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Tissue Viability

Use of dermal gel pads in preventing and managing pressure ulcers in ICU: an audit

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Use of dermal gel pads in preventing and managing pressure ulcers in ICU: an audit

ABSTRACT

Most of the pressure ulcers (PUs) that developed in the intensive care unit (ICU) of an acute trust were medical-device related. While use of a dermal pad was recommended as part of its pressure ulcer prevention strategy, staff were concerned that it tended to tear or split while in use. An alternative gel pad (Dermisplus® Prevent, Frontier Medical), that was cost-effective and appeared to be more robust, was identified. A 4-week non-comparative audit involving 37 patients was therefore undertaken to investigate the effect of this alternative gel pad on PU incidence in the ICU. With the exception of the change in the gel pad used, there was no difference to the overall PU prevention strategy. No new PUs developed during the audit period with the new gel pad, although there was also no reduction in incidence compared with the previous 3 months. None of the four patients (11%) with blanching erythema developed category 1 PUs. There were also no reports of tearing or splitting with the new gel pad. The ICU staff commented that they found the new gel pad simpler to use, easier to clean and more robust than the previous product used. Following the audit, the ICU incorporated the new gel pad into its PU prevention strategy.

Key words: Medical-device related pressure ulcers ■ Prophylaxis ■ Intensive care unit ■ Robustness ■ Ease of use ■ Cost-effectiveness

Patients in the intensive care unit (ICU) are considered to be at high risk of pressure ulceration for a variety of reasons, ranging from motor and sensory loss due to the use of analgesics, sedatives and/or muscle relaxants, to issues related to underlying disease processes. A systematic review found that age, perfusion, mobility/activity and vasopressor infusion were significant risk factors for pressure ulceration in critically ill patients (Alderden et al, 2017). Others have found that diabetes, length of hospital stay and low serum albumin are also important (Frankel et al, 2007; Sayar et al, 2009; Efteli and Gunes, 2013; de Almeida Medeiros et al, 2018).

In 2017–18, the pressure ulcer (PU) prevalence in England was reported to be between 4.1% and 4.6% (Clinical Audits and Registries Management Service (CARMS), 2017). However, as these audits exclude category I, deep tissue injury (DTI) and device-related PUs, the full prevalence is likely to be substantially higher. There is little accurate prevalence data for PUs in ICU, but the incidence rate has been reported to be between 3% and 20% (Richardson et al, 2017). This range is likely to relate to the local reporting systems used and methodological differences in the studies that calculated the rates. However, it could be argued that, despite the shift in culture that PUs are not an inevitable event for ICU patients, the higher rates observed in this setting are to be expected, given that this patient population is at increased risk.

Guest et al (2017) found the cost of PUs to the NHS is £531.14 million. However, this is an underestimate as the study did not include hospital prescriptions associated with the treatment of these ulcers, or PUs in residential and nursing homes. Furthermore, the impact on patients' wellbeing, quality of life and society also need to be considered.

Current PU prevention strategies for ICU patients include regular repositioning, use of pillows to offload heels, employment of pressure-redistributing equipment such as mattresses, cushions and offloading boots, and nutritional support (National Pressure Ulcer Advisory Panel (NPUAP), European Pressure Ulcer Advisory Panel (EPUAP) and Pan Pacific Pressure Injury Alliance (PPPIA), 2014). A randomised controlled trial found that silicone foam dressings were effective in preventing heel and sacral PUs in the ICU setting (Santamaria et al, 2015). In this single-site RCT, a five-layer silicone foam dressing was applied in the emergency department before admission to ICU. However, a consensus panel of experts subsequently concluded there was inadequate evidence to recommend the use of five-layer silicone bordered dressings in PU prevention (Black et al, 2015).

At the University Hospitals Birmingham NHS Trust, due to the nature of the interventions required in critical care, the ICU is the biggest inpatient user of medical devices. Various methods are used to secure and support medical devices, such as support arms for ventilator tubing, oral endotracheal tubes fasteners that avoid the need for tape, and a catheter/drainage tube holder, but this often differs from unit to unit and there is little robust evidence to support their use. Dermal gel pads (DGPs) (Aderma, Smith & Nephew) are used to provide some pressure redistribution under and around such devices and under vulnerable bony prominences.

