

Effect of On-The-Job Training on Nurses' Performance Regarding 'Helping Babies Breathe' During the Golden Minute of Life

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Abstract: This study aimed to evaluate the effect of on-the-job training on nurses' performance regarding helping babies breathe (HBB) during the golden minute of life.

Research design: A quasi-experimental design was used to conduct this study.

Setting: The study was carried out at the Delivery Room of Obstetric and Gynecological Hospital affiliated to Ain Shams University Hospitals.

Subjects: A sample of convenience included all (50) the nurses, worked in the previously mentioned setting.

Tools: A predesigned questionnaire and an observation checklist to evaluate the nurses' knowledge and performance respectively, regarding HBB during the golden minute of life. According to assessment of actual nurses' educational needs, on-the-job training was designed and implemented.

Results: The study revealed that three fifths of the nurses had satisfactory total knowledge related to HBB during the golden minute of life pre training implementation compared to the great majority of them post implementation. As well, nurses' performance was improved post training implementation. There was a positive correlation between total knowledge of the studied nurses and their total performance post training implementation.

Conclusion: Based on the findings of the present study on-the-job training had a positive effect on improving the nurses' knowledge and performance regarding HBB during the golden minute of life.

Recommendation: Continuous on-the-job training to enhance nurses' knowledge and performance regarding helping babies breathe (HBB).

Keywords: Golden minute, helping babies breathe, neonatal resuscitation, nurses, on-the-job training.

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I. Introduction

Globally, 2.9 million neonates die every year, of which 700,000 die due to intrapartum-related complications. The first minute after a baby is born, the "Golden minute", is the crucial window for the initiation of neonatal resuscitation among the 10 million non-breathing babies born annually. [1,2]

Reduction in neonatal mortality rose to prominence on the global health agenda with the declaration of the Millennium Development Goals during the 2000 United Nations General Assembly. Specifically, Millennium Development Goal-4 targeted a two-thirds reduction in the global under-5 mortality rate from 1990 to 2015. Although remarkable progress has been made with respect to decreasing childhood mortality, the rate of reduction in neonatal mortality has been notably slower, so that neonatal deaths now comprise 45% of all childhood deaths. [3,4]

Post 2015, the Sustainable Development Goals and the Every Newborn Action Plan set new targets for national neonatal mortality rates of less than 10 neonatal deaths per 1,000 live births, with reduction of global rates from 20 per 1,000 live births in 2015 to 7 per 1,000 live births by 2035. [5]

Most babies that do not breathe at birth will begin to do so with simple drying and stimulation. For those babies who do not respond to these initial measures, assisted ventilation with a bag-mask is the single most important step in helping babies to breathe. Scaling up neonatal resuscitation training in countries where most newborn deaths occur remains an urgent global health priority. [6,7]

Neonatal resuscitation competency among health workers is critical in every delivery room to ensure the safety and health of newborn infants. Resuscitation training in facilities has been shown to reduce the number of intrapartum-related neonatal deaths by 30%. [8]

Helping Babies Breathe is evidence-based nursing practices about neonatal resuscitation techniques in resource limited areas. It is an initiative of the American Academy of Pediatrics (AAP), in consultation with the World Health Organization (WHO), and in collaboration with the United States Agency for International

Development (USAID), the National Institute of Child Health and Development (NICHD), and a number of other global health stakeholders. [9]

In order to train birth attendants in developing countries, on the essential skills of neonatal resuscitation, HBB was designed. It focuses on the initial steps of resuscitation, including immediate drying of the baby, providing warmth, clear the airway and stimulation to breath, evaluation of breathing, ventilation with bag-mask if needed, followed by evaluation of breathing and heart rate, within the first 60 seconds after birth (The Golden Minute). [10,11,12]

In June 2010 after 4 years of development that included peer review and formative educational field testing, HBB training was released. The present HBB program includes a clinical curriculum based on global evidence, innovative educational design, and purpose-built educational and clinical equipment, including a low-cost neonatal simulator to enhance skill development. [13]

Training is the process of imparting knowledge, skills and aptitude to perform desired care. A well planned and well executed training program can provide the following advantages; it helps in improving the level of performance, uniformity of work methods and procedures helps to improve the quality of care, a systematic training program reduces the cost and time in learning, good training helps in economical use of materials and finally, it boosts the morale of nurses to perform the care. [14]

