

Assessment of Nursing Care Provided to Neonates Undergoing Phototherapy

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Abstract

Background: Neonatal jaundice occurs in about 60% of neonates. If not managed properly, it can progress to severe neonatal jaundice leading to death or permanent disability. **Aim of this study:** To assess nursing care provided to neonates undergoing phototherapy. **Design:** A descriptive design was utilized in this study. **Setting:** The study was carried out in the neonatal intensive care units affiliated to Helwan General Hospital and Ain Shams University Obstetric Hospital. **Subject:**The study included 80 nurses working at the previously mentioned setting and one hundred and twenty neonates. **Tools:**Two tools were utilized for data collection in a period of 4 months, (1) A questionnaire sheet to assess nurses' knowledge and (2) An observation checklist to assess nurses' practice regarding neonates suffering from jaundice and undergoing phototherapy. **Results:** The results revealed that, the majority of the studied nurses had poor knowledge, more than three-quarters of the studied nurses had a poor level of actual practice regarding nursing care for neonates undergoing phototherapy and there was a highly statistical significant relation between nurses' knowledge & practice. **Conclusion:** The study concluded that, nurses had a poor level of knowledge and practice regarding the nursing care for neonates undergoing phototherapy. **Recommendations:** Develop educational training programs for meeting actual educational need assessment of nurses dealing with neonates undergoing phototherapy to update nurses' knowledge and practices toward providing comprehensive, concise and complete nursing care for neonates undergoing phototherapy.

Key words: Neonates, Nursing Care, Phototherapy.

Introduction

Neonatal period is the period from birth to four weeks postnatal. Many physiological changes occur during this period, neonates can be high risk for serious illnesses that affect their health such as hyperthermia, hypothermia, hyperglycemia, hypoglycemia, respiratory distress syndrome, meconium aspiration,

seizures and neonatal jaundice (Barakat, 2015).

Neonatal jaundice is an increased the level of bilirubin in the blood and is characterized by a yellowish discoloration of skin and sclera. It is a common disorder occurring in both term and preterm neonates and generally benign, self-limiting process, but if not properly monitored and treated, it can result in permanent

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neurologic damage (**Hartshorn and Buckmaster, 2010**).

Approximately 60% of term and 80% of preterm neonates develop jaundice in the first week of life. The breastfed neonates are more likely than bottle-fed neonates to develop physiological jaundice within the first week of life. Incidence is higher in populations living at the higher level. Incidence also varies with ethnicity. It is lower in Africans Americans and higher in East Asians (**Ives, 2011**).

Phototherapy is used for the treatment of neonatal hyperbilirubinemia. It causes unconjugated bilirubin to be mobilized from the skin by structural isomerization to a water- soluble form that can be excreted in the urine. The aim of phototherapy is to decrease the level of unconjugated bilirubin in order to prevent acute bilirubin encephalopathy, hearing loss and kernicterus. Lamps emitting light between the wavelengths of 400 - 500 nanometers, peak at 460nm (**Hansen, 2011**).

The decision to start phototherapy is based on the level of serum bilirubin, the gestational of the neonate and the underlying cause of the hyperbilirubinemia. Factors that influence the efficacy of phototherapy include the light wavelength, bilirubin level, birthweight, gestational age, postnatal age, surface area exposed, skin thickness and the etiology of jaundice(**Stokowski, 2011**).

The neonatal nurse plays a critical role in identifying the neonate at risk, providing parent education, support and providing nursing care to neonates undergoing treatment for hyperbilirubinemia. The neonatal nurse coordinates communication among all members of neonates care team, including physicians, laboratory personnel and parents (**Ferreira et al., 2012**).

Significance of the study

Neonatal Jaundice is the most common health hazardproblem that

requires medical attention, its incidence about 50%of birth in the world and 60% of birth in Egypt (**Ahmed and Hani, 2017**). Phototherapy administration requires appropriate nursing care to minimize the potential side effects, complications and enhances the effectiveness of phototherapy (**Linton et al.,2010**). Nurses' knowledge, attitude and practice play an important role to achieve optimal outcomes for neonates who receiving phototherapy. The current study will shed light on nurses' knowledge and practice regarding care of neonates undergoing phototherapy.

Aim of the study

The aim of this study is to assess nursing care provided to neonates undergoing phototherapy.