The trust has the largest ICU in Europe. While its PU incidence is low, more than 85% of these ulcers are device related. No avoidable category III or IV PUs developed in the ICU in 2017–18, making device-related DTI the biggest PU-related burden across the ICU floor. Guidelines incorporating NPUAP/EPUAP/PPPIA (2014) guidance are in place, with additional local guidance on the use of devices for preventing PUs and redistributing pressure. All registered and unregistered nurses are expected to complete PU competencies every 3 years, and all ICU staff receive yearly update training on

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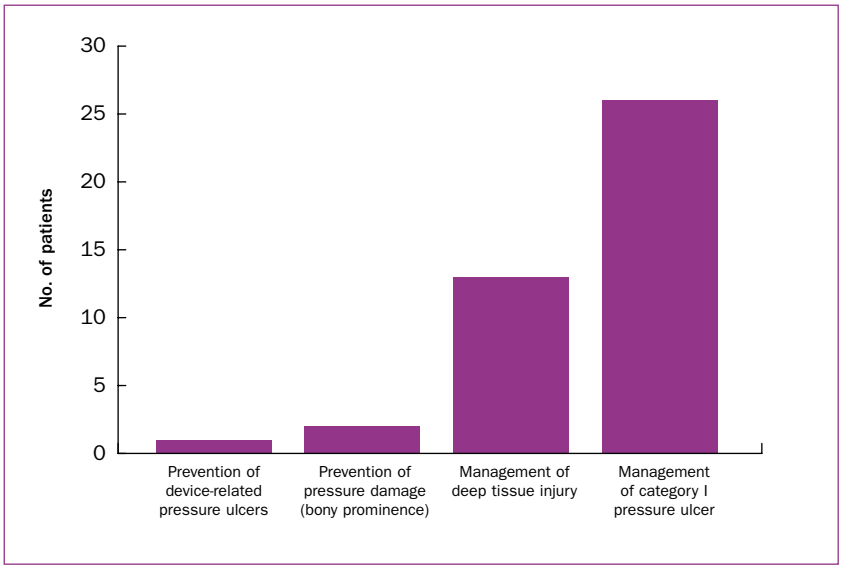

