Factors Affecting Prediction of Pressure Ulcer among Patients at Critical Care Unit: Suggested Nursing Care Plan

[a] Lobna A. Ibrahim, [b] Neamatalah Goma Ahmed and Dalia Ali Ameen.
[a] Clinical instructor /Faculty of Nursing Sohag University, [b] Ass. Professor /Medical Surgical Nursing Department/Ain Shams University.

Abstract

Background: Pressure ulcer (PU) commonly called Pressure injury (PI), pressure sores (PS), decubitus ulcers (DU) or bedsores (BS), are localized injury occur most often in the skin and subcutaneous tissue over bony prominences. **Aim:** This study aimed to assess factors affecting prediction of pressure ulcer among patients at critical care unites**. Design** A descriptive exploratory design was utilized for the conduction of this study. **Setting** the study was carried out in critical care unit (ICU) of Sohag University Hospital**. Study subject:** A purposeful sample of seventy patients. **Tools: I** – patient assessment form which includes patients demographic characteristics' and patients' clinical data, **II-** Braden scale to detect high risk patient for pressure ulcer, **III-**factors affecting prediction of pressure ulcer tool**. Results:** revealed that, many factors affecting prediction of pressure ulcers, such as patient's related factors, 55.7% of the studied patients were bed ridden, 87.1% of them were incontinence of stool, 72.9% having a low level of consciousness, 74.3% of the studied patients exposed to shear and friction on the skin, 64.3% were diabetic, and 55.7% were suffered from vascular disease. Almost all of the nurses' practices regarding pressure ulcer prevention were poor, and according to Braden scale assessment 55.7% of patients admitted to ICU were at high risk for pressure ulcer. **Conclusion:** more than half of patients admitted to ICU had sever risk for pressure ulcer according to Braden scale, more than half of patients were bed ridden, most of them were incontinence of stool, three quarter of patients having a low level of consciousness and were exposed to shear and friction on the skin, nearly two third of patients were diabetic and more than half of them were suffered from vascular disease. All of nurses' practices regarding pressure ulcer prevention were poor, and most of patients did not have environmental factors to prevent pressure ulcer. **Recommendations:** Application of Braden scale tool to assess all admitted patients to intensive care units. Braden scale should become as daily nursing assessment task.

Keywords: Pressure ulcer – Braden scale – Nursing.

Introduction

Peptic ulcer may be superficial, caused by local skin irritation and redness with subsequent surface maceration, or deep, originating in underlying tissue. Deep lesions often go undetected until they penetrate the skin, and usually caused subcutaneous damage. Most pressure ulcer develops over bony prominences: sacral area, greater trochanter, ischia tuberosity, heel, and lateral malleolus. Collectively, these areas account for 95% of all pressure ulcer sites **(Ferri, 2017).**

National Pressure Ulcer Advisory Panel (NPUAP) modified the staging systems of developing pressure ulcer into six stages. **Stage I** non-**blanchable** erythema with intact skin surface; **Stage II** epithelial damage, abrasion or blister; **Stage III** damage to the full thickness of the skin without a deep cavity and **Stage IV** damage to the full thickness of the skin with a deep cavity. **Unstageable Pressure ulcer:** Obscured full-thickness skin and tissue loss, full-thickness skin and tissue loss in which the extent of tissue damage within the ulcer cannot be confirmed because it is obscured by slough or eschar. **Deep Tissue Pressure ulcer:**

Persistent non-blanchable deep red, maroon or purple discoloration intact or non-intact skin with localized area or epidermal separation revealing a dark wound bed or blood filled blister **(Cash & Glass, 2017).**