Research Questions

1. What is the nurses' knowledge regarding the care of neonates undergoing phototherapy?
2. What is the nurses' practice regarding the care of neonates undergoing phototherapy?
3. Is there a relationship between nurses' knowledge and practice regarding the care of neonates undergoing phototherapy?

Subject and Methods

The subject and methods of the current study were discussed under the following four designs:-

- I. Technical design.
- II. Operational design.
- III. Administrative design.
- IV. Statistical design.

I. Technical design

Research design:

A descriptive study was utilized in this study.

Research Setting:

The study was conducted at the neonatal intensive care units affiliated to Helwan General Hospital and Ain Shams University Obstetric Hospital.

Subject:

All available nurses including eighty nurses (forty from each study setting) who providing care for neonates undergoing phototherapy working at the previously mentioned settings and one hundred and twenty neonates were included in the study under the following inclusion criteria.

The inclusion criteria of nurses included:

- Ages above 20 years.
- All levels of nursing qualifications.
- Years of experience in care of neonates not less than one year.

The inclusion criteria of neonates included:

- Both gender.
- Gestational age between 36 and 37 weeks.
- Birth weight ranged from 2000 to 3700 / grams.
- Type of jaundice was physiological & pathological.
- All neonates undergoing phototherapy.

Tools of data collection:

Questionnaire Sheet:-

It was designed by the researcher after reviewing the related literature (**Adebami, 2015**) in an Arabic language and consisted of four parts as the following:

- 1.Characteristics of nurses such as age, level of education, years of experience and previous attendance of training programs about phototherapy.
- 2.Characteristics of neonates such as gestational age, gender, birth weight, birth order and type of jaundice.
- 3.Nurses' knowledge regarding jaundice such as definition, diagnosis, clinical manifestations, complications, treatment and nursing care.
- 4.Nurses' knowledge regarding phototherapy such as definition, aim, side effects and nursing care for neonates undergoing phototherapy.

Scoring system:

Knowledge obtained from the nurses was checked with a key model answer, each of the question scores ranged from 3 to 6 grades according to the importance and weighing of each item. The total score for the questionnaire was 100 grades equal 100%. The scores obtained from each question was summed up to get a total score for nurses' knowledge. The total score was converted into percentage and categorized into < 60% considered poor, 60% < 75% considered average and ≥ 75% considered good.

Observation checklist:-

The researcher adapted checklists from **Lomax, (2015),Lynn, (2014) and MacDonald et al., (2012)** for vital signs, measuring weight, measuring length, hand washing, phototherapy safety, eye care, cord care, bottle feeding, gavage feeding (insertion and administration) and incubator care to assess nursing care practice provided by the nurses for neonates suffering from jaundice and undergoing phototherapy.

Scoring system:

The correct complete practice was scored two, while the incomplete correct was scored one and not done scored zero. Checklist for nursing care provided to neonates undergoing phototherapy scored 15 marks, eye care scored 10, cord care scored 10, bottle feeding scored 20, gavage feeding scored 20, incubator care scored 15, measuring weight scored 10, measuring length scored 10, axillary temperature scored 15 and hand washing scored 5 that made a total score of 130 grades equal 100% for all checklists. The total score was converted into percentage and categorized into < 60% considered poor, 60% < 75% considered average and $\geq 75\%$ considered good.

II. Operational design

A) Preparatory phase:

A review of the past and current national and international related literature using articles, journals, scientific periodicals and text books to be acquainted with the various aspects of the research problem.

B) Content validity:

Tools were submitted to a panel of two professors of pediatric nursing and one professor of pediatric medicine to test the content validity. Modifications of the tools were done according to the panel judgment on the clarity of sentences, appropriateness of content and sequence of items. No radical modifications were recommended.

C) Reliability:

Tools reliability was tested by using a Cronbach's Alpha of (75%) for questionnaire sheet to assess nurses' knowledge and (80%) reliable for observation checklist to assess nurses' practice for neonates suffering from jaundice and undergoing phototherapy.

D) Pilot study:

A pilot study was conducted on eight nurses that represent 10% of the study nurses, to evaluate tools for applicability and clarity and to estimate the time needed for filling in tools. Data obtained from the pilot study were analyzed and the necessary modifications were done as revealed from the pilot study by addition and omission of some items of the questionnaire. Those who participated in the pilot study was excluded from the main study sample.

