

1 Use of Paperless Partograph in Management of Labour

2 ABSTRACT

3 **Background:** In resource-poor countries, problems of lack of skilled staff, increased delivery
4 load, lack of basic amenities for foetal monitoring like cardiotocography (CTG), and
5 measurement of foetal scalp blood pH, leads to challenges faced by treating obstetrician.
6 Partograph though a simple tool is underused. Several factors have been implicated for this and
7 it's incorrect use at all levels of maternity care. These are lack of awareness ,no proper training,
8 low availability of the graphs, negative perceptions of it, high patient load, inadequate staff at
9 the facilities, lack of supervision, and negative attitudes among some of the health workers. Dr.
10 Debdas proposed the Paperless Partograph designed for use by clinicians in low resource areas
11 as a simple, non-time consuming, two step calculation requiring only basic addition and the
12 reading of a clock..

13 **Material and Methods** Women were enrolled into two groups –A and B of 520 each. Group A
14 women were monitored with Modified WHO Partograph. In Group B , after the women had
15 cervical dilatation of four cm or more, Alert ETD (Estimated Time of Delivery) and Action
16 ETD were calculated and monitored as per paperless partograph protocol

17 **Results:** Paperless Partograph can be easily used in place of Modified WHO partograph in low
18 resource and high patient load settings as the time taken from 4 cm to full dilatation was similar
19 in both the graphs and the number of PV examinations done and time taken to plot the graph
20 was less in Paperless Partograph than Modified WHO Partograph.

21 **Conclusion:** Paperless Partograph is a simple 20 second tool which can be used to monitor
22 labour progress in high patient load settings and peripheral centres.

23 **KEYWORDS:** Paperless partograph, Modified WHO partograph, Labour Monitoring .

25

26 **Introduction**

27 India has shown a significant decline in the Maternal Mortality Ratio from 130 in 2014-2016 to
28 97 per lakh live births in 2018-2020.¹ India at 17% and Nigeria at 14% accounted for one third
29 of all global maternal deaths. One of the major causes of maternal deaths is prolonged and
30 obstructed labour (5%) which leads to perinatal mortality and morbidity.

31 Between 2016 and 2030, as part of the Sustainable Development Goals, the target is to reduce
32 the global maternal mortality ratio to less than 70 per 100 000 live births.²

33 The partograph is a graphic recording of progress of labour and salient conditions of the mother
34 and foetus, has been used to detect labour that is not progressing normally. Implementation of a
35 partograph helps in a functioning referral system and its use improves the efficiency and
36 effectiveness of maternity services.

37 In resource-poor countries, problems of lack of skilled labour, increased delivery load, lack of
38 basic amenities for foetal monitoring like cardiotocography (CTG), and measurement of fetal
39 scalp blood pH, leads to challenges faced by treating obstetrician and therefore, less recording
40 and acceptance of Modified WHO Partograph.³

41 Dr. Debdas proposed the Paperless Partograph designed for use by clinicians in low resource
42 areas as a simple, non-time consuming, two step calculation requiring only basic addition and
43 the reading of a clock/ watch, identifying slow progress of labour, the time to intervene and
44 terminate labour or to transfer a woman to higher centers with facilities for Caesarean section.³

45 This method may be implemented at the Primary Health Centres/Community Health Centres
46 (PHC/CHC), as they may help in reducing maternal mortality, without any additional cost.⁴

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50 **Material and Methods**

51 The study was a prospective comparative study conducted in the Department of Obstetrics and
52 Gynaecology in SMS Medical College, Jaipur, from October 2022 till June 2024 . It aimed to
53 compare effectiveness of Modified WHO partograph and Paperless partograph in assessment of
54 women in labour.

55 A total of 1040 women were selected after applying inclusion and Exclusion criteria .All
56 women with single, live, term pregnancy with vertex presentation in spontaneous labour with a
57 cervical dilatation of four or more centimetres suitable for vaginal delivery were included.
58 Women with previous caesarean section, any medical disorder or any congenital anomaly or
59 foetal distress at the start of study were excluded from the study. Data Collection was started
60 after obtaining Ethical clearance after taking written and informed consent. The women were
61 enrolled into two equal groups –A and B (520 each). Group A women were monitored with
62 Modified WHO Partograph. In Group B cases, when the women had cervical dilatation of four
63 cm Or more, Alert ETD (Estimated Time of Delivery) and Action ETD were calculated. The
64 two Estimated Time of Delivery (ETD) were calculated using FRIEDMAN'S FORMULA of
65 cervical dilatation of 1cm/hour. ALERT ETD was calculated by adding the remaining
66 dilatation to first PV Finding.

