

Achieving effective outcomes: monitoring the effectiveness of the Softform Premier Active™ mattress

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A pressure ulcer is a localized injury to the skin and/or underlying tissue usually over a bony prominence, which results from pressure or pressure associated with shear (European Pressure Ulcer Advisory Panel (EPUAP), 2009). Pressure ulcers, also referred to as pressure sores, bedsores and decubitus ulcers, are categorized using the EPUAP (2009), ranging from mild discolouration of the skin, to a deep wound extending to bone and into internal organs (Romanelli, 2006). In relation to pressure ulcer prevention and management, there is consensus that health-care provision should include:

- ♦ Education and training of health-care professionals in pressure ulcer prevention and management
- ♦ Regular re-positioning of patients as their clinical needs warrant
- ♦ The provision of specialist pressure redistributing support surfaces as the clinical need indicates. (National Institute for Clinical Excellence (NICE), 2005; EPUAP, 2009).

This article will discuss the audit of 40 patients, 20 with up to grade 2 and 20 with up to Grade 3 (EPUAP, 2009) pressure ulcers and the clinical and financial outcomes when using the Softform Premier Active mattress within a UK primary care trust (PCT). Pressure ulcers are considered to be largely preventable. Hibbs (1988) stated that 95% of pressure damage was preventable and this has been re-iterated by Morison (2001), Walsh and Bennett (2004) and Clark (2005).

Product selection

The cost of wound care is significant. The impact on the patient's quality of life is high and wound care accounts for 3% of the annual NHS expenditure. This has been estimated at £2.3–£3.1bn per year (Drew et al, 2007) with the estimated cost of a Grade 4 pressure ulcer in the UK being £40–50 per day (Franks and Posnett, 2007) and an estimated cost of £9.89 million within one UK NHS trust per year (Vowden et al, 2009).

The factors influencing the clinicians' selection of appropriate pressure ulcer prevention and management strategies including the appropriate use of medical devices (Department of Health (DH), 2000). Additionally, patient safety has become an increasing concern and the National Patient Safety Agency aims to lead and contribute to safe patient care by informing, supporting and influencing organizations and people working in the health sector (www.npsa.nhs.uk/nrls).

The Government report *High quality care for all: NHS Next Stage Review final report* by Lord Darzi in June 2008 (DH, 2008) and *Transforming community services* (DH, 2009) highlight the importance of quality care and shift the emphasis from secondary to primary health care and allowing for the transformation of community services. This philosophy is supported by *World Class Commissioning* (DH, 2009b) which sets targets for PCTs for improving health outcomes and reducing health inequalities. The 2009 Care Quality Commission (CQC) regulate health and adult social care services, whether provided by the NHS, local authorities, private companies or voluntary organizations and protects the rights of people detained under the Mental Health Act. The CQC (2009) puts the onus for the health, safety and welfare of the service user firmly with the registered person who must ensure quality of care by ensuring sufficient numbers of suitably qualified, skilled and experienced persons employed and that they receive appropriate training to maintain competence. The Quality, Innovation, Productivity and Prevention (QIPP) agenda (DH, 2010) and high impact actions (DH, 2009) similarly emphasize that pressure ulcers have become increasingly high on the political

ABSTRACT

The identification of pressure-relieving mattresses to achieve positive clinical outcomes for patients and financial considerations for organizations is a challenge for health-care staff. This article reports on an audit undertaken within a primary care trust to determine the clinical and cost effectiveness of the Softform® Premier Active mattress. Preliminary results have been previously published (Stephen-Haynes, 2009) and are presented here in full.

KEY WORDS

♦ Pressure ulcer ♦ Softform® Premier Active ♦ Classification ♦ Outcomes

Figure 1: Softform Premier Active complete



Figure 2: Softform Premier Active Insert



agenda. Posnett et al (2009) emphasize that pressure ulcers are a significant cause of morbidity and mortality. Additionally, the impact of factors that can influence the health-related quality of life of patients living with a chronic wound, such as changes in mobility and general functioning and control of odour and pain, should be considered as equally important in measuring the success of wound care interventions (Bradbury et al, 2008).

The emphasis and culture of the NHS now focuses more on outcomes. A range of outcomes including clinical, financial, and educational are now considered. Outcome measurement is a relatively new concept used within health care as a means of evaluating the efficacy of various treatments (Price, 1999; Steed et al, 2006). It is becoming more widely recognized that outcomes that are considered important to health professionals, in terms of the rationalization of clinical decision making and as

part of clinical research, are not necessarily those deemed important by patients.

Cause of pressure ulcers

Jay (1995) identified five key extrinsic factors thought to be the causative factors of pressure ulcer damage:

- ◆ Pressure
- ◆ Shear
- ◆ Friction
- ◆ Moisture
- ◆ Skin temperature.