E) Field work:

The actual field work was carried out over the period of four months started from the first week of May 2016 up to the end of August 2016 for data collection. The researcher was available in the study setting 2 days per week from 8 am to 12 pm by rotation. The verbal consent was obtained from each nurse and parents of neonates. The researcher started by introducing herself to the nurses and the purpose of the study was explained to each nurse, then the questionnaire sheet was distributed to all nurses and filled in the presence of the researcher to ensure that questions were answered completely by the nurse. The time required to complete questionnaire was around 15-20 minutes. The researcher observed the actual practice of each nurse while providing care for neonates by indirect observation guided by observation checklists.

III. Administrative design

Administrative approval to carry out the study was obtained through an issued letters from the Dean of the faculty of nursing, Helwan University, directed to directors of the previously mentioned settings to explain the aim of the study in order to obtain their permission and cooperation.

Ethical considerations:

Prior the conduction of the study, an agreement of ethical committee was obtained from faculty of nursing, an oral permission for voluntary participation was obtained from nurses and purpose of the study was explained. Nurses were informed that participation is voluntary and that they could withdraw at any time of the study. Confidentiality of the nurses' data was ascertained. Nurses' names were coded for data entry so that their names could not be identified. In addition to, a consent was obtained orally from parents of neonates under the study, ensuring complete privacy and total confidentiality.

IV. Statistical design

The collected data were revised, coded, tabulated and analyzed using the number, percentage distribution, mean score, standard deviation (SD), proportion probability of error (P-value) and chi-square X^2 . Statistical analysis was performed manually using Statistical Package for Social Science (SPSS), version 22. Highly statistically significance set at $P^{**} < 0.001$, statistically significance set at $P^* < 0.05$ and no statistical significance set at $P > 0.05$.

Results

Table (1) showed that, less than half of the studied nurses (46.2%) were in the age group of ≥ 30 years with $\bar{x} \pm SD$ was 26.7 ± 0.76 years. Regarding nurses' level of education more than half of them (52.5%) had the diploma nursing school. Concerning years of experience of the studied nurses, more than one-third of them (42.5%) had from $10 < 15$ years of experience in the neonatal intensive care unit with $\bar{x} \pm SD$ was 20 ± 0.88 years.

Table (2) revealed that, more than two thirds of nurses (72.5%) had poor knowledge as regards definition, more than three quarters of them (77.5%) had poor

knowledge about signs & symptoms, while 68.8% of nurses had poor knowledge as regards diagnosis and 71.2% of them had poor knowledge related to complications.

Table (3) clarified that, more than three quarters of nurses (76.25%) had poor knowledge about definition of phototherapy, while three quarters of them (75%) had poor knowledge related to aim of phototherapy, more than two thirds of nurses (72.5% & 73.75%) had poor knowledge about side effects and nursing care of neonates undergoing phototherapy respectively.

Table (4) indicated that, the majority of the studied nurses (83.75%) had poor knowledge about care provided to neonates undergoing phototherapy, while 7.5% of them had an average knowledge and 8.75% had good knowledge with $\bar{x} \pm SD$ was 1.25 ± 0.60 regards neonates suffering from jaundice and undergoing phototherapy.

Table (5) described that, more than two thirds of the studied nurses (68.75%, 67.5%, 71.25%, 68.75%, 70%, 70%, 70% & 71.25%) had poor practice related to hand washing, vital signs, measuring weight, measuring length, eye care, cord care, bottle feeding and gavage feeding respectively and 65% of them had poor practice related to incubator care.

Table (6) demonstrated that, more than three quarters of the studied nurses (76.25%) had a poor level of actual practice, while 12.5% of them had an average level of actual practice and 11.25% had a good level of actual practice with $\bar{x} \pm SD$ was 1.35 ± 0.67 regarding to care provided to neonates suffering from jaundice and undergoing phototherapy.

Table (7) indicated that, there was a highly statistically significant relation ($p = 0.000$) between nurses' level of knowledge and their actual practice in care of neonates

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suffering from jaundice and undergoing phototherapy ($\chi^2 = 86.6, P < 0.001$).

Table (1): Number & Percentage distribution of nurses according to their socio-demographic characteristics (N = 80).

