Assessment of Nurses' Knowledge and Practices Regarding Pressure Ulcer Preventive Measures among Critically Ill Children

Mona Haliem Atta[1], Sabra Mohamed Ahmad[2], and Fatma El Zahraa Kamal El-sayed[3]
[1]Clinical Instructor in Health Technical Institute, Sohag,
[2]Assistant Professor of Pediatric Nursing Faculty of Nursing Sohag University,
[3]Assistant Professor of Pediatric Nursing Faculty of Nursing Sohag University
Corresponding author email Email: ***monashaker1991@gmail.com***
Phone number: ***002-01203249006***

Abstract

Background: A pressure ulcer, which is also called a pressure injury, is an area of damage to the skin and soft tissue underneath it, usually happening over a bony prominence or soft tissue. Nurses have a major role in preventing pressure ulcers through effective care and evidence-based practices. **Aim of the study:** the aim was to assess nurses' knowledge and practices regarding pressure ulcer preventive measures . **Research design:** The present study utilized a descriptive exploratory research design to attain its objective. **setting:** The current study was carried out in the critical care units of Sohag University Hospital (pediatric intensive care unit – critical care unit).**sampling:** A convenient sample of all available nurses(50 nures). **Tools**: Two tools were used to gather the data,**Tool (I):**A designed interviewed questionnaire to assess personal demographic characteristics and assess knowledge of nurses about pressure ulcer prevention, **Tool (II):** Checklist for observations to evaluate nurses' work about pressure ulcer prevention**. Results**: unsatisfactory overall knowledge of nurses about (96%) with regard to pressure ulcers and incompetent preventive measures were displayed by most of the nurses (94%) in the study. **Conclusion**: there was statistical significant positive correlation between the total studied nurses' knowledge and practices regarding pressure ulcers in critically ill children. **Recommendations**: pediatric nurses must be up to date on the latest prevention through workshops, educational programs, and ongoing in- service training programs for nurses is urgently needed to enhance the application of pressure ulcer prevention practices..

Keywords: Critically Ill Children, Nurses' knowledge and practices, Pressure ulcer, Preventive measures

Introduction

The skin is the most significant tissue in the human body, functioning as a barrier against viruses and other negative physical, chemical, and biological influences, even though ensuring a stable internal environment. The skin receives three-quarters of the blood volume and circulates it for a variety of purposes, including sensation, temperature regulation, protection, excretion, and secretion, as well as absorption and immunity **(Sharshour, et al., 2023)**.

A pressure ulcer, which is also called a pressure injury, is an area of damage to the skin and soft tissue underneath it, usually happening over a bony prominence or soft tissue. The damage is caused by severe and sustained pressure, or compression combined with friction and shear stress. Pressure-induced skin injury can cause noticeable erythema on intact skin or deep ulcers **(Crunden, et al., 2022)**.

Critically ill child whose baseline state of health has significantly altered and whose life is threatened and needs close observation and intensive care. These critically ill children are completely or partially dependent on the health care provider. As a result of these disease and illness those children may suffer from problems in circulation , breathing or acute deterioration of conscious level , hypoxemia, shock, severe dehydration, vigorous bleeding requiring transfusion, coma or seizures, thus these children are more susceptible to pressure ulcers due to many conditions especially the presence of medical devices, immobility and malnutrition **(Hamed & Safi, 2021).**

The damage caused by pressure ulcer causes pain, distress and discomfort increases the risk of infection is linked to elevated rates of morbidity and mortality and lengthens hospital stays. Effective applications of pressure ulcer preventive measures need early identification of at-risk children that include immobility , malnutrition, fractures, urinary and fecal incontinence, dry skin, critically ill conditions and terminal illness the effects of all risk factors should be diminished through their optimal management **(Willock, et al., 2023).**

Nursing practices must include skills, knowledge and consistency in order to prevent pressure ulcers. Skin examination, repositioning and pressure release are critical components of

successful pressure ulcer preventive measures in children. Preventive strategies must address the unique requirements of each patient **(Gbadamosi, et al., 2023).**

In order to prevent pressure ulcers, nurses are crucial, consequently, nurses should be completely aware of pressure ulcer risk factors while assessing children. Nursing treatments should include skin evaluation, monitoring devices, pressure relief, repositioning, dietary support and the usage of skin moisturizers **(Abd Elkhalek,et al., 2023).**

