



Report on a Clinical Evaluation of the
Media Alternating Overlay Mattress and the
Altair Alternating Replacement Mattress

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Introduction

Pressure damage is an expensive complication of illness and disability (Hitch, 1995). It costs the NHS large sums of money each year both due to prolonged treatment, and in more recent times, due to increasing litigation both by the patients affected and or their families. Pressure damage also causes immense human suffering. Aetiology is multifactorial, with many different potential factors predisposing a client to the development of pressure damage. Dealey, (1997) classified the causes of pressure damage into three groups: intrinsic, extrinsic and external factors. Whilst a great deal of research has focused on pressure sore aetiology, the actual interaction between extrinsic and intrinsic factors is still not understood.

Infarction of tissue can occur anywhere on the body. However, the greatest risk is to the skin and subcutaneous tissues, which bear the brunt of exogenous pressure on the body (Bliss 1993) and this is mainly bony prominences such as sacrum, hip and heel. A pressure ulcer is defined as a 'lesion caused by unrelieved pressure that results in damage to underlying tissue' (US Department of Health and Human Services 1992)

Bridel (1992) believes that most pressure ulcers can be prevented if an active preventative plan is initiated and implemented. As long ago as 1987, Hibbs stated that pressure ulcers were '95 per cent preventable'; the five per cent that were not preventable were possibly due to being admitted to hospital with a fractured neck of femur following a fall and the possibility of having been lying on the ground for some hours.

Estimates of hospital prevalence of pressure ulcers vary between five per cent and 10 per cent (Davies et al. 1991) although in certain specialities, the actual figure may be as high as 60 per cent (Verluyzen 1986). In acute care, prevalence of pressure ulcer formation ranges from three per cent to 14 per cent and in long-term care it is as high as 15--25 per cent. National average of pressure ulcers was nine per cent in 1987 (Bergstrom et al. 1987) and Waterlow (1988) found an incidence of 15 per cent in acute settings with another study showing an incidence of 40 per cent in ITU. If Hibbs (1987) is correct and pressure ulcers are 95 per cent preventable, even taking into account pre-existing pressure ulcers, even nine per cent would be an unacceptable level of prevalence.

Pressure relieving equipment is most appropriately used for those people known to have an elevated risk of pressure damage, or for those with existing pressure damage. This type of device removes the source of pressure from the surface of the body and is achieved by alternately inflating cells so that the body is cyclically supported on one set of cells while the remaining cells deflate away from the body (Pring and Millman 1998, Phillips 1999). During deflation, part of the body is not subject to any pressure and this can be checked by the ability to slide a hand between the patient's body and the deflated cells.

It is the experience of TVCS that, given appropriate equipment, pressure ulcers can be healed in the most seriously medically compromised patients, even though they may be dying at the time. Therefore, given appropriate equipment, these patients should not have developed pressure damage in the first place.

The Media alternating mattress overlay and Altair replacement alternating mattress are the latest products available from Select Medical Ltd. Both of these mattresses have been tested for reliability and contact pressure mapping testing has also been conducted with good results. Select Medical Ltd commissioned TVCS to conduct a case study on each of the mattresses.

Description of the Mattresses

The Media alternating mattress overlay and Altair replacement alternating mattress have similar features. Both of the systems comprise standard two cell alternation over a 10 minute cycle. The air cells are constructed from polyurethane which maximizes durability and facilitates ease of cleaning and decontamination. The mattress has CPR pull cords and quick release connectors that can be used in case of emergencies. The waterproof cover is constructed from two-way stretch nylon and has securing straps. The pump has a comfort control setting to suit individual client's requirements; safety features include low/normal low pressure indicators and an audible low pressure alarm. The Altair mattress also benefits from a static function, which can be utilised when patients require short term transportation.

The following two case studies were chosen as the gentleman had a terminal medical condition and had developed pressure damage because he had not been provided with an air mattress, and the lady was at extreme risk and undoubtedly would have developed pressure damage without appropriate equipment.