On-the-job training (OJT) is one of the paramount training methods because it is planned, organized, and conducted at the nurses' workplace. The OJT is a method used for augmenting nurses' skills. It is mainly suitable for developing expertise distinctive to nurses. The OJT is the best method as it is economical, simple and effective and everybody can do it. It doesn't need wide-ranging budgets, complex training courses, devoted training staffs or absence from the workplace. Its effectiveness can be significantly enhanced by applying a methodical approach. The OJT provides the nurses with the opportunity to "practice and learn by doing" and makes sure that the nurses are actually working as they were taught. [15]

1.1. Significance of the study:

Over the past 20 years, Egypt has made significant progress on under-five-year child mortality that was reduced by 70% (1990-2008). Despite this reduction, large disparities in child survival still persist at national level in particular for the neonatal period which was reduced at a slower pace. Currently, 9 out of 10 deaths of children under the age of five take place before the child's first birthday, and about one half of these deaths occur during the first month of life.[16]

Nurses have an important role in helping babies breathe, so that, it is important for nurses to be present at a baby's birth to continually assess the situation. There is only one minute before delayed or inappropriate action can result in brain damage or death for the baby. This is why it is called the Golden Minute. Once nurses have evaluated the state of the baby's breathing, they need to make a quick decision on how to proceed and to put the plan into action immediately. [17] Although health workers are the key personnel in the provision of neonatal resuscitation, it has been revealed that in low-resource settings, staff usually have inadequate training and knowledge, and that additional formal guidance and support are needed. [18].Therefore, the current study was carried out in an attempt to increase nurses' knowledge and improve their performance regarding HBB during the golden minute of life through developing and implementing OJT.

1.2. Aim of the study:

This study aimed to evaluate the effect of on-the-job training on nurses' performance regarding HBB during the golden minute of life. This aim was achieved through:

- Assessing knowledge and performance of nurses regarding HBB during the golden minute of life.
- Designing and implementing on-the-job training for studied nurses regarding HBB during the golden minute of life.
- Evaluating the effect of on-the-job training on nurses' knowledge and performance regarding HBB during the golden minute of life.

1.3. Research hypothesis:

It was hypothesized that the implementation of on-the-job training improves the nurses' knowledge and performance regarding HBB during the golden minute of life.

II. Subjects and Methods

The subject and methods of the current study will be discussed under the following four (4) designs: Technical design, operational design, administrative design and statistical design

2.1. Technical Design:

It included research design, setting, subjects and tools for data collection.

Research design:

A quasi-experimental design was used to conduct this study.

Research setting:

The study was conducted at the Delivery Room of Obstetric and Gynecological Hospital affiliated to Ain Shams University Hospitals.

Research subjects

A sample of convenience included all (50) the nurses who are working in the previously mentioned setting and receiving the babies after birth by rotation regardless their age, qualification, years of experience and previous attendance of training courses about HBB.

Tools of data collection

Data were collected through using the following tools:

1. Pre-designed questionnaire: (pre/post)

Adapted from the **American Academy of Pediatrics** [11], and translated by the researchers into simple Arabic language, it consists of two parts to assess the following data:

Part A.: It is concerned with characteristics of nurses which included: gender, age, qualification, years of experience and attendance of previous training course about HBB.

Part B.: It concerned with nurses' knowledge regarding HBB during the golden minute of life, the questionnaire consisted of 17 closed-ended questions in the form of multiple choice questions (MCQs) about initial assessment for baby, methods of breathing evaluation, action for baby with normal breath, indications for HBB, first step of HBB, indications of bag- mask ventilation (BMV), procedure facilitates baby breath, action if baby does not breath, action in general cyanosis, position of baby on ventilation, and time of cutting umbilical cord.

Scoring system: According to the answers obtained from the studied nurses, a scoring system was followed to assess the nurses' knowledge, The nurse was expected to answer 14 out of 17 of the questions correctly to successfully complete the written knowledge evaluation each question scored two marks for a correct answer and zero for an incorrect or no answer. These scores were summed and converted into a percentage, the nurses' total knowledge score was categorized into; satisfactory $\geq 82\%$ (28 scores) and unsatisfactory $< 82\%$.

