

## Research Article

# Bedsore Incidence in ICU Patients: A Tertiary Care Experience

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**Abstract: Introduction:** The aim of this study was to see the incidence of bedsores in our hospital and determine relating factors.

**Material and Methods:** This cross sectional study was performed on 71 consecutive ICU admissions at Ziauddin hospital ICU from March to May 2015. Data was analyzed on SPSS version 16 by independent sample t-test and chi square test. In 71 patients, 12 developed bedsores, of which seven were males and five were females. Available data in Performa included: demographics, functional class, comorbidities, category(surgical, medical or trauma patient), primary cause of ICU admission, total day of ICU stay, total period of mechanical ventilation, requirement of dialysis, albumen level and if bed sore developed than its details and grade.

**Result:** In this study, 71 patients were admitted in ICU; 40 patients, which is 56.33%, were male and 31 patients, which is 43.66%, were female. Twelve patients that are 16.90% were affected with bedsores of which seven were males and five were females and this was found to be statistically significant.

The mean age of patients with bedsores was  $66.75 \pm 18.29$  as compared to  $52.42 \pm 18.20$  in group with no bed sore development.

Total mechanical ventilation required in the group that developed bed sore was  $4 \text{ days} \pm 1.67$  to group with no bed sore development, which was  $2.36 \text{ days} \pm 1.21$ .

The patients who developed bed sore had serum albumen levels  $2.54 \pm 0.26$  and group that did not develop bed sore had albumen levels  $3.14 \pm 0.77$  and the result was found to be statistically significant.

**Duration of Study:** From June 2017 to June 2018.

**Conclusion:** Development of bed sore was found to be statistically significant to the poor functional class, high mean age, total hospital stay, mean mechanical ventilation and low level of albumin.

**Keywords:** Bedsores, Pressure ulcers, Hospital, Admitted patients, Intensive care unit, Incidence.

## INTRODUCTION

Pressure ulcers are a result of added pressure on skin's capillary – arterial system. Such ulcers heal slowly and if not managed may lead to local and systemic infection add to morbidity and mortality. Its development is a major concern in bedridden, poor functional class and ICU patients. Many may be associated with poor medical condition or additional surgical problem [1] that makes recovery and mobility slow. Pressure is ischemia or necrosis of skin as result from compression from external surface and osteoid process for a prolonged period [2]. The relating factors are old age, presence of malnutrition, dehydration, prolonged illness, overpressure and friction on skin [3]. Bed sore frequently involves immobile and unconscious patients who have no feeling of pain [1]. The commonly involved sites are sacrum-pelvis, occipital area, and heel as they are under more compression [1]. ICU patients are further susceptible due to poor functional class. Immobility, mechanical ventilation and due to effect of sedative [4, 5] skin care in ICU patients should

be paid attention to particularly to susceptible anatomic areas of bed sore development and if they occur, should be appropriately managed. High incidence of bed sore development is considered a poor score for the hospital [6] as it can increase morbidity and mortality [7]. Several studies have shown increased bed sore variables in ICU from 3.8 % to 33.3% [5, 8, 9]. Frequency has also been known to increase in trauma patient [10]. Despite increase in healthcare services, the frequency of bed sore has increased and thus is a major concern for critical care teams [2, 3, 11]. Patients in need of critical care predisposed them to the development of bedsores and for their management is difficult, accurate programming should be developed. To the best of our knowledge, there is no such study in our area, hence decided to conduct one.

