

## Effectiveness of Applying an Educational Module about Neonatal Respiratory Distress Syndrome on Nurse's Practice

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### Abstract

**Background:** Respiratory distress syndrome (RDS) is one of the most frequent respiratory diseases; it results from lung immaturity and a deficiency in surfactant, so it is seen most often in premature infants and is a leading cause of neonatal morbidity and mortality. **Aim of the study:** was to evaluate the effectiveness of applying an educational module about neonatal RDS on nurse's practice. **Subjects and Methods: Research design:** A quasi experimental research design was used. **Setting:** The present study was conducted at the Neonatal Intensive Care Units (NICU) involved in Pediatric Hospital and Obstetric Emergency Hospital at Zagazig University Hospitals, and El-Mabara Hospital for health insurance. **Subjects:** 50 nurses who were providing direct nursing care to neonates in mentioned settings. **Tools for data collection:** Two tools were used; first a questionnaire sheet to collect nurses' characteristics and the second tool was an observational checklist used to assess nurse's practice. Educational module was developed to educate the studied nurses about neonatal RDS. **Results:** 10.0% of the studied nurses had good practice score before implementation of educational module. This percentage increased to 94.0% after implementation of educational module, and decreased to 84.0% in the follow up phase. **Conclusions:** Implementation of the educational module to nurses' have a positive effect on improving their practice about Respiratory distress syndrome as there was a statistical difference throughout the three phases of the study. **Recommendations:** Hospitals should provide guidelines protocol to the nurses about nursing care for neonates in critical care units and In addition, develop evidence based guidelines on RDS to be available for all nurses in order to follow is essential.

**Keywords:** Educational module, Respiratory distress syndrome, premature, Neonatal Intensive Care Unit, morbidity and mortality.

### Introduction:

Respiratory distress syndrome (RDS) is one of the most frequent respiratory diseases and is a leading cause of neonatal morbidity and mortality. RDS is also known as hyaline membrane disease. Preterm birth is the most important risk factor in the development of respiratory distress syndrome. The main cause of severe respiratory syndrome is lung surfactant deficiency. Inadequate surfactant production leads to diffuse alveolar atelectasis, edema, cell injury and the decrease of lung compliance.<sup>(1)</sup>

Neonatal respiratory distress syndrome is a condition of advancing respiratory distress, appears at shortly time after birth .The disease follows an acute course, with deterioration within 48 hours followed by stabilization and improvement.<sup>(2)</sup>

RDS is the most common cause of respiratory failure in preterm infants. It is estimated that approximately 25,000 cases of RDS occur in the United States alone and it is known to occur in all races and regions of the world, though precise statistics are unavailable.<sup>(3)</sup> In Egypt, the numbers of cases of respiratory distress syndrome reach to 11,193 cases in newborn neonates at year 2007.<sup>(4)</sup>

Clinical presentation of respiratory distress in neonates includes tachypnea, poor feeding, nasal flaring, grunting, cyanosis, intercostals retraction and reduction of respiratory sounds in lungs auscultation. The pathophysiology of RDS is surfactant deficiency of the lungs of infants. There is a reverse relationship between the incidence of RDS and gestational age. Respiratory distress, chest radiographic findings (bilateral

reticulogranular and air bronchogram patterns) and acidosis are the main clinical and paraclinical diagnostic clues.<sup>(5)</sup>

The aim of the management of RDS is to provide interventions that maximize survival whilst minimizing potential adverse effects, including the risk of BPD. To achieve best outcomes for preterm neonates with RDS they should have optimal supportive care, with monitoring physiological variables and appropriate responses.<sup>(6)</sup>

The vital role of the nurse on neonatal admission is to assess neonate's condition in order to identify his needs, take accurate decisions for intervention, and evaluate neonate's progress. Therefore, it is essential for NICU nurse to be skillful in the assessment of neonate with RDS.<sup>(7)</sup>

