

# Incidence of Bedsore among the admitted Patients in a Tertiary Care Hospital

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## ABSTRACT

**Background and objective:** Bedsore is a disruptive and often disabling condition affecting bedridden, infirm, debilitated and malnourished patients. We looked at the incidence of bedsores among the admitted patients in a tertiary care hospital.

**Materials and methods:** This was an observational cohort study covering 2408 patients. The patients were followed up every alternative day from the day of admission till their discharge/ death from the hospital. Katz index of independence in activities of daily living was used to evaluate the level of functional dependence of patients. Braden scale was used to assess the risk factors for the formation of bedsores.

**Results:** A pooled incidence of 5.9% was estimated. The incidence of bedsore was maximum in intensive care units (9.4%), followed by orthopedic units (8%), emergency wards (7.7%) and neurosurgical units (6%). Mean age was  $44.6 \pm 17.56$  (14-90 years). Unconscious patients, those admitted through emergency, and those who stayed longer in emergency and on IV fluids had a significantly higher chance of developing bedsores. This was also true for patients on Jejunostomy/Gastrostomy feed or total parenteral nutrition (TPN); who needed elevation of the head end of the bed; for whom assistance was required to change their position; and the patients whose position was changed less frequently ( $p < 0.05$ ). The sacrum was the most common site for all the four stages of bedsores.

**Conclusion:** A bedsore incidence of 6% mandates an urgent need to improve the quality of patient care in various units of the hospital. Appropriate equipment, adequate manpower and administrative concern and accountability is the need of the hour.

**Keywords:** Bedsores, Admitted patients, Incidence.

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## INTRODUCTION

Bedsores are a serious health issue for patients in all the kinds of settings. Incidence of bedsore varies from 0.4 to 38.0% in major hospitals, 2.2 to 23.9% in those on long-term care and 0 to 17% in home care settings.<sup>1-4</sup> Bedsores are associated with prolonged and expensive hospitalization.

Various risk factors for bedsores can be categorized as intrinsic and extrinsic factors. The intrinsic risk factors include limited mobility, comorbidities, such as diabetes, chronic obstructive pulmonary disease, congestive heart failure, malignancy and renal dysfunction, poor nutrition and aging skin. Extrinsic factors include: pressure, friction, shear and moisture.<sup>5</sup> Shear forces cause stretching and angulation of blood vessels; these are generated when the head of the bed is elevated and the person slides toward the foot end of the bed. Among the extrinsic factors, excessive compression of the soft tissues between a bony prominence and the surface of the bed is well known. A standard hospital mattress can generate pressure of 45 to 75 mm Hg.<sup>6</sup> Pressure of 200 mm Hg for 16 hours or 600 mm Hg for 11 hours are required before a full-thickness injury occurs.<sup>7</sup>

Pressure ulcers are usually located over bony prominences. Majority (80%) of bedsores occur over the heels, lateral malleoli, sacrum, ischia and greater trochanters.<sup>7</sup> Prevention of pressure ulcers can lead to a reduction in the suffering, morbidity, bed occupancy, work load and the cost of healthcare. It is a great nursing care challenge and a thorough understanding of the etiological factors is required. Extent and duration of immobility affects the incidence of bedsore development and regular repositioning has been shown to significantly decrease pressure ulcer development.<sup>8</sup> A written schedule should be used to direct and document repositioning the position and position of bedbound patients should be changed two hourly. Thirty degree oblique position has been shown to be the ideal position for bedridden patients.<sup>9</sup> Specialized support surfaces (mattresses and beds) have also been shown to decrease the incidence of bedsores.<sup>10-12</sup>

Keeping all these factors in mind, the current study was carried out to estimate the incidence of bedsore in

the admitted patients of PGIMER, Chandigarh and to see if the incidence is different from the published literature.

