Comparison of a new foam mattress with the standard hospital mattress

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This study evaluates pressure ulcer incidence rates and comfort perceptions in 100 subjects admitted to a district general hospital. Subjects were divided into two groups, Group A using the standard hospital mattress (Transfoam), which had been in use in the hospital for three years, and Group B using the study mattress (Transfoamwave), which was new at the beginning of the trial.

Due to the low observed incidence of pressure ulcers, it has not been possible to determine whether there is a difference in the clinical performance of the mattresses. Both appear to provide similar levels of comfort. Seat cushions were provided for each trial subject but staff failed to make good use of them, which suggests that more education is required in this area.

Cushions; Mattresses; Pressure ulcers

During the 1990s there have been calls for more clinical trials involving equipment described as 'pressure-relieving' or 'pressure-reducing'.[1-4] As early as 1992, Young and Cotter[5] identified that many of the products described in this way did not have clinical evidence to support these claims. Since then, there has been a rapid increase in the number of pressure-reducing foam mattresses available and they have been purchased in large numbers throughout the UK.

One of the catalysts for this change was a series of laboratory studies in 1993 which identified that a range of NHS contract mattresses had performed poorly when compared with the new types of pressure-reducing foam mattresses.[6] These findings were confirmed the following year in a randomised controlled study.[7]

Pressure-reducing foam mattresses differ from the NHS contract mattress in terms of design and materials used; these differences are detailed in greater depth in other articles.[8-10] In most cases, the pressure-reducing foam mattresses have not been subjected to a well-constructed clinical trial and fewer still have had their performance investigated after some years of clinical use, despite a call for such investigation in *Effective Health Care* in 1995.[2,11,12]

This paper describes a study which sought to investigate the performance of a number of pressure-reducing foam mattresses after three years of clinical use and that of a new mattress based on similar design principles. The investigation was conducted by means of a randomised controlled trial conducted in the surgical, orthopaedic and medical wards at Dr Grays Hospital, a 250-bed district general hospital situated 60 miles from Aberdeen.

Method

Inclusion criteria

All admissions to the research areas were screened and considered for inclusion in the trial if sufficient mattresses were available. The following inclusion criteria applied:

- Emergency or list admission for bed rest or major surgery
- Less than 160kg in weight (one of the research wards regularly admitted obese patients for stomach surgery)
- Skin intact
- No existing skin conditions
- Patient not terminally ill.

Individuals who met the entry criteria were randomised to a control or trial mattress using an opaque envelope. The subject or the next-of-kin was then approached to provide written consent. This procedure had been agreed in conjunction with the local ethics committee.

Equipment used

Both pressure-reducing mattresses evaluated in this trial are constructed using foams of varying densities, and their surfaces are

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Table 1. Subject characteristics

Characteristic	Group A (n = 50)	Group B (n = 50)
Male	31 (62%)	30 (60%)
Female	19 (38%)	20 (40%)
Age (years): mean (s.d.)	61 (4.1)	69 (4.5)
Waterlow score on admission: mean (s.d.)	14 (3.6)	13 (2.5)
2-6 hours out of bed each day	49 (98%)	45 (90%)
Seat cushion provision	25 (50%)	14 (25%)

Table 2. Incidence of pressure damage

Incidence	Group A (n = 2)	Group B (n = 2)
Broken skin	1 (Grade 4)	1 (Grade 2)
Non-blanching redness	1	1

Table 3. Subects' rating of mattress comfort

Comfort rating	Group A (n = 48)	Group B (n = 47)
Very uncomfortable	0	0
Uncomfortable	1 (2%)	0
Adequate	2 (4%)	3 (6%)
Comfortable	34 (72%)	26 (55%)
Very comfortable	11 (23%)	18 (38%)

uncut. Group was allocated to the control mattress (Transfoam), which had been in clinical use for three years. Group B was allocated to the trial mattress (Transfoamwave). All Group B mattresses were new at the beginning of the trial. The two mattresses had similar covers, and were evaluated using the Mount Vernon mattress assessment criteria.[7]

Data collection

Data were collected on Days 1, 5 and 10 and two outcome measures were used: pressure ulcer incidence and comfort perception. Tissue damage was assessed by staff who were unaware which mattress the subject was using. Pressure ulcers were graded using the Torrance scale.[13] Waterlow scores[14] are presented as means and standard deviations, Mann Whitney U-test being used to compare the groups. Chi-square tests were used to examine the categorical variables. Pressure ulcer incidence was subjected to Fisher's exact test.

