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## Abstract

This paper aims to reflect on the successful management of pressure ulcer equipment within a district general hospital. Insight is given into what is considered an effective, efficient and economic use of static and dynamic mattress, underpinned by a fundamental education package into pressure ulcer management and prevention techniques.

**Key words:** Pressure ulcers ■ Equipment and supplies ■ Research and development

Year on year there continues to be a growth in the number of companies and products which are aimed at assisting in the prevention and management of pressure ulcers. The National Institute for Clinical Excellence (NICE, 2003) pressure ulcer prevention guidelines emphasize the need for clinicians to fully explore the appropriateness and implications of using such equipment. However, NICE (2003) also reminds clinicians that the role of such products is secondary to the delivery of essential nursing care when developing an environment which is conducive to wound healing and the maintenance of healthy tissue. Healthcare professionals and care givers should avoid relying solely on products to prevent further ulcers, as to do so may result in additional tissue damage or delayed wound healing (Bryant, 2000). Rather, the objective should be to create a favourable environment for wound healing.

NICE (2003) categorizes all products used in the management of pressure ulcers as 'pressure relieving'. The term 'pressure-relieving devices' can in turn be divided into high-tech and low-tech devices. High-tech devices would include power-assisted mattresses (alternating and low air loss products) and low-tech would constitute foam and gel products that claim to deliver pressure reduction. Initially, the re-categorization within the NICE guidelines led to some confusion, as the more commonly recognized terms became obsolete. Fletcher (1997), as had many others, previously categorized such products as 'pressure reducing' and 'pressure relieving'. Such classification denoted 'pressure reducing' as products that reduced overall pressure. In contrast, 'pressure relieving' products were considered to be those

that consistently reduced pressure below capillary closing pressure. It is debatable just how important or relevant capillary closing pressures are when considered in solitude in relation to pressure ulcer prevention techniques and products as it does not take into account any other intrinsic or extrinsic factors which may contribute to pressure ulcer development.

Articles which state 'capillary closing pressure' or 'normal capillary closing pressure' in relation to pressure-relieving products have been greatly criticized for a number of reasons, including inaccuracy and misinterpretation of the original data. Reference has been made in many articles, including sales literature, that refers to 'normal capillary closing pressure' as 32 mmHg, generally this figure is referenced to a study carried out by Landis (1930). Landis recorded operating capillary pressure within the fingertips of healthy young individuals, and made no claim that the figure of 32 mmHg was representative of other areas of the body or indeed representative of individuals considered vulnerable or at elevated risk of pressure ulcer development. In addition, it is important to note that Landis reviewed operating pressures, not closing capillary pressures, which are often mistakenly reported.

The necessary pressure to achieve closure of the capillaries has been recorded at lower levels within certain groups, for example, the elderly, dehydrated patients, high dependency and hypotensive patients in comparison with healthy individuals (Bryant, 2002). Reger et al (1998) reviewed the significance of measurements that companies provide, namely interface pressure. Consensus states that skin resting surface interface pressure does not replicate nor give an indication of the interface pressure of bone and tissue. Interface pressure of the skin does not give any reassurance that the blood flow through the capillaries is unimpeded (Wolsey and Hill, 1999).

Responsible companies will acknowledge the limitation of their products and promote the fundamentals of pressure ulcer prevention and wound repair, which is the delivery of essential nursing care.

## Development of the static-led approach

North Cheshire Hospitals NHS Trust has 600 general beds allocated over two sites, Warrington District and Halton Hospital. Prior to 2003, this Trust had shown a year on year increase in the number of dynamic systems in use at any given time, which was having a significant impact on available budgets. The option of adopting the static-led approach was considered by the tissue viability nurse (TVN) and, following consultation with colleagues, it was decided to implement a clinical study.

