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

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Abstract

Background: The main course of treatment for respiratory distress syndrome includes surfactant replacement therapy (SRT), which prevents alveolar collapse, boosts survival, and lowers respiratory morbidities. Evidence-based nursing guidelines improve neonatal care and bridge the gap between research findings and clinical 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 (64 nurses) who were responsible for providing care to high-risk neonates and purposive sample of high-risk neonates (30 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 (84.4%) had satisfactory total level of knowledge in post-implementation of guideline, there was an improvement in total nurses practices post-implementation of guideline compared to pre-implementation. There was a positive correlation between nurses' knowledge and practices of caring high-risk neonates undergoing SRT in pre/post evidence-based guideline implementation. **Conclusion:** The evidence-based guideline was effective in improving nurses' knowledge and practices regarding care of high-risk neonates undergoing SRT post- implementation of guideline. 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, Care, Surfactant Replacement Therapy

1. Introduction

High-Risk Neonates (HRN) are newborns who are more likely to experience morbidity, NICU hospitalization, adverse neurological squeal, and respiratory complications. The leading cause of neonatal mortality worldwide is prematurity and its consequences. A major factor in prematurity-related neonatal mortality is respiratory distress syndrome (RDS), which is brought on by immature lungs and a deficiency in surfactants [***13].***

The primary management strategy for premature neonates with RDS includes surfactant replacement therapy (SRT), which can improve lung elasticity and prevent alveolar collapse, improving survival and lowering respiratory morbidities. Additionally, the main method of respiratory support for preterm newborns is shifting from invasive ventilation and its complications to non-invasive ventilation, which is becoming more common **[20].**

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; endotracheal intubation assistance, maintenance of mechanical ventilation as necessary, measurement of oxygen concentration, ongoing monitoring of the SaO_2 and observation of the neonates' reaction to oxygen. Moreover, promoting adequate nutrition and hydration is important **[17].**

Nurses are responsible for providing a systematic and high quality practice. To provide safe and efficient care, neonatal nurses must be aware of the complexities involved in caring for any neonate who needs SRT. In order to provide the best care possible while maintaining consistency with knowledge, contexts, values, environments, goals, and evidence in the interest of health, good practice in nursing is understood to be a set of theories, processes, techniques, and activities that are inseparable and interrelated **[14].**

To reduce neonatal mortality and morbidity, nurses play a crucial part in the treatment of high-risk neonates. While nurses who work in NICUs should be licensed and educated through ongoing evidence-based training programs. Nursing care of neonates with RDS having SRT is demanding, so paying meticulous attention to subtle changes in the neonate's oxygenation status, especially in regard to nursing care before, during, and after administration of SRT **[18].**

Significance of the study

Surfactant replacement therapy (SRT) is a life-saving management for high-risk premature 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 **[14].**

Respiratory distress syndrome is a significant contributor to neonatal mortality in developing nations. Worldwide, 70% of babies born at less than 33 weeks of gestation have RDS. The prevalence of RDS is 1% of all newborns, but it rises to 50% at 30 weeks, 75% at 28 weeks, and 90% at 26 weeks of gestation. In Egypt, a survey of neonatal mortality in NICUs at children's hospitals conducted by Cairo University found that mortality from RDS among neonates accounted for 9.6% of all neonatal deaths and 26.7% of all deaths overall, making it one of the major reasons for admission to the NICUs. The most effective method for reducing RDS and its mortality worldwide is SRT **[3].**

Meanwhile, total number of high-risk neonates admitted to NICUs of Benha University Hospital was 549 high-risk neonates, nearly 70% of them were RDS, while more than one quarter (30%) of them were preterm with RDS ***[6].*** 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 guideline for nurses working in NICUs regarding care of high-risk neonates undergoing surfactant replacement therapy.
- Evaluating the effect of evidence–based guideline 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 and practices regarding care of high-risk neonates undergoing SRT.

