Recognising the feet as being at risk from pressure damage

Sue Bale, Patricia Price, Sally Rees-Mathews, Keith G Harding

Abstract

This article reports the findings of a survey and an audit undertaken to investigate the provision of foot support in a university teaching hospital. Phase I surveyed strategies employed to support feet and phase II audited the use of the Repose Foot Protector, manufactured by Frontier Therapeutics, specifically designed to provide pressure support for the feet. Patients with reduced mobility, nursed out of bed in a chair, have been highlighted as a group potentially at risk of tissue damage to the heels. This survey of current strategies employed to support feet included 289 patients. Patients included were from both hospital and community settings. The survey reported a lack of specialist equipment for the heels of patients with reduced mobility sitting in a chair. Only 67 (23.2%) patients were allocated foot support (typically a stool, with or without a pillow) to use while seated out of bed in a chair. The audit of requests for a new device to protect feet included 100 patients. The main reasons for requesting this device included pressure relief (81 occasions), to treat 'foot drop' (32 occasions) and in promoting comfort (31 occasions). There was a significant improvement in the skin condition of the heels and comfort (P< 0.0001) from study entry to exit. This audit indicated a high level of both staff and patient satisfaction.

The treatment of patients with pressure ulcers presents an important wound healing challenge to healthcare providers working in many healthcare settings (Bergstrom et al, 1994). There is little dispute that the costs associated with the prevention and treatment of pressure ulcers is an extensive drain on the limited NHS budget (Dealey, 1997). In addition, pressure ulcers are associated with high morbidity and mortality especially in frail elderly people, with 50% who develop severe pressure damage dying within 4 months (Bliss, 1990).

Prevention, rather than treatment of pressure ulcers, has been recommended as the best way forward, with prevention strategies including early assessment of risk factors and allocation of appropriate support surfaces (Bergstrom et al, 1994). Throughout this article the term 'support surface' is used, as opposed to pressure relief. The use of the term support surface has been used because it describes more accurately the function of surfaces designed to prevent tissue damage. The need for support surfaces to protect the sacrum and trochanters (areas vulnerable to pressure damage) is well accepted whether the patient is nursed in bed or in a chair (Dealey, 1991a; Gebhardt and Bliss, 1994).

However, although most ulcers develop in the sacral and buttock region (66.4%) (Dealey, 1991a) surveys have tended to highlight the heels as being another common location for ulceration, at 20% incidence (David et al, 1983; Dealey, 1991b). Despite nurses being aware of the importance of relieving pressure at the sacrum, the requirement for protection of the heels has not yet been adequately addressed once patients are out of bed. In our experience, pillows have been commonly used (with or without a footstool) to support the feet when patients are sitting in a chair, although this practice lacks an evidence base. Cheney (1993) argues against the use of pillows and highlights that confused or restless patients may not be able to keep the pillows in place. The study described in this article was concerned with investigating the use and availability of specialist equipment for the support of heels. A two-phase approach was used: first to identify the current extent and nature of devices used to support feet (in Phase I), and second, to evaluate the use of the Repose Foot Protector, manufactured by Frontier Therapeutics (in Phase II) which has been designed to provide protection for feet (Figure 1).

PHASE I: SURVEY OF THE MANAGEMENT OF FOOT SUPPORT

Objectives

The objective of phase I was to record the use of existing means of providing foot support to patients when nursed out of bed.

Sue Bale is Director of Nursing Research, Patricia Price is Director, Sally Rees-Mathews is Research Occupational Therapist and Keith G Harding is Professor of Rehabilitation, Wound Healing Research Unit, University of Wales College of Medicine

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Method

Patients treated in the integrated medical, surgical and traumatic wards in a university teaching hospital and a nursing home took part in this survey.These different settings were selected as representing areas where patients with a wide variety of healthcare problems might be found and where a high percentage of patients would be at risk of developing pressure damage.

Patients were considered for inclusion in the survey if they were nursed in one of the study areas and were identified as being nursed out of bed for some part of the day and were neither totally ambulant nor confined to bed. The length of time patients were nursed out of bed varied between specialties, with high dependency patients spending around 2-6 hours daily out of bed, and the wards and nursing home patients around 6-8 hours.

