

Effect of Educational program on Nurses' Performance Regarding Acquired Skin injuries at Neonatal Intensive Care Units

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Abstract

Background: the skin of the neonate is less in thickness and more fragile than that of older infants requiring special nursing care to prevent acquired skin injuries in neonates. Maintaining skin integrity and prevention of skin injuries help to prevent complications to neonates and costs for the healthcare systems. **Aim:** the present study aimed to determine the effect of educational program on nurses' performance regarding acquired skin injuries at Neonatal Intensive Care Units. **Design:** quasi experiment research design **Settings:** the present study was conducted at Neonatal Intensive Care Units of Tanta University Hospital and Itay Elbaroud General Hospital. **Subjects:** a convenience sampling of 90 nurses working in the previously mentioned settings. **Tools:** two tools of data collection were used; a structured interview schedule for assessment of nurses' knowledge and observational checklists for assessment of nurses' practice regarding the skin care of neonates. **Results:** total scores of nurses' knowledge and practices improved after the educational program. There were statistically significant differences between nurses' knowledge and practice before, immediately after and three months after the educational program. **Conclusion:** Implementation of educational program regarding skin injuries improves nurses' performance at the Neonatal Intensive Care Units. **Recommendations:** Integrating the preventive care measures of acquired skin injuries in the routine care of the neonates. Continuous in service training about acquired skin injuries should be provided for neonatal nurses. **Keywords:** Acquired skin injuries, Educational program, Nurses' performance, Neonatal Intensive Care Units.

Introduction:

Neonatal period is a critical and challenging time of the child life it is the first 28 days after birth. During this period, the neonate has to accommodate to the extra- uterine life successfully. Some of neonates fail to adjust and require admission to neonatal intensive care units with subsequent life support. Great advances and technology have been applied in the care of neonates in the Intensive Care Units (NICU) leading to marked decrease in morbidity and mortality in the neonates. On the other hand, many life support devices and multiple invasive procedures make it challenging to maintain the skin integrity of the neonate⁽¹⁻³⁾

Skin is the largest organ of the body. It is the first defense line for the body from external insults. It is also responsible for thermoregulation, maintenance of fluids and electrolytes through prevention of loss and control excretion, perception of touch stimulation and providing storage for fats. Many internal diseases can be diagnosed by remarkable skin manifestations. Skin of the neonate showed incomplete maturation in its thickness and functions. The skin barrier reaches its full development during the first weeks after birth therefore, it is crucial to maintain skin integrity within the neonatal period.⁽⁴⁾

Acquired skin injuries (ASIs) in neonates are the breakdown of the skin integrity after birth. There are various risk factors for acquired skin injuries which may be intrinsic including; prematurity, congenital skin malformations, nutritional deficits, or dehydration; or extrinsic factors including connecting to monitors and life-supporting devices, vascular accesses, improper use of adhesives, use of harsh detergents, unsafe products, impaired mobility, increased

humidity, moisture and incompetent routine neonatal skin care^(5,6)

According to a systematic review published by August D, et al., in 2018, the incidence of neonatal acquired skin injuries and revealed that the prevalence was 9.25-43.1%.⁷ Another cross-sectional study in 2017 reported that, the prevalence of neonatal acquired skin injuries were about 26% of the studied neonates due to the usage of skin adhesive tapes⁽⁸⁾

The neonatal nurse should be aware about the intrinsic and extrinsic risk factors that put the neonate at a higher risk for acquiring skin injuries in the NICU in order to prevent their occurrence especially in the more vulnerable neonates.

Intrinsic risk factors include; prematurity, compromised circulation, generalized skin edema, birth skin problems, nutritional imbalances, and dehydration. Extrinsic risk factors include; life support devices ex., tubes, catheters, electrodes, probes, phototherapy, use of disinfectants topical skin agents, improper application of adhesives including fixation tapes, electrodes, restricted mobility and decreased activity, Use of harsh detergents and soaps, prolonged hospitalization of the neonate.^(9,10)

Common acquired skin injuries at NICUs include; diaper dermatitis, needle puncture marks, extravasation skin injuries, iatrogenic calcinosis cutis, calcified nodules, burns, mechanical injuries, pressure injury, nasal injury, phototherapy related skin problems, cutaneous complications of umbilical catheterization, anetoderma of prematurity^(11,12.)