2.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. Neonatal intensive care unit located in the fourth floor of internal medicine building and consisting of three chambers, each containing eight incubators for a total of 24 incubators.

Subjects

- A convenient sample of all available nurses (64) 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 (30) who were admitted to NICUs and involved in the study according to some inclusion criteria.

Inclusion criteria:

- High-risk neonates less than 32 weeks of gestational age.
- High-risk neonates with RDS and received 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 (1) 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 (5 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 (6 questions).

Part (2) 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 (8 MCQs).

b. Nurses' knowledge regarding RDS that included; definition, etiology, clinical pictures, diagnosis, complications, management and nursing care (6 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 (11 MCQs).

Scoring system for knowledge

Each question had a model key response checked, and the answers were scored as follows: a complete and correct answer was scored (2), incomplete and correct answer was scored (1) and wrong answer or don't know was scored (0).

The total score of nurses' knowledge was classified as:

- Satisfactory knowledge: if the nurse scored equal or more than 85%-100%.
- Unsatisfactory knowledge: if the nurse scored less than 85%.

- **Tool (II): Observational checklist**

The observational checklists were adapted from the **[7], [10], [19]),** to assess nurses' practices regarding care of high-risk neonates undergoing surfactant replacement therapy. It were include 11 procedures about;-

- Hand washing (8 steps)
- Oro/naso pharyngeal suction (18 steps)
- Endotracheal suction (19 steps)
- Total parenteral nutrition (24 steps)
- Arterial blood gas sampling (11 steps)
- Capillary blood gas sampling (14 steps)
- Venous blood gas sampling (11 steps)
- Nursing care of endotracheal tube insertion (13 steps)
- Nursing care for high risk neonates before administration of SRT (8 steps)
- Nursing care for high risk neonates during administration of SRT (10 steps)
- Nursing care for high risk neonates after administration of SRT (5 steps)

Scoring system of nurses' practices

Each step of nurses' practice was checked with observational checklist and it was scored as the following; done was scored (1) and not done was scored (0).

The total scores of the nurses' practice was classified as;

- Competent practice: if nurses scored 100%.
- Incompetent practice: if nurses scored less than 100%.

Tools validity and reliability

- **Content validity**

A jury of three pediatric nursing specialists from the Nursing Benha University staff (one professor and two assistant professors) tested the study tools' face and content validity. The instruments were examined by the specialists for clarity, applicability, relevance, completeness, and simplicity. Regarding the structure, layout, paraphrasing, consistency, accuracy, and applicability of the tools, all of their feedback was taken into account. The final form was then utilized for data gathering.

- **Reliability**

The internal consistency of the study tools was tested using the Cronbach's alpha coefficient test by administering the tools to the same study subjects under comparable circumstances. Findings of multiple tests were compared (test- retest reliability). Where it was discovered that r= 0.98 for the structured interview questionnaire format and r= 0.99 for observational checklists. These findings show that the research tools have a high degree of dependability.

Pilot Study

A pilot study was conducted on 10% of the total study subjects (6 nurses and 3 high-risk neonates with SRT) in order to assess the feasibility, applicability, and clarity of the study tools as well as to determine how long it would take to complete each tool. According to the findings of the pilot study, minor adjustments were made to (tool I) by adding and removing a few queries. In order to prevent sample bias, nurses who participated in the pilot research were not included in the study. The pilot study lasted for one month, from the beginning of January 2022 to the conclusion of January 2022.

Field work

Assessment, planning, implantation, and evaluation stages of the fieldwork were all completed. From the first of February 2022 to the end of July 2022, data were collected over a six-month span. According to the study's policies, the data were gathered from the aforementioned setting. Tuesday and Thursday were the days the researcher was available to gather data using the study tools in the morning and afternoon shifts from 9 am to 1 pm or from 1 pm to 5 pm.

