

Effect of Educational Program about Prevention of Neonatal Skin Breakdown on Nurses' Practices at Neonatal Intensive Care Units

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ABSTRACT

Background: Preventing neonates with skin breakdown is a high priority for neonatal care by reviewing clinical guidelines of skin care, implementing new procedures, and updating nurses' knowledge. **The study was aimed to** evaluate the effect of an educational program about prevention of neonatal skin breakdown on nurses' practices at neonatal intensive care units. **Subjects and method: Research design:** A quasi-experimental research design was used. **Setting:** The study was conducted at Neonatal Intensive Care Units (NICUS) of four hospitals (El Salam Hospital, Al Hayat Hospital, Specialized Maternity Hospital, and EL-Nasr Specialized Hospital) which are affiliated to the Universal Health Insurance Authority (UHIA) of Port Said governorate. **Subjects:** Convenience sampling included all nurses (70) working at the aforementioned hospitals, as well as 50 neonates in each program phase (150) who admitted during the time of data collection. **Tools used for data collection:** first, an observational checklist and second, scale termed as the Neonatal Skin Condition Score (NSCS). **Results:** statistically significant differences were found between nurses' total practice levels pre & immediate post, pre & follow up phase ($p \leq 0.005$). Also, between the immediate post and follow-up phase of program implementation ($p \leq 0.001$). **Conclusion:** implementing an educational program significantly improved nurses' practices and decreased neonatal skin breakdown. **Recommendations:** Providing continuous training education programs for nurses about prevention of skin breakdown in NICU.

Keywords: educational program, neonates, prevention, skin breakdown, nurses' practices

INTRODUCTION

The neonatal period is referred to as the period which lasts from birth to day 28 of life. The first few hours after delivery are a period of transition from intrauterine to extrauterine life, during which the neonate goes through a number of stages of adaption. Certain neonates need to be admitted to the neonatal intensive care unit (NICU_s) due to potential health issues such as prematurity, hypothermia, nutritional health problems, and hypoglycemia (Ricci & Kyle, 2021).

The neonatal period in which most neonatal mortalities happen worldwide. The World Health Organization (WHO) reports that 2.4 million neonates worldwide died in their first month of life in 2019 (WHO, 2020). In the first week, it is reported that, almost half of the neonatal mortalities may occur due to the skin's epidermal barrier function is still insufficient (Bişgin, Taplak & Polat, 2022). The skin acts as a barrier, thermoregulator, and means of communication for a variety of bodily processes and feelings. Neonatal skin care is crucial with undeveloped skin structures and functions because the skin serves as a barrier that protects and controls the body from the outside world (Stroustrup, Bragg & Gennings, 2018).

In terms of both structure and function, neonatal skin is very different from adult skin. The epidermis, dermis, subcutaneous tissue, and integument all have different structures (Garncarczyk, Adamczyk, Lubczyńska, Wcisło-Dziadecka, Antończak, & Jakubowska, 2021). The skin of the neonate is delicate, and the skin of a preterm neonate is undeveloped. Skin breakdown may be quite easy to happen to the skin. High skin permeability, which makes it possible for neonates to absorb topical medications, chemicals, and lotions via the skin and puts them at risk of infection and toxicity, is a serious worry. Neonates are susceptible to undetectable water loss and temperature instability (Yashwantrao, 2019).

When one or more layers of the skin have been disrupted, skin breakdown occurs.

The phrase "change to intact skin" was used to describe skin breakdown, which also included tissue loss, abrasion, simple skin penetration, and inflammation and pressure ulcers that were deep and widespread (Palmer, 2013). Neonatal skin breakdown rates range from 9.25% to 43.1%, indicating a continued high risk of skin breakdown for neonates in the NICU. The neonatal health at delivery has a direct factor that raise the risk of skin breakdown. skin integrity, birth weight, immobility, gestation, impaired -

tissue perfusion; surgery, malnutrition, and- sepsis are some of these intrinsic causes. Research has reported a direct correlation between lower gestation when the skin is at its most fragile and higher risk of skin breakdown. When extrinsic factors are taken into account, past research has shown that neonates who use medically supporting equipment have a significant risk of skin breakdown (Broom, Dunk, & Mohamed, 2019).

