

The Effect of Artificial Intelligence Techniques on Nursing Performance at Labor Unit

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Abstract:

Background: Artificial intelligence (AI) is often described as the new electricity. Just as the invention of electricity transformed the way we live, work, and play, AI is poised to transform the world we live in. Aim of study: To evaluate the effect of Artificial intelligence techniques on nursing performance at labor unit. Design: Quasi experimental design was used. Setting: The study was conducted at labor unit at Rofyda maternity hospital- sheikh Zaid, Giza Government. Sampling: A convenient sample 30 nurses and convenient sample one hundred laboring women according to inclusion and exclusion criteria. Tools: Three tools were used to collect data. Structured Interview questionnaire sheet for nurses including Socio-demographic data for nurses such as name, age, sex, occupation, Nurse' knowledge about AI and partograph (traditional and E- partograph) and nurse's satisfaction. Sociodemographic data of laboring women, and E- partograph sheets. It included data such as laboring women's vital signs, Fetal Heart Sound, cervical dilatation, rupture of membrane and any Data arise. Results: There was a highly statistically significant relation between nurses' total knowledge and their total practice. There was a highly statistically significant relation between nurses' total knowledge and their satisfaction level about PAINT program. There was a highly statistically significant relation between using PAINT program and nursing performance. Conclusion: highly a significant improvement in knowledge and practice of nurses after implementing PAINT program in labor unit. Moreover, the nurses were satisfied by using PAINT program. Recommendation: Apply PAINT program as essential tool of recording in laboring unit and train nurses on how to use it.

Key Word: Artificial Intelligence techniques, nursing performance, labor unit, Partograph, PAINT.

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I. Introduction

McGrow., (2019) described Artificial intelligence (AI) is the research and development of computer systems that can do tasks that would ordinarily require human intelligence, such as vision, speech recognition, decision-making, and/or language translation. **Robert., 2019** added that Many people have dubbed artificial intelligence (AI) the "new electricity." Just as electricity did when it was originally introduced, AI has the potential to transform the way we live, work, and play. According to a research, global AI healthcare investment will reach \$36.1 billion by 2025.

As AI advances, it will dramatically change healthcare organizations and service delivery. Artificial intelligence raises unique and difficult challenges, and there is still much to learn. Healthcare organizations will need to use AI to provide the most value to physicians and consumers. Nurses who understand how artificial intelligence (AI) may improve patient care and outcomes should be at the forefront of AI deployment in healthcare settings. (**Wiljer & Hakim., 2019**).

Maternal mortality and morbidity can be significantly decreased by good labour monitoring, which entails detecting any complications during childbirth and taking appropriate intervention as soon as feasible. The WHO's Paper Partograph, which is used to track work, could be crucial in this case. (**Hasan et al., 2017**).

Partograph significantly improved the maternal and newborn outcomes of labour, and it is therefore suggested that it be implemented in all maternity departments. Because the client's name is on the cover of the maternity case record, the charts that were retroactively reviewed revealed that many more records contained valid admission times and the patient's identity. (**Mohammed, et al., 2018**).

Litwin et al., (2018) stated that; The E-Partograph is designed to improve data entry efficiency by automatically graphing data and saving all client files within the application. The E-Partograph system aims to improve intrapartum data documentation and application in clinical labour management choices in general.

Given that nurses make up the biggest number of healthcare professionals working in a healthcare system, the quality of nursing care should always be a top concern in healthcare delivery. Budget limits, a lack of technology champions, and aversion to change, on the other hand, frequently stymie substantial healthcare innovations that could result in significant improvements in service delivery efficiency. As a result, we expect that our study will spark more debates about the use of AI in nursing administration, workflows, workflow, quality improvement, education, and training, empowering nurses to take the lead on technological transformation rather than merely following it. (*Ng et al., 2021*).

The study's experienced nurses described themselves as a "dying breed" and expressed concern that the new generation of nurses' expertise of labour is solely based on technology and high-intervention methods. They were concerned that the knowledge and skills needed to facilitate vaginal delivery, as well as the ability to counteract the consequences of the time-pressured, high-intervention setting, would be lost. As a result, there is a need to convey information and experience to new nurses so that they may confidently make the case for longer time in order to promote vaginal delivery.

II. Subjects And Methods

Aim of the study: Is to assess the effect of artificial intelligence techniques on nursing performance at labor unit. **Research design:** A quazi experimental research design was utilized in the current study. It is an empirical study used to estimate the causal impact of an intervention on its target population without random assignment.

