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Bedsore Incidence in Trauma Patients Admitted to the ICU

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ABSTRACT

Bedsore is one of the most prevalent problems in hospitals especially ICU ward; which results in death and incapability, life quality degradation and increase of hospital costs. Pressure ulcer or bedsore is a lesion involves the skin or subcutaneous layers and generally comes after an undergoing constant pressure by tissues. The aim of this study is to investigate the frequency of bedsore in trauma patients. This cross-sectional study, performed on 248 trauma patients admitted in ICU of Hamedan Be'ssat hospital and filling the inquiries was based on variables. Data was analyzed by SPSS version 15, T-test and Chi-Square test. In 248 patients' case studies, 21 bedsore cases were recorded; of which 16 were males and 5 were females. There was a significant relationship between patients' age and duration of hospitalization with bedsore incidence. The frequency of bedsore incidence points and their gradation were evaluated that most of hospitalized patients in ICU had no ulcer. Further, the frequency of ulcer grades was analyzed based on trauma type that all sores had higher rate in multiple traumas. Programming is an important factor to minimize pressure sores; thus, probability of bedsore incidence shall be considered in all admitted patients.

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1. INTRODUCTION

Bedsore, also called as pressure ulcer, is a lesion emerged from extra pressure on capillary-arterial system. Such ulcers heal slowly and lead to osteomyelitis, local or systemic infection. Bedsore is one of major concerns of patients who are forced to stay in bed or a steady condition for a long time. Most of them have also surgery problems that make the recovery process more difficult and costly (1). Pressure ulcer is the necrosis of body skin and may occur while a soft tissue is located between an osteoid process and an external surface for a long time (2). Its developing factors are old age, dehydration of body, drugs, malnutrition, and incontinence in excretion, history of illnesses, overpressure to skin, friction between skin, external surface, and tension (3). Bedsore involves patients including: admitted, immobile, unconscious, and patients with no sense of pain (1). The most prevalent locations of pressure sores are occiput, sacrum, scapula, pelvis, ischium, heel and great toe (3). It should be considered that salient points of body such as heels, ischium and trochanter are under more pressure in lying or sitting positions; thus, incidence of ulcer is more probable in those points (1). admitted patients in ICU are susceptible to pressure sore due to bedsore risk factors

such as tranquilizers, mechanical respiration and intense immobility (4-6). The aim of skin care is to protect its integrity. It has to be controlled daily by focusing on susceptible anatomic areas for sore progression. These areas consist of calcaneal tuberosity, skin of coccyx, sacrum and femur trochanter. High rate of pressure sore is a negative score for hospitals and clinics (7). And can affect the patients' quality of life and promote their death rate (8). Studies carried out in different countries have reported the progression of pressure sores variable in ICUs (%3.8-%33.3) (6, 9, 10). Reyhani has reported the frequency of bedsore among patients with skull and spinal cord traumas in ICUs as %22.7 (11). Despite of developments in quality of healthcare services throughout the world as well as our country, the number of bedsore patients has been increased, so that it has been the major concern of acute and chronic care centers such as ICUs (2, 3). Those patients are in need of intensive cares and their predisposition to bedsore is higher and control of effects is more difficult, thus, accurate programming for disease prevention is important and to this end, acknowledgement on actual incidence rate of them in ICUs is necessitate. Therefore, we got through this study.

2. MATERIALS AND METHODS

The method is a cross-sectional study and carried out after approval of Ethic Committee of HamedanUniversity of Medical Sciences and acquiring the consent of patients in 2012. This research was performed on 248 trauma patients admitted in ICU of Hamedan Be'ssat hospital by enumeration. Exclusion criteria include patients with bed sore prior to hospitalization in ICU and those who were released within 24 hours subsequent to hospitalization in ICU. The data assigned to trauma patients who got involved in any grade of pressure sores was recorded in case of no exclusion criterion. Available data in checklist is: demographic data (age and gender), patient's sore grade, type of trauma, days of admitted and date of bed sore incidence, and finally Apache II score (12) was evaluated for patient that is one of death prediction systems in hospitals in basis of disease severity. Apache score criteria including: age, hematocrit rate, WBC, rectal temperature, mean arterial pressure, heart beat rate, respiration rate (RR), sodium and potassium level, oxygenation and A-a condition, creatinine serum, arterial pH, history of vital organs severe failure and GCS. For bed sore gradation, a 4-stage system made by *European pressure ulcer advisory panel* was used as follows: stage 1: piece of visible normal skin that is distinguishable from adjacent skin via temperature, tissue stability, sensation in area. Stage 2:

partial loss of skin including dermis, epidermis, or both. Stage 3: total loss of cutaneous layer including subcutaneous lesion or necrosis which may progress into cutaneous lower levels other than inferior fascia. Stage 4: total loss of cutaneous layer along with severe tissue degradation, expanded necrosis or damage to muscles, bones, or protective structures (13). Eventually, the data obtained from all checklists was gathered and analyzed by SPSS software version 15 and T-test as well as Chai 2. Likewise, Apache 2 score was input to software and the relation of each model with actual rate (discrimination) was evaluated by ROC (receiver operator characteristic) (12) and circumstantial evidence Z was used for measuring the difference between them.