2. An observation checklist:

Adopted from the **American Academy of Pediatrics** [19], it was used to evaluate the nurses' performance regarding HBB. It consisted of six major steps; prepare for birth, keep baby warm, clear airway and stimulate breathing, evaluate breathing, ventilate with bag-mask, followed by evaluate breathing and heart rate, within the first 60 seconds after birth.

Scoring system: Every step takes specific score according to its importance and priorities, these scores were summed and converted into a percentage. The scoring system of nurses' total performance was classified into competent $\geq 95\%$ and incompetent $< 95\%$.

Validity and Reliability:

It was ascertained by a jury of 5 experts in neonatology in both nursing and medical field. Their opinions elicited regarding the format, layout, consistency, accuracy and relevancy of the tools. Testing reliability of the translated version of questionnaire was done by Cronbach alpha, the result was 0.788.

2.2. Operational Design

It consisted of preparatory phase, ethical considerations, pilot study and fieldwork.

Preparatory Phase

This phase included reviewing of literature related to nurses' knowledge about HBB. This served to develop the study tools for data collection. During this phase, the researchers also visited the selected place to be acquainted with the personnel and the study setting.

Ethical Considerations

Informed consent was obtained from nurses prior to data collection, the studied nurses were informed about the purpose and the expected outcomes of the study and they were assured that, the study is harmless and their participation is voluntary and they have the right to withdraw from the study at any time without giving any reason. They were also assured that, anonymity and confidentiality will be guaranteed, as well the collected data will be used for the research purpose only. Ethics, values, culture and beliefs were respected.

Pilot study:

A Pilot study was carried out including 10% of the studied nurses (5 nurses) to test the applicability and feasibility of the study tools. Modifications were done according to the results of the pilot study. Nurses included in the pilot study were excluded from the main study sample since some modifications were done in the form of rephrasing for some statements. The final form of the tools was then obtained and the time needed for completing each tool was also determined.

Fieldwork

The actual fieldwork was carried out over a period of 5 months from beginning of January to the end of May 2016. The researchers were available in the study setting 3 days/week in the morning and afternoon shifts and the actual fieldwork was divided into four phases:

1. Assessment phase: (one month)

In this phase, the researchers were using the constructed tools to collect data about nurses' knowledge and performance related to HBB during the golden minute (pre-test), in their workplace. The purpose of the study and its expectations were explained by the researchers to the studied nurses before starting interviewing and data collection. The pre designed questionnaire was filled in by the nurses. Time needed to filling in the questionnaire depended on nurses' own knowledge, the average time ranged between 15-20 minutes. The observation checklist was filled in by the researchers, in nurses' workplace, during the golden minute after receiving babies. The time needed to fill in the checklist depended on the time of the procedure, each procedure time ranged between 10 to 15 seconds.

2. Planning phase: (one month)

After determining objectives of the OJT, the training was designed by the researchers in Arabic language in the light of the literature review. It was revised, organized and the content was prepared according to nurses' educational needs. It included knowledge about initial assessment for baby, methods of breathing evaluation, action for baby with normal breath, indications for HBB, first step of HBB, indications of bag- mask ventilation (BMV), procedure facilitates baby breath, action if baby does not breath, action in general cyanosis, position of baby on ventilation, and time of cutting umbilical cord. The practical aspects of OJT included; preparation for HBB before every birth, immediate drying of the baby, providing warmth, position of the head and clear the airway (remove secretions if needed), additional stimulation to breathe, followed by bag -mask ventilation (BMV) if needed, within the first 60 seconds after birth.

3. Implementation phase: (two months)

This phase consumed 8 weeks, three days per week, to implement the OJT. The researchers inspected the roster of nurses to identify the number of nurses in each shift. At the beginning, an introduction about OJT was done, and then each nurse, in the shift, performed the procedures, whereas the researchers directed her on how to perform appropriately and gave feedback immediately by pointing out any errors. Meanwhile, the researchers used group discussion with the studied nurses to cover the theoretical aspects of OJT related to HBB. This process was repeated for each of the studied nurses several times until reaching competency. Different methods of teaching were used as group discussion, demonstration and re-demonstration. Suitable media was used such as; real equipment (bag-mask, mannequin), posters and booklet.

4. Evaluation phase: (one month)

The same tools were used immediately post implementation of OJT for all studied nurses as an indicator to determine the level of improvement.

