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Louise McKeeney describes how a system for the provision of alternating air-pressure mattresses was introduced in the community by Coventry Primary Care Trust as part of a strategy for the prevention and management of pressure ulcers. The mattress management system and quality assurance mechanisms that are used to ensure a high-quality service are also described

KEY WORDS

*Alternating air-pressure mattresses
Pressure ulcer prevention*

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Provision of alternating air-pressure mattresses in the community

The presence of pressure ulcers is seen as a key indicator of quality (Department of Health, 1993) and they are both costly to the patient (Franks, 2001) and the NHS. It is important that resources are directed towards prevention rather than treatment, which makes the provision of pressure-relieving equipment an integral part of any strategy for the prevention and management of pressure ulcers.

Over the past 10 years there has been a dramatic increase in equipment available to provide pressure relief, including the alternating air-pressure mattress (AAPM) (Cooper et al, 1998). The use of equipment to prevent pressure ulcers has increased, although there is little comparative evidence available about the effectiveness of AAPMs.

It is accepted that purchasing decisions for these often very expensive pieces of equipment should be based on evidence from clinical trials (Willis, 1995).

However, selecting the most effective AAPM is difficult because the evidence is limited (Dealey, 2000; Clark, 1998), and evaluating pressure-relieving equipment is recognised to be difficult (Taylor, 1999; Dealey, 1995).

The lack of research into the benefits of individual types of pressure-relieving equipment creates problems for practitioners who are responsible for making an informed choice.

Current reviews of available evidence (Cullum, 2003) focused on randomised controlled trials that may provide information on a product's efficacy but gives the practitioner little or no information on its effectiveness in clinical practice (Clark et al, 2002).

Purchasing considerations There are many variables that have to be considered when purchasing pressure-relieving equipment and numerous factors that affect the choice of AAPM. While maintaining comfort and ensuring a good night's sleep for the patient is paramount (Pring and Millman, 1998), effectiveness, acceptability, and cost need to be considered.

The variables become more apparent in the community; equipment has to be easy to use, reliable and user-friendly, as it is patients and carers who are responsible for the use of the AAPM.

In the community it is important to ensure that equipment is used correctly and allocated equitably on the basis of the patient's clinical need.

Systems need to be in place to ensure that patients have access to pressure-relieving equipment as soon as their need is identified.

This requires a flexible service with a range of

BOX 1. MATTRESSES USED IN THE SERVICE

● MEDIUM-RISK OVERLAY

The Viaclin is a portable alternating pressure mattress overlay. It is an 18-cell single-layer overlay that is placed over the existing static mattress. It has a two-cell alternating cycle of 12 minutes and adjusts automatically to the patient's weight.

● HIGH-RISK MATTRESS REPLACEMENT

The BiWave Carer is a dynamic mattress replacement system. It has a two-cell cycle alternating over 12 minutes and adjusts automatically to the patient's weight.

● VERY HIGH-RISK MATTRESS REPLACEMENT

The Cairwave is a dynamic mattress replacement system. It has a three-cell cycle alternating over 7.5 minutes and adjusts automatically to the patient's weight.

equipment readily available to meet patients' needs.

This can only be achieved by having a service that is managed effectively and monitored to maintain maximum efficiency.

Background to the mattress management system

Before the implementation of a mattress management system in the then Coventry Primary Healthcare Trust (now Coventry Primary Care Trust), there was an ad-hoc system for allocating pressure-relieving equipment and an audit identified that patients were frequently allocated an AAPM for long periods without review.

This also resulted in the inappropriate allocation and continued use of equipment even when the patient's clinical need had improved or resolved.

Sometimes equipment was not returned even when patients had died or moved out of the area. This lack of monitoring of patients and equipment resulted in spiralling rental costs.

After a period of product evaluation and a review of the literature, a range of AAPMs was selected for use and the mattress management system was implemented. This included criteria for selection to ensure equitable allocation, tracking, and monitoring.

