Pressure Ulcer Prevention and Management Guideline: Comparison between Intensive Care Unit and General Word at Mansoura University Hospital

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Abstract: A pressure ulcer (PU) is an areas of localized damage to the skin, which can extend to underlying structures such as muscle and bone. Damage is caused by a combination of factors including pressure, shear, friction and moisture. Pressure ulcers can develop in any area of the body, but generally occur over areas of bony prominences. Pressure ulcers occur in approximately 17-20 % of hospitalized patients. Patients with stroke in intensive care units and ward are particularly at risk because they are relatively immobile. Therefore, the best treatment for pressure ulcers is to prevent their development. Prevention depends on excellent nursing care that concentrates on meticulous skin care and relief of pressure. The aim of this study to determine the effectiveness of nursing care for prevention and management of pressure ulcer in the intensive care unit and comparison with care in general medicine wards. The sample of this study consisted of 50 adult patients from both sexes admitted to the ICU during nine months and complain from stroke, the patients were included if they stayed for at least 5 consecutive nights in intensive care unit and transport to medical general word to stay another five nights or more. Results: an improvement in the Braden pressure ulcer risk assessment scale after intervention in ICU and in the ward in the study group (pre, post1,post2)(60%, 80%, 96%, respectively) and there are found a significant differences (p= 0.020, 0.006).
Conclusion: The implementation of nursing intervention preventive measures in both ICU and the general ward was successful on preventing pressure ulcer.
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Keywords: Pressure ulcers, prevention, pressure ulcer management.

Introduction

Pressure ulcers are a complex clinical problem with a multi-factorial etiology[1]. Pressure ulcers are localized areas of tissue necrosis that develop when soft tissue is compressed between a bony prominence and an external surface for a prolonged period of time [2,3]. These lesions have also been referred to as bed sores decubitus ulcers pressure sores. Because pressure is the considered the essential factor that lead to the development of these wounds, the term " pressure ulcers' is recommended pressure ulcers commonly occur over the sacrum, great trochanter, ischial tuberosity, malleolus, heel, fabular, head, and scapula[1,3,4].

Critically ill patients are at a higher risk for pressure ulcers than are patients in general care areas. Several factors increase the risk; greater severity of illness; increased length of stay; poor tissue perfusion due to hemodynamic instability, use of vasoactive medications, and anemia; sensory impairment resulting in a reduced sensitivity and/or reaction to pressure due to sedation or underlying abnormality; skin maceration due to moisture; immobility; and poor nutritional status.[5,6] These factors all contribute to the mechanical causes of pressure ulcer: pressure, shear, and friction.

Impaired mobility is an important contributing factor. Patients who are neurologically impaired, heavily sedated, restrained, or demented are incapable of assuming the responsibility of altering their position to relieve pressure. Moreover, this paralysis leads to muscle and soft tissue atrophy, decreasing the bulk over which these bony prominences are supported.

Prevention of pressure ulcers is a fundamental aspect of intensive care nursing, and quality improvement methods are arguably the most cost-effective and intuitive approach to addressing this potentially serious problem. Prevalence surveys are often used in quality improvement as a practical means of determining the extent of a problem, identifying at-risk populations and deficits in service provision, measuring clinical and financial outcomes, and monitoring improvement in clinical practice. Such surveys provide a measure of the extent of a disease or health care problem at a particular time and, when performed repeatedly, an indication of trends.[15] The purpose of this practice improvement program was to improve patients' outcomes by reducing the prevalence of pressure ulcers, identifying areas for improvement in prevention of pressure ulcers, and improving the use of prevention strategies in an intensive care unit (ICU).

The aim of this study: To determine the effectiveness of nursing care for prevention and management of pressure ulcer in the intensive care unit and comparison with care in general wards.

Research questions:

Do you find any difference between occurrence of pressure ulcer in the ICU and general medical ward?

2. Material and Methods

Study design:

Quasi-experimental design was used in this study.

Setting:

This study was conducted in Mansoura University Hospital in the following two settings: The stroke intensive care unit and stroke general medicine ward were used for collecting data and practicing standard nursing performance to prevent the occurrence of pressure ulcer among hospitalized stroke patients in ICU and general medicine ward.