67 ACTION ETD was calculated by adding four hours to ALERT ETD.

68 In Paperless Partograph both ETDs were written in big bold letters on front page of woman's
69 case sheet and ACTION ETD was encircled in red as it is the time when some intervention
70 (like caesarean section, amniotomy, oxytocin augmentation etc.) must be done for better
71 maternal and foetal outcome. Maternal condition in terms of general condition, pulse rate,
72 blood pressure and temperature noted. Foetal heart rate was also noted. Uterine contractions
73 were recorded – C1/2/3 (Contractions number/frequency/duration). First per vaginal

74 examination was noted at the start of plotting the data of partograph and subsequent PV
 75 examination was done every 3 hours or as and when required.

76 **RESULTS**

77 The Mean age was 25.88±4.26 years in Paperless Partograph and 25.66±4.06 years in WHO
 78 Partograph group. 95.5% and 94.4% women were home makers in paperless and WHO
 79 partograph respectively. 52.30% women in paperless partograph group were educated till 10th
 80 standard or less. The two groups were statistically similar.

81 The number of per vaginal examinations done in Paperless partograph group was 1-3 in 85.7%
 82 women, 4-5 in 18.6% and >5 in only 4.6% women compared to 69.23%, 25.76% and 4.8%
 83 respectively in WHO partograph group. The results were statistically significant between the
 84 two groups (p-value=0.0198). This suggest that in paperless partograph group lesser number of
 85 PV examinations were required as compared to WHO partograph group. Table 1

86 Table 1: Number of Per Vaginal Examination Done in the Two Groups

No. of PV done	PAPERLESS PARTOGRAPH (n=520)		MODIFIED WHO PARTOGRAPH (n=520)		Test of Significance- Chi-square Test χ^2	
	n	%	n	%		
1-3	399	85.7%	361	69.23%	χ^2 1.9 Pvalue=0.161	$\chi^2 = 7.85$ p-value =0.0198 (Significant)
4-5	97	18.6%	134	25.76%	χ^2 5.93 Pvalue=0.019	
>5	24	4.6%	25	4.8%	χ^2 0.02 pvalue=0.884	

88 About 97.11% women when monitored with Paperless partograph group and 93.84% with
 89 WHO partograph group progressed from 4 cm to full dilatation in ≤ 6 hours, i.e, before Alert
 90 ETD/Line. 2.88% in Paperless and 6.15% in WHO partograph progressed to full dilatation
 91 taking 6-12 hours, i.e, after Alert ETD/ Line.

92 The mean time \pm SD for Paperless and WHO partograph was 3.78 ± 1.52 and 3.87 ± 1.65
 93 respectively. There was no statistically significant difference between the two graphs at the
 94 common alpha level of 0.05, although it is somewhat close to the threshold when it comes to
 95 time taken to progress from 4 cm to full dilatation of cervix. Table 2

Time Taken to Progress (in hours)		PAPERLESS PARTOGRAPH (n=520)		MODIFIED WHO PARTOGRAPH (n=520)		Chi-square Test χ^2
		N	%	n	%	
4cm – Full Dilatation	<3	142	27.30	143	27.5	7.180 with 3 DF p-value= 0.066
	3-6	363	69.80	345	66.34	
	6-9	13	2.5	30	5.76	
	9-12	2	0.38	2	0.38	
Mean \pm SD		3.78 ± 1.52		3.87 ± 1.65		

