

## Risk factors assessment of Pressure ulcers among critically ill patient connected with mechanical ventilation

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### Abstract:

**Background:** Pressure ulcers (PU) are a common, uncomfortable, and costly medical condition that are closely linked to higher rates of morbidity, death, length of hospital stay, and length of time spent on mechanical ventilation. **Aim of the study:** To assess risk factors for pressure ulcers among critically ill patients. **Research design:** observational prospective exploratory research design. **Setting:** This study was carried in intensive care units at Assiut university hospital. **Subjects:** A convenience sampling of 60 patients. **Tools:** Two tools were utilized to collect data of study, **Tool I:** Patient assessment **Tool II:** Comprehensive skin assessment tool. **Results:** It was noticed that immobility, malnutrition, cognitive disorders, Dehydration and Diabetes were the most significance factors of pressure ulcer occurrence ( $P = 0.05^*$ ). The most common site of pressure ulcer in patient's group1 and group2 was coccyx (23.1%) and Heel (19.2%). **Conclusion:** The study confirmed that common risk factors for Pressure ulcers in Intensive Care Unit (ICU) patients were: immobility, malnutrition, cognitive disorders, urinary incontinence Dehydration, Diabetes and compromised blood flow. **Recommendation:** To lower the risk of pressure ulcers, ICU patients must follow protocols aimed at preventing pressure ulcers.

**Keywords:** Critically ill patients, Risk factors & Pressure ulcers

### Introduction:

Pressure ulcers (PUs), also known as pressure sores and bed ulcers, are small injuries to the skin or underlying tissue that most commonly occur over bony prominences and can be caused by any mixture of compression, shearing forces, or friction. The most common places for pressure ulcers to occur are the shoulders, hips, heels, and tailbone, areas with little protecting tissue or muscle. (Nancy et al., 2022).

Pressure ulcers occur most frequently over bony prominences, and the most common Pressure ulcers vulnerable locations include the sacrum, coccyx, heels and ear. Pressure ulcers can occur on the areas of the coccyx, the heels, the foot, the hips, the shoulders, the knees, the ankles, the elbows, and the ear flaps (Sardo et al., 2023).

Pressure ulcers are a worldwide problem that affects hospital and community patients. It affects negatively the patients, families and had an economic burden on the health care agencies. Pressure ulcers are associated with longer duration of intensive care unit stay and increased mortality rates. Pressure ulcers had emotional, mental, physical, and social effects on quality of life. (Taylor et al., 2021)

One of the most vulnerable groups of people, critically ill patients are at a high risk of developing pressure ulcers because of factors like clinical instability, invasive interventions, restricted physical

activity, retention of feces or urine, moisture, edema, ischemia, malnutrition, multiple treatments, and longer ICU stays, all of which can contribute to the development of pressure ulcers in critically ill patients. (Tilmazer. et al, 2019).

Hospital-acquired pressure injuries (HAPIs) are twice as common among patients hospitalized to the intensive care unit (ICU) compared to other acute care patients. Determining the factors associated with HAPI development in critical care patients is necessary to enable risk-based preventive measures. (T Gou & Zhang, 2023).

### Significance of the study:

Pressure ulcers are seen as a common and expensive issue in patient care. In nursing care, the frequency of pressure ulcers is an important indicator and an essential clinical problem in providing of healthcare. (Zarei et al., 2019).

Statistics of intensive care unit (ICU) at Assiut University Hospital in year 2021 of revealed that the number of patients admitted to intensive care unit (ICU) is 418 cases with deferent diagnosis, this patient higher risk for developing pressure ulcer.

### Aim of the study:

To assess risk factors for pressure ulcers among critically ill patients

**Research questions:**

**Q1.** What are the risk factors for pressure ulcers in critically ill adult?

**Patient and Method:****Research design:**

Observational prospective exploratory research design that was conducted in this study.

**Setting of the study:**

The data were collected from different intensive care units (Trauma ICU, General ICU and Critical ICU), all at main Assiut University Hospitals, in Egypt.