3. RESULTS AND DISCUSSION

In this study, 248 trauma patients referred to ICU were studied; 178 patients (%71.8) were male and 70 (%28.2) were female with mean age of 48.36. 21 patients (%8.5) were affected with bed sore, of which, 16 (%76.1) were male and 5 (%23.8) were female in which its relationship with bed sore incidence was not significant statistically (p-value=0.128), moreover, 227 patients (%91.5) had no sore (Diagram 1).

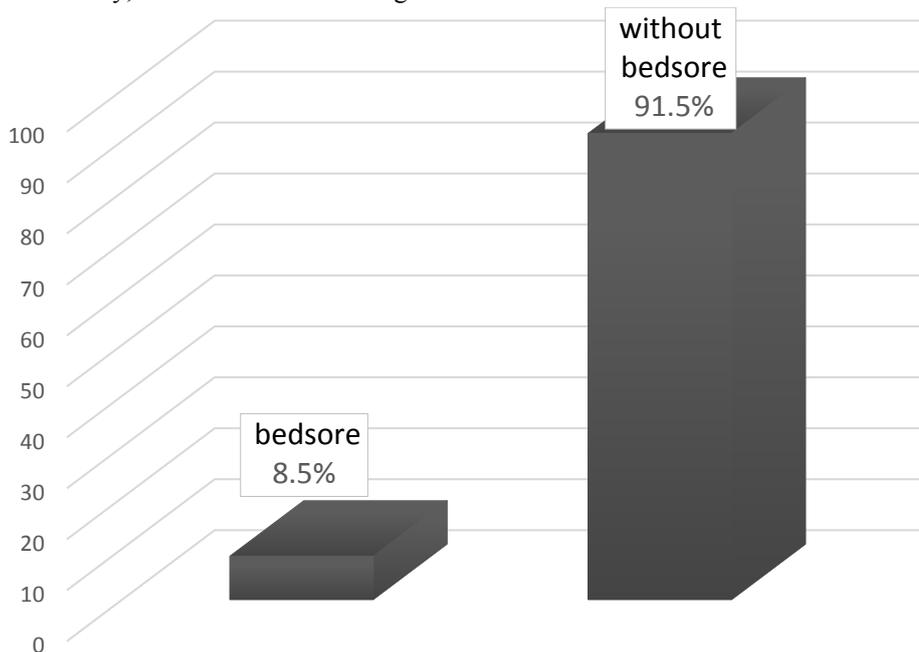


Diagram 1. Bed sore incidence rate in individuals under study

Average duration of admitted for under studied patients was 18.24 days, the maximum was 113 and the minimum was 3 days that was statistically significant (p-value<0.001). By analyzing the patients and evaluation of

Apache 2 score, its mean was obtained as 17.03 with the maximum of 28 and minimum of 12 that was not statistically significant (p=0.25) (Table 1).

Table 1. Mean admitted days and Apache score of patients with bed sore

	mean	SD	Max	Min	P-value
Days of hospitalization	18.24	15.83	113	3	<0.0001

Apache score	17.03	2.95	28	12	0.25
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The frequency of bedsore incidence points and their gradation were evaluated that most of hospitalized patients in ICU had no ulcer (table 2). Further, the frequency of ulcers grades was analyzed based on trauma type that all sores had higher rate in multiple traumas (table 3). In present study, the grade of patients' sores was

distinguished in addition to their gender and as for the fact that the number of males and patients with no visible ulcer is higher; therefore, those with bedsore had higher rate in male group attributed to female group (Table 2, Table 3, Table 4).