A crucial nursing goals includes maintenance of the body temperature, pulse oximetry from birth, detection of exhaled CO<sub>2</sub> can ensure correct placement of endotracheal tubes, and continuous measurement of end-tidal CO<sub>2</sub> as well as monitoring Pa CO<sub>2</sub> levels. Umbilical or radial arterial cannulation is indicated if it is anticipated there will be need for regular blood gas analysis<sup>(8,9)</sup>

Nursing management for neonates with RDS through assist newborn with endotracheal intubation, maintain mechanical ventilation as indicated, measure oxygen concentration, continuous monitoring of the SaO<sub>2</sub>, observe the infant's response to oxygen. Suctioning as needed because the gag reflex is weak and cough is ineffective. Moreover, promoting adequate nutrition and hydration is important.<sup>(10,11)</sup>

The nurses have a key role in the care of high risk and preterm infants to decrease neonatal mortality morbidity. whereas nurses working in the NICU should be qualified and trained through ongoing education program. Therefore, it is necessary to assess the nurses' performance regarding neonate's RDS to improve their performance and prevent the

RDS complications among those neonates.<sup>(12,13)</sup>

### **Significance of the study:**

Neonates are prone to respiratory problems, which can potentially lead to life-threatening conditions. The most common clinical syndrome that leads to acute respiratory failure in the new-born is respiratory distress syndrome. Respiratory distress syndrome is the most common cause of neonatal treatment in intensive care units. Caring for neonates with respiratory failure requires extensive knowledge of nursing theory and practical skills. Proper nursing allows one to identify problems quickly and take appropriate measures to eliminate them.<sup>(14)</sup> Accordingly this study is conducted to emphasize on the effectiveness of applying an educational module about neonatal respiratory distress syndrome on nurse's practice.

### **Aim of the study:**

The present study aimed to evaluate the effectiveness of applying an educational module about neonatal respiratory distress syndrome on nurse's practice.

### **Research Hypothesis:**

Application of an educational module about neonatal respiratory distress syndrome improves nurses' practice.

### **Subjects and methods:**

#### **Research design:**

A quasi-experimental design was conducted to achieve the aim of the study.

#### **Study setting:**

The study was conducted at the Neonatal Intensive Care Units (NICU) involved in:

(1) The Pediatric Hospital at Zagazig University Hospitals (18 nurses).

(2) Obstetric Emergency Hospital at Zagazig University Hospitals (16 nurses).

(3) El-Mabara Hospital for health insurance (16 nurses).

### **Study subjects:**

Subjects of this study were composed of 50 nurses who were providing direct nursing care to neonates with RDS in the above mentioned setting.

### **Tools of data collection:**

#### **Tool I: A questionnaire interview sheet**

A questionnaire interview sheet was developed by the researcher, designed in Arabic language. It was concerned with personal data of the study subjects as, hospital name, age, marital status, sex, qualification & years of experience in NICU & as well as attending any training courses related to neonatal respiratory distress syndrome.

#### **Tool II: Nurses Practices Observational Checklist**

An observational checklist was developed by the researcher to assess the actual nurses' practice regarding their care provided to the neonates with respiratory distress syndrome.

**Scoring system for Tool II:** each correct step took one point and zero for wrong one. Total score of practice was 195 marks. The total score of nurses' practice classified as follows:

Good > 75%

Fair 50 – 75 %

Poor < 50 %

### **Content Validity and Reliability:**

It was established by a panel of five expertises in nursing and medical staff including: two professor of pediatrics, two professor of pediatrics Nursing and lecturer of pediatric Nursing who reviewed the instruments, and designed booklet for clarity, relevance comprehensive, understanding, applicability, and easiness for administration. Minor modifications were required. The reliability of the tool

was established by Alpha Cronbach test, which was used to measure the internal consistency of the used tool. The reliability scores of the tool was 0.82, which indicated the high tool internal consistency of the used tool.