Assessment phase:

Each nurse was individually interviewed. Average number of nurses interviewed/ day was 7-8 nurses per day at morning and afternoon shift. The researcher welcomed each nurse, explained the goals, timeline, and activities of the study, and obtained verbal and written consent from nurses to engage in the study before the interview even began. Additionally, the researcher collected information about the high-risk neonates under study who were receiving SRT from their medical records (this took about 10:15 minutes for each high-risk neonate), and then provided the nurses under study with a questionnaire (Tool I) to complete in order to evaluate their level of knowledge (it took nearly 15 minutes).

Meanwhile, observational checklists were used to watch each nurse as they worked. The researcher

required an average of 30 minutes to complete each nurse's observational checklist (Tool II). Pretesting lasted for 4 weeks (from the beginning of February, 2022 to the end of February, 2022).

Implementation phase:

Sessions were used to carry out the implementation phase. To encourage sharing in the study, motivation and reinforcement were used during sessions. Each session began with a summary of the preceding one and its goals. The nurses were made aware of the dates, times, and locations of sessions held in the pediatric unit lecture. Ten groups of the nurses under study, each with 5-7 nurses, were formed. A total of 10 sessions were held. Each session lasted between 30 and 60 minutes for the theoretical portion of the guideline. For the practical portion, there were six sessions, each lasting between 60 and 90 minutes, held twice a week during morning and afternoon shifts and implemented in accordance with the nurses' physical and mental state. Ten minutes were allotted for questions and comments after each class. For every set of nurses, these sessions were repeated. From early March 2022 to late June 2022, this period lasted four months.

Evaluation: (posttest)

Following the implementation of the contents of the evidence-based guideline, a post-test was given to evaluate nurses' skills and knowledge using the same tools as the pretest in relation to the care of high-risk neonates with SRT. his stage took a month (July, 2022).

Statistical design:

The gathered information was arranged, reviewed, examined, and tallied. To make the data collected appropriate for computer entry, they were coded and transformed into a form. The Statistical Package of Social Science (SPSS) version 25 for Windows was used to input the data on an IBM compatible computer. Software graphics were created using the 2010 version of the Microsoft Office Excel application. The use of descriptive statistics was made (e.g percentages means and standard deviation). The Chi-square (X2) test was used to determine the importance of qualitative variables, the t-test was used to compare two means, and the correlation coefficient (r) was used for normally distributed quantitative variables. When P 0.05, a level value was deemed significant, and when P 0.001, a level value was considered highly significant (HS). When P > 0.5, no statistically significant variation was taken into account.

3. Results

Table (1): Shows that, less than half of the studied nurses (42.2%) are in the age group of 20-< 25 years and their mean age is 26.4 ± 4.70 years. Concerning gender, more than three quarters of them (76.6%) are females. Regarding years of nurses' work experience in Neonatal Intensive Care Unit (NICU), more than one third of them (37.5%) have experience <5 years in NICU with mean 9.52±4.59 years. In relation to attendance of evidence-based training courses about SRT, all of the studied nurses (100%) don't attend any training courses. Regarding qualifications, less than half of the studied nurses (46.9%) have diploma of nursing school and the minority of them (12.5%) have bachelor of nursing.

Table (2): Demonstrates that, three-fifths of the studied high-risk neonates (60%) are males. Less than half of them (46.7%) are in the gestational age group < 26 weeks with their mean gestational age is 27.2±1.54 weeks, their birth weight is <1000 gram with their mean birth weight is 1232.7 ± 381grams and their birth height <40cm with their mean birth height is 41.59 ± 2.01cm. Concerning hospitalization, less than half of the studied high-risk neonates (43.3%) stay <30 days in hospital. Regarding type of delivery, more than three quarters of the studied high-risk neonates (76.7%) delivered by cesarean section and less than one quarter of them (23.3%) delivered by normal.

