Effect of skin care bundle program on improving nurses' practice and child's outcome

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Abstract

Background: Bed sores (Pressure ulcers) are the most common iatrogenic events associated with healthcare. Pressure Ulcers (PUs) are localized skin damages that occur when soft tissue is compressed between a bony prominence structure and external forces for an extended period of time. It can occur because of shear and friction. Critically ill children admitted in PICU are at risk for pressure ulcers due to immature skin, decreased perfusion, decreased mobility, altered neurologic responsiveness, volume overload, moisture, and medical devices. Aims: was to evaluate the effect of skin care bundle on improving nurses' practice and child's outcomes. Subjects & methods: Research design: A quasi experimental design was used. Subjects: the study included a convenient sample of nurses (n=60) and purposive sample of critically ill children (n=50). Setting: This study was conducted at two settings, Pediatric Intensive Care Units at Benha University Hospital and Specialized Pediatric Hospital at Benha city, Egypt. Tools of data collection: Three tools were used to collect the necessary data included; a structured interview questionnaire, Observational checklist used to determine nurses' practice regarding SKIN care bundle and Braden scale risk assessment tool to assess severity of risk for developing pressure ulcer among critically ill pediatric patients. Results: It was found that there was highly statistically significant difference throughout program phases regarding skin care bundle and pressure ulcer practice among the studied nurses ($P < .001$) and a statistically significant difference in total score of children risk assessment pre and post the program ($P < .001$). Conclusion: In the light of the study findings, it was concluded that, the training program had a positive effect on improving nurses' practice regarding SKIN care bundle and prevention of PUs as shown on post and follow up test than pretest and had a positive outcomes on children at the pediatric intensive care unit Recommendations: The health care system should be trained and educated in pressure ulcer risk assessment scale and prevention to recognize the risk factors that lead to the development of pressure ulcers and how to maintain correct and suitable preventive measures.

Key Words: Nurses, Practice, SKIN care bundle, pressure ulcers, Pediatric intensive care unit.

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Introduction

Pressure ulcers are defined as an area of localized damage to the skin and or underlying tissue as a result of pressure or pressure and shear. Risk factors for pressure ulcers include, but are not limited to increasing age, poor mobility, poor nutrition and multi-morbidity [1]. Critically ill children admitted in PICU are at risk for pressure ulcers due to immature skin, decreased perfusion, decreased mobility, altered neurologic responsiveness, volume overload, moisture, and medical devices. The PU occurs usually at pressure dependent regions of bony prominence due to prolonged contact with a firm surface [2]. There is a multifactorial risk associated with the development of PUs, which defined as intrinsic and extrinsic factors. Intrinsic factors are including duration, amount of pressure, friction, shear, and moisture, while, extrinsic factors are including poor perfusion, malnutrition, infection, anemia and immobility. But a recent study reported that, low levels of albumin are an indicator of malnutrition. Albumin' normal levels range between 36 and 52 g/L and the levels of pre - albumin (normal levels are between 16 and 35 mg/dL) may reflect the current nutritional status. Therefore, albumin and pre albumin levels should be routinely evaluated for the pediatric patients weekly or biweekly to reveal trends in matching nutritional therapy [3]. PI ranges from skin redness to full skin and tissue loss, exposing the tendons and bones. There are four stages of PI, such as stage I–non-blanchable erythema, stage II–partial thickness skin loss, stage III–full thickness skin loss, and stage IV–