### **Field work:**

After an official permission was obtained from the dean of the Faculty of Nursing at Zagazig University and from Managers of previously mentioned setting to carry out the study. The agreement for participation of subjects was obtained after the explanation the aim of the study to nurses included in the study. They were given opportunity to refuse to participate. They were notified that they could withdraw at any stage of the research. They were met by the researcher at their available time. As regards the nurse's practices, they were observed individually during their actual work in previously mentioned setting. The educational module was developed through four phases as follows:

#### **Assessment phase:**

The assessment of nurses' practice was performed before the constructed and implementation of the educational module by observing each nurse to assess their practice (pretest) by using tool II after explaining the aim of the study and had their approval to participate in the study.

#### **Planning phase:**

Based on the results obtained from observational checklist (from pilot study and assessment phase) as well as reviewing the related literature the educational module was developed by the researcher. Detected needs, requirements and deficiencies were translated into the aim and objectives of the educational module. The contents of the educational module were selected on the basis of identified needs. Teaching methods were selected to suit teaching in small groups in the form of lectures, group discussion, demonstrations and re-demonstration.

Teaching materials were prepared as PowerPoint and handouts that covered theoretical and practical information.

### **Implementation phase:**

The educational module of this study was implemented through eleven sessions in which nurses were divided into small groups to facilitate the learning process. The length of each session differed according to the content and nurse's responses. It was ranged 30-45 minutes.

The first session was about respiratory distress syndrome, second session about vital signs, third session about intravenous therapy, fourth session about gavage feeding, fifth session about suctioning, six sessions about peripheral artery and venous sampling, seven session about oxygen therapy, eight session about care of the infant on CPAP, nine session about care of the infant on MV, ten session about infection prevention in NICU, eleven session Cleaning of NICU. Each session started with a summary of the previous session and the objectives of the new one taking were explained in Arabic language and simple English terms that suits the level of nurses' education. Motivation and reinforcement during a session were used in order to enhance nurses' learning.

### **Evaluation phase**

In this phase every nurse of the studied sample were observed individually after implementation of the educational module to assess their practice (posttest) by using toolII. Also after two months later the nurses of the studied sample reassessed for their practice (follow up) using toolIII. This study was carried out for 12 months during the period from June 2015 to May 2016.

### **Pilot study:**

A pilot study was conducted on 5 nurses to evaluate the content of the tools, their clarity as well as to estimate the time

needed for filling the sheets with the collected data. Subjects who shared in the pilot study were included in the main study sample as no radical modifications were needed on the study tools.

### **Administrative and ethical considerations:**

An official permission was obtained from the Dean of the Faculty of Nursing at Zagazig University and from Managers of previously mentioned setting to carry out the study. Also agreement for participation of subjects was obtained after the explanation of the aim of the study to nurses included in the study. They were given opportunity to refuse to participate. They were notified that they could withdraw at any stage of the research. Also they were assured that information would be confidential and used for research purpose only.

### **Statistical analysis:**

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 15. Qualitative data was presented as number and percent. Comparison between groups was done by Chi-Square test. Quantitative data was presented as mean  $\pm$  SD. Paired t-test was used for comparison within groups.  $P < 0.05$  was considered to be statistically significant.

### **Results:**

**Table (1):** Illustrated the characteristics of the studied nurses, it was revealed that 36.0% of studied nurses were working at Pediatric Hospital, as well as Obstetric Emergency Hospital and El-Mabara Hospital were 32.0% in each hospital. It was found also that 64.0% of nurses in the age group 20 –30 years, and 36.0% their age more than 30 years, with mean age of  $27.68 \pm 4.7$  years.

Regarding marital status, 94.0% of nurses were married. It was found also that 70.0% of studied nurses had diploma degree, and 30.0% graduated from technical institute of nursing. Concerning years of experience, 52.0% of the studied nurses had more than 10 years and 18.0%

of them had 5-10 years, with mean of  $8.66 \pm 5.03$  years of experience. The same table also reported that 98.0% of the studied nurses never attended any previous training program about neonatal respiratory distress syndrome.