Nursing care of the neonatal skin includes proper examination of the skin involving assessment of the risk factors for acquiring skin injuries and skin integrity. Risk

assessment guides nurses to effectively develop individualized skin care plan to avoid acquired skin injuries.⁽¹³⁾

General nursing care for the neonatal skin includes proper bathing, diaper care, and cord care, and gentle handling. The frequent change of diapers, keeping the skin dry, protecting the periumbilical skin during cord antisepsis, specific skin care during the use of invasive and noninvasive oxygen therapy, emollients, disinfectants and adhesive tapes.^(14,15,16)

In the same context, there are other preventive measures including; use of double-walled incubators the use of plastic transparent bags for the neonates, and transparent adhesive dressings to reduce transepidermal water loss. Additionally, prevention of ultraviolet associated skin injuries includes protection from direct exposure to sunlight passing from windows and also dim lightening of the nursery or cover the incubators to protect neonates from light injury.^(17,18,19)

Significance of the study:

Acquired skin injuries at Intensive Care Units are common adverse problems that negatively affect the health of the neonate. Most acquired skin injuries can be completely avoided through efficient nursing care. There is no standard approach for the neonatal nurse to deal with skin injuries, or systematic strategy adopted for assessing and monitoring the factors relating to their occurrence and subsequently minimizing them. There are few clear studies assessing the current knowledge of nursing staff regarding acquired neonatal skin injuries. The current study aimed to provide an educational program about nursing performance regarding acquired skin injuries in NICUs.

Aim of the study:

The present study aimed to determine the effect of an educational program on nurses' performance regarding acquired skin injuries at Neonatal Intensive Care Units.

Research hypothesis:

Implementation of educational program is expected to improve nurses' performance regarding acquired skin injuries at Neonatal Intensive Care Units.

Subjects and Method

Research design

Quasi-experimental research design was used to conduct the current study.

Setting:

The study was conducted at two neonatal Intensive Care Units, Tanta University Hospital which affiliated to the Ministry of Higher Education & scientific Research, Algharbia governorate and NICU at Itay Elbaroud General Hospital which is affiliated to the Ministry of Health and Population, Elbohira governorate.

Subjects:

Convenience sampling of 90 nurses working at previously mentioned settings. Fifty from Neonatal Intensive Care Units at Tanta university Hospital and forty from Itay Elbaroud General Hospital.

Tools of data collection:

Two tools were used to collect the data:

Tool (I): A structured interview schedule

It was designed by the researcher based on the review of literatures.^(9,19-21-) It consisted of two parts: **Part(1):** Socio-demographic characteristics of the nurses such as; age sex, marital status, educational level, years of experience at neonatal intensive care units, and whether they had attended any neonatal training courses.

Part (2): Nurses' knowledge about of the anatomy of skin, predisposing factors for

acquiring skin injuries, prevention of skin injuries, neonatal skin care and management of acquired skin injuries at neonatal intensive care units.

Nurses' knowledge was scored as following:

- Correct and complete answer was scored (2).
- Correct and incomplete answer was scored (1).
- Don't know or incorrect answer was scored (0)

The total score of nurses' knowledge was calculated as follow:

- Less than 65% was considered low level.
- From 65- <75% was considered moderate level.
- From 75%-100% was considered high level.

Tool (II):- Skin Care Observational Checklist:

It was developed by the researchers and used to assess nurses' practice regarding neonates ' skin care after reviewing recent related literatures.⁽²²⁻²⁸⁾ It was used to assess nursing interventions pre, post and three months after the implementation of the educational program. It included nursing practice of the following:

- a. Skin care including bathing, diaper care, cord care, prevention, and protection of skin during the use of invasive oxygen therapy, prevention of pressure injuries and decreasing trans-epidermal water loss.
- b. Assessment of acquired skin injuries including assessment of the risk factors for acquiring skin injuries and characteristics of the skin, signs of skin breakdown and special assessment of acquiring skin injury.

- c. Infection control practices for the nurses including antiseptic hand washing, use of appropriate personal protective equipment.

