Original Research Article

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Bedsore is a curse in disguise: capturing the zeitgeist

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ABSTRACT

Background: Development of a bedsore is always avoidable still its worldwide prevalence fluctuates between 0%-56%. Bedsores are maximally observed in patients who are on long term care, in intensive care, immunocompromised or on home care.

Methods: In a tertiary care center-JK hospital, Bhopal, a longitudinal observational study was done for a duration of 3 years, on all registered in-patients, to understand the trend of bedsore rates on monthly basis.

Results: In our study, even though, on yearly basis, average of rates is showing a declining trend in favorable manner yet higher statistical analysis (ANOVA test p value = 0.054) has decrypted the non-significant results.

Conclusions: Timely and appropriate prophylactic interventions are needed to overcome the increased bedsore rates. Checklist based surveillance and monitoring should be a pressing priority. Cochrane reviews are also suggestive of incorporation of organizational changes, risk assessment tools, wound care teams and education to reduce the incidence of pressure ulcers.

Keywords: Bedsore, Bhopal, Pressure Injuries, Prevention, Rates

INTRODUCTION

Dictionary meaning of bedsore is "an ulceration of tissue deprived of adequate blood supply by prolonged pressure. Also known as decubitus ulcers or pressure ulcers. Generally it is a painful, often reddened area of degenerating, ulcerated skin caused by pressure (in combination with shear or friction) and lack of movement, and worsened by exposure to urine or other irritating substances on the skin. There are other factors which influences the tolerance of soft tissues for pressure and shear. These factors are protein calorie malnutrition, microclimate, perfusion, age, decreased sensation and certain diseases that reduce blood flow to the skin/soft tissue. They usually occur over a bony prominence. The most common sites are the skin overlying the sacrum, coccyx, heels and hips, though other sites can be affected, such as elbows, knees, ankles, back of shoulders, or the back of the cranium. Constant pressure resulting in

'distortion or deformation damage leads to tissue ischemia, cessation of nutrition and oxygen supply to the tissues and eventually tissue necrosis. There is failure of reactive hyperemia cycle too.1 Untreated bedsores can become seriously infected or gangrenous. The external pressure (>2-8 hours) must be greater than the arterial capillary pressure (32 mmHg) to impair inflow and greater than the venous capillary closing pressure (8 - 12 mmHg) to impede the return of flow for an extended time. Bedsores are a major problem for patients who are confined to bed or a wheelchair. Turning and repositioning of the person in bed or wheelchair to redistribute pressure is the recommended mode of primary prevention.² Along with blood vessel obstruction, tissue distortion also occludes lymphatic flow, which results into accumulation of metabolic waste products, proteins and enzymes in the affected tissue. This too can compound the tissue damage.^{3,4}

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The rate of pressure ulcers in hospital settings is high. For example, prevalence is 8.3-23%, 26%, 0-29% in European, Canadian and American hospitals respectively. Updated staging system given by National Pressure Ulcer Advisor Panel (NPUAP) includes⁵

- Stage 1 pressure injury: Non blanchable erythema of intact skin.
- Stage 2 pressure injury: Partial-thickness skin loss with exposed dermis.
- Stage 3 pressure injury: Full thickness skin loss.
- Stage 4 pressure injury: Full thickness skin and tissue loss.
- Unstageable pressure injury: Obscured full thickness skin and tissue loss.

For any admitted patient, bedsore is an unexpected drawback, a negative detriment occurring in addition to his primary illness. But it is evitable.

Spearheading positive health care practices are required for amping up patient's security. Imperative usage of evidence based facility assessment checklists (Braden score etc.) is required. These checklists have screening for risks, ulcer care plan, assessment plus reassessment of ulcers, monitoring/treatment/prevention strategies of ulcers, policies related to ulcers assessment and finally assessment of staffs training etc.

Aims and objectives

This study was undertaken at our hospital with the intention of exploring the trends in occurrence of bedsores amongst admitted patients of various departments to assess quality of care. Verification of experiential etiology of bedsores by comparing with other studies was also planned.