**Table (2):** mentioned the nurse's practice score regarding care to neonates with RDS throughout the module phases. It was found that the total mean practice score regarding care to neonates with RDS was  $106.78 \pm 25.83$  before implementation of the educational module compared to  $169.16 \pm 7.88$  and  $156.26 \pm 10.0$  after implementation of the educational module and follow up phase respectively. There were highly statistical significant differences (p value was  $<0.001^{**}$ ).

**Table (3):** Indicated the effect of the educational module on total nurses' practice score, it was found that 10.0% of the studied nurses had good practice

score before implementation of educational module. This percentage increased to 94.0% after implementation of educational module, and decreased to 84.0% in the follow up phase, the difference was statistically highly significant (p value was  $<0.001^{**}$ ).

**Table (4):** Represented the relations between total nurse's practice score with their age. It was found that 6.3 % of the studied nurses whose age was between 20- 30 years had good total practice score before implementing the educational module, this percentage increased to 93.8 % and 81.3 % respectively for both post implementing the educational module and follow up phase. It was found also that there was no statistical significant relation throughout the three phases of the module between nurses' practice score and their age.

**Table (5):** portrayed the relation between total nurses' practice score with their educational level. It was found that 8.5% of the studied nurses who were graduated from The Technical Institute of nursing and obtained good total practice score before implementation of the educational module,

compared to 100.0 % after implementation of the educational module and 93.3% during follow up phase. It was found that there was statistical significant relation before implementation of the educational module between nurses' practice score and their educational level

**Table (6):** clarified the relation between total nurses' practice score with their years of experience. The results showed that 15.4% of the studied nurses whose years of experience were more than 10 years had good total practice scores before implementation of the program compared to 96.2% after implementation of the educational module and decreased to 88.5% throughout the follow up phase. While it was found that there was statistical significant relation in the follow up phase of the educational module between nurses' practice score and their years of experience

### Discussion:

Respiratory Distress syndrome is a life threatening lung disorder that commonly affects premature infants Dorothy et al <sup>(12)</sup>, It can cause neonates to need extra oxygen and help breathing. The course of illness with RDS depends on the size and gestational age of the neonate, the severity of the disease, the presence of infection; whether or not the neonate needs mechanical help to breathe. RDS typically worsens over the first 48 to 72 hours Marylyn and Hockenberry<sup>(15)</sup>

Regarding the nurses' characteristics, the present study showed that nearly two thirds of studied nurses were in the age group 20 –30 years, these findings were in agreement with the study findings of Ahmed, <sup>(16)</sup> Who found nearly the same result in his study about the nurses' knowledge and practice regarding infection control in pediatric critical care units.

Concerning the level of education of the nurses working in the NICUs, it was found that two thirds of nurses had diploma, this finding was similar to the finding of Abd-ELaziz, <sup>(17)</sup> who studied the quality of

nursing care for neonates with respiratory distress syndrome at Benha University and found that most of nurses were diploma. On the contrary Towfik, <sup>(18)</sup> who studied the assessment of nursing care provided to neonates with respiratory distress at Zagazig University and her findings reported that less than half of nurses had diploma.

Moreover, regarding the attendance of nurses for any previous training programs about respiratory distress syndrome, the present study revealed that the majority of them were not attending any previous training program or courses about respiratory distress syndrome. This might be due to that all training programs implemented in the continuous training unit in new surgical hospital at Zagazig University Hospitals and El-Mabara Hospital for health insurance focused on clinical procedures and not specific disease as RDS. This agrees with Elsayed, <sup>(19)</sup> who found in her study about nursing care provided for neonates with respiratory distress syndrome in the neonatal intensive care units at Makkah Al-Mukarramah in Saudi Arabia and her result showed that the majority of the studied nurses were not attending training program.

