because 95% of pressure ulcers are thought to be preventable (Department of Health (DoH), 1993; Hibbs, 1998). Pressure ulcers are known to be an expensive and painful waste of resources and the cost to the patient includes pain, extended hospitalization, systemic illness and loss of independence. They represent a major burden of sickness and reduced quality of life for patients and their carers and are a high cost to not only the patient but also healthcare organizations.

It is, therefore, paramount that resources are directed towards prevention rather than cure. The introduction of preventive measures into routine care of those patients identified as being at risk of developing pressure ulcers would reduce physical, psychological, social and financial costs (Davies, 1994). However, the use of pressure ulcer prevention equipment can only be effective if used as soon as the patient is identified as being at risk.

This article discusses how as part of its pressure ulcer prevention and treatment programme an acute general hospital with over 300 beds introduced a static-led approach by adopting a two-mattress approach which involves only one type of both static and dynamic mattresses. Pressure-reducing foam mattresses and cushions are used for the management of patients up to high risk of pressure ulcer development. Pressure-relieving dynamic mattress and cushions are used for those patients at very high risk of developing pressure ulcers.

Pressure ulcer prevention equipment can be classified into two categories:

- **Pressure-relieving equipment**: these distribute the load or relieve pressure at regular intervals such as alternating-pressure devices.
- **Pressure-reducing equipment**: these redistribute pressure by spreading the weight over a large surface and include static overlays or mattresses and dynamic low-air loss systems.

The use of effective pressure-relieving equipment is well recognized as being fundamental in a pressure ulcer prevention and treatment programme and over the last decade there has been a proliferation in the availability of such equipment. Furthermore, there has been a widespread increase in the use of pressure-relieving equipment across the UK (Dealey, 1995). However, most of the equipment available for the prevention and treatment of pressure ulcers has not been reliably evaluated and there is insufficient research evidence on clinical and cost-effectiveness to guide healthcare practitioners on equipment choice (NHS Centre for Reviews and Dissemination, 1995; Hitch, 1995; Fletcher, 1997).

The presence of pressure ulcers is seen as one of the key indicators of the quality of care delivered in the health service.
The nature and amount of equipment required is one of the most important considerations in the development of a pressure ulcer prevention policy. Decisions on the choice of equipment must consider the benefit to the individual patient and the most cost-effective use of resources.

**BACKGROUND**

Before the introduction of the static-led approach, wards owned and leased a varied range of dynamic mattresses, and the increase in the availability of pressure-relieving equipment through the ad hoc hire system resulted in a threefold increase in expenditure within 3 years. This was influenced by the increase in the acuity of patients and the absence of a standardized procurement policy.

The supervisory control of expenditure of ad hoc hires was problematic owing to the lack of a centralized management system. The lack of storage facilities on all wards resulted in equipment being stored in unsuitable areas such as bathrooms and day rooms. This, combined with individual ward protection of their own devices, many of which were purchased from ward funds, contributed to inappropriate and prolonged usage of dynamic mattresses.

From a clinical perspective many of the devices were overdue for replacement and, as the efficacy of many of the products was also dependent on the condition of the static mattress, a review of equipment requirements was essential.

**METHODOLOGY OF THE APPROACH**

The nature and amount of equipment required is one of the most important considerations in the development of a pressure ulcer prevention policy. Decisions on the choice of equipment must consider the benefit to the individual patient and the most cost-effective use of resources. A project team of clinical, managerial, procurement and finance representatives was set up to establish the resource requirements by evaluating the equipment need in clinical practice and a prerequisite was to establish a programme of care within the constraints of current expenditure. Adopting a multidisciplinary approach ensured that influencing factors, such as financial and procurement issues, were identified and addressed at an early stage and facilitated a shared ownership to a successful local policy.

Evaluations were arranged from three leading companies and they were all invited to give a company presentation. An independent internal product evaluation form was prepared to measure mattress effectiveness (Figure 1). The evaluation across a range of specialties, included patient acceptability, ease of cleaning and ease of nursing interventions including repositioning and transfer of patients.

Service centre visits were arranged by each company for representatives of the group to have an overview of their products and services and the project leader also visited other trusts. Specific clinical outcomes were assessed throughout the evaluation; however, because of the short time frame of the evaluation period it was considered that further clinical evidence was necessary. Therefore, an essential requirement from all companies was that clinical papers relating to patient outcomes supported the efficacy of the products. This ensured that the purchase and leasing of equipment was based on informed decision-making as equipment had been proven in clinical practice.

**ESTABLISHING EQUIPMENT NEED**

The standards developed by the Dyfed Powys Health Authority (1998) National Demonstration Project underpinned the project and were used as a framework to develop a programme of care. To establish the equipment requirements, a baseline clinical audit (Figure 2) which was undertaken and the risk profile was categorized using the pressure sore prediction score (PSPS) (Lowthian, 1987). The equipment requirements were correlated to the distribution of risk and a 19% prevalence rate was recorded.

