the tool

The stability of the developed tool was determined by Cohen's kappa with the computed value of 0.73. The equivalency of the tool was established by the computed kappa value of 0.71. The credibility of the tool was also established when a generalised consensus was established amongst the experts.

Phase 4—Pilot runs

The first pilot trial was conducted by the researcher to determine the feasibility of the developed tool in the actual setting by administering it to intranatal women. The second pilot run was conducted by the nurses (actual users) of the labour room. The nurses used the developed tool on the admitted intranatal women.

The results of the trial runs showed that the tool was feasible, with understandable and clear language.

Phase 5—A labour monitoring tool was developed

A valid and reliable novel labour monitoring tool was developed.

Results

Outcome of focus group discussions (FGD): Various key factors and themes emerged regarding the barriers in the implementation of the present partograph [Table 2].

Result of retrospective observation of partograph sheets

Retrospective observation of the partograph sheets filled out by the nurses was done. Considering the maternal parameters such as temperature, blood pressure and pulse, it was incompletely filled in 47.2%, 54.7% and 68.8% of the sheets, respectively. Amniotic fluid was completely documented in only 23.6% of sheets. Around 70% of the sheets did not have a proper recording of foetal heart rate. The maximum sheets, that is 80%, had an incomplete recording of uterine contractions. Cervical dilatation was also found to be incompletely documented in 70.8% of partograph sheets. In 15% of sheets, drugs and time in labour were not documented at all. There was an incomplete recording of time of entering labour in 67% of the sheets. These observations highlighted the main components that the nurses found difficult to fill.

Table 2: Emerged barriers from focus group discussions

Emergед themes	Factors	Researcher-led initiatives
Perspective related to problems in utilising existing labour monitoring tool	-Lack of clarity in timing and frequency of plotting parameters -Complex in filling due to many observations and many boxes to be filled -Difficulty in understanding and interpreting the recorded observations such as membrane status and contractions -Lack of instructions	-Clarity to be enhanced by mentioning timing of observation, frequency of all observations, timing of delivery and clarifying safe and vigilant zones -Guidelines and instructions to be mentioned on the same sheet for easy reference
Health centre-related perceived barriers	-Lack of audit -Workload -Shortage of staff -Fear of accountability	—
Barriers related to components of the partograph	-Less space to write -To have clarity in the descent of head -To have clarity in filling uterine contractions	-More space to be provided, specifically in the drugs section. -Descent of the head to be mentioned with numbers -Column of contractions to be made easier by eliminating shading and adding just frequency
Facilitators for using the partograph	-To include colour coding -To mention timing of observations	-Colour coding to be given -Continuity in the timing of observations to be provided

Table 3: Changes made in the tool after the first round of validation

Items modified	Items added	Items deleted
- Colour graphics were modified - Client identification data were modified by adding the option of spontaneous and ARM in ROM - Term 'action' was renamed as 'assess/refer' -Column of uterine contractions was modified by writing the number of uterine contractions instead of symbols - Range of foetal heart rate was modified by dividing the range of 110–160 beats/min into sections -Column of drugs was elaborated by adding IV fluids, oxytocin and other drugs	- Head station was added. -Delivery notes were added	- Column of 'special remarks' was deleted

Table 4: Changes made in the tool after the second round of validation

Items modified	Items added	Items deleted
- Colour graphics and pattern of shading were modified by adding colour in the 6 th - and 10 th -h column.	-	-
-Cervicograph was modified by adding finger breadth measurement		
- Option of NVD/assisted and LSCS was mentioned in delivery notes.		
-Graphical pattern was developed for maternal pulse and blood pressure		

After extensive literature review, focus group discussions and retrospectively observing the partographs, a draft was prepared, which was circulated thrice amongst the validators, and changes were made as per the suggestions [Tables 3 and 4].

Content Validity Index of each item (CVI-i) and Content Validity Index of each expert (CVI-e) were calculated for the drafts after each round. The Scale-CVI of the final draft was 0.97. The mean consensus was also established for each item.

The following components were finalised for the novel labour monitoring tool:

- Client identification
- Alert and action estimated time of delivery
- Cervicograph starting at 4 cm with frequency and finger breadth measurement with different colour coding of safe, vigilant and referral zones
- Hours and time in the active phase of labour
- Head station
- Amniotic fluid with symbols
- Number of uterine contractions to be filled numerically
- To tick mark foetal heart rate half an hour, which is divided into three sections with highlighted danger zones
- Graphical pattern of blood pressure and pulse (frequency of observation is mentioned)
- To write temperature (frequency of observation is mentioned)
- Drug/and Intravenous (IV) fluids with dose
- Delivery notes of mother and newborn.