Ismael <sup>(20)</sup> mentioned that, knowledge was very important, and its application in clinical practice was more important. So, knowledge alone without practice had no effect. Moreover, new trends based on improving nurses' knowledge through nursing care standard could enhance their knowledge and consequently improves their practice. In addition nursing staff must be updating their knowledge and skills through regular review and assessment of competence.

The present study reported that nearly one third of studied nurses had poor practice score regarding respiratory distress syndrome before implementation of the educational module. This poor practice may be attributed to lack of facilities, guidance, reinforcement and inadequate training educational programs about RDS. This was consistent with

Mohamed <sup>(21)</sup> who conducted a study to determine impact of an educational program in improving nurses' practice among restrained children in Zagazig University and reported that nearly one third of studied nurses had poor performance before implementation of educational program.

As regards the relation between the level of nurses' practice and their age, the result of the current study revealed that no statistical significant relation between nurse's practice and their age. This was in a line with Mohamed, <sup>(21)</sup> who found that in her study that there was no statistical significant relation throughout the three phases of the program between nurses' practice score and their age.

Regarding the relation between the level of nurses' practice and level of education, the result of the current study revealed that was statistical significant relation between nurse's practice and level of education before implementation of the educational module, where the nurses were graduated from technical institute had higher level of practice than the diploma degree nurses. This may be due to nurses with diploma didn't have extensive course that acquired them with a comprehensive practice about care of high risk neonates. These results were similar to the study of Abd-Elaziz, <sup>(17)</sup> who found in her study that there were statistically significant differences between nurses' practice and their qualifications. These findings were contraindicated with the study of El-Sayed, <sup>(19)</sup> who showed that nurses with diploma nurse had higher performance than the bachelor degree nurses.

As regards to relation between nurses' practice and years of experience, this study showed that there was significant statistical relation between nurse's practice and years of experience during follow up phase of implementing the educational module, where the nurses who were less than five years of experience had higher level of practice. This could be explained as senior nurses

who had prolonged years of experience took administrative role and delegated the nursing activities to the junior nurses. So, they were far away from the practical field and consequently their mastering skills were decreased or diminished. This was on contrast with Saleh et al <sup>(22)</sup> who found that there was no significant statistical relation between nurse's practice and years of experience.

### **Conclusion:**

In the light of the current study findings, it might be concluded that the educational module to nurses' have a positive effect on improving their practice about Respiratory distress syndrome.

### **Recommendations:**

On the basis of the current study findings, the following recommendations are suggested:

- Development of training program should be conducted periodically

for nursing staff in NICU will help to improve their practice.

- The hospitals should develop evidence based guidelines on Respiratory Distress Syndrome to be available for all nurses in order to follow.
- Guideline protocol should be organized and available for the nurses to guide them in dealing with high risk neonates in the critical care units.
- Availability of head nurses for, feedback, guidance, reinforcement as well as punishment is highly needed.

**Table (1): Characteristics of Studied Nurses (50 Nurses)**

<b>Characteristics</b>	<b>No</b>	<b>%</b>
• <b>Hospital</b>		
1. Pediatric Hospital	18	36.0
2. Obstetric Emergency Hospital	16	32.0
3. El-Mabara Hospital	16	32.0
• <b>Age (years):</b>		
▪ 20 – 30	32	64.0
▪ >30	18	36.0
<b>Mean ± SD</b>	<b>27.68±4.7</b>	
• <b>Marital status:</b>		
▪ Single	3	6.0
▪ Married	47	94.0
• <b>Qualification:</b>		
▪ Diploma in nursing	35	70.0
▪ Technical health institute	15	30.0
• <b>Years of experience:</b>		
▪ < 5 years	15	30.0
▪ 5- 10	9	18.0
▪ >10	26	52.0
<b>Mean ± SD</b>	<b>8.66±5.03</b>	
• <b>Training courses:</b>		
▪ Yes	1	2.0
▪ No	49	98.0



Table (2): Nurses' Practice Score Regarding care to neonates with RDS throughout the Educational Module Phases, No.=(50).

