Effect of Evidence-Based Guidelines on Nurses' Performance Regarding Care of High-Risk Neonates Undergoing Surfactant Replacement Therapy

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Abstract

Background: Surfactant Replacement Therapy (SRT) is part of the core treatment strategy for respiratory distress syndrome, which prevent collapse of alveoli, improving survival and reducing respiratory morbidities. Evidence-based nursing guideline increases the quality of neonatal care and closes the gap between research outcomes and practice. **Aim of the study was** to assess the effect of evidence-based guidelines on nurses' performance regarding care of high-risk neonates undergoing SRT. **Design:** a quasi–experimental research design was utilized to conduct this study. **Setting:** This study was conducted in Neonatal Intensive Care Unit (NICU) at Benha University Hospital. **Sample:** A convenient sample of all available nurses (٦٤ nurses) who were responsible for providing care to high-risk neonates and purposive sample of high-risk neonates (٣٠ neonates) who receive SRT and admitted to NICUs. **Tools of data collection:** Two tools were used: Tool (I): A structured interviewing questionnaire sheet to assess characteristics of the studied subjects and nurses' knowledge regarding care of high-risk neonates undergoing SRT. Tool (II): Observational checklists to assess nurses' practices regarding care of high-risk neonates undergoing SRT. **Results:** The majority of the studied nurses had satisfactory total level of knowledge in post-implementation of evidence-based guidelines and the majority of the studied nurses have competent practice in post-implementation of evidence-based guidelines. **Conclusion:** The evidence-based guidelines was effective in improving nurses' knowledge and practices regarding care of high-risk neonates undergoing SRT post-implementation of guidelines. Additionally, there was a positive correlation between nurses' total knowledge and practices. **Recommendation:** Enhancing nurses' knowledge and practices regarding care of high-risk neonates undergoing surfactant replacement therapy by encouraging them to attend periodical training courses.

Keywords: Evidence-Based, Guidelines, Nurses' Performance, High-Risk Neonates, Surfactant Replacement Therapy

١. ntroduction

High-Risk Neonates (HRN) can be defined as neonates at greater risk of morbidity, Neonatal Intensive Care Units (NICUs) admission, adverse neurological squeal and respiratory complication. The Prematurity and its complications are the leading cause of neonatal mortality worldwide, a major driver of the prematurity related neonatal mortality is Respiratory Distress Syndrome (RDS) due to immature lungs and surfactant deficiency ***[٩].***

Surfactant Replacement Therapy (SRT) is part of the core management strategy for premature neonates with RDS, which can prevent the collapse of alveoli and increase lung elasticity, improving survival and reducing respiratory morbidities. Moreover, the increasing use of non-invasive ventilation as the primary mode of respiratory support for preterm neonates and reducing use of invasive ventilation and its complications ***[١٢].***

Evidence-based guideline plays a pivotal role which provides the nurses with best scientific knowledge and practices about SRT based on the new evidences from clinical trials and systematic reviews of Medline and Cochrane library about SRT which includes; assist newborn with endotracheal intubation, maintain mechanical ventilation as indicated, measure oxygen concentration, continuous monitoring of the $SaO^{٢}$ and observe the neonates' response to oxygen. Moreover, promoting adequate nutrition and hydration is important ***[١٣].***

Nurses are responsible for providing a systematic and high quality practice. Neonatal nurses responsible for understanding the complexities of care given to any neonate requiring SRT to deliver safe and effective care. So, good practice in nursing is understood as an inseparable and interrelated set of theories, processes, techniques, and activities that are seen as the best available options for care in the area, while maintaining the consistency with knowledge, contexts, values, environments, goals and evidences in the interest of health ***[١٠].***

However, nurses have a key role in the care of high-risk neonates to decrease neonatal mortality and morbidity. Whereas, nurses working in the NICUs should be qualified and trained through ongoing evidence-based training program. Nursing care of neonates with RDS undergoing SRT is demanding, so paying meticulous attention to subtle changes in the neonate's oxygenation status, particularly in regard to nursing care before, during and after administration of SRT ***[١٤].***

Significance of the study

Surfactant replacement therapy (SRT) is a life-saving treatment for high-risk neonates with RDS and the most effective standard treatment in developing countries. There are numerous randomized clinical trials have established the efficacy of SRT in reducing mortality and morbidity in RDS so neonatal survival improved more in high-risk neonates and low birth weights and associated problems undergoing surfactant replacement therapy ***[١٠].***

Respiratory distress syndrome is an important cause of neonatal mortality globally particularly in developing countries. RDS affects approximately ٧٠٪ of infants born at less than ٣٣ weeks of gestation worldwide. The incidence of RDS is ١٪ of all births, however increases to ٥٠٪ at ٣٠ weeks of gestation, ٧٥٪ at ٢٨ weeks and ٩٠٪ at ٢٦ weeks. In Egypt, a study of neonatal mortality in NICUs in children's hospital, Cairo University revealed that mortality from RDS among neonates comprise ٢٦.٧٪ of all

deaths and constitute ٩.٦٪ and one of important causes of admission to the NICUs. SRT have the best effect on diminishing RDS and its mortality globally ***[٣].***

Meanwhile, total number of high-risk neonates admitted to NICUs of Benha University Hospital was ٥٤٩ high-risk neonates, nearly ٧٠٪ of them were RDS, while more than one quarter (٣٠٪) of them were preterm with RDS ***[٤].*** However, SRT is one of new evidence treatment modalities for RDS and become available universally. Therefore, it's important for the nurses to understand that Evidence-Based Practices (EBP) improves the quality of high-risk neonate's outcomes and provide an assessment for them to integrate the best evidence and using an actual clinical example which cause an improvement in nurses' knowledge and clinical practices. So, this study will be conducted.