Significance of that study

The prevalence of pressure ulcers ranges from 0.8% to 27% worldwide, making them a major concern in critical care units. These ulcers present considerable challenges to healthcare practitioners. Children in critical condition, increasing the risk of morbidity, mortality, and healthcare expenses. Children in critical condition who need mechanical breathing, inotropic support or prolonged hospitalization as well as dietary inadequacies, are at highest risk. Pressure ulcers caused by medical devices are extremely prevalent in this population, with prevalence rates ranging from 50 to 69% (**Triantafyllou, et al., 2021).**Thus, the aims of this study was to assess nurses' knowledge and practices regarding pressure ulcer preventive measures among critically ill children.

Aims of this study

The current study was conducted to accomplish the following aims:

Assess nurses' knowledge and practices regarding pressure ulcer preventive measures among critically ill children through:

1. Assess nurses' knowledge regarding pressure ulcer preventive measures among critically ill children.
2. Assess nurses' practices regarding pressure ulcer preventive measures among critically ill children.

Research questions

1. What is the level of nurses' knowledge regarding pressure ulcer preventive measures among children in critical condition?
2. What is the level of nurses' practices regarding pressure ulcer preventive measures among critically ill children?
3. Is there a relation between nurses' knowledge and practices for pressure ulcer prevention in critically ill children and their personal characteristics?

Subjects and Method

The current study was conducted under four main designs as follows:

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

Technical design includes research design, setting, sample and tool for data collection

Technical design

Research design

The current study utilized a descriptive exploratory research design to attain its objectives.

Research settings

The current study was conducted at Sohag University Hospital in critical care units, specifically in the Pediatric Intensive Care Unit and the Critical Care Unit. The Pediatric Intensive Care Unit is on the 2nd floor and consists of two rooms: the first room contains 5 beds, and the second one includes 4. The Critical Care Unit, also on the 2nd floor, comprises four rooms: the first room has 4 beds, the second room has 5 beds, the third room contains 4 beds, and the fourth room has 5 beds.

Sampling

A convenient sample comprising all staff nurses (50) who are available and working in the previously mentioned settings was included in the study.

Tools of data collection

Two tools were used to gather the data.

Tool (I): A organized interviewed questionnaire:

The researcher established this instrument after analyzing the necessary literatures, **Qaddumi, and Khawaldeh,(2014)** & **Nuru, et al.,(2015).** The tool was written in obvious Arabic and was divided into two parts:

Part (1):Personal Demographic Characteristics of nurses under the study, include age, gender, degree of education, years of experience, attendance of previous pressure ulcer training courses, and the presence of a guideline for preventing pressure ulcers in different departments.

Part (2): Nurses' knowledge regarding pressure ulcer prevention among critically ill children: was classified into two parts as follows. **A-Nurses knowledge about pressure ulcers:** It encompassed (26) multiple - choice questions **B- assessing nurses' knowledge regarding nursing care for pressure ulcers:** It encompassed (17) true ,false questions.

It was created to evaluate real nurses' understanding of the definition, causes, stages, signs, symptoms,

most common locations , complications, prevention, risk factors and nursing care of pressure ulcers after a review of the relevant literature.

Scoring system: The scoring system for assessing nurses' knowledge was examined after the nurses completed the interview questions and a model key answer was used to assess their knowledge. Consequently, the right response received a mark of one, while the wrong response received a grade of zero.. These ratings were added –up and transformed into a percent score. Nurses' overall knowledge was classified as follows:

- A score of 80% or above was considered a satisfactory level of knowledge.
- A score below 80% was deemed an unsatisfactory level of knowledge.

Tool (II): observational checklist to examine nurses' practices about pressure ulcer prevention among children in critical condition:

This instrument was taken from **Frank et al.,(2017)** & **Mohamed et al., (2019)** then adjusted by the researcher to evaluate nurses' practice on preventive strategies of pressure ulcers in critically unwell children, It had eight items (36 steps) and encompassed the practices of skin care (15 steps), skin assessment (8 steps), child positioning (3 steps), bed elevation (3 steps), medical device care (3 steps), moisture management (2 steps), and nutritional assessment (2 steps).

Scoring system: The scoring system for nurses' practice was examined once the observational checklist was completed. As a result, a score (1) was assigned to the action that was completed completely and a score (0) was assigned to the action that was not completed. These scores were added together and turned into a percentage score. Total score is classified as follows:

- A score of 80% or above was considered a competent level of practice.
- A score below 80% was considered as incompetent level of practice.