## METHODOLOGY

The study was carried out in medical ward, surgical ward, advanced trauma centre, orthopedic ward, neuro medicine and surgical ward, main ICU and other intensive care units of the hospital. This was an observational cohort study. All the patients admitted during the study period (i.e. 2 months in each unit) were assessed for the development of bedsores. Patient information proforma was used to collect the data regarding the demographic characteristics of the subjects. Katz index of independence in activities of daily living (ADL)<sup>13</sup> was used to evaluate the level of functional dependence of patients, viz. bathing, dressing, toileting, transferring, continence and feeding. Maximum attainable score for all the activities was six. For each activity score one meant that the patient was independent in carrying out each activity and score zero meant that the patient was totally dependent for the concerned activity. Braden scale<sup>14</sup> was used to assess the risk factors for the formation of bedsores. It involves assessment of the patient on six parameters, i.e. sensory perception, moisture, activity, mobility, nutrition, and friction and shear. The maximum attainable score was 23 and the minimum score was six. The patient was considered to be at 'risk' of developing bedsores if the score was between 15 and 18, at 'moderate risk' if the score was 13 to 14, at 'high risk' if the score was 10 to 12 and at 'very high risk' if the score was nine or less. Site assessment check list was used to evaluate the site for the development of bedsores. Pressure ulcer staging scale was used to categorize the bedsores as per the stage.

All the patients were followed up till their discharge from the hospital. Each patient was visited on alternate days to document the development of bedsores. Bedsores care practices adopted in the hospital were ascertained among the cases that developed bedsores. New cases were recruited in the study as and when they were admitted in the units under study.

Clearance was obtained from the Institute Ethics Committee. Written permission was obtained from concerned authority of each unit. Informed verbal consent was sought from the patients/care givers. The data were analyzed using SPSS-16 package. Both descriptive and inferential statistics were employed.

## RESULTS

### Pooled Incidence of Bedsores

Out of the total enrolled patients, 141 (5.9%) developed bedsores during the observation period (Fig. 1).

More patients from intensive care units developed bedsores (9.4%) as compared to others. The next highest incidence was in patients admitted in the orthopedic units, emergency wards and neurosurgical units. Least percentage of bedsores was noted from the medical and surgical wards (Table 1).

### Sociodemographic Profile of the Patients

As depicted in Table 2, mean age  $\pm$  SD of the subjects who developed bedsores was  $44.6 \pm 17.56$  with the range of 14 to 90 years. Around one-fifth (21.4%) of the subjects were above 60 years of age. As per age, gender, marital status, and educational status, there was no significant difference in the development of bedsores. Occupation wise, there were significantly more number of patients who were not working or who were involved in petty businesses like driver, social worker, cycle-repair, milkman, and tailor ( $p < 0.05$ ).

### Clinical Data of the Patients

The incidence of bedsores was higher in thin built patients and those who were overweight, but the difference was not statistically significant. However, there were significantly more patients who were unconscious, were admitted through emergency department and stayed for more days in emergency, or who were on IV fluids, on Jejunostomy/Gastrostomy feed or total parenteral nutrition (TPN) who developed bedsores ( $p < 0.05$ ) (Table 3).

### Assessment of Dependency Level and Risk Assessment of Bedsores among the Patients

As per Katz score, majority of the patients (83%) who developed bedsores were completely dependent for all of their activities of daily living, i.e. bathing, dressing, going to the toilet, transferring, continence, and feeding. As per Braden scale, 34.8% patients were at 'very high risk', 38.3%

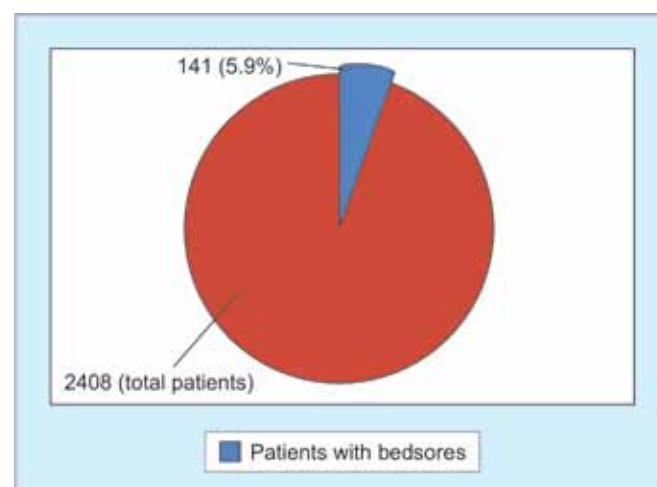


Fig. 1: Incidence of bedsores

were at 'high risk', 15% were at 'moderate risk' and 23% were at 'risk' of development of bedsore.