Aim of the study

The aim of this study was to assess the effect of evidence-based guidelines on nurses' performance regarding care of high-risk neonates undergoing surfactant replacement therapy.

This aim was achieved through:

- Assessing nurses' knowledge and practice regarding Surfactant Replacement Therapy (SRT) in Neonatal Intensive Care Units (NICUs).
- Designing and implementing evidence-based guidelines for nurses working in NICUs regarding care of high-risk neonates undergoing surfactant replacement therapy.
- Evaluating the effect of evidence–based guidelines on nurses' performance regarding care of high-risk neonates undergoing surfactant replacement therapy.

Research hypothesis

- Implementation of evidence-based guidelines will expected to improve scores of nurses' knowledge regarding care of high-risk neonates undergoing SRT.
- Implementation of evidence-based guidelines will expected to improve scores of nurses' practices regarding care of high-risk neonates undergoing SRT.

Subjects and Method

Research design

A quasi–experimental research design was utilized to conduct the study.

Research Setting

The current study was conducted in Neonatal Intensive Care Unit (NICU) at Benha University Hospital affiliated to higher education and research. NICUs located in the fourth floor of internal medicine building and composed of three rooms where each room contain eight incubators (total=٢٤ incubators).

Subjects

- A convenient sample of all available nurses (٦٤) who were responsible for providing care to high risk neonates at the time of this study from the above mentioned setting were included in the study regardless their personal characteristics and willing to participate in the study.
- Purposive sample of high-risk neonates (٣٠) who were admitted to NICUs and involved in the study according to some inclusion criteria.

Inclusion criteria:

- High-risk neonates less than ٣٢ weeks of gestational age.
- High-risk neonates with Respiratory Distress Syndrome (RDS) and received Surfactant Replacement Therapy (SRT) during the period of data collection.

Exclusion criteria:

- High-risk neonates with other chronic illness such as cardiac disease or congenital anomalies such as congenital diaphragmatic hernia and esophageal atresia.

Tools of the study:

There are two tools were utilized to collect the required data. These tools as the following: -

Tool (I): A structured interview questionnaire (pre/post)

It was designed by the researcher in the light of relevant references and revised by supervisors. It composed of two main parts:

Part (١) Characteristics of the studied subjects:

a- Nurses' characteristics was included; age, gender, qualifications, years of nurses' experience and attend any of training courses about evidence-based practices regarding caring of high-risk neonates with RDS undergoing SRT (٥ questions).

b- Characteristics of high-risk neonates consisted of; gender, gestational age, birth weight, height, duration of hospital stay in days and type of delivery (٦ questions).

Part (٢) Nurses' knowledge regarding care of high-risk neonates undergoing SRT

This part was concerned with assessing the following:

a. Nurses' knowledge regarding evidence-based guideline that included Multiple Choices Questions (MCQs) about; definition, goals, benefits, sources, stages of applying EBP, EBP users, challenges and barriers of EBP, factors facilitate implementation of EBP (٨ MCQs).

b. Nurses' knowledge regarding RDS that included; definition, etiology, clinical pictures, diagnosis, complications, management and nursing care (٦ MCQs).

c. Nurses' knowledge regarding surfactant replacement therapy (SRT) that included; definition, sources, function, indications of SRT, the effect of SRT types on its dose used, the current available dose that is given for SRT and the most used in NICU, routes of administration, complications of administration, nursing intervention pre, during and after administration of SRT (١١ MCQs).

Scoring system for knowledge

Each question was checked with a model key answer and it was scored as; a complete and correct answer was scored (٢), incomplete and correct answer was scored (١) and wrong answer or don't know was scored (٠). Total scores of knowledge were ranged from ٠-٥٠ degree.

The level of nurses' knowledge was calculated and classified as the following:

- Satisfactory knowledge: if the nurse scored equal or more than ٨٥٪-١٠٠٪.
- Unsatisfactory knowledge: if the nurse scored less than ٨٥٪.

Tool (II): Observational checklist

The observational checklists were adapted from the ***[٥], [٨],***

[١٦]), to assess nurses' practices regarding care of high-risk neonates undergoing surfactant replacement therapy. It were include ١١ procedures about;-

- Hand washing (٨ steps)
- Oro/naso pharyngeal suction (١٨ steps)
- Endotracheal suction (١٩ steps)
- Total parenteral nutrition (٢٤ steps)
- Arterial blood gas sampling (١١ steps)
- Capillary blood gas sampling (١٤ steps)
- Venous blood gas sampling (١١ steps)
- Nursing care of endotracheal tube insertion (١٣ steps)
- Nursing care for high risk neonates before administration of SRT (٨ steps)
- Nursing care for high risk neonates during administration of SRT (١٠ steps)
- Nursing care for high risk neonates after administration of SRT (٥ steps)

Scoring system of nurses' practices

The score system of nurses' practice was classified into ٢ points. Done was scored (١) and not done was scored (٠). The total scores of the nurses' practice were ranged from ٠- ١٤١ degree. The level of the nurses' practice was calculated and classified as;

-Competent practice: if nurses scored ١٠٠٪.

-Incompetent practice: if nurses scored less than ١٠٠٪.

Tools validity and reliability

- ***Content validity***

Validity of the study tools was checked by a jury of three experts (one professor and two assistant professor) in the pediatric nursing field from faculty of Nursing Benha University to test face and content validity. The experts reviewed the tools for clarity, relevance, comprehensiveness, simplicity and applicability. All their remarks were taken into consideration regarding the format, layout, paraphrasing, consistency, accuracy and relevancy of the tools. Then the final form was used in data collection.