Nurses' interventions were evaluated as follows:

- Done correctly and complete were scored (1)
- Not done were score (0)

The total score for nurses' practice was considered as follow:

- Unsatisfactory practice: less than 70%.
- Satisfactory practice: more than 70%.

Method

1. Official permission was obtained from the Faculty of Nursing, Tanta University and the responsible authorities of the Intensive Care Units of Tanta University Hospital and Itay Elbaroud General Hospital.
2. Ethical and legal considerations:
 - The nature of the study was discussed with the participants.
 - Confidentiality and privacy were guaranteed all over the study.
 - Nurses' approval to participate in the study including the right to withdraw at any time was maintained.
3. Ethical approval was obtained from the Faculty of Nursing Scientific Research Ethics Committee.
4. Study tools were developed by the researcher based on the review of the related literatures.
5. Tools of the study were tested for their content validity and reliability by a jury of five experts in pediatric nursing.
6. A pilot study was conducted on (10%) of the study sample to test the feasibility, applicability and clarity of the tools. Accordingly, the needed modification was done. The time

consumed for each session was also, be assessed. The pilot sample was excluded from the study sample.

7. Neonatal nurses were interviewed and their knowledge was assessed using Tool I part (2) pre-test, immediate post-test and three months later.
8. Nurses were observed for their practice using (Tool II) pre-test, immediately post-test and after three months from the program implementation.

Field of work:

Data collection has taken six months starting from the beginning of November 2020 to the end of April 2021. The study was performed in four main phases; assessment, planning, implementation and evaluation phases.

1. Assessment phase:

The researcher obtained nurses approval for the participation in the study. Nurses were interviewed individually, socio-demographic characteristics, and nurses' knowledge using Tool I. Assessment of nurses' practices was also assessed using the observational checklists using tool (II) to obtain baseline data.

2. Planning phase:

The collected data were reviewed by the researcher, organized and the researcher set priorities and formulated the educational objectives and outcomes. The researcher selected the appropriate teaching methods including lectures, demonstration, re-demonstration, discussions. The researcher also, prepared educational materials including booklet and power point presentations during this phase to reinforce the understanding of the nurses.

3. Implementation phase:

The researcher implemented the educational program for nurses at the NICUs

through three sessions, three days / week. The studied nurses were divided into 9 subgroups each one consisting of 10 nurses.

Session one: It took about 20-30 minutes. The researcher focused on the anatomy of the skin, the characteristics of the neonatal skin, definition of the acquired skin injuries, risk factors for acquiring skin injuries and prevention of skin injuries, common acquired skin injuries in the NICUs, and the adverse consequences of skin injuries on the neonates.

Session two: It took about 30 minutes, the researcher revised the knowledge presented in the previous session and demonstrated measures of hand washing technique, wearing personal protective equipment, routine skin care practices including bathing, diaper care, cord care, assessment of risk factors, assessment of skin turgor, perfusion, color, and skin temperature and assessment of skin injuries of the neonate.

Session three: It took about 30 minutes the researcher reviewed the previous content and clarified measures to prevent the incidence of skin injuries involving safe and effective use of emollients, disinfectants and adhesives in the skin, special care of skin during oxygen therapy, prevention of trans-epidermal water loss (TEWL), and nursing management of skin injuries and care of skin wounds.

4. Evaluation phase:

Evaluation of nurses' performance was done immediately after implementation of the program and three months later. The effectiveness of the educational program was evaluated by comparing posttest results with pretest baseline data.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using SPSS

software. For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, Chi-square test (χ^2), Z value of the Mann-Whitney test, F value of the ANOVA test were used. Significance was adopted at $P < 0.05$ for interpretation of results of tests of significance.

Results:

Figures (1): shows percentage distribution of the studied nurses according to their age. It was clear that more than half of the studied nurses (60%) were in the age group of 25<30 years, compared to 12.2% of them who were between 30-<35 years with mean age of 26.71 ± 3.1 years.

As regards nurses, educational level, **Figures (2)** clarifies that nearly two thirds of the nurses (63.3%) had a bachelor degree of nursing, while the rest of nurses (36.7%) were graduated from nursing institutes.