Sample:

The sample of this study consisted of 50 adult patients from both sexes admitted to the ICU during nine months and complain from stroke, the patients were included if they stayed for at least 5 consecutive nights in intensive care unit and transport to medical general word to stay another five nights or more. Patients were classified randomly into two groups:

- Group one (Control group) 25 patients with stroke under the routine hospital nursing care. And the second group (Study group) 25 patients received standard nursing care through the researcher.

Tools:

Three tools were developed and modified by the researcher and used in this study.

Tool I – Assessment sheet it contain demographic data as age, sex, marital status, date of admission, present medical history, and also contain Braden pressure ulcer risk assessment scale.

Tool II - contain skin inspection to evaluate: the site of pressure, depth , color of skin, skin temperature, moisture, texture, stage of ulcer, signs and symptoms of dehydration and extent.

Tool III – Standard nursing performance for preventing the occurrence of pressure ulcer checklist it contains of, reduce or eradicate Friction and Shear, tools to diminished pressure, deal with moisture, maintain sufficient pressure, maintain tissue perfusion and oxygenation, and promoting mobility.

Methods:

An official letter was issues from the Dean of the Faculty of Nursing, Mansoura University to the Directors of the hospitals and ICU units, general stroke ward, and the Head of Nursing Service Administration soliciting their approval to conduct the research.

Data collection tools were developed and modified by the researcher and reviewed for completeness by experts in critical care nursing education and staff nurse.

A pilot study was implemented on 5 patients to test the tools. The observation checklist was applied by the researcher to make sure that all items included were applicable. After analyses the pilot study results, the necessary modifications were done and the 5 numbers of patients were excluded from study sample.

This work is accomplished during the period from October 2009 up to June 2010, through out two phases: the first phase accomplished in ICU, the two groups of patients assessed on admission and divided randomly to equal groups. One group (study group) were cared by the standard nursing care performance from the first night of patients' admission while the other group (control group) received routine care from intensive care nursing staff, and then data were collect from both groups after the three to five days by the researcher who applied the assessment tools to fulfill the questionnaire sheet checklist (Braden Ulcer Scale) before patients leave ICU to general medical ward.

The second phase, the researcher continue in implementation of standard nursing care for study group in general medical ward while control group received routine care from general medical ward nursing staff and after another three to five days for patients' stayed accomplished in medical general ward, the researcher applied assessment tools to fulfill Braden ulcer Scale on more a time, to establish the occurrence (or not) of pressure ulcer for both groups. The researcher was observed nursing performance all of the time during applied this care for control group through observation checklist and documents all nursing care activities.

Statistical analysis

Data was analyzed using SPSS (Statistical Package for Social Sciences) version 15. Qualitative data was presented as number and percent. Comparison between groups was done by Chi-Square test. Data was presented as mean ± SD. Student t-test was used for comparison between groups. Wilcoxon Signed Ranks test used for comparison within group. $P < 0.05$ was considered to be statistically significant.

3. Results:

Table (1) shows the distribution of patients in both study and control group according to their general characteristics. The mean age of patients in study group was 58.96 ± 8.90 and 56.80 ± 9.10 years in the control group. The majority of them in both study and control group had work (54%) and married (56%). Regarding their gender, the majority of them was (60%) female in study group, while the majority of control group (56%) were male.

Table (2): Illustrate an improvement in the Braden pressure ulcer risk assessment scale after intervention in ICU and in the ward in the study group (60%, 80%, 96% respectively) and there are found a significant differences (p= 0.020, 0.006). While there is no statistical improvement in the control group regarding Braden scale(48%, 36%, 36% respectively).

Table (3) portrays the skin inspection in both study and control group post intervention in ICU. The majority of both study and control group (92%, 88%, 48%, 80%, 84%, 52%) respectively had pressure on sacrum, coccyx and trochanter area.

No constantly moist or very moist was observed at both study and control group. While more than third quarter (84%) of the control group had rarely moisture.