Setting: Rofyda Maternity Hospital in Rofyda Health Park at sheikh Zayed, cairo, Egypt in labor unit.

Type of the sample:

- Convenient sample of all nurses working in labor unit.
- Convenient sample of laboring women.

Sample size:

- 30 nurses (All nurses at labor unit) were included in the study.
- 100 laboring women attend the labor unit for a period of 4 months.

Sample criteria:

Inclusion criteria for laboring women sample:

1. Laboring women with single fetus, with spontaneous labor in the first stage of labor.
2. Cervical dilatation in between 4-7 centimeters.
3. Gestation of at least 37 completed weeks.
4. Cephalic presentations.
5. Without complications.

Inclusion criteria for nurses:

1. Nurses responsible for direct nursing care at labor unit.

Exclusion criteria for laboring women sample:

1. Laboring Women with high risk pregnancy.
2. Laboring women with medical and obstetric complications.
3. Elective caesarean section.

Exclusion criteria for nurses:

1. Nurses who have administrative role.

Tools for data collection:

- 1) Interview questionnaire sheet for nurses (knowledge assessment sheet pre-post and follow up)

This tool was constructed by the researcher in English and Arabic language to suit the nurses' level of education based on review the literature putting into considerations the aim of the study and the data needed to be collected from the subjects. This tool divided into 5 parts

Part I. It was used to assess Socio-demographic data for nurses and such as name, age, sex, occupation, etc.

Part II. it was used to assess Nurse' knowledge regarding traditional partograph and its utilizations, Nurse' knowledge regarding electronic partograph, and Nurse' knowledge regarding AI techniques Pre and post and after 4 months and finally nurse's satisfaction about the new partograph PAINT tool post and after 4 months.

2) Socio-demographic data for laboring women: It was used to assess Socio-demographic data for laboring women and such as name, age, sex, occupation, and obstetric and medical history.

3) E- partograph sheets. A designed application PAINT which like partograph record it included data such as laboring women`s vital signs, Fetal Heart Sound, cervical dilatation, rupture of membrane and any Data arise and finally it has an auto decision for laboring type and be printed as a report for each laboring women used to assess performance of nurses to document and monitor data during labor by computerized manner.

Validity:

The revision of the tools was done by a panel of three expertise (three professor in health nursing field) Dean of faculty of nursing – MTI University, Head of Maternal and Neonatal Health Nursing Department Faculty of Nursing

– MTI University, Head of Maternal and Neonatal Health Nursing Department Faculty of Nursing – 6 October University to evaluate the content validity of the tools and the necessary modification was done.

Also, validity of the third tool PAINT application was done by training the model by 90% of total cases 200 and validate it by testing the model by 10% of total cases 200 and the accuracy of model was 97% for training and 100% for testing.

Reliability:

Reliability was estimated among 15 participants by using test-retest method with two weeks apart between them. Then Cronbach alpha was calculated between the two scores using SPSS computer program. For Part 2 Section B: Nurses `Knowledge regarding the Partograph: It was 0.85, for section E: Knowledge on the Artificial Intelligence, it was 0.79, for section F: Partograph as artificial intelligence nursing tool (PAINT) Satisfaction, it was 0.80 which indicate that the instrument is reliable to detect the objectives of the study.

Ethical considerations:

An official permission to conduct the proposed study will be obtained from the Scientific Research Ethics Committee. Participation in the study is voluntary and subjects will be given complete full information about the study and their role before signing the informed consent. The ethical considerations will include explaining the purpose and nature of the study, stating the possibility to withdraw at any time, confidentiality of the information where it will not be accessed by any other party without taking permission of the participants. Ethics, values, culture and beliefs will be respected.

Preparatory phase:

During this phase, the researcher reviewing related current and past, national and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection.

Pilot study:

It was carried out on 10% (3) of nurses and 10% (10) of laboring women under the study to test the applicability, clarity, and the efficiency of the tools. It also aims to ensure simplicity, relevance, and feasibility of conduction of the study tools. In addition, it helps in estimation of the time needed to collect data and determine the obstacles. No necessary modifications were carried out and tools finalized, so they were included in the study sample.

Field work:

> The study was conducted for four months, from the beginning of June 2021 to the end of September 2021.