2.3. Administrative Design

An official permission to conduct the study was obtained through an issued letter from the Dean of the Faculty of Nursing, Ain Shams University, to the medical and nursing directors of the previously mentioned study setting to obtain their approval to conduct the study. The letter included the title, aim and the expected outcome of the study.

2.4. Statistical Design

The collected data were organized, revised, scored, tabulated and analyzed using the number and percentage distribution. Statistical analysis was done through computer using the Statistical Package for Social Sciences (SPSS) version 18. Qualitative variables were compared using Chi-square (χ^2) test and quantitative variables were compared using Pearson correlation coefficient (r). The significance of the results was considered as follows: When $p > 0.05$: it is statistically insignificant difference; while $p < 0.05$ or $p < 0.001$: it is statistically significant difference.

III. Results

Table (1) shows that all (100%) of studied nurses were females and did not attend any previous training courses about HBB. More than three fifths (62%) of them were in the age group 30-≤40 years with a mean age of 36 ± 6.14 years. It is clear from the same table that, more than one third (36% & 34%) of the studied nurses held bachelor degree of nursing and had 5 -< 10 years of experience respectively.

According to research hypothesis, **table (2)** reveals that there are statistically significant differences ($p < 0.001$) in all items of nurses' knowledge regarding HBB during the golden minute of life pre/post implementation of OJT. More than half (52%, 54% & 52%) of the studied nurses had unsatisfactory knowledge regarding procedure facilitates baby breathing, action if baby does not breath and action in general cyanosis respectively pre training implementation compared to 86%, 92% and 94% of them had satisfactory knowledge

respectively post implementation. Meanwhile, 60% of the studied nurses had satisfactory knowledge regarding indications for HBB pre training implementation compared to 96% post implementation.

Figure (1) illustrates that there is a statistically significant difference ($X^2= 18.88$ at $p<0.001$) between pre/post OJT implementation regarding nurses' total knowledge about HBB during the golden minute of life, where three fifths (60%) of the studied nurses had satisfactory total knowledge pre training implementation compared to 96% of them post implementation.

Table (3) indicates that there are statistically significant differences ($p<0.001$) between pre/post OJT implementation in all items of nurses' performance regarding HBB during the golden minute of life. The same table reveals that 60% and 50% of the studied nurses had incompetent performance of preparation for HBB before every birth and evaluation of the breathing respectively pre OJT implementation compared to 94% and 98% of them had competent performance respectively post implementation. Meanwhile, 60% of studied nurses had competent performance of bag-and-mask ventilation pre OJT implementation compared to 98% of them post implementation.

According to research hypothesis, **figure (2)** illustrates that there is a statistically significant difference ($X^2= 14.58$ at $p<0.001$) between pre/post OJT implementation regarding nurses' total performance of HBB during the golden minute of life, where less than two thirds (64%) of the studied nurses had competent total performance pre implementation compared to 98% of them post implementation.

Table (4) reveals that there is a positive correlation ($r = 0.703$ at $p < 0.05$) between total knowledge and total performance of the studied nurses regarding HBB during the golden minute of life post OJT implementation. However, there is no correlation ($r = 0.301$ at $p > 0.05$) between them pre implementation.

Table (5) shows that there is a positive correlation ($r =0.827$ at $p<0.05$) between nurses' qualification and their total knowledge regarding HBB during the golden minute of life pre OJT implementation. Moreover, there are positive correlations ($r=0.871$ & $r=0.632$ at $p<0.05$) between nurses' qualification and years of experience respectively and their total knowledge post implementation. Meanwhile, there are no correlation between nurses' age and their total knowledge pre/post OJT implementation.

Table (6) indicates that there are positive correlations ($r=0.671$ & $r=0.581$ at $p<0.05$) between nurses' qualification and years of experience respectively and their total performance regarding HBB during the golden minute of life post OJT implementation. Meanwhile, there are no correlation between nurses' age and their total performance pre/post training implementation.

Table (1): Distribution of the Studied Nurses According to Their Characteristics (n=50).

Nurses' characteristics	No	%
Gender		
Female	50	100
Age (in years)		
< 30	7	14
30 <- 40	31	62
40 <= 50	12	24
Mean ± SD	36 ± 6.14	
Qualification		
Nursing School Diploma	22	44
Nursing Institute Diploma	10	20
Nursing Bachelor Degree	18	36
Years of experience		
< 5	7	14
5 <- 10	17	34
10 years & more	26	52
Mean ± SD	9.4 ± 3.62	
Attendance of previous training courses about HBB		
No	50	100

Table (2): Distribution of the Studied Nurses According to Their Knowledge Regarding HBB Pre/Post Implementation of On-The-Job Training (n=50).