There are intrinsic factors and extrinsic factors that determine the tolerance of soft tissue to the adverse effects of pressure. Intrinsic risk factors are physiologic factors or disease states that increase the risk for pressure-ulcer development (age, nutritional status, and decreased arteriolar blood pressure). Extrinsic factors are external factors that damage the skin (friction and shear, moisture, and urinary or fecal incontinence, or both) **(Grass & Buck, 2017).** Variables that appear to be predictors of pressure-ulcer development include age more than70 years, impaired mobility, current smoking history, low body mass index, altered mental status, urinary and fecal incontinence, malnutrition, restraints, malignancy, diabetes mellitus, stroke, pneumonia, congestive heart failure, fever, sepsis, hypotension, renal failure, dry and scaly skin, history of pressure ulcers, anemia, lymphopenia, and hypo-albuminemia **(Hotus, 2015).**

Significance of the study

Patients with either a primary or secondary diagnosis of pressure ulcer are discharged to long-term care at three time the rate of other diagnoses. Pressure ulcers also increase health care practotioners' workloads, as additional time and care must be provided to manage and treat patients' pressure ulcers-more dressing changes, more medications, and more documentation as will as healthcare costs increase dramatically due to pressure ulcers. Thus, the assessment, prevention, and treatment of pressure ulcer are of major important to health care professionals and to the facilitie at which they practice. Many facilities have developed pressure ulcer prevention programs to put these idea into practice and prevent negative outcomes. The National Pressure Ulcer Advisory Panel (NPUAP) incidence rate of over 50% inpatient placed on a standard bed most of these incident pressure ulcer stage I.

The incidence and prevalence of pressure ulcers vary greatly, depending on the setting. In the hospital, higher rates are noted in intensive care units which reported a 12.4% incidence rate for stage II. According to the statistic offices of sohag University Hospitals, The total number of admitted patients was 600 in intensive care unit (Sohag University Hospital) incidence rate of pressure ulcer in hospital records is 14% of patients in intensive care unit **(Statistic offices of Sohag University Hospitals, 2016).**

Pressure ulcer has been described as one of the most costly and physically debilitating complications in the 20th century. Pressure ulcer is the third most expensive disorder after cancer and cardiovascular diseases **(Burdette, Taylor & Kass, 2012).**

Aim of the study

This study aimed to assess factors affecting prediction of pressure ulcer among patients at critical care unites through.

1- Assess factors affecting prediction of pressure ulcer among patients at critical care unites.

2- Develop Suggested nursing care plan for prediction of pressure ulcer among patients at critical care unites.

Research question

The current study answered the following question:

1- What are the factors that affect prediction of pressure ulcer among patients at critical care units?

2- What is the suggested nursing care plan for prediction of pressure ulcer among patient at critical care unit?

Subject and methods

Research Design: A descriptive explorative design was utilized for the conduction of this study.

Setting of the Study: The study was conducted at Intensive Care Unit of Sohag University Hospital.

Subject: - A purposive sample of 70 newly admitted adult critically ill patients from the above mentioned sitting were included in the study according to inclusion criteria.

Inclusion criteria:

Newly admitted adult male and female patients.

Exclusion criteria:

Patients with pressure ulcer.

Data Collection tools

Data were collected using the following tools:

Tool 1: Patients assessment tool (Appendix I):

This tool was used to assess studied patients on admission, it was developed by the investigator based on literature review **(Ferris, 2017), (Asfour, El-soussi& Reffat, 2016), Lgadiem et al., (2016), Lynn, (2015), (Smeltzer, Bare, Hinkle & Cheever, 2014), and (Skipper, 2012),** it was written in English language and filled by investigator, it consisted of three parts:

Part (I): A) Patients' demographic data:

This part was used to assess demographic characteristic of the studied patients such as (age, gender, level of education, occupation, and marital status).

B) Patients' clinical data:

This part was included clinical data related to patients such as ICU admission, past medical history, hospital length of stay, and ambulatory condition.

Part (II): patient anthropometric measurements:

This part was used to assess body measurements as weight by kilogram (kg), height by centimeters (cm) on admission to calculate body mass index for the studied patients and to assess changes in body mass index that considered indicator for predicting of PU as underweight, overweight, and obese.