**Sample:**

The sample was gathered for approximately seven months (from December 2022 to June 2023) in accordance with the inclusion criteria. The statistical program Epidemio Information 2000 was used to determine the sample size. The 95% confidence interval, 80% study power, 95% prevalence of critically ill patients, and worst-acceptable result of 5% were used in the computation of the expected frequencies of critical care units from earlier studies. Based on a four mentioned criteria, a sample size of 54 critically ill patients was computed. (Taheri, 2017), to overcome the drop factors the sample size became 60 patients. Those patients assigned according to occurrence of pressure ulcer in two groups (group1: patients with pressure ulcer) (group2: patients without pressure ulcer).

**Inclusion criteria:**

The study included patients who had the following criteria:

- 1- Patient's age between 18 – 65 years.
- 2- New admission patient to intensive care units.
- 3- All patients receiving mechanical ventilation

**Exclusion criteria:**

The study excluded patients with the following criteria

- 1- Burned Patient.
- 2- Patient with skin disease such as (Eczema, Lupus, Dermatitis, Cellulitis).
- 3- Patient discharged with less than 7days of ICU (because pressure ulcer developed with in the 7days of ICU).

**Data Collection Tools:****Tool (I): Patient assessment tool:**

The tool was developed by the researcher after reviewing literatures. The tool used to assess patient condition, and divided into two parts as:-

**Part I: Demographic data assessment sheet:**

Includes patient's code, age and Gender.

**Part II: Clinical data:**

As diagnosis, weight, length of ICU stay and duration of connection with mechanical ventilation).

**Tool II: Comprehensive skin assessment tool:**

This tool adopted from **Western Australian Pressure Injury Forum, 2013**. To assess the skin status and consist of four parts:

**Part I: Skin health status assessment:** It included six items namely (skin temperature, color, moisture, turgor, tissue perfusion and integrity).

**Part II: Risk factors for developing pressure ulcer.** As (immobility, malnutrition, Compromised blood flow, cognitive disorders, incontinence, Dehydration, edema and Diabetes).

**Part III: Braden risk assessment scale:**

This tool is adopted by **Bergstrom, Braden, Laguzza & Holman, 1987**.and recently use by (Huang. et al, 2021) used to determine the patient's risk of pressure ulcer development. With six subscales—sensory perception, skin moisture, activity, mobility, nutrition, and friction/shear—this scale is a summated rating system. Scores of 15-18 indicate low risk, scores of 13-14 indicate moderate risk and scores of  $\leq 12$  indicate high risk (Huang. et al, 2021).

**Part IV: pressure ulcer assessment:**

It included (presence of pressure ulcer by using yes or no occurrence, pressure ulcer stages such as (Stage 1: just erythema of the skin. Stage 2: erythema with the loss of partial thickness of the skin including epidermis and part of the superficial dermis. Stage 3: full thickness ulcer that might involve the subcutaneous fat. Stage 4: full thickness ulcer with the involvement of the muscle or bone)

And location of pressure ulcer such as (Occiput, Heel, Coccyx, elbow, Sacrum and buttock).

Content validity of this tool was 0.93, reliability was Cronbach's alpha 0.88.

**Method:****Preparatory phase:**

- After describing the purpose and design of the study, permission to conduct it was granted by the hospital's relevant authorities in the critical care, and anesthesiology departments.
- Based on an analysis of relevant literature, the researcher developed the tools.
- Seven experts (three critical care nursing professors and four critical care medicine professors) in the study's field evaluated the generated tool for clarity and dependability, and any necessary adjustments were made.

**A pilot study:**

Was completed in order to evaluate the tools' applicability and viability. The pilot study was made 10% patients of the study sample there is no adjustment and the pilot study was excluded from the result.