Skin integrity is compromised by invasive treatments and the use of devices. To keep the neonate alive in the neonatal intensive care unit, several invasive procedures and technical devices are required. Some of the equipment the care team needs to give care includes endotracheal tubes, catheters and nasal prongs, IV sets, and feeding tubes. When these devices are used in conjunction with physiological problems that already exist, it makes neonates more susceptible to skin breakdown, and consequently, infections (Santos & Costa, 2015).

A significant risk factor for neonate skin breakdown is the frequent use of tape in neonatal care. All of the skin's structures are present at birth, although many of its functions are still developing. The epidermis and dermis, the two layers of skin, are thin and hardly attached. These layers can get separated by even minor rubbing of the epidermis, such as when removing tape fast, which can result in a blistering and epidermal loss (Hockenberry, Wilson, & Rodgers, 2022).

The stress that urine, feces, friction, microorganisms, and chemicals put on neonate skin, particularly in the diaper area, can compromise barrier function and cause dermatitis, infection, and discomfort (Burdall, Willgress, & Goad, 2019). Possible side effects of skin care procedures include the danger of sepsis from topical petrolatum ointment application, the risk of acute hypothyroidism from endogenous thyroxine suppression from the povidone-iodine application, and the risk of chemical burns from chlorhexidine solution administration. Traditional monitor probes can cause skin breakdown in neonates because of physical irritants and the heat the probe produces (Mishra et al., 2021, Ethawi, Al Zubaidi, Schmölder, Sherif, Narvey, & Seshia., 2018).

New clinical recommendations for skin care have made prevention and treatment of neonates with skin breakdown a continual quality improvement (QI) endeavor. To lessen skin breakdown in neonates receiving NICU care, innovative procedures, materials, and staff training will be used (Boswell, Waker & Dowling, 2016). Early and frequent evaluations, the choice of appropriate preventative measures, the treatment of

existing skin conditions, and routine reevaluation of prevention and treatment strategies are all components of comprehensive skin care for neonates for prevention skin breakdown. Use evidence-based neonate skin care procedures and examine the skin regularly to preserve the neonate's skin integrity (Melnyk & Fineout, 2021).

AIM OF THE STUDY

The present research was aimed to evaluate the impact of an educational program about prevention of neonatal skin breakdown on nurses' practices at Neonatal Intensive Care Units through:

- Assessing nurses' practices about skin breakdown prevention in neonatal intensive care units
- Designing an educational program about prevention of neonates skin break down for nurses in neonatal intensive care units
- Implementing an educational program for nurses about neonatal skin break down in NICUs
- Evaluating the effect of an educational program about skin breakdown prevention on nurses' practices.
- Assess neonatal skin breakdown before and after application of an educational program about skin breakdown prevention.

Research hypothesis

- Nurses' practices regarding prevention of skin breakdown will be improved after implementation of an educational program.
- Neonatal skin condition score expected to be improved after the program than before.

SUBJECT AND METHOD

A quasi-experimental one-group pre-post-follow up assessment research design was used.

I. Research setting

The study was carried out at NICUS at four hospitals namely (El-Salam, Al-Hayat, Specialized obstetric - EL-Nasr specialized) affiliated to the Universal Health Insurance Authority (UHIA) in Port Said governorate.

Subjects

Sample A: All nurses (70) working in the aforementioned settings and agreed to participate in the study regardless of their age, sex, education and experience in years.

Sample B: A sample of 50 neonates in each program phase (150) who admitted during the time of data collection.

Tools of data collection

Two tools were used in this research:

Tool 1: Nursing Practices Observational Checklist

Based on Drost (2019), this tool was developed by the researcher and necessary modifications were done to simplify the steps of procedure. Researcher used it to assess the actual nurses' preventive practices of skin breakdown in NICU. The checklist consisted of the following: diaper care (8 steps), adhesive tape application and removal (8 steps), IV management and extravasation injuries (5 steps), minimize pressure (3 steps), nasal prong CPAP (6 steps), nasogastric tube (6 steps), and phototherapy (5 steps).

Regarding to observation checklist, it was checked as done or not done, which (1) score was given for done and (0) was given for not done. The total score was calculated by summing up and converted into a percent score. The total score of the observational checklist was 42 scores. Nurses' total level of practices has been classified as the score of $\geq 80\%$ considered adequate practice and a score $< 80\%$ considered inadequate practice (Said, Mohamed & Draz, 2019).