BMI = Weight (Kg)/ Height (m^2)

- All body mass index was measured and compared by using reference range **Appendix (V)**

Part (III): Patients condition assessment.

This part consists of five sub parts:

Part (1): Hemodynamic parameters:

This part was used to measure and record hemodynamic parameters as (respiration, pulse, Temperature, blood pressure, oxygen saturation, and bowel& bladder elimination) four successive days from admission and assess changes in hemodynamic parameters that considered indicators for predicting PU as hyperthermia, hypotension, hypoxia, and Incontinence (urine, stool).

- All hemodynamic parameters were measured and compared by reference range **Appendix (V)**

Part (2): Skin condition:

This part was used to assess and record skin condition as color, intact condition, sign and symptoms of infection four successive days from admission.

Part (3): Glasgow coma scale for neurological assessment:

A standardized scale adopted from **(Teasdale and Jennett, 1974).** It was a scale for assessing level of consciousness and it has been used mainly in evaluating prognosis, comparing, and monitoring the neurological status. The scale is composed of three tests: eye, verbal, and motor response. The three values item separately as well as their sum are considered. The lowest possible GCS (grade 1 in each element) is 3 (deep coma, death), while the highest is 15 (fully awake person).

Scoring system

Glasgow coma scale score was assessed and recorded on admission and then classified study subject according to GCS into three categories:

- Mild : 13- 15 degree
- Moderate: 9- 12 degree
- Sever : 8 degree or less

Part (4): laboratory investigation and blood gases measurement: This part consists of two parts:

Part (A): laboratory investigation:

Laboratory investigation as RBC, WBC, Hgb, blood glucose level, liver function test

(Albumin), and prothrombin time were assessed and recorded from patient's files four successive days from admission.

- All lab tests were measured and compared by using reference range **Appendix (V)**

Part (B): blood gases measurement:

Blood gases measurement as Pao_2, $Paco_3$, Hco_3, and Sao_2 were assessed and recorded from patient's files on admission.

- All blood gases were measured and compared by using reference range **Appendix (V)**

Part (5): Respiratory aids

This part was used to assess and record prescribed respiratory aids for the studied patients during ICU stay from patients' file four successive days from admission.

Tool 2: Braden scale for predicting pressure ulcer risk (Appendix II):

A standardized scale developed in 1987 by **Barbara Braden and Nancy Bergstrom.** The purpose of the scale is to help health professionals, especially nurses, assess a patient's pressure ulcer level of risk for pressure ulcer development in critical ill patients and a scale made up of six subscales, which measure elements are sensory perception, moisture, activity, nutrition, mobility, friction, and shear**.** Each category was rated on scale of 1 to 4 scale excluding the friction and shear category which was rated on 1- 3 scale. This combines for possible total of 23 point, with higher score meaning a lower risk of developing pressure ulcer. A score of 23 means there is no risk for developing pressure ulcer while the lowest score of 6 points represent the severest risk for developing pressure ulcer.

Scoring system:

Factors predicting of pressure ulcer were assessed and recorded by using Braden scale four successive days from admission and classified the studied patients into three categories:

- High risk: total score ≤ 12
- Moderate risk: total score 13- 14
- Low risk: total score 15- 16 if under 75 years old or 15- 18 if over 75 years old.

Tool 3: Factors affecting prediction of pressure ulcer tool (Appendix III):

It was used to assess factors affecting prediction of pressure ulcer. It was developed by the investigator after reviewing the related literature **(Hamdy, 2017, Mohamed, 2014 & Kizzs, 2012)**. It included three factors; patient related factors, nurse related factors, and environment related factors.