Table (3) also illustrates the stage of bed sores in the study and control group. Nearly half of control group 11 had stage I of bed sores as compared to only 2 patients in study group.

The skin colors was normal in the majority of the study group (92%) and 56% of the control group had flushed skin colors. Moreover, the majority of the study group (92%) had normal skin temperature while, nearly half of the control group (56%) were hot skin temperature.

According to poor skin trugor and flushed dry skin there are a statistical significance (0.001, 0.001) respectively between the study and control group.

Table (4) shows the skin inspection in both study and control group post intervention in the word. Nearly third quarter of both study and control group (80%, 92%, 64%, 84%) respectively had pressure on sacrum and coccyx area.

In relation to skin colors and skin temperature, nearly all the study group (92%, 88%) had normal skin color and skin temperature. While, nearly half of the control group (48%, 64%) had flushed and hot skin.

The moisture condition was rarely in the entire study group (100%) and 40% of the control group. However, the moisture in nearly one third of the control group (20%, 32%) was very moist and occasionally moist.

As regard the bed sores stage, only one patient in study group have stage I as compared to 11 patients in the control group and 7 patients in control group had stage II.

Table 4 also presents significant differences observed in the study and control groups as related to poor skin trugor and flushed skin integrity (0.001, 0.001) respectively.

Regarding nursing performance to reduce bed sores in both study and control group in ICU table (5), there is a highly significant differences observed in study and control group related to lift body of the bed while moving, use lifts sheets or devices to turn, maintain head of bed at, or below, 30 degrees, use of a positioning schedule, use pillows or wedges to eliminate pressure on bony prominences, avoid lying the patient directly on hip bone when patient lateral position, use lotion or cream after bathing, range of motion exercise and elevate the edematous body part to promote venous return and diminish congestion (p=0.002, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001, 0.001, and 0.001) respectively. Meanwhile no significant difference regarding maintain skin clean and dry, repositioning every two hours at least, a replacement mattress with low interface pressure, provide high protein diet, vitamins and minerals, maintain adequate hydration, observe laboratory investigation as serum albumin and avoid massage in redness areas (p= 0.312, 0.116, 0.384, 0.061, 0.149, 0.006, and 0.203) respectively.

Table (6) presents significant differences observed in related to most of items. However, there is no statistical significance in related to a replacement mattress with low interface pressure, Maintain linen and clothes clean and dry, observe laboratory investigation as serum albumin and avoid massage in redness areas (0.180, 0.009, 0.008,and 0.203) respectively.

Table (1): Distribution of patients in both study and control group according to their general characteristics.

Characteristics	Study group n (25)	Control Group n (25)	Total n (50)
Age	58.96 ± 8.90	56.80 ± 9.10	57.86 ± 8.88
Gender:			
Male	10 (40%)	14 (56%)	24 (48%)
Female	15 (60%)	11 (44%)	25 (50%)
Occupation:			
Working	13 (52%)	14 (56%)	27(54%)
Not working	12 (48%)	11 (44%)	23 (46%)
Marital Status:			
Married	13 (52%)	15 (60%)	28 (56%)
Widowed	10 (40%)	7 (28%)	17 (34%)
Divorced	2 (8%)	3 (12%)	5 (1%)

Table (2): Braden pressure ulcer risk assessment scale for both study and control group pre and post intervention in ICU and in word

	Pre test		Post 1		Post 2		P value
	No	%	No	%	No	%	
Study:							
Mild	15	60	20	80	24	96	P1 = 0.020
Moderate	6	24	3	12	0	0	P2 = 0.006
High	4	16	2	8	1	4	
Control:							
Mild	12	48	9	36	9	36	P1 = 0.495
Moderate	5	20	8	32	6	24	P2 = 0.244
High	8	32	8	32	10	40	
P value	0.415		0.007		0.000		

P1: Pre versus Post 1P2: Pre versus Post 2

Table (3): Skin inspection in both study and control group in ICU post nursing intervention