**Ethical consideration:**

- Research approval will be approved from ethical committee in the faculty of nursing.
- There is no risk for study subject during application of the research.
- The study will follow common ethical principles in clinical research.
- Informed consent will be taken from person participating study after explaining the nature and purpose of the study.
- Confidentiality and will be assured.
- Patient has the right to refused to participate or withdraw from the study without any rational at any time.
- Study subject privacy will be considered during collection of data.

**Assessment phase:**

- During this phase the researcher assessed patient from the first day of admission and record patient demographic and clinical data before any data collection by taking this information from his/her sheet using tool I ( part 1).

- The researcher assessed patient from the first day and record Skin health status daily for fourteen day by using tool II (part I)
- The researcher assessed patient's risk factors for developing pressure ulcer daily for fourteen day by using tool II (part 2).
- The researcher assessed the patient's level of risk for developing pressure ulcers from the first day and record Braden risk assessment scale daily for fourteen day by using tool II (part 3) to assess (sensory perception, skin moisture, activity, mobility, nutrition, and friction/shear).

The researcher assessed presence of pressure ulcer, pressure ulcer stages and location of pressure ulcer. Once daily for fourteen day by using tool II (part4) because of the pressure ulcers are developing in this days.

**Statistical analysis:**

The computer program SPSS (ver.25) was used to computerize and analyze the data. Descriptive statistics were used to present the data, either as means  $\pm$  standard deviations for qualitative data or as frequencies and percentages.

**Results:**

**Table (1): Percent Distribution of Demographic data and clinical data among Studied Patients (n=60)**

Variable	Presence of pressure ulcer		P value
	Yes (group1=27)	No(group2=33)	
Gender	Male	22 (81.5%)	0.92
	Female	5 (18.5%)	
Diagnosis	Traumatic brain injury	0 (0.0%)	0.05
	Chest trauma	1 (3.7%)	
	Renal failure	0 (0.0%)	
	Pneumonia	0 (0.0%)	
	Spinal cord injury	11 (40.7%)	
	Diabetes, septic shock	2 (7.4%)	
	Chest and head trauma	9 (33.3%)	
	Other	3 (11.1%)	
Age (Mean & SD)	45.96 $\pm$ 16.02	39.39 $\pm$ 13.45	0.09
Length of ICU stay (Mean & SD)	21.70 $\pm$ 5.58	19.90 $\pm$ 5.75	0.228
Weight (Mean & SD)	67.74 $\pm$ 11.93	62.36 $\pm$ 14.21	0.123
Duration of connection with MV (Mean & SD)	11.92 $\pm$ 2.75	9.90 $\pm$ 3.16	0.01*

*Chi square test, \*Significant level at P value < 0.05*

*MV: mechanical ventilation*

*ICU: intensive care unit;*

**Table (2): Percent Frequency Distribution of skin health assessment among Studied Patients (n=60)**

Skin health assessment		Presence of pressure ulcer		P value
		Yes (group1=27)	No(group2=33)	
Temperature day 1	Normal	24 (88.9%)	31 (93.9%)	0.48
	Fever	3 (11.1%)	2 (6.1%)	
Temperature day 14	Normal	24(88.9%)	29 (87.9%)	0.90
	Fever	3 (11.1%)	4 (12.1%)	
Color day 1	Pink	6 (22.2%)	9 (27.3%)	0.63
	Pallor	21 (77.8%)	24 (72.7%)	
Color day 14	Pink	3 (11.1%)	17 (51.5%)	0.001*
	Pallor	24 (88.9%)	16 (48.5%)	
Moisture day 1	Moist	13 (48.1%)	22(66.7%)	0.03*
	Excessive moist	5 (18.5%)	0 (0.0%)	
	Dry	9 (33.3%)	11 (33.3%)	
Moisture day 14	Moist	6 (22.2%)	23 (69.7%)	0.001*
	Excessive moist	5 (18.5%)	0 (0.0%)	
	Dry	16 (59.3%)	10 (30.3%)	
Turgor day 1	Normal (< 3Sec)	13 (48.1%)	31 (93.9%)	0.001*
	Impaired (>3Sec)	14 (51.9%)	2 (6.1%)	
Turgor day 14	Normal (< 3Sec)	8 (29.6%)	31 (93.9%)	0.001*
	Impaired (>3Sec)	19 (70.4%)	2 (6.1%)	
Tissue perfusion day1	Normal	10 (37.0%)	33 (100.0%)	0.001*
	Decreased	17 (63.0%)	0 (0.0%)	
Tissue perfusion day 14	Normal	6 (22.2%)	31 (93.9%)	0.001*
	Decreased	21 (77.8%)	2 (6.1%)	
Skin Integrity day1	Intact	27 (100.0%)	33 (100.0%)	-
Skin Integrity day 14	Intact	0 (0.0%)	33 (100%)	0.001*
	Pressure ulcer	27 (100%)	0 (6.1%)	