Nurses characteristics	Number (n)	Percentage (%)
Age (in years)		
20:< 25	15	18.8
25 :< 30	28	35
≥ 30	37	46.2
$\bar{x} \pm SD$	26.7 ± 0.76	
Level of education		
Nursing school	42	52.5
Nursing technical institute	26	32.5
Bachelor graduate	12	15
Years of experience		
1 : <5	17	21.2
5 : < 10	24	30
10 : < 15	34	42.5
≥ 15	5	6.2
$\bar{x} \pm SD$	20±0.88	

Table (2): Number & Percentage distribution of nurses according to their knowledge about neonatal jaundice (N = 80).

Level of Knowledge	Poor		Average		Good	
	No	%	No	%	No	%
Knowledge items						
Definition	58	72.5	15	18.75	7	8.75
Signs & Symptoms	62	77.5	11	13.75	7	8.75
Diagnosis	55	68.75	17	21.25	8	10
Complications	57	71.25	16	20	7	8.75

Table (3): Number & Percentage distribution of nurses according to their knowledge about phototherapy (N = 80).

Level of Knowledge	Poor		Average		Good	
	No	%	No	%	No	%
Knowledge items						
Definition	61	76.25	12	15	7	8.75
Aim of phototherapy	60	75	13	16.25	7	8.75
Side effects	58	72.5	14	17.5	8	10
Nursing care of neonates undergoing phototherapy	59	73.75	14	17.5	7	8.75

Table (4): Number & percentage distribution of nurses according to their total level of knowledge about neonates suffering from jaundice and undergoing phototherapy (n = 80).

Total level of knowledge	No	(%)
Poor (< 60%)	67	83.75
Average (60% < 75%)	6	7.5
Good (≥ 75%)	7	8.75
$\bar{x} \pm SD$	1.25 ± 0.60	

Table (5): Number & percentage distribution of nurses according to their actual practice of neonates suffering from jaundice (n = 80).

Level of Practice Practice items	Poor		Average		Good	
	No	%	No	%	No	%
Hand washing	55	68.75	16	20	9	11.25
Vital Signs	54	67.5	17	21.25	9	11.25
Measuring weight	57	71.25	16	20	7	8.75
Measuring length	55	68.75	17	21.25	8	10
Eye care	56	70	14	17.5	10	12.5
Cord care	56	70	14	17.5	10	12.5
Bottle feeding	56	70	15	18.75	9	11.25
Gavage feeding	57	71.25	14	17.5	9	11.25
Incubator care	52	65	19	23.75	9	11.25

Table (6): Number & percentage distribution of the studied nurses according to their total actual practice regarding to care provided to neonates suffering from jaundice and undergoing phototherapy (n = 80).

Total level of actual practice	No	(%)
Poor (< 60%)	61	76.25
Average (60% < 75%)	10	12.5
Good (≥ 75%)	9	11.25
$\bar{x} \pm SD$	1.35 ± 0.67	

Table (7): Relation between total nurses' level of knowledge and their actual practice regarding to care of neonates suffering from jaundice and undergoing phototherapy (n = 80).

Nurses' practice Nurses' knowledge	Good		Average		Poor		Total		Chi-square	P-value
	No	%	No	%	No	%	No	%		
Good	7	8.75	0	0	0	0	7	8.75	86.6	< 0.001
Average	2	2.5	4	5	0	0	6	7.5		
Poor	0	0	6	7.5	61	76.25	67	83.75		
Total	9	11.25	10	12.5	61	76.25	80	100		

Discussion

Regarding characteristics of the studied nurses, the present study revealed that less than half of the studied nurses were in the age group of ≥ 30 years. This may be due to this age group is the common age of nurses who give care for neonates undergoing phototherapy. This finding was similar to a study carried out by **Samara et al., (2013)** who studied "Nursing care for the newborn infant with jaundice in a maternity hospital in Brazil" and reported that all study nurses were having age ranged from 25 to 35 years.

As regards nurses' level of education, the present study revealed that more than half of nurses had a technical nursing school diploma. This may be due to the fact that nursing secondary school provide the community with a large number of nursing school nurses graduates. This finding was inconsistent with **Ashor et al.,(2016)** who studied "The effect of a designed nursing care protocol on clinical outcomes of neonates with hyperbilirubinemia at (NICUs) in Shebin El-Kom Teaching Hospital" and found that less than half of nurses were qualified by diploma of nursing school.