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partial thickness tissue loss. The cases, where the depth of the injury is unknown, are classified as either unstageable PI due to the presence of eschar or slough limiting the ability of the assessor to stage or suspected deep tissue injury if a localized skin area is of discolored purple or maroon colors [4]. Preventing PIs in critically ill patients requires a structured, tailored, and multifaceted PI prevention approach with unit-based quality assurance projects that monitor PI prevalence and assess the effectiveness of the implemented preventive measures. Using the recently updated evidence-based guidelines on PI prevention and care is helpful [5]. Using care bundle to avoid hospital acquired conditions is a quality improvement methodology that is gaining increasing recognition. A bundle is a set of interventions preferably evidence-based, intended for a defined patient population and care setting that, when implemented together will result in better outcomes than implemented individually. Typically, a bundle has 3-6 relatively independent elements that are accepted by clinicians as care that should be delivered as usual practice [6]. SKIN care package is a collection of quality management ideas that can be implemented in the intensive care unit with the aim of reducing the incidence of pressure ulcer development by assessing the risk of ulcer from pressure, skin inspections and using skin care bundle plans that will take place constantly for pediatric patients receiving care [7]. Components of this bundle concise in an abbreviation, that include "S" support surface, "K" keep turning every two hours for preventing ischemia of soft tissue, I" improve moisture management/incontinence management for maintaining skin integrity and "N" Nutritional management for promoting wound healing and preventing pressure ulcer development [8]. Prevention Strategies for Optimal Skin Health As previously discussed, maintaining skin integrity, especially in younger pediatric populations, is important in preventing PIs [9].

Significance of the study

Hospital acquired pressure injuries occur in 3%–34% of hospitalized patients worldwide and result in longer hospital stays, increased morbidity and increased human suffering [10]. In addition, it is necessary for PICU nurses to have a recognized process of assessing skin condition, and a reliable tool to be used to measure children at risk for PUs efficiently, rather than to base clinical decisions on their own subjective opinion and experience, which predispose children to the hazards of misclassification of risk [11].

Aims

The study aimed to Evaluate the effect of skin care bundle program on improving nurses' practice and child's outcomes.

This aim was fulfilled through the following objectives

Assessment of nurses' practices as regarding applying SKIN care bundle.

Design training program based on the actual need assessment of nurses in pediatric intensive care unit.

Implement training program for nurses in pediatric intensive care unit about SKIN care bundle.

Evaluate the effect of training program on modifying nurses' practice in pediatric intensive care unit and child's outcomes.

Research hypothesis

Nurses' practice and child's outcomes will be improved regarding skin care bundle after implementation of the program.

Subjects and methods

Research design

A quasi-experimental design (pre, post and follow up) was utilized to evaluate the effect of skin care bundle on improving nurses' practice and child's outcomes.

Setting

This study was conducted at two settings: Pediatric Intensive Care Units at Benha University Hospital and Specialized Pediatric Hospital at Benha city.

Subjects

A convenient sample of nurses (n=60) working at pediatric intensive care unit.

Purposive sample of all children(n=50) who were admitted through the study period with the following criteria:

Age from 1 year to 12 years

Critically ill pediatric patients regardless the diagnosis

Children with a length of stay longer than or equal to 2 days

Tools of Data Collection

Data was collected through the following tools

Tool I: A structured interview questionnaire sheet for nurses

It was designed by the researcher to assess the demographic data of nurses such as age, educational

level, years of experience and attendance to any training about skin care bundle.

Tool II: Observational checklists

The checklists were developed by the researcher guided by [12-13] to assess nurse's practice as regarding care for pressure ulcer in critically ill pediatric patients. It was comprised of the following parts:

Part (1): A checklists of a designed skin care bundle program

It was developed by the researcher guided by [12]. It was composed of four main sub items. The scoring system was developed by the researcher, each correct step done scored one point, and not done scored zero point. Total score of practice totaled 31 marks and distributed as follows:

Surface (9 marks)
Keep turning (8 marks)
Incontinence care (11 marks)
Nutrition (3 marks)

Part (2): A checklists for weight measurement in children

It was developed by the researcher guided by [13] to assess the actual nurses' practice of measuring weight. It was discussed of two main sub items. Total score of practice totaled 20 marks and distributed as follows:

Weight measurement for young children less than 2 years old (13 marks)
Weight measurement for children older than 2 years old (7 marks)

The total score of nurse's practice was classified as follows:

Good 80%
Fair from 60% to >80%
Poor < 60%

Tool (III): Children's assessment sheet

It was comprised of two parts as the following:

Part (1)

It was concern with demographic data and health characteristics of the children admitted in PICU such as age, sex, residence and medical data that related to patient's status such as diagnosis and their predisposing factors for developing pressure ulcer. The data was collected by the researcher through reviewing the child's medical record.