## MATERIAL AND METHODS

The study design is a prospective cohort with a sampling technique being purposive sampling done in our hospital's ICU patients after taking clearance from our hospitals Ethical Review Committee, after taking informed consent from next of kin and attendants. This is a study carried out from a period of March to May 2015 on 71 ICU admissions. An exclusion

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criterion was prior bed sore and discharge from ICU in 24 hours. The data were assigned to all surgical and medical patients in ICU who did not fall in exclusion criteria and the development of a bed sore in any was noted and assessed. Available data in Performa included: demographics, functional class, comorbidities, category(surgical, medical or trauma patient), primary cause of ICU admission, total day of ICU stay, total period of mechanical ventilation, requirement of dialysis, albumen level and if bed sore developed than its details and grade. European Ulcer Advisory Panel grading system for bed sore was used which is as follows: Stage 1: piece of normal visible skin distinguishable from surrounding by temperature, tissue stability and sensitivity. Stage 2: partial loss of epidermal or dermal layer or both. Stage 3: Total loss of cutaneous layer including subcutaneous lesion and necrosis and progression into cutaneous levels. Stage 4: complete loss of cutaneous layer, along with damage to muscles bones, and protective structures [12]. Data collected on Performa was gathered and analyzed on SPSS version 16. Mean and standard deviation were reported for age, total hospital stay, mechanical ventilation, albumen levels, bed sores and no bed sores and degree of bed sores, Independent sample t-test was used for statistical mean difference in both group. Frequency and percentage were also reported for gender, BMI, number of commodities and infections. Peterson chi-square test was used to see the association with bed sores and the degree of bed sore. Results with a p value less than 0.05 were considered significant.

## RESULTS

In this study, 71 patients were admitted in ICU; 40 patients, which is 56.33%, were male and 31 patients, which is 43.66%, were female. Twelve patients that are 16.90% were affected with bed sores of which seven were males and five were females and this was found to be statistically significant. The mean age of patients with bed sores was  $66.75 \text{ years} \pm 18.29$  as compared to  $52.42 \text{ years} \pm 18.20$  in group with no bed sore development and it was found to be statistically significant. Most of the patients admitted were under medical ICU team 57, while surgical patients were 14. Fifty five patients from both groups were admitted from emergency department as compared to admissions from wards, which were 16. Most of the patients, 59 admitted had BMI 18.5 to 25 but it was not statistically significant. All patients who developed bed sores had grade 2 bed sores and were found at sacral and iliac region.

Chi-square results of relationship between presence or absence of bed sore to BMI was bed sore occurring mostly in 18.5-25 and was not significant. Most of the patients who developed bed sore had nonnative functional class 54.5%, while those who did not have bed sore had active functional class 80.7% and it was found to be statistically significant. Most of the patients who developed bed sores had two 41.70% or more than two comorbidities 41.70% as compared to those

who did not develop bed sore with most of patients in this group having only one comorbidity, 40.70%. Most of the patients in both groups had single infection. Higher percentage of patients who developed bed sores required dialysis. Thirty percent of the patients who developed bed sores as compared to 8.9% from non-bed sore group died in ICU.

Independent sample test results were seen for mean age, total hospital stay, total mechanical ventilation required and level of albumen to patients developing bed sore to those not developing bed sores. The mean age of patients developing bed sores was  $66.75 \text{ years} \pm 18.29$  compared to those not developing bed sores,  $52.42 \pm 18.20$  and it was found to be statistically significant. The patients who developed bed sores had a hospital stay of  $10.58 \text{ days} \pm 1.96$  as compared to those not developing bed sore  $8.62 \text{ days} \pm 5.42$ , it was not statistically significant. Total mechanical ventilation required in the group that developed bed sore was  $4 \text{ days} \pm 1.67$  to group with no bed sore development, which was  $2.36 \text{ days} \pm 1.21$  and it was statistically significant. The patients who developed bed sore had serum albumen levels  $2.54 \pm 0.26$  and group that did not develop bed sore had albumen levels  $3.14 \pm 0.77$  and the result was found to be statistically significant. All patients with bed sores were managed conservatively and none required surgical intervention with debridement under GA.

