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Effect of skin integrity care bundle on hospital acquired pressure ulcer among patient with traction

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Abstract:
Background: Hospital acquired pressure ulcers represent a significant burden to both patients and healthcare providers. Skin integrity care bundle is a set of nursing interventions, each part of which has been proven in clinical practice to prevent hospital acquired pressure ulcer among patient with traction. **Aim:** Explore the effect of skin integrity care bundle on hospital acquired pressure ulcer among patient with traction. **Setting:** Trauma and emergency ddepartment at Assiut university Hospital. **Sample:** A Sixty (33 male and 27 female) adult patients with traction were included in the study; patients were divided equally into two groups (study and control). **Tools**: **(I)** A structured interview-based questionnaire, **(II)** Skin assessment observation check list and Braden scale for predicting pressure ulcer risk. **Results:** Skin integrity care bundle had a positive effect in preventing the development of pressure ulcer among studied patients in the study group where the majority (90%) of the patients showed no pressure ulcers or no sign of pressure ulcer after application of the nursing intervention while pressure ulcers were observed among more than two thirds of the patients in the control group. **Conclusion:** The program succeeded in preventing the development of pressure ulcers. **Recommendations:** Hospitals' policy should enforce the application of nursing intervention measures to prevent the occurrence of pressure ulcer.

Keywords: Hospital acquired pressure ulcer, Patient with traction, & Skin integrity care bundle

Introduction:
When pressure is applied to the skin's surface over bony prominences, pressure ulcers (PU) develop. The National Pressure Injury Advisory Panel **(Kottner et al., 2019)** acknowledges that pressure ulcers can form beneath medical devices on any part of the body, and this damage takes the pattern or shape of the medical device. This force can be constant pressure on the skin, friction, or dragging (shearing) force between the skin and another surface.

Medical devices created and used for diagnostic or therapeutic purposes may put patients of all ages at a significant risk of developing pressure ulcers connected to the use of those devices. When a wheelchair, cast, splint, poorly fitted artificial (prosthetic) device, or any object presses against the skin, a pressure ulcer develops. Although they can occur everywhere, pressure ulcers are most frequently found where bone is in close proximity to the skin, such as over the hip bones, tailbone, heels, ankles, and elbows **(Tyrer et al., 2020).**

Because nurses could be hesitant to adjust medical devices for fear of displacement, this interferes with basic skin care and assessment. Inspection of the skin area beneath a medical device can occasionally be challenging. Inadequate knowledge and understanding of the most recent evidence-based techniques for medical device-related pressure injury avoidance may also have an adverse effect on patient care **(Bader et al., 2019).**

One of the most popular forms of immobilization is traction. In orthopedic clinics all around the world, it is frequently applied to the treatment of patients who have hip or femur fractures. More over 340,000 hip fracture cases occur in the United States each year, and 1.6 million instances do so globally. Of these, 13% to 37% result in fatalities. A skilled nurse is needed to address the patient's demands and prevent complications because traction is a very stressful scenario for the patient to deal with **(Grigatti & Gefen, 2021).**

Skin and skeleton traction are the two most used types of traction. In order to apply skin traction, a Velcro boot (buck's traction), belt, or halter are typically fastened around the injured leg. Skin traction is mostly used to lessen the excruciating muscular spasms that come along with hip fractures. Pins, cables, tongs, or screws may be surgically introduced into the bone during skeletal traction. These enable the use of greater weights-typically 15 to 30 pounds—and longer traction times (6.8to13.6 Kg). Bone realignment is aided by skeletal traction **(Ignatavicius et al., 2018).**

One of the most fundamental and important objectives of nursing care is to maintain skin integrity in hospitalized patients with traction. So, the skin care

bundle is defined as a planned strategy for enhancing patient outcomes and care delivery **(Lavallée et al., 2017).**

Every patient who is at risk for developing a pressure ulcer should receive the skin integrity care package in order to completely eradicate preventable pressure ulcers. The acronym for the five key pressure ulcer prevention strategies—surface of skin, keep moving, incontinence, nutrition and hydration, and safe discharge planning—is skin integrity care bundle **(Shanley rt al., 2022).**

Significance of the study:

Records from **the trauma and emergency department statistical records, (2022)** indicate that 100 individuals had fractures and needed traction in the years 2020–2021. Researchers' observations of fracture patients who used tractions revealed that these patients were more likely to have pressure injury, which puts them at risk for developing a number of sequelae such bacteremia, osteomyelitis, squamous cell carcinoma, and sinus tracts. Despite this, pressure damage is a health issue that can be avoided. In order to better understand how skin integrity care bundles affect hospital-acquired pressure injuries in patients with traction, this study was carried out.

Aim of the study: Explore the effect of skin integrity care bundle on hospital acquired pressure ulcer among patient with traction

Research hypothesis: The development of pressure ulcer will be lesser among study group patients compared to those among control group ones.