Chi square test, \*Significant level at P value < 0.05

**Table (3): Percent Frequency Distribution of risk factors for developing pressure ulcer among Studied Patients (n=60).**

Risk factors for developing pressure ulcer For Study Patients	Presence of pressure ulcer		P-value
	Yes (group1=27)	No (group2=33)	
Immobility	24 (88.9%)	2 (6.1%)	0.001*
Malnutrition	11 (40.7%)	2 (6.1%)	0.001*
Compromised blood flow	5 (18.5%)	0 (0.0%)	0.001*
Cognitive disorders	6 (22.2%)	0 (0.0%)	0.004*
Incontinence	1 (3.7%)	0 (0.0%)	0.260
Dehydration	6 (22.2%)	0 (0.0%)	0.004*
Diabetes	6 (22.2%)	0 (0.0%)	0.004*

Chi square test, \*Significant level at P value < 0.05

**Table (4) Frequency Distribution of Braden risk assessment among Studied Patients (n=60).**

Braden scale		Presence of pressure ulcer		P - Value
		Yes (group1=27)	No(group2=33)	
Braden risk assessment score day1	(Mean & SD)	9.70±2.21	15.09±1.68	0.001*
Braden risk assessment score day1	Low risk	1 (3.7%)	24 (72.7%)	0.001*
	Moderate risk	3 (11.1%)	7 (21.2%)	
	High risk	23 (85.2%)	2 (6.1%)	
Braden risk assessment score day14	(Mean & SD)	9.77±2.13	16.03±1.74	0.001*
Braden risk assessment score day14	Low risk	1 (3.7%)	30 (90.9%)	0.001*
	Moderate risk	4 (14.8%)	3 (9.09%)	
	High risk	22 (81.5%)	0 (0.0%)	

Chi square test, \*Significant level at P value < 0.05

**Table (5): Percent Frequency Distribution of pressure ulcer assessment among Studied Patients (n=60).**

Pressure ulcer assessment		Presence of pressure ulcer
		Yes (group1=27)
Pressure ulcer stages day 14	First "non-bleachable erythema	21(77.8%)
	Second "partial thickness of skin loss	5 (18.5%)
	Third "full thickness of skin loss	1 (3.7%)
Location of pressure ulcer day 14	Occiput	1 (3.8%)
	Heel	5 (19.2%)
	Coccyx	6 (23.1%)
	Occiput and buttock	3 (11.5%)
	Sacrum and buttock	1 (3.8%)
	Ischium and buttock	2 (7.7%)
	Sacrum and heel	2 (7.7%)
	Heel and elbow	1 (3.8%)
	Heel and buttock	5 (19.2%)