Table (3) & figure (1): Shows that, the majority of the studied nurses (84.4%) have satisfactory level of total knowledge in post-implementation of guideline compared to 6.3% in pre-implementation of guideline. While this table indicates that, there is a highly statistical significance difference (P ≤ 0.000) in total nurses' knowledge in pre-implementation of guideline compared to in post-implementation.

Table (4): Demonstrates that, more than two thirds of the studied nurses (70.9%) have incompetent practices regarding total parental feeding and nursing care before SRT administration procedures in pre-implementation of guideline. While, the majority of the studied nurses (93.8%) have competent practices regarding venous blood gas sampling and nursing care after SRT administration procedures in post-implementation of guideline. However, there are highly statistical significances differences (P ≤ 0.000) between the studied nurses' practices in post-implementation of guideline compared to in pre-implementation.

Figure (2): Shows that, the majority of the studied nurses (90.6%) have competent practice in post-implementation of guideline compared to less than one third of them (28.1%) in pre-implementation of guideline.

Table (5): 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 ≤ 0.000).

Table (1) Distribution of the studied nurses regarding their characteristics (n=64)

Nurses' characteristics		No.	%
Age (years)			
20-< 25		27	**42.2**
25-<30		20	31.2
≥ 30		17	26.6
Mean ±SD	**26.4 ± 4.70**		
Sex			
Male		15	23.4
Female		49	**76.6**
Years of work experience in NICU			
<5		24	**37.5**
5-<10		23	35.9
≥ 10		17	26.6
Mean ±SD	**9.52±4.59**		
Attending evidence-based training courses about surfactant replacement therapy			
Yes		0	0.0
No		64	**100.0**
Qualifications			
Diploma of nursing school (3years)			**46.9**
Technical institute of nursing			25.0
Technical institute of health science			15.6
Bachelor of nursing			12.5

Table (2) Distribution of the studied high-risk neonates regarding their characteristics (n=30)

Characteristics of high-risk neonates		No.	%
Sex			
Male		18	**60.0**
Female		12	40.0
Gestational age /weeks			
<26		14	**46.7**
26-<29		5	16.6
29 - 32		11	36.7
Mean ±SD	**27.2±1.54**		
Birth weight /gm			
<1000		14	**46.7**
1000 <1500		7	23.3
1500 ≤ 2000		9	30.0
Mean ±SD	**1232.7 ± 381**		
Birth height /cm			
< 40		14	**46.7**
40 < 45		5	16.6
45 ≤ 50		11	36.7
Mean ±SD	**41.59 ± 2.01**		
Duration of hospitalization /days			
< 30		13	**43.3**
30 < 45		9	30.0
45 ≤ 60		8	26.7
Mean ±SD	**31.40 ± 7.85**		
Type of delivery			
Normal		7	23.3
Cesarean section		23	**76.7**

Table (3) Distribution of total nurses' knowledge regarding different variables in pre/post-implementation phases (n=64).

Nurses' knowledge	Pre-implementation of evidence-based guideline				Post-implementation of evidence-based guideline				X^2	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Nurses' knowledge about EBG	5	7.8	59	92.2	57	89.1	7	10.9	48.01	0.000**
Nurses' knowledge about RDS	3	4.7	61	95.3	53	82.8	11	17.2	52.61	0.000**
Nurses' knowledge about SRT	4	6.3	60	93.7	50	78.1	14	21.9	50.49	0.000**
Total knowledge	**4**	**6.3**	**60**	**93.7**	**54**	**84.4**	**10**	**15.6**	60.71	0.000**

(**) highly statistically significant at p<0.001 (EBG)Evidence-Based Practice (RDS) Respiratory Distress Syndrome (SRT) Surfactant Replacement Therapy