The mattress management system was organised by the tissue viability service, and installation, collection, decontamination, and storage was contracted to an equipment delivery company.

These services were contracted as it was not possible to store, transport, and clean all of the AAPMs locally. The equipment purchased was from the 1999 Pegasus range (Box 1).

Selection, allocation, and monitoring

Criteria for the provision of AAPMs were developed to aid selection and allocation of equipment. This was based on evidence (Shipperley, 1998), the local acute hospital's strategy for prevention and management of pressure ulcers, and information provided by the equipment's manufacturers.

The criteria were developed to ensure that the AAPMs were used effectively and allocated fairly to patients according to their clinical needs.

AAPMs are requested by fax from community nurses within Coventry PCT, an AAPM is then allocated, and the equipment delivery company contacts the patient to arrange installation. The AAPM is installed, usually on the same day or the next morning, and after use it is collected, decontaminated, and stored by the equipment delivery company. The community nurses report any returns, repairs, and patient reassessments.

All collections, installations, and repairs are recorded on a database that allows all AAPMs to be monitored. The database also provides reports on the prevalence of pressure ulcers and indicates which patients are due to be reassessed. The computerised database ensures that the tissue viability service knows the location of each AAPM and whether it is being used efficiently.

Dealey (2000) recommends that nurses, patients and carers have a basic understanding of how to use any pressure-relieving equipment. The tissue viability service and the manufacturers of the AAPMs have provided training to community nurses over a period of three years. All patients and carers are given a demonstration of how to use the equipment on installation, and an instruction leaflet on safe and correct use of the AAPM.

Audit Following the implementation of the system for provision of AAPMs, the tissue viability service wanted to audit the quality of the equipment used and the service provided by the equipment delivery company. The team identified the following objectives:

- To identify a profile of how, when, why, and for how long AAPMs were used;
- To assess patients' and carers' satisfaction with the quality of the equipment provided, including ease of use, comfort, and noise level;
- To identify the impact of the provision of AAPMs on district nursing visits;
- To identify the number of pressure ulcers healed or improved using AAPMs.

Methodology The audit was based on the results of a questionnaire, which was developed following a review of the literature. It included questions relating to the patient's experience of using the AAPM, improvements

TABLE 1. RISK ASSESSMENT

AAPM	Low risk	Medium	High risk	Very high risk	Not recorded
Medium-risk overlay	8	35	49	48	8
High-risk mattress replacement	8	26	34	48	0
Very high-risk mattress replacement	0	3	5	19	1

TABLE 2. GRADE OF PRESSURE ULCER AT ASSESSMENT

Grade using the Stirling pressure ulcers scale (Reid and Morison, 1994)	AAPM		
	Medium-risk overlay	High-risk mattress replacement	Very high-risk mattress replacement
0	24 (10%)	24 (12%)	2 (3%)
1	58 (24%)	39 (20%)	8 (12%)
2	111 (46%)	65 (32%)	20 (29%)
3	44 (18%)	42 (21%)	12 (18%)
4	5 (21%)	29 (15%)	26 (38%)
	242*	199*	68*

*A number of patients had more than one pressure ulcer

TABLE 3. CONDITION OF PRESSURE ULCERS AFTER USE OF AAPM

	AAPM		
	Medium-risk overlay	High-risk mattress replacement	Very high-risk mattress replacement
Healed	56 (38%)	21 (18%)	
Improving	49 (33%)	62 (53%)	20 (72%)
Remains the same	17 (11%)	7 (6%)	6 (21%)
No pressure ulcer	22 (15%)	24 (21%)	2 (7%)
Deteriorated	4 (3%)	2 (2%)	0 (0%)

in her or his pressure ulcer, and the quality of the service provided by the equipment delivery company.

A member of the tissue viability service team completed the questionnaire with the patient or carer. Patients using an AAPM as part of palliative care who were considered too ill or unable to communicate were not asked the questions.