Chi square test, \*Significant level at  $P$  value  $< 0.05$

**Table (1):** Illustrates demographic and clinical data of study Patients. Regarding to gender, the high percent of patients were male in patients group1 and group2 (81.5%) and 69.7%) respectively. As regard to diagnosis, the most common diagnosis was spinal cord injury in group1 and group2 (40.7%) and 39.4%) respectively. Regarding to age, it was noticed that the mean and Std.deviation of age in patients group1 and group2 ( $45.96 \pm 16.02$ ), ( $39.39 \pm 13.45$ ) respectively without statistical significant differences. As regard to weight, it was noticed that the mean and Std.deviation of weight in patients group1 and group2 ( $67.74 \pm 11.93$ ), ( $62.36 \pm 14.21$ ) respectively without statistical significant differences. Regarding to length of stay, It was noticed that the mean and Std.deviation of length of stay in patients group1 and group2 ( $21.70 \pm 5.58$ ), ( $19.90 \pm 5.75$ ) respectively without statistical significant differences. As regard to duration of connection with mechanical ventilation, It was noticed that the mean and Std.deviation of duration of connection with mechanical ventilation in group1 and group2 ( $11.92 \pm 2.75$ ), ( $9.90 \pm 3.16$ ) with statistical significant differences. ( $P$  value =  $0.01^*$ ).

**Table (2):** Shows skin health assessment of group1 and group2. Regarding to color, It was noticed that the majority of patient were pallor group1 (88.9%) while majority of patient in group2 were pink (51.5%) with statistical significant differences at 14<sup>th</sup> day ( $P = 0.001^*$ ) respectively. Regarding to Moisture, It was noticed that the majority of patient were dry in group1 (59.3%) while majority of patients group2 were moist (69.7%) with statistical significant differences at 14<sup>th</sup> day ( $P = 0.001^*$ ) respectively.

Regarding to turgor, It was noticed that the majority of patient were impaired skin turgor in group1 (70.4%) while majority of patients group2 were normal skin turgor (93.9%) with statistical significant differences at 14<sup>th</sup> day ( $P = 0.001^*$ ). Regarding to

Tissue perfusion, It was noticed that the majority of patient were decreased Tissue perfusion in patients group1 (77.8%) while majority of patients group2 were normal Tissue perfusion (93.9%) with statistical significant differences at 14<sup>th</sup> day ( $P = 0.001^*$ ). Regarding to Skin Integrity, It was noticed that the majority of patient were pressure ulcer in study Patients 27 while majority of patient without pressure ulcer were intact skin 33 with statistical significant differences at 14<sup>th</sup> day ( $P = 0.001^*$ ).

**Table (3):** Show Risk factors for developing pressure ulcer. It was noticed that immobility, malnutrition, cognitive disorders, Dehydration and Diabetes were the most significance factors of pressure ulcer occurrence ( $P = 0.05^*$ ). Regarding to immobility, it was noticed that the majority of patient were immobility (88.9%) in patients group1 while the little number of patient group2 (6.1%) were mobile. Regarding to malnutrition, it was noticed that the little number of patient were malnourished in patients group1 and group2 (40.7%). Regarding to Compromised blood flow, it was noticed that the little number of patient were Compromised blood flow in patients group1 and group2 (18.5%). Regarding to cognitive disorders, it was noticed that the little number of patient were cognitive disorders in patients group1 and group2 (22.2%). Regarding to Incontinence it was noticed that the little number of patient were Incontinence in patients group1 and group2 (3.7%). Regarding to Dehydration it was noticed that the little number of patient were Dehydration in patients group1 and group2 (22.2%). Regarding to Diabetes it was noticed that the little number of patient were Diabetes in patients group1 and group2 (22.2%).

**Table (4):** Shows Braden risk assessment of study Patients. Regarding to 1<sup>th</sup> day, it was noticed that the mean and Std. deviation in patients group1 and group2



(9.70±2.21), (15.09±1.68) with statistical significant differences. It was noticed that the majority of patient had high Braden risk assessment score in patients group1(85.2%) while the majority of patients group2 had low Braden risk assessment score (72.7%) with statistical significant differences (P = 0.001\*) . Regarding to 14<sup>th</sup> day, it was noticed that the mean and Std. deviation in patients group1and group2 (9.77±2.13), (16.03±1.74) with statistical significant differences. It was noticed that the majority of patient had high Braden risk assessment score in patients group1(81.5%) while the majority of patients group2 had low Braden risk assessment score (90.9%) with statistical significant differences (P = 0.001\*).