Nurses' knowledge regarding	Pre				Post				X ²	p-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Initial assessment for baby	25	50	25	50	45	90	5	10	19.05	0.000*
Methods of breathing evaluation	32	64	18	36	47	94	3	6	13.56	0.000*
Action for baby with normal breath	25	50	25	50	48	96	2	4	26.84	0.000*
Indications for HBB	30	60	20	40	48	96	2	4	18.88	0.000*
Steps of HBB	26	52	24	48	48	96	2	4	25.16	0.000*
Indications of bag-and-mask ventilation	28	56	22	44	45	90	5	10	14.66	0.000*
Procedure facilitates baby breathing	24	48	26	52	43	86	7	14	16.33	0.000*
Action if baby does not breath	23	46	27	54	46	92	4	8	24.73	0.000*
Action in general cyanosis	24	48	26	52	47	94	3	6	25.69	0.000*
Position of baby on ventilation	32	64	18	36	49	98	1	2	18.78	0.000*
Time of cutting of umbilical cord	30	60	20	40	47	94	3	6	16.32	0.000*

*Statistically significant difference

Figure (1): Percentage Distribution of the Studied Nurses According to Their Total Knowledge Regarding HBB Pre /Post Implementation of On-The-Job Training.

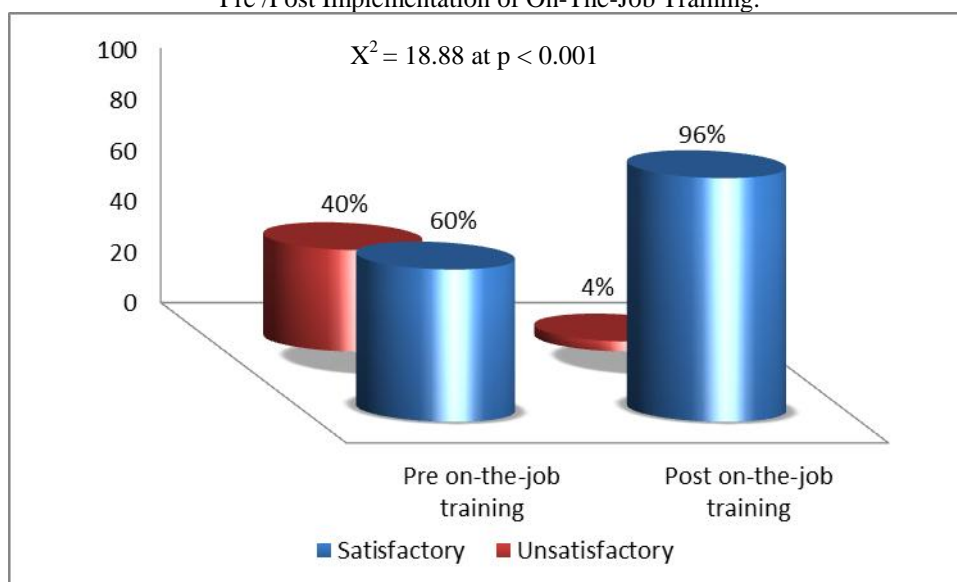


Table (3): Distribution of the Studied Nurses According to Their Performance Regarding HBB Pre/Post Implementation of On-The-Job Training (n=50).

Nurses' performance Regarding	Pre				Post				X ²	p-value
	Competent		Incompetent		Competent		Incompetent			
	No.	%	No.	%	No.	%	No.	%		
Prepare for HBB before every birth	20	40	30	60	47	94	3	6	32.97	0.000*
Keep baby warmth	39	78	11	22	50	100	0	0	12.36	0.000*
Clear the airway and stimulate breathing	30	60	20	40	48	96	2	4	18.88	0.000*
Evaluate breathing	25	50	25	50	49	98	1	2	29.94	0.000*
Ventilate with bag-and-mask	30	60	20	40	49	98	1	2	21.76	0.000*
Evaluates breathing and heart rate	32	64	18	36	48	96	2	4	16.00	0.000*

*Statistically significant difference

Figure (2): Percentage Distribution of the Studied Nurses According to Their Total Performance Regarding HBB Pre/Post Implementation of On-The-Job Training.