Part (2)

Braden scale risk assessment tool

It was adopted from [14] Braden and Bergstrom, (2002), it consisted of seven subscales such as:

Sensory perception
Activity level
Mobility
Nutrition status
Skin exposure to moisture
Friction and shear forces
Tissue perfusion & oxygenation

Scoring system

No risk of developing pressure ulcer with the score more than 25
Mild risk with the score ranged from 22 to 25
Moderate risk with the score ranged from 17 to 21
High risk with the score ranged from 7 to 16

Development of the training program

The training program regarding skin care bundle was developed to improve nurses' practice provided to pediatric patient.

The program was developed through the following phases

Assessment phase

The program was constructed for the assessment of nurses' practice. The assessment was performed before the implementation of training program by interviewing each nurse individually to assess their practice (pretest) by using tool I and 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 the interview sheet and observational checklist (from pilot and assessment phase) as well as reviewing the related literature the training program was developed by the researcher. Detected needs, requirements and deficiencies were translated into aim and objectives of the training program. The contents of the training program were selected on the basis of identified needs. Teaching methods were selected to suit teaching in small groups in a form of lectures, group discussion, demonstration and re-demonstration. Teaching materials were prepared as handouts that covered theoretical and practical information.

Implementation phase

The program of this study was implemented through five sessions in which studied nurses have been divided into small groups. Each session was lasted for 30-45 minutes. Each session started with a summary of the previous session and the objectives of the new one. Sessions 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 was interviewed individually immediately after implementation of the training program to assess their practice (posttest) by using tool I and tool II. Also, after two months later the nurses of the studied sample reassessed for their practice (follow up) by using tool I and tool II.

II-Operational design

The operational design included preparatory phase, content validity, pilot study and field work.

Preparatory phase

The researcher was review local and international related literature to be aware of various aspects of the research problem.

Content validity and reliability

The structured interview sheet and observational checklist were developed after a thorough reviewed of the related literature and then reviewed by five experts including (three professors of pediatrics medicine, and two working in pediatric nursing field) to test the content validity. Minor modifications were made based on feedback from the five experts and the final forms were ready for use. Content reliability of the tool was done by using Cronbach's Alpha test reliability coefficient. The reliability of nurse's practice assessment tool (Observational checklist sheet) used was 0.86which indicates accepted internal consistency of the used tool.

Ethical consideration

All ethical issues were taken into consideration during all phases of the study: the researcher maintained an anonymity and confidentiality of the subjects. The inclusion in the study was totally voluntary. The aim of the study was explained to every nurse before participation and an oral consent was obtained. The nurses were notified that they can withdraw at any stage of the research; also, they assured that the information obtained during the study will be confidential and used for the research purpose only.

Pilot study

A pilot study was conducted on 10% of the nurses to assess the applicability of the data collection tools arrangements of items, estimate the time needed for each sheet and the feasibility of the study and acceptance to be involved in the study. Subjects who shared in the pilot study were included in the main study sample as no radical modifications were needed on the study tools.

Field of work

Data collection took a period of six months from November2020 to April 2021. After getting the official permission the pilot testing of the study tools was done and analyzed. The researcher started the data collection 3 days weekly from 9 AM to 12:00 PM in the morning shift, nurses were divided into 10 small groups; each group contained 6 nurses. The structured interviewing questionnaire sheet was filled out by the nurse and observational checklists were collected by the researcher and the average time required for completion of each tool was around 15-20 minutes. The researcher observed the nurses' practice during their actual practices with children. The purpose of the study was explained briefly to nurses, and obtained their verbal consent.