Patients and Method:

Research design: Quasi experimental research design was utilized in this study.

Study variables: The independent variable in this study was skin integrity care bundle while the dependent variables was hospital acquired pressure ulcer among patient with traction

Study setting: The study was conducted in Trauma and Emergency Department at the Main Assiut university Hospital.

Sample: A total of Sixty (33 male and 27 female) adult patients with traction were enrolled as study subjects and were divided into two groups using a simple random method. The odd number refers to control group (n=30) was cared for with routine hospital nursing care while even number refers to the observation group (n=30) was nursed with skin integrity care bundle for 4 weeks. Their mean age ± SD was 36.4±12.3 years for study group and 41.27±13.6 years for control group.

Inclusion criteria: Patients who met the following criteria were eligible: (1) patients between the ages of 20 and 65; (2) patients who underwent traction; (3) patients without a pressure ulcer at the time of assessment and without any other serious comorbidities; (4) patients whose condition necessitated a hospital stay of at least four weeks; and (5) patients with good verbal communication skills.

The sample was calculated according to the following equation: **Steven, (2012)**

n = [DEFF*Np(1-p)]/ [(d2/Z21-α/2*(N-1) + p*(1-p)]

DEFF (Design effect) = 1

N (population) = 100

p (Hypothesized %) = 10%+/-5

d (tolerated margin of error) = 0.05

Z (level of confidence) = 1.96

α (Alpha)= 0.05

n = [1*100*10%+/-5 (1-10%+/-5)/ [(0.05)2/ (1.96)21-0.05*(100-1) + 10%+/-5 (1-10%+/-5)]

n= 60 patients

Tools: Two tools were utilized in this study:

Tool (1): A structured interview-based questionnaire was used to gather data of the study patients, which was written in English Language. The following two parts were included in it:

Part (1): Demographic and baseline data It was used to collect demographic and baseline data of the study patients. It consisted of (6 items) such as age, gender, marital status, and level of education.

Part (2): Comprehensive skin assessment observation checklist: It was adapted from **Boston University Research Team., 2016)**. It was used to assess skin state, and pressure ulcer sites and stages. This part was implemented twice. First time it was conducted on admission to exclude patients with pressure ulcers from the study and then it was conducted after 4 weeks from patients' admission to assess the effect of skin integrity care bundle on hospital acquired pressure ulcer among patient with traction.

a. For skin assessment: It included six items namely, skin temperature (normal or hotness), skin color (normal or red), moistening status of the skin (normal, wet or dry), skin turgor (normal or edema) and skin intact (normal or integrity).

b. For pressure ulcer assessment:

- Pressure ulcer assessment sites: It included (5 items) as (Sacrum, Heels, Ischium (buttocks), Greater trochanter, and Lateral malleoli).
- Pressure ulcer assessment stages: It included four stage (I, II, III, & IV). Where "I" means non-blanchable erythema, with intact skin surface; II means epithelial damage, abrasion or blister; III means damage to the full thickness of the skin without a deep cavity and IV means damage to the full thickness of the skin with deep cavity