Figure 1. The nurses' objectives for using the pressure-redistribution pad

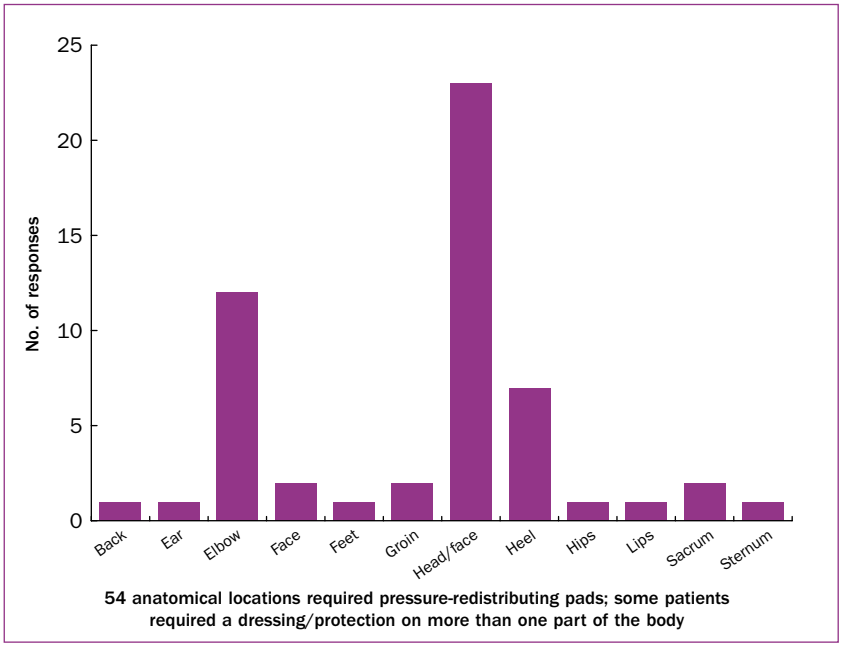

Figure 2. Anatomical locations requiring pressure-redistributing pads

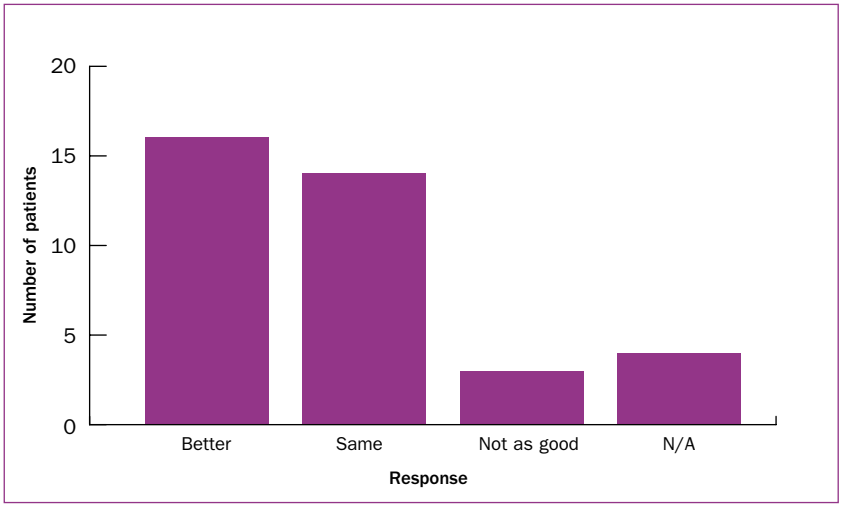

Figure 3. Feedback on how the pressure-redistribution pad compared with the dermal gel pad

prevention. The SKIN bundle is incorporated into the ICU electronic observations chart. Full skin inspections, including that under medical devices, are undertaken and documented at least twice daily. The chart requests details on specific areas of the body and the medical devices used. Repositioning is planned and documented electronically; this includes sections on changes in position of both patients and devices.

DGPs are used in the ICU to help prevent friction and shear, and redistribute pressure. Square DGPs are mainly used under bony prominences, while it is usually more manageable to place small pieces, cut from a roll, under medical devices. DGPs, which are single patient use only, are washed with soap and water in accordance with guidance from infection control. In the ICU, they are used predominantly on the back of the head, when pillows are in use, on the heels when elevation is difficult or painful, and under devices for pressure redistribution. In the authors' experience, DGPs had a tendency to split and crack within 5–7 days, and so needed replacing. In an attempt to address this issue, the provider delivered education on the use and cleaning of the pads. However, while attending a conference, the author saw a different dermal pad (Dermisplus Prevent, Frontier), hereafter referred to as the pressure-redistribution pad (PRP), which is designed to redistribute peak pressures—for example, from a medical device or bony prominence—over the wider surface area of the pad. The pad felt robust, was cheaper than the DGP currently being used in the ICU, and internal test data from Frontier Medical suggested that its peak pressures are, on average, 10% lower than it (Taylor and Webber, 2016). It was therefore decided to undertake an audit to evaluate if the PRP range of gel pads could reduce pressure ulceration in the ICU, with less waste due to splitting and cracking.

Methods

This was a prospective non-randomised audit undertaken in four ICUs within the trust. The primary objective was to evaluate the clinical effectiveness of the PRP, as determined by its ability to reduce the risk of pressure damage over a 4-week evaluation.

All patients in the ICUs who met the following clinical indications for the PRP were included in the evaluation:

- Intact skin, where there is a risk of pressure damage, including from medical devices
- Areas of the body with existing category I pressure damage
- Recently resolved category I PU, to protect against recurrence

There were no exclusion criteria in terms of patient demographics, although as the product literature advises that the PRP should not be used where there are high levels of moisture, such as on the sacrum in incontinent patients or under leaking drains, any individuals with these characteristics were excluded.

Patient recruitment took place between 12 February 2018 and 12 March 2018.

Treatment protocol

There was no change to the standard of care provided to the patients in these ICUs, except for the switch from the DGP to the PRP. The same shapes and sizes were used as for the

Table 1. Results for key performance attributes of the pressure-redistributing pad

	Pressure redistribution	Ease of cutting	Ability to remain in place	Ease of cleaning	Product integrity	Patient comfort
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Excellent	19 (51)	13 (35)	18 (49)	19 (51)	20 (54)	15 (41)
Good	12 (32)	14 (38)	10 (27)	10 (27)	11 (30)	12 (32)
Satisfactory	3 (8)	1 (3)	8 (22)	5 (14)	4 (11)	5 (14)
Poor	1 (3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
N/A	2 (5)	9 (24)	1 (3)	3 (8)	2 (5)	5 (14)
	37 (100)	37 (100)	37 (100)	37 (100)	37 (100)	37 (100)

DGP. No other changes were made regarding PU prevention or education strategies throughout the audit. The PRPs were secured in place with a retention product such as adhesive silicone tape, tubular bandage or underwear.

The nurses received training from Frontier Medical on the correct use of the PRPs and were told to adhere to the manufacturer's instructions for use. They were advised to use the PRPs for as long as clinically needed.