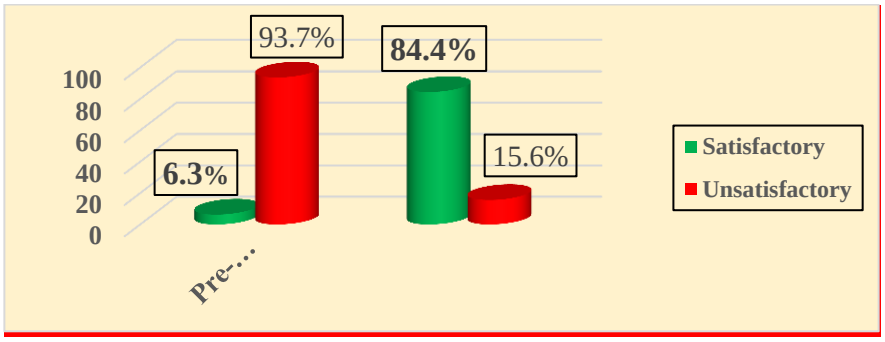

Fig. (1) Distribution of total nurses' knowledge regarding different variables in pre/post-implementation of evidence-based guideline (n=64)

Table (4) Distribution of total nurses' practices regarding different procedures in pre/post-implementation of guideline phases (n=64)

Nurses' Practices	Pre-implementation of evidence-based guideline				Post-implementation of evidence-based guideline				X^2	P-value
	Competent		Incompetent		Competent		Incompetent			
	No.	%	No.	%	No.	%	No.	%		
Hand washing	5	7.5	54	45.3	90.6		9.4		37.96	0.000*
Oro/naso pharyngeal suction	4	5.0	37	62.5	85.9		14.1		31.97	0.000*
Endotracheal suction	4	5.0	37	62.5	87.5		12.5		37.63	0.000*
Total parental nutrition	8	1.6	28	**71.9**	81.2		18.7		30.70	0.000*
Arterial blood gas sampling	7	2.7	42	57.8	90.6		9.4		34.39	0.000*
Capillary blood gas sampling	5	1.9	39	60.9	90.6		9.4		25.97	0.000*
Venous blood gas sampling	2	0.0	50	50.0	**93.8**		6.2		29.14	0.000*
Nursing care of endotracheal tube insertion	9	3.5	45	54.7	85.9		14.1		25.31	0.000*
Nursing care before SRT administration	8	1.6	28	**71.9**	90.6		9.4		31.93	0.000*
Nursing care during SRT administration	2	4.2	34	65.6	89.1		10.9		36.74	0.000*
Nursing care after SRT administration	6	6.4	40	59.0	**93.8**		6.2		41.55	0.000*

(**) highly statistically significant at p<0.001.

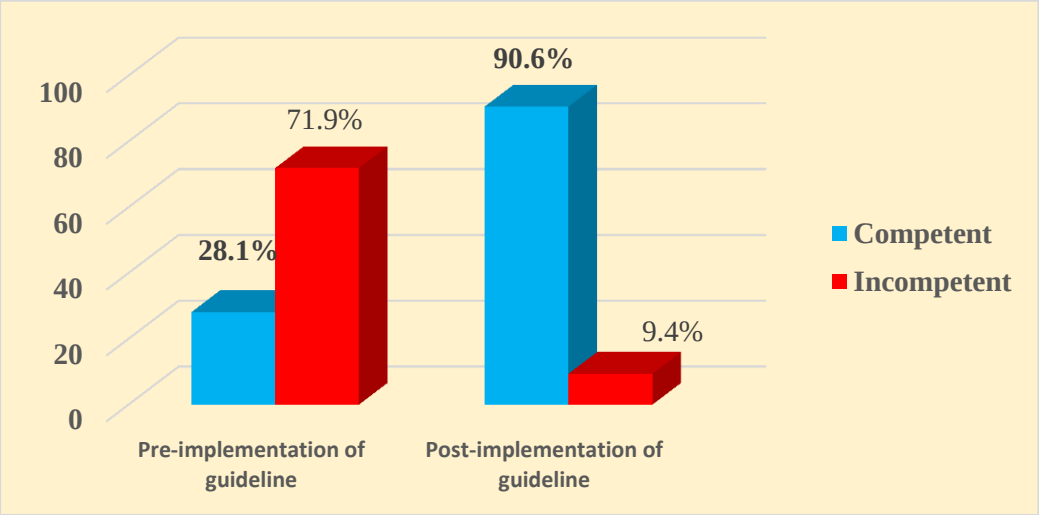

Fig. (2) Distribution of total nurses' practices regarding different procedures in pre/post-implementation of evidence-based guideline (n=64)