A Suggested nursing care plan (Appendix IV)

It was adopted from **(Berlowitz, Ayello& Zulkoski, 2010),** this was examples of intervention that may be considered for specific scores on each Braden subscale, along with the nurse and certified nursing assistant (CAN) responsibilities for care provision. These should be tailored to meet the needs of studied patient and used as examples of how all levels of unit staff have responsibilities for pressure ulcer prevention.

II-Operational design

The operational design included preparatory phase, ethical consideration, validity and reliability, pilot study, field work and limitation of the study.

Preparatory Phase:

It included reviewing of related literature, and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop data collection tools.

Ethical considerations

The ethical research considerations in this study included the following:

1- The research approval of protocol was obtained from scientific research ethical committee in faculty of nursing at Ain Shams University before starting the study.

2– The investigator clarified the objective and aim of the study to the patients included in the study.

3 - The investigator assured maintaining anonymity and confidentiality of the subject data.

4– Patients were informed that they allowed choosing to participate or not in the study and that they had the right to withdraw from the study at my time without giving any reasons.

5- Oral informed consent was obtained from each conscious adult patient or from

responsible person who is the first relative and the medical attorney (if unconscious patient). It included the aim of the study, potential benefits, risks and discomforts from participation

6- Ethics, values, culture and beliefs were respected.

7- An approval was obtained from the director of Sohag University Hospital and director of ICU unit to conduct the study.

C- Content Validity and reliability:

Testing Validity of the proposed tools by using face and content validity. **Face validity** aimed at inspecting the items to determine whether the tools measure what supposed to measure. **Content validity** was conducted to determine whether the content of the tool cover the aim of the study. It measured by a jury of 7 experts, three of them were professors, two assistant professors and two of them were lecturers of medical surgical nursing at Faculty of Nursing, Ain Shams University. The expertise reviewed the tool for clarity of sentences, relevance, accuracy, comprehensiveness, simplicity and applicability, minor modification was done. Finally, the final forms were developed.

Testing reliability: It refers to the extent to which the same answers can be obtained using the same instruments more than one time of proposed tools was done statistically by alpha Cronbach test. Cronbach's alpha is a measure of internal consistency, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability. Technically speaking, Cronbach's alpha is not a statistical test – it is a coefficient of reliability (or consistency). Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Cronbach's alpha reliability coefficient normally ranges between 0 and 1. Higher values of Cronbach's alpha (≥ 0.7) denote acceptable reliability **(Cortina, 1993).** The formula for the standardized Cronbach's alpha: **(Appendix VI)**

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

D- Pilot study:

A pilot study was conducted to test feasibility and applicability of the study tools used in this study. It was carried out on 10% of total study subjects (7).There was no modifications on tools were done after pilot study so that, the patients who included in the pilot study were included in the main study group.

Statistical design:

The data were collected and coded. Then the collected data were organized, analyzed using appropriate statistical significance tests using the Computer Statistical Package for Social Science (SPSS), version 21. Data were presented using descriptive statistics in the form of frequencies and percentages. Chi square test was used to compare the frequencies between study variables.

Degrees of significance of results were considered as follow:

P-value > 0.05 Not significant (NS)

P-value ≤ 0.05 Significant (S)

• Standard deviation (SD) & arithmetic mean ($\overline{X}$) for quantitative data: age.

• Frequency and percentage for qualitative data: gender

• Chi-square test used to compare between two or more groups.

Result

White collar: work used to characterize non manual works, Blue collar: work often involve something being physically built or maintained.

Table 1. Shows that, 40% of the studied patients their age range from more than or equal 50 years old with a mean and standard deviation of 44.68±10.28. As regard to the gender 54.3% were males, according to educational level 31.4% were illiterate, and 72.9% of the studied patient were blue collar, as regard to marital status 52.9% of the studied patients were married.

Table 2. Illustrated that, 52.9% of the studied patients were very limited in sensory perception, according to moisture 44.3% of the studied patients were often moist, while 57.1% were bed fast, as regard to mobility 35.7% of the studied patients were slightly limited, 37.1% of the studied patients were having

adequate nutrition, according to friction and shear 61.4% had problem, and according to the total score of Braden scale 55.7% of the patients admitted to ICU have high risk for pressure ulcer.