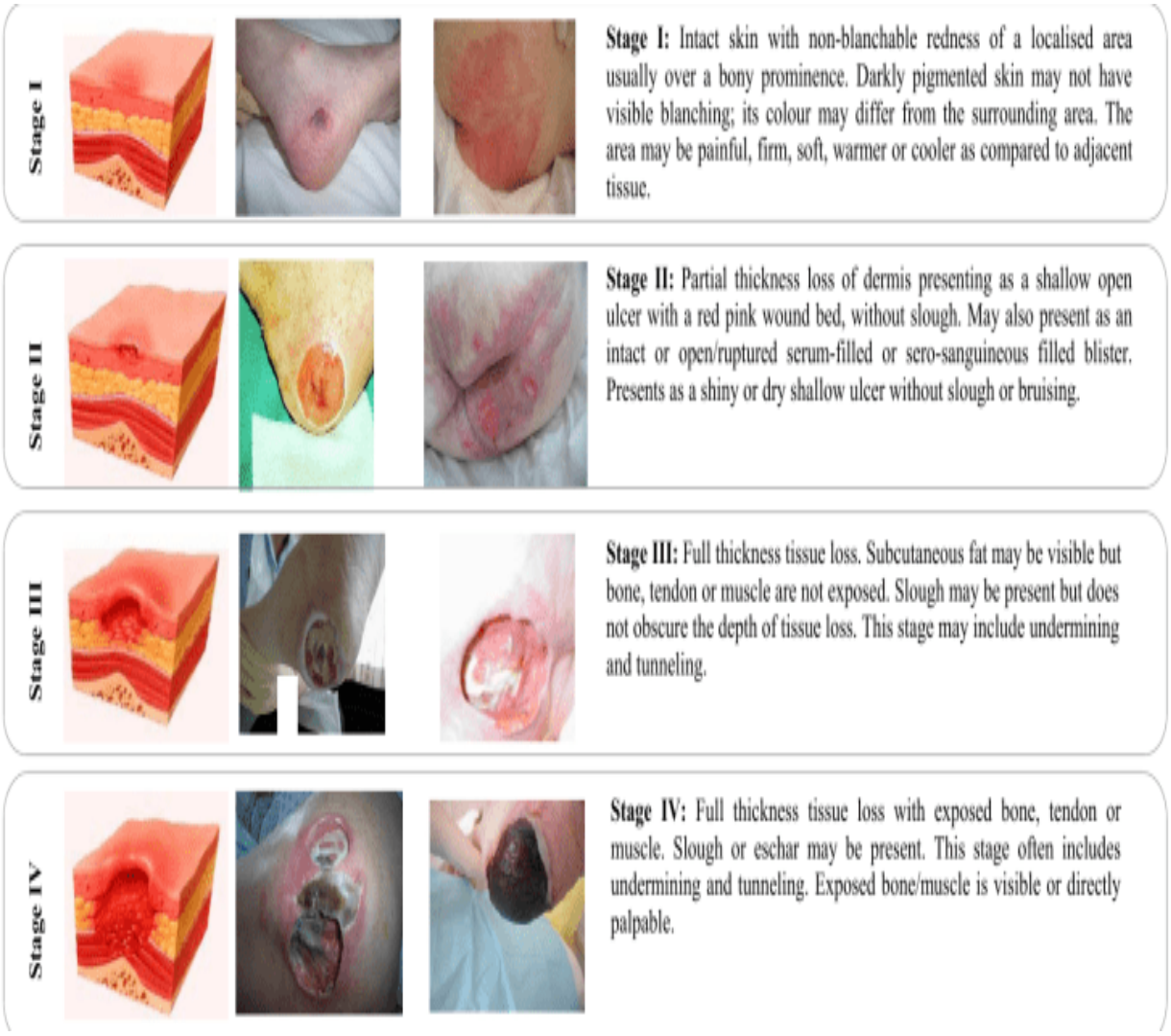


Figure (1): Pressure ulcer stages adopted from Arora et al., (2020)

Tool (II): Braden risk assessment scale: It adopted from **(Bergstrom et al. 1988) and (Moore & Patton, 2019)**. The level of the patient's pressure ulcer risk was determined using the Braden scale. This scale consists of six subscales: sensory perception, skin moisture, activity, mobility, nutrition, and friction/shear. It is a summed rating scale.

Each subscale is given a numerical rating; all except one are scored from 1 to 4, where a score of 4 indicates that there are no issues with that particular subscale and a score of 1 indicates a serious issue. Only the friction and shear subscale received a score between one and three. The overall score, which ranges from 6 to 23, is calculated by adding the scores for each of the subscales; the lower the number, the higher the risk.

A total score between 15 and 18 indicates a low risk, a total score between 13 and 14 a moderate risk, a total score between 10 and 12 a high risk, and a total score under 9 a very high risk. Braden scale sum scores had intraclass correlation coefficients of 0.90 (95% confidence interval: 0.88-0.92) and 0.88 (95% confidence interval: 0.85-0.91), respectively, and corresponding standard errors of measurement of 1.00 and 0.98. The respective 95% levels of agreement were 2.8 to 2.8 and 2.7 to 2.7.

Skin integrity care bundle: It was adopted from the Pan Pacific Pressure Injury Alliance, the European Pressure Ulcer Advisory Panel, and the National Pressure Ulcer Advisory Panel **Kottner et al., (2019).** On the patients in the study group, it was employed to carry out the intended care. It consists of five key components: supporting the body surface, checking the skin, moving about and repositioning, caring for incontinence, nourishment and hydration, and taking preventive skin care measures.

Ethical considerations

Permission to carry out the study was obtained from the ethical committee of the faculty of Nursing. An official letter was issued from the Dean of the Faculty of Nursing to the Head of Trauma and emergency department at Assiut university Hospital soliciting the necessary approval to conduct the present research. Each patient was informed with the purpose of the study.

The researcher emphasized that the participation was voluntary to participate in the study. Verbal consent was obtained from each patient prior to his/her contribution in the present study. Confidentiality of any obtained information was assured through coding of all data.

Phases of data collection:

Preparatory phase:

Tools development: A review of local and international, current and past related literature in the various aspects using articles, books, magazines and periodicals were done (**Boston University Research Team., 2016, Moore & Patton, 2019 and Arora et al., 2020)**.

Content validity and reliability: Content validity was established by panel of five experts from faculty of nursing Medical Surgical Nursing department Assiut University. Who reviewed the tools for clarity, relevance, comprehensiveness, understanding, applicability and easiness for administrative, and no modifications was needed. Content reliability of tool (I, part 2) was confirmed for consistency by using Cronbach's alpha test. The tools proved to be reliable (0.703).