> The investigator visiting the labor unit of Rofyda hospital three day per week from 10 am to 2pm and as needed when entering a new laboring woman.

> The study was conducted in cooperation between the medical team and the nursing team, after a full explanation of the aim of the study.

The study was implemented in the following stages:

Preparing and planning stage:

- From the beginning of March 2020, the investigator starts to prepare excel sheet which contain 200 partograph for previously laboring women from sheet applied by academic students on actual and real cases.

- Then entering this data in an excel sheet to use it in programming and training Artificial intelligence technique tool.

- The researcher has a more time to search for engineer in AI techniques to help in designing the PAINT model because there is few numbers of engineer can deal with AI techniques in nursing field.

- Finally, communicate and cooperate with Artronix company to design PAIN model, this step taken about 2-4 months. Several meetings were done to explain every point that the researcher needed to fulfill the aim of the study through PAIN model.
- The last step was set a logo and name to PAIN model in the form of abbreviation which was Partograph Artificial Intelligence Nursing Tool with its special logo design.
- Financial support completely provided by the researcher.

PAIN model aims to classify delivery types for laboring women following this step

- Load Dataset.
- Data exploration.
- Dataset contains 200 cases (excel sheet of 200 W.H.O. modified paper partograph for 200 laboring women).
- Data preprocessing.
- Features engineering.
- Training and evaluation.
- Splitting the dataset into a training dataset and testing dataset with a ratio of 90% for training data and 10% for testing data.
- Using support vector machine for training.
- An accuracy of around 97% for the training dataset was achieved then an accuracy of around 100% for the testing dataset due the test data set is too small.
- Finally, the investigator has a AI model in the form of PAIN model that can has auto decision of types of delivery predicted to laboring women with every data set entered in it.
- At the start of April 2021, the investigator receives the PAIN app completely from the company and install it at the laptop and be ready for use.
- At the start of May, the researcher went to labor unit in Rofyda Maternity hospital in Sheikh Zayed in order to assess the setting, after searching for suitable and equipped place to implement the study.
- A successful meeting done with the director, matron and nursing staff of hospital in order to facilitate the study and prepare environment as providing another computer at the third floor to facilitate installing the app in the second and third floor of the hospital at the same time.
- After that installing PAIN model in the 2 computers at second and third floor was done and it became ready to be used.
- By assessing labor unit, the researcher found that the partograph of laboring women were done by doctors and not by nurses. So, power point presentation was prepared to discuss WHO modified traditional partograph and how to use it for all nurses.
- And finally, booklet to discuss PAIN model in details what is PAIN? How to use by steps, in English and Arabic language was prepared by investigator and printed and distributed for all nurses.

Implementation stage:

- At the start of June, the investigator explains the aim of the study to the nurses and take the written consent of acceptance to participate in the study.
- The data collected by using interviewing questionnaire tool to identify their knowledge about AI and partograph distributed to the nurses at labor unit pre-test at the first time.
- Sessions were done for a small group of nurses about traditional partograph utilization using power point presentation and discussed by the investigator for all nurses in labor unit.
- After 2 weeks data collected by using interviewing questionnaire tool distributed to the nurses at labor unit to evaluate the post-test.
- Sessions was done by the investigator to show how to use the PAIN application, and a booklet was distributed to all nurses by 2 languages in Arabic and in English language and Training program for all nurses at labor unit on E-partograph, definition, uses and how to be applied with laboring women was done.
- Performance of the nurses in documentation at traditional or PAIN partograph was collected and nurses' satisfaction about this new artificial intelligence technique was assessed post session by using interviewing questionnaire tool.

- The investigator collect data at labor unit four days per week from 10 am to 2 pm. In a period of 4 months every day ask how many cases of laboring women and how much nurses have doing partograph and entering data to PAINTE application and confirm the accuracy of entrance of data.
- The investigator collects E-partograph sheets from the PAINTE program and Print it to analyze it to measure the effect of using this new technique on nursing performance in labor and take nurses satisfaction about this new artificial intelligence technique.

Evaluation stage:

- The researcher collect data by using interviewing questionnaire tool to identify their knowledge about AI and partograph distributed to the nurses at labor unit, performance of nurses by collect all printed report from PAINTE application for all entered data of laboring women and take nurses satisfaction about this new artificial intelligence technique as a following up after 4 months at labor unit.