Table 3. Shows that, 55.7% of the studied patients were bedridden, 87.1% of them having stool incontinence, 72.9% of studied patients having low level of consciousness, 74.3% of studied patients were exposed to shear and friction, 64.3% of them were diabetic, and 55.7% of them having a vascular disease.

Table 4. Shows that100.0% of patients was not assessed for pressure ulcer risk using (Braden), Patients skin condition was not assessed, Seat cushion was not used and not documented. 60.0% repositioning technique every 2 hours were not done, and not used pressure reducing support surface, 55.7% management of moisture was not done, and 74.3% of the patient were exposed to friction and shear on the skin.

Table 5. Shows that, clear job descriptions, ratio of nursing staff, adequate supplies on all shift, good communication of reporting pressure ulcer staging or healing, meeting between staff and head nurse, training course on how to treat patients at risk , policy of nursing skills, and clear guidelines for the care of patients (100.0%) of all items of environments related factors were not achieved.

Table 6. Show that, there were highly significant relation between skin intact and total Braden scale regarding pressure sore risk in which p value (0.009) respectively, also this table represents there were non-significant relation between sign and symptoms of skin infection and total Braden scale regarding pressure sore risk at P (0.18).

Table (1): Frequency and Percentage distribution of demographic characteristics of the studied patients (n=70).

Demographic characteristics	Frequency N	Precent %
Age (years)		
20≥30	8	11.4%
30≥ 40	13	18.6%
40≥50	21	30.0%
≥ 50	28	40.0%
Mean ±SD 44.68 ±.10.28		
Gender		
Male	38	54.3%
Female	32	45.7%
Educational level		
Illiterate	22	31.4%
Read& write	17	24.3%
Primary & secondary	12	17.1%
University	19	27.1%
Occupation		
White collar	19	27.1%
Blue collar	51	72.9%
Marital status		
Married	37	52.9%
Single	8	11.4%
Divorced & Widowed	25	35.7%

Table (2): Frequency and Percentage distribution of the studied patients according to Braden scale score (n=70).

Braden scale	Frequency N	Precent %
Sensory perception		
Completely Limited	12	17.1%
Very Limited	37	52.9%
Slightly Limited	4	5.7%
No impairment	17	24.3%
Moisture		
Constantly Moist	16	22.9%
Often Moist	31	44.3%
Occasionally Moist	8	11.4%
Rarely Moist	15	21.4%
Activity		
Bedfast	40	57.1%
Chair fast	13	18.6%
Walks Occasionally	0	0.0%
Walks Frequently	17	24.3%
Mobility		
Completely Immobile	12	17.1%
Very Limited	16	22.9%
Slightly Limited	25	35.7%
No Limitations	17	24.3%
Nutrition		
Very Poor	13	18.6%
Probably Inadequate	14	20.0%
Adequate	26	37.1%
Excellent	17	24.3%
Friction and Shear		
Problem	43	61.4%
Potential Problem	10	14.3%
No Apparent Problem	17	24.3%
Total Braden scale score		
Low Risk (15 or more)	21	30.0%
Moderate Risk (13 -14)	10	14.3%
High Risk (less or equal 12)	39	55.7%

Table (3): Frequency `and percentage distribution of patients related factors (n=70).

Patients related factors	Yes		No	
	N	%	N	%
Impaired mobility: Bed	39	55.7%	31	44.3%
Chair	28	40.0%	42	60.0%
Incontinence of:				
Urine	52	74.3%	18	25.7%
Stool	61	87.1%	9	12.9%
Nutritional deficits	25	35.7%	45	64.3%
Low level of consciousness " moderate/sever"	51	72.9%	19	27.1%
Exposure to shear, pressure, and friction (rubbing) on the patient's skin.	52	74.3%	18	25.7%
History of Diabetes mellitus	45	64.3%	25	35.7%
History of vascular disease.	39	55.7%	31	44.3%

Table (4): Frequency and percentage distribution of nurses related factors (n=70).