Pilot study: A pilot study carried out in August 2021 that conducted on 10% of the sample (6 patients) admitted to Trauma and emergency department in Assiut University Hospital to evaluate the applicability, clarity of the tools and identify any difficulties. These patients were included since, in accordance with the pilot research, no alterations were performed. Additionally, it featured a time estimate for when the tools would need to be completed.

Implementation phase: Data were gathered from both groups during this phase using tools (I, Part I) to examine baseline demographic information and tool (I, part 2) to measure skin characteristics. Patients who had pressure ulcers when they first had their skin evaluated were not included in the study. To determine if patients' risk for developing pressure ulcers increases or decreases with or without applying the skin integrity care bundle, was used twice: once upon patient arrival and once after 4 weeks.

Skin integrity care bundle implementation phase: Data of the current study over a period of ten months beginning of August 2021 till end of May 2022.

- First, the researchers arranged with the head nurse of trauma and emergency department to inform them by the patient that needed skin or skeleton traction and met the inclusion criteria. The investigators met the patient within the maximum 24 hours of inserted traction.
- The investigators greeted, introduced themselves and explained the aim and tools of the study to the patients and obtained their approval to participate in the study.
- After that the investigators used tool I, part (1) to assess demographic, characters of the skin (tool I, part 2) tool (II) to assess risk factors for developing pressure ulcers, and filling this tools for one patient tool thirty minutes.
- The investigators divided the patients into two groups, the even number for study group and odd number for control group who admitted to trauma and emergency department, about 6 patients per week.
- The researchers used Skin integrity care bundle elements for every patient in study group in the morning and evening shift every day for four weeks.

The following skin integrity care bundle were applied for each patient individually:

1. The skin was examined, paying close attention to bony prominences.
2. An air mattress was utilized
3. Patients' positions were changed every two hours, and movement and repositioning were continued (consult with doctor for the right position). The patient was told to employ manual handling aids (such as trapeze bar or bed linens to help lift and reposition).
4. Every 30 minutes, pressure relieving lifts (leaning to the side, leg lift, and lying down) were used for a total of 30 seconds.
5. Patients were positioned in semi-sitting or flat positions in beds at 30° to 45° angles.
6. The linens were kept wrinkle-free, dry, and clean.
7. Nutrition (all the nutrients are provided in the hospital's meals).
   Provide and ensure that the patient consumes enough fluids each day (2.5 L).
8. Prevention methods for skin care:
   - Steer clear of fragrances and other ingredients that could irritate your skin.
   - Avoid massaging skin that could develop a pressure sore because it becomes brittle and susceptible to breaking.
   - First explain items of care bundle for every patient with his relative (one patients with one relative) for about 15 minute, then application the item for about 30 minute, finally receive feedback from the patient for about 15 minute. The total amount of

application of this tools for one patient took one hour in the first meeting, while in the other day it took about 45 minute(exclude the time for explanation of item).The total number of study patient in the shift that care bundle was applied on them about 3 patients While control group received

Evaluation phase

Using the post-Comprehensive Skin Assessment Form and the Braden Risk Assessment Scale, the researchers reevaluated each patient in the study and control groups during this phase in order to determine the impact of the application of the skin integrity care bundle on hospital acquired pressure ulcers for the study group after one month.

Statistical design:

Data entry and data analysis were done using statistical package for the social science (SPSS) version 26. Data were presented as number, percentage means and standard deviation. Chi-square test was used to show relation between variables. T-test was used to compare mean. P-value considered statistically significant when $p < 0.05$.

Results:

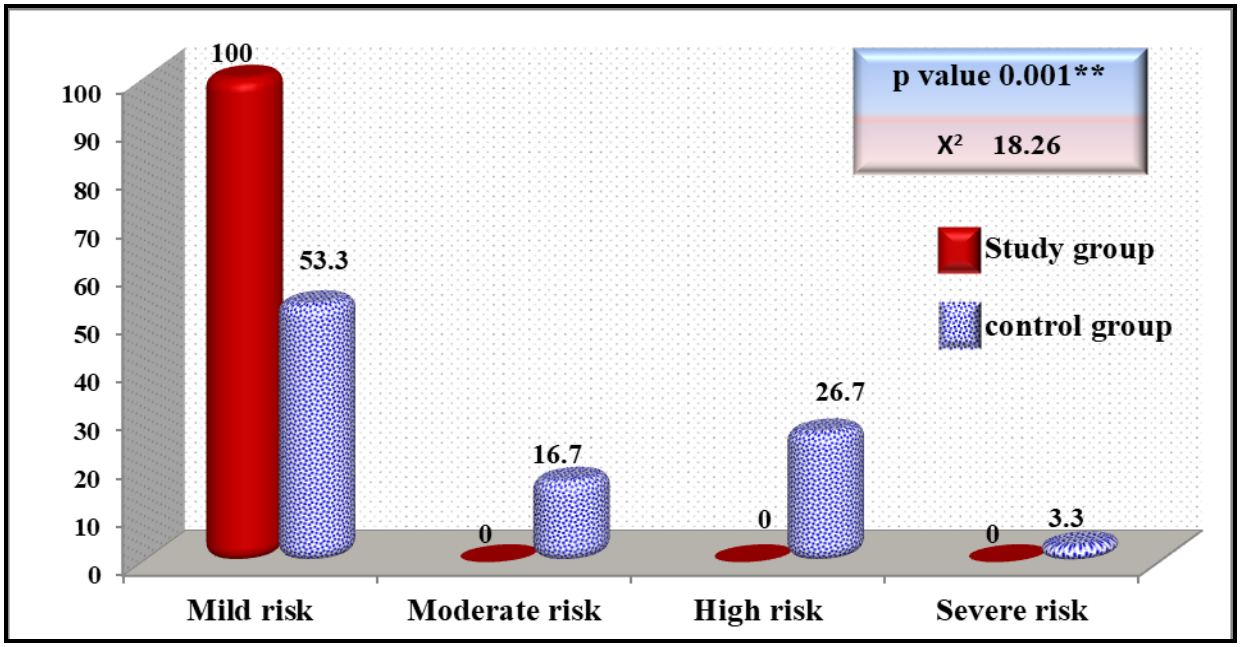
Table (1): Frequency and Percentage distribution of the study Patients' demographic and baseline data among the Study and Control Groups