As regards years of experience of the studied nurses, the present study showed that more than one-third of the studied nurses had years of experience in NICU that ranged from $10 < 15$. This finding was similar to the finding of **Kunswa, (2010)** who studied "Needs, problems and nursing care of a newborn infant in Egypt" and found that the majority of the studied nurses had years of experience ranged from 5-10 years.

As regards nurses' knowledge about the concept of neonatal jaundice, the current study result showed that more than two-thirds of the studied nurses had poor knowledge as regards definition of neonatal jaundice. This may be due to in-adequate

attendance of continuous pre-service and in-service training programs. This result was contradicted with **Ahmed and Hani, (2017)** who studied "Assessment of nurse's knowledge and practice working in district hospitals at Minia governorate about neonatal hyper bilirubinemia" and reported that the majority of the studied nurses have a good knowledge about definition of neonatal hyperbilirubinemia.

The present study showed that more than three-quarters of the studied nurses had poor knowledge regarding signs and symptoms of neonatal jaundice. This result was contradicted with **Adebami, (2015)** who studied "Assessment of knowledge on causes and care of neonatal hyperbilirubinemia at the Nigerian primary and secondary health institutions" and reported that half of the studied nurses had a good level of knowledge as regards signs & symptoms of neonatal jaundice.

The current study revealed that more than two-thirds of the studied nurses had poor knowledge as regards diagnosis of neonatal jaundice. This result disagreed with **Abai et al., (2011)** who studied "Improving the knowledge and practice on early detection of neonatal jaundice by nurses in Kuching district" and found out that most study nurses understand how to diagnose neonatal jaundice.

As regards complications of neonatal jaundice, the current study proved that more than two-thirds of the studied nurses had poor knowledge as regards complications of neonatal jaundice. This result was incongruent with **Brethauer and Carey, (2010)** who studied "Maternal experience with neonatal jaundice in the USA" and reported that there is the need for nurses to be qualified and trained to perform early detection of jaundice, as a way to provide an adequate nursing care, to prevent future complications of the newborn infant.

Regarding nurses' knowledge about the definition of phototherapy, its aim and

side effects, the present study clarified that relatively most of the studied nurses had poor knowledge as regards the previously mentioned items, which means that they were lacking the necessary knowledge to support their nursing practices in order to provide competent nursing care. This result was in accordance with that of a study carried out by **Fathy, (2004)** who studied the effect of intervention nursing program for the care of high-risk neonates at Mansoura hospitals, who found that the majority of nurses knew nothing about side effects of phototherapy.

In a similar study, **Cohen, (2006)** recommended that the nurse should be familiar with the diagnosis and management of jaundice to prevent vision and hearing damage. The treatment choice for jaundice remains to be close observation and frequent feeding followed by phototherapy.

As regards the studied nurses' knowledge about nursing care for neonates undergoing phototherapy showed that more than two-thirds of the studied nurses scored poor knowledge. This finding was contradicted with **Ahmed and Hani, (2017)** who stated that all of nurses have excellent knowledge regarding nursing care for infant receiving phototherapy.

In relation to total nurses' knowledge regarding nursing care for neonates undergoing phototherapy, this result clarified that the majority of the studied nurses scored poor knowledge. This may be attributed to lack of attending training programs to update nurses' knowledge. These results were confirmed by **Abd El-Galil, (2009)** who studied "Monitoring quality of nursing care in neonatal care units at hospitals, affiliated to Ministry of Health, Dakahlia Governorate" and identified that the majority of staff nurses had score low knowledge related to care for neonates under phototherapy.

The current study showed that more than two-thirds of the studied nurses had poor practice regarding hand washing. This might be due to hand washing was not followed routinely in most of the nursing procedures due to insufficient or lack of training and knowledge about measures of infection control and improper application of infection control standards at NICU. This result supported by **Abou-zaid, (2008)** who studied "The quality of nursing care for high-risk neonates receiving total parental nutrition in Egypt" and reported that the majority of nurses had incompetent level of hand washing performance.