### Variables related to Positioning of the Patients

Table 4 shows the variables related to positioning the patients in the bed. There was significantly higher incidence of bedsore in patients who needed elevation of the head end of the bed, for whom assistance was required to change their position, and patients whose position was changed less frequently ( $p < 0.05$ ).

### Common Sites and Stages of Bedsore

Figure 2 shows the stages of bedsore and the anatomical site involved. Sacrum was the commonest site for all the four stages of bedsore. It was followed by bedsore at ilium and heels.

### DISCUSSION

Bedsore is a potential problem in intensive care patients. It is a known fact that the patients in critical care units are quite sick. Most of them are unconscious

**Table 1:** Incidence of bedsore as per the wards/units

Wards	Frequency	Bedsore	$\chi^2$ (df)	p-value
	Total no. of patients recruited (N = 2408) n (%)	Proportion of patients who developed bedsore (N = 141) n (%)		
Medical wards	889 (36.9)	41 (4.6)	23.55 (5)	0.03
Surgical wards	612 (25.4)	28 (4.6)		
Neurosurgery	131 (5.4)	08 (6.1)		
Emergency	300 (12.5)	23 (7.7)		
Orthopedics	273 (11.3)	22 (8.1)		
Intensive care units	203 (8.4)	19 (9.4)		

df: Degrees of freedom

**Table 2:** Sociodemographic profile of the patients

Variables	Frequency	Bedsore	$\chi^2$ (df)	p-value
	Total no. of patients recruited (N = 2408) n (%)	Patients who developed bedsore (N = 141) n (%)		
<b>Age (years)</b>				
≤20	326 (13.5)	13 (3.9)	7.66 (4)	0.10 (>0.05)
21-40	940 (39.1)	49 (5.2)		
41-60	812 (33.6)	56 (6.8)		
61-80	310 (12.8)	20 (6.4)		
81 and above	020 (0.8)	03 (15)		
	Mean age ± S.D: 40.53 ± 17.39 Range: 2-93 years	Mean age ± S.D: 44.6 ± 17.56 Range: 14-90 years		
<b>Gender</b>				
Male	1527 (63.4)	88 (5.8)	0.07 (1)	0.7 (>0.05)
Female	881 (36.6)	53 (6)		
<b>Marital status</b>				
Ever married	1846 (76.6)	116 (6.2)	6.77 (1)	0.1 (>0.05)
Unmarried	562 (23.3)	025 (4.4)		
<b>Educational status</b>				
Primary or below	831 (34.5)	53 (6.3)	8.24 (2)	0.31 (>0.05)
Senior secondary or below	1203 (49.1)	68 (5.6)		
Graduate and above	374 (15.5)	20 (5.3)		
<b>Occupation</b>				
Not working*	773 (32.1)	51 (6.5)	21.13 (6)	0.04 (<0.05)
Service	650 (26.9)	42 (6.4)		
Student	306 (12.7)	12 (3.9)		
Laborer	269 (11.2)	14 (5.2)		
Agriculture	207 (8.6)	12 (5.7)		
Business	164 (6.8)	07 (4.2)		
Others**	040 (1.7)	03 (7.5)		

\*Housewife/retired, \*\*driver, social worker, cycle repair, milkman and tailor, df: degrees of freedom; SD: standard deviation



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**Table 3:** Clinical data of the patients