- ***Reliability***

Reliability of the study tools was checked by testing the internal consistency of the tools by administrating the tools to the same study subjects under similar condition using Cronbach's alpha coefficient test. Results from repeated testing was compared (test-retest reliability). Where it was found that r= ٠.٩٨ for the structured interview questionnaire format and r= ٠.٩٩ for observational checklists. These results indicate high degree of reliability for the study tools.

Pilot Study

Pilot study was carried out on ١٠٪ of the total study subjects (٦ nurses & ٣ high-risk neonates undergoing SRT) to check the clarity, applicability, feasibility of the study tools and to estimate the time needed to fill each tool. Minor modifications were done (in tool I) in the form of adding and omission of some questions according to the results of the pilot study. Nurses who involved in the pilot study were excluded from the study to avoid sample bias. Pilot study was done through one month as it was carried out at the beginning of January, ٢٠٢٢ till the end of January, ٢٠٢٢.

Field work

Field work was carried out through: assessment, planning, implantation and evaluation phases. Data were collected over a period of

٦ months starting from the first of February, ٢٠٢٢ to the end of July, ٢٠٢٢. The data were collected from the previously mentioned setting according to the policy of the study setting. The researcher was available two days/week (Tuesday and Thursday) at morning and afternoon shifts from ٩ am to ١ pm or from ١ pm to ٥ pm to collect the data using the study tools.

Assessment phase:

Each nurse was individually interviewed. Average number of nurses interviewed/day was ٧-٨ nurses per day at morning and afternoon shift. At the beginning of interview; the researcher welcomed each nurse, explained the purpose, duration and activities of the study and took written approval from nurses to participate in the study. the characteristics of the studied high risk neonates receiving SRT were collected from medical record by the researcher (it took about ١٠:١٥ minutes) for each high-risk neonate then the researcher gave the studied nurses questionnaire (Tool I) for filling it to assess their knowledge (it took nearly ١٥ minutes).

Meanwhile, the researcher was observed each nurse individually during his/her practice three times and take the median by using observational checklists (Tool II). The average time needed for each nurse (by the researcher) was ٣٠ minutes. This period of pretest took ٤ weeks (from the beginning of February, ٢٠٢٢ to the end of February, ٢٠٢٢).

Implementation phase:

The implementation phase was achieved through sessions, each session started by a summary of the previous one and the objectives of the new one, motivation and reinforcement were used during sessions to enhance sharing in the study. The nurses were informed about the time and place of sessions which were carried out at the pediatric units lecture room. The studied nurses were divided into ١٠ groups each group consisted of ٥-٧ nurses. The total number of sessions were ١٠ sessions ٤ sessions for theoretical part each session consumed nearly ٣٠-٦٠ minutes and ٦ sessions for practical part where each session required from ٦٠-٩٠ minutes ٢ days/week (Tuesday and Thursday) in the morning and afternoon shifts and was implemented according to nurses' physical and mental readiness. Each session included ١٠ minutes for discussion and feedback. These sessions were repeated to each group of nurses. This phase took four months from the beginning of March, ٢٠٢٢ to the end of June, ٢٠٢٢.

Evaluation: (posttest)

After implementation of the evidence-based guidelines contents, the post-test was administered immediately to assess nurses' knowledge and practices using the same tools of pretest related to care of high-risk neonates undergoing SRT. This phase took one month (July, ٢٠٢٢).

Statistical design:

The collected data were organized, revised, analyzed, and tabulated. The collected data were coded and transformed into specially designed form to be suitable for computer entry process. Data were entered using Statistical Package of Social Science (SPSS) version ٢٥ for windows, running on IBM compatible computer. Software

graphics were done by using Microsoft office excel program version ٢٠١٠. Descriptive statistics were applied (e.g percentages means and standard deviation). Test of significance, Chi-square (X^2) this test used to measure significance of qualitative variables, t- test was used for comparison between two means and correlation coefficient (r) was used for quantitative variables that were normally distributed. A significant level value was considered when P < ٠.٠٥ and a highly significant (HS) level value was considered when P < ٠.٠٠١. Meanwhile, no statistical significance difference was considered when P > ٠.٥.

Results

Table (١): Shows that, less than half of the studied nurses (٤٢.٢٪) are in the age group of ٢٠-< ٢٥ years and their mean age is ٢٦.٤ ± ٤.٧٠ years. Concerning gender, more than three quarters of them (٧٦.٦٪) are females. Regarding years of nurses' work experience in Neonatal Intensive Care Unit (NICU), more than one third of them (٣٧.٥٪) have experience <٥ years in NICU with mean ٩.٥٢±٤.٥٩ years. In relation to attendance of evidence-based training courses about SRT, all of the studied nurses (١٠٠٪) don't attend any training courses. Regarding qualifications, less than half of the studied nurses (٤٦.٩%) have diploma of nursing school and the minority of them (١٢.٥٪) have bachelor of nursing.

Table (٢): Demonstrates that, three-fifths of the studied high-risk neonates (٦٠٪) are males. Less than half of them (٤٦.٧٪) are in the gestational age group < ٢٦ weeks with their mean gestational age is ٢٧.٢±١.٥٤ weeks, their birth weight is <١٠٠٠ gram with their mean birth weight is ١٢٣٢.٧ ± ٣٨١grams and their birth height <٤٠cm with their mean birth height is ٤١.٥٩ ± ٢.٠١cm. Concerning hospitalization, less than half of the studied high-risk neonates (٤٣.٣٪) stay <٣٠ days in hospital. Regarding type of delivery, more than three quarters of the studied high-risk neonates (٧٦.٧٪) delivered by cesarean section and less than one quarter of them (٢٣.٣٪) delivered by normal.