Table 2: Time Taken to Progress from 4cm to Full Dilatation

98 The time taken to plot data in 75% cases in Paperless partograph and 59.2% in WHO
 99 partograph groups was 1 minute. It was 2 minutes in 23.6% and 36.7% in Paperless and WHO
 100 partograph groups respectively and 3 minutes in 1.3% cases in Paperless and 3.8% in WHO
 101 partograph group. Only 1 woman (0.2%) in WHO partograph group required 4 minutes to plot
 102 the data. The mean \pm SD for Paperless partograph group was 1.263 ± 0.469 and for WHO
 103 partograph group is 1.450 ± 0.579 . There was a significant difference in the time taken to plot
 104 data in Paperless and WHO partograph. Table 3

105 Table 3: Time Taken to Plot Data in both Paperless and Modified WHO Partograph

Time Taken (in minutes)	PAPERLESS PARTOGRAPH (n= 520)		MODIFIED WHO PARTOGRAPH (n=520)		TEST OF SIGNIFICANCE- Chi-square Test χ^2
	n	%	n	%	
1	390	75%	308	59.2%	p-value=0.00191 (Significant)
2	123 23.6%		191	36.7%	p-value=0.00012 (Significant)
3	7	1.3%	20	3.8%	p-value=0.012 (Significant)
4	-	-	1	0.2%	p-value=0.317 (Significant)
5 or more	-	-	-	-	-
Mean \pm SD (Time in minutes)	1.263 ± 0.469		1.450 ± 0.579		Chi-square = 31.62 p-value= 0.00000063 (Significant)

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108 **DISCUSSION**

109 The number of per vaginal examinations done in Paperless partograph group were less as
110 compared to WHO partograph group. This significant difference was because of doing PV
111 examination only when required in Paperless partograph group instead of every 4 hours as in
112 WHO partograph group. Less number of PV examinations done in a particular patient also
113 decreases the risk of introduction of infection to the patient and its complications like
114 chorioamnionitis, sepsis etc.

115 There was no significant difference in time taken from 4 cm dilatation to delivery between both
116 the groups as the monitoring of labour done in both the groups was on similar standard
117 protocols, proving that either partograph can be used to monitor the progress of labour.

118 In a study by Agarwal et al (2013) the mean duration for delivery after Alert ETD was 4.3
119 hours in Paperless partograph which was similar to the WHO recommendation for partographs
120 with a four-hour action line.⁵

121 Debdas A et al (2020) also found in their study that 68.2% women delivered before Alert ETD
122 and 11.8% delivered after Alert ETD when monitored by Paperless partograph.⁶

123 The time taken to plot data in Paperless partograph group was significantly less compared to
124 WHO partograph group as it required simple time calculation and there was no graph to chase
125 and almost requiring only a minute or less to note the ETDs (Alert and Action Estimated Time
126 of Delivery) on the bedhead ticket and monitor the patient accordingly. Also there is no need of
127 specifically skilled trained doctors to use this partograph as it includes only simple time
128 calculation which can easily be done by any MBBS doctor / Medical officer/ labour room staff
129 which makes it more useful to use in peripheral centres.

130 In a similar study conducted by Veena et al ,on enquiring about the preference, 5 out of 6
131 resident doctors (83.3%) preferred to use the paperless partograph rather than the WHO
132 partograph (16.7%) as it was less time-consuming. In addition, also because of the ease of
133 plotting and maintaining the Paperless partograph it required less time consumption .⁷

134 Another study by Deka G et al ,showed that most of the resident doctors (66.6%) preferred to
135 use the paperless partograph rather than the WHO partograph (33.4%) as it was simple
136 graphless and less time consuming. ⁸

137

138 **CONCLUSION**

139 We can conclude that Paperless Partograph can be easily used in place of Modified WHO
140 partograph in low resource and high patient load settings .

141 **LIMITATION OF THE STUDY**

- 142 1. The study was performed in a single centre which is a tertiary care referral centre, thus it is
143 not reflective of the whole population.
- 144 2. Since, the study was carried out in a tertiary centre any other limitation which could arise
145 during the use of Paperless partograph in PHCs, CHC or sub-district hospitals could not be
146 identified. Hence, more such studies need to be carried out in peripheral institutes.

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148 **DECLARATIONS**

149 **FUNDING:** No funding sources

150 **CONFLICT OF INTEREST:** None declared

151 **ETHICAL APPROVAL:** The study was approved by the Institutional Ethics Committee

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