Assessment protocol

The participating nurses were given a standard data collection form to complete during the 4-week evaluation. This was designed to elicit data on:

- The patient's relevant medical history and Waterlow score
- The nurse's main clinical objective for using the PRP
- The anatomical location onto which the PRP was applied
- How the PRP was secured
- Any occurrences of pressure damage or skin changes that occurred while the PRP was in place
- Their subjective views on the pressure redistribution, ease of use and other performance-related factors of the PRP
- The amount of time (days) that the PRP was used on each patient
- The nurse's views on how the PRP compared with the DGP.

No formal ethical approval was sought as this was a simple product evaluation of a like-for-like product. The ICU lead gained consent to conduct the trial from the divisional nurse lead.

Results

A total of 39 patients were recruited into the evaluation, but two were excluded from the data analysis as their data forms were incomplete. The results given below therefore relate to the sample of 37 patients.

The majority of the remaining 37 patients were recruited from one ICU (n=17, 46%), with seven (19%), six (16%) and three (8%) patients coming from the other three units (these data were missing for four patients). The mean Waterlow score for the 28 patients for whom this was reported was 30 (range 18–40; median: 30), which is very high risk. (Data were missing for seven patients, and an additional two patients were described simply as at 'high risk' with no stated score). Relevant medical information was provided for only 10 patients and related mainly to the use of inotropes, followed by the presence of diabetes, head injuries, use of sedation, respiratory failure and spinal injury. No additional demographic data were collected during the audit.

There were no reported occurrences of pressure damage during the 4-week audit. The PRPs were primarily used to prevent pressure damage, either device-related (13/42, 31%) or from a bony prominence (26/42, 62%) on the feet, groin or neck/face. They were used on only two patients (5%) with a category I PU, as well as on one patient (2%) with a DTI. The cause of these ulcers/DTI is unknown, but all had been present before the start of the audit (*Figure 1*). The medical devices used on these patients that could have placed them at risk of ulceration were vascaths, a continuous positive airway pressure (CPAP) mask, urethral catheters/tubing, an orogastric tube, back drains and (unspecified) catheters.

The most common anatomical locations covered with the PRPs were the head/face, followed by the elbow and the heels (*Figure 2*). Most of the PRPs (34/37, 92%) were not secured, with two being held in place by a medical device (5%) and one (3%) by tape. Most were used for up to 3 days (18/37, 49%), with only two (6%) being used for more than 9 days.

Other skin changes were picked up by the data-collection form. These findings indicated that there was one case (3%) of maceration (in a pyrexic patient) and four cases of non-blanching erythema (11%).

The PRP scored well in terms of the participating health professionals' subjective observations of its clinical effectiveness, ease of use and other performance attributes. It was rated as 'excellent' or 'good' in ≥27/37 patients (≥73%) for all six parameters assessed. The highest scoring parameters were pressure redistribution and product integrity (with approximately 83% rating both as excellent/good), followed by its ability to remain in position/ease with which it could be cleaned (with approximately 77% for both), and comfort/ease with it can be cut (73%). A full breakdown of these scores is given in *Table 1*.

When asked how they felt the PRP compared with the DGP used for each individual patient, most of the sample stated that it was either better or the same (30/37, 81%); only three (8%) considered it not as good (*Figure 3*). Individual

Box 1. Participating health professionals' comments on how the pressure-redistribution pad compared with the dermal gel pad
Not gluey/oily
Less tacky, more flexible/pliable
Very durable. Cleans better and does not tear as easily
Appears to remain in place better than the previous product
Integrity stronger. Easier to clean
Does not tear up easily
Not slippery/sticky
Not sticky and easy to clean
Does not tear easily when being removed. Stays in place better and washes well
Cleans easily. Stays in place better. Does not tear as easily
We could place a whole sheet under a patient's back, which worked well
Found product difficult to secure while using [it] on a CARP nasal bridge, but I was able to secure it well on a vascath linear groin area
Did not notice difference [between products]
Found no difference in effectiveness
Appears to mould and have imprint of ear and then, if moved, pressure increases in the other area of ear due to the imprint

comments on how the PRP compared with the DGP are listed in *Box 1*.

Discussion

In terms of the primary outcome, there was no reduction in pressure ulceration during the audit period when compared with the previous 3 months when the DGP had been used. However, the results were positive in that no patients developed a new PU during the audit period. While 11% were reported to have blanching erythema, none developed category I pressure damage. Almost all of the PRPs (92%) did not require any additional securement, reducing costs. Staff appeared to prefer the PRP to the DGP. They found it easier to clean and it did not tear as easily (there were no reports of it tearing or splitting during the trial)—indeed, staff considered it more robust than the DGP.