Table (٣) & figure (١): Shows that, the majority of the studied nurses (٨٤.٤٪) have satisfactory level of total knowledge in post-implementation of evidence-based guidelines compared to ٦.٣٪ in pre-implementation. While this table indicates that, there is a highly statistical significance evidence-based guidelines compared to in post-implementation.

Table (٤): Demonstrates that, more than two thirds of the studied nurses (٧٠.٩٪) have incompetent practices regarding total parental feeding and nursing care before SRT administration procedures in pre-implementation of evidence-based guidelines. While, the majority of the studied nurses (٩٣.٨٪) have competent practices regarding venous blood gas sampling and nursing care after SRT administration procedures in post-implementation of evidence-based guidelines. However, there are highly statistical significances differences (P ≤ ٠.٠٠٠) between the studied nurses' practices in post-implementation of evidence-based guidelines compared to in pre-implementation.

Figure (٢): Shows that, the majority of the studied nurses (٩٠.٦٪) have competent practice in post-implementation of evidence-based guideline compared to less

than one third of them (٢٨.١٪) in pre-implementation.

Table (٥): Reports that, there is a positive correlation between total nurses' knowledge and practice regarding care of high-risk neonates in pre/post-implementation of evidence-based guideline (P ≤ ٠.٠٠٠).

Table (١): Distribution of the studied nurses according to their characteristics (n=٦٤)

Nurses' characteristics	No.	%
Age (years)		
٢٠-< ٢٥	٢٧	٤٢.٢
٢٥-<٣٠	٢٠	٣١.٢
≥ ٣٠	١٧	٢٦.٦
Mean ±SD	٢٦.٤ ± ٤.٧٠	
Gender		
Male	١٥	٢٣.٤
Female	٤٩	٧٦.٦
Years of work experience in NICU		
<٥	٢٤	٣٧.٥
٥-<١٠	٢٣	٣٥.٩
≥ ١٠	١٧	٢٦.٦
Mean ±SD	٩.٥٢±٤.٥٩	
Attending evidence-based training courses about caring of high-risk neonates undergoing surfactant replacement therapy		
Yes	٠	٠.٠
No	٦٤	١٠٠.٠
Qualifications		
Diploma of nursing school (٣years)		٤٦.٩
Technical institute of nursing		٢٥.٠
Technical institute of health science		١٥.٦
Bachelor of nursing		١٢.٥

Table (٢): Distribution of the studied high-risk neonates according to their characteristics (n=٣٠)

High-risk neonates' characteristics	No.	%
Gender		
Male	١٨	٦٠.٠
Female	١٢	٤٠.٠
Gestational age /weeks		
<٢٦	١٤	٤٦.٧
٢٦-<٢٩	٥	١٦.٦
٢٩ - ٣٢	١١	٣٦.٧
Mean ±SD	٢٧.٢±١.٥٤	
Birth weight /gm		
<١٠٠٠	١٤	٤٦.٧
١٠٠٠ <١٥٠٠	٧	٢٣.٣

١٥٠٠ ≤ ٢٠٠٠	٩	٣٠.٠
Mean ±SD	**١٢٣٢.٧ ± ٣٨١**	
Birth height /cm		
< ٤٠	١٤	**٤٦.٧**
٤٠ < ٤٥	٥	١٦.٦
٤٥ ≤ ٥٠	١١	٣٦.٧
Mean ±SD	**٤١.٥٩ ± ٢.٠١**	
Duration of hospitalization /days		
< ٣٠	١٣	**٤٣.٣**
٣٠ < ٤٥	٩	٣٠.٠
٤٥ ≤ ٦٠	٨	٢٦.٧
Mean ±SD	**٣١.٤٠ ± ٧.٨٥**	
Type of delivery		
Normal	٧	٢٣.٣
Cesarean section	٢٣	**٧٦.٧**

Table (٣): Distribution of total nurses' knowledge regarding care of high-risk neonates undergoing surfactant replacement therapy in pre/post-implementation of evidence-based guidelines (n=٦٤).

Nurses' knowledge	Pre-implementation of evidence-based guidelines				Post-implementation of evidence-based guidelines				X^2	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Nurses' knowledge about EBG	٥	٧.٨	٥٩	٩٢.٢	٥٧	٨٩.١	٧	١٠.٩	٤٨.٠١	٠.٠٠٠**
Nurses' knowledge about RDS	٣	٤.٧	٦١	٩٥.٣	٥٣	٨٢.٨	١١	١٧.٢	٥٢.٦١	٠.٠٠٠**
Nurses' knowledge about SRT	٤	٦.٣	٦٠	٩٣.٧	٥٠	٧٨.١	١٤	٢١.٩	٥٠.٤٩	٠.٠٠٠**
Total knowledge	**٤**	**٦.٣**	**٦٠**	**٩٣.٧**	**٥٤**	**٨٤.٤**	**١٠**	**١٥.٦**	٦٠.٧١	٠.٠٠٠**

(**) highly statistically significant at p<٠.٠٠١ (EBG)Evidence-Based Practice (RDS) Respiratory Distress Syndrome (SRT) Surfactant Replacement Therapy