Items	Study		Control		P value
	No	%	No	%	
Sacrum	**23**	**92**	**22**	**88**	**0.637**
Coccyx	**20**	**80**	**21**	**84**	**0.713**
Trochanter	**12**	**48**	**13**	**52**	**0.777**
Ischeal tuberosities	**0**	**0**	**2**	**8**	**0.149**
Epidermis	**0**	**0**	**9**	**36**	**0.001**
Dermis	**0**	**0**	**1**	**4**	**0.312**
Complete skin	**0**	**0**	**0**	**0**	-
Skin Color					
Cyanosis	**0**	**0**	**0**	**0**	**< 0.001**
Flushed	**2**	**8**	**14**	**56**	
Normal	**23**	**92**	**11**	**44**	
Skin temperature					
Hot	**2**	**8**	**14**	**56**	**0.001**
Cold	**0**	**0**	**1**	**4**	
Normal	**23**	**92**	**10**	**40**	
Moisture					
Constantly moist	**0**	**0**	**0**	**0**	
Very moist	**0**	**0**	**0**	**0**	**0.037**
Occasionally	**0**	**0**	**4**	**16**	
Rarely	**25**	**100**	**21**	**84**	
Texture					
Soft	**25**	**100**	**25**	**100**	-
Hard	**0**	**0**	**0**	**0**	
Normal	**0**	**0**	**0**	**0**	
Stages					
Stage I	**2**	**8**	**11**	**44**	
Stage II	**0**	**0**	**0**	**0**	-
Stage III	**0**	**0**	**0**	**0**	
Stage IV	**0**	**0**	**0**	**0**	
Poor skin turgor	**0**	**0**	**13**	**52**	**< 0.001**
Flushed dry skin	**1**	**4**	**11**	**44**	**0.001**
Coated tongue	**1**	**4**	**3**	**12**	**0.297**
Oliguria	**1**	**4**	**0**	**0**	**0.312**
Irritability	**1**	**4**	**0**	**0**	**0.312**
Confusion	**3**	**12**	**1**	**4**	**0.297**
Edema	**17**	**68**	**8**	**32**	**0.011**
Swelling	**3**	**12**	**8**	**32**	**0.088**

Table (4): Skin inspection in both study and control group in the word post nursing intervention.

Items	Study		Control		P value
	No	%	No	%	
Sacrum	**20**	**80**	23	92	0.221
Coccyx	**16**	**64**	21	84	0.107
Trochanter	**8**	**32**	13	52	0.152
Ischeal tuberosities	**0**	**0**	2	8	0.149
Epidermis	**0**	**0**	7	28	0.004
Dermis	**0**	**0**	8	32	0.002
Complete skin	**0**	**0**	1	4	0.312
Skin Color					
Pale	**0**	**0**	4	16	
Cyanosis	**0**	**0**	2	8	< 0.001
Flushed	**2**	**8**	12	48	
Normal	**23**	**92**	7	28	
Skin temperature					
Hot	**3**	**12**	16	64	< 0.001
Cold	**0**	**0**	4	16	
Normal	**22**	**88**	5	20	
Moisture					
Constantly moist	**0**	**0**	2	8	
Very moist	**0**	**0**	5	20	< 0.001
Occasionally	**0**	**0**	8	32	
Rarely	**25**	**100**	10	40	
Texture					
Soft	**25**	**100**	20	80	0.018
Hard	**0**	**0**	5	20	
Normal	**0**	**0**	0	0	
Stages					
Stage I	**1**	**100**	11	61.1	
Stage II	**0**	**0**	7	38.9	0.433
Stage III	**0**	**0**	0	0	
Stage IV	**0**	**0**	0	0	
Poor skin turgor	**0**	**0**	15	60	< 0.001
Flushed dry skin	**1**	**4**	18	72	< 0.001
Coated tongue	**0**	**0**	8	32	0.002
Oliguria	**0**	**0**	1	4	0.312
Irritability	**0**	**0**	6	24	0.009
Confusion	**1**	**4**	4	16	0.157
Edema	**9**	**36**	7	28	0.544
Swelling	**1**	**4**	6	24	0.042

Table (5): Nursing performance to reduce bed sores in both study and control group in ICU.