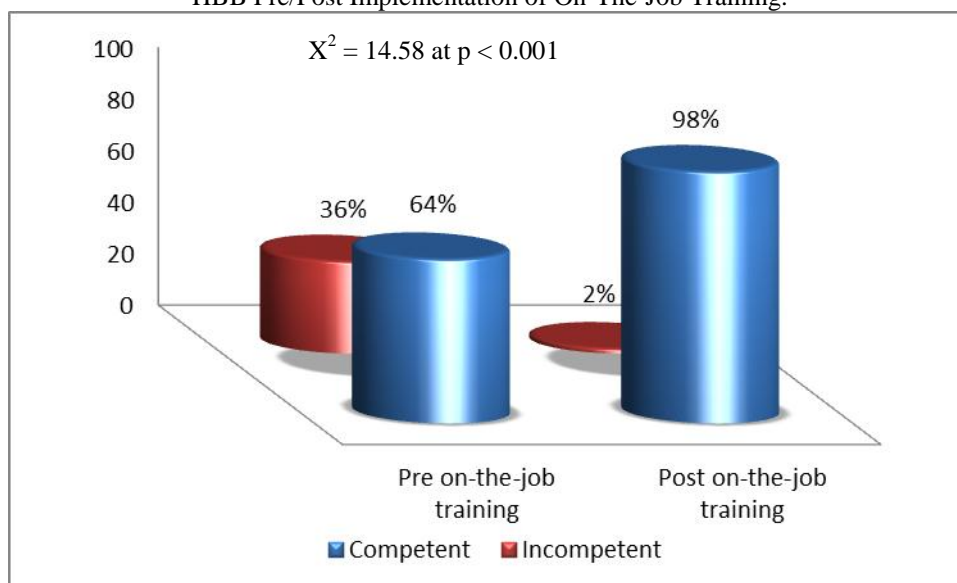


Table (4): Correlation between the Studied Nurses' Total Knowledge and Their Total Performance Regarding HBB Pre/Post Implementation of On-The-Job Training.

Total nurses' performance	Total nurses' knowledge			
	Pre on-the-job training		Post on-the-job training	
	r	p	r	p
Pre on-the-job training	0.301	0.031	-	-
Post on-the-job training	-	-	0.703	0.020*

*Correlation is significant at p< 0.05

Table (5): Correlations between the Studied Nurses' Characteristics and their Total Knowledge Regarding HBB Pre /Post Implementation of On-The-Job Training.

Nurses' characteristics	Nurses' knowledge			
	Pre on-the-job training		Post on-the-job training	
	r	p	r	p
Age	0.213	0.120	0.283	0.512
Qualification	0.827	0.043*	0.871	0.010*
Years of experience	0.062	0.102	0.632	0.031*

*Correlation is significant at p<0.05

Table (6): Correlations between the Studied Nurses' Characteristics and their Total Performance Regarding HBB Pre /Post Implementation of On-The-Job Training.

Nurses' characteristics	Nurses' performance			
	Pre on-the-job training		Post on-the-job training	
	r	p	r	p
Age	0.043	0.159	0.206	0.142
Qualification	0.132	0.254	0.671	0.004*
Years of experience	0.351	0.042	0.581	0.030*

*Correlation is significant at p<0.05

IV. Discussion

Helping babies breathe is a growing suite of evidence-based, hands-on programs developed to reduce neonatal mortality in resource-limited environments. Programs are supported and implemented by many global partners including the US Agency for International Development (USAID) and Save the Children. Together, the HBB programs address the three most common causes of preventable neonatal deaths: complications during golden minute, complications from preterm birth, and neonatal infections. [20]

This study was aimed to evaluate the effect of on-the-job training on nurses' performance regarding HBB during the golden minute of life through; assessing knowledge and performance of nurses regarding HBB during the golden minute of life, designing and implementing OJT for studied nurses, evaluating the effect of OJT on nurses' knowledge and performance regarding HBB.

As regards nurses' characteristics, the findings of the current study revealed that more than three fifths of nurses were in the age group 30-<40 years with a mean age of 36.0±6.14 and less than half of them held nursing

school diploma. These findings are in accordance with those of **Ashish et al.** [8], who found in a study entitled "Evaluation of Helping Babies Breathe Quality Improvement Cycle (HBB-QIC) on retention of neonatal resuscitation skills six months after training in Nepal" that, the majority of the studied sample were aged from 30 to 40 years, but the authors controversy about the educational level. The researchers believe that this may be due to the presence of different categories in nursing education in Egypt but in Nepal there's only high school of nursing.