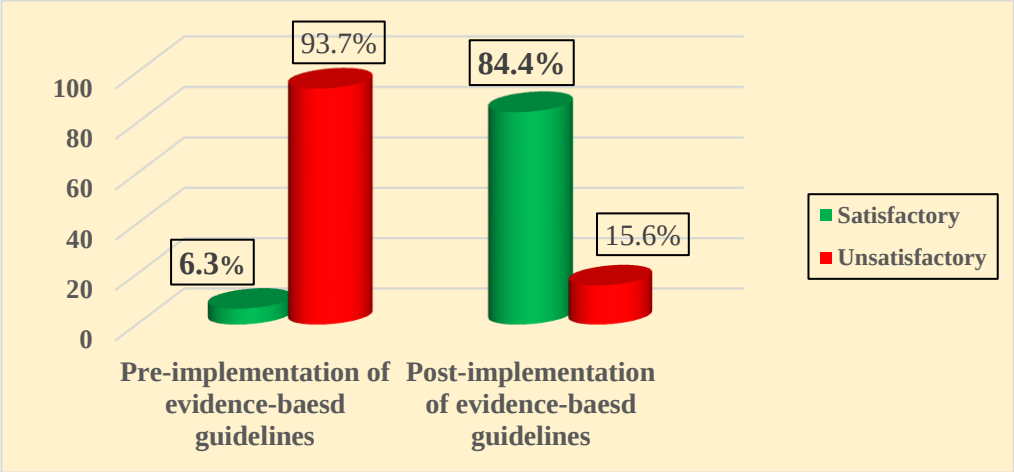

Figure (١): Distribution of total nurses' knowledge regarding caring of high-risk neonates undergoing surfactant replacement therapy in pre/post-implementation of evidence-based guidelines (n=٦٤)

Table (٤): Distribution of total nurses' practices regarding caring of high-risk neonates undergoing surfactant replacement therapy in pre/post-implementation of evidence-based guidelines (n=٦٤)

Nurses' Practices	Pre-implementation of evidence-based guidelines				Post-implementation of evidence-based guidelines				X^2	P-value
	Competent		Incompetent		Competent		Incompetent			
	No.	%	No.	%	No.	%	No.	%		
Hand washing	٣٥	٥٤.٧	٢٩	٤٥.٣	٥٨	٩٠.٦	٦	٩.٤	٣٧.٩٦	٠.٠٠٠**
Oro/naso pharyngeal suction	٢٤	٣٧.٥	٤٠	٦٢.٥	٥٥	٨٥.٩	٩	١٤.١	٣١.٩٧	٠.٠٠٠**
Endotracheal suction	٢٤	٣٧.٥	٤٠	٦٢.٥	٥٦	٨٧.٥	٨	١٢.٥	٣٧.٦٣	٠.٠٠٠**
Total parental nutrition	١٨	٢٨.١	٤٦	٧١.٩	٥٢	٨١.٣	١٢	١٨.٧	٣٠.٧٠	٠.٠٠٠**
Arterial blood gas sampling	٢٧	٤٢.٢	٣٧	٥٧.٨	٥٨	٩٠.٦	٦	٩.٤	٣٤.٣٩	٠.٠٠٠**
Capillary blood gas sampling	٢٥	٣٩.١	٣٩	٦٠.٩	٥٨	٩٠.٦	٦	٩.٤	٢٥.٩٧	٠.٠٠٠**
Venous blood gas sampling	٣٢	٥٠.٠	٣٢	٥٠.٠	٦٠	٩٣.٨	٤	٦.٢	٢٩.١٤	٠.٠٠٠**
Nursing care of endotracheal tube insertion	٢٩	٤٥.٣	٣٥	٥٤.٧	٥٥	٨٥.٩	٩	١٤.١	٢٥.٣١	٠.٠٠٠**
Nursing care before SRT administration	١٨	٢٨.١	٤٦	٧١.٩	٥٨	٩٠.٦	٦	٩.٤	٣١.٩٣	٠.٠٠٠**
Nursing care during SRT administration	٢٢	٣٤.٤	٤٢	٦٥.٦	٥٧	٨٩.١	٧	١٠.٩	٣٦.٧٤	٠.٠٠٠**
Nursing care after SRT administration	٢٦	٤٠.٦	٣٨	٥٩.٤	٦٠	٩٣.٨	٤	٦.٢	٤١.٥٥	٠.٠٠٠**
Total Practices	**١٨**	**٢٨.١**	**٤٦**	**٧١.٩**	**٥٨**	**٩٠.٦**	**٦**	**٩.٤**	٥٣.٧٤	٠.٠٠٠**

(**) highly statistically significant at p<٠.٠٠١.