Nurses related factors	Yes		No	
	N	%	N	%
Using Braden pressure ulcer risk assessment tool.	0	0.0%	70	100.0%
Assessment of patient's pressure ulcer daily.	70	100.0%	0	0.0%
Assessment of skin condition daily.	0	0.0%	70	100.0%
Assessed patient's factors related pressure ulcers.	0	0.0%	70	100.0%
Turn and reposition patients every 2 hours and prevent direct contact between bony prominences.	28	40.0%	42	60.0%
Provide pressure reducing support surface.	28	40.0%	42	60.0%
Provide pressure reducing seat cushion.	0	0.0%	70	100.0%
Manage moisture (from incontinence).	31	44.3%	39	55.7%
Manage nutrition	70	100.0%	0	0.0%
Reduce friction and shear	18	25.7%	52	74.3%
Document plan of care.	0	0.0	70	100.0%

Table (5): Frequency and percentage distribution of environmental related factors (n=70).

Environmental related factors	Yes		No	
	N	%	N	%
A clear job description for each individual is present within ICU	0	0.0%	70	100.0%
The ratio between the number of nursing staff and the number of patients corresponds to the global percentage within critical care units	0	0.0%	70	100.0%
Adequate supplies were available to staff on all shift and whenever needed	0	0.0%	70	100%
Effective communication of reporting pressure ulcer staging or healing between ICU staff is present.	0	0.0%	70	100.0%
Periodic meetings between nursing staff and head nurse.	0	0.0%	70	100.0%
Training courses on how to treat patients at risk for pressure ulcer are available.	0	0.0%	70	100.0%
Policy of nursing skills in ICU are available.	0	0.0%	70	100.0%
Specific and clear guidelines for the care of patients in ICU are available.	0	0.0%	70	100.0%

Table (6): Relation between skin condition of studied patients and total score of Braden scale regarding prediction of pressure sore risk (n=70).

Skin condition / Item	Total Braden scale score								Test	
	Low		Moderate		High		Total			
	N	%	N	%	N	%	N	%	X2	P-value
Skin intact										
No	16	40.0%	8	20.0%	16	40.0%	40	100.0%		
Yes	5	16.7%	2	6.7%	23	76.6%	30	100.0%	9.38	0.00**
Total	21	30.0%	10	14.3%	39	55.7%	70	100.0%		
Signs and symptoms of infection										
No	16	34.8%	8	17.4%	22	47.8%	46	100.0%		
Yes	5	20.8%	2	8.3%	17	70.8%	24	100.0%	3.43	0.18
Total	21	30.0%	10	14.3%	39	55.7%	70	100.0%		

In significant P value > 0.05, highly significant ** p value at < 0.001

Discussion

Part I: Demographic characteristic of studied patients:

As regards the age of patients under the present study, the present study showed that, nearly more than one third of studied patients their age ≥ 50 years with a mean age of 44.68±10.28. This result could be due to the most of critically ill patients were old age due to critical illness and chronic disease affect old age more than young age.

This finding was consistent with what was reported by **(Gedamu, 2014)** who conducted study about, "Prevalence and associated factors of pressure ulcer among hospitalized patients ", in Ethiopia and found that, more than one third of studied patients their aged >55 years. This finding was contradicted with by **Jaul et al.(2017)**, who conducted study about, "pressure ulcer in survival in elderly person with chronic disease" and reported that more than three quarter of studied patients their age >55 years with a mean age in the total study population was 79.7 ± 10.9 years.

In related to gender**,** the present study results showed that, more than half of the studied patients were male. This finding was consistent with what was reported by **Pacha et al. (2018)**, Who conducted study about "pressure ulcer in intensive care unit "who stated that, two third of the studied patients were male.