Regarding vital signs, the current study clarified that more than two-thirds of the studied nurses had poor practice. This finding was similar to the study conducted by **El-Sayed, (2007)** who studied "The effect of in-service educational program for nurses in pediatric intensive care unit about care of critically ill children in Egypt" and reported that only 26.0% of nurses had good performance. Meanwhile, this finding was disagreed with **Mustafa, (2007)** who studied "Quality of nurses' performance in neonatal intensive care units in Egypt" and found that no one of the studied nurses had poor performance in vital signs, so it is a basic procedure in the assessment of the neonate.

The present study revealed that more than two-thirds of the studied nurses had poor practice in procedures of eye care, cord care, measuring weight, length, gavage feeding, bottle feeding and incubator care. This finding was contradicted with **Samara et al., (2013)** who reported that good quality of care for the neonate with jaundice, need the nurse to be aware of the procedures related to phototherapy, as well as protect her/his eyes with a dark blindfold, remove eye protection during bathing and diaper exchange, accurate water balance, observe frequency, appearance, and quantity of eliminations, promote gastrointestinal motility through

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feeding and stimulation of bowel movements.

Furthermore, **Jirapaet et al., (2006)** who studied the nurses' experience of barriers to safe practice in the neonatal intensive care unit in Thai land, mentioned that it is important to note that nurses are a barrier to safe care if they lack knowledge, skills or advocacy in patient safety. They clarified that these characteristics can lead to difficulties in interacting with the working environment. Since most NICU tasks require knowledge-based and rules-based activities, nurses who lack knowledge and experience about specific nursing tasks subsequently may make a wrong clinical decision and deliver the wrong care.

On investigating the actual nurses' practice regarding nursing care for neonates suffering from jaundice and undergoing phototherapy, the current study indicated that more than three-quarters of the studied nurses had poor practice and less than quarters of them had average and good practice. This may be due to resistance of nurses to change, in addition to that most of staff nurses were carrying out procedures without following the standardized scientific steps of nursing procedures, that may be attributed to the fact that the actual care for neonates with jaundice didn't done by those who have experience and previous training courses, adding to the lack of supervision from professionally trained head nurses, who can teach and guide them when needed. This finding was contradicted with **El-Shahat, (2014)** who studied "Assessment of nurses' knowledge and practice about the care needed for newborn under phototherapy in neonatal intensive care unit (NICU) in Ismailia city" and reported that the majority of nurses had very good total practice scores about nursing care for neonates under phototherapy.

Concerning the relation between total studied nurses' level of knowledge and the total level of actual practice, the present study reflected that there was a highly

statistically significant relation between nurses' total score of knowledge and practice ($P < 0.001$). This may be due to the impact of nurses' level of knowledge on their level of practice regarding neonates suffering from jaundice and undergoing phototherapy. This finding agreed with **Ashor et al.,(2016)** who proved that there were a highly statistically significant positive relation between total knowledge and total practices. On the contrary, **Fathy, (2004)** who found that there was no statistically significant relation between nurses' knowledge and practice.

Conclusion

Based on the study findings, it could be concluded that the majority of the studied nurses scored poor knowledge regarding actual nursing care for neonates undergoing phototherapy. So, this study answered the research question (1) which stated that what is the nurses' knowledge regarding the care of neonates undergoing phototherapy?, more than three-quarters of the studied nurses had poor practice regarding actual nursing care for neonates undergoing phototherapy. So, this study answered the research question (2) which stated that what is the nurses' practice regarding the care of neonates undergoing phototherapy? And there was a highly statistically significant relation between nurses' total score of knowledge and practice ($P < 0.001$). So, this study answered the research question (3) which stated that is there a relationship between nurses' knowledge and practice regarding the care of neonates undergoing phototherapy?

Recommendations

In the light of the current study findings, the following recommendations are proposed:

- Assess barriers hindering nurses care of neonates undergoing phototherapy.

- Periodic assessment of knowledge and practice of nurses providing care to neonates undergoing phototherapy.

- Develop educational training programs for meeting actual educational need assessment of nurses dealing with neonates undergoing phototherapy to update nurses' knowledge and practices toward providing comprehensive, concise and complete nursing care for neonates undergoing phototherapy.

- Designing an illustrated booklets containing all tasks for nurses working in neonatal intensive care units to be sure that all essential knowledge and practices needed are in their hands and acts as standardized protocol.

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