Tool 2: Neonatal Skin Condition Score (NSCS) scale

The Association of Women's Health, Obstetricians, and Neonatal Nurses supported a neonatal skin care evidence-based practice initiative that led to the development of NSCS, which measures neonate's skin (AWHONN, 2011). The best skin condition is indicated by a score of 3, while the worst skin condition was indicated by a score of 9. This scale evaluates the three primary skin conditions—dryness, erythema, and disintegration. The three subscales have item scores that range from 1 to 3. Scores of 1 indicate good skin integrity, whereas scores of 3 indicate poor skin integrity. The scores are between 3 and 9. The best possible score is three, and the poorest possible score is nine.

II. Operational design

The operational design of the current study included the preparatory phase, pilot study and field work.

1. Preparatory phase

Review of the relevant literature from the past and present that addresses different aspects of preventing skin breakdown in the NICU, using readily available books, articles, periodicals, online searches, textbooks, scientific journals, and magazines to adapt to research difficulties and develop the research tools.

2. Content validity of the tool

A group of five pediatric nursing specialists decided after reviewing the tool for completeness, applicability, clarity, and relevancy and making minor changes based on their opinion.

3. Reliability of tool

Cronbach alpha coefficient was used to assess the internal consistency of the tool and its value was 0.729 for Nurses' practices.

4. Pilot study

Before the beginning of the data collection phase, a pilot research was conducted on 10% of the total number of nurses in the aforementioned settings to assess the precision, applicability, and viability of the research tools as well as it was used to determine how long it would need to complete the tools. It also assisted in identifying problems and barriers that would impair data collecting. The study tools were modified as needed. The pilot sample did not include any of the nurses who participated in the pilot study. During the beginning of March 2021 to the end of March 2021, it was conducted.

5. Field work

This fieldwork was achieved through assessment, planning, implementation and evaluation phases.

- **Assessment phase**

Initially, researcher went to the research setting, interviewed every nurse there, made introductions to every nurse participating, discussed the goals, timeline, and activities of the study, encouraged the nurses to participate, and got their agreement. prior to the data collection. Then, assessment of nurses' practices about prevention of skin breakdown in NICU was performed using tool I and tool II. The three-month duration of this phase was from April 2021 to June 2021. The data gathered served as a pre-test for comparing baseline data. Also, it assisted in creating an educational intervention based on needs that were determined.

- **Planning phase**

Based on assessment phase, the researcher designed the training program based on the actual need assessment of the studied nurses through reviewing the related literature and based on recent evidence based guidelines for skin breakdown prevention. Practical skills about prevention of skin breakdown in NICU were covered through educational training program. The researchers created a booklet with the program's material that was written in easy Arabic and reinforced via images to make it easier to understand.

The program's overall goal was to improve nurses' practice about prevention of skin breakdown in NICU. Following procedures were included in the practical skills for

the prevention of skin breakdown: care for neonates with nasogastric tubes, nasal prong CPAP, under phototherapy, IV management, managing extravasation injuries, minimizing pressure, applying and removing adhesive tape.

- **Implementation phase**

The developed skin break down prevention educational program was given in two practical sessions; lasting between 45 and 60 minutes for each session. In order to facilitate practical sessions, nurses were separated into small groups with 5 to 6 members in each group. Each group received a description of the educational program as follows before the session began: (introduction, its importance, training plan, learning objectives), and each nurse received an individual re-demonstration of the practical session.

Depending on the number of nurses, there were 3 sessions each week. Many instructional techniques, including lectures, brainstorming sessions, small-group discussions, demonstrations, and repetitions of demonstrations, were employed. There were many different instructional tools used, including power point, video, posters, audiovisual materials, and handouts. To draw attention to, inspire, and promote home review, home education, and practice support, training manuals were also given to each nurse. Every neonate was observed to assess neonatal skin condition. The program operated from September 2021 through December 2021 for four months.

- **Evaluation phase**

Assessing the improvement in nurses' practices was the basis for determining the program's effectiveness. This was accomplished by comparing the pretest with posttest immediately done after the implementation of the program, and three months later. The three-month duration of this phase was from April 2022 to June 2022. A comparison of Neonatal Skin Condition Score (NSCS) pre , immediately post program implementation and three months later was made to evaluate the impact of the program on nurses' practices.