A novel labour monitoring tool was developed and used on 200 intranatal mothers admitted to Civil Hospital Phase 6, Mohali, Punjab. It was observed that around 90% of these mothers underwent normal vaginal delivery, nearly 6% had instrumental deliveries and only 4% had caesarean deliveries (due to foetal distress and non-progress of labour). The duration of first and second stages of labour was around 5.12 hours and 30.81 minutes, respectively. Unnecessary per vaginal examination was reduced in these mothers. No method of labour augmentation was adopted for around 79% of mothers. Only 2% of mothers and neonates experienced morbidities such as post-partum haemorrhage, perineal tears and neonatal respiratory distress.

Discussion

The present study mentions the development of a novel labour monitoring tool. Qualitative and quantitative data were collected for framing the draft of the tool.

Focus group discussions

Focus group discussions conducted in the present study have highlighted certain barriers in utilising partograph, such as accountability issues, finding complex in filling, lack of audit, shortage of manpower and lack of clarity and instructions. This information is comparable to the studies conducted by Zellew D and Tegegne T,^[17] Hagos AA, Teka EC and Degu G,^[18] Haile Y, Tafese F, Weldemariam TD and Rad MH^[19] and Yisma E, Dessalegn B, Astatkie A and Fesseha N^[20] in which workload, shortage of resources, lack of supervision, lack of audit, finding complex in filling and time-consuming are the factors that hinder the partograph utilisation.

Retrospective observation of the partographs

One hundred six sheets were observed in the present study, which revealed that uterine contraction was incompletely recorded in the maximum number (80%) of the observed sheets. Around 71% of sheets had incomplete documentation of cervical dilatation. Drugs or dose component was also found incomplete in 65% of the filled partographs. Around 9.4% of sheets had no recording of amniotic fluid.

A similar study was conducted by Manna N, Bhattacharya P, Mukherjee R and Das A^[22] (2022) in which 131 partograph case sheets of mothers were assessed. Of these, partograph was initiated in only 48.85% of cases and completed in only 6% of cases. Considering the parameters, cervical dilatation was plotted in all the initiated case sheets, whereas the least plotted component was amniotic fluid (18.75%). In another retrospective descriptive study determining the completeness of the partographs, it was seen that there was no documentation of foetal heart rate in 24.7% of sheets. Amniotic fluid and uterine contractions were not filled in 99.7% and 22.5%, respectively. There were 16% of graph sheets without plotting of cervical dilatation.^[21]

The complexity and lack of proper guidelines can be the reasons for improper plotting of the various components of the partograph.

Development of a novel labour monitoring tool

A novel labour monitoring tool was developed in the present study using the methodological research approach, considering the less utilisation of the present partograph. A study was conducted by Souza JP *et al.*^[22] in which a simplified, effective, labour tool was developed using a prospective cohort study, because of the less positive impact of the present partograph

on labour-related health outcomes. Researchers developed prediction models to identify intrapartum women who are at risk of perinatal morbidity or mortality.

Implementation of partograph

It was seen in the present study that after the implementation of the labour monitoring tool on intrapartum mothers, a maximum number of mothers had a normal vaginal delivery and were not augmented artificially. No mother had prolonged labour, and unnecessary vaginal examinations were also avoided. Only 2% of mothers and neonates suffered from morbidities. Other studies conducted by Sanyal *et al.*,^[23] Valvekar,^[24] Tayade,^[25] Shereen and Shoib^[26] and Anokye R *et al.*^[27] reported that with the use of partograph, maximum number of mothers delivered vaginally had the least requirement of labour augmentation, no case of prolonged labour, reduction in the number of vaginal examinations and less asphyxiated neonates.

Conclusion

As the use of partograph is essential for improved labour outcomes, it is recommended that the novel labour monitoring tool may be used for effective maternal and perinatal care.

Ethical clearance

The institutional ethics and review committee provided ethical approval via SOCON/9954/B.

Acknowledgement

The researchers experience deep gratitude to the experts and the subjects for their invaluable contribution.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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