Data	Study group		Control group		P-value
	N. (30)	%	N. (30)	%	
Age group					
- < 35 years	16	53.4	13	43.3	
- 35- <45 years	4	13.3	4	13.3	**0.571**
- 45 years or more	10	33.3	13	43.3	
Age mean	**36.4±12.3**		**41.27±13.6**		**0.592**
Sex					
Male	19	63.3	14	46.7	**0.149**
Female	11	36.7	16	53.3	
Marital status					
Single	10	33.4	7	23.3	
Married	19	63.3	19	63.3	**0.413**
Divorced	0	0.0	2	6.7	
Widow	1	3.3	2	6.7	
Education					
No formal education	6	20.0	6	20.0	**0.901**
Read and write	11	36.7	10	33.3	
Basic learning	6	20.0	4	13.3	
Secondary	4	13.3	5	16.7	
University	3	10.0	5	16.7	

Table (2): Comparison between two patients' groups in comprehensive skin assessment observation after skin integrity care bundle application

Items	Study group		Control group		p-value
	N. (30)	%	N. (30)	%	
Skin temperature					
Normal	29	96.7	12	40.0	**0.001****
Hotness	1	3.3	18	60.0	
Skin color					
Normal	28	93.2	11	36.7	**0.001****
Redness	2	6.7	19	63.3	
Skin moisture					
Normal	30	100.0	13	43.3	**0.001****
wet or dry	0	0.0	17	56.7	
Skin turgor					
Normal	30	100.0	26	86.7	**0.001****
Edema	0	0.0	4	13.3	
Skin intact					
Normal	30	100.0	27	90.0	**0.001****
Integrity	0	0.0	3	10.0	

Chi square test *(**) Highly statistical significant difference*



Chi square test *(**) Highly statistical significant difference*

Figure (1): Comparison between two patients' groups regarding the degree of pressure ulcer risk score as predicated by Braden scale after skin integrity care bundle application

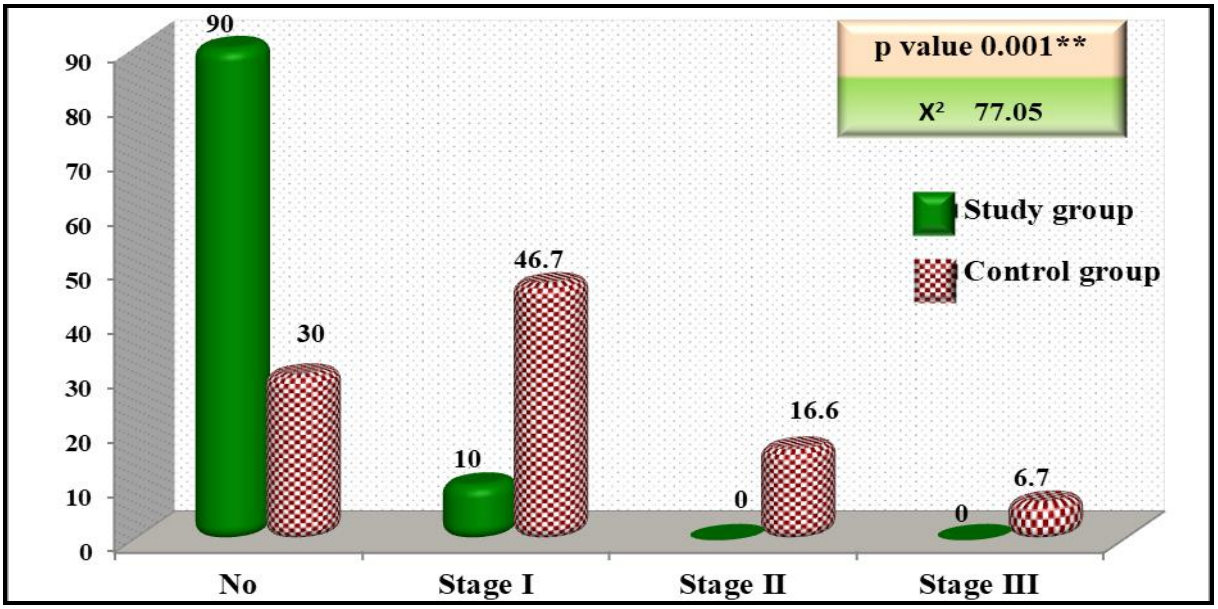
Table (3): Comparison between the two patients' groups toward Mean and SD of predicting pressure ulcer risk score before and after skin integrity care bundle application