III. Administrative Design

Before beginning any study step, the Health Insurance Authority received an official letter from the Dean of the Nursing faculty outlining the chosen study topic and notifying the hospital director and NICU director in Port Said governorate to conduct the study after explaining the aim of the study.

Ethical Consideration

Health insurance authority approval was obtained to facilitate hospital directors' cooperation in the study after clarification of the study's purpose, and approval was obtained from each participant after explanation of the study's purpose and the specifics of the data collection process so that she was aware of the significance of her participation. Also, NICU nurses were given a concise and in-depth explanation of the study to reassure them that any information received would be kept confidential and used only for the needs of the study. The subjects could not be harmed by the study procedures. Professional assistance and counsel were given where required. The nurses who participated in the study were made aware that it was completely voluntary and that they had the right to leave the study at any moment and without explanation.

IV. Statistical analysis

Number and percentage distributions were used to organize, rectify, combine, and evaluate the collected data. Statistics were performed using the following techniques: percentage, mean, standard deviation, SD-Pearson correlation (r), chi-square (X^2), percentage error (P value), and significance of findings at P less than 0.05.

RESULTS

Table (1) shows that, 52.9% aged between 30 to less than 35 years with mean 30.9 ± 4.7 , 65.7% had one to less than five years' experience in NICU and 50% graduated from technical nursing institutes. In addition 38.6% of the studied nurses attend previous training courses regarding neonatal skin care, and 55.6% of them trained once, of the studied nurses (45.7%) reported that there were no standard guidelines about neonatal skin care in their NICU to follow it.

Table (2) shows that, 14.3% of the studied nurses had adequate practice regarding diaper care in pre program which reached to 81.4% in post program phase, and slightly declined to 77.1% in the follow up phase. Related to practice of adhesive tape application and removal, it was found that 12.9% of the studied nurses had adequate practice in pre program compared to 78.6% in post program phase, which slightly decreased to 60.0% in the follow up phase. Regarding IV management and extravasation injuries, it was evident that, 5.7% only of the studied nurses had adequate practice in preprogram, that reached to 78.6% & 60.0% post program and follow up phases respectively. Also, 70.0%, 100.0% & 87.1% of the studied nurses had adequate practice related to minimize Pressure throughout phases of program. Concerning care of neonates with nasal prong CPAP, 22.9% had adequate practice in pre program compared 88.6 % in post program phase, and 67.1% in the follow up phase. As regard to care of neonates with nasogastric tube. The same table showed that, 12.9 % of the studied nurses only had adequate practice in pre-program, which enhanced to 72.9% immediately post, and 68.6 % at the follow up phase. Additionally, more than half of the studied nurses (52.9%) had adequate practice related to care of neonates under phototherapy in pre program, compared to 100 % immediately post and at follow up phases of program.

Table (3) shows that, there was obvious improvement in overall items of practices with statistically significant difference between pre and post total practices of the studied nurses about prevention Of skin breakdown. Also between pre and follow up overall practices of them about prevention of skin breakdown ($P < 0.05$).

Table (4), shows that, total nurses practices improved from 11.4 % who had adequate practices related to prevention of skin break down at preprogram to reached to 85.7%, and 62.9% immediately post and 3 months later after program implementation respectively with statistical significant differences were found between nurses' total all

practices levels pre & immediate post, pre & follow up phase ($p \leq 0.005$). Also, immediate post and follow up phase ($p \leq 0.001^{**}$).

Table (5) shows that, there was statistically significant relation between nurses' age and their total practices in the follow up phase, and between nurses' education and their total practices (pre, post and follow up). Also, there was statistically significant relation between nurses' years of experience in NICU and their total practices through the program stages.

Figure (1) illustrates that there was an improvement in the total mean scores of neonatal skin condition from 5.5 pre program implementation to 3.6 immediately post program, and slightly raised to 4.2 at the follow up phase of program implementation.

Table (1): Percentage distribution of the studied nurses about their characteristics (n=70).