The results of the present study showed that, slightly more than half of the studied nurses had experience for 10 years and more and all of them did not attend any previous training course about HBB. From the researchers' point of view, more years of experience in receiving babies in delivery room, ensure the quality of care given to the babies. These findings are in agreement with that of **Lawn et al.** [2], who carried out a study entitled "Every newborn: progress, priorities, and potential beyond survival" and found that most of the nurses had more than 10 years of experience in NICU and in the delivery room and that nurses must have training courses, but in fact, not all institutes provide the health care providers with training courses regarding HBB.

The results of the current study indicated that there are statistically significant differences in all items of nurses' knowledge regarding HBB during the first minute of life pre/post implementation of OJT. Half of the studied nurses had unsatisfactory knowledge regarding initial assessment for baby and action for baby with normal breathing pre implementation of OJT compared to the great majority of them had satisfactory knowledge post implementation. These results could be due to that, all of the studied nurses did not attend any previous courses about HBB. These findings are in accordance with that of **Gupta et al.** [21], who studied the evaluation of the Helping Babies Breathe (HBB) initiative scale-up in Malawi, and reported that, more than half of health workers, who largely came from the nurse/midwife technician group, had insufficient knowledge regarding assessment and action for baby with normal breathing pre HBB training which significantly improved post training.

Concerning the studied nurses' knowledge regarding methods of breathing evaluation, indication and steps of HBB, and indications of bag-and-mask ventilation, the results of the current study revealed that, there are statistically significant improvement post implementation of OJT, where more than half of nurses had satisfactory knowledge pre implementation compared to the great majority of them post implementation. This may be attributed to the OJT is a simple method for learning and the most practical way to understand. These results are consistent with those of **Bang et al.** [12], who carried out a study entitled "Helping Babies Breathe (HBB) training: What happens to knowledge and skills over time?", and reported that HBB training improved knowledge of the birth attendants regarding indication and methods of HBB, and indications of bag-and-mask ventilation in the golden minute of life.

On assessing the studied nurses' knowledge regarding procedures facilitate babies breathe, action if baby does not breath and in general cyanosis, the results of the present study revealed that, there are statistically significant improvements in nurses' knowledge regarding these items post implementation of OJT. This may be attributed to the OJT which helps the nurses learn quickly by being the part of the execution and hence no extra time is wasted in understanding. These results are highly supported by those of **Gupta et al.** [21], who reported that there were statistically significant improvements in their study sample knowledge regarding action to facilitate babies breathe, and action if baby does not breath and in general cyanosis.

Considering the total knowledge of the studied nurses regarding HBB, the result of the current study showed marked improvement in nurses' total knowledge post OJT implementation. This improvement in nurses' knowledge justified the research hypothesis and attributed it to the fact that nurses are liable to learn and acquire knowledge through OJT. This result is congruent with those of **Hoban et al.** [22], who found in a study entitled "Helping Babies Breathe' training in sub-Saharan Africa: Educational impact and learner impressions" that, the study sample had low mean scores of knowledge before intervention, while immediately following the HBB training, they had high mean scores of knowledge as well as 6 months after the training. Additionally, this result is similar to those of **Bang et al.** [12], who reported that, HBB training significantly improved knowledge, where the great majority of nurses passed the knowledge test post-training compared to slightly more than two thirds of them passed it pre-training.

The results of the current study showed that, there are statistically significant differences in all items of nurses' performance regarding HBB during the golden minute of life pre/post implementation of OJT. Three fifths of the studied nurses were incompetent in preparing for HBB before every birth, meanwhile, three fifths of them were competent in clearing the airway and stimulating breathing, and ventilate with bag-and-mask pre implementation of OJT compared to the great majority of them were competent post implementation. These results may be due to that, in OJT, the researchers directed each nurse on how to perform the procedures appropriately and gave feedback immediately by pointing out any errors. These results are highly supported with those of **Seto et al.** [23], who studied "Educational outcomes of Helping Babies Breathe training at a community hospital in Honduras", and reported that nurses were incompetent regarding preparation before birth and stimulate breathing before HBB training, also the same study revealed that, HBB training resulted in

significant increases in mean scores for bag-mask ventilation skills' test, where nurses demonstrated a greater mean difference in scores after training. Previously, **Hoban et al.** [22] mentioned that bag-and-mask nurses' skills improved immediately after the training and were retained 6 months after the training.