The risk profile demonstrated that 15% of patients were at very high risk, 11% of patients were at high risk and 10% at risk. At the time of audit, 93 patients had a dynamic mattress, which provided varying degrees of pressure relief and/or reduction but as companies link their products to an undefined sure sore prediction score (PSPS) (Lowthian, 1987). The equipment requirements were correlated to the distribution of risk and a 19% prevalence rate was recorded.

The risk status of preventive aids was linked to the risk assessment scoring system and provided a baseline for the identification of equipment requirements. The factors considered as influential in the allocation of mattresses included:

- Identification of risk factors (PSPS)
- Classification of skin/tissue damage — modified Torrance (1993)
- Clinical rationale and professional judgment.

Although pressure ulcer risk assessment tools have been criticized, they support the systematic review of an individual’s condition...
PRESSURE AREA MANAGEMENT: A STATIC-LED APPROACH

Figure 1. A minimum 7-day evaluation of a pressure-relieving mattress.
Antipressure protection equipment can only be effective if it is used as soon as the patient is identified as being at risk. Pressure-reducing foam mattresses provide a first-line defence against pressure ulcer development and an improved level of patient comfort. The introduction of a more appropriate support surface to replace the standard hospital mattress is a practical step in the prevention of pressure damage.

Deeks (1996), in his review of the DoH clinical practice guidelines concerning risk assessment tools (United Leeds Teaching Hospital NHS Trust, 1995), concluded that they can only be of value in preventive care if they prompt the provision of effective and appropriate interventions to individual patients. The predictive validity of PSPS was assessed on a large cohort of hospital admissions and was shown to have good predictive powers (Deeks, 1996).

It was concluded that a ‘very high-risk’ dynamic mattress should be available to all patients in the very high-risk category and access to dynamic systems in other categories would be based on clinical rationale. Alternative options were explored for the remaining categories, which resulted in the introduction of a static-led approach.

At any given time, Deeks (1996), in his review of the DoH clinical practice guidelines concerning risk assessment tools (United Leeds Teaching Hospital NHS Trust, 1995), concluded that they can only be of value in preventive care if they prompt the provision of effective and appropriate interventions to individual patients. The predictive validity of PSPS was assessed on a large cohort of hospital admissions and was shown to have good predictive powers (Deeks, 1996).

Figure 2. Clinical audit on the equipment required for a programme of care.
following purchase (Gray and Palk, 2000). A follow-up study by Gray et al (1998) indicated that the Softform pressure-reducing foam mattress provided similar level of performance after 3 years of use in the clinical environment and a proven effectiveness of the mattress in assisting practitioners in reducing the incidence of pressure ulcers.

In introducing the Softform mattress as an integral part of the pressure ulcer prevention program, a randomized clinical trial...evaluated the Medical Support Systems (MSS) Softform mattress indicated that there is an association between pressure ulcer development and the type of static mattress used. Another study also demonstrated that pressure-reducing foam mattresses continue to perform well for years following purchase...

Table 1. Pressure-reducing/relieving mattresses

<table>
<thead>
<tr>
<th>Benefits to patients</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved quality of baseline mattress on admission</td>
<td></td>
</tr>
<tr>
<td>Risk assessment recorded within 6 hours of admission</td>
<td></td>
</tr>
<tr>
<td>Ongoing assessment of risk status documented on core care plan</td>
<td></td>
</tr>
<tr>
<td>Appropriate allocation of equipment</td>
<td></td>
</tr>
<tr>
<td>Equipment available at point of need</td>
<td></td>
</tr>
<tr>
<td>Effective provision of a 24-hour pressure damage prevention and management</td>
<td></td>
</tr>
<tr>
<td>Availability of specialized advice and care from TVN</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits to the organization</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant costs reduction</td>
<td></td>
</tr>
<tr>
<td>Procurement-led</td>
<td></td>
</tr>
<tr>
<td>Compliance with Dyfed Powys Health Authority (1998) National Demonstration Project guidelines</td>
<td></td>
</tr>
<tr>
<td>Practice examined by audit trail</td>
<td></td>
</tr>
<tr>
<td>No dynamic mattress ad hoc hires for the last 9 months</td>
<td></td>
</tr>
<tr>
<td>Local policy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits to staff</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Effective equipment selection from a two-system approach</td>
<td></td>
</tr>
<tr>
<td>Easy supply from centralized store</td>
<td></td>
</tr>
<tr>
<td>Clinical and cost-effective system</td>
<td></td>
</tr>
<tr>
<td>Equipment available at point of need</td>
<td></td>
</tr>
<tr>
<td>Advice and support from TVN</td>
<td></td>
</tr>
<tr>
<td>Planned educational and training programme</td>
<td></td>
</tr>
<tr>
<td>Fully resourced 7-year pressure care management programme</td>
<td></td>
</tr>
</tbody>
</table>

TVN = Tissue viability nurse

Figure 3. Distribution of risk 2000 and 2001.
and treatment policy, it was proposed that the following outcomes could be achieved:

- Reduction in incidence of pressure damage
- Significant reduction in the number of dynamic mattresses
- Reduced costs
- Litigation risks reduced
- The Softform mattress has a longer life and therefore a reduced need for frequent mattress replacement as a result of ‘grounding’.