Variables	Frequency	Bedsore	$\chi^2(df)$	p-value
	Total no. of patients recruited (N = 2408) n (%)	Patients who developed bedsores (N = 141) n (%)		
<i>Body built</i>				
Normal	2297 (95.4)	129 (5.6)	5.41 (2)	0.067 (>0.05)
Thin	61 (2.5)	6 (9.8)		
Overweight	50 (2.1)	6 (12)		
<i>General condition</i>				
Conscious	2031 (84.3)	91 (4.9)	59.11 (2)	0 (<0.05)
Unconscious	264 (11.0)	43 (16.2)		
Semiconscious	113 (4.7)	7 (6.2)		
<i>Admission through</i>				
Emergency department	1478 (61.4)	118 (7.9)	31.45 (1)	0 (<0.05)
General OPD	930 (38.6)	23 (2.4)		
<i>Stay in emergency</i>				
≤10	1425 (59.2)	109 (7.6)	21.61 (3)	0 (<0.05)
11-20	43 (1.7)	5 (11.6)		
21-30	9 (0.3)	4 (44.4)		
More than 30 days	1 (0.04)	0		
<i>Present diet</i>				
Normal	1574 (65.4)	53 (3.4)	64.87 (8)	0 (<0.05)
NPO-IV fluid	572 (23.7)	67 (11.7)		
Diabetic diet	108 (4.4)	9 (8.3)		
Burn diet	17 (0.7)	0		
Renal diet	62 (2.5)	2 (3.2)		
High protein diet	40 (1.7)	2 (5)		
Jejunostomy/gastrostomy feed	24 (0.9)	3 (12.5)		
Total parenteral nutrition	11 (0.4)	3 (27.2)		
<i>Type of mattresses</i>				
Mattress with rexine cover	2202 (91.5)	78 (3.5)	249.8 (1)	0 (<0.05)
Alternating air mattresses	206 (8.5)	63 (30.6)		

df: Degrees of freedom

**Table 4:** Variables related to positioning of the patients

Variables	Frequency	Bedsore	$\chi^2df$	p-value
	Total no. of patients recruited (N = 2408) n (%)	Patients who developed bedsores (N = 141) n (%)		
<i>Patients needing head elevation</i>				
No	1684 (69.9)	65 (3.8)	40.49 (1)	0 (<0.05)
Yes	724 (30.1)	76 (10.5)		
<i>Repositioning the patient by</i>				
Lifting	2396 (99.4)	140 (5.8)	0.13 (1)	0.714 (>0.05)
Dragging	12 (0.5)	1 (8.3)		
<i>Position change done by</i>				
Self	1673 (69.4)	35 (2.1)	1.41 (1)	0 (<0.05)
Assisted	735 (30.5)	106 (14.4)		
<i>Frequency of position change</i>				
Ambulatory	1501 (62.3)	30 (2.0)	1.23 (5)	0 (<0.05)
Less than hourly	224 (9.3)	19 (8.5)		
Every 2 hourly	222 (9.2)	39 (17.6)		
2-4 hourly	58 (2.4)	7 (12.1)		
4-6 hourly	80 (3.3)	12 (15)		
>6 hourly	323 (13.4)	34 (10.5)		

df: Degrees of freedom

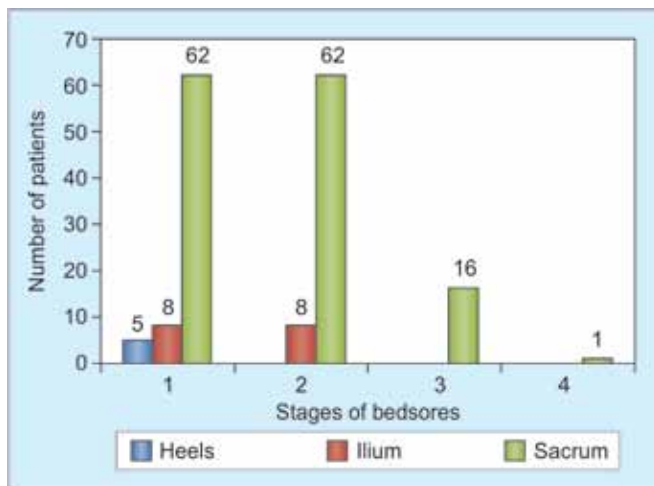


Fig. 2: Stages of bedsores with sites involved

and totally dependent upon the health care professional. A large proportion of the patients are immune compromised. High prevalence (41%)<sup>13</sup> and incidence (33%)<sup>14</sup> of bedsores has been reported from other countries. Even rates of greater than 50% have also been reported for patients in intensive care settings.<sup>15</sup> Pooled incidence of bedsores in the current study was 6%. The majority of the patients who developed bedsores were from intensive care units (9.4%).