It is important for the clinician to consider the extrinsic factors and the wide range of intrinsic factors that cannot be changed, such as the patient's age, sex and physical status, as well as the intrinsic factors that may respond to therapy or modification, such as disease condition, nutritional and fluid status. Appropriate assessment of these should be considered when planning and choosing the appropriate mattress support surface.

Wolverton et al (2005) and Walsh and Plonczynski (2007) have identified that the appropriate use of effective pressure-relieving support surfaces, together with nursing interventions, is central to avoiding pressure area damage in at-risk patients as well as facilitating healing where ulceration is in evidence.

Rationale for the audit

A range of mattress types is useful as it provides the clinician with a range of options that may be used to reduce pressure ulcer risk status following a holistic risk assessment (NICE, 2005). Importantly, the EPUAP (2009) does not promote a particular brand of pressure reducing/relieving mattress. The EPUAP (2009) encourages the clinician to include practical considerations regarding cost, quality, manufacturer's guarantee, and ease of replacement parts. Importantly, the clinician should have a range of options which allow him or her to step up or down as indicated by need. The *Professional Code of Conduct* (Nursing and Midwifery Council, 2008) emphasizes that care should be based upon the available evidence. Indeed, health-care organizations are required to provide a safe decontamination service as part of achieving successful clinical outcomes including procurement, appropriate use of, maintenance and repair and training health and social care professionals (Medical Device Agency, 2008).

Determining the purchase of appropriate equipment is the responsibility of the central equipment service manager and the tissue viability consultant nurse with support and guidance from an infection control consultant nurse, electrical bio-mechanical engineer (EBME), tissue viability nurse (TVN) for nursing homes, community staff and finance. To meet the remit of NICE (2005) regarding appropriate equipment selection, an audit was undertaken of the Invacare® Softform Premier Active - alternating cells within a Softform Premier mattress, which has a 2-cell 10-minute cycle. This mattress has previously been evaluated by Thompson (2006) and Gray (2008).

Softform Premier Active mattress

The Invacare® Softform Premier static pressure-reducing mattress is a non-turn mattress with a reinforced polyurethane base, has a two-way stretch vapour permeable cover with welded seams and a fully concealed welded zip.

The Invacare® Softform Premier Active (Figure 1) is based upon the Softform Premier with the addition of a layer of alternating cells inserted under the castellated foam of a Softform Premier mattress (Figure 2). It has a 39 stone 248kg weight limit, the pump weighs 2kg and the mattress weighs 13kg. The product has an 8-year warranty for the foam, a 4-year warranty for the cover and 2-year product support for the pump. The alternating insert operates on a 2-cell 10-minute cycle and upgrade from the Softform Premier is available with all parts being replaceable, allowing for stepping up and down between static and dynamic alternating pressure with ease. In the event of power failure, the patient remains on a static pressure-reducing mattress. The Softform Premier Active offers ease of decontamination (Department of Health, 2007).

Evidence

The previous research undertaken by Thompson (2006) discusses two patient care scenarios from an overall evaluation of 40 patients including patients with a Waterlow (1995) score of 18-30, with or without a Grade 1-2 pressure ulcer (EPUAP, 1998a; 1998b). Thompson (2006) identifies patients with a number of clinical conditions being nursed on the mattress including age-related general deterioration, cancer, cystic fibrosis, bariatric, renal failure, cardiac failure, diabetes and post-operative recovery.

Thompson (2006) concludes that, used in conjunction with a pressure ulcer prevention strategy, the Softform Premier Active may be used in the prevention and treatment of high risk-patients and has the potential to reduce the reliance on alternating pressure air mattress.

Gray et al (2008) undertook a study to compare the effect of using the Softform Premier Active versus a standard air mattress on pressure ulcer incidence in two elderly care wards with a sample of 50 subjects. The mean age was 82.4, Waterlow=22.2 (range 17-29). Of the 50, four developed a grade 2 pressure ulcer (sacral ulcer-3, heel ulcer-1). The comparison mattress, a dynamic air mattress also had four subjects who developed a pressure ulcer (sacral-2, heel-2). A conclusion is made that an 8% incidence in this particular group was surprisingly low and that the pressure-reducing mattress was as effective as the standard air mattress in pressure ulcer prevention.