The fundamental principle of a static-led approach is to provide an environment in which pressure ulcers do not develop or existing pressure ulcers improve. Pressure ulcer development is complex; but the problem could potentially be resolved through the provision of appropriate pressure-reducing equipment to those individuals at risk (Maylor, 2001). Although 28% of mattresses currently in use were Softform, these were not allocated as per individual patient need. In view of the proven effectiveness of the MSS Softform mattress (Gray and Campbell, 1994), it was recommended by the project team as the mattress of choice to replace all baseline mattresses and would be appropriate for patients up to high risk when supported by clinical rationale.

**DYNAMIC SYSTEMS**

A tendering process was initiated for the supply of a dynamic mattress with a company risk status of ‘very-high risk’. Further selection criteria supported by an extensive literature review were from a clinical and cost-effective perspective and were also influenced by the following factors:

- Ongoing training and education support from company
- Decontamination facility
- Tracking system
- Competitive ad hoc rental costs
- Maintenance contract
- Incidence and prevalence recording system
- Provision of storage facility.

The contract was awarded to Pegasus Ltd and the Cairwave Therapy System was the mattress of choice. Studies have shown that alternating pressure air mattresses are of benefit in the prevention of pressure ulcers (MDA, 1995) and have been successfully used both in the prevention and treatment of pressure ulcers (Winman and Clarke, 1997). A randomized controlled trial (RCT) on the Cairwave Therapy System has also demonstrated that it is effective in the prevention of pressure ulcers (Pegasus Airwave Ltd, 1997) and 3 years experience of the Cairwave mattress both in the intensive therapy unit and at ward level has also proven its efficacy.

**TWO-SYSTEM APPROACH**

The pressure care products include a combination of dynamic and static systems. As pressure-area care must be provided on a 24-hour basis serious consideration was given to the seating available. The effectiveness of pressure-reducing/relieving mattresses is undermined if patients sit out in ordinary hospital chairs for long periods (Table 1). Preventive measures should not concentrate solely on
mattresses; chair-bound patients may be more at risk than those who are bed-bound (Hitch, 1995). Consequently, the static-led approach is a combination of the following:

- **Mattresses**
  - Static: MSS Softform for patients up to high risk
  - Dynamic: Pegasus Cairwave Therapy System for very high-risk patients

- **Cushions**
  - Static: MSS Image and Solution
  - Dynamic: Pegasus Daycare and Pro-active Seating systems.

The dynamic systems are on a 7-year leasing contract and all static systems were purchased with a rolling replacement programme set up. To fully implement, manage and develop the programme a tissue viability nurse (TVN) was appointed. The equipment not in use is located in a centralized store and is allocated to wards as per individual patient need and a support worker will be appointed to facilitate the process.

This has resulted in a more manageable and cost-effective system. Initial risk assessment is within 6 hours of admission and a core care plan has been introduced which facilitates ongoing assessment of patient risk status and promotes the appropriate allocation of systems and provides an audit trail. This 7-year programme of care includes the appointment of the TVN and support worker and has also created a minimum cost saving of £50,000 per annum.

**COMPARATIVE AUDIT RESULTS**

Further audits were undertaken to evaluate and examine the changes that had occurred since the implementation of the static-led approach. There was no apparent change in the patient population and the level of risk was assessed using the PSPS (Lowthian, 1989) risk assessment tool (Figure 3). The audit results demonstrated that the prevalence rate had reduced to 6%, showing a dramatic improvement since the initial audit (Figure 4). It is recognized that when interpreting these figures prevalence data only give a snapshot view. The audits further showed a reduction in the number of dynamic mattresses in use, and, more important, an improvement in the appropriate allocation which was based on clinical need. (Figure 5). This is partly attributed to the improvement in the use of documentation, which facilitates the initial and ongoing assessment of risk (Figure 6).

**STAFF SURVEY**

Although nursing staff had often commented on the ease and simplicity of the two-mattress system, a sample survey of 65 trained nurses was undertaken to evaluate and confirm staff attitude to the static-led approach and the results showed that:

- 88% of staff liked the central store
- 95% liked the one dynamic mattress
- 85% used the core care plan
- 93% of staff appointed within the last 2 years liked the current system of a static-led approach in comparison with their previous experiences.

**CONCLUSION**

Although initial findings seem to indicate key benefits to the pressure care and management programme, there is a need to continue the educational activity on an ongoing basis. The introduction of computerized incidence monitoring will support the use of biannual prevalence data. This can be used to assist in the monitoring of the effectiveness of the static-led approach in conjunction with regular clinical audits of appropriate use of equipment and documentation measured against local guidelines. On initial assessment the static-led

---

**KEY POINTS**

- Clinical evidence suggests that high-quality mattresses are beneficial for patients with pressure injuries.
- High costs and inappropriate use of equipment prompted an evaluation of the best use of pressure-relieving devices.
- The development of a static-led system has both reduced costs and simplified many nursing burdens.
- Computerized monitoring and clinical audits can both assess and monitor the most effective approach to treatment.
approach initiative seems promising with benefits to patients, staff and the organization. 


Winman G, Clark M (1997) A randomized stratified survey of the current use of alternating pressure air mattress within the NHS. J Tissue Viabil 7(5):