Items	Mean $\pm$ SD			t test		P value	
	Pre	Post	FU	Post Vs. Pre	Fu Vs. pre	Post Vs. Pre	Fu Vs. pre
<b>Vital Signs</b>	11.44 $\pm$ 2.87	20.46 $\pm$ 4.13	18.68 $\pm$ 5.35	11.852	10.609	<0.001**	<0.001**
<b>Intravenous Procedure</b>	9.16 $\pm$ 1.98	13.74 $\pm$ 1.69	12.48 $\pm$ 2.25	11.657	7.159	<0.001**	<0.001**
<b>Nasogastric tube feeding</b>	15.46 $\pm$ 2.31	22.08 $\pm$ 1.84	20.40 $\pm$ 2.03	15.590	11.037	<0.001**	<0.001**
<b>Suctioning procedure</b>	9.88 $\pm$ 3.27	16.46 $\pm$ 0.89	14.76 $\pm$ 1.41	15.085	10.440	<0.001**	<0.001**
<b>Oxygen therapy</b>	11.64 $\pm$ 1.96	15.60 $\pm$ 1.37	14.78 $\pm$ 1.45	11.512	8.973	<0.001**	<0.001**
<b>CPAP Management</b>	8.64 $\pm$ 1.85	11.34 $\pm$ 0.82	10.50 $\pm$ 0.93	9.041	6.576	<0.001**	<0.001**
<b>Ventilator Management</b>	15.48 $\pm$ 4.42	27.28 $\pm$ 2.44	25.56 $\pm$ 2.91	30.783	23.221	<0.001**	<0.001**
<b>Collection of blood samples</b>	6.34 $\pm$ 1.66	9.42 $\pm$ 0.70	8.56 $\pm$ 1.07	15.751	9.472	<0.001**	<0.001**
<b>Arterial blood gases sampling</b>	6.90 $\pm$ 2.09	11.04 $\pm$ 1.28	10.24 $\pm$ 1.53	13.942	10.825	<0.001**	<0.001**
<b>Infection controlmeasures</b>	11.84 $\pm$ 6.90	21.74 $\pm$ 2.61	20.30 $\pm$ 2.67	11.989	9.907	<0.001**	<0.001**
<b>Total</b>	106.78 $\pm$ 25.83	169.16 $\pm$ 7.88	156.26 $\pm$ 10.0	11.910	14.702	<0.001**	<0.001**

**Table (3): Total Nurse's Practice Score throughout the Educational Module Phases:**

Practice	Poor		Fair		Good		Pre Vs. Post		Pre Vs. FU	
	No	%	No	%	No	%	Z	P	Z	P
▪ Pre intervention	17	34.0	28	56.0	5	10.0				
▪ Post intervention	0	0.0	3	6.0	47	94.0	6.111	<0.001**	6.032	<0.001**
▪ Follow-up	0	0.0	8	16.0	42	84.0				

\*\*P<0.001 (highly significant)