Table 2. Bedsore grades of patients based on sore position

Wound Site	No wound	Grade2	Grade3	Grade4	Total
sacrum	232	7	6	3	248
Occipital	240	6	2	-	
Heel	237	9	2	-	
Elbow	246	2	-	-	
Iliac	245	1	1	1	
Shoulder	245	1	2	-	
Leg	246	2	-	-	

Table 3. Bedsore grades of patients based on their trauma type

Wound Site	Trauma	No wound	Grade2	Grade3	Grade4	Total	p-value
sacrum	Head	60	0	3	0	63	0.148
	Multiple	172	7	3	3	185	
Occipital	Head	63	0	0	0	63	0.245
	Multiple	177	6	2	0	185	
Heel	Head	60	3	0	0	63	0.612
	Multiple	177	6	2	0	185	
Elbow	Head	63	0	0	0	63	0.407
	Multiple	183	2	0	0	185	
Iliac	Head	63	0	0	0	63	0.793
	Multiple	182	1	1	1	182	
Shoulder	Head	62	0	1	0	185	0.613
	Multiple	183	1	1	0	182	
Leg	Head	63	0	0	0	63	0.407
	Multiple	183	2	0	0	1825	

Table 4. Bedsore grades of patients based on gender

Wound Site	Trauma	No wound	Grade2	Grade3	Grade4	Total	p-value
sacrum	Male	167	5	3	3	178	0.459
	Female	65	2	3	0	70	
Occipital	Male	171	5	2	0	178	0.545
	Female	69	1	0	0	70	
Heel	Male	171	1	6	0	178	0.741
	Female	66	3	1	0	70	
Elbow	Male	176	2	0	0	178	0.373
	Female	70	0	0	0	70	
Iliac	Male	175	1	1	1	178	0.754
	Female	70	0	0	0	70	
Shoulder	Male	177	1	0	0	178	0.064
	Female	68	0	2	0	70	
Leg	Male	176	2	0	0	178	0.373
	Female	70	0	0	0	70	

The aim of this study was determination of pressure ulcer incidence rate in trauma patients admitted in ICU and its

association with factors such as age, gender, and duration of patients' hospitalization. Achieved results from present

study show that there is a significant relationship between age and days of hospitalization with bedsore breakout (p-value<0.001), but there was no significant correlation between gender variable (p-value=0.128) and Apache score (p-value=0.025) as well as affected points with incidence of bedsore. According to achieved results from present study, it was found that %8.5 of trauma patients hospitalized in ICU affected by bedsore (pressure sore). While, in a study carried out by *Jamand et al.*, the frequency of bedsore in ICU, surgery, internal and orthopedic wards was %14 according to Braden criteria (14); nevertheless, in a study by *Hagiswa*, the incidence rate of bedsore was reported as %19.7 in an academic hospital (15). In a homogeneous study carried out by *Mogharehi M.* in Shiraz academic hospital, the incidence rate of bedsore was %19.1 (16). Likewise, *Nayak D.* has reported the frequency of bedsore incidence %3-%11 (17). The aforesaid studies are not consistent with findings of present study. The probable reason is that the bedsore breakout has been evaluated in all patients, but in present study, bedsore incidence rate has been solely evaluated in trauma patients; however, in study made by *Jamand et al.*, an academic hospital and a nonacademic hospital were sampled. The results of this study showed that the most prevalent points of bedsore are sacrum and heel that is consistent with *Tubaishat* (18) and *Lindgren* (19) studies. *Soozani* and *Hassani* concluded from their studies that the most prevalent points for bedsore are first ischial tuberosity and then sacrum and the reason of inconsistency with present study is that in present study the patients were studied in lying position, while spinal patients were studied sitting on wheelchair (20). Moreover, the present study showed that sacrum area has the most percentage of bedsore incidences that it was also pointed by other researches. As for that the majority of patients admitted in ICU are lying over back with upward held head and torso, it is expected that most pressure comes to sacrum and thus, the probability of bedsore incidence is higher at this point. It seems that the prevalence of bedsore in particular points, depends on consistent pressure bearing by area more than anything else and mobility and displacement can play a role in prevention of disease. There was no statistical association between weight, age, and gender with bedsore frequency in present study. Further, there was no significant difference in mean age in a study accomplished by *Reyhani-e-Kermani* (21). Study made by *Gallagher et al.* did not also show any relationship between age and gender with bedsore incidence rate (22). Whereas, the major reason for emersion of bedsore is long pressure on cutaneous layers and blood transmission failure to organ and most studies have approved this fact, it seems that immobility is a predictive factor of this lesion incidence. In incapable patients or absolute admitted, sequential displacement may prevent bedsore incidence. The most important preventing factor is encouraging patient for regular displacement in body position all over a day.

4. CONCLUSION

Achieved results from present study showed that pressure ulcer incidence rate in ICU admitted trauma patients is in a satisfied level in comparison with universal statistics, however, as for the problems arising from pressure sores, ICU treatment and care team have to attempt more to minimize the pressure sores rates. Findings of this study represented that the emerged bedsore pattern in trauma patients is consistent with developed bedsore in other patients and studies. Thus, adequate preparations shall be considered in all patients susceptible to bedsore incidence.

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AUTHORS CONTRIBUTION

This work was carried out in collaboration among all authors.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

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