Data collected included patients sex, date of birth, clinical area and primary disease diagnosis. To minimise interrater variability one researcher collected data. Data were collected over 1 week. In addition, information about the current pressure-relieving regime, including the mattress type, cushion type and specifically the type of foot support employed, was also collected.

Results

Patient population: A total of 289 patients were surveyed: 148 males and 141 females. On entry into the study, the mean age was 73 years for males, and 72 years for females, with an overall range of 21 - 100 years. This range of ages reflects the population of patients managed both in acute hospital wards and in a nursing home. *Systems used to support the feet:* While seated out of bed, 67 patients (23.2%) were provided support (typically a footstool) for the feet. Forty-eight of the total patients (16.6%) had their feet elevated on a stool alone. An additional three patients (1%) had their feet resting on the bed. Four patients (1.4%) used a pillow in conjunction with a footstool, while a further eight patients (2.8%) used a foot-stool laid on its side with a pillowcase placed over the stool legs to form a 'hammock'. One patient used a seat cushion on the floor as a soft surface to support the feet. Most patients (76.8%) were not provided with any foot support at all.

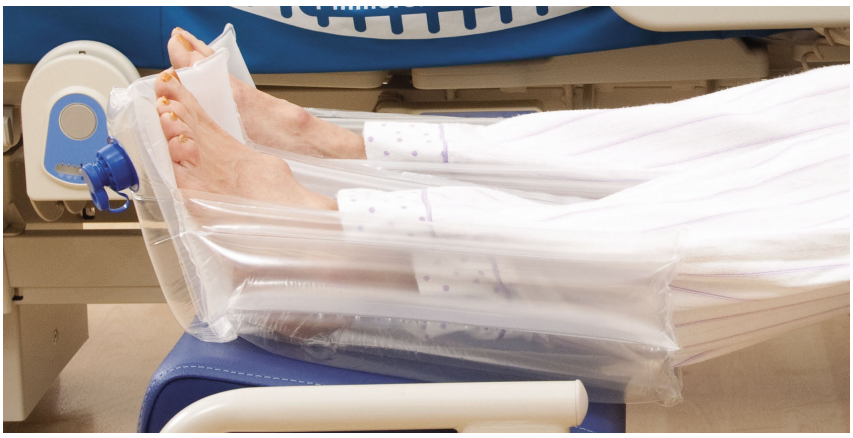
Pressure-redistributing systems used: A pressure-redistributing mattress in bed was provided to 128 (44.3%) patients. Fifty-six patients (19.4%) were allocated an alternating pressure mattress while 72 (24.9%) were nursed on a static mattress. Gebhardt and Bliss (1994) suggest that patients remain vulnerable to pressure even when well enough to sit out of bed but still require a pressure-redistributing mattress. Of the 128 (44.3%) patients who were allocated a pressure-redistributing mattress only 28 patients (9.7%) were also given a pressure-redistributing cushion.

Outcome of Phase I

Phase I focused on the allocation of pressure support for the feet in compromised patients, often elderly, across several specialties both in hospitals and in the community. In this survey, only 67 (23.2%) patients were allocated foot support (typically a footstool) to use while seated. There were no devices designed for foot protection available and a variety of homemade remedies were used, the effectiveness of such remedies being questionable.

The results of this survey highlight the importance of, and the need to, develop and evaluate devices specifically designed to reduce tissue damage to the feet of patients seated out of bed. The results of this survey encouraged us to develop and evaluate the Repose Foot Protector specifically designed to protect feet from pressure damage.

Figure 1. The Repose Foot Protector in use.



PHASE II: AUDIT OF A NEW THERAPY TO PROTECT THE FEET

Phase II relates to the evaluation of a new device: the Repose Foot Protector. Small-scale evaluations have supported the view that the Repose Foot Protector can be of value in the treatment of pressure ulcers (Rees-Mathews et al, 1999). The Repose Foot Protector is made of two layers of polyurethane film, air-inflated with a pump that also acts as the packaging for the product. As the design of the product redistributes weight from the heel to the

remainder of the lower leg, it is for use with feet in an elevated position, either in bed or seated with a footstool.