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In common with many healthcare environments, the time and resources the tissue viability team had available in order to combat the trend of increasing dynamic usage was limited, as were budgetary spends. The majority of time was spent in the management of wound care rather than the preferred subjects of education and prevention. The financial and human burdens of pressure ulcer management has been identified and is well documented (Thomas and James, 2002). It is not only the initial resource problems associated with pressure ulcer development, for example, pain, discomfort, wound management costs, but also the consequential effects, including longer hospital admissions, temporary placements into interim settings, inhibition of rehabilitation programmes and delayed discharges (Davies, 1994).

Hibbs (1988), like other clinicians, has identified the importance of pressure ulcer prevention. The authors of this paper are in agreement with such opinions, however, recognition must be given to the invariably limited resources which are available, especially within this Trust. With just one TVN and an equipment coordinator responsible for 600 beds, it was unrealistic to think that an effective programme of education in pressure ulcer prevention techniques could be mounted. Therefore it was agreed that a company specializing in pressure ulcer prevention products should be sought to assist with the project. It was agreed at the outset that the selected company's clinical support team would be required to take a large proportion of the responsibility for the teaching, support and maintenance of an education programme aimed at increasing the performance of pressure ulcer techniques during this study. The TVN and associates within the Trust recognized the potential risk of company bias with regard to education and product promotion (Bryant, 2000), and duly adopted a circumspect approach to the appointment process.

### **Introducing the static-led approach**

The main aim of the static-led approach is to manage pressure area care in the most effective, efficient and economic way (Thomas and James, 2002). The benefits of the static-led approach cannot be achieved simply through the placement of quality foam mattresses and appropriate use of dynamic mattresses; it is a continual process of practice reflection, education, observation and informal and formal feedback.

An audit to determine the condition of static mattresses within North Cheshire Hospitals NHS Trust was initiated in 2003. The results of the mattress audit identified that the majority of static mattresses needed replacing due to evidence of contamination and of the foam bottoming out. Following the tendering process (O'Connor, 2000), the Trust decided to replace its mattresses with mattresses supplied by Medical Support Systems (MSS). Within the subsequent agreement, MSS agreed to assist the Trust in the utilization of a static-led approach to pressure care techniques and equipment management. This meant that the Trust and MSS would form a partnership with the objective of increasing the appropriate use of equipment (both foam and dynamic mattresses) and include the launch of a continuous education programme aimed at improving pressure ulcer prevention techniques. The measurable outcomes of this study were recorded pre- and post-static-led approach implementation:

- Prevalence of pressure ulcer development
- Number of rental dynamic bed days
- Informal and formal feedback from carers, giving their views/opinions of current practice in relation to pressure ulcer prevention and management.

### **Study and data collection**

The study compared the number of dynamic-bed days used within this Trust before and after the implementation of education and the new foam (static) mattresses. This allowed quantitative data to be available for analysis that could subsequently be used to determine any significant differences. The provision of dynamic mattresses (the supplier and models) remained consistent both pre- and post-study. Data were collected for 12 months between October 2001 and October 2002 (pre-placement of the static-led approach technique), and then for 2 years between October 2003 and October 2004 (post-placement).

The client group of patients admitted before and after the implementation of the static-led approach was not considered significantly different. The majority of wards still had the same consultant, ward specialty and, in most cases, the turnover of care givers had been insignificant, therefore the needs of the patients or techniques implemented had not changed drastically. It is important to limit any factors which may influence the use of dynamic mattresses or pressure ulcer development other than those which are being investigated (Greenhalgh, 1997), in this case the programme of education and the placement of a quality foam mattress. If, for example, the specialty of the ward had changed (an extreme example being from a day case ward to older care) or a significant change in the nursing staff (level of education and performance of pressure ulcer prevention techniques is very much dependent on individual nurses rather than the setting) had occurred, then it would be difficult to attribute any subsequent differences in the pattern of dynamic mattress usage to the static-led approach. The authors acknowledge that, ideally, all the patient groups would have been identical. For example, a record of each patient's risk to pressure ulcer development from each ward should ideally have been recorded and compared pre- and post-implementation of the static-led approach. However, the practical implications of conducting such an exercise are significant, as the resources that would have been required to implement these controls effectively were beyond the limited resources of the team. Consequently, it was decided to instigate informal discussions and gain insight from circumstantial evidence, and this approach provided adequate evidence to confirm that neither the patient groups nor care givers had drastically changed during the trial period.