METHODS

It was a longitudinal descriptive study. Study was conducted in a tertiary care centre and associated hospital of LN Medical College, Bhopal. Study duration was of 3 years (January 2017 to December 2019). For continuous 36 months, all patients (pediatrics, middle aged and geriatrics of all genders) who got registered as in patient were included in the study (as denominator). All the admitted patients were observed for development of bedsore during their hospital stay. Bedsore rate was calculated on monthly basis. All admitted patient of hospital who developed bedsore after admission were included in study (as numerator). Those who were already having bedsore on admission were excluded. Formula used for Bedsore rate calculation was: Total number of bedsores observed in a month/Total number of days of in-patients' hospital stay * 1000. Total number of monthly bedsores data was taken from Infection Control surveillance registers and month-wise total in-patient hospital stay days data was collected from medical record department (MRD) software. Microsoft Excel spreadsheets were used for data entry and calculation purposes. For statistical analysis 3 consecutive years' quantitative data was evaluated by using ANOVA.

ANOVA statistics was employed to dig out whether there is any significant difference in terms of improvement in bedsore rates (year wise) after imparting periodic training on bedsore care and management. Moving average method was used as a trend-following indicator. By this technique, series of points (averages) were used to plot a chart of moving averages (3 monthly/quarterly basis). Due permission was taken from authorities to conduct the research work. This was a secondary data based study and no intervention was done. Confidentiality of the data was maintained.

RESULTS

Data was collected from MRD department about all registered in-patients from January 2017 to December 2019. Data for patients with history of bedsore development during treatment was gathered from surveillance registers of respective departments. All the data was tabulated and above mentioned formula was applied. Thus calculated rates have been displayed in table number 1 against the respective months for a period of 3 years. Overall decrease was seen. Moving average was also evaluated by breaking a single year into subsets of 4 quarters to analyze the trends (Figure 2). Declining trends were observed. Table number 3 and 4 represents calculated ANOVA statistics (p=0.54) and are also showing non-significant p value. Also average of 3 years prevalence was calculated as 0.56.

Table 1: Distribution of month wise bedsore rates over a span of three years.

Month	Total number of bedsores recorded in 2017	Total number of bedsores recorded in 2018	Total number of bedsores recorded in 2019
January	0.064	0.052	0.127
February	1.57	0.15	0
March	1.25	0.395	0
April	0	0.18	0
May	0.29	0	0.127
June	0.098	0	0.061
July	0.111	0.121	0.111
August	0.32	0.194	0.115
September	0.136	0	0.106
October	0.214	0.35	0
November	0.148	0.139	0
December	0.104	0.068	0.056

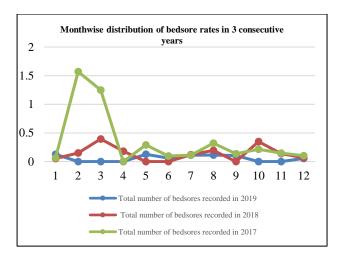


Figure 1: Representation of 3 years bedsore rates.

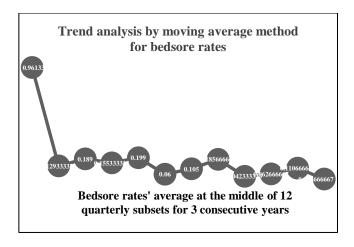


Figure 2: Representation of bedsore rates by moving average method (12 quarters) for 3 years span.

Table 3: Distribution of study population as per bedsore rates for variance calculation.

Groups	Count	Sum	Average	Variance
Total number of bedsores rates recorded in 2019	12	0.703	0.058583333	0.00315572
Total number of bedsores rates recorded in 2018	12	1.649	0.137416667	0.016886447
Total number of bedsores rates recorded in 2017	12	4.305	0.35875	0.253864932

Table 4: Distribution of study population (as per ANOVA statistics) for exploring significance of difference in terms of year wise improvement in rates.

