The Integrity Full Replacement Alternating Mattress

Fiona Collins
Fiona Collins is Director, Wound Healing Centres UK
Email: fiona@nationalwhc.org

It is estimated by Posnett and Franks (2007), that 1 in 5 hospitalised patients—20 000 at any one time—have a pressure injury, with 400 000 new pressure injuries developing each year and that the financial cost associated with these pressure injuries is between £1.8 billion and £2.6 billion annually. There is no similar data available for patients living in the community. However, people with severe vulnerability to developing pressure injuries are increasingly being cared for in their own homes, so it must be assumed that numbers of pressure injuries in the community equal if not exceed those that develop in hospital. This is set to increase in the current climate of 'admission avoidance', whereby health services and adult social care attempt to manage people in their own homes rather than admitting them to hospital. It is therefore essential that suitable pressure injury prevention strategies are in place to protect people from developing potentially life-threatening injuries.

A pressure injury is area of localised injury to the skin and underlying tissue caused by pressure, shear, friction and or a combination of these (European Pressure Ulcer Advisory Panel (EPUAP), 1998). Pressure injury may range from discoloured areas of skin to large, necrotic areas of tissue involving muscle, tendons and the underlying bone. Most occur over the major weight-bearing body parts, such as the sacrum, heels and ischial tuberosities (Clark et al, 2004).

Pressure injuries are caused by three 'extrinsic' factors: unrelieved pressure, shear forces and friction. Principally, a pressure injury is caused by the compression of the skin and underlying soft tissues against a support surface, such as the bed or the chair, by the person's body weight. As the tissues are compressed, the blood supply becomes occluded, preventing oxygen and essential nutrients from reaching the tissues and preventing waste products from being removed (Hampton, 2008). If the person is regularly repositioned, then pressure is redistributed, allowing the blood supply to return to the tissues and thus maintaining skin integrity. However, when unrelieved pressure is prolonged, the skin and the muscle or bone underneath it can be destroyed (Hampton and Collins, 2005). If the person has a tendency to slide, whether in the bed or in the chair, then injury is worsened by the influence of shear forces and friction. The shear forces injure the internal soft tissue and cause the capillaries to 'kink', thus preventing blood flow through them. Friction causes injury at the skin surface as the person slides over the support surface (Collins 2004), causing abrasions or blistering.

Other 'intrinsic' factors such as age, weight, nutritional status and incontinence will increase the person's risk of developing pressure injury, but will not directly cause injuries in the absence of unrelieved pressure.

ABSTRACT

The Integrity® Full Replacement Alternating Mattress, manufactured and distributed by Sumed, is an innovative alternative for those users who find conventional alternating pressure mattresses uncomfortable. The mattress is designed with smaller cells than conventional alternating mattresses and this has a number of benefits for the user, in that posture within the bed is not compromised as the cells alternatively inflate and deflate, maintaining mobility and function. Furthermore, users report that the small cell size results in their experiencing far more comfort on this mattress compared with other alternating mattresses previously tried, as they feel far less movement with the alternation. Importantly, the construction of the mattress affords significant safety to the user in the event of power failure, and this is particularly pertinent in the community setting where the user is monitored less frequently. This article discusses pressure injury prevention in the community and describes how the Integrity® mattress provides a solution.

KEY WORDS

Pressure injury prevention • Risk Assessment • Full Replacement Alternating Mattress • Improved comfort • Maintenance of posture

Pressure injury is avoidable

Pressure injuries occur across the age spectrum, from pre-term infants through to the very old, where they are most commonly found and in all medical specialties (Benbow, 2008). The majority, however, are thought to be avoidable; prevention is dependent on either removing or modifying the cause and ensuring that staff have up-to-date training in prevention (European Pressure Ulcer Advisory Panel (EPUAP), 1998). These injuries have now evolved to being a synonym for neglect and/or abuse (Meehan and Hill, 2002). The Department of Health (DH) (2010) has now specified what can be considered to be an avoidable pressure injury:

The person receiving care developed a pressure injury and the provider of care did not do one of the following:

- Evaluate the person's clinical condition and pressure injury risk factors
- Plan and implement interventions that are consistent

with the person's needs and goals, and recognised standards of practice

- Monitor and evaluate the impact of the interventions
- Revise the interventions as appropriate

In addition to the association between pressure injury development and poor care, pressure injuries are a huge concern for health professionals. O'Tuathail and Taqi (2011) reported the main reasons for this:

- They cause suffering and frustration to patients (Gould et al, 2001; Moore and Price, 2004)
- They reduce quality of life (Fox, 2002; Akyol, 2006; Hopkins et al, 2006)
- They are associated with increased morbidity (Allman, 1997; Wai-Han et al, 1997)
- They are a huge financial burden on any healthcare system (Bennett et al, 2004)
- They carry the underlying connotations of neglect, mismanagement, feelings of failure and guilt on the part of the health professional (Beckmann, 1995).

Furthermore, in the author's opinion, in recent years,the impact of Safeguarding of Adults at Risk (SAARS)and Root Cause Analysis undertaken under the essence of Care strategy (DH, 2010), has dramatically affected the way in which nurses and other healthcare professionals provide care to those vulnerable to pressure injury in the community. One is far more likely to find patients being nursed on dynamic alternating surfaces at home and in care homes than previously, as nurses themselves have become risk-averse, highly aware of their own accountability, with a tendency to overprescribe as a consequence. In theory, this should contribute to a reduction in incidence of pressure injuries and this remains to be seen. However, in reality this has resulted in the over-prescription of alternating mattresses, with some patients being nursed on products that are considered to be excessive to meet their need, many of whom report discomfort when nursed on alternating mattresses (Stephen Haynes, 2010).

Pressure injury prevention

Pressure injury prevention requires, among other aspects: a comprehensive assessment of the person's risk of predisposition to pressure injuries to take place; an inspection of the skin to be undertaken; and appropriate equipment to be provided for the patient, based on the other assessment outcomes. In the absence of a suitable pressure-relieving support surface, increased repositioning should be undertaken. The interpretation of assessment findings is reliant on the clinician being thoroughly and regularly educated on pressure injury causation and prevention. The most common risk assessment tool is the Waterlow (1985) Risk Assessment Score. Risk assessment scores or calculators are generally used in order to standardise assessment and provide early identification of people who are at risk of pressure injuries (National Institute for Health and Clinical Excellence (NICE), 2005). The assessment should lead to the introduction of preventive measures, which are targeted at those in need, ensuring that scarce resources are used to their best advantage (Stanton, 2001). In addition to risk assessment, it is also essential that the person's skin is regularly examined for early signs of pressure injury (NICE, 2005), both before and after intervention. Once a person has been identified as being at risk of pressure injury, it is essential that suitable equipment is provided in order to minimise the risk, as this provision, combined with regular repositioning, will prevent pressure injury from occurring.

Pressure reducing or relieving

There are two types of mattresses: pressure-reducing mattresses, which are constructed from foam, fluid or air and which redistribute the patient's weight; and pressure-relieving models, which include alternating mattresses and low-air-loss systems. NICE (2005) states that all individuals assessed as having a grade 1-2 pressure injury should, as a minimum provision, be placed on a high-specification foam mattress or cushion with pressure-reducing properties, combined with very close observation of skin changes, and a documented positioning and repositioning regime.

If there is any perceived or actual deterioration of affected areas or further pressure injury development, an alternating pressure mattress or sophisticated continuous low pressure system (e.g. low air loss, air fluidised etc.) should be used.