Administrative Item:

An official written approval letter was obtained from the Dean Faculty of Nursing Helwan University to the director of Rofyda Maternity Hospital for conducting data. The approval letter included the aim of the study, aim of the study was explained to obtain permission and cooperation. The investigator then met the head of the hospital and the matron of nurses to explain the purpose of the study and methods and make a power point presentation to attract attention and appreciation of the medical team and take the approval to collect data from labor unit at Rofyda hospital.

Statistical Item:

Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program.

Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t-test for comparison between two means, and ANOVA (F) test for comparison between more than two means.

Qualitative data were presented in the form of frequency distribution tables, number, and percentage. It was analyzed by chi-square (χ^2) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used (if the table was 4 cells), or Likelihood Ratio (LR) test (if the table was more than 4 cells). Level of significance was set as P value <0.05 for all significant tests.

Limitations of the study:

The current study is limited to:

- a) Lack of data base for partograph in Egyptian hospitals.
- b) Small numbers of nurses that use partograph in labour unit.
- c) Decrease of engineering who design AI techniques.
- a) Lack of references about AI techniques in maternity nursing field.
- b) Lack of recent technological facilities in public hospitals.

III. Result

Table (1) show that, approximately three quarters of studied nurses (73.3%) of the studied nurses aged between 20 to < 30 years with mean of 26.2 ± 6.4 years. All of them were registered nurses (100%). Majority of them did not receive any in-service training program in the management of a pregnant mother in labor (83.3%). Approximately 40% of them had experience of 6-10 years (36.7%). Average number of nurses working per shift in labor unit was 3-4 nurses/ shift (80%)

Table (2) reveals comparison of the Knowledge items about Partograph's utilization among studied nurses pre, post, and follow up interventions. Post and follow up -intervention programs revealed a highly significant improvement ($p < 0.0001$) in the knowledge items. In addition, mean total score of knowledge items showed statistically significant increase in the mean of pre intervention (4.3 ± 1.2) to 5.9 ± 1.3 post intervention, and to 6.8 ± 1.5 follow up.

Table (3) demonstrates comparison of the practice items about Partograph (traditional), Partograph utilization, E - Partograph, as well as Grand total practice Mean \pm SD among studied nurses pre, post, and follow up interventions. Post and follow up -intervention programs revealed a highly significant improvement ($p < 0.0001$) in all practice items except the item "Partograph is used to monitor every woman in nurse' working hospital/Health Center", where majority of participating nurses responded "not done" in each period of intervention ($P = 0.77$). In addition, grand mean total score of practice items showed a highly statistical significant increase in the mean of pre intervention (2.7 ± 1.2) to 6.2 ± 0.6 post intervention, and to 3.4 ± 1.5 follow up.

Table (4) demonstrated the satisfaction of studied nurses regarding all the eight items of Partograph as artificial intelligence nursing tool (PAINT) post and follow up intervention. There was no significant statistical difference between post and follow up intervention in each item of satisfaction ($P > 0.05$ for each).

Table (5) highlights evaluation of the effect of E- partograph on the final decision method of delivery in labor unit. Using E-partograph revealed a highly significant ($P < 0.000$). it is indicated that use of E-partograph minimize unnecessary Cesarean section (decrease in Decision of C.S. from 36.7% in traditional partograph to 13.3% in electronic partograph. and increase in decision of vaginal delivery from 63.3% in traditional partograph to 86.7% in electronic partograph in the same group).

Fig. (1) highlights categories of performance in labor unit among studied groups. According to table performance of nurses highly significant developed by using E-partograph. As shown poor performance was 0% in electronic partograph for G1 & G2 and 10% in traditional partograph. While fair performance was 0% in electronic partograph for G1 & G2 and 10% in traditional partograph. And good performance was 100% in electronic partograph for G1 & G2 and 80% in traditional partograph.

Fig. (2) highlight the efficacy of using E partograph on the nurses total score of knowledge about the E partograph in Labor unite. Post -intervention program revealed a highly significant improvement ($p < 0.000$) in the total knowledge score. The post program' good knowledge response was increased from 0% pre intervention to 70% post intervention, and 96.7% in follow up and the difference was highly significant ($P < 0.0001$). In addition, the mean total knowledge score increased from 9.8 ± 1.6 pre intervention to 13.4 ± 2.5 post intervention, and increased to 15.5 ± 0.9 in follow up, and the difference was also highly significant ($P < 0.0001$).