Following the introduction of the Repose Foot Protector, phase II was designed as an audit to investigate the reasons for asking for a protector for a particular patient, identify location of use, and evaluate its use by the health carer and its effect on the condition of the heel.

Method

An audit of 100 consecutive requests for a foot protector in a university teaching hospital was followed-up by the research occupational therapist involved in the development of the device, using a structured questionnaire. Data collection came after and followed on from the phase I evaluation. Information was collected the day the device was supplied (not necessarily the day of admission), and again on day three and day 10 after its request. Information was collected on patient characteristics, clinical diagnosis, length of time between admission and request, Waterlow score (Waterlow, 1985), reason for request, ward type, patient comfort and condition of the heel(s) using the European Pressure Ulcer Advisory Panel (EPUAP) classification (EPUAP, 1999).

Where appropriate, patients were asked to assess their own comfort level (using a five point scale ranging from very comfortable to very uncomfortable) when using this device, while clinicians commented on the value of the protector and the clinical outcome (in terms of the condition of the skin). If pressure damage resulting in tissue breakdown was present on the heel then dressings were used as clinically indicated.

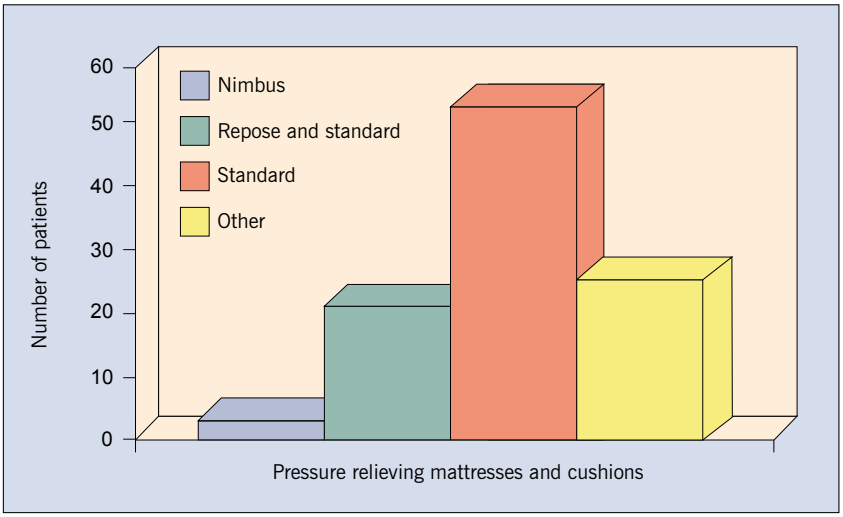


Figure 2. Pressure-relieving mattresses and cushions used in phase 2.

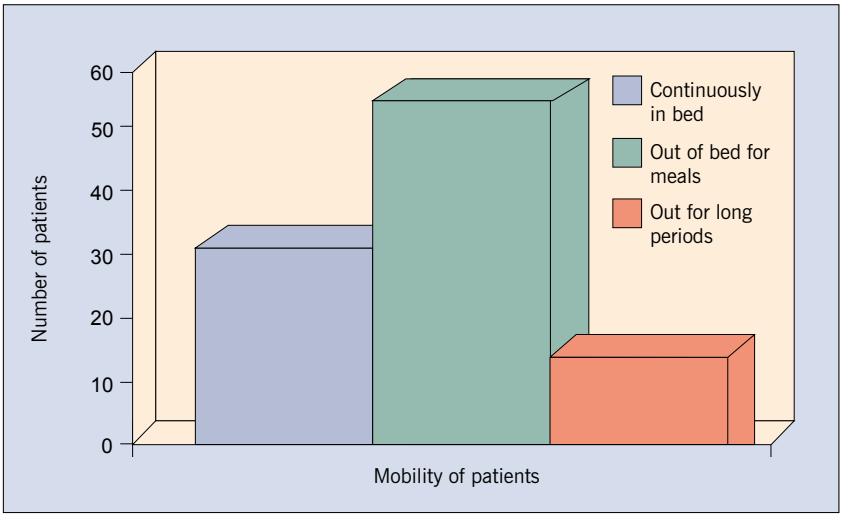


Figure 3. Mobility of patients needing additional foot protection.