Operational design

The operational design of this study included a preparatory phase, content validity and reliability, ethical consideration, a pilot study and fieldwork.

Preparatory phase

The researcher revised the local and universal related literature covering the several aspects of the study procedures and created these study tools by reviewing books, periodicals, journals, magazines and internet that were reviewed by the researcher. Tools of data collection were modified by the researcher and translated into Arabic format.

Tools validity and reliability

The study's tools were evaluated by three panel professionals in the field of pediatric nursing from Sohag University's Faculty of Nursing to guarantee that the tools accurately measured what they were intended to measure. The tools were modified based on the panel's judgments on sentence clearness, appropriateness of the content, and item sequence.

The suitable reliability test was carried out to test tool reliability using internal consistency method. They proved a high degree of reliability with alpha cronbach test in which (alpha = 0.754 for nurses' knowledge questionnaire and alpha = 0.854 for nurses' observational checklist).

Ethical consideration

This study had the following ethical research considerations:

- The Scientific Research Ethical Committee of Sohag University's Faculty of Nursing approved the study before to its beginning.
- All nurses in this study were informed of the study's goal and objectives prior to its start.
- The participants were assured that their information was saved confidentiality and used solely for research purposes.
- Nurses were told that participation in the study is voluntary, and they may withdraw at any moment without explanation.
- Nurses provided oral agreement to participate in the trial.
- Respect was shown for beliefs, standards, values, and morals.

Pilot study

In January 2024, a pilot study was done on 10% of the study sample. The pilot study aimed to identify logistical issues that could impact data quantity, quality, and sample size. Additionally, it evaluated the study tools' viability, objectivity, relevance, and intelligibility, as well as the time needed to complete the observational checklist. After the pilot study, no changes were made to the tools, therefore the number of nurses from the pilot sample (5) was added to the study sample.

Field work

Data collection was conducted over four months, from the beginning of March 2024 until June 2024. The study included all nurses who worked in critical care units, such as the critical care unit and pediatric intensive care unit. At the initial interview in order to enhance communication and the usage of the study tools, the researcher introduced herself. The

aim and nature of the study were clarified to all participating nurses' and their consent was obtained before data collection began.

First, the observational checklist was utilized by the researcher. (Tool II) to observe each nurse implementing preventive measures for children with pressure ulcers. Each procedure took approximately 15–25 minutes, depending on its complexity.

Next, the researcher assessed nurses' knowledge about pressure ulcers (Tool I) at Sohag University Hospital using a structured interview questionnaire. The questionnaire, modified by the researcher in simple Arabic language required 30 minutes to complete.

Three days per week (Sunday, Monday, and Tuesday), the researcher worked shifts in the morning and the afternoon at the study location. Data were collected at a time convenient for the nurses at their workplace, and the observational checklist was tested within the study setting.

Administrative design

The administrator of the study settings received formal approval to conduct the study from the dean of Sohag University's Faculty of Nursing. A clear explanation was given about the purpose and goals, also the tools were explained to gain their collaboration Additionally, the researcher held meetings and discussions to explain the purpose, nature, and goal of the study.

Statistical design

The data were coded, ordered, computerized, organized, and analyzed using version 27 of the statistical package for social science (SPSS) program. The arithmetic mean (X) and standard deviation (SD) were utilized to depict quantitative data, whereas categorical data were described using frequencies and percentages. The qualitative variables were compared using the Chi Square test (X2), which is utilized for relationship assessment.

Result

Table (1): Revealed personal demographic characteristics of nurses under study, over one-third of them (32%) were between the ages of 25 and under 30 years, most of them(94%) were female and more than two thirds of them (68%) had technical institute of nursing education. Also, nearly one third (32%) of them had less than 3 years working in pediatric intensive care units, the majority of them (92%) hadn't have guidelines on preventing pressure ulcer for children in different departments.

Table (2):shows that, the mean result of the nurses under study is 10.66±3.572 for pressure ulcer among critically ill children, 6.64±1.600 for pressure ulcer treatment, 6.38±1.227 for pressure ulcer preventive measures, 5.380±1.496 for nursing care for pressure ulcers and 29.06±5.7050 for the total knowledge.