Items	Study						Control						P value
	Incorrect done		Not don		Done		Incorrect done		Not done		Done		
	No	%	No	%	No	%	No	%	No	%	No	%	
❖ **Reduce or eradicate friction and shear**													
1- Lift body of the bed while moving	1	4%	8	32%	16	64%	11	44%	8	32%	6	24%	0.002
2- Use lifts sheets or devices to turn, reposition or transfer patient	0	0%	8	32%	17	68%	11	44%	12	48%	2	8%	< 0.001
3- Maintain head of bed at, or below, 30 degrees	0	0%	1	4%	24	96%	10	40%	4	16%	11	44%	< 0.001
4- Maintain skin clean and dry	0	0%	0	0%	25	100%	1	4%	0%	0%	24	96%	0.312
❖ **Diminish pressure:**													
1- Use of a positioning schedule	0	0%	2	8%	23	92%	11	44%	0	0%	14	56%	0.001
2- Use pillows or wedges to eliminate pressure on bony prominences	0	0%	2	8%	23	92%	12	48%	5	20%	8	32%	< 0.001
3- Repositioning every two hours at least	1	4%	2	8%	22	88%	6	24%	1	4%	18	72%	0.116
4- Avoid lying the patient directly on hip bone when patient lateral position	1	4%	4	16%	20	80%	13	52%	5	20%	7	28%	< 0.001
5- A replacement mattress with low interface pressure	0	0%	23	92%	2	8%	0	0%	21	84%	4	16%	0.384
❖ **Deal with moisture:**													
1- Maintain skin clean and dry	0	0%	0	0%	25	100%	1	4%	0	0%	24	96%	0.312
2- use lotion or cream after bathing	0	0%	0	0%	25	100%	4	16%	13	52%	8	32%	< 0.001
3- Maintain linen and clothes clean and dry	0	0%	0	0%	25	100%	0	0%	0	0%	25	100%	-
4- apply warm water in bathing and spongy pads	0	0%	0	0%	25	100%	8	32%	12	48%	5	20%	< 0.001
5- Avoid accumulation of moisture, especially in skin fold	0	0%	0	0%	25	100%	1	4%	0	0%	24	96%	0.312
❖ **Maintain sufficient nutrition:**													
1- Nutritional assessment	0	0%	3	12%	22	88%	2	8%	10	40%	13	52%	0.018
2- Provide high protein diet, vitamins and minerals	1	4%	5	20%	19	76%	4	16%	10	40%	11	44%	0.061
3- Maintain adequate hydration	0	0%	0	0%	25	100%	2	8%	0	0%	23	92%	0.149
4- Observe laboratory investigation as serum albumin	1	4%	5	20%	19	76%	10	40%	5	20%	10	40%	0.006
❖ **Maintain tissue perfusion and oxygenation:**													
1- Range of motion exercise	0	0%	2	8%	23	92%	11	44%	4	16%	10	40%	< 0.001
2- Avoid massage in redness areas	0	0%	0	0%	25	100%%	2	8%	1	4%	22	88%	0.203
3- Elevate the edematous body part to promote venous return and diminish congestion	0	0%	2	8%	23	92%	9	36%	13	52%	3	12%	< 0.001
4- Observe laboratory investigation as hemoglobin and ABG	1	4%	7	28%	17	68%	12	48%	7	28%	6	24%	0.001
❖ **Promoting mobility:**													
1- Range of motion exercises will performed when patients were in supine position and immediately before turning to each position.	0	0%	2	8%	23	92%	13	52%	5	20%	7	28%	< 0.001
2- Each exercise will performed 2 to 5 times, beginning at patient's head and moving down one side of the body at a time, moving each joint in a smooth manner twice daily	1	4%	2	8%	22	88%	14	56%	10	40%	1	4%	< 0.001

Table (6): Nursing performance to reduce bed sores in both study and control group in the word.