Table (5) Correlation between overall nurses' knowledge and practices in pre/post-implementation of evidence-based guideline (n=64)

Variables		Total nurses' practices	
		Pre	Post
Total nurses' knowledge	**r**	0.525	0.561
	p	0.000**	0.000**

R= correlation coefficient test. P= p-value

4. Discussion

The early 1990s, systematic reviews of randomized controlled trials confirmed that surfactant administration in preterm neonates with RDS reduces mortality, decreases the incidence of pulmonary air leak, and lowers the risk of chronic lung disease or death at 28 days of age. SRT was established as an effective and safe therapy for preterm neonates with immature lung and plays a crucial role in the management of high-risk neonates with RDS. ***[17].***

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 ***[20].*** SRT administration requires an experienced practitioner with evidence-based knowledge and skills so, the current study was conducted.

Regarding characteristics of the examined nurses **(Table 1),** the results of this research showed that fewer than half of the examined nurses were between 20 to < 25 years and more than three quarters of them were females. This may be due to the perception of nursing as a feminine career as more female than male enroll in nursing schools or institutions in Egypt. These findings were congruent with ***[15],*** they founded that, (50%) of the examined nurses between 20 to < 25years and the majority of them (80.7%) were females.

Additionally, the current research founded that, more than one third of the studied nurses had less than five years of experience working in neonatal intensive care units with mean 9.52±4.59 years. This finding showed lack of nursing experience in caring for the high-risk neonate with SRT. This finding was in the same line with ***[4],*** they reported that, (50%) of the studied nurses 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 sessions regarding SRT. This might be due to hospital policies and the work overload at these areas. This result was matched with ***[2],*** 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 (98%) didn't receive any 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 contradicted with ***[5],*** they viewed that, the majority of studied nurses (98.8%) had master degree.

Regarding the characteristics of the studied high-risk neonates **(Table 2)**, the results of the current study showed that less than half of these neonates had gestational ages (GA) less than 26 weeks with mean

27.2±1.54 weeks and three fifths of them were males. These results were supportes with findings of ***[12],*** who stated that, mean GA of the studied high-risk neonates was 29.7 ± 4.5 weeks and nearly three fifths of them were males.

Concerning the mean birth weight, the current research's findings clarified that, the high-risk neonates under study had a mean birth weight of 1232.7 381 grams. This could be the result of respiratory distress syndrome, which primarily affects premature newborns. This result was consistent with ***[16],*** who established that the examined group's mean birth weight was 1388.80 323.52 gm. In the same context **[8],** they showed that the main causes of RDS were pathological pregnancy, birth weight, and mode of delivery. In all GA groups, neonates weighing 1000–1499 grams had a higher chance of developing RDS than those weighing 1500–2499 grams.

concerning type delivery, the current study clarified that, more than three quarters of examined high-risk neonates were delivered via 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 ***[9],*** They claimed that, at any given GA, neonates delivered by caesarean section (CS), particularly those born without conventional labor, have a higher prevalence of RDS than those born vaginally.

Regarding total nurses' knowledge of high-risk neonates undergoing surfactant replacement therapy **(Table 3 & Figure 1)**, it was revealed that, the majority of studied nurses had satisfactory knowledge in post-implementation of guideline with a highly statistical significant difference in pre/post-implementation of guideline. From the researcher point of view there was a decline in nurses' knowledge in the current research prior to the implementation of the evidence-base guideline compared to post-implementation, this might be due to the fact that, none of the nurses involved in the study attended training sessions on how to care for high-risk neonates receiving SRTand more than a third of them had less than five years of experience working in neonatal critical care units, and less than half had nursing school diplomas.