Owing to the limited resources available to the team, and the significant amount of information that needed to be collected, assessed and reflected upon, the authors decided to gather both quantitative and qualitative data (Quinn, 1999; Salmon, 2003; Webb, 2003). Accordingly, qualitative data was collected during informal and formal discussions with the ward staff. Quantitative data was collected through prevalence and rental bed days. Dr Michael Clarke, Senior Research Fellow at the Wound Healing Unit, University of Wales College of Medicine, was asked to review the first

year's findings of this project (2003–2004). A central objective of adopting the static-led approach is to reduce a Trust's costs through combining nursing best practice with optimization of equipment management.

Clarke (2005) reviews the financial effects of implementing this strategy. The evidence from this study indicates that a considerable cost saving on rental spend was achieved following the adoption of a static-led approach to equipment management, both during the first year following placement and continuing into the second year.

The experience within this Trust demonstrates that the successful adoption of the static-led approach is dependent on the effective re-education of a nursing team in approved pressure ulcer prevention techniques, active promotion of the NICE (2003) guidelines and the continual monitoring, observation, reflection and action planning by the tissue viability team. Furthermore, the selection of equipment appropriate to the demands of the static-led approach is essential and, following the successful results stemming from this initiative, Warrington opted to introduce the MSS Soffform Premier mattress as the preferred static support surface.

The NICE (2003) guidelines provide valuable information and recommendations for reducing the incidence of pressure ulcer development. However, it is up to the individual tissue viability team (and when applicable, the support of a supplier company) to educate the care givers regarding the interpretation, introduction and implementation of these recommendations into their own Trust protocol. Within this Trust, Kinetic Concepts Inc, the company who had the contract for dynamic mattresses at the time of the study, provided the rental dynamic mattresses, supplying an excellent source of data and online monitoring. It is important to recognize and acknowledge that without access to such an advanced tracking system, gaining credible quantitative data would be difficult and time consuming. The online monitoring provided the clinical team with valuable information such as individual ward usage and product summaries on a daily basis — thus facilitating a priority-based education structure. For example, wards which demonstrated a high use of dynamic rentals were targeted first.

Before the introduction of the static-led approach, enquiries were made with ward staff into current practices, knowledge and rationale associated with pressure ulcer prevention techniques and equipment selection. This data was collected through informal and formal methods including feedback at teaching sessions, discussion groups and meetings (*Table 1*). The results provided an insight into current activities and the level of knowledge regarding pressure ulcer prevention and equipment management.

Analysis and reflection of this qualitative data was applied when making the following decisions:

- The most appropriate content of the education package (see *Table 2*)
- Assist in the schedule of delivery

The results of this data provided a guide into the optimal content focus and a schedule of the delivery based on priority. Priority was based on the criteria in *Table 3*.

It is acknowledged that the type of qualitative data collected during this part of the study provides an insight

into occurrences, but does not constitute controlled research evidence. Such limitations are recognized by the authors, however, it was felt that for the purpose of devising an appropriate content and education schedule, the data were informative, directional and sufficient for the purpose of considering optimal resource management. Successful content and prioritizing of education would not have been achieved if such data were considered in isolation. Following data collection, the tissue viability team discussed each ward independently, reflecting upon the data which had been collected. This made the task of prioritizing delivery and content a much more efficient and reliable process.

An education programme was devised between the tissue viability team and MSS' clinical team. Responsibility and ownership of this project was seen by all parties as being jointly held by both the Trust and MSS. A brief summary of the education programme is shown below.