Nurses' characteristics	N	%
Age/years:		
20 -< 25	10	14.3
25-<30	14	20.0
30 -< 35	37	52.9
≥ 35	9	12.9
$\bar{X} \pm SD$	30.9±4.7	
Experience / years in NICU:		
1-< 5	46	65.7
5-< 10	14	20.0
≥ 10	10	14.3
$\bar{X} \pm SD$	4.9±3.9	
Academic qualifications:		
Bachelor of nursing science	28	40.0
Technical Institute of nursing	35	50.0
Diploma of secondary nursing schools	7	10.0
Attendance of previous training courses about neonatal skin care:		
Yes	27	38.6
No	43	61.4
Number of training courses (n=27);		
One	15	55.6
Twice	7	25.9
Three	5	18.5
$\bar{X} \pm SD$	1.65±.79	
Availability of standard guidelines about prevention of skin breakdown in NICU;		
Yes	16	22.9
No	32	45.7
Don't known	22	31.4

Table (2): Percentage distribution of the studied nurses' total practices related to prevention of skin breakdown in (NICUs) throughout program phases (n=70).

Prevention of skin breakdown	Program phases											
	Pre				Immediately Post				Follow up			
	Adequate		Inadequate		Adequate		Inadequate		Adequate		Inadequate	
	n	%	n	%	n	%	n	%	N	%	N	%
Diaper care	10	14.3	60	85.7	57	81.4	13	18.6	54	77.1	16	22.9
Adhesive tape application and removal	9	12.9	61	87.1	55	78.6	15	21.4	42	60.0	28	40.0
IV Management and Extravasation injuries	4	5.7	66	94.3	49	70.0	21	30.0	39	55.7	31	44.3
Minimize Pressure	49	70.0	21	30.0	70	100.0	0	0.0	61	87.1	9	12.9
Nasal prong CPAP	16	22.9	54	77.1	62	88.6	8	11.4	47	67.1	23	32.9
Nasogastric tube	9	12.9	61	87.1	51	72.9	19	27.1	48	68.6	22	31.4
Phototherapy	37	52.9	33	47.1	70	100.0	0	0.0	70	100.0	0	0.0

Table (3): Mean distribution of studied nurses' practices related to prevention of skin breakdown for neonates throughout the program phases (n=70).

Total nurses' practices	Pre/ Immediately post				Pre / Follow up			
	Pre Mean±SD	Post Mean±SD	t	Sig	Pre Mean±SD	Follow up Mean±SD	T	Sig
Diaper care	2.5±2.2	6.1±1.4	14.88	.000	2.5±2.2	5.2±1.8	8.42	.000
Adhesive tape application and removal	1.67±2.2	5.38±1.9	10.38	.000	1.67±2.2	4.93±1.9	9.32	.000
IV Management and Extravasation injuries	2.8±.89	4.8±.86	15.49	.000	2.8±.89	4.1±1.1	8.36	.000
Minimize Pressure	1.9±.84	2.8±.43	8.25	.000	1.9±.84	2.4±.71	4.61	.000
Nasal prong CPAP	2.3±1.7	5.5±.74	14.02	.000	2.3±1.7	5.02±1.2	11.55	.000
Nasogastric tube	1.4±1.5	4.7±.52	17.19	.000	1.4±1.5	4.5±.88	15.79	.000
Phototherapy	3.4±.91	5.0±.00	14.59	.000	3.4±.91	4.9±.30	12.76	.000
Total practices of nurses	16.01±4.5	34.2±2.7	28.68	.000	16.01±4.5	31.1±3.07	22.80	.000

t- paired sample t test

Significant level (p< 0.05)

Table (4): Percent distribution of total nurses' practices levels of satisfaction related to prevention of skin breakdown before and after, 3months later program implementation (n=70).

Nurses' total practice levels	Pre		Immediately Post		Follow		Test of significance		
	n	%	n	%	n	%	P1	P2	P3
Adequate ($\geq 80.0\%$)	8	11.4	60	85.7	44	62.9	$\chi^2 = 3.97$ P = 0.046*	$\chi^2 = 6.41$ P = 0.032*	$\chi^2 = 13.96$ P \leq 0.001**
Inadequate ($< 80\%$)	62	88.6	10	14.3	26	37.1			

(*): Statistically significant at $P < 0.05$

(**): Highly statistical significance at $P < 0.001$.