All patients allocated an AAPM were assessed for

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their risk of developing a pressure ulcer using the Walsgrave risk assessment tool, which is an adapted version of the Waterlow (1987) tool. The severity of existing pressure ulcers was graded according to the Stirling pressure ulcers scale (Reid and Morison, 1994).

The results of the questionnaire were analysed. In total, 292 questionnaires were completed between January 1999 and August 2001.

Results

Profile of the use of equipment Most (82 per cent, n=241) of the pressure-relieving AAPMs were used for under three months while just one per cent (n=3) had been in use for over one year. Of the patients who were allocated an AAPM, 81 per cent (n=237) were nursed in bed for more than 12 hours a day. Patients' assessed risk and grade of ulcer were also recorded (Tables 1 and 2).

Patient and carer satisfaction Most patients (90–96 per cent) reported comfort on all three types of AAPM with just six per cent of patients reporting that they did not have a good night's sleep, although this was not necessarily attributed to the AAPM. All except 19 (seven per cent) of the carers had full instructions on the use of AAPMs and what to do in the event of power failure.

The power unit and pump were reported to be quiet and all carers found the AAPMs easy to use. Only seven per cent (n=21) requested an engineer during this period.

Impact of provision of AAPMs on district nurse visits

A conservative estimate of the reduction in nursing visits showed that almost half (46 per cent) of patients required fewer visits for the provision of pressure relief as a result of having an AAPM.

After using the AAPM, most (71 per cent) of the patients' pressure ulcers either healed or improved (Table 3). It should be noted that all patients whose condition deteriorated while using the AAPM had other identified factors that contributed to pressure-ulcer development. For example, two patients sat out of bed for long periods of time, two had a general deterioration of their condition, and two were at the end stages of palliative care.

Discussion The results demonstrate that AAPMs are frequently used in the community for a period of 12 weeks or less, with a small proportion used for over 13 weeks and some for more than one year.

The AAPM overlay, Vialin, and AAPM replacement mattress, BiWave Carer, are used for patients with higher-risk scores than our criteria recommended. The audit results would suggest that the AAPM overlay could be used for patients considered at very high risk,

although research would be required to establish the reliability of the risk score and the type of AAPM.

One of the arguments for purchasing AAPMs is that they could reduce district nursing visits. Of 292 patients, 125 had their visits by their district nurse reduced after the installation of an AAPM.

It is difficult to identify whether this is purely due to the provision of the AAPM or a result of the patient's general improvement. However, it does suggest that AAPMs can contribute to a reduction in district nursing visits.

The requirement that the AAPM is easy to use for patients and carers is vital. It is encouraging to report that they all found the equipment easy to use. When the AAPMs were purchased this was considered an important issue, as patients in the community may not always see their nurse every day. Patients need access to information about how to use the AAPM and what to do in the event of problems.

Between them, the patients had 509 pressure ulcers of which 69 per cent (n=351) were grade 0–2, 19 per cent (n=98) were grade 3, and 11 per cent (n=60) were grade 4. This suggests that future purchases of AAPMs should concentrate on increasing the stock of medium-risk alternating overlays. This reflects the frequent requests from community nurses for these overlays.

Gebhardt and Bland (1998) identified that using pressure-relieving equipment that is not mechanically sound or is incorrectly set up may put the patient at greater risk of pressure ulcers than if no equipment is used. A high rate of equipment breakdown would cause distress and inconvenience to patients. Our incidence of AAPM breakdown was seven per cent and this provides a benchmark for future audits.

Conclusion Our results show that AAPMs were perceived by patients as comfortable, quiet, easy to use, and did not disturb sleep. Patients and carers were given written instructions about what to do if the AAPM deflated or if there was a power failure.

The mattress management system for the allocation and delivery of AAPMs is managed efficiently with fair access for patients. It has resulted in reduced rental costs but future changes in the patient population and the dependency of patients nursed at home may require an increase in equipment.

The quality and service provided to patients receiving AAPMs is of great importance particularly when making decisions about their purchase and use. This investigation has provided a profile of equipment use within the trust to further inform purchasing decisions and development of the quality of service provided. ■