Clarke (2005) states there were a number of changes within the Trust setting during the initial year following placement, specifically, the purchase of 30 dynamic mattresses and an increase in the number of beds within the Trust. However, this period directly coincided with the absence of the equipment coordinator during the months of March, May and June 2003. The role of the equipment coordinator is pivotal within this Trust, and is fundamental to the successful implementation of a static-led approach programme. The role includes (with the support of the TVN) giving advice on product availability, selection of pressure ulcer prevention products, pressure ulcer prevention guidance and day-to-day management of the

### Table 1. Assessing the knowledge and implementation of pressure ulcer development and management

The aim of the following discussion points: To be able to prioritize the education schedule and contents based on the individual needs of the ward; that is, areas which needed addressing in order to improve the delivery of essential nursing care in relation to pressure ulcer prevention techniques.

- Review of the type of ward and patient group
- Review of current pressure ulcer prevention policies and practice
- The criteria the ward implements to establish the need for a dynamic mattress
- The appropriateness of dynamic mattresses in use
- The pressure ulcer prevention methods in use, i.e. repositioning schedules, limited chair nursing, use of electrical profiling beds, bed tilting — these methods of prevention are to be discussed later
- History of usage using Kinetic Concepts Inc's online tracking system

### Table 2. Contents of education programme

- Pressure ulcer aetiology and development process
- Overview pressure relieving and reducing equipment
- Reflection on current pressure ulcer prevention techniques, rationale behind them
- Acknowledgement of the both intrinsic and extrinsic factors which contribute to pressure ulcer development. How, when and why such factors manifest and the minimization of them
- Review into current recommendations, European Pressure Ulcer Advisory Panel and the National Institute for Clinical Excellence (2003)
- Recognizing patients who are considered vulnerable or at elevated risk of pressure ulcer development
- Initiation of pressure ulcer prevention techniques
- Practice reflection and review, continual process to programme is amended as necessary in order to meet any changing needs of the ward/environment

### Table 3. Prioritizing the delivery of education

- Wards which were considered susceptible to pressure ulcer development due to the vulnerability of patient group, for example orthopaedic and elderly care (Gebhardt and Bliss 1994). Nursing kardex, average Waterlow score of patients, tissue viability nurse knowledge and informal discussions with nursing staff were recorded to establish average risk of pressure ulcer development within given patient group
- The knowledge and rationale exhibited by the nursing staff when asked on issues relating to pressure ulcer prevention techniques. Information gathered through formal and informal discussions
- Frequency, type and appropriateness of pressure ulcer prevention techniques used, information gathered through informal observations
- Results of annual prevalence
- Previous and current trends of dynamic mattress usage over the previous year. Computer data was access and reflected upon through Kinetic Concepts Inc's interactive tracking system, providing ward by product and ward by cost analyses

rental contract. It is generally agreed within the team that the temporary absence of the equipment coordinator did result in a relaxing of control of equipment management, and directly correlated with the subsequent increase in usage of dynamics. On a positive note, this incident effectively illustrated and confirmed the valuable contribution equipment coordinators make to the tissue viability service.

An annual prevalence of pressure ulcers during this period of the study (2001–2004) was recorded and did not show any increase year on year. In fact, a slight decrease in annual prevalence was shown:

- 2001 = 9.8%
- 2002 = 9.8%
- 2003 = 9.6%
- 2004 = 9.5%

The authors acknowledge the numerous limitations and flaws when interpreting the efficacy of pressure ulcer prevalence when used in isolation; however, when used in conjunction with other information it may assist in providing a greater insight into the occurrence of pressure ulcers and the successes of pressure ulcer prevention techniques.

The results suggest a month on month reduction in the number of rental dynamic bed-days since the adoption of the static-led approach. One suggestion for this is that nurses benefited from education into the benefits of preventative nursing care, the value of informed clinical observation, understanding the relevance of documentation and appropriate equipment selection. In addition, the activities related to prevention techniques (specifically those aimed at reducing contributing factors such as pressure, shear and friction) increased and improved patient outcomes thus reducing the need to step some patients up to a dynamic mattress.