Item	Study group	Control group	p-value
	Mean ±SD	Mean ±SD	
Before intervention	15.47±2.93	15.0±3.09	**0.776**
After intervention	19.43±1.63	15.0±3.35	**0.001****

Table (4): Comparison between two patients' groups regarding pressure ulcers site after skin integrity care bundle application

Sites	Study group		Control group		p-value
	N(30)	%	N(30)	%	
Sacrum					
- Yes	2	6.7	6	20.0	**0.006****
- No	28	93.3	24	80.0	
Heels					
- Yes	0	0.0	4	13.3	**0.001****
- No	30	100.0	26	86.7	
Ischium (buttocks)					
- Yes	1	3.3	5	16.7	**0.002****
- No	29	96.7	25	83.3	
Greater trochanter					
- Yes	0	0.0	6	20.0	**0.001****
- No	30	100.0	24	80.0	
Lateral malleoli					
- Yes	0	0.0	3	10.0	**0.001****
- No	30	100.0	27	90.0	

(**)Highly statistical significant difference



(**)Highly statistical significant difference

Figure (2): Comparison between two patients' groups regarding stages of pressure ulcers after skin integrity care bundle application

Table (5): Relation between demographic data of the study patients in study and control groups and predicting pressure ulcer risk scores after skin integrity care bundle application

Demographic characteristics	Predicting pressure ulcer risk integrity care bundle application								P-value
	Study group				Control group				
	Mild risk	Moderate risk	High risk	Severe risk	Mild risk	Moderate risk	High risk	Severe risk	
	30 (%)	0 (%)	0 (%)	0 (%)	16 (%)	5 (%)	8 (%)	1 (%)	
Age group									
- < 35 years	13(43.3)	0(0.0)	0(0.0)	0(0.0)	7(43.8)	1(20.0)	0(0.0)	0(0.0)	
- 35- <45 years	9(30.0)	0(0.0)	0(0.0)	0(0.0)	7(43.8)	1(20.0)	2(25.0)	0(0.0)	**0.034***
- 45 years or more	8(26.7)	0(0.0)	0(0.0)	0(0.0)	2(12.5)	3(60.0)	6(75.0)	1(100.0)	
Sex									
Male	19(63.3)	0(0.0)	0(0.0)	0(0.0)	9(56.3)	2(40.0)	2(25.0)	1(100.0)	**0.185**
Female	11(36.7)	0(0.0)	0(0.0)	0(0.0)	7(43.8)	3(60.0)	6(75.0)	0(0.0)	
Marital status									
Single	10(33.4)	0(0.0)	0(0.0)	0(0.0)	6(37.5)	0(0.0)	1(12.5)	0(0.0)	
Married	19(63.3)	0(0.0)	0(0.0)	0(0.0)	9(56.3)	4(80.0)	5(62.5)	1(100.0)	
Divorced	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(6.3)	1(20.0)	0(0.0)	0(0.0)	**0.075**
Widow	1(3.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(25.0)	0(0.0)	
Education									
No formal education	6(20.0)	0(0.0)	0(0.0)	0(0.0)	2(12.5)	3(60.0)	1(12.5)	0(0.0)	
Read and write	11(36.7)	0(0.0)	0(0.0)	0(0.0)	5(31.3)	0(0.0)	4(50.0)	1(100.0)	
Basic learning	6(20.0)	0(0.0)	0(0.0)	0(0.0)	4(25.0)	0(0.0)	0(0.0)	0(0.0)	
Secondary	4(13.3)	0(0.0)	0(0.0)	0(0.0)	2(12.5)	1(20.0)	2(25.0)	0(0.0)	**0.423**
University	3(10.0)	0(0.0)	0(0.0)	0(0.0)	3(18.8)	1(20.0)	1(12.5)	0(0.0)	
Current medical problem									
Anemia	5(16.7)	0(0.0)	0(0.0)	0(0.0)	1(6.3)	1(20.0)	2(25.0)	0(0.0)	
Urinary incontinence	1(3.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	1(100.0)	
Cardiovascular disease	1(3.3)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	**0.001****
Endocrine	2(6.7)	0(0.0)	0(0.0)	0(0.0)	2(12.5)	0(0.0)	2(25.0)	0(0.0)	
No problem	21(70.0)	0(0.0)	0(0.0)	0(0.0)	13(81.3)	4(80.0)	4(50.0)	0(0.0)	