Fig. (3) highlight the efficacy of using E partograph on the nurses total score of practice about the E partograph in Labor unite. Post -intervention program revealed a highly significant improvement ($p < 0.000$) in the total practice score. The post program' good practice response was increased from 0% pre intervention to 90.1% post intervention, and 80% in follow up and the difference was highly significant ($P < 0.0001$). In addition, the mean total practice score increased from 2.7 ± 0.3 pre intervention to 6.2 ± 0.6 post intervention, and increased to 4.4 ± 1.2 in follow up, and the difference was also highly significant ($P < 0.0001$).

IV. Discussion

Regarding Distribution of Nurses' Knowledge about the characters of Partograph's utilization, the current study revealed a highly significant improvement in knowledge. approximately one third of nurses were of the view that there is a managerial policy that all women in labour should be monitored with a partogram in respective health facilities, whereas two third of them disagreed or did not know. However, in pre intervention only few nurses considered the partogram useful in obstetric review, all of them considered it useful in post-intervention.

Furthermore, *Shang., (2021)* who studied A Concept Analysis on the Use of Artificial Intelligence in Nursing was conducted that no studies have explicitly formulated a definition of a "nursing AI" or "the use of AI in nursing" this is complicated by the fact that not even "AI" is consistently defined, and numerous competing definitions exist, including machine learning, neural networks, and decision trees. Although there is a sense of coherence, where it is agreed upon that those previously mentioned terms are under the overarching field of AI, this hierarchy is not strictly enforced, and these terms can be presented as their own. Also, even if the authors do define AI, many do not even define what machine learning, neural networks, or decision trees are. This lack of definition clarity has severe implications for research, practice, and theory, as it limits the readership to only those with a significant amount of computer science knowledge, creating a knowledge divide.

Regarding Distribution of Nurses' practice about Partograph (Traditional and E- partograph), characters of its utilization, and Artificial Intelligence pre, post, follow up interventions, only nearly third of nurses have used partograph before and 16.7 % Had a training regarding the use of partograph. Also, half of nurses agreed that the partogram is available in their health facility. And all nurses don't use E-partograph before, and only few of them Had training on the use of E-partograph.

Elsayed & Sleem., (2021) who studied Nurse Managers' perception and Attitudes toward Using Artificial Intelligence Technology in Health Settings at Mansoura University Hospitals and found that, the highest percent mean score was related to perception of advantage toward using artificial intelligence, followed by the problems concerning artificial intelligence application in healthcare. The majority of studied sample had a moderate level of perception with positive attitude toward artificial intelligence. There is a highly significant positive correlation between nurse managers' perception and attitude toward using AI in nursing settings. and *Abdullah & Fakeih., (2020)* who studied Health Care Employees' Perceptions of the Use of Artificial Intelligence Applications mentioned that the overall perception of health care employees toward AI was moderate.

Khan et al., (2018) found that out of 648 partographs reviewed for their quality of recording 61% had

fetal heart rate (FHR) recorded, 68% had descent of fetal head and 18% had moulding of fetal skull recorded. The cervical dilatation line was plotted correctly in 70% of all partographs and in 82% of the partographs where any abnormality was indicated.

In addition, *Jeong, (2020)* who studied Artificial intelligence, machine learning, and deep learning in women's health nursing in Korea also mentioned that Data manipulation based on a careful understanding of the data is also an essential competency for working with AI. If we can manage data appropriately and enter high-quality data during the analysis process, it will be easier to obtain better results from AI-based studies. A standard AI curriculum should be established and introduced in nursing education as soon as possible. Each nursing school can modify the standard curriculum according to the faculty's competency and capacity of facilities.

Meanwhile, *Shang, (2021)* who studied A Concept Analysis on the Use of Artificial Intelligence in Nursing, and *Griner et al., (2020)* who studied Artificial Intelligence Forecasting census and supporting early decisions. found as a result of the use of AI in nursing, The outcomes at the nurse level are closely related to patient-level outcomes. The most noticeable and common outcome is increased performance, which can be through increased decision-making and collaboration with other members of the healthcare team. Also, both decision-making and collaboration are related, as the predictions of the AI can be discussed as a team, leading to team learning and decision making.