The success and foundation of the static-led approach should not be solely translated into financial implications. More important are the benefits it has on the clinical environment and implications which are considered predominant. The following case study aims to demonstrate some of the clinical benefits related to the implementation of a static-led approach.

#### Case reflection

The majority (90%) of foam mattresses within this Trust are now MSS Softform Premier, therefore on admission there is

a high probability that a patient will be nursed on one until assessment or observation dictates otherwise.

In one case, Mrs X had been allocated an MSS Softform Premier mattress on admittance to hospital as a matter of routine. Following pressure ulcer risk assessment it was deemed necessary to prescribe a dynamic system (no skin damage had been observed). However, the dynamic mattress appeared to impair independent transfers and mobility due to the unstable surface. Although in theory the maximum inflate mode on a dynamic mattress is designed for transferring, it did not contribute in this incidence because Mrs X relied on nurses to activate this mode — therefore impairing the purpose of independence. The patient felt less confident self transferring because of the movement of the supporting air cells and the height of the mattress exceeding the optimal height for transferring. The patient was reassessed with these findings in mind. It was decided by the tissue viability team, ward nurses and the patient that re-installment of the MSS Softform Premier mattress would benefit her greatly in relation to pressure ulcer prevention. It was agreed that, owing to the step down in equipment, the patient should be observed more frequently to ensure no subsequent damage was occurring. The patient was able to contribute to her own recovery, predominantly repositioning and transferring herself (including limited chair nursing). Documentation was made regarding the decision, rationale and outcome. The ward nurses and TVN felt that there was no detrimental effects in the patient's skin condition and an improvement in the her independence and mobility had been observed.

Other factors which may contribute to why nurses could prescribe an inappropriate support systems include:

- Prescribing a dynamic mattress based on Waterlow, Braden or Norton score in isolation, i.e. no assessment or nursing judgement deployed
- Prescribing a dynamic mattress for patients who are nursed in the chair for long periods. It is acknowledged within the NHS that some patients experience inappropriate length of time in a chair, when assessment shows the patient would benefit from limited chair nursing (Gebhardt and Bliss, 1994; NICE, 2003)
- If a dynamic system contributes to a patient's immobility or impairs independence (see case reflection)
- Continued use of a dynamic mattress due to a lack of reassessment and failure to step down
- When a dynamic system is used in place of nursing care, e.g. when the assumption is made that skin observations and pressure-relieving techniques are no longer necessary or can be performed less frequently
- When a dynamic system is used as the ward's own preventative protocol leading to blanket prescribing rather than prescription following individual assessment
- If a patient is to be nursed on it up until their discharge, and on discharge they will be sleeping on a standard mattress.

It is important to understand the aim of the static-led approach: to optimally use the attributes of the support surface, without direct patient detriment. Education on practical pressure ulcer prevention and observation techniques is paramount. It is important that all education material provided to a Trust by a company or supplier should emphasize and

mirror recommendations made by the experts (e.g. NICE and the European Pressure Ulcer Advisory Panel) within the arena of tissue viability. The use of pressure ulcer prevention accessories can also contribute to the prevention of pressure ulcers and reduction in the use dynamic mattresses for example heel boots, gel pads, leg troughs and preventative dressings.

### Static mattress audit report

To ensure the optimal clinical effectiveness of equipment, the Department of Health (1993) recommends that a mattress audit take place annually, and that any breaches in tissue viability or infection control recommendations identified by the audit are addressed and swiftly acted on.

This Trust completed an audit of the mattresses in use on 22 November 2004 (Figure 1). A total of 610 mattresses were inspected and audited. Of the 610, 419 were MSS (411 Softform Premiers). Of the 419 MSS mattresses, 54 covers required replacement; physical damage was the sole reason for cover failure. The audit also concluded that all 66 mattresses that failed the audit, were condemned and removed from use; none of these was MSS mattresses. This outcome effectively endorsed the team's decision to opt for a high specification static mattress which would deliver value over the long term.