Items	Study						Control						P value
	Incorrect done		*Not don*		Done		ncorrect done		Not done		Done		
	No	%	No	%	No	%	No	%	No	%	No	%	
❖ **Reduce or eradicate friction and shear:**													
1- Lift body of the bed while moving	0	0%	10	40%	15	60%	9	36%	14	56%	2	8%	< 0.001
2- Use lifts sheets or devices to turn, reposition or transfer patient	0	0%	7	28%	18	72%	11	44%	13	52%	1	4%	< 0.001
3- Maintain head of bed at, or below, 30 degrees	0	0%		0%	25	100%	8	32%	13	52%	4	16%	< 0.001
4- Maintain skin clean and dry	0	0%	0	0%	25	100%	9	36%	1	4%	15	60%	0.002
❖ **Diminish pressure:**													
1- Use of a positioning schedule	0	0%	1	4%	24	96%	15	60%	4	16%	6	24%	< 0.001
2- Use pillows or wedges to eliminate pressure on bony prominences	0	0%	3	12%	22	88%	10	40%	7	28%	8	32%	< 0.001
3- Repositioning every two hours at least	0	0%	2	8%	23	92%	16	64%	3	12%	6	24%	< 0.001
4- Avoid lying the patient directly on hip bone when patient lateral position	0	0%	5	20%	20	80%	8	32%	9	36%	8	32%	0.001
5- A replacement mattress with low interface pressure	0	0%	19	76%	6	24%	3	12%	18	72%	4	16%	0.180
Deal with moisture:													
1- Maintain skin clean and dry	0	0%	0	0%	25	100%	10	40%	1	4%	14	56%	0.001
2- use lotion or cream after bathing	0	0%	2	8%	23	92%	8	32%	14	56%	3	12%	< 0.001
3- Maintain linen and clothes clean and dry	0	0%	0	0%	25	100%	7	28%	1	4%	17	68%	0.009
4- apply warm water in bathing and spongy pads	0	0%	0	0%	25	100%	12	48%	8	32%	5	20%	< 0.001
5- Avoid accumulation of moisture, especially in skin fold	0	0%	0	0%	25	100%	11	44%	0	0%	14	56%	< 0.001
❖ **Maintain sufficient nutrition:**													
1- Nutritional assessment	0	0%	5	20%	20	80%	6	24%	9	36%	10	40%	0.005
2- Provide high protein diet, vitamins and minerals	1	4%	5	20%	19	76%	9	36%	8	32%	8	32%	0.003
3- Maintain adequate hydration	0	0%	0	0%	25	100%	7	28%	5	20%	13	52%	< 0.001
4- Observe laboratory investigation as serum albumin	0	0%	8	32%	17	68%	8	32%	5	20%	12	48%	0.008
❖ **Maintain tissue perfusion and oxygenation:**													
1- Range of motion exercise	0	0%	2	8%	23	92%	13	52%	8	32%	4	16%	< 0.001
2- Avoid massage in redness areas	0	0%	0	0%	25	100%	1	4%	2	8%	22	88%	0.203
3- Elevate the edematous body part to promote venous return and diminish congestion	0	0%	4	16%	21	84%	9	36%	13	52%	3	12%	< 0.001
4- Observe laboratory investigation as hemoglobin and ABG	0	0%	12	**48**%	13	52%	11	44%	8	32%	6	24%	0.001
❖ **Promoting mobility:**													
1- Range of motion exercises will performed when patients were in supine position and immediately before turning to each position.	0	0%	2	8%	23	92%	13	52%	9	36%	3	12%	< 0.001
2- Each exercise will performed 2 to 5 times, beginning at patient's head and moving down one side of the body at a time, moving each joint in a smooth manner twice daily	0	0%	2	8%	23	92%	12	48%	11	44%	2	8%	< 0.001

4. Discussion

Intensive prevention of pressure ulcers is a fundamental part of nursing care, especially in case of patients from high risk group. The highest risk groups are patients with diseases requiring lying in bed whose restricted activity has two aspects. First, low physical activity due to long-lasting immobility. Second, restricted possibility to change position of the body. Effect of these two aspects is long-lasting pressure which plays the main role in pressure ulcer development [6,9,11].