**Table (5):** Shows pressure ulcer assessment of patient's group1. Regarding to stages of pressure ulcer, it was noticed that the majority of patient's group1 (77.8%) were First “non-bleachable erythema. Regarding to location of pressure ulcer, it was noticed that the common site of pressure ulcer in patient's group1 was coccyx (23.1%) and Heel (19.2%).

### Discussion:

Studies have shown that patients with limited movement are most likely to develop pressure ulcer during hospitalization (Balzer & Kottner, 2015).

Gender-wise, most of the patients admitted to the study setting were males in patient's group1and group2. Although slightly more men had hospital-acquired pressure ulcers than women, overall differences in occurrence were minor. This can be attributed to hormonal changes in women. This result was in line with the result of (Lichterfeld-Kottner et al., 2020) who mentioned that men were at higher risk for developing a pressure ulcer. According to these results, the most common diagnoses seen in patient's group1and group2 were spinal cord injury and chest, head trauma; those with restricted movement have a higher prevalence of pressure ulcers. Given that prolonged pressure on the skin and insufficient blood supply to the organ are the main causes of pressure ulcers, a contrary to (Tervo-Heikkinen et al., 2022) showed that the neurological condition were the second common risk factor for developing the pressure ulcers. In this study the mean age in patient's group1and group2 (45.96±16.02),(39.39±13.45) respectively.

These results were matched and comparable to (Coyer & Tayyib, 2017) who that indicated that age alone is not considered an independent factor for pressure ulcer. As mentioned in the literature age is a risk factor for developing pressure ulcer but not a single factor (Digesa et al., 2023).

Based on the results of the current study, the mean length of stay was reduced among the patients group2 compared to the patients group1 (19.90±5.75) and

(21.70±5.58) respectively. This study was supported by (Lyder et al., 2012) demonstrated that the risk of readmission and the length of hospital stay are increased when pressure ulcers develop in a medical facility. The degree of pressure ulcers may be exacerbated by this finding that those with the worsening condition and longer hospital stays also have higher inactivity and pressure ulcer risk factors.

Length hospital stay in (Bereded et al., 2018) this study also showed that the Patients whose Length hospital stay was ≥ 6 days were 8.44 times more likely to develop pressure ulcers than those patients who were stayed for ≤ 6 days.

This result was in line with the (Gedamu et al., 2014) When patients Length hospital stay increases, the risk of hospital-acquired infection increases which leads to the development of pressure ulcers.

However, weight also can affect pressure ulcers, the study (Daniel et al., 2017) mentioned that the pressure ulcers incidence was higher in the underweight group and (Chen et al., 2023) found that BMI was not considered an independent risk factor while implementing an evidence-based bundle for pressure ulcers and this result is consistent with the results of the current study. Moreover, the mean duration of mechanical ventilation was reduced among the patient's group2 compared to the patients group1 (9.90±3.16) and (11.92±2.75) respectively.

Similarly, (Lu et al., 2023) found that patients who developed pressure ulcers were hospitalized in the intensive care unit for an average of 16.8 days and were dependent on mechanical ventilation for 11.4 days during this period.

The main cause of pressure ulcers is immobility; the risk of developing a pressure ulcer increases fourfold in the presence of friction or shearing forces compared to their absence. This is justified by the fact that critical patients are immobile with little or no response to stimuli, increasing the risk of friction and shearing forces. (González-Méndez et al., 2018) and these results supported the findings of the current study as it was shown that the number of patients who were immobile was at a greater risk of developing pressure ulcers. And many researches supported that the immobility increase the risk of the pressure ulcers (Amir et al., 2017) (W. P. Chaboyer et al., 2018).

In this study the two main risk factors for the development of pressure ulcers are inadequate food and nutritional deprivation. Suboptimal nutrition interferes with the function of the immune system, collagen synthesis, and tensile strength.