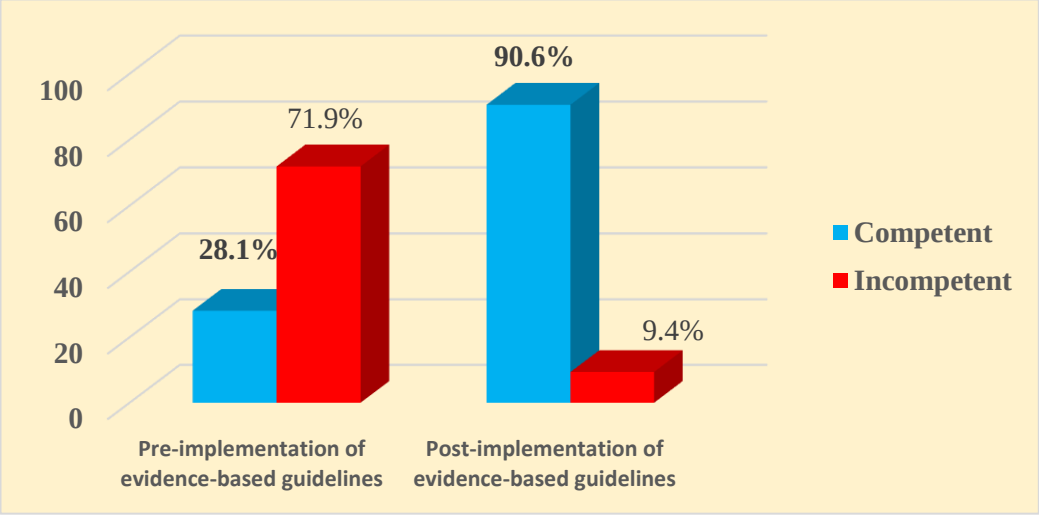

Figure (٢): Distribution of total nurses' practices regarding caring of high-risk neonates undergoing surfactant replacement therapy in pre/post-implementation of evidence-based guidelines (n=٦٤)

Table (٥): Correlation between total nurses' knowledge and their total practices in pre/post-implementation of evidence-based guidelines (n=٦٤)

Variables	Total nurses' practices			
	Pre-implementation of evidence-based guidelines		Post-implementation of evidence-based guidelines	
	r	P- value	r	P- value
Total nurses' knowledge	٠.٥٢٥	٠.٠٠٠**	٠.٥٦١	٠.٠٠٠**

r= correlation coefficient test. P= p-value

Discussion

Surfactant Replacement Therapy (SRT) was established as an effective and safe therapy for preterm neonate with immature lung and plays a pivotal role in the management of high-risk neonates with RDS by the early nineteen ninety, systematic reviews of randomized controlled trials confirmed that surfactant administration in preterm neonate with RDS reduces mortality, decreases the incidence of pulmonary air leak, and lowers the risk of chronic lung disease or death at ٢٨ days of age ***[١٣].*** Evidence-based guidelines are critical examination of the most recent evidence available used a format of summarizing management strategies followed by evidence-based recommendations for nurses about caring for high-risk neonates undergoing SRT ***[١٧].*** SRT administration requires an experienced practitioner with evidence-based knowledge and skills so, the current study was conducted.

Regarding characteristics of the studied nurses, the findings of the current study clarified that, less half of the studied nurses aged between ٢٠ to < ٢٥ years and more than three quarters of them were females. This might be due to nursing profession considering feminine due to the number of female join to nursing school or institute is greater than the number of males in Egypt. These findings were congruent with ***[١١],*** who carried out a study about "Effect of using clinical pathway on nursing care of neonates with respiratory distress syndrome" and founded that, half of the studied nurses (٥٠٪) aged between ٢٠ to < ٢٥years and the majority of them (٨٠.٧٪) were females.

Additionally, the current study revealed that, more than one third of the studied nurses had less than five years of work experience in neonatal intensive care units with mean ٩.٥٢±٤.٥٩ years. This finding indicated low level of nursing experience in caring for the high-risk neonate undergoing SRT. This finding was in the same line with ***[٣],*** who founded in a study entitled "Assessment quality of nursing care provided to neonates with respiratory distress syndrome at Intensive Care Unit in Al-Nasiriyah city hospitals" and reported that, half of the studied nurses (٥٠٪) had less than two years of experience in NICU.

Concerning the attendance of evidence-based training courses about SRT, all of the studied nurses didn't receive any training courses about SRT. This might be due to hospital policies and the work overload at these areas. This result was matched with ***[١],*** who founded in a study entitled "Effectiveness of applying an educational module about neonatal respiratory distress syndrome on nurse's practice" and portrayed that, the majority of the studied nurses (٩٨٪) never attended any previous training program about neonatal respiratory distress syndrome.

As regards the nurse's qualifications, the finding of the current study proved that, less than half of the studied nurses had diploma of nursing school. This might be due to the need for a job and salary. This result was supported with ***[١٥],*** whose study entitled "Impact of an educational program on improving nurse's knowledge and practice concerning caring for neonates with respiratory distress syndrome" who reflected that, less than half of studied nurses (٤٤.٠ %) had diploma of nursing.

Concerning the mean birth weight, the current study findings showed that, the mean birth weight of the studied high-risk neonates was

١٢٣٢.٧ ± ٣٨١ grams. This might be due to respiratory distress syndrome affecting mainly preterm neonates. This finding was consistent with ***[١٢],*** who declared in their similar study "Effect of instructional guidelines on nurses' performance regarding care of high risk neonates undergoing surfactant replacement therapy" and founded that, mean birth weight of the studied group was ١٣٨٨.٨٠ ± ٣٢٣.٥٢ gm.

In the same context **[٦],** proved in a similar study "Neonatal respiratory distress syndrome: are risk factors the same in preterm and term infants" and showed that, birth weight, mode of delivery and pathological pregnancy were the chief factors associated with RDS. Neonates weighing ١٠٠٠-١٤٩٩ grams were at higher risk of RDS in comparison to those weighing ١٥٠٠-٢٤٩٩ in all GA groups.

Regarding type of delivery, the current study clarified that, more than three quarters of studied high-risk neonates were delivered by cesarean section (CS). This might be due to the cesarean section delivery one of the main risk factors related to high-risk neonates or prematurity. This finding was parallel with ***[٧],*** who mentioned in similar study which entitled "Respiratory distress syndrome management in resource limited Settings-Current evidence and opportunities" and stated that, any given GA the prevalence of RDS is larger for neonates born by CS, especially without conventional labor, than for those born by vaginal delivery.