The incidence of bedsores in patients admitted in emergency department was also high. Most (8%) patients in other units who developed bedsores had also been admitted through emergency. This could be explained by the fact that most of the patients remain lying on the stretchers in emergency for hours together which increases the risk for bedsores development among the patients. A high proportion of patients admitted through the emergency department were at risk for pressure ulcer development, as has also been reported by Tarpey et al.<sup>12</sup>

Shear forces are generated when the head of the bed is elevated and the person slides toward the foot of the bed. Similarly friction occurs, if the patient is dragged instead of being lifted while repositioning. There were significantly more number of patients (10.5%) who needed elevation of the head end of the bed, for whom assistance was required to change their position, and the patients whose position was changed less frequently. It is usually recommended that in hospital care the immobile patients should be repositioned every 2 hours.<sup>16</sup> However, in around one-fourth of the subjects in the current study, the frequency of change of position was more than four hourly, implying suboptimal care being given.

It has been reported that the use of alternating-air mattress or a water bed lower the incidence of pressure ulcers by more than half among the hospitalized patients.<sup>17</sup> However, in the present study, it was noticed

that only 31% patients were provided alternating air mattresses. Thus, a majority of patients were at further risk to develop the bedsores.

Age is considered as a significant risk factor for the development of bedsores. Elderly are more prone for bedsores; 21.4% of the subjects in the present study were above 60 years of age. Bedsores development is directly linked to tolerance of tissues for pressure as well as the intensity and duration of that pressure. With increase in age, the skin elasticity is reduced, the skin become more fragile, and is likely to get damage even with less duration of pressure.

One fact to note is that if at the time of admission in the hospital, all the patients are assessed for the risk of development of bedsores, the incidence of bedsores can be reduced.<sup>18</sup> In the current study, as per the Braden scale, all the patients with bedsores were at various levels of risks, i.e. very high risk, high risk, moderate risk and at risk of development of bedsores and majority were dependent for all the activities of daily life, i.e. bathing, dressing, toileting, transferring, continence, and feeding as per the score of Katz index. A policy regarding the use of these types of scales needs to be formulated before implementing it in the clinical situations. Nevertheless it is important that the nurses are made aware regarding the use of these scales for improving the quality of care.

Several studies reveal varying sites which commonly are involved in occurrence of bedsores.<sup>8,19-24</sup> In the current study, sacral area was the commonest site for the four stages of bedsores. Supine position is the most favored position for the bedridden patients. Also these areas are more likely to remain wet because of urinary and fecal incontinence superadded with contamination with various microorganisms.

The incidence of bedsores in the orthopedic and neurosurgical patients in the present study was quite high. The possible reason for the higher incidence of bedsores in these patients may be that majority of these patients remain immobile for a number of days. Even neurosurgery patients remain in altered sensorium for long-time postoperatively. Lack of frequent posture change due to these conditions is a known causative factor of bedsores.<sup>25</sup>

This study had several strengths. The sample size was large and we did not rely on hospital nurses for any data. A direct assessment of the probable sites of bedsores development was performed by specially trained research personnel. It has been documented that using retrospective record review as the source of information may significantly underestimate pressure ulcer incidence.<sup>26</sup>

The limitation of the study was that data in each unit under study was collected only for 2 months. The factors influencing the development of bedsores were not studied.

## CONCLUSION

An overall incidence of 6% of bedsores in a tertiary care hospital is a matter of concern for the healthcare administrators. Appropriate monitoring of the patients needs to be performed to lower the incidence. There is a need to develop strategies for reduction and prevention of bedsores in hospital. The pooled incidence data may provide a benchmark to evaluate the preventive strategies for the bedsores.

## CLINICAL IMPLICATIONS

Periodical sessions should be carried out to sensitize the nurses regarding prevention and management of bedsores in all the units. An interdisciplinary, collaborative approach is required, and healthcare providers should develop an understanding that prevention of bedsores is a team goal that requires a team effort. The nurses should provide and document ongoing skin assessments, develop individualized plans of care, and implement evidence-based strategies for the prevention of bedsores. This would ideally evolve from well supervised quality control checks for nursing care.

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