III-Administrative design

An official permission was granted by submission of an official letter from the Faculty of Nursing to the responsible authorities of the study setting to obtain their permission for data collection.

IV-Statistical design

Data collected from the studied sample was revised, coded and entered using Personal Computer (PC). Computerized data entry and statistical analysis were fulfilled using the Statistical Package for Social Sciences (SPSS) version 22. Data were presented using descriptive statistics in the form of frequencies, percentages and Mean SD. A correlation coefficient "Pearson correlation" is a numerical measure of some type of correlation, meaning a statistical relationship between two variables. A t-test is a type of inferential statistic used to determine if there is a significant difference between the means of two groups .Cochran's Q Test is a non-parametric way to find differences in matched sets of three or more frequencies or proportions. The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal. The Kruskal Wallis test is the non-parametric alternative to the One-Way ANOVA.

Significance of the results

Highly significant at p-value < 0.01.
Statistically significant was considered at p-value < 0.05
Non-significant at p-value ≥ 0.05

Results

Table (1) showed personal characteristics of the studied nurses. it was found that the studied nurses' age ranged between 20 and 38 years, with mean age 23±3.2 years. The same table clarified that 6.7 % of studied nurses had diploma degree, and 66.7% had finished their education in institute of nursing while 26.7% had bachelor degree of nursing. Concerning years of experience, 35.0% of the studied nurses had less than one year of experience, and 28.3% had five years of experience in PICU. The results revealed also that 60.0% of the studied nurses weren't attending training programs about pressure ulcers.

Table 1: Characteristics of the studied nurses (N=60)

Demographic characteristics	(n=60)	
	Frequency	Percent
Age group: /year		
20-	32	53.3
25-	13	21.7
30-	11	18.3
35-	4	6.7
Mean ± SD	23±3.2	
(range)	(20-38)	
Gender:		
Male	15	25.0
Female	45	75.0
Academic qualifications:		
Diploma in Nursing	4	6.7
Technical Institute of Nursing	40	66.7
Bachelor degree of Nursing	16	26.7
Years of experience in PICU		
< a year	21	35.0
A year	11	18.3
5 years	17	28.3
10 years	2	3.3
> 10 years	9	15.0
Attending of training programs about Pus		
Yes	24	40.0
No	36	60.0
Number of training programs [N=24]		
One	5	8.3
Two	17	28.3
Three	2	3.3

Table 2: Total Nurses' practice as regarding care for pressure ulcer in critically ill pediatric children, showed a statistically significant difference in total score of skin care bundle and pressure ulcer performance among the studied nurses pre and post the program (P < .001). As evidence, no one of the studied nurses had good level of total practice regarding skin care bundle and pressure ulcer in PICU at pre - program, where changed to (100.0%) at post - program. At the same table, it was found that the total mean practice was 31.9±3.4 before implementation of the educational program compared to 48.1±1.8 and 39.7±1.8 after implementation of the educational program and during follow up phase respectively. There were highly statistically significant differences (p<0.001).

Table 2: Total Nurses' practice as regarding care for pressure ulcer in critically ill pediatric children

Total Nurses' practice	Pre (n=60)		Post (n=60)		Follow up (n=60)		(p-value) #
	No	%	No	%	No	%	
Poor practice	22	36.7	0	0.0	0	0.0	.000**1
Fair practice	38	63.3	0	0.0	37	61.7	.000**2
Good practice	0	0.0	60	10 0.0	23	38.3	.000** 3
Paired t-test							
Total mean practice	31.9±3.4		48.1±1.8		39.7±1.8		.000**1 .000**2 .000** 3

Table (3): Braden scale risk assessment of the children admitted in PICU throughout the study phases, showed a statistically significant difference in total score of children's risk assessment pre and post the program (P < .001). As evidence, 88.0 % of the studied children had high level of risk assessment before implementation of the educational program, where declined to 4.0% and 20% after implementation of the educational program and during follow up phase respectively. According to total mean risk, before the program, the total mean score of children risk assessment was 10.5±4.2 which increased to 20.7±4.1 at the post program phase, and declined to 20.0±2.9 at the follow-up phase. These improvements were statistically significant.