The PRP is simple to use, can be applied in a variety of ways and cut, if required, for more awkward anatomical areas, such as around fingers where there are contractures, making it very versatile. It is designed to redistribute peak pressures and reduce shear and friction at the skin surface. Anecdotally, dressings, such as hydrocolloids and foam dressings, are used to reduce pressure, but these are not able to effectively redistribute pressure, although they may reduce some elements of shear and friction. In addition, these dressings also tend to ruck and roll around the edges, causing skin damage and necessitating regular reapplication. In the case of hydrocolloids, this can cause trauma to the skin as a result of too frequent removal. Furthermore, as the majority of these dressings are opaque, it is difficult to inspect the skin with them in place. This is particularly problematic in the very high-risk ICU population. In contrast, the PRP can be atraumatically lifted and replaced multiple times, allowing the skin beneath to be inspected. This makes the PRP more clinically and cost-effective than dressings for which there is little or no evidence about their ability to prevent pressure ulceration.

Staff in the ICU receive annual training on the prevention and management of PUs and have access to a strong team of tissue viability link nurses for day-to-day support. This contributes to the high priority placed on prevention strategies. The only change in PU prevention strategy during the audit was the switch in the type of pad used; all other interventions remained the same. While the DGPs were readily available in each unit and there was much awareness about them, there may have been a reluctance to use them due to concerns about them tearing or splitting. During the audit, the provision of additional education on the appropriate use of the PRP by its distributor might have heightened awareness and use of it. However, given the number of comments about the PRP being easier to clean, less sticky and less liable to tear than the DGP, staff may have been more likely to use it for these reasons. An increase in the use of PRPs did not result in a decrease in pressure ulceration.

The support from the distributor of the PRP, in terms of its provision of staff education, presence on the units during the trial and collection of the evaluation forms, was invaluable. When undertaking an audit, extra resource is useful, given the demands on NHS staff. However, this may have introduced an element of bias to the audit, as the ICU staff felt more supported and confident about using the product.

Even though there was no decrease in pressure ulceration during the audit, the positive comments that the PRP did not tear or split, suggest an advantage over the DGP. Furthermore, it appears that PRP has other benefits, as it can be easily cleaned and is less sticky. If these aspects have a positive impact on staff attitudes, making them more likely to use it, this may have a positive impact on PU prevention in the future. It was therefore decided to stop using the DGP and change to the PRP. Audits will be undertaken to monitor its use and PU incidence.

There have been a few small trials on dermal pads (Fletcher, 2009; Large, 2011; Knowles et al, 2013), which have shown reductions in pressure ulceration. However, further research is required on the use and efficacy of PRP in preventing PUs and whether one dermal pads is better than another.

Limitations

There was no increase in pressure ulceration during the audit. However, just under half the sample (49%) used the product for only up to 3 days, and there was no formal follow-up after the audit was completed. As the audit was conducted in an ICU setting, the results may not be transferable to other patient populations, particularly considering the high use of the PRP to redistribute pressure on the head of sedated patients. As most patients were sedated, the PRP did not need to be secured, which would not be the case for the general acute patient population. Furthermore, the sample was small, given the number of patients within an ICU at any one time. All staff comments were subjective and so open to interpretation.

Conclusion

Clearly, dermal pads cannot replace repositioning regimens or the appropriate use of specialist pressure-redistributing

mattresses, cushions or offloading equipment. However, they can be useful for specific areas, such as under devices and where pain, contractures, instability or external fixators cause problems with repositioning. The PRP is inexpensive and, during this audit, was found to be robust, as well as easy to use and clean, when compared with the DGP. This could potentially improve outcomes related to pressure ulceration. **BJN**

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KEY POINTS

- Eighty-five percent of the pressure ulcers (PUs) in one acute trust intensive care unit (ICU) were medical-device related. The ICU staff used a dermal gel pad to protect against such skin damage but were concerned that it tended to tear or split while in use
- This 4-week non-comparative audit evaluated an alternative gel pad (Dermisplus Prevent), which was more cost-effective and appeared to be more robust than the previous pad used, on a sample of 37 patients in four ICUs
- No PUs developed during the audit period, although there was no change in incidence compared with the previous 3 months. However, there were no reports of the new gel pad splitting or tearing, and the ICU seemed to prefer it, commenting that it was easier to use, clean and more robust

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CPD reflective questions

- To what extent are patients in your clinical setting at risk of medical device-related pressure ulceration?
- How aware are you of what are the most common causes of pressure ulceration in your setting?
- How could you determine that the pressure ulcer prevention strategies you use are clinical and cost effective?