Figure (1): shows that, majority of the studied nurses (96%) had an unsatisfactory knowledge level regarding pressure ulcers in critically ill , while only (4%) had a high satisfactory level regarding pressure ulcers in critically ill.

Table (3): shows that, the mean result of nurses under the study is 3.36±1.005 for skin assessment, 6.780±1.359 for skin care, .900±.6144 for medical devices care practices, 1.320±.4712 for child positioning and bed elevation practices, 1.240±.7160 for moisture management practices , .3800±.5674 for nutritional assessment practices and 13.980±2.0946 for the total practices.

Figure (2): shows that, most of the studied nurses had incompetent practice level regarding pressure ulcers preventive measures in critically ill children, while a minority of them had satisfactory practice level regarding pressure ulcer preventive measures in critically ill children.

Table (4): shows that, there was statistically difference significant with a positive correlation between the total studied nurses knowledge and practices about pressure ulcers in critically ill children at (P=0.014)

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Result

Table (1): Frequency distribution of the nurses' personal data (n=50)

Personal date	No	%
Age of nurses in years		
< 20	7	14
20 < 25	13	26
25< 30	16	32
≥ 30	14	28
Gender		
Male	3	6
Female	47	94
Educational level		
Technical institute of nursing	34	68
Technical institute of health	9	18
Bachelor in nursing science	7	14
Years of experience in pediatric intensive care units		
<3 year	16	32
3 <6 year	15	30
6- <9 year	4	8
≥ 9 years	15	30
Attendance of training courses regarding pressure ulcer		
Yes	4	8
No	46	92
Is there a guideline on preventing pressure ulcer in different departments?		
Yes	6	12
No	44	88

Table (2): Distribution of the studied nurses' mean score of knowledge dimensions regarding nursing preventive measures for pressure ulcers in critically ill children (n=50)

Dimensions	Minimum	Maximum	Mean	Std. Deviation
Pressure ulcer among critically ill children	5.00	24.00	10.6600	3.57206
Pressure ulcer treatment	4.00	9.00	6.6400	1.60051
Pressure ulcer preventive measures	4.00	9.00	6.3800	1.22708
Nursing care for pressure ulcers	2.00	8.00	5.3800	1.49680
Total knowledge	17.00	44.00	29.0600	5.70503

Figure (1): Distribution of nurses' knowledge level regarding pressure ulcer preventive measures (n=50)

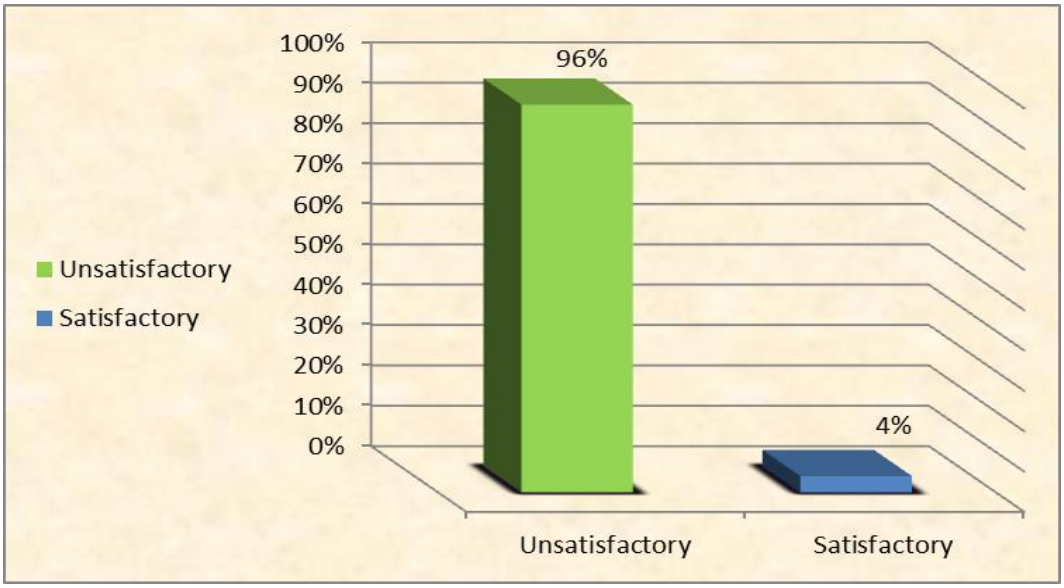
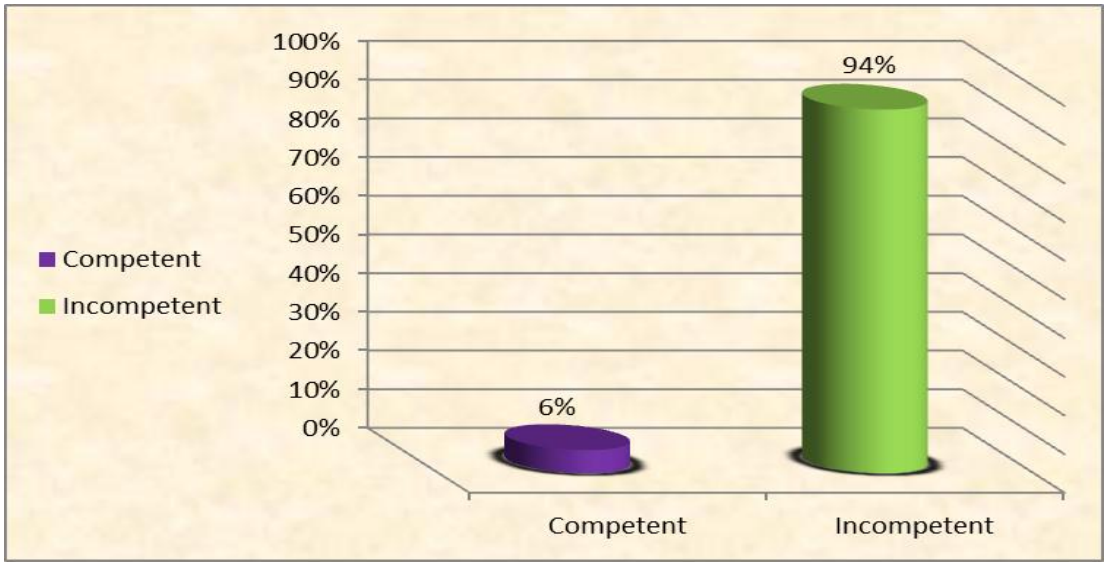