Total scores of knowledge before, immediate, and three months after the educational program was illustrated in **Table (1)**. It was evident that only one fifth of nurses (21%) had had level of knowledge prior to the program that was significantly improved to 82.2% immediately and 70% three months after with statistical significant differences pre and immediately posttest ($P_1 = 0.001^*$), pre and post three months ($P_2 = 0.001^*$). No statistical significant difference was found between immediately after and three months post educational program.

Table (2) presents total score of practices before, immediate, and three months after educational program. It was obvious that nearly equal percent (84.4% & 82.2%) of the studied nurses had satisfactory practices immediately and three months after the program respectively compared to 43.3% of

them before the program with high statistical significant difference ($P=0.001^*$).

Concerning relation between nurses' total knowledge and their total practices **Table (3)** illustrates that there were significant positive correlations between nurses' knowledge and practices concerning skin injuries pre, immediate and three months after the program implementation ($P=0.001^*$).

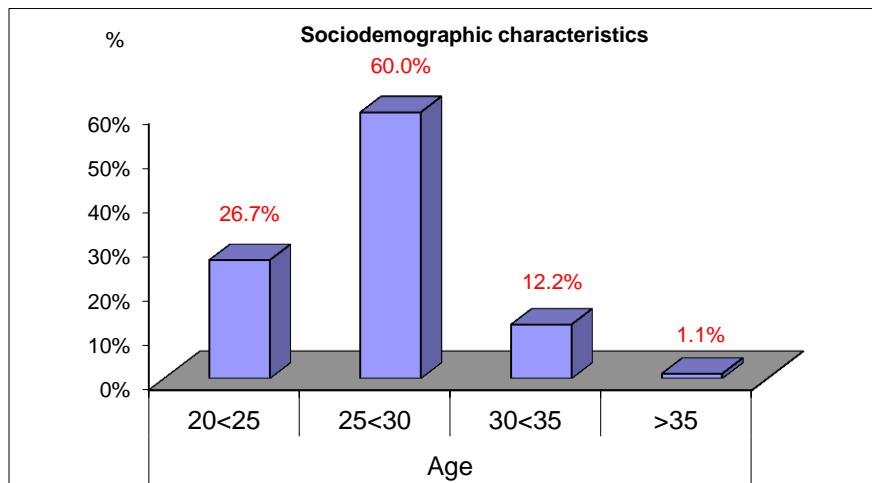


Figure (1): Studied nurses according to their age.

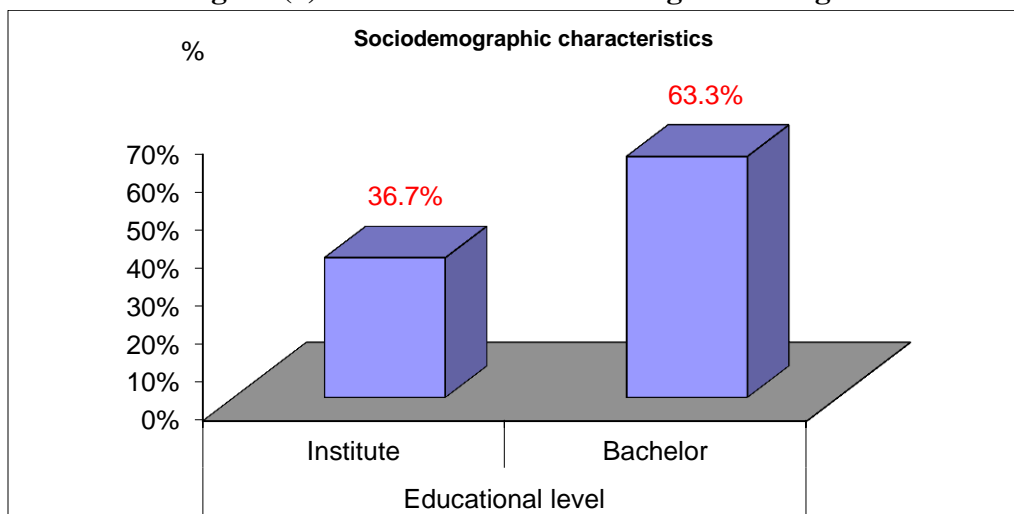


Figure (2): Educational level of the studied nurses

Table (1): Total scores of nurses' knowledge regarding acquired skin injuries before, immediate and 3 months after educational program.