This finding was contradicted with **Matozinhos et al. (2017),** who conducted study about "factors associated with incidence of pressure ulcer during hospital stay "and found that, more than half of studied patients were female.

In related to educational level, the present study results showed that, nearly one third of the studied patients were illiterate. This finding was consistent with what was reported by **(Gedamu, 2014)** who conducted study about, "prevalence and associated factors of pressure ulcer among hospitalized patients", in Ethiopia and reported that, more than one third of studied patients were illiterate.

This finding was contradicted with by **Kaur et al. (2018),** who conducted study about, "comparison of two intervention strategies on prevention of bedsore among the bedridden patients" and reported that, nearly one third of studied patients were on university degree.

In related to occupation, the present study results showed that, nearly three quarter of studied patients were blue collar (employed). This result could be due to most of critically ill patients were blue collar due to greater number of blue collar individual have a dangerous work so that most of them suffering from trauma and injury .

This finding was consistent with what was reported by **Eljedi et al. (2015),**who conducted study about, "effect of an education program on family caregiver's prevention and management of pressure ulcer bedridden patients after discharge from hospital", who stated that, nearly three quarter of patient was blue collar (employed)

This finding was contradicted with by **Kaur et al. (2018),** Who conducted study about, "comparison of two intervention strategies on prevention of bed sore among the bed ridden patients" and reported that, more than three quarter of studied patient was white collar (un employed).

In related to marital status, the present study results showed that, more than half of the studied patients were married. This finding was consistent with what was reported by **(Gedamu, 2014)**, who conducted study about "Prevalence and associated factors of pressure ulcer among hospitalized patients" ", in Ethiopia and reported that, nearly two third of studied patients were married.

This finding was contradicted with **Eljedi et al. (2015)**, who conducted study about, "effect of an education program on family caregiver's prevention and management

of pressure ulcer bedridden patients after discharge from hospital" and found that, more than half studied patients were single.

Part II: Barden scale for predicting pressure Sore risk

In related to Braden scale of patients, the present study showed that, more than half of studied patients were high risk for pressure ulcer. This result could be due to most of critically ill patients were high risk for malnutrition and immobility, shearing and friction for long time this increase risk for pressure ulcer.

This finding was consistent with what was reported by **osis et al. (2016)**, who conducted study about "factors for development of pressure ulcer in patients with traumatic brain injury "and found that, more than half of studied patients were high risk for pressure ulcer.

This finding was contradicted with what was reported by **Schott et al.(2018)**, who conducted study about "risk of pressure ulcer in hospitalized patient after stroke relation of nutritional factors and morbidity "and found that, less than half of studied patients were high risk for pressure ulcer.

Part III: Factors Affecting prediction of Pressure ulcer.

In related to patient's factors under the present study, the present study showed that, most of the studied patients were risk for impaired mobility, incontinence, and nutritional deficit, low level of consciousness, friction & shear, oedema of the foot, history of pressure ulcer, DM, and vascular disease.

This finding was consistent with what was reported by **(Bauer, 2016)**, **Budri et al. (2016), and Binks et al. (2015),** and found that, most of patients were risk for impaired mobility, incontinence, and nutritional deficit, low level of consciousness, friction & shear, oedema of the foot, history of pressure ulcer, DM, and vascular disease.

Part IV: Relation between skin condition of studied patients and total of Braden scale regarding prediction pressure sore risk

The present study stated that, there were significant relations between skin condition (skin intact) of studied patients and Braden scale score, but also there were on significant relation between skin condition (sign &symptoms of infection) of studied patients and Braden scale score.

This finding agree with **(Scarlatti, 2012),** who conducted study about "pressure ulcer in surgery patient: incidence and associated factors "and found that, there were significant relation between skin lesion and Braden scale score, and with **(Dana and Bauman, 2015),** who conducted study about "bacteriology of pressure ulcer in individual with spinal cord injury: what we know and what should know "and found that, there were no significant relation between skin infection and Braden scale score.