The aim was to heal pressure damage in the gentleman and prevent pressure damage in the lady.

Case Study 1

(Mr SB) an elderly gentleman of 91 years, with a serious and terminal condition of Chronic Leukemia and esophageal cancer, while in hospital developed several areas of pressure damage on his heels, hip and sacrum due to use of inappropriate equipment.

He was transferred to a nursing home for terminal care.

Mr SB was placed on an Altair 8" Replacement Alternating Mattress on the 9th May 2005, on the date of his admission to the nursing home, his Waterlow score was 32 and he was pale, in pain and emaciated. He was an intelligent man who enjoyed company and every day he spoke to his daughter, who was living in Florida. He also enjoyed passing the time with the nurses and had a gentle sense of humour.

Mr SB had a catheter on admission to the nursing home and was continent of faeces. His nutrition was poor as he found eating difficult, but he certainly tried his best to eat at meal times. He was totally immobile and on bed rest from the moment of admission.

There was no information to say which type of mattress he had been provided with in hospital, but it undoubtedly was not an air mattress or he would not have developed the pressure damage that was obvious from the first assessment.

Hip

The most severe damage was on his hip (picture 1). Although the wound was clean, it was at its most painful stage with the nerve endings exposed. The wound margins were red and oedematous, which suggested that there was further damage occurring beneath the tissues. 2.8cms x 2.9cms (8.12 cms²).

By day 22 the wound was on the point of healing (picture 2) and measured less than 0.5cms x 0.5cms.

Description of pressure damage



Mr SB said that the wound was no longer painful and he was more comfortable.

The final assessment day found the hip completely healed.



Conclusion

Mr SB had so many serious conditions that placed him at risk of pressure damage, that, placed him at risk of pressure damage was a difficult task. Nevertheless, the Altair 8" kept him free of further damage and actually healed his hip wound as can be seen from the pictures.

Sacrum

The wound on Mr SB's sacrum was also a painful wound (picture 4) and the smaller of the 2 wounds measured 2.5cms x 0.8 (2²cms) and the larger 2.5cms x 1.2cms (3² cms).

The wound had slight necrotic tissue within the wound margins and there was an 8cm patch of inflammation surrounding the wound which was also suggestive of further and deeper pressure damage.



The wounds were in two parts, with the smaller wound being more superficial but undoubtedly would be the more painful because of the exposed nerve.

Picture 5 shows the healing that occurred during the previous 22 days. The necrotic tissue has gone, the smaller wound size is 1.5cms x 1.2cms (1.8 cms² – reduction of 0.2 cms²) and the larger 2cm x

1.2cmx (2.4cms² – a reduction of 0.6cms²) giving a total reduction in wound surface size of 0.8cms². The inflammation was no longer so pronounced and the wound was no longer painful.

The final wound bed was granulating and parallel with the surface with epithelial tissue appearing at the edges.

The surrounding tissue had almost fully recovered and was now pale pink instead of the red it had been



Conclusion

The wounds were no longer uncomfortable and there was healing tissue within and around the wound. This is a positive outcome for this trial. Mr SB will remain on the trial mattress until fully healed.

Heel

On the 9th May, the heel was broken, with some necrotic tissue at the wound margins. The base of the wound was shiny and the surrounding tissue was inflamed with the suggestion of further damage below the surface.

Within 22 days, the necrotic tissue had gone, the wound had ideal granulation in the wound bed and the inflamed area had reduced to a pink/mauve and was no longer offering a threat of further breakdown.



The wound had reduced in size from 4cm x 3cms (12cms²) to 3.5cms x 2cms (7cms²) a total reduction in surface area of 5cms²

Mr SB reported that the mattress was extremely comfortable. He remained on bed rest throughout the trial, without complaints of any discomfort. He slept well during the night and he reported a good quality sleep.

The staff were very satisfied with the mattress as they watched the wound healing.