Selection of an appropriate support surface should take into consideration factors such as the individual's level of mobility within the bed, his/her comfort, the need for microclimate control, and the place and circumstances of care provision (NPUAP/EPUAP, 2009). Alternating mattresses reduce interface pressure by the cyclical inflation and deflation of cells over a period of time; during this process, an area of the patient's body is lifted clear of the surface of the bed (Bell, 2005). Providing alternating mattresses for use in people's own home requires consideration of a number of factors, including reliability of the product from a user perspective, the noise made by the pump, the comfort afforded to the user and—an issue not to be underestimated—the cost of the mattress to purchase and maintain. Perhaps the most obvious of these is whether the patient likes or is able to tolerate the equipment or is comfortable on it. Many patients will tolerate slight discomfort if they feel that the equipment is of benefit; however, if they are unable to sleep or their pain is increased, the selection should be reconsidered, even if the original choice was felt to give the optimal prevention. It is worth considering the main treatment objective when selecting equipment (Stephen-Haynes, 2010). In many instances, if the user has experienced discomfort on an alternating mattress, they will be reluctant to try another, even if their risk level dictates a requirement for this. Often, patients and their carers report that when crucially sited cells deflate, the person's posture is compromised. This tends to occur at bony prominences such as the shoulder and pelvis.

One of the difficulties experienced when using alternating mattresses in people's own homes is when the product fails. The person's carers may not notice that the equipment is not working immediately and then may experience difficulty

obtaining a replacement mattress urgently, in order to prevent the person from becoming temporarily vulnerable to pressure injury development. The initial purchase price of the mattress and the subsequent reliability will have a significant impact on whether or not a mattress is considered by a purchasing authority or otherwise.

Integrity Full Replacement Alternating Mattress

The Integrity Full Replacement Alternating Mattress (Integrity®) manufactured by Sumed, is designed to reduce the potential for development of pressure injury in people who are known to be at risk and to aid healing of pressure injury in people with existing pressure injuries up to Category 4 (NPUAP/EPUAP, 2009). The Integrity has a double height small cell construction; it has 29 cells in total, 19 of which are micro low air loss cells at the heels, sacrum and head, to provide extra protection, delivering maximum immersion and comfort in extremely vulnerable people. The small diameter of the cells is one of the most important factors in the design of the mattress, as it provides a much more comfortable experience for the user.

The more cells, the less movement the patient experiences and the more comfortable the patient experience is as a result. Results from yet to be published clinical evaluation on the Integrity (as yet unpublished) found that quality of sleep and improvement in comfort was experienced in users who had previously found alternating mattresses to be uncomfortable/intolerable. Users found that due to the small cell size, their posture was maintained even when the cells deflated, enabling them to maintain their comfort and crucially their mobility within the mattress.

The mattress construction is extremely important with respect to use in the community: it has a 5 cm foam base that prevents patients 'bottoming out' onto the bed frame should the power fail or be accidentally disconnected. A double layer of air cells is supported by the foam mattress and in the event of power failure, the lower layer remains inflated for up to 24 hours, providing further protection. This gives the person's carers sufficient time to obtain a replacement before a pressure injury develops.

Features include: an automatic 'start up' mode which auto-adjusts for patient weight with a 10 minute cycle time and medium pressure level; pressure and cycle time options; fine pressure control; auto firm 'Nursing' setting for catheterisation and manual handling procedures.

As well as a 1-hour static mode, Integrity has a unique auto dual mode that alternates between an hour of static support followed by an hour of alternating support. Using auto dual and static modes along with the adjustable pressure and cycle times, Integrity is ideal to prepare patients for 'step down'. The Integrity pump is small and ultra-quiet, of particular value in a community setting, where there are few extraneous noises to distract user and carers from the consistent hum of some noisier pumps; this noise can make some users reject outright the use of an alternating mattress.

Integrity can comfortably support patients up to 28 stone

Figure 1: Integrity mattress inclined

Figure 2: User-friendly control panel

Figure 3: The Integrity mattress is easy to fold.

Figure 4: Integrity mattress laid out on a bed.

Figure 5: The mattress is easy to repair.