P1: comparison between pre & immediate post

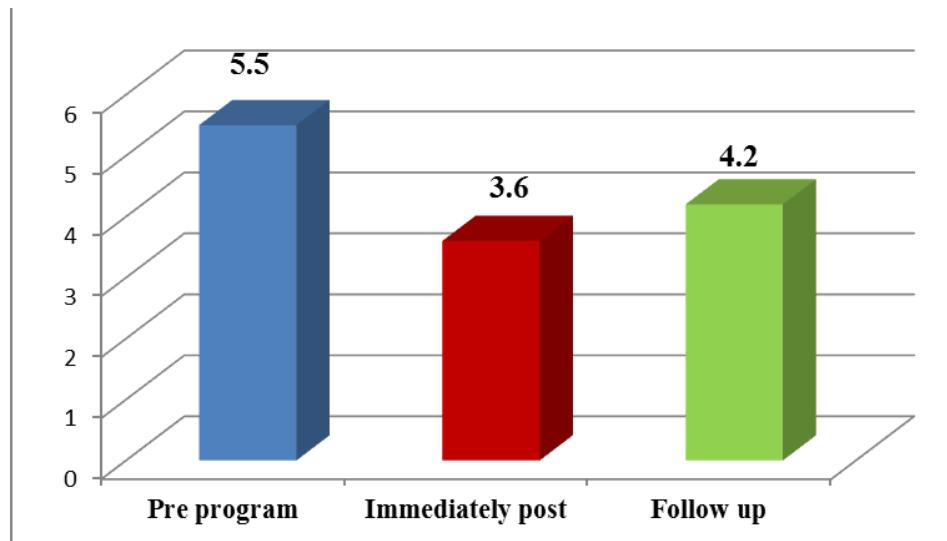
P2: comparison between pre & follow up after 3 months

P3: comparison between immediate post & follow up after 3 months

χ^2 : Chi square

Table (5): Relation between characteristics of the studied nurses and their total practices related prevention of neonatal skin breakdown in NICU throughout program phases (n=70)

Nurses' characteristics	Pre		X ²	Sig	Immediately post		X ²	Sig	Follow up		X ²	Sig
	Adequate	Inadequate			Adequate	Inadequate			Adequate	Inadequate		
	N(%)	N(%)			N(%)	N(%)			N(%)	N(%)		
Age (years):												
20 <25	2(20.0)	8(80.0)	2.01	.570	10(100.0)	0(0.0)	4.39	.222	9(90.0)	1(10.0)	11.56	.008*
25 <30	2(14.3)	12(85.7)			11(78.6)	3(21.4)			7(50.0)	7(50.0)		
30 <35	4(10.8)	33(89.2)			30(81.1)	7(18.9)			19(51.4)	18(48.6)		
≥ 35	0(0.0)	9(100.0)			9(100.0)	0(0.0)			9(100.0)	0(0.0)		
Academic qualifications												
- Diploma of secondary nursing schools	1(14.3)	6 (85.7)	8.09	.044*	6 (85.7)	1(14.3)	8.75	.031*	2(28.6.)	5(71.4)	6.57	.050*
-Technical institute of nursing	7 (20.0)	28 (80.0)			30(85.7)	5(14.3)			25(71.4)	10(28.6)		
-Bachelor of nursing science	0 (0.0)	28 (100.0)			24(85.7)	4(14.3)			17(60.7)	11(39.3)		
Experience / years:												
1 < 5	5(10.9)	41 (89.1)	10.78	.013*	40 (87.0)	6 (13.0)	16.25	.011*	29(63.5)	17(37.0)	18.6	.001*
5 < 10	3 (21.4)	11 (78.6)			11(78.6)	3(21.4)			9(64.3)	5(35.7)		
≥ 10	0 (0.0)	10 (100.0)			9(90.0)	1(10.0)			6(60.0)	4(40.0)		
Training courses:												
Yes	3(11.1)	24(88.9)	.004	.947	22(81.5)	5(18.5)	.643	.423	16(59.3)	11(40.7)	.244	.622
No	5(11.6)	38(88.4)			38(88.4)	5(11.6)			28(65.1)	15(34.9)		



	High skin breakdown
	Medium skin breakdown
	low skin breakdown

Figure (1): Total mean scores of neonatal skin condition throughout the program phases.

DISCUSSION

Regarding the studied nurses' total practice, improvement in practices overall items practices with statistically significant difference between pre and post total practices of them about skin breakdown prevention. Also between pre and follow up total practices of them about prevention of skin breakdown ($P < 0.05$). The minority of the studied nurses had adequate total practice score before program compared to most of them at immediately post and nearly three fifth three months later.