Results

Patients who were involved in the audit ranged from18-100 years, with a mean age of 70.5 years. The mean Waterlow score was 16.1 (SD = 3.3) with an average length of stay before the request for the protector of 8.8 days (SD = 9.8). The length of time before the request for the protector was variable, with the longest time from admission to request being 90 days. The variation in the length of time staff took to request a foot protector could be because of either the introduction of a new therapy into a health setting or to a growing awareness within the hospital of the presence of the device.

Thirty-three percent of the requests for a foot protector came from the orthopaedic ward, 22% from surgical wards, and with the medical wards and the intensive care unit requesting 31%. Eleven percent of the requests came from a range of other locations including neurosurgery, neurology, haematology, dermatology, bone marrow unit, cardiac surgery, X-ray and oncology. In addition a record was made of other types of pressure support that patients were using at the time of the audit (Figure 2), which showed that 52% of patients were being cared for on a standard hospital mattress.

The lack of mobility of the patients, as shown in Figure 3, was also of interest as this reflected the time they were likely to need specific heel protection; these data showed that 86% of patients were either continuously in bed or only out of bed for short periods such as meals. The main reasons for requesting a protector (nurses were able to select more than one reason and so make multiple responses) was to provide pressure relief (81 occasions), although its use in the treatment of 'foot drop' (plantar flexion) (32 occasions) and its value as promoting patient comfort (31 occasions), was also important.

Each heel for which a protector was requested was assessed separately, and the

condition of the skin at day 0 (the day the request was received) and at day 10 (the end of the assessment period) was graded by the nurse in charge of the patient. The grading system used to assess the skin was by the use of an ordinal scale; therefore, the data were analysed using non-parametric tests (Wilcoxon). The ratings of skin condition for both the left and right heels were statistically significant at P< 0.0001 (Table 1) from study entry to exit. Reverse staging was used and in both cases there was a significant improvement in the condition of the skin, with a shift towards a lower grading using the EPUAP system within the relatively short study period of 10 days.

Patient comfort was assessed using a five-point Likert-type scale (Oppenheim, 1992), where a low score indicated a positive rating and patient comfort. Such scales result in ordinal data, and a non-parametric test (Wilcoxon signed rank; Pett, 1997) was used to test for the difference in comfort ratings over time. There was a significant change in ratings (P< 0.0001) day 0 - day 10, such that patients reported a higher level of comfort in the heel area after the use of the foot protector (Table 2).

An important aspect of an audit of this type is the views of the intervention by the staff involved in its use. The results of the staff evaluations are presented in Figure 4, which include an indication of 'ease of use' as well as likelihood of requesting protectors in the future. These data suggest that most staff were pleased with the item, with only two nurses having experienced any problems. Investigation of the reasons for the problems associated with the use of the protector and the reticence to use this device again showed that the protector had been used inappropriately in both instances as the protector had been strapped to the foot (not recommended) and the tape used had become dirty.

Outcome of phase II

This audit indicates support for the use of the foot protector, with a high level of both staff and patient satisfaction. This audit used a questionnaire to evaluate the use of the protector in a 'real world' situation. In choosing this method, a range of potentially important variables was not considered, as this was not a controlled study. In addition, the period of follow-up was limited to 10 days by the study protocol. While this time difference has shown a level of statistical significance that is impressive, the improvement in skin condition may or may not have continued over time, but this was not assessed. A longer period of follow-up may prove useful in future studies, particularly given the range of time patients had been in hospital before the request for a protector.