This finding is consistent with *Ng et al., (2021)* who assessed the role of artificial intelligence in enhancing clinical nursing care in a scoping review they found Thirty-seven articles were included, highlighting the potential use of AI for nursing documentation, formulation of nursing diagnoses, formulation of nursing care plans, patient monitoring, patient care prediction and wound management. However, the majority of the studies were developmental and laboratory-controlled experiments, where only five articles reported findings from studies conducted in real-life clinical settings. This could be to prevent the premature implementation of technology that could be still flawed in its accuracy (e.g., in terms of analyzing and predicting features that cause certain medical problems), degree of automaticity (e.g., privacy infringement), end-user uptake (e.g., how adherent nurses are in following AI-generated prompts and recommendations) and logistical requirements (e.g., healthcare data may not be readily available for machine learning) (*Kelly et al., 2019*). Hence, future research should consider both real-life experimental study designs to investigate the practicality of implementing AI. This would provide a more robust methodology and evidence to support the effectiveness of using AI in improving nursing care especially in a real-lifeseeting (*Bärnighausen et al., 2017*).

V. Conclusion

Based on the findings of the current study that assessed the effect of artificial intelligence techniques on nursing performance at labor unit, it can be concluded that: PAINT program has a great satisfaction from nurses, easy to use by nurses, has a positive effect on the newborn, labor progress and on laboring women health monitoring in labor unit. and the final decision of method of delivery as decreasing unnecessary C.S. rate. Using PAINT program increase level of performance of nurses in labor unit and decrease rate of errors of recording during deliver and increase knowledge and practice of nurses in labor unit. PAINT program has a great accuracy when used with real cases.

VI. Recommendations

Based on the findings of the current study, the following implications and recommendations are proposed:

- Asking decision makers in Helwan University to Adopt utilization of PAINT model partograph in labor unit at university hospital,
- Empower maternity nurses to the AI Techniques by:
 - a. Equipping labour unit with advanced and recent technology.
 - b. Providing comprehensive educational program for maternity nurses regarding application of PAINT partograph.
- Encourage spreading of research dealing with AI in Ob/Gyn nursing field.
- A standard AI curriculum should be established and introduced in nursing education as soon as possible.

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Table (1): Socio-demographic characteristics of the studied nurses (N = 30)

Socio demographic characteristics	Frequency	
	N0.	%
Age (Years):		
20 – <30 years	22	73.3
≥ 30 years	8	26.7
Mean ± SD	26.2 ± 6.4 Y	
Educational Level		
Registered nurses	30	100
Duration after preservice training:		
1-3 years		
4 - ≥ 5 years	10	33.3
	20	66.7
Received in-service training program in the management of pregnant mother in labor?		
No		
Yes		
If yes, place of training (n=5)	25	83.3
Emergency obstetric & neonatal care	5	16.7
	5	100
Experience:		
≤ 5 years	10	33.3
6- 10 years	11	36.7
≥ 11 – 20 years	9	30
Place of work:		
Hospital Health Center	29	96.7
	1	3.3
Average number of nurses working per shift in labor unit:		
3-4 nurses/ shift		
5-≥ 6 nurses/ shift	24	80
	6	20
Total	30	100

Table (2): Distribution of Nurses' Knowledge about the characters of Partograph's utilization pre, post, follow up interventions

Knowledge about partograph utilization	Pre- intervention		Post- intervention		Follow up intervention		*χ ² /LR	P value
	N0	%	N0	%	N0	%		
Frequency of using partograph once the active phase of labor started:								
Wrong answer/ Don't know	15	50	4	13.3	0	0	LR=31	<0.0001
Incomplete answer	1	3.3	2	6.7	0	0		
Correct complete answer	14	46.7	27	80	30	100		
Which assessment / diagnosis measure can be made with the Partograph:							LR=38	<0.0001
Wrong answer/ Don't know	2	6.7	0	0	0	0		
Incomplete answer	16	53.3	3	10	0	0		
Correct complete answer	12	40	27	90	30	100		
Usefulness of Partograph in obstetric review:							LR=6.2	<0.04
Don't know	3	10	0	0	1	3.3		

Yes	24 3	80 10	0 30	0 100	2 27	6.7 90		
Presence of a managerial policy in labor unit that all women in labor should be monitored with a Partograph:							LR=9.3	0.02
g answer/ Don't know	14	46.7	7	23.3	14	46.7		
Incomplete answer	7	23.3	4	13.3	7	23.3		
Correct complete answer	9	30	19	63.3	9	30		
Total Knowledge Mean ±SD	4.3± 1.2		5.9± 1.3		6.8±1.5		F=7.8	<0.001
Total	30	100	30	100	30	100		