Table 3: Braden scale risk assessment of the children admitted in PICU throughout the study phases

Total Children's risk assessment	Pre (n=50)		Post (n=50)		Follow up (n=50)		(p-value) #
	No	%	No	%	No	%	
No risk	0	0.0	10	20.0	0	0.0	.000**1
Mild risk	0	0.0	12	24.0	20	40.0	.000**2
Moderate risk	6	12.0	26	52.0	20	40.0	.000** 3
High risk	44	88.0	2	4.0	10	20.0	
Paired t-test							
Total mean risk	10.5±4.2		20.7±4.1		20.0±2.9		.000**1 .000**2 .000** 3

Table (4): Relations between nurses' practice regarding SKIN care bundle and pressure ulcer in PICU scores pre the program and their characteristics, revealed that, there was highly statistically significant relation between total nurses' practice at pre-program and their characteristics as age, academic qualifications and years of experience in PICU at (P= < 0.05). It is evident that the practice score was higher among those aged 25-29 years, who graduated from technical institute of nursing, and had 5 years of experience in PICU.

Table 4: Relations between nurses' practice regarding SKIN care bundle and pressure ulcer in PICU scores pre the program and their characteristics

Demographic characteristics	Performance mean scores	Kruskal Wallis	P

	Mean ± SD	Median		
Age group: /year 20- 25- 30- 35-	31.5±2.7 35.2±4.0 30.7±2.3 28.0±1.2	31.0 38.0 32.0 28.0	15.8	.001*
Gender: Male Female	31.0±.0 32.2±3.9	31.0 32.0	H=345.0	.897
Academic qualifications: Diploma in Nursing Technical Institute of Nursing Bachelor degree of Nursing	29.0 ± .0 33.0±3.6 30.0 ±2.1	29.0 31.0 30.0	12.8	.002*
Years of experience in PICU < a year A year 5 years 10 years > 10 years	31.6± 2.0 31.3 ± 3.7 34.0 ±4.4 27.0 ±.0 30.7 ±1.6	31.0 30.0 34.0 27.0 32.0	11.9	.018*
Attending of training programs about Pus Yes No	32.1 ±3.7 31.8 ±3.3	31.0 31.0	H=464.0	.625
The number of training programs [N=24] One Two Three	34.4 ±5.0 32.0 ±3.0 27.0 ±.0	38.0 31.0 27.0	6.8	.078

Table (5): Correlation between nurses' practice as regarding care for pressure ulcer and children risk assessment Score, Concerning the correlations between nurses' practice and children risk assessment pre, post, follow the program, Table (5) indicates statistically significant positive correlations between total mean score of nurses' practice and children risk assessment score at pre (r= .271*), post (r= .471**), and follow (r= .453*) program phases.

Table 5: Correlation between nurses' practice as regarding care for pressure ulcer and children risk assessment Score

Practice Score	Total score of children risk assessment

	r	P
Pre- program	.271*	.019
Post- program	.471**	.000
Follow- program	.453**	.000