Case Study 2

(Mrs OH) was a 72 year-old lady with kidney failure and multiple pathology. Her condition was such that she was extremely oedematous, with white, almost opaque skin over her legs that had the appearance of low serum albumin. She was also obese and, linked with the oedema, this made her a very large lady of at least 27 stone. Her general poor condition and her weight placed her at high risk of a pressure ulcer at a Waterlow score of 28. Mrs OH spoke little English and was French by origin, and, therefore, communication was often difficult.

Mrs OH refused to eat and began losing weight and this added to her risk score. She had a catheter in order to reduce the risk of skin damage and her skin was remarkably clear, particularly as all the multiple pathology, that was part of her condition, increased her risk.

There was also the problem that Mrs OH was totally immobile and that meant that there would be a point where her skin would breakdown and this could happen very rapidly.

Although Mrs OH did not have pressure damage, but was at very high risk of developing a pressure ulcer, she was supplied with a Media 5" Alternating Overlay. Heavy patients are often too heavy for a mattress, particularly an alternating overlay, as they can bottom out. This risk was checked by sliding a hand between the bed and the patient, between the cells. Mrs OH was not bottoming out on the overlay.

Mrs OH was on the mattress for a total of four weeks. During that time she did not develop pressure damage, not even in the form of redness. During that time, she dramatically lost weight until her BMI became within normal limits. Her oedematous legs reduced to normal size and she became more manageable for repositioning. At this point, a decision was made to remove her from the mattress and place her on a visco-elastic mattress.

Within 4 days, Mrs OH began to experience severe skin damage over the sacrum and the Media 5 Mattress was replaced. The wound gradually healed during the next few days.

The nurses were pleased with the clinical effectiveness of the Media 5" Alternating Overlay as it reduced their need to reposition Mrs OH and it kept her free from pressure damage at her most vulnerable time. The effectiveness of Media 5" Alternating Overlay was

underlined by the fact that Mrs OH developed damage as soon as she was placed on a static (albeit pressure redistributing) system.

Conclusion

Mrs OH would have undoubtedly developed pressure damage much earlier in her care if the Media 5" Alternating Overlay had not been available to her. Also, the damage may have been much worse than she experienced, as the first four weeks she was at her most vulnerable time.

Findings of the two case studies and recommendations

The mattresses both have a firm cell when inflated, and these cells do not appear to collapse together under the weight of the patient. The cells collapsing together is a common occurrence in most dynamic air mattress systems, and it is this occurrence that prevents the mattresses providing zero pressures on any area of the patient – due to this there can only be reduced pressures. However, with these two mattresses, there appeared to be a 'gap' beneath the patient over the collapsed cell. TVCS would recommend testing this to see how low the pressure is, over the collapsed cell, under a heavy patient.

The Altair 8" Replacement Alternating Mattress has a facility to alter the internal pressures within the cell. This is generally acts as a comfort facility with patients who are thin, generally requiring a lower or 'softer' cell. It is important that nurses are able to completely understand where that dial needs to be set for the individual patient as, in the author's experience, the dial can be left too high in a thin patient, placing them at risk of pressure damage, or too low for a heavy patient, which can lead to them 'grounding' on the bed base. It actually requires an 'idiot proof' dial to ensure that anyone unfamiliar with the mattress, could see where to set the dial.

There is a facility to place the dial on 'static' mode, to enable turning. The first assessment of Mr SB, found the mattress on static mode. This was a dangerous thing to happen as the cells are necessarily firm and, when not alternating, can increase the potential of a pressure ulcer. The problem was pointed out to the nurses and the situation was resolved. It is highly recommended that the static mode automatically reverts back to alternation after 20 minutes. This is one of the modifications that have already been put into place by Select Medical in their new design, and this is to be applauded.

Study conclusion

Although this was only a small evaluation, the outcome was very successful for both patients. One began the process of healing during the study and the other did not develop pressure ulcers whilst on the mattress. This is a positive conclusion and demonstrates the clinical effectiveness of the Media alternating mattress overlay and Altair replacement alternating mattress in these two cases.

Both patients will retain their mattresses until Mr SB's pressure ulcers heal and while Mrs OH's risk is still high.

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