In our study the highest risk of pressure ulcers development had patients from ICU (stroke) and neurological units. Among neurological pathologies the most common causes of pressure ulcers are: paralyses (strokes, injuries) with restricted possibility of movement and perception disorders which interrupt senses of stimuli, especially pain, which suggests local ischemia caused by pressure.

The result of the present study revealed improvement in Braden score after intervention with study group in both ICU and the word compared to pre intervention. While, in control group no statistical difference was found between pre and post intervention in ICU and the word. This is consistent with Tamam[16], who mentioned that identifying the early signs of pressure ulcer formation allows healthcare professionals to intervene quickly, preventing significant loss of tissue and associated complications. And in accordance with National Institute of Clinical Excellence & Fife et al [17,3]. Who demonstrated that length of stay (LOS) in the neurologic ICU does not correlate with new ulcer development but is highly correlated with the Braden scale. Their results suggested that causal factors influence the Braden score, and the Braden score, in turn, can be used to predict both the incidence of new pressure ulcers and the LOS in the ICU.

Health care professionals advocate skin inspection as fundamental to any plan for preventing pressure ulcers. Skin inspection provides the information essential for designing interventions to reduce risk and for evaluating the outcomes of those interventions. Also according to Souza D,&Santos V [18]. Who reported that the important to obtain a baseline skin assessment when a patient arrives in a clinical area so that any damage if present can be identified and promptly treated. In our study skin inspection demonstrate that, the majority of both study and control group (92%, 88%, 48%, 80%, 84%, and 52%) respectively had pressure on sacrum, coccyx and trochanter area. This is in agreement with Keller et al [5], who stated that immobility in bed tends to cause pressure ulcers on occipital, sacrum, heels, malleoli, and trochanter regions.

As regards the moisture of the present study subjects, the entire study group had no moisture in both ICU and the word, while more than third quarter (84%) of the control group had rarely moisture in ICU and nearly one third of the control group in the word (20%, 32%) was very moist and occasionally moist (Table 3, 4). This goes on line with Lahmann et al[19], who emphasized that patients who are wet are at risk for pressure ulcers. Patients that are incontinent of urine or stool, those that sweat a lot and those that have draining wounds are at risk for pressure ulcers. Moisture makes the skin soft. This softness leads to skin breaks. This study result was supported by Vollman, [20], Findings, which revealed that the skin must be, protected from exposure to excessive moisture with a barrier product in order to reduce the risk of pressure damage.

A relatively all the study group had normal skin colors and skin temperature, while nearly half of the control group (56%, 56%) had flushed and hot skin in ICU. Moreover, also nearly half of the control group in the word (48%, 64%) had flushed skin color and hot skin. These findings were inconsistent with National Institute of Clinical Excellence[21], which emphasized that inspect skin regularly for signs of redness in individuals identified as being at risk of pressure ulceration. The frequency of inspection may need to be increased in response to any deterioration in overall condition.

Assessment of the stage of bed sores illustrated that nearly half of control group 11 had stage I of bed sores as compared to only 2 patients in study group in ICU (Table 3). While only one patient in study group have stage I as compared to 11 patients in the control group and 7 patients in control group had stage II in the word (Table 4). This was supported by findings of Bours, [22], study which revealed that effectively monitor and manage all levels of skin damage can ensure that the ulcers did not become worse. And in your observational study, 13.7% of stage I pressure ulcers without intervention deteriorated to a higher stage.

There is good evidence to support the notion that many pressure ulcers are preventable. The general guidelines for PU prevention involve implementation of preventive measures appropriate for the level of risk. In our study there is a highly significant differences observed in study and control group in both ICU and the word related to pressure ulcer reduction strategies include systematic turning regimens to diminish pressure for immobilized patients and reduce or eradicate friction and shear. This finding in agreement with Bours, [22], Who mentioned that patients with severe sensory losses, a standard method is turning the patient at least every 2 to 3 hours. The objective is to prevent the patient from lying supine (a position in which the sacrum and heels bear weight) and on one side (a position in which the femoral trochanter bears weight). Pillows are used to prop the patient at a 30-degree lateral position, and the patient is turned from side to side every 2 to 3 hours, or more frequently, if possible. Although protecting the sacrum and hips, 30-degree lateral turning places pressure on the knees and

the medial and lateral malleoli. To protect these areas, pillows should be inserted between the ankles and knees, which prevents prolonged pressure and relieves the amount of pressure. Also, according to European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel guideline [23], repositioning should be undertaken using the 30-degree tilted sidelying position (alternately, right side, back, left side) or the prone position if the individual can tolerate this and her/his medical condition allows. Avoid postures that increase pressure, such as the 90-degree side-lying position, or the semi-recumbent position.