## DISCUSSION

The purpose of our study, which is the first of its kind in the country to the best of our knowledge, was to look at the incidence of bed sore in patients admitted in our hospital and its association with different factors. The incidence of bed sore occurrence in our admitted patients was 16.90%. This incidence was quite comparable to 14% in hospitalized patients according Braden criteria [13], 19.7% from a study by Hagswa [14] and 19.1% according to Mogharehi in hospital in Iran [15]. The incidence of bed sore was slightly less in study by Nayak D [16] which fell in range of 3-11%.

The region of bed sore of all of our patients was at sacrum and iliac area. This finding was similar to what was mentioned by studies from Lingren [17] and Tubaishat [18] but along sacrum they also mentioned heel to be equally common. Soozani and Hassani mentioned iliac tuberosity and sacrum to be the most frequent site. Sacrum was also mentioned to be the most common site [19]. The reason of development of bed sores at sacrum region in our study and other studies that looked for incidence of bed sore in ICU patients was due to the fact the sacral region experiences highest pressure as the patient is lying straight with upward held head and torso.

The degree of bed sore in our entire patient was grade 2 and it is in contrast to another study done on trauma ICU patients [19] where all grade of bed sore was found.

It is obvious that the most important factor in development of bedsore was constant pressure and immobility. Other factors with a possible relationship have been looked into. In the current study, there was no significant relationship with BMI, gender, increased number of comorbidities, number of infections and requirement of dialysis. This was also consistent with [19], however age mentioned as a nonsignificant association in this study [19] and by Reyhani-e-Kermani [20] was not similar our results in which we found significant association with age. Study by Gallagher *et al.* [21] increased duration of hospital stay was significantly associated with bedsore development and this was a consistent feature of study done on trauma ICU patients [12]. Low level of serum albumen was also significantly associated with bedsore development in our study.

The most important factor of development of a bedsore is persistent pressure on cutaneous layers and hampering blood circulation leading to ulceration. The management therefore mainly involves regular monitoring of susceptible areas and sequential displacement, particularly for unconscious ICU patients to prevent the development of bedsore. Adequate preparation should be done in patients likely to develop bedsores.

Pressure sore can be prevented by identifying high-risk group. One should focus on correcting nutritional status, frequent position change and to use a bedsore mattress in high - risk groups. One can use of emollients for dry skin or skin barrier products if it is excessively moist.

All of our patients who developed bedsores required were managed conservatively by wound dressing and care, changing position and by providing bedsore mattress, infection control, pain management and correcting the main disease. Only a few patients required minimal debridement at bedside. We further added protein in the diet. All these factors prevented the progress of the bedsore stage with all those who had it.

## CONCLUSION

Bedsore development is a common occurrence in ICU patient. Development of bedsore was found to be statistically significant to the poor functional class, high mean age, total hospital stay, mean mechanical ventilation and low level of albumin. Presence of bedsore should be actively monitored and appropriately managed.

## AUTHORS' CONTRIBUTION

Single Authored.

## CONFLICT OF INTEREST

Declared none.