These findings were similar to ***[16],*** who declared in their similar study that, there were a highly statistical significant differences in pre/post-instructional implementation of guideline. Also these findings were supported by ***[13]***, who stated in their similar research that, units anticipating the use of SRT must be well-prepared with skilled medical and nursing staff as well as a respiratory therapist. Ideally, a doctor or licensed nurse should administer SRT. The care of neonates treated with SRT requires highly qualified medical and nursing personnel.

Concerning total nurses' practices regarding different procedures in caring of high-risk neonates undergoing surfactant replacement therapy **(Table 4)**, the current study mentioned that, less than three quarters of the studied nurses have incompetent practices regarding total parental nutrition procedures in pre-guideline implementation. This outcome could be the result of the nurses at the unit not having access to the procedures book for frequent review of the procedure.

Also, viewed in the same table there was statistical significant difference regarding nurses' practice in the most steps related to total parental nutrition in pre/post-implementation of guideline. These findings were paralleled with ***[1],*** they founded that 64.3% of the nurses under study scored poorly overall performance scores in relation to total parental nutrition procedures.

As showed in the same table, the findings 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-guideline implementation. From the researcher observation, nurses weren't performing their precise SRT role. This may be due to the fact that, less than half of the studied nurses had diploma of nursing school and their ineffective practices were caused by their absence of knowledge of SRT, a dearth of lectures, and a dearth of educational resources. These results were in accordance with ***[16],*** who reported that, statistically significant difference (P-value 0.015) in pre/post implementation of instructional guideline regarding nurses' practices about blood gases sampling and care before, during and after SRT.

Concerning total nurses' practices **(Figure 2)**, the current study revealed that, there was an obvious improvement in total nurses' practices post-implementation of guideline compared to pre-implementation with a highly statistically significant improvement in post-implementation of guideline. This improvement demonstrated the value of the evidence-based guideline that assisted the nurses in enhancing their practices to care for high-risk neonates undergoing SRT, and it supported the validity of the study hypothesis.

Regarding correlation between total nurses' knowledge and practices in pre/post-implementation of guideline **(Table 5)**. The results of the current research, reflected that, there was a positive correlation between total nurses' knowledge and actual practice of providing care for high-risk neonates undergoing SRT before and after the adoption of an evidence-based guideline. This result was consistent with a study by ***[11],*** which revealed a strong relationship between nurses' knowledge and practice. From the researcher point of view, only licensed professionals and nurses should apply SRT. The ability to acquire new skills and knowledge is something that nurses should have access to in order to be successful in their careers. The evidence-based guideline had a positive impact on staff nurses' education levels. The evidence-based recommendation had a noticeable effect on raising the level of knowledge among nurses. It also makes them more motivated to develop their abilities even further. Finally, evidence-based guideline had a significant impact because ongoing education is crucial for

preparing nurses to handle the significant changes that are presently affecting the health care system.

5. Conclusion

The research hypothesis was accepted, as can be seen from the results of the current study. In comparison to before the evidence-based guideline were implemented, the post-implementation period showed that the guideline had a significant impact on nurses' knowledge and practices regarding the care of high-risk newborns receiving Surfactant Replacement therapy (SRT). The total knowledge of nurses and their practices also had a favorable correlation.

Recommendations

Based on the basis of the study's results, the following recommendation are made:

- Implementing periodical evidence-based guideline for nurses working in Neonatal Intensive Care Units (NICUs) regarding surfactant replacement therapy.
- Encouraging nurses to regularly attend training sessions to improve their expertise and methods for caring for high-risk newborns receiving Surfactant Replacement Therapy (SRT).
- Providing nurses in NICUs with updated pamphlets, posters, and Arabic booklets on how to care for high-risk newborns receiving surfactant replacement therapy.

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