Method

Following these previous reviews by Thompson (2006) and Gray (2008) it was agreed to audit the Invacare® Softform Premier Active within the PCT. An audit of 20 patients was undertaken which included patient outcomes, comfort, infection control and electro-biomedical engineering. An audit tool was agreed by a

Table 1. Patients with up to grade 2-3 EPUAP in first wave of audit

Age	Diagnosis	Waterlow risk assessment	EPUAP classification	Outcome
71	Motor Neurone Disease (MND)	18	2	Improved skin and comfort
56	Multiple Sclerosis (MS)	20	0	Maintain skin
57	MS	18	0	Maintain skin
99	Frail	20+	0	Maintained Deceased
62	Myeloma	27	2	Maintained
78	Cardiac failure Myeloma	17	2	Healed
91	Angina	12	2	Healed
51	Paraplegic	21	3	Improved ulcer
88	Cardiac failure	18	2	Improved ulcer
84	Osteoarthritis	23	2	Maintained
57	MS	20	0	Maintained
75	MND	20	1	Improved ulcer Improved motion sickness
68	Cancer of cervix	11	0	Maintained
80	Cancer of lung	21	0	Maintained
50	MS	20+	3	Healed
92	Cardiac failure	15	2	Maintained
70	MS Palliative	21	2	Deceased. Skin maintained Improved motion sickness
82	Palliative	21	0	Deceased Skin maintained
45	MS	25	0	Reduced spasms Improved sleep Skin maintained
64	MS	24	2	Healed

consultant nurse in tissue viability, central equipment loans manager and Invacare® company representatives. This was approved by clinical governance. The audit was arranged through the central equipment loan service and included the criteria listed below:

- ◆ Age/gender
- ◆ Weight
- ◆ Waterlow risk assessment
- ◆ Skin condition
- ◆ Mobility
- ◆ Comfort
- ◆ Clinical effectiveness
- ◆ Rationale for use
- ◆ Functionality
- ◆ Audit support
- ◆ Cost
- ◆ Recommendations regarding future purchase.

The initial audit included patients with up to a Grade 3 pressure ulcer (EPUAP, 2009), patients with neurological disorders and degenerative conditions with a requirement to improve or maintain skin condition, improve comfort or the requirement of an alternative system (*Table 1*). All patients were offered and had access to the existing range of equipment available across the PCT.

Results

- ◆ Age ranges from 45-99, mean: 71.3 years
- ◆ Recorded weights: Min 8st/51kgs- Max 25st/159kgs
- ◆ Waterlow risk of 11-25
- ◆ Pressure ulcer grade (EPUAP, 2009)
- ◆ Intact skin-8
- ◆ Category 1-1
- ◆ Category 2-9
- ◆ Category 3-2.

Of the 20 patients, 10 showed signs of skin improvement within two weeks, none of the patients' skin condition deteriorated, 14 patients found the mattress to be more comfortable than previous equipment, four found it to be as comfortable, two did not comment.

Two patients found an improvement relating to motion sickness, one found it decreased spasms and one found their sleep pattern improved.

All 20 staff found the equipment easy to use, 16 recommended it for purchase, four did not comment. Eight patients found the system quieter than their previous equipment. Additionally, some areas not considered in the original audit were highlighted and are of particular interest including reduction in spasms, alteration to sleep pattern and reduction of motion sickness and patient acceptability.

Audit conclusion

The audit indicates that despite significant age, chronic illness and palliative care needs the Softform Premier Active mattress offered a number of clinical benefits including: maintenance of skin, improvement in patients with up to a Grade 2 (EPUAP, 2009) pressure ulcer, patient comfort, reduced spasms and improved sleep pattern. This conclusion led to a re-audit (*Table 2*) of the Softform Premier Active with patients with up to a Grade 3 pressure ulcer (EPUAP, 2009) with modifications to the original audit tool including re-positioning, length of time on the mattress, the patient's ability to sit out and

patient comfort which was completed by the patient or carer.

Results

- ◆ Age ranges from 52-92, mean= 71.6 years
- ◆ Recorded weights: Min 7st/44.45kgs - Max 17.5st/107.95kgs
- ◆ Waterlow risk of 12-28
- ◆ Pressure ulcer grade (EPUAP, 2009)
- ◆ Intact skin - 2
- ◆ Grade 1-0
- ◆ Grade 2-7
- ◆ Grade 3-11.

Outcomes

- ◆ Pressure ulcers healed: 8
- ◆ Skin maintained: 5
- ◆ Patient comfort/patient able to sleep: 6
- ◆ Difficult to re-position: 1

Comfort

- ◆ Mattress more comfortable than previous equipment: 14
- ◆ Same level of comfort: 4
- ◆ No comment: 2
- ◆ Improvement relating to motion sickness: 4
- ◆ Decreased spasms: 1
- ◆ Sleep pattern improved:1.

All 20 staff found the equipment easy to use, 19 recommended it for purchase, and one did not recommend it as they found it difficult to re-position themselves. Ten patients found the system quieter than their previous equipment, 14 thought the noise tolerable and six did not comment. Additionally, some areas not considered in the original audit were highlighted and are of particular interest, including reduction in spasms, alteration to sleep pattern and reduction of motion sickness and patient acceptability which was reported in all patients with degenerative conditions.