The patient characteristics included in this audit are interesting and indicate a potential use of the foot protector across the acute care setting. However, there was no indication in the data recorded of the length of time pressure damage had been present before the additional pressure support was requested. It is likely that those that were assessed as having a grade 3 or 4 pressure ulcer at day 0 may well have had some tissue damage for a considerable amount of

Table 1. Skin condition of heels

Left heel (n =88)	Healthy	Grade 1	Grade 2	Grade 3	Grade 4
Day 0	11	65	12	0	0
Day 10	43	41	4	0	0
Right heel (n = 91)	**Healthy**	**Grade 1**	**Grade 2**	**Grade 3**	**Grade 4**
Day 0	9	66	14		
Day 10	45	32	13		

Wilcoxon signed rank z=-6.17, *P*<0.0001

Table 2. Patient comfort using a five-point scale

	Mean	SD	Median	Min	Max
Day 3	2.0	0.5	2	1	3
Day 10	1.8	0.5	2	1	3

Wilcoxon signed rank z=-3.71, *P*<0.0001

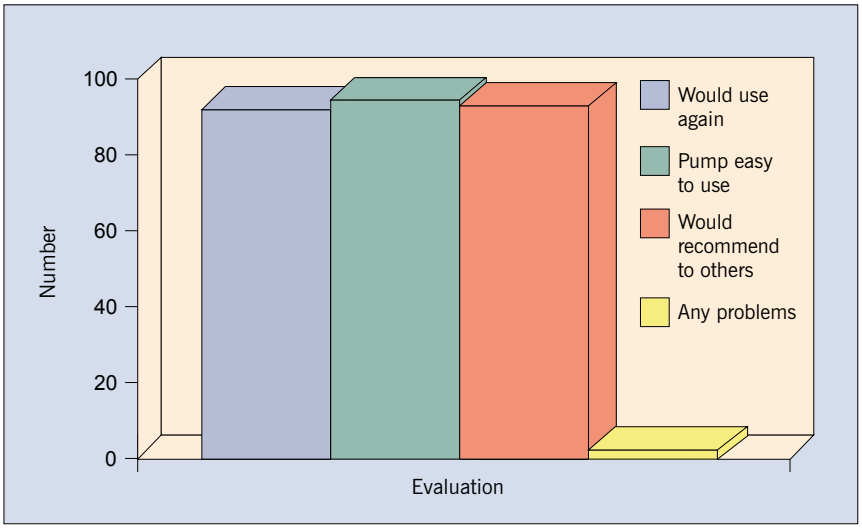


Figure 4. Nurse evaluation of the performance of the foot protector (day 10).

time, although it must be acknowledged that tissue deterioration can occur over relatively short time periods. However, accuracy in the assessment of risk is an important consideration and education relating to this aspect of care must be provided alongside the provision of additional forms of foot support.

It is clear from this audit that the use of the foot protector provides an additional tool that staff can utilise in a wide range of care settings. While pressure support was the most frequently cited reason for asking for a protector, the other reasons given, such as foot drop, show that a range of clinical problems can be addressed. The improvement in skin condition over a relatively short period indicates the strong potential benefits of providing additional pressure support in this way.

CONCLUSION

Phase I demonstrated that foot support for vulnerable patients had not been adequately addressed in a university teaching hospital and a nursing home, and highlighted the need for a specialist device. A range of homemade devices were used in phase I, mainly using a footstool, the effectiveness of which has not been formally tested. One might question whether the use of foot stools to provide foot support could be considered to be an acceptable level of practice.

Phase II audited the use of a new device, designed to provide support for the feet, that resulted in successful patient outcomes. We would recommend that while further research is needed, early indications are that the Repose Foot Protector has the potential to provide additional pressure support to the feet of vulnerable patients and can lead to the improvement of the condition of damaged skin over a period of time. This device was also used to treat foot drop and relieve discomfort in patients experiencing pain.

The importance of providing pressure support to the sacral area of bedbound patients has largely been addressed and there is an increasing awareness of risks associated with the sacral area of seated patients. A range of mattresses and cushions has been recommended for these patients. However, providing pressure support for the heel area would appear to be an under-researched area of patient care and with around 20% of pressure ulcers occurring here, this is an aspect of patient care that urgently requires attention. BJN

KEY POINTS

- *Research has to date focused on pressure support of the sacral area when patients are nursed in and out of bed.*
- *Phase I of the study identified a lack of equipment for supporting the feet of patients nursed on bed.*
- *Phase II audited the use of a new device, specifically designed to provide foot support. Successful patient outcomes were reported.*
- *Phase II described this device being used to provide support, comfort and prevent foot drop.*
- *With around 20% of pressure ulcers occurring on the feet and a lack of equipment for patients when nursed out of bed, this area of care requires further research.*

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