(*) statistical significant difference (**) Highly statistical significant difference

Table (1): Shows that there was no statistically significant difference between both groups regarding their demographic and baseline data. Regarding age it was found that (43.3%) of study patient are less than 35 years while (40.0%) of control patients are fifty years or more. Regarding sex it was found that 63.3% of study patients are male but (53.3%) of patients are female. Regarding marital status; it was found that (63.3%) of study and control patients are married. Regarding education; it was found that (36.7%) of study group and (33.3%) of control group are read and write. Regarding current medical problem (70.0%) of study and control patients had no problem.

Table (2): Illustrate that there was a statistically significant difference between study and control group after intervention as regard skin character around bony prominent with **p-value <0.001.**

Figure (1): Shows that (100%) of the study patients and (53.3%) of control patient had mild risk of predicting pressure ulcer with positive relation with **p-value <0.001.**

Table (3): Clarifies that there was a statistically significant difference between study and control group after intervention as regard mean and SD of predicting pressure ulcer risk with **p-value <0.001.**

Table (4): Demonstrate that there was a statistically significant difference between study and control group after intervention as regard the area affected by pressure ulcer with **p-value <0.001.**

Figure (2): Clarifies that the (90%) of study patients had no pressure ulcer after intervention, while (46.7%) of control patients had stage I pressure ulcer after intervention

Table (5): Reflects that there was a statistically significant difference between study and control group after intervention as regard current medical problem with **p-value <0.001.** There was a statistically significant difference between study and control group after intervention as regard age group with **p-value <0.034.**

Discussion:

Pressure ulcers are still a significant issue for patients having orthopedic surgery, despite being generally preventable. Since it has negative effects on patients' physical, social, and functional well-being, it is widely acknowledged as one of the five most frequent causes of injury to this group of patients. It is increasingly being referred to as a gauge of the standard of the care given by healthcare organizations. **(Martins et al., 2022).** The present study aimed to explore the effect of skin integrity care bundle on hospital acquired pressure ulcer among patient with traction. In general, the current study found that the nursing intervention application had a statistically significant beneficial effects on reducing hospital acquired pressure ulcer among patients with traction.

The contemporary study revealed that no statistically significant difference between study and control groups regarding their demographic and baseline data. This was necessary to ensure the two groups could be compared and to show that the randomization of the two groups had been successful. This confirmed by **Boonchoo et al., (2019)** who documented that it is of paramount importance to prevent bias based on a variable known to affect results, such as baseline reading ability or gender, make sure the groups are equal before the experiment begins.

Regarding age; it was found that more than two fifths of the studied patient were less than 35 years. **Zarei et al., (2019)** were in agreement, revealing that "the current study findings demonstrated that the risk of developing pressure ulcer had a substantial association with patient age, with the risk increasing with greater age. In line with this, **Akhkand et al., (2020)** study found that patients' age was a significant factor in increasing the risk of pressure ulcer in orthopedic surgery patients and disagreed.

This disagreed with **Kayser et al., (2019)** who stated in their study, that two thirds of all patients with orthopedic problems were in the age 55 years older and this can be attributed to the beginning of generic period of life.

Regarding sex it was found that greater than half of the studied patients are male, married. Regarding current medical problem majority of study and control patients had no problem. This match with **Rashvand et al., (2020)** who mentioned that the proportion of institutional-acquired pressure ulcers was higher for men in hospitals.

The present study illustrated that there was statistically significant difference between study and control group after intervention as regard skin character around bony prominent. This supports other studies conducted by **Soodmand et al., (2019**) who found only 3.22% developed pressure ulcer and in the study conducted by **Khojastehfar et al., (2020)** reported that the implemented nursing interventions (which included preparing the patient's bed, moving the patient, providing nutritional support, and providing skin care) were successful in reducing the prevalence of pressure ulcers, with only 5.23% of patients having pressure ulcers.

Pachá et al., (2018) who reported that no evidence that nursing interventions had any impact on the presence of pressure ulcers, which is in contrast to the findings of the current investigation. The diverse study designs and healthcare settings may be to blame for these variations in prevalence rates.

Concerning the pressure ulcer's stage, the present study found that their was a statistically significant difference between the study and control group after application of the nursing intervention and the majority of the studied patients had stage I pressure ulcer.