* χ^2 : Friedman repeated test (one type of Chi square test used for repeated measures) χ^2 :Chi square test / LR Likelihood Ratio test

Table (3): Distribution of Nurses 'practice about Partograph (Traditional and E- partograph), characteristics of its utilization, and Artificial Intelligence pre,post, follow up interventions

Practice about partograph	Pre- intervention		Post- intervention		Follow up intervention		* χ^2 /LR	P value
	N0	%	N0	%	N0	%		
Nurse used a Partograph before.							LR=39.4	<0.0001
Not done	21	70	0	0	8	26.7		
Done	9	30	30	100	22	73.3		
Had a training regarding the use of partograph							LR=52.1	<0.0001
Not done	25	83.3	1	3.3	5	16.7		
Done	5	16.7	29	96.7	25	83.3		
Availability of Partograph in nurse' labor ward							LR=24.8	<0.0001
Not Available	15	50	0	0	15	50		
Available	15	50	30	100	15	50		
Partograph used to monitor patients during labor in nurse' hospital/ H. Center							LR=20.3	<0.0001
Not done	14	46.7	0	0	14	46.7		
Done	16	53.3	30	100	16	53.3		
How often is it used							LR=18.6	<0.005
Not uses	14	46.7	2	6.7	14	46.7		
Routinely	13	43.3	26	86.7	13	43.3		
Rarely	2	6.7	0	0	2	6.7		
Occasionally	1	3.3	2	6.7	1	3.3		
Partograph is used to monitor every woman in nurse' working hospital/Health Center							LR=1.8	0.77 NS
Not done	23	76.7	24	80	22	73.3		
Done	7	23.3	6	20	8	26.7		
Used an E-Partograph before							LR=85.5	<0.0001
Not done	30	100	1	3.3	0	0		
Done	0	0	29	96.7	30	100		
Had training on the use of E-partograph							LR=67.2	<0.0001
Not done	28	93.4	1	3.3	5	16.7		
Done	2	6.6	29	96.7	25	83.3		
Practicing any Artificial Intelligence Techniques							LR=34.8	<0.0001
Not done	26	86.7	2	6.7	4	13.3		
Done	4	13.3	28	93.3	26	86.7		
Total practice Mean ±SD	4.9± 1.5		6.2± 0.6		3.4±1.5		F=31.9	<0.0001

Total	30	100	30	100	30	100		
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* χ^2 : Friedman repeated test (one type of Chi square test used for repeated measures) χ^2 : Chi square test / LR Likelihood Ratio test.

Table (4): Satisfaction of studied nurses regarding Partograph as artificial intelligence nursing tool (PAINT) (N=30)

Satisfaction aspects	Post- intervention N=30		Follow up intervention N=30		* χ^2 /LR	P value
	N0	%	N0	%		
Easy to use the E-Partograph Yes	30	100	30	100	0.0	1.0 NS
Like to use E-partograph Yes	30	100	30	100	0.0	1.0 NS
Should E-Partograph be used in all normal labor Yes	30	100	30	100	0.0	1.0 NS
The E-Partograph reduce the risks of maternal / neonatal morbidity & mortality Yes	30	100	30	100	0.0	1.0 NS
Wishing to use the E-Partograph routinely Yes	30	100	30	100	0.0	1.0 NS
Partograph not effective to monitor laboring mothers No Yes	29 1	96.7 3.3	29 1	96.7 3.3	0.0	1.0 NS
The E-Partograph usage is time consuming Yes	30	100	30	100	0.0	1.0 NS
Have you any difficulty in using the E-Partograph No Total	30 30	100 100	30 30	100 100	0.0	1.0 NS

χ^2 : Chi square test / LR Likelihood Ratio test.

Table (5): Effect of PAINT partograph on the final decision on the method of delivery

Groups of final decision of methods of delivery	G1 - PAINT N=30		G2- PAINT N=70		G1- Manual N=30		*Test of Sig. $\chi^2=7.6$	P value
	N0.	%	N0.	%	N0.	%		
C section	4	13.3	10	14.3	11	36.7	<0.03	
Vaginal delivery with Episiotomy	26	86.7	60	85.7	19	63.3		
Total	30	100	70	100	30	100		

Fig. (1): Effect of the E partograph on the performance of nurses within Laborunit