Regarding total nurses' knowledge of caring high-risk neonates undergoing surfactant replacement therapy, the finding of the current study showed that, the minority of the studied nurses had satisfactory total level of knowledge in pre-implementation of evidence-based guidelines with a highly statistical significant difference. From the researcher point of view, there was decrease in nurses' knowledge in the present study pre-implementation of evidence-based guidelines compared to post-implementation, this might be due to the fact that, all of the studied nurses didn't attend any training courses about evidence-based practices of caring high-risk neonate undergoing SRT and more than one third of them had less than five years of work experience in NICUs and also less than half of them had diploma of nursing school.

As regard, in the same table there were highly statistical significant differences in pre/post-implementation of evidence-based guidelines. This finding was similar to ***[١٢],*** who declared in their similar study that, there were a highly statistical significant differences in pre/post-instructional implementation of guideline. Also this result was supported by ***[٩]***, who proved in their similar study that entitled "Nursing competency for caring of high-risk neonates at neonatal intensive care unit" and mentioned that, units expecting to use SRT must be well prepared with trained and knowledgeable medical and nursing staff and a respiratory therapist. SRT should be performed by a physician or qualified nurse. It is essential to have medical and nursing staff well trained in caring for neonates managed with SRT.

Concerning total nurses' practices regarding caring of high-risk neonates undergoing surfactant replacement therapy, the current study mentioned that, less than three quarters of the studied nurses have incompetent practices regarding total parental nutrition procedures in pre-implementation of evidence-based

guidelines. This result might be attributed to the fact that, nurses didn't emphasize for updating their practices by attending training courses about caring of high-risk neonates undergoing SRT.

As showed in the same table, the finding of the current study clarified that, the majority of the studied nurses had competent practices regarding venous blood gas sampling and nursing care after SRT administration procedures in post-implementation of evidence-based guidelines. From the researcher's point of view, these findings could result from evidence-based guideline which, emphasizes to improving nurse's performance.

Concerning total nurses' practices, the finding of the current study revealed that, the majority of the studied nurses had competent practice in post-implementation of evidence-based guidelines with a highly statistically significant difference. This improvement justified the research hypothesis and reflected the importance of the evidence-based guidelines which helped the nurses to improve their practices in caring of high-risk neonates undergoing SRT.

This finding was in accordance with ***[١٢],*** who reported that, highly statistically significant difference in pre/post implementation of instructional guideline regarding nurses' practices (P-value ٠.٠٠٠).

Regarding correlation between total nurses' knowledge and practices. The present study reflected that, there was a positive correlation between total nurses' knowledge and practices of caring high-risk neonates undergoing SRT in pre/post-implementation of evidence-based guidelines. This finding was congruent with the study done by ***[١٥],*** and founded that, there was positive correlation between nurses' knowledge and practice. This result might due to that, the nurses with requisite evidence-based knowledge do the better professional practice to improving the quality of nursing care for high-risk neonate undergoing SRT.

Conclusion

Based on the findings of the present study, the following can be concluded; the research hypothesis was accepted. The majority of the studied nurses had satisfactory total level of knowledge and competent practices regarding caring of high-risk neonates undergoing SRT in post-implementation of evidence-based guidelines. Additionally, there was a positive correlation between nurses' total knowledge and practices.

Recommendations

Based on the findings of present study, the following recommendations are suggested:

- Enhancing nurses' knowledge and practices regarding care of high-risk neonates undergoing Surfactant Replacement Therapy (SRT) by encouraging them to attend periodical training courses.
- Distributing updated pamphlets, poster and Arabic booklets for nurses in NICUs regarding care of high-risk neonates undergoing surfactant replacement therapy.
- Future researches should be replicated on a large sample of nurses and high-risk neonates in different settings which are needed for generalization of the obtained results.

References

[١] ***Abdelsamad, F., Eldakhakhany, A., Elabdeen, K. and Elshiek, A. (٢٠١٨):*** Effectiveness of applying an educational module about neonatal respiratory distress syndrome on nurse's practice, Zagazig Nursing Journal; ١٤(١): ٦٢-٧٥. Available at: https:// znj. journals. ekb. eg/ article_ ٣٧٧٤١.html. Accessed on: ١٥/٧٢٠٢٢ at ١am.

[٢] ***Abou-Faddan, H. and Abdelaziz, N. (٢٠١٨):*** Respiratory distress and its outcome among neonates admitted to neonatal intensive care unit of Assiut University Children Hospital, Egypt, The Egyptian Journal of Community Medicine; ٣٦ (٢): ٦٩-٧٨. Available at: https:// ejcm. journals. ekb. eg/article_١١٠٥٢.html. Accessed on: ١٨/١٢/٢٠٢٠ at ١١pm.

[٣] ***Aziz, A., and Mansi, Q. (٢٠١٧):*** Assessment quality of nursing care provided to neonates with respiratory distress syndrome at intensive care unit in Al-Nasiriyah city hospitals, Kufa Journal for nursing sciences; ٧(٢): ١-١٢. Available at: https://www.iasj.net/iasj/article/١٦٢٨٢٠. Accessed on ٨/١٢/٢٠٢١ at ٥:٠٠pm.

[٤] ***Benha University Hospital Statistics Department, (٢٠٢٠):*** statistical report of high-risk neonate with respiratory distress syndrome.

[٥] ***Centers for Disease Control and Prevention, (٢٠١٧):*** Pneumonia ventilator-associated (VAP) and non ventilator-associated pneumonia (PNEU) event. Available at: http://www.cdc.gov/nhsn/PDFs/pscManual/٦pscVAPcurrent. Accessed on: ٥/١٢/٢٠٢٠ at ١١pm.