In contrast, a study by **Zakaria et al. (2018)** found that approximately two thirds of the individuals had stage II pressure ulcers. In contrast to the control group, where the majority of patients had pressure ulcers in stages I, II, or III, just two study subjects had stage I pressure ulcers, according to **Sugihara et al., (2018)'s** study. According to the results of the current study, after the administration of the nursing intervention, there was a statistically significant difference between the study and control groups, with the sacrum being the most often impacted region. As the skin is the body's first line of defence, it's possible that the hospital care routine overlooks the significance of skin care to prevent pressure sores and infection.

The majority of orthopedic patients in the control group did not properly care for their skin by cleaning, drying, and applying lubricant to bony prominences. This is especially concerning for orthopedic patients whose skin is delicate and prone to breakage.

According to **Yang et al., (2017)'s** research, the key joints most frequently afflicted by pressure ulcers in orthopedic patients were the greater trochanter, heels, sacrum, ischium, and lateral malleoli. The study titled "Pressure sores as a complication in individuals with spinal cord injury" by **Mavris et al., (2022)** reported the same findings.Treatment and prevention. However, nearly half of pressure ulcer reports were from the buttocks, while fewer than one fifth came from the sacrum, greater trochanter, and heels **(Gefen et al., 2020).**

Two weeks after the nursing interventions were put into place, the skin around bony prominent areas was reassessed. It was found that the nursing interventions had been successful in protecting the skin because none of the studied patients in the study group had abnormalities in the skin's moisture or turgor, with the exception of two who had hotness and one who had redness, while all of the subjects in the control group had changes to their skin's temperature (hotness), color (redness), or dryness. In the control group, edema and abrasion were also seen.

The researcher opinion that this may be attributed to the routine hospital care which do not emphasize the importance of assessing elders' skin regularly to detect early those at risk for developing pressure ulcers and do not institute appropriate measures to prevent this problem. This match with **Sayan et al., (2020)** who reported that, since all patients in the two groups had no risk of pressure ulcer on admission to the hospital the risk for pressure ulcer increased significantly after two weeks of the implementation of the nursing interventions among patients in the control group compared to those in the study group where the majority still have no risk.

The frequent positioning changes of elderly patients every hour reduced pressure, friction, and shear damage, and they experienced less extended pressure on bony prominences. This maintained a sufficient flow of oxygen and nutrients to the area and prevented tissue death.

Repositioning the patient reduces the chance of pressure ulcer development and transfers or releases pressure on the areas that are vulnerable, according to another study by **Prakash & Prakash (2019).**

Repositioning is thought to shorten the time the tissue is subjected to pressure and lessen the risk of developing a pressure ulcer, according to a study by **Alimansur & Santoso, (2019)**

Liang, (2020) suggested that raising the bed's head to 30 degrees would aid to maintain the skin's oxygen supply.

In this regard, **Saleh et al. (2019)** highlighted that maintaining clean, dry skin can reduce the incidence of pressure ulcer development.

Additionally, **Parnham et al. (2020)** suggested massaging the skin regularly and using cream near bone prominences to prevent skin injury.

This study backs up **Cai et al., (2019).'s** other study in which it was discovered that most patients with recorded skin care had protective dressings put over bony prominences, which may have been a protective factor in preventing the development of pressure ulcers.

Additionally, according to the patient's tolerance, **Whiteson et al., (2021)** emphasized the need of mobility and daily walking in the room or hallway. This increased blood circulation supplies oxygen, nutrients, vitamins, and minerals that support the formation of cells and tissue.

The existing study found a positive relation between study and control group after intervention as regard their age group and medical problems.

In this line, **Skaansar et al., (2020)** study revealed that adult patient's group who aged from 18 to ≤ 55 years old experienced a significant improvement in wound severity among the orthopedic surgery patients after the nursing program application than the elderly group patients who aged more than 55 years old. This may be due to delay of wound healing process during aging process, because of decrease collagen and vascularity.

Jayakumar et al., (2021) explaining that age-related changes had an impact on the wound healing process

through reduced skin elasticity, collagen, and age-related diseases so the skin impaired.

Finally, the present study proved that there was a great enhancement in outcomes of the studied patients' regarding pressure ulcer occurrence after the nursing intervention application. According to the study, all of these contribute to maintaining skin integrity and preventing pressure ulcers. Additionally, consuming enough fluids each day aids in the formation of new tissue and the development of new cells since the body requires water to transport nutrients to the cells.

Conclusions:

- There were statistical significant differences between study and control group after the nursing intervention application regarding the regard skin character around bony prominent, predicting pressure ulcer risk, area affected by pressure ulcer.
- Study patients had no pressure ulcer after intervention, while 46.7% of control patients had stage I pressure ulcer after intervention
- There was no statistical significant difference between study and control group after the nursing intervention application as regard the patient demographic except regarding their age groups

Recommendations:

1. Nurses should encourage and motivate patients to be active and help them change positions every hour.
2. Ongoing education for nurses about the steps necessary to prevent pressure ulcers, with a focus on how crucial it is that they use these steps in their daily work.
3. Give the hospitals the supplies the nurses need to accomplish their goal of reducing the development of pressure ulcers.

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