Results

Study population

A population of 100 subjects was recruited over a 12-month period (Table 1). Fifty subjects were recruited to each group, with 31 males and 19 females in Group A, and 30 males and 20 females in Group B. The mean age in each group was similar: 61 and 69 years in Groups A and B, respectively. Waterlow assessments were carried out on admission; mean scores were similar (14 in Group A, 13 in Group B). Both groups spent similar amounts of time out of bed during the day, with 90% in Group A and 98% in Group B spending 2-6 hours out of bed. The only difference between the groups was in provision of pressure-reducing seat cushions (50% in Group A and 25% in Group B).

Pressure ulcer incidence

In the study as a whole, the pressure ulcer incidence was low – 2%, observed in both groups (Table 2).[1] One subject in Group B developed a superficial ulcer, Grade 2, on the sacrum, and one subject in Group A developed a pressure ulcer on the heel, Grade 4. One subject in each group was observed to have non-blanching hyperaemia which did not progress to broken skin.

Comfort perceptions

Comfort ratings, on a five-point scale from 'very uncomfortable' to 'very comfortable', are shown in Table 3. Of the 60 who described the mattresses as 'comfortable', 34 were in Group A and 26 in Group B; 29 found their mattress 'very comfortable' – 11 in Group A and 18 in Group B.

Mattress condition

During the study, two mattress covers in Group A were found to be torn, resulting in two subjects in this group being withdrawn from the trial.

Discussion

This study was limited by the small numbers recruited. However, with the small difference noted in pressure ulcer incidence, many hundreds of subjects would have been required to produce a statistically significant difference. The population was well balanced, with a difference only in the provision of pressure-reducing cushions. This difference did not appear to affect pressure ulcer incidence, but it raises an important issue, as many authors have previously highlighted the need for cushion provision.[15-17]

The wards were provided with sufficient pressure-reducing foam cushions for each subject recruited to the trial. However, even in Group A, which had the highest provision rate, only 50% of the subjects were given a cushion. This suggests that staff failed to link the risk of pressure ulcer development with the provision of cushions, despite cushion availability. As sufficient cushions were available and these were provided for use in a trial the protocol of which was otherwise adhered to, the need for education on this subject is indicated. This is perhaps an issue on which the researchers should have spent more time educating ward staff.

Little can be concluded from the incidence rates of pressure damage, given the small numbers and the lack of a significant difference between the two groups. It is recognised that a mattress alone, regardless of design, cannot prevent pressure ulcers; however, mattresses do play a part in pressure ulcer prevention programmes and such a programme existed within the research area.

The low rate of pressure ulcers achieved in both groups of subjects may be attributed to the existence of a tissue viability nurse, a wound-care group and an ongoing education programme, together with the use of the pressure-reducing mattresses. It is therefore suggested that both mattresses assist in the prevention of pressure ulcers.

In terms of subject perceptions of comfort, both mattresses had high scores. The response with respect to the new mattress indicates that it provided subjects with an acceptable level of comfort. The standard mattress appears to be standing the test of time, with a similar number of subjects responding positively.

Conclusion

This study sought to investigate two pressure-reducing foam mattresses; at the beginning of the trial one group of mattresses had been in use for three years and the other group was new. The results show no statistically significant difference between the two groups, and a low pressure ulcer incidence rate was observed. This finding suggests that the new mattresses will be a useful adjunct to pressure ulcer prevention, and the older mattresses are maintaining their level of clinical performance. Subjects' perceptions of comfort also suggest that both mattresses are performing well in this area. This trial has provided the type of clinical information called for in *Effective Health Care*[12] and will therefore be useful to those responsible for developing pressure ulcer prevention programmes. ■

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