Table (3): Distribution of nurses' mean score of practices dimensions regarding nursing preventive measures for pressure ulcer (n=50)

Dimensions	Minimum	Maximum	Mean	Std. Deviation
Skin assessment	1.00	6.00	3.3600	1.00529
Skin care	4.00	11.00	6.7800	1.35962
Medical devices care practices	.00	2.00	.9000	.61445
Child positioning and bed elevation practices	1.00	2.00	1.3200	.47121
Moisture management practices	.00	2.00	1.2400	.71600
Nutritional assessment practices	.00	2.00	.3800	.56749
Total practices	11.00	20.00	13.9800	2.09460

Figure (2): Distribution of nurses' practice level regarding pressure ulcer preventive measures in critically ill children (n=50)



Table(4): Correlation between the total studied nurses' knowledge and practices regarding pressure ulcers in critically ill children (n=50)

Study variables	Total practices	
	R	P
Total knowledge	.345	.014*

* Statistically significant at p<0.05.

Discussion

The nurse team is in charge of delivering direct and ongoing care aimed at preventing and treating pressure ulcers. To achieve quality care, nursing practices must rely on the best available evidence, including knowledge of pressure ulcers, which should be an integral part of every nursing practitioner's expertise (**Zhang, et al.,2024).** So this study aims to assess nurses' knowledge and practices regarding pressure ulcer preventive measures among children in critical condition.

Based on the study's findings regarding the personal characteristics of the nurses under investigation, it was determined that over one-third of them were in the age range of 25 to under 30. In terms of gender, the majority of the nurses surveyed were females.

This conclusion was supported by the research done **by Mohamed et al. (2019)**. According to the study, the mean age of the nurses was 28.95±4.93 years, and the majority of them were females.

Additionally, a study by **Hamdy, et al. (2023)** who found that Over one-third of the nurses in the study were aged 20 to less than 25. Furthermore, approximately three-quarters of them were females.

Regarding the educational background of the nurses under study, the current study revealed that 68% of them had attended a technical nursing school. The findings of **Hamdy, et al. (2023)**,who reported that almost one-third of them had technical institute nursing education, confirmed this conclusion .

On the other hand, this result disagreed with **Sharshour, et al., (2023)**, found that over half of them had a bachelor's degree in nursing sciences. And with **Sengul, & Karadag.,(2020),** who reported that nearly three fourths of them73.5% held bachelor degree.