Patient/carers' comments

Below are some comments collected in the audit:

'Really like this mattress and think we should use them'

'Family commented on how quiet the mattress was and how comfortable the patient found it'

'Patient really liked the mattress and accepted it...Don't think she would have complied with an alternating pressure mattress'

Financial outcomes

The Softform Premier Active mattress has the advantage of being based upon the Softform Premier which can easily be converted into the Softform Premier Active mattress. Maintaining the budget for equipment services

Table 2. Patients with up to grade 3 EPUAP in second wave of audit

Age	Diagnosis	Waterlow risk assessment	EPUAP classification	Able to reposition	Able to sit out	Time on mattress	Outcome
61	Multiple sclerosis (MS)	20	3	No	Yes	8 weeks	Healed and comfort
52	Paraplegia secondary to spinal operation	26	0	No	Yes	9 weeks	Maintain skin
53	Cerebral abscess	19	2	No	Yes	10 weeks	Maintain skin and comfort
69	Myotonic dystrophy	20+	3	Limited	Yes	8 weeks	Healed
92	Palliative care	21	3	Yes	Yes	5 days	Maintained comfort
88	Cardiac failure	24	3	Yes	Yes	4 weeks	Healed
62	Bowel cancer and boney secondaries	20+	3	Yes	Yes	6 weeks	Healed comfort sleep
62	Myeloma	27	3	No	Yes	4 weeks	Maintained ulcer
88	Palliative care	20+	2	Limited	No	3 weeks	Improved ulcer Skin maintained
90	Chronic obstructive pulmonary disease Atrial fibrillation	16	3	Yes	Yes	6 weeks	Ulcer improved
62	Multiple myeloma	28	2	Yes	Yes	12 weeks	Maintained
72	Alzheimers	24	3	Yes	Yes	12 weeks	Healed
68	MS	20+	3	Yes	Yes	12 weeks	Improved comfort
61	Motor neurone disease	20+	2	Yes	Yes	>12 weeks	Healed. Able to tolerate mattress
51	Paraplegia Diabetes	21	3	Yes	Yes	4 weeks	Improved but found it difficult to move
88	Left ventricular failure	18	2	No	Yes	12 weeks	Healed comfort
91	Angina. Hysterectomy	12	2	Yes	Yes	6 weeks	Healed
57	MS	15	0	Yes	Yes	4 weeks	Able to tolerate mattress as unable to tolerate alternating pressure of mattress
84	Prostate cancer Palliative	23	2	Yes	No	6 weeks	Skin remained intact Ulcer static
91	COPD Postural hypotension Atrial fibrillation	18	3	Yes	Yes	8 weeks	Ulcer healed. Patient had previously refused mattress

is a significant challenge within all NHS and private organizations. The cost of the mattress is £850 per unit, with an additional pump added costing £270. These costs should be considered in relation to clinical outcomes and cost of alternative products.

Discussion

It is recognized that a pressure-relieving mattresses can contribute to an improvement of the patient's sleep and quality of life (Price et al, 2003) and this is particularly evident in patients with from multiple sclerosis or motor

neurone disease (Chokroverty, 1996). Indeed, Beldon (2002) observes that motion sickness can be a problem for some patients when on mattresses. Therefore, there is a need to have a mattress which does not cause discomfort, nausea, pain or disturb sleep.

The Softform Premier Active mattress offers some significant factors including clinical and practical issues. Clinically it maintained skin, demonstrated healing in patients with up to Grade 3 pressure ulcers, increased patient comfort, reduced spasms, and improved sleep patterns. Practically, it offers ease of use, simple operation within a quiet system, high weight limitations, ease of storage, ease of manual handling, maintenance of infection control and the availability of replacement parts. Indeed, health-care organizations are required to provide a safe decontamination service as part of achieving successful clinical outcomes including procurement, appropriate use of maintenance and repair and training health and social care professionals (Medical Device Agency, 2008).

This evaluation has shown the Softform Premier Active mattress is an alternative to more traditional alternating pressure system in specific patient groups. This, in association with the previously published articles by Thompson (2006) and Gray et al (2008), contributes to the evidence base that health-care professionals may use when making an informed choice about equipment selection and patient care.

The audit was limited by the fact that the mattress was not used on patients with Grade 4 pressure ulceration.

Conclusion

The prevention and management of pressure ulcers is complex, multi-factorial and particularly important in health care in the NHS. Nursing care, re-positioning, skin care, nutrition and an overall holistic assessment and plan of care by motivated, well-informed staff make a significant contribution to overall care. For those that develop pressure ulceration, access to appropriate equipment is essential.

The maintenance, purchase and appropriate use of equipment requires a multi-professional approach. The audit indicates that despite significant age, chronic illness and palliative care needs, the Softform Premier Active mattress offers clinical, practical and financial benefits. **BJCN**

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