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## REFERENCES

- [1] Chico-Fernández M, Terceros-Almanza L, Mudarra-Reche C. Innovation and new trends in critical trauma disease. *Med Intensiva (English Edition)* 2015; 39(3): 179-88. DOI: 10.1016/j.medine.2015.03.002
- [2] Potter PA, Perry AG, Hall A, Stockert PA. *Fundamentals of Nursing*. USA: Elsevier Mosby 2009.
- [3] Terekeci H, Kucukardali Y, Top C, Onem Y, Celik S, Öktenli Ç. Risk assessment study of the pressure ulcers in intensive care unit patients. *Eur J Int Med* 2009; 20(4): 394-7. DOI: 10.1016/j.ejim.2008.11.001
- [4] Keller PB, Wille J, van Ramshorst B, van der Werken C. Pressure ulcers in intensive care patients: A review of risks and prevention. *Intens Care Med* 2002; 28(10): 1379-88. DOI: 10.1007/s00134-002-1487-z
- [5] Elliott R, McKinley S, Fox V. Quality improvement program to reduce the prevalence of pressure ulcers in an intensive care unit. *Am J Crit Care* 2008; 17(4): 328-34.
- [6] Sanada H, Sugama J, Thigpen B, Kitagawa A, Kinoshita S, Murayama S. A new instrument for predicting pressure ulcer risk in an intensive care unit. *J Tissue Viability* 2006; 16(3): 216.
- [7] Yoo Y, Mun S. The advantages of early trauma team activation in the management of major trauma patients who underwent exploratory laparotomy. *Ann Surg Treat Res* 2014; 87(6): 319-24. DOI: 10.4174/astr.2014.87.6.319
- [8] Cho I, Noh M. Braden scale: Evaluation of clinical usefulness in an intensive care unit. *J Adv Nurs* 2010; 66(2): 293-302. DOI: 10.1111/j.1365-2648.2009.05153.x
- [9] Shahin ES, Dassen T, Halfens RJ. Pressure ulcer prevention in intensive care patients: Guidelines and practice. *J Eval Clin Pract* 2009; 15(2): 370-4. DOI: 10.1111/j.1365-2753.2008.01018.x
- [10] Shahin ES, Dassen T, Halfens RJ. Pressure ulcer prevalence and incidence in intensive care patients: A literature review. *Nurs Crit Care* 2008; 13(2): 71-9. DOI: 10.1111/j.1478-5153.2007.00249.x
- [11] Fernandes LM, Caliri MHL, Haas VJ. The effect of educative interventions on the pressure ulcer prevention knowledge of nursing professionals. *Acta Paul Enferm* 2008; 21(2): 305-11. DOI: 10.1590/S0103-21002008000200012
- [12] Toner L. European pressure ulcer advisory panel. *Br J Commun Nurs* 2007; 12(Sup4): S3-S.
- [13] Jamand T, Akaberian S, Khoramroodi R. Assessment of risk

- factors associated with bedsores in patients admitted to Fatemeh Zahra & Salman Farsi Hospitals in Boushehr by using the braden indices (2007-2008). *ISMJ* 2012; 15(3): 233-40.
- [14] Hagsawa S, Ferguson-Pell M. Evidence supporting the use of two-hourly turning for pressure ulcer prevention. *J Tissue Viability* 2008; 17(3): 76-81. DOI: 10.1016/j.jtv.2007.10.001
- [15] Mogarehi M, Sanaiey Z. Pressure sore incidence and risk factors in patients admitted in medical surgical and orthopedic wards in affiliated hospitals of Shiraz University of medical sciences. *Iran J Nurs* 2003; 16(34): 8-13.
- [16] Nayak D, Srinivasan K, Jagdish S, *et al.* Bedsores: "Top to bottom" and "bottom to top". *Indian J Surg* 2008; 70(4): 161-8. DOI: 10.1007/s12262-008-0046-4
- [17] Lindgren M, Unosson M, Krantz A, Ek A. Pressure ulcer risk factors in patients undergoing surgery. *J Adv Nurs* 2005; 50(6): 605-12. DOI: 10.1111/j.1365-2648.2005.03441.x
- [18] Mafraq J. The prevalence of pressure ulceration among Jordanian hospitalised patients. *J Wound Care* 2013; 22(6): 305. DOI: 10.12968/jowc.2013.22.6.305
- [19] Farshid RB, Hamed S, Saadat T. Bedsore incidence in trauma patients admitted to the ICU. *J Biol Today's World* 2014; 3(12): 261-5.
- [20] Soozani A, Hasani M. The effect of structured educational model on knowledge of caregivers and the process of pressure ulcer healing in veterans with spinal cord injury in Shahroud, Iran. *Horizon Med Sci* 2007; 12(4): 55-61.
- [21] Reyhani H, Haghiri A. Determination of bed sore risk factors in cranio-spinal trauma patient in intensive care unit. *Arak J Med Sci* 2006; 10(2): 79-84.

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