According to the current study, more than half of the nurses had 3 to less than 6 years of experience. **Ibrahim et al., (2022)** found that over half of the nurses surveyed had experience ranging from 5 to <10 years. The survey also discovered that clinical skills are lacking among young nurses. They lack the expertise to prioritize and manage child care requirements and provide care for children who are very ill, and identify issues early on. They are also less concerned about safety.

From the researcher's point of view, young nurses, therefore, need particular training, which leads to increased performance in all nursing-related areas.

In terms of nurses attending pressure ulcer training courses in critical care units, the current study found that the majority of the nurses surveyed had not attended such courses.

These results were consistent with those of **Ebi, Hirko, & Mijena (2019),** who discovered that over two-thirds of participants had never taken a pressure ulcer training session.

From the researcher's point of view, the finding could be attributed to the hospital's lack of a continuing education department, a lack of willingness to train, and increased workload and assignment in pediatric critical care units.

Regarding to presence of guideline on preventing pressure ulcer in critical care units the current study shown that most of them 88% hadn't a guideline on preventing pressure ulcer for children in different departments. this result agree with **Elmansy,et al., (2015)** Who discovered the lack of policies and procedures in intensive care units

Regarding the studied nurses' knowledge level, the present study shown that the majority of the studied nurses(94%) had unsatisfactory overall level of knowledge regarding pressure ulcer preventive measures among critically ill children.

This finding was in agreement with **Sengul, and Karadag. (2020),** who discovered that the majority of the nurses evaluated had an inadequate level of overall knowledge on pressure ulcer prevention. Also **Grešš Halász, et al., (2021)** a study in Slovakia to assess "Nurses' knowledge and attitudes towards prevention of pressure ulcers" Who mention that, inadequate knowledge of nurses towards pressure ulcer prevention.

From the researcher's point of view, lack of qualification may be the result of some nurses neglecting to update their knowledge on pressure ulcers after years of continuous work, as most of nurses in the study had graduated from technical nursing and health institute.

In terms of the nurses' overall practice levels concerning pressure ulcer prevention strategies for critically ill children, the current study found that most of the nurses under investigation had incompetent levels of overall practice.

This finding was in agreement with **Malinga, & Dlungwane, (2020),**a study conducted in South Africa to describe nurses' knowledge, attitudes, and practices regarding pressure ulcer prevention, which stated that the majority of the nurses studied had an incompetent level of practice in pressure ulcer prevention.

From the researcher's point of view, this could be due to a lack of training programs and years of experience, which impacts the level of practice, a lack of motivation among nurses to keep their practices up to date, and a severe workload.

However**, Getie, et al., (2020),** disagreed with this finding. They noted that approximately 51.9% of the nurses in their study reported having good pressure ulcer prevention practices.

The current study found no significant relationship between the overall knowledge level of the studied nurses and factors such as age, gender, educational level, years of experience in pediatric intensive care units, attendance at training sessions on pressure ulcers, or adherence to guidelines for preventing pressure ulcers in children across different departments ($P > 0.05$).

Conclusion

Based on the results it can be concluded that , it is feasible to conclude that the majority of the nurses tested (96%) of them had unsatisfactory awareness of pressure ulcer prevention techniques. In terms of their procedures, (94%) of them showed incompetence in the workplace. Finally, there was a statistically significant association between the study sample's overall knowledge and behaviors regarding pressure ulcer prevention.

Recommendations

Based on the results it can be recommended that:

1. Implementing on-the-job training programs for nurses is urgently needed to enhance the application of pressure ulcer prevention practices.
2. A book covering all nurse competencies related to pressure ulcer prevention that includes standards, procedures, and evidence-based practice-based recommendations needs to be widely disseminated.
3. It is recommended that pediatric nurses be up to date on the latest developments in pressure ulcer prevention through workshops, educational programs, and ongoing training.
4. Empower nurses to prevent pressure ulcers and provide timely intervention in critical care units.
5. Developed and implemented a repositioning timetable for nursing staff in intensive care units.
6. Create, revise, and execute a schedule for nursing personnel to reposition themselves in intensive care units.
7. Make sure there is a sufficient supply of the facilities and tools required for the treatment and avoidance of pressure ulcers.
8. More research ought to be done to raise nurses' knowledge and proficiency in preventing pressure ulcers.

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