Source of Variation	Squared sum	Degree of freedom	F statistics	P-value	F critical value
Between groups	0.581212667	2	3.182900351	0.05445215 (Insignificant)	2.204010
Within groups	3.012978083	33	(Less than F critical value)		3.284918
Total	3.59419075	35			

DISCUSSION

From preventive perspective, risk assessment is to be done in terms of development of pressure injury using a structured risk assessment like Braden scale (within 8 hours after admission), Norton plus scale, Water low scale, refining assessment after including individual's risk factors, repeat assessment after definite intervals, development of plan of care based on particular risk factor.⁶

Regular surveillance and monitoring are required to prevent development of pressure injuries. A breakthrough could be obtained by aiming to reverse the determinants associated with instigation of pressure ulcers. Pressure ulcer management follows treat-protect-treat algorithm which includes removal of possible cause, improvement of nutrition (protein, iron, vitamin C, Zinc etc.), treat co morbid conditions and wound therapy. Thorough cleaning and dressing is required. Venous and lymphatic flow should be improved by frequent change of posture. Full range of movement and active physiotherapy of the joints is also recommended. Mechanical, enzymatic and

biological debridement are the quicksilver panacea for most of them. Pressure irrigation, low frequency ultra sound energy waves, laser therapy are other supportive options.⁷⁻¹⁴

One should also have an uncanny knack of being able to see immediately where to use the non-absorbent, absorbent, debriding, self-adhering, silicon or occlusive dressings. Specialized dressings and bandages like hydrocolloid, alginate, nano silver dressings along with negative pressure wound therapy are also being consolidating end results. Antibiotics, creams (with fatty acids) and ointments are also prescribed to treat complications.

Inferences obtained from our study in terms of causation were more or less similar to other related studies. In comparison to a study conducted at Chandigarh (Prevalence 41% and incidence 33%) prevalence/incidence rates of our hospital are quiet low. 15

Similar study was also conducted in orthopedic department of a tertiary care centre at Uttar Pradesh. ¹⁶

Although, mean value and variance of individual sample set is decreasing in prospective year wise manner, and indicating a decline in bedsore rates of our hospital, yet in F statistics of ANOVA, p value is non-significant and also our calculated F value is less than critical F value, hence null hypothesis could not be rejected. This is harbingering the need of better preventive programs which are to be implemented in our setting to bring down the future rates in comparison to past ones.

Moving average technique is giving an idea of the trends in our dataset, it is an average of subsets of 12 quarters of whole study span. It is customizable and for short time frames, is a sensitive indicator too. Trend line is moving in favorable direction (possibly due to multiple training sessions). Reasons behind having low prevalence in our hospital are expected to be either good patient care or smaller hospital stay of individual patient.

Preventive measures are game changers. Nowadays various options are available. Water filled and tied gloves are really an inexpensive option for domiciliary foot care. Various low tech and high tech support surfaces and overlays are available. Custom designed gel and pneumatic wheelchair cushions are used to redistribute the pressure. Many soft silicone elastomer based commercially available devices are also helpful. Static surfaces (such as foam filled mattresses, air-filled mattresses, fluid-filled mattresses) are non-electricity driven, while dynamic surfaces (such as alternating air pressure mattresses or pneumatic ripple beds) require electrical power. Air fluidized beds, electronic moving air mattresses contains air and ceramic sphere particles which are helpful in negating the effect of pressure/shear/friction/immobility etc.¹

Whereas in established bedsores, direct closure of the edges of wound are done with the help of surgery, in case of grade three and four pressure ulcers, which fails to heal - reconstructive surgery options are split thickness skin grafting, local/regional flap, micro vascular free flaps etc.

Management includes multidisciplinary approach of aiding and abetting a preventive and corrective measure. Certain avant garde tipping points are in vogue but should be prescribed only under strict medical advice, as they still require further research to determine their effectiveness.

These include growth factors and cytokines, hyperbaric oxygen (HBO) to increase tissue oxygen tension, Skin graft substitutes (bioengineered skin), consisting of connective tissue matrix, expanded epidermis, epidermal stem cells, bone marrow (BM) or adipose tissue derived stem cell (ASC) therapy. ¹⁷⁻²¹

Home based palliative care of bedsores by using pressure ulcer indicator form for terminally ill patients is again a surefire positive solution for this life's peril. ^{22,23}

CONCLUSION

The reasonable deduction is that in order to make any patient's hospital stay/diseased phase of life more comfortable, more cost effective, more secured – a suitable algorithm, for preventive plus corrective actions, is required to be designed after considering maximum possible combinations, permutations of the associated causes of any bedsore. More and more such studies are required to be carried out (based on standardized format of checklists) in all health care settings to curb and understand the extent of challenge. Education and training of concerned health care facility personnel in this regard is essential. Remember this obnoxious lesion is preventable.

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Ethical approval: The study was approved by the

Institutional Ethics Committee

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