As mentioned in the result of this study more than of the patients who developed pressure ulcers in study patients were malnourished and these results were in the same line with previous research which stated that Malnutrition is closely related to problems such as

muscle loss and reduced mobility, which have previously been established as significant risk factors for the development of pressure ulcers (Serra et al., 2014) (Roberts et al., 2015), and (Dahl et al., 2013) mentioned that the patients risk factor were (Immobility, Nutritional deprivation, stroke, reduce level of consciousness, fracture and decrease perfusion) were the most common risk factors in study patients.

Urinary incontinence, fecal incontinence, dual incontinence, and urinary catheters are other moisture-related issues. It adds to the skins soaking, and this might make the damaged skin. The current study showed that the effect of incontinence on pressure ulcers incidence. (Neloska et al., 2016) (W. Chaboyer et al., 2016) mentioned that urinary incontinence, fecal incontinence increases the risk of developing pressure ulcers.

(Olivo S, et al., 2020) mentioned that some risk factors including diabetes mellitus increase the risk of developing pressure ulcers which is inconsistent with the results of the current study. Based on the results of the current study, the mean Braden risk assessment score was reduced among the patients with pressure ulcer compared to the patients without pressure ulcer. Also the study of (Almeida et al., 2016) stated that the Braden risk assessment score was lower among the patient who developed pressure ulcers with mean of 11 compared to 17 for the patient who did not develop pressure ulcers. According to (Alderden et al., 2020), The strongest predictor was skin irritation, a potentially modifiable risk factor.

Patients with skin irritation were 79% more likely to develop pressure ulcers than patients with non-irritated skin. Skin irritation is a sign of a change in skin integrity and, consequently, a reduction in tissue tolerance to shearing and mechanical forces, which are the causes of the formation of pressure ulcers. Excessive dryness of the skin, drug allergies, or caustic substances acting as irritants can all lead to skin irritation.

Meanwhile, Stages 1 and 2 pressure ulcers are frequently seen in intensive care patients, here in the current study, the number of patients with pressure ulcers in grades 1 and 2. (Aghazadeh et al., 2021) noted that stage 2 pressure ulcers were more prevalent than stage 1. In contrast, in a study conducted by (Uzun & Tan, 2007) in an intensive care, stage 1 pressure ulcers were observed at a greater rate (72.3%) than stage 2 (14.9%).

Regarding the location of pressure injury, the current study revealed that the common site of pressure ulcer in study Patients was coccyx and Heel. this result is in the same line with (Rivera et al., 2020) who mentioned that the most common site for developing pressure ulcer is sacrum and coccyx. and this result is

in the same line with (Dahl et al., 2013) who mentioned that the most common site for developing pressure ulcer is sacrum and Heel, however (Parrillo et al., 2016) found the heels were the most common location where pressure ulcers occurred.

This may be due to the fact that most patients are placed in a semi-Fowler's supine position without the use of any pressure-relieving equipment, which causes more pressure points on the sacrum.

### Conclusion:

For certain hospital patients, pressure ulcers are an inevitable consequence. The study sites identified several risk factors for pressure ulcers, such as diminished sensory perception, increased skin moisture, poor nutrition, lack of movement, and immobility due to fractures and spinal damage. In the present study, the quality of the evaluation of the patient and the risk factors for pressure ulcers in most cases has been undesirable. It appears that poor patient evaluation quality and pressure ulcer risk factors are related to nurses' ignorance, lack of sense of duty, and most importantly—the absence of a reliable tool for estimating pressure ulcer risk.

### Recommendation:

- To lower the risk of pressure ulcers, ICU patients must follow protocols aimed at preventing pressure ulcers.
- In critical care units, managing pressure ulcers should be a standard component of care for all critically ill patients.
- Braden risk assessment scale must be apply in ICU after training of critical care nurses how to use.

### Conflict of interest:

- The researcher declare that there is no conflict of interest.

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