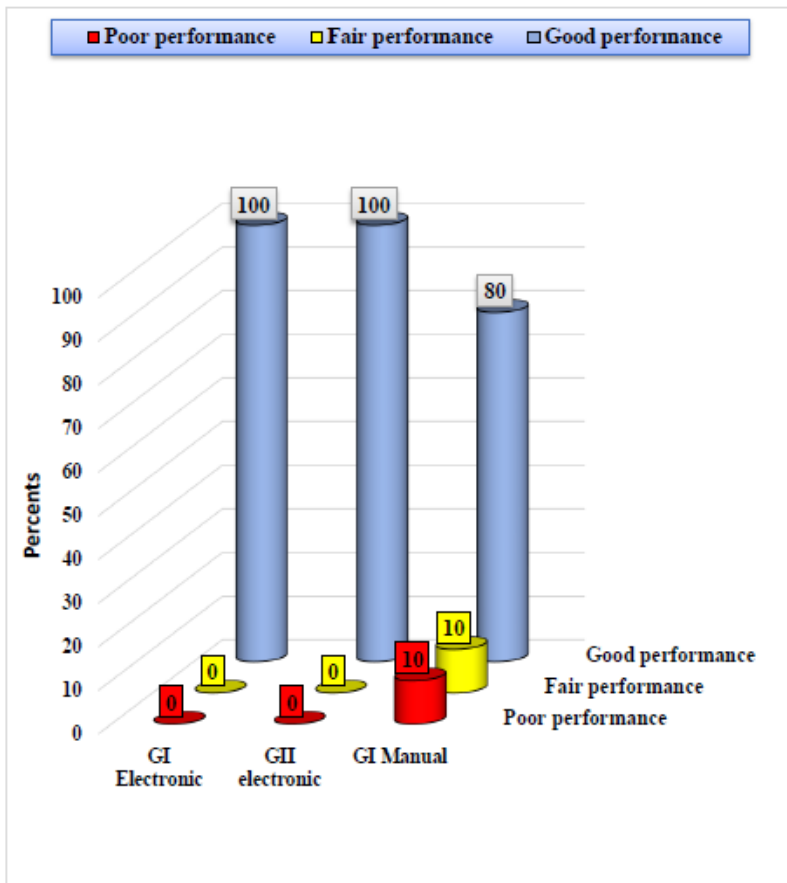


Fig. (2): The effect of the educational program about using E-partograph on the nurses total score of knowledge about the E-partograph in Labor unit (N=30)

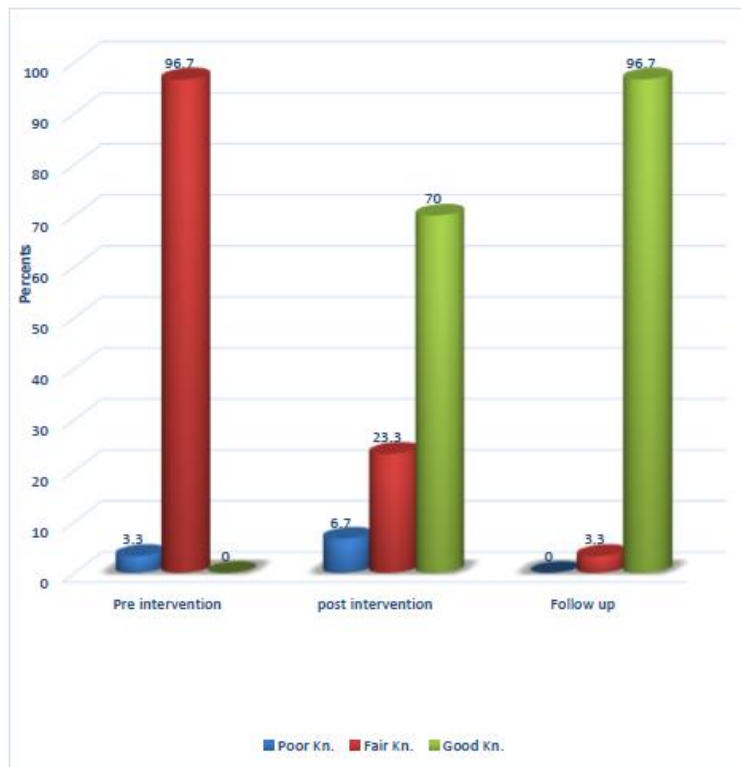


Fig. (3): The effect of the educational program about using E partograph on thenurses total score of practice about the E partograph in Labor unit (N=30)