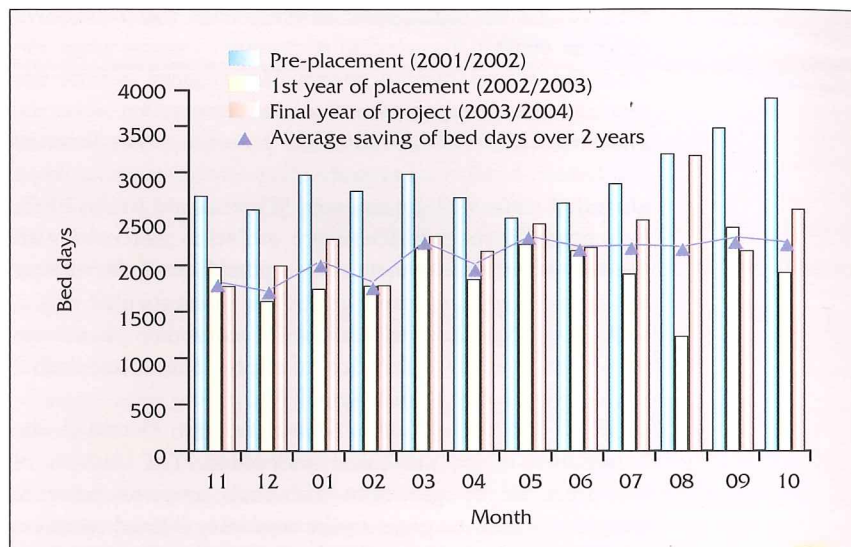
Figure 1 shows a reduction in the number of dynamic bed days associated with the static-led approach. Clearly indicated is the variation in use during the year, again a typical reflection of the challenges an acute Trust faces. An important factor highlighted by this graph is the need for continual monitoring and educational input for the static-led approach to be maintained. The primary difficulties associated with the static-led approach are ensuring a continual programme of education, ensuring all nurses are aware of the criteria and use of dynamic systems, and effectively compensating for high staff turnover. It should also be noted that during the first and final years since placement, there was an increase in the number of beds within the Trust. This increase in beds has not been accounted for within these figures as it was difficult to accurately determine the amount of extra dynamic mattresses needed (if any) to meet the needs of these additional patients.

The cost savings associated with the reduction in bed days has been seen as significant, concluding that the objections and aims associated with the static-led approach were successfully achieved.

### Conclusion

This study was conducted over a 2-year period; valuable insight into pressure ulcer prevention was gained by all parties. This aim of the project was to reduce the amount of inappropriately used dynamic mattresses within this typical busy district hospital and reduce the associated costs without jeopardising patient care and outcome. This was achieved through implementing a detailed programme of education aimed at highlighting appropriate use of equipment and improving the delivery of essential nursing care in relation to pressure ulcer prevention techniques. The integrated approach of the TVN, equipment coordinator, link nurses and ward staff, supplemented with clinical support from MSS to promote the essentials of nursing care, combined to

Figure 1. Monthly account of the number of bed days for which dynamic mattresses were rented.



deliver a successful outcome. The static-led approach has now been adopted as a core policy within the Trust. BJN

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### KEY POINTS

- The delivery of an effective, efficient and economic approach to pressure ulcer care is dependent on a number of contributing factors.
- Essential to which is the content, delivery and application of practical pressure ulcer techniques via a structured education programme.
- Pressure relieving products can only contribute to the prevention of pressure ulcers and should not be seen as a predominant factor in the prevention or management of pressure ulcers.
- It is important to recognize and utilize the benefits of a pressure relieving foam mattress before using dynamic mattresses.
- Static mattresses can contribute to increasing mobility and independence and therefore reduce the incidence of pressure ulcer development.