Discussion

Pressure injury presently has been a serious healthcare problem all over the world. Children were recognized as the high-risk population of pressure injuries in the latest prevention and treatment of pressure injuries clinical practice guideline [15]. Pressure ulcer (PUs) in the pediatric population has been poorly documented and has not received adequate attention in the literature compared to those in the adult population. The chronically ill children and the pediatric patient population with chronic conditions and severe neurological and sensory motor impairments are at significant risk for the development of PUs. A comprehensive and thorough pediatric skin care program should emphasize the need for accurate, continuous assessment, including specific and detailed documentation of tissue damage. Early assessment and detection are essential because early-stage PUs is far easier and less costly to treat [16]. The present study was focused on assessing nurses' practice about pressure ulcer and applying skin care bundle, and to design, implement and evaluate the training program for those nurses based on the actual nurses' needs. The results of the present study revealed that nurses' practice had improved after implementation of nursing intervention program regarding pressure ulcer and applying skin care bundle. This result matched with [17] who conducted a study to determine the effect of preventive bundle guidelines on nurses' knowledge and compliance regarding pressure ulcer among critically ill children at pediatric intensive care unit and found nearly the same result as nurses' practice had improved after implementation of the program. Similarly, with [18] who conducted a study to evaluate the effect of implementing a designed skin care bundle protocol on modifying nurses' practices towards pediatric intensive care unit patients and mentioned that nurses showed an improvement in their practice about pressure ulcer and skin care bundle after program implementation. In the same line, [19] who conducted a study to evaluate the impact of educational guidelines about prevention of pressure injuries among infants in intensive care unit, support the findings of the present study and reported that there was improvement in practice level among studied nurses regarding to prevent and management of pressure ulcer. Regarding children's risk assessment throughout the study phases by using Braden scale, the finding of the present study proved that, the majority of the studied children had a high-risk level of Braden PUs risk assessment before program implementation, which decreased at post and follow up phases of the program implementation. This finding is agreed with [17-18]. On the contrary, this finding was uncoordinated with [20] who conducted a study about ''applicability of pressure ulcer protocol in intensive care unit" and found that, more than half of the children were have moderate risk for PUs development according to Braden PUs risk assessment before application of the program. The researcher suggested that, the present study result might be due to nurses' knowledge deficit and lack of training about risk assessment for children by using Braden scale. As regards the relation between general characteristics of the studied nurses and their total practice before program implementation, revealed that, there was highly statistically significant relation between total nurses' practice at pre-program and their characteristics as age, academic qualifications and years of experience in PICU. It is evident that the practice score was higher among those aged 25-29 years, who graduated from technical institute of nursing, and had 5 years of experience in PICU. The researcher might be relay that to the increased years of experience in PICU can improve the level of awareness and practice. This finding is accepted by [21] who conducted a study about "Knowledge, attitude and practice of nurses towards pressure ulcer prevention" reported that, there was a significant positive relation between nurses' practice and years of experience before training program. On contrary this previous finding was versus with the finding of [22] who conducted a study about ''assessment of nurses' perception, practice of pressure ulcer prevention care bundle'' and who found that, nurses' practice score had no significant relations with their age, educational level and years of experience before the educational guideline. Concerning the correlations between nurses' practice and children risk assessment pre, post, follow the program, there were statistically

significant positive correlations between total mean score of nurses' practice and children risk assessment score at pre (r=.271*), post (r=.471**), and follow (r=.453*) program phases. This result matched with [17] who mentioned that preventive bundle guidelines were significantly reduced the pressure ulcer risk among the studied children. From the researchers' point of view, these findings add more support for applying the prevention skin care bundle to prevent pressure ulcer because it allows best practices among nurses result in improving their performance and clinical outcomes. Finally, analysis of data and discussion proved that the research hypotheses in the current study showed that, nurses' practice scores increased significantly and immediately after the implementation of nursing training program and two months later compared to pre- program phase.

Conclusion

In the light of the study findings, it was concluded that, the training program had a positive effect on improving nurses' practice regarding SKIN care bundle and prevention of PUs as shown on post and follow up test than pretest and had a positive outcome on children at the pediatric intensive care unit

Recommendations

The health care system should be trained and educated in pressure ulcer risk assessment scale and prevention to recognize the risk factors that lead to the development of pressure ulcers and how to maintain correct and suitable preventive measures.

Limitations of the Study

The researcher was faced with the following limitations:

Lack of nurses' cooperation during the work due to work overload.

There was some difficulty to carry out an interview with nurses and applying risk assessment scale on pediatric patients.

Occurrence of corona virus at this period.

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