Additionally, statistically significant differences between the total nurses' practices across program phases (pre, immediate post, and follow up phase) were found, which may be interpreted as the success of the current educational program enhancing nurses' practices concerning skin breakdown prevention. The findings of the current study concur with those of Abd Elrazek (2020), who discovered that there were notable improvements in the nurses' practices following the intervention.

In order to prevent diaper dermatitis, the perianal area should be kept dry and clean, and diapers should be changed as frequently as necessary. According to the European Roundtable Meeting on Best Practice Healthy Baby Skin Care, buffers should be applied to diaper wipes in order to keep the pH between slightly acidic and neutral. To avoid scrubbing, which can break the barrier, drying can be done by gently patting with a dry towel or soft cloth. Diaper dermatitis can be treated and prevented by using barrier creams with an appropriate amount of petrolatum and zinc oxide (Gupta et al., 2022).

Nurses' practices regarding the prevention of skin breakdown in relation to diaper care had significantly improved. Less than one fifth of the studied subjects had adequate practice related to diaper care in pre program which reached to majority in post program implementation and more than three quarter three months later. The improvement in this study is parallel to study conducted by Diab (2015), who stated that, most of nurses had more satisfactory practice toward diaper care on post intervention.

Only one fifth of the research nurses had adequate practices score regarding prevention of skin breakdown in relation to adhesive tape application and removal prior program. On the other hand, nurses' practices score was increased to more three quarter immediately post program implementation and nearly three third during follow up phase. This might have been caused by lack of guidance and the nurses didn't know the proper technique for applying and removing adhesive tape. Another justification for not including adhesive tape application and removal in nurse curricula. This considers one of the main purpose of epidermal stripping in NICU. Identifying risk factors is the starting point for the prevention of skin breakdown, which recommended for giving a full educational program for nurses about adhesive tape application and removal and its dangers on the skin breakdown.

This view was reinforced by August, New, and Kandasamy (2021) whose found that neonatal skin breakdown occurs more frequently than in the adult population, with all neonatal injuries occurring while receiving hospital care. Skin breakdown occurs more frequently in soft tissue locations and is associated with the adhesive tape connected with medical devices required to provide care.

Observation of the nurses when caring for newborns with nasal prong CPAP, less than one quarter of them had adequate practices in pre program compared the majority immediately post, and approximately two third three months later. These findings reinforced by Said, Mohamed, and Draz (2019) research in Egypt, who found that just one-tenth of the examined nurses had a competent level prior to the introduction of the nursing program, compared to almost two-thirds of them immediately after.

These findings supported also by Milligan, and Goldstein (2017), whose study aimed to standardize care and enhance assessments for neonates receiving non-invasive respiratory support (NIRS) therapy to lessen complications related to nasal injury. and found that, knowledge scores slightly increases from an average of 6.76 (SD = 2.016) to 6.88 (SD = 1.495, $p = 0.833$). The incidence of nasal injuries from NIRS use was decreased by 15.8% (34.7% post program compared to 18.9%; $p = 0.086$) pre program implementation.

The present study shown that, more than half of the studied nurses had adequate practices for prevention of skin breakdown in relation to phototherapy in the pre program compared to all of them immediately post and three months after program. These outcomes can be attributable to the fact that nurses were knowledgeable about care for neonates under phototherapy because they were extensively taught in nursing schools, it's consider a part of phototherapy protocol, and nurses in NICU should perform it every day. This finding is in harmony with a study by Mohamed, El Dakhkhny, Bassam, and El Sayed (2019), which was conducted in Egypt and discovered that the majority of nurses had high practice scores on the preventative measures for phototherapy.

Results of the existing study showed that there was statistically significant relation between nurses' age and their total practices in the follow up phase. As the practices scores were statistically higher among nurses aged between 30 to less than 35 years old in the follow up phase, as mentioned previously, whenever the nurses' ages increases, whenever their practices increased. This finding was in agreement with Sabaq, and Amer (2018), whose study carry out in Egypt at Benha University and found that there was a statistically significant positive correlation between total

compliance of nurses with their age and years of experience after program implementation.

Regarding to the relation between nurses' total practices and their level of education, this study findings revealed that the nurses with high educational level had adequate overall practices regarding prevention of skin breakdown throughout the program phases. This finding was predicted as level of education has positive effect on nurses' practices.

Concerning years of experience the studied nurses in NICU, there was statistically significant relation between nurses' years of experience in NICU and their total practices through the program phases (pre, immediate post, follow up). As the practice scores were statistically higher among nurses with experience from 2-5 years. This result may be due to the years of experience enabling nurses to master skills competently.