Concerning total performance of the studied nurses regarding HBB during the golden minute of life, the finding of the present study showed that, less than two thirds of the studied nurses had competent total performance pre implementation of OJT compared to the great majority of them post implementation. This finding indicates that the implementation of OJT was successful in improving nurses' performance which justified the research hypothesis. This result is matched with that of **Bellad et al.** [24], who carried out a study entitled "A pre-post study of a multi-country scale up of resuscitation training of facility birth attendants: does Helping Babies Breathe training save lives?", and mentioned that, the majority of the study sample was incompetent regarding practicing HBB before training and significantly improved after training. Additionally, **Bang et al.** [12] highlighted that improvements in HBB skills after training were more impressive than the gains in knowledge, in part, because bag-mask ventilation (BMV) skills were so low initially. Prior to the initial HBB training, only minority of nurses could ventilate a newborn mannequin effectively, as measured by the straightforward BMV skills test, but the great majority of them passed the test after initial training.

As regards the correlation between the studied nurses' total knowledge and their total performance regarding HBB during the golden minute of life, the result of the present study indicated that, there is a positive correlation post implementation of OJT. This result is congruent with that of **Gupta et al.** [21], who detected that significant correlation was found between the study sample's knowledge and skills after HBB initial training. Additionally, **Seto et al.** [23] mentioned that, while implementing the educational program, the researchers identified positive correlation between the level of knowledge of the studied sample and their level of performance.

Considering correlations between the characteristics of the studied nurses and their total knowledge regarding HBB during the golden minute of life, the results of the present study revealed that, there are positive correlations between nurses' qualification and their total knowledge pre and post implementation of OJT. Moreover, there is a positive correlation between nurses' years of experience and their total knowledge post implementation of OJT. Meanwhile, there is no correlation between nurses' age and their total knowledge pre/post implementation of OJT. These results are not corresponding with those of **Lion et al.** [25], who carried out a study entitled "Evaluation of quality improvement intervention to increase use of HBB" and showed that, the studied characteristics namely level of education and years of experience were not associated with the level of knowledge. Conversely, the **World Health Organization** [5] reported that, the studied sample characteristic such as level of education was positively correlated with their level of knowledge and skills.

As regards correlations between the characteristics of the studied nurses and their total performance regarding HBB during the golden minute of life, the results of the current study indicated that, there are positive correlations between nurses' qualification and years of experience, and their total performance post implementation of OJT. Meanwhile, there is no correlation between nurses' age and their total performance pre/post implementation of OJT. These results are congruent with those of **Mduma et al.** [26], who studied "Frequent brief on-site simulation training and reduction in 24-h neonatal mortality-An educational intervention study", and found that there were statistically significant differences between demographic data namely level of education and years of experiences of the study sample and their level of performance, while non-statistical significance was observed in relation to their age.

V. Conclusion:

Based on the results and research hypothesis of this study, it can be concluded that, the implementation of OJT improved the nurses' knowledge and performance regarding HBB during the golden minute of life. Less than two thirds of studied nurses had satisfactory knowledge and competent level of performance pre implementation of OJT compared to the great majority of them post implementation. Moreover, there is a positive correlation between total knowledge of the studied nurses and their total performance regarding HBB post implementation of OJT. There are also positive correlations between nurses' qualification and years of experience, and their total knowledge as well as total performance post implementation of OJT. Meanwhile, there is no correlation between nurses' age and their total knowledge as well as total performance pre/post implementation of OJT.

VI. Recommendations

In light of the study findings, the following recommendations are suggested:

- Continuous on-the-job training to enhance nurses' knowledge and performance regarding helping babies breathe (HBB)
- Hanging poster about HBB steps in the delivery room to be in front of all nurses.
- An orientation program for the newly assigned nurses in the delivery room about HBB.

- Dissemination of on-the-job training regarding HBB for nurses in all delivery settings in Egypt to overcome neonatal mortality.
- Further studies should be carried out on a larger number of nurses all over Egypt for evidence and generalization of the results.

VII. References

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