This finding was contradicted with **Tleyjeh et al. (2018),** who conducted study about "infectious complication of pressure ulcer " and found that, there were no significant relation between skin damage and skin ulceration, and with **(Kuciec and Tepes, 2016),** who conducted study about "characteristics feature of pressure ulcer infection" and found that, there were significant relation between skin infection and pressure ulcer appears.

Regarding nurses' related factors, the present study showed that almost all of nurses' related factors that could help in preventing pressure ulcer were poor. This might be due to shortage of nursing staff and lack of time for assessment and evaluation, or due to the increase in the number of patients and work overload, and also it might be due to lack of overall hospital policy and absence of standard guidelines in ICU.

This finding was consistent with what was reported by **Valles, Monsivais, Guzman, & Arreolaes, (2016), and Nasreen, Afzal,**

Sarwae, & Waqas, (2017), who conducted a study about "Nursing care missed in patients at risk of or having pressure ulcers", and "Nurse's knowledge and practice toward pressure ulcer prevention in general hospital", who found that**,** nurse's practices were poor regarding pressure ulcer prevention.

This finding was contradicted with (**Dilie & Mengistu, 2015)**, who conducted a study about "Assessment of nurses' Knowledge, Attitude and perceived barriers to expressed pressure ulcer prevention" which reported that attitude of nurses was not associated with pressure ulcer prevention.

Environmental related factors, the present study showed that all most of the studied patients did not have an environmental factor that could help in prevention of pressure ulcer. This finding was consistent with what was reported by **Dilie & Mengistu, (2015), and Nuru, Zewdu, Amsalu, & Mehretie, (2015)**, who conducted a study about "Assessment of nurses knowledge, attitude, and perceived barriers to expressed pressure ulcer prevention practice", and "Knowledge and practice of nurse's towards prevention of pressure ulcer and associated factors", who found that there were shortage in environmental factors regarding prevention of pressure ulcer.

Conclusion

Based on findings of the current study, it can be concluded that: more than half of patients admitted to ICU had a high risk for pressure ulcer development according to Braden scale, more than half of patients were bed ridden, most of them were incontinence of stool, three quarter of patients having a low level of conscious and were exposed to shear and friction on the skin, nearly two third of patients were diabetic and more than half of them were suffered from vascular disease, all of nurses related factor regarding pressure ulcer prevention were poor , and most of patients did not have an environmental factors that could help in prevention of pressure ulcer development . There were statistically significant relation between gender, pulse, temperature, pulse oximetry, respiratory aids, skin intact, GCS and total Braden scale score.

Recommendations

The results of this study projected the following recommendation:

Recommendations regarding nursing practice:

1- Application of Braden scale tool to assess all admitted patients to intensive care unit and to become as daily nursing assessment task.

2- Patients who are restricted to bed or chair should be assessed for pressure, friction, and shear in all position and during lifting, turning, and repositioning.

3- Patients at risk of developing pressure ulcer should not remain on stander mattress. Placement mattress with low interface pressure should be used.

4- Skin should be protected from excessive moisture and incontinence to maintain skin integrity by establishing bowel and bladder program.

5- Nutritional support and program should be implemented for bedridden patients.

6- All staff nurses in ICU should train on how to use Braden scale during patient assessment.

Recommendations regarding research:

- Replication of the current study on larger probability sample is recommended to achieve generalization of the results.

Recommendations regarding service:

- Suggested nursing care plan are more likely to be effected if they take into account local circumstance and are disseminated by ongoing education and training program.

• Organization need to ensure that resources are available to clients and staff. These resources include, but are not limit to, appropriate moisturizer, skin barriers, access to equipment (therapeutic surface), and relevant consultants.

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