(177 kg) in weight and has a wide range of functionality. Pressure and cycle time can be adjusted to suit individual patient needs and body types with soft, medium and firm pressure setting options with additional adjustability within each setting and cycle times of 5, 10, 15 and 20 minutes. This enables the user to provide the person at risk with a bespoke programme suited to their individual needs, particularly invaluable to small and frail users. The tailoring for individual needs can be done from the control panel.

Post-market evaluation of the product by Sumed (on file) has determined that the Integrity mattress is particularly indicated in people at severe risk of pressure injury or with existing pressure injuries who also suffer from extreme discomfort on conventional alternating mattresses.

Case Study 1: mattress discomfort

This lady was 99 years old and resident in a care home. She had complex needs, which led to her admission there, including a history of falls, fractured neck of femur one year ago, renal impairment and a heart murmur. She is able to mobilise with the assistance of a member of care staff and a Zimmer; her Waterlow risk score was 18 (high risk).

This lady had been provided with an alternating mattress replacement, but complained bitterly with regard to the discomfort she experienced. Her comments on the existing mattress included: 'It is horrible. It is always bumpy with too many ridges—not at all comfortable.' Staff in the care home were concerned that the lady would reject her alternating mattress, despite her risk level. It was therefore decided that the lady should evaluate the Integrity mattress over a four-week period, in order to see if the design would improve her comfort.

The outcome was extremely positive. Care home staff reported that the mattress was no longer an issue for complaint. The lady herself reported: 'On the old mattress, you had a job to get comfortable. On this one, you get comfortable straight away. I get in, I lay down and straight away I'm comfortable. There are no bumps like the old mattress. I hope I keep this one.'

The lady continues to be managed comfortably on this mattress after four months and her skin remains intact.

Case Study 2: posture improvement

A 90-year-old lady was referred to the author for an assessment of her posture and for advice/recommendations for positioning and prevention of pressure injuries. She had a Waterlow score of 23.

The lady suffered from complex health problems including osteoarthritis and bilateral leg ulcers. She was cared for at home by her family and had a profiling hospital bed with alternating mattress. She also had a wheelchair and pressure-relieving cushion, where she spent several hours each day, in addition to a riser recliner. Attempts had been made by physiotherapists to address the lady's poor posture in bed (which was the main presenting problem due to the discomfort it caused) without success. As a consequence, the lady had begun to refuse to go to bed, preferring to sleep in her recliner chair, which she felt was more comfortable.

However, community staff were concerned that she was at risk of developing pressure injuries. At the assessment it was determined that the main issue was the loss of the lady's pelvis into the depressed cell during deflation. As the cell inflated, the pelvis became trapped, preventing the lady from independently repositioning and causing extreme discomfort. The lady was provided with an Integrity mattress in order to determine if this could meet two main requirements: correct symmetrical alignment in bed, to reduce pain; and improved comfort, in order that the lady would agree to remain in bed where her tissue integrity could be maintained, rather than remaining at risk in her recliner chair.

Figure 6: Control panel. Auto dual mode is third on the bottom row of the console.

The use of the Integrity mattress was extremely successful. The family reported that their mother had been the most comfortable in years and, several months later, she continues to be successfully managed on the mattress.

Conclusion

Providing appropriate equipment in the community to prevent pressure injuries in highly vulnerable people is only one part of the overall pressure injury care plan. This plan relies on marrying the interpretation of assessment findings with knowledge of suitable equipment and a comprehensive care plan which should involve regular repositioning and regular examination of the user's skin. The Integrity mattress has an important part to play in this process, as it achieves clinical effectiveness, with the added benefits of much improved comfort and postural positioning.

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Learning points

- Pressure injuries are largely preventable, if the patient has a full assessment and if suitable support surfaces are provided in association with regular repositioning
- The Integrity Full Replacement Alternating Mattresses assists in preventing and healing pressure injuries, whilst optimising comfort
- The small cells of the Integrity Full Replacement Alternating Mattress prevent the body becoming excessively immersed, thus posture is maintained.