[٦] ***Condò, V., Cipriani, S., Colnaghi, M., Rinaldo, R., Bulfoni, C., Parazzini, F. and Mosca, F. (٢٠١٧):*** Neonatal respiratory distress syndrome: are risk factors the same in preterm and term infants, The Journal of Maternal-Fetal & Neonatal Medicine; ٣٠(١١): ١٢٦٧-١٢٧٢. Available at: https://www.tandfonline. com/doi/abs/ ١٠.١٠٨٠/ ١٤٧٦٧٠٥٨.٢٠١٦.١٢١٠٥٩٧. Accessed on: ١٨/١٢/٢٠٢٠ at ١١pm.

[٧] ***Ekhaguere, O., Okonkwo, I., Batra, M. and Hedstrom, A. (٢٠٢٢):*** Respiratory distress syndrome management in resource limited settings—Current evidence and opportunities, Frontiers in Pediatrics;١٠ (٩٦): ١٥٠٩. Available at: https://www.researchgate.net/ publication/ ٣٦٢٣٢٨٧٠٢_ Accessed on: ٢٥/١٢/٢٠٢٢ at ١١pm.

[٨] ***El Shahed, A., Dargaville, P., Ohlsson, A. and Soll, R. (٢٠١٧):*** Surfactant for meconium aspiration syndrome in term and late preterm infants, Cochrane Database of Systematic Reviews; ١٢(CD٠٠٢٠٥٤). Available at: https://doi.org/١٠.١٠٠٢/١٤٦٥١٨٥٨.CD٠٠٢٠٥٤.pub٣ Accessed on: ٢٥/١٢/٢٠٢٠ at ١١pm.

[٩] ***Hendy, A., Al-Sharkawi, S., and Abd Al-Moniem, I. (٢٠٢٠):*** Nursing competency for caring of high-risk neonates at neonatal intensive care unit, Egyptian journal of health care; ١١(٢): ٢٠٠-٢١٣. Available at: https://www.researchgate.net/publication/٣٤٢٠٨٤١٧٩_ Accessed on: ٢٤/١٢/٢٠٢١ at ١pm.

[١٠] ***Joseph J. (٢٠١٧):*** Knowledge regarding surfactant therapy among student nurses. American Journal of Advances in Nursing Research; ٤(٢): ٥٤-٥٦. Available at: https:// www.researchgate.net/ publication/

٣٣١١٥٥٢٨٢_. Accessed on: ٢٢/١٢/٢٠٢٢ at ١am.

[١١] ***Khalaf, S. and Sadik, A. (٢٠١٧):*** Effect of using clinical pathway on nursing care of neonates with respiratory distress syndrome. Tanta Scientific Nursing Journal; ١٢(١): ٥١-٧٢. Available at: https://tsnj.journals.ekb.eg/article_٧١١٥٩.html. Accessed on ٥/١١/٢٠٢١ at ١:٠٠am.

[١٢] ***Kunswa, M. and Mohamed, H. (٢٠٢١):*** Effect of instructional guidelines on nurses' performance regarding care of high risk neonates undergoing extubation of mechanical ventilator. Egyptian Journal of Health Care; ١٢(٢): ١٧٣٩-١٧٥٦. Available at: https://www.researchgate.net/publication/٣٤٨٩٧٧٤٣٢_. Accessed on: ١٥/١/ ٢٠٢٠, ٦pm.

[١٣] ***Ng, E., and Shah, V. (٢٠٢١):*** Guidelines for surfactant replacement therapy in neonates. Paediatrics & Child Health; ٢٦(١): ٣٥-٤١. Available at:https://www.researchgate.net/publication/٣٤٨٩٧٧٩٧٠_Guidelines_for_surfactant_replacement_therapy_in_neonates.Accessed on:٢٢/٢/٢٠٢٢

[١٤] ***Parthasarathy, A., Menon, P., and Nair, M. (٢٠١٩):*** IAP Textbook of pediatrics, diseases of respiratory system, Jaypee Brothers Medical Publishers. Indian Academy of Pediatrics, ٧th ed., Section ٨, Pp.٦٢٩-٦٣٣.

[١٥] ***Refat, N., Zak, N., Sayed, E., and Ahmed, M. (٢٠٢٠):*** Impact of an educational program on improving nurse's knowledge and practice concerning caring for neonates with respiratory distress syndrome. Assiut Scientific Nursing Journal; ٨(٢٢): ١٤٥-١٥٢. Available at: https://asnj.journals.ekb.eg/article_١١٥٥٨٦.html. Accessed on ٨/١٢/٢٠٢١ at ٥pm

[١٦] ***Sweet, D., Carniellib, V., Greisenc, G., Hallman, M., Ozeke, E., te Pas, A., Plavkag, R., Roehrh, C., Saugstad, O., Simeoni, U., Speer, C., Vento, M., Gerhard, H., Visser, G. and Halliday, H. (٢٠١٩):*** Consensus guidelines on the management of RDS, Neonatology;١١٥(١): ٤٣٢–٤٥٠. Available at: https://www.karger.com/Article/Fulltext/٤٩٩٣٦١. Accessed on: ١٨/١٢/٢٠٢٠ at ١١pm.

[١٧] ***Walsh, B. (٢٠٢٣):*** Neonatal and pediatric respiratory care-e-book, surfactant replacement therapy, chapter ١٢, ٦th ed., Elsevier Health Sciences, Pp. ١٨٧-١٩٣.