Knowledge	Before	Immediate after	After three months	X ²
	No	No	No	
Low level	33	5	6	68.038
Moderate level	38	11	21	47.201
High level	19	74	63	4.102
P value	P1	P2	P3	
	**0.001	**0.001	0.129	

*Statistically significant difference at (P<0.05)

** High statistical significance at (P value < 0.001)

Table (2): Total scores of nurses practices regarding acquired skin injuries before & immediate and after three months of implementation the program.

Practice	Before	Immediate after	After three months	X ²	P
	No	No	No		
Unsatisfactory	51	14	16	32.968	**0.001
Satisfactory	39	76	74	29.119	**0.001

*Statistically significant difference at (P<0.05)

** High statistical significance at (P value < 0.001)

Table (3): Relation between nurses' knowledge and practice.

Practice	Knowledge	
	r	P value
Pre	0.661	0.001**
Immediate	0.834	0.001**
After three months	0.719	0.001**

*Statistically significant difference at (P<0.05)

** High statistical significance at (P value < 0.001)

Discussion:

Regarding the socio-demographic characteristics of the studied nurses, it was found that the majority of nurses were aged 25 < 30 that may be due to that younger nurses can tolerate the heavy workload of the NICU, that was not in the same line with **McKnigh et al (2020)**. who conducted a study in Kenya on neonatal nurses' strategies to cope with stress on and found that most of the nurses were on the average of 37 years old⁽²⁹⁾

Regarding the **educational level** of nurses, the present study revealed that nearly two-thirds of them had a bachelor's degree in nursing it may be due to that the most of faculty graduates are employed in the most critical parts of the hospital including the NICUs. These findings were consistent with **Abd El- Galil et al. (2019)** who assessed the

effect of staff development program on the neonatal nurses' performance and found that nearly the same percent holding a bachelor degree in nursing.⁽³⁰⁾

The present study showed improvement in the total scores of the studied nurses' knowledge immediately and three months after attending the educational program in comparison to their knowledge before the educational sessions this improvement in nurses' knowledge was similar to **Mohamed et al. (2019)** who conducted a study at Banha pediatric hospital to assess the effect of guidelines regarding pressure ulcer preventive measures and reported a remarkable improvement in nurses' knowledge after the implemented program in their study.⁽³¹⁾

Regarding the total scores of nurses' practices about acquired skin injuries in the

previously mentioned neonatal intensive care settings, nurses displayed significant progress concerning the overall neonatal skin care and prevention of acquired skin injuries. These results are concurrent with the intended outcome of the educational program which aimed to enhance nurses' performance regarding neonatal skin care. This improvement in the total practices of nurses was compatible with **Yan et al. (2021)** who conducted a meta-analysis to evaluate the effect of training programs on nurses' ability to care for subjects with pressure injuries.⁽³²⁾

This current study showed that there was a significant statistical correlation between the studied nurses' level of knowledge and their observed practices regarding neonatal skin care. That means enhancing nurses' knowledge would subsequently be reflected in their performance. These results agreed with **Abdu H(2019)**, who conducted a study to assess the knowledge and practice of immediate newborn care among nurses and found that the practices of the nurses were a strongly linked to level of knowledge.⁽³³⁾

Conclusion

Based on the findings of the current study, it was concluded that:

The educational program was effective in improving nurses' knowledge and practices related to the care of neonatal skin and the prevention of acquired skin injuries. Moreover, there was a highly statistically significant positive correlation between total scores of knowledge and practice related to the prevention of acquired skin injuries and the skin care of the neonates in the NICUs.

Recommendations

–Emphasis on the early detecting of the risk factors for acquiring skin injuries in the NICUs in each neonate.

–Integrating the preventive measures for acquired skin injuries in the routine care of the neonate.

–Continuous educational programs for the nurses working in the Intensive Care Units to enhance nurses' knowledge and practice and prevents the occurrence of skin injuries.

–Discharge instructions regarding neonatal skin care must be provided to the mothers

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