Regarding efficiency of educational program on improving neonatal skin condition and prevent skin break down. The results of the present study indicated that, the skin of the studied neonates was highly broken down pre program with mean score 5.5 and become low broken immediately post the program with mean improved to 3.6 and return to be medium broken with mean of 4.2 three months later of program implementation. This result reflects the effect of educational program in prevention of skin breakdown. This finding may due to applying program to prevent skin breakdown, allow rapid spread of best practices among nurses result in an improving neonatal skin condition.

These findings supported by Said, Mohamed, and Draz (2019) who found that, preterm newborns in the control and study groups had a statistically significant difference in their total mean Neonatal Skin Condition Score scores in the first, second, and third weeks following program implementation

CONCLUSION

According to the current study's findings, it was concluded that the total practices of the nurses who participated in the study had improved. The majority of

the studied nurses had adequate total practices scores for preventing skin breakdown in the immediate post-program phase, but these scores had declined slightly during follow-up. Last but not least, the training course was successful in enhancing nurses' practices for preventing skin breakdown in the NICU. Also, with the use of standardized techniques, neonates skin breakdown was decreased.

RECOMMENDATIONS

In light of the results of current research, the following recommendations are proposed:

1. Ongoing educational programs, and nurse training to enhance procedures for preventing skin breakdown in NICUs.
2. To assist nurses in their work, emphasize the existence of printed rules for preventing skin breakdown in the NICU and briefly describe them as manuals, posters, and booklets.
3. Studies should be conducted to identify the prevalence and contributing factors of skin breakdown in neonates admitted to the NICU.

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تأثير برنامج تعليمي عن الوقاية من تحطم الجلد لحديثي الولادة على ممارسات ممرضي وحدات العناية المركزة لحديثي الولادة.

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الخلاصة

رعاية الاطفال حديثي الولادة من تحطم الجلد اولوية قصوى في رعاية حديثي الولادة ، وذلك من خلال تحديث الإرشادات السريرية للعناية بالجلد ، وتطبيق ممارسات جديدة وتحديث معلومات الممرضين. **هدف** الدراسة: هو تقييم تأثير برنامج تعليمي عن الوقاية من تحطم الجلد لحديثي الولادة على ممارسات ممرضي وحدات العناية المركزة لحديثي الولادة. **التصميم:** تم استخدام بحث شبه تجريبي لمجموعة واحدة (قبل – بعد- متابعة). **مكان الدراسة:** تم تنفيذ الدراسة في وحدات العناية المركزة لحديثي الولادة في مستشفى السلام ومستشفى النساء التخصصي و مستشفى الحياة ومستشفى النصر التخصصي للأطفال التابعين للتأمين الصحي الشامل في محافظة بورسعيد. **عينة البحث:** تضمنت الدراسة كل الممرضين (٧٠) الذين يعملون في وحدات العناية المركزة لحديثي الولادة بالمستشفيات السابق ذكرها، بالإضافة الى ٥٠ طفل حديثي الولادة دخلوا خلال وقت جمع البيانات. **أدوات جمع البيانات:** تم استخدام أداتين لجمع البيانات ، **الأولى:** استمارة ملاحظة لتقييم ممارسات الممرضين للوقاية من تحطم الجلد بوحدات الرعاية المركزة لحديثي الولادة **والثانية:** مقياس حالة الجلد للطفل حديثي الولادة. **النتائج:** أشارت نتائج الدراسة إلى وجود فروق ذات دلالة إحصائية على جميع مستويات الممارسات للممرضين قبل وبعد البرنامج مباشرة و قبل البرنامج والمتابعة و كذلك وبعد البرنامج مباشرة والمتابعة. **الخلاصة:** كان لتنفيذ البرنامج التعليمي أثر فعال في تحسين ممارسات الممرضين عن للوقاية من تحطم الجلد وكذلك في تقليل تحطم الجلد عند حديثي الولادة. **التوصيات:** توفير برامج تعليمية تدريبية مستمرة للممرضين عن الوقاية من تحطم الجلد في وحدة العناية المركزة لحديثي الولادة.

الكلمات المرشدة: برنامج تعليمي - حديثي الولادة – الوقاية من تحطم الجلد - ممارسات الممرضين.