Considering nutritional status, the study findings revealed that, there is no statistical significance observed in study and control group in ICU related to the most items of maintaining sufficient nutrition (Table 5). On the other hand, there are the significant differences observed in study and control group in the word related to all items of maintaining sufficient nutrition (Table 6).these findings are in congruence with a study done in Australian health care settings showed that, inadequate nutrition increases the risk of developing pressure sores and slows the healing process of sores that do develop. Malnourished people may not have enough body fat to pad the skin and bones or to keep the blood vessels from being squeezed shut. Also, skin repair is impaired in people whose diets are deficient in protein, vitamin C, or zinc. This is supported by Brown [10], who stated that, malnutrition, hypoproteinemia, and anemia reflect the overall status of the patient and can contribute to vulnerability of tissue and delays in wound healing. Poor nutritional status certainly contributes to the chronicity often observed with these lesions. Anemia indicates poor oxygen-carrying capacity of the blood. Vascular disease also may impair blood flow to the region of ulceration. This goes on line with Benoit and Watts [7],who emphasized that the nutritional screening identifies individuals as being prone to develop pressure ulcers or to be malnourished or at nutritional risk, then a more comprehensive nutritional assessment should be undertaken by a registered dietitian or a multidisciplinary nutritional team. Nutritional support should be offered to each individual with nutritional risk and pressure ulcer risk.

Moisture can increase skin friction and weaken or damage the protective outer layer of skin if the skin is exposed to it a long time. For example, the skin may be in prolonged contact with perspiration, urine, or feces. The present study revealed no significant differences in study and control group in both ICU and the word related to most items of deal with moisture. These results are supported by the results of Garcia, & Thomas, [9], who emphasized on keeping skin clean and dry. Wet skin can become soft, inflamed and is less resistant to damage. Moisture weakens the skin and causes it to breakdown more quickly. Wash and dry skin right away after any bowel or bladder accident. Change clothes when they become wet. Pack an extra pair of pants in your travel day pack for times when you're stuck in a sudden downpour or an accessible bathroom isn't available.

Meanwhile, the result of the present study revealed a statistically significance observed in study and control group in ICU and in the word related to avoid massage in redness areas. This result is consistent with Gebhardt, & Ballard [24, 27] , who has similarly found that all applied pressure ulcer preventive measures in your study are in line with the guidelines of the EPUAP and AHCPR except massage which is applied to 8.8% of all patients. Also, Günes& Reddy et al [25, 26], has indicated that massage is contraindicated in the presence of acute inflammation and where there is the possibility of damaged blood vessels or fragile skin. Massage cannot be recommended as a strategy for pressure ulcer prevention.

Conclusion and Recommendations:

It can be concluded from the results of this study that the implementation of the preventive measures of nursing intervention in both ICU and the ward was successful in prevent the bed sores in study group. On the other hand, the implementation of routine care in both ICU and the ward revealed deterioration in control group patients and can observe patients with stage I and stage II of bed sores.

In the light of the foregoing, the following recommendations are proposed:

The use of pressure reducing devices and nursing interventions in intensive care patients are in line with international pressure ulcer guidelines. Only massage, which is also being used, should be avoided according to the recommendation of national and international guidelines.

- A head-to-toe skin assessment should be carried out with all clients at admission, and daily thereafter for those identified at risk for skin breakdown. Particular attention should be paid to vulnerable areas, especially over bony prominences.
- In-service educational program for nurses who working in ICU and the neurological word should be conducted to emphasize on the importance of the bedsores preventive measures.
- Raising awareness of preventive and treatment strategies among intensivists and other health care professionals.

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