**References:**

1. Fratila A, Nyiredi A, Ilie C, Iacob D and Mogoi M.: Prevention of neonatal respiratory distress syndrome.:*Jurnalulpediatrului*, 2013; (16): 46.
2. Nettina S: *Manual of Nursing Practice*, 10<sup>th</sup> ed., Pediatric respiratory disorders; New York: Wolterskluwer health, Lippincott Williams &Wilkins. 2014.1503-1508.
3. Keszler M and Abubakar K.: *Textbook of Clinical Pediatrics*, chapter 15 Respiratory System, Springer-Verlag Berlin Heidelberg. 2012: 195-202.
4. National Statistics by Country for Neonatal Respiratory distress Syndrome: Prevalence Rate for Neonatal Respiratory Distress Syndrome to Countries and Regions; 2007.
5. Niknafs P, Faghani A, Afjeh S, Moradinazer M, Bijari B: Management of Neonatal Respiratory Distress Syndrome Employing ACoRN Respiratory Sequence Protocol versus Early Nasal Continuous Positive Airway Pressure Protocol, *Iranian Journal of Pediatrics*. 2014; 1 (24): 57-63.
6. Sweet D, Carnielli V, Greisen G, Hallman M, Ozek E, Plavka R, Saugstad O, Simeoni U, SpeerCh, Vento M, Visser G and Halliday H:European Consensus Guidelines on the Management of Respiratory Distress Syndrome, *Neonatology*. 2017;111:107–125.
7. Hockenberry MJ, Wilson D and Wong's: *Nurses care of infants and children*; 8<sup>th</sup>ed. Philadelphia: Mosby Co. 2009: 257-303.
8. Phillipos E, Solevg AL, Pichler G, Aziz K, van Os, O'Reilly M: Heart rate assessment immediately after birth. *Neonatology*. 2016; 109: 130–138.
9. Bruschetti M, Romantsik O, Zappettini S, Ramenghi LA, Calevo MG: Transcutaneous carbon dioxide monitoring for the prevention of neonatal morbidity and mortality. *Cochrane Database Syst Rev*. 2016; 2.
10. Hay w., Levin M., Sondheimer J. and Deterding R: *Current Diagnosis &Treatment Pediatrics*, 19<sup>th</sup>ed, Mcgraw Hill Companies. 2009: 345-350.
11. Timmons, O: Mortality Rate & Prognostic Variables in Children with Acute Respiratory Distress Syndrome, *Journals of Pediatrics*, 2008 (2), 896-899.
12. Dorothy R, Marlow B, and Redding A: *Textbook of Pediatric Nursing*;; 20<sup>th</sup>ed; W.B. Saunders Company., 2010: 504-516.
13. Cloherty J, Eichenwald E, and Stark A: *Manual Of Neonatal Care*, 5<sup>th</sup>ed, Lippincott Williams& Wilkins. 2010: 340-368.
14. Lewicka M, Sulima M, Taras E, and Stawarz B: Non-invasive respiratory support in newborn - nursing care, *journal of public health, nursing and medical recue*, 2013 (2),7-13.
15. Marylyn J and Hockenberry D: *Essentials of pediatric nursing*, 10<sup>th</sup> ed., Lippincott Williams &Wilkins Company. 2008: 350-359.
16. Ahmed, R: Actual and Perceived Knowledge, Attitude and Practice of Nurses toward Infection Control in Pediatric Critical Care units at Tanta University Hospital. Master thesis. Pediatric Nursing, Faculty of Nursing, Ain Shams University; 2005.
17. Abd-ELaziz S M: Quality of nursing care for neonates with Respiratory Distress Syndrome at Benha University. Master thesis. Pediatric Nursing, Faculty of Nursing, Benha University; 2010.
18. Towfik N M: Assessment of Nursing Care Provided to Neonates with Respiratory Distress at Zagazig University, Master thesis. Pediatric Nursing, Faculty of Nursing, Zagazig University; 2014.
19. Elsayed A L: Nursing Care Provided for Neonates with Respiratory Distress Syndrome in the Neonatal Intensive Care Units at Makkah Al-Mukarramah in Saudi Arabia, *Life Science Journal* 2013;10(1):<http://www.lifesciencesite.com>.
20. Ismail B : Nursing Intervention Offered to Premature Neonates at Neonatal Intensive care Unit at Zagazig University hospitals. published Master Thesis. Faculty of Nursing. Zagazig University, 2010, 77-58.

21. Mohamed B M: Impact of an educational program in improving nurses' performance among restrained children Zagazig University Hospital. Doctorate Thesis. Faculty of Nursing. Zagazig University. 2014: 105-118.

22. Saleh M, Mohamed N and Abdeen M: Nurses Compliance To Standards Of Nursing Care In Performing Invasive Procedures At Zagazig University Hospitals. Unpublished Master Thesis. Faculty of Nursing. Zagazig University, 2008:100-105.