

**Research Article****The efficacy of Air Mattress in bedsore prevention and treatment****Parag Garg<sup>1</sup>, Roopak Patel<sup>2</sup>, FJ Taraporvala<sup>3</sup>, Aniruddha Pispati<sup>4</sup>**<sup>1</sup>MS orth, <sup>2</sup>DNB orth, <sup>3</sup>MS orth, <sup>4</sup>Student, Jaslok Hospital and research Centre, 15 - Dr. Deshmukh Marg, Pedder Road, Mumbai, Maharashtra, India**\*Corresponding author**

Parag Garg

Email: [paragorth@gmail.com](mailto:paragorth@gmail.com)

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**Abstract:** Air mattress has been one of the fore-runners in patient care to prevent pressure sores. They work in the principle of distributed pressure over larger areas and providing a better interface to pressure sensitive areas. In this study we want to assess the efficacy of their air mattress not only in preventing but also in curing pressure ulcers, as compared to the standard mattresses. We went thought the 1 year hospital records of all patients prone to develop decubitus ulcers and found 57 patients who did develop them. We noted the site, size, duration and severity of the ulcer. We then classified all patients into 2 kinds groups depending on the mattress used. 42 of them had the air mattress while 17 did not. Of the 42 patients with the air mattress patients 3 (7%) had a pre existing ulcer while 2 (4%) developed a new ulcer during their stay (Total 5, 11%). On the other none of the 15 patients on the standard mattress had a pre existing ulcer, but 5 (33.3%) of them developed a new ulcer during their stay. After discovery of the ulcer an immediate treatment protocol was set into place. All 5 (100%) patients with ulcers on the air mattress got full ulcer recovery while only 2 out of the 5 (40%) patients on the standard mattress recovered. There was a significant difference both in the incidence and rate of healing of decubitus ulcers in patients using air mattresses as compared to standard mattress. We therefore recommend use of air mattress for all patients prone to ulcers and also to patients who have already developed such ulcers for speedy recovery.

**Keywords:** Decubitus ulcers, air mattress.

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**INTRODUCTION**

Decubitus ulcers or bedsores as they are commonly known as is a complication which ails the elderly or patients with restricted mobility, leading to extended pressure on certain parts of skin, leading to necrosis, sloughing and finally ulceration. These sores not only increase the morbidity of the patient, they may contribute to patient mortality [1]. The condition is often avoidable using pressure ulcer prevention strategies which reduce the magnitude and duration of pressure at the interface of a patient and his/her support surface (mattress). This may be achieved by physically repositioning the patient (either manually or using turning beds), and / or using pressure relieving support surfaces such as cushions, mattress overlays, specialty mattresses or specialty beds.

Since sustained pressure is the cause of these ulcers, pressure surface are of utmost importance for the development of these ulcers. The standard hospital mattress in our hospital exerts a pressure of about 120 mmHg. This much pressure can lead to pressure ulcers in susceptible individuals if the same position is maintained for longer durations [2]. Other factors which predispose to ulcers i. In addition to reducing the

pressure at the patient/mattress interface, maintaining the general health of the patient's skin is also essential to prevent pressure ulcers. Moisture accumulation on the skin is an important physical factor predisposing a patient to the occurrence of pressure ulcers are skin conditions, moisture accumulation and general hygiene of the patient [3]. Skin moisture is known to reduce the acidity and therefore its antibacterial property [4].

The prevalence and incidence of skin break down is expected to continue increasing as the elderly population, severely debilitated and patients with polytrauma or fractures continues to increase. Finding ways to prevent the development of skin breakdown and treat it more effectively would be expected to create economic benefits by preventing the need for expensive treatment and equipment. Recognizing and managing pressure ulcers at an early stage to avoid skin lesions turning into pressure ulceration will be absolutely essential.

As discussed before the support surface plays a major role in preventing this condition. In the modern scientific era we have specialized beds to avoid this specific problem [6]. Air mattress is one of them which

are known to decrease the incidence of pressure sores [7,8]. We conducted a comparative study in our hospital to confirm the same and find other realistic facts about

**AIMS**

- To determine the extent to which pressure-relieving support surfaces reduce the incidence of pressure ulcers compared with standard support surfaces
- And their comparative effectiveness in ulcer recovery.

**MATERIALS AND METHODS**

We checked the pre assessment records of all patients of polytrauma , elderly debilitated patients with fracture, with regards to inspection of skin condition over the pressure areas : sacrum, coccyx, hips, heels, elbows, knees, and back of the cranium. The time duration of this assessment was of 10 months from March 2013 to December 2013.

We noted the site, size, duration and severity of the ulcer. Careful record of the type of mattress used was made. We then classified all patients into 2 kinds groups depending on the mattress used: standard or air mattress

**RESULTS**

A total of 57 patients were short listed for this study. 42 of them had the air mattress while 17 did not. 36 patients had sacral and hip ulcers, 18 had heel ulcers and 3 had cranium ulcers. The average size of the sacral

ulcers was 13.5 cm ( range 4.2 cm – 56 cm ) while that of heel ulcers was 3.3 c m( range 2 cm to 5.8 cm ). 21 of these ulcers were grade II , 16 grade III , 14 grade I and 6 grade IV . There was an even distribution of site , size and grading of these ulcers in both the representative groups.

Out of the 42 patients with the air mattress patients 3 (7%) had a pre existing ulcer while 2 (4%) developed a new ulcer during their stay (Total 5 , 11%). On the other none of the 15 patients on the standard mattress had a pre existing ulcer, but 5 (33.3%) of them developed a new ulcer during their stay. After discovery of the ulcer an immediate treatment protocol was set into place.

According to our protocol as soon as a pressure ulcer was detected, an ulcer management plan was initiated. It included 4 hourly repositioning of the patient, mobilizing the patient as much as possible, constant wound care, wound debridement and extra sanitary precautions.

All 5 (100%) patients with ulcers on the air mattress got full ulcer recovery while only 2 out of the 5(40%) patients on the standard mattress recovered. Healing was defined as formation of a healthy bed of tissue with commencement of keratanisation. The average time of recovery was almost the same in both groups, with a mean duration of 21.8 days in group I and 22.3 days in group II.

**Table-1:**

Total Patients (57)	Pre-Existing Bed Sore	Bed Sore Developed During Hospital Stay
Air Mattress Applied (42)	3	2
Air Mattress Not Applied (15)	--	5
P Value (Significant Difference )	< 0.05 , Significant	< 0.05 , Significant

**Table-2:**

Total Bed Sore Patients (11)	Recovered	Not Recovered
Air Mattress Applied (5)	5	0
Air Mattress Not Applied (5)	2 (40%)	3 (60%)
P Value (Significant Difference )	< 0.05 , Significant	< 0.05 , Significant

**DISCUSSION**

Air mattresses were introduced with the purpose of reducing pressure ulcers in immobile patients. They do so by redistributing the pressure, reducing the in shear and thus providing a better microclimate for the patient’s skin. The bed circulates filtered warm air under pressure, which sets small ceramic beads or silicone in motion under the patient. When the patient is placed in the bed, the body weight is distributed over a large surface area. This simulates a fluid movement and prevents prolonged pressure over the same area preventing pressure ulcer formation and progression [2].

Our study demonstrates the results of a relatively small but similar cohort of patients (in terms of age, co-morbidities and mobility status). Overall 10.52 %(6 out of 57), even in such case is a high incidence , which signifies the importance to improve bed sore prevention practices.

The incidence of bed sores in the patients without air mattress was significantly higher 40% (6 out of 15) as compared to that of patients with bed sore with air mattress is 5.12% , (2 out of 39, P < 0.05). The significant difference clearly rules in favor of using air

mattresses at least in all high risk cases like elderly, debilitated and immobile patients.

We followed a protocol of 4 hourly turning of the patient, because of the nature of injuries of our poly trauma patients causes much distress to the elderly during the turn over. Many studies like that of Defloor *et al*<sup>9,10</sup> and Vandervee<sup>11</sup> *et al* have proven that 4 hourly turning of patients is as effective as the traditional 2 hourly turning as proposed by Kosiak [12,13].

There was also a significant difference in healing rates following our standard treatment protocol for pressure ulcer treatment. All cases using the air mattress (5/5, 100%) recovered fully while only one third (2/6, 33.3%) recovered in the standard mattress group ( $p < 0.05$ ). Thus air mattresses also significantly aid in recovery and treatment of decubitus ulcers.

In conclusion we recommend to use air mattress for all at risk patients for decubitus ulcers and also to include air mattress as an essential part of the treatment protocol of bed sores.

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