Pressure ulcer prevention: an evaluation of KerraPro Pressure Reducing Pads in at-risk patients

KEY WORDS
- Evaluation
- KerraPro
- Pressure-reducing pads
- Pressure ulcer
- Prevention

Pressure ulcer incidence is on the decline, we have still to achieve zero tolerance goal, suggesting a need for novel, simple and effective ways of integrating prevention into everyday nursing care. This article reports on an evaluation of KerraPro™ Pressure Reducing Pads, a range of shaped pads made from 100% silicone, designed to help protect the skin of at-risk patients as part of a pressure ulcer prevention programme. Clinicians reported favourably on pressure redistribution, ease of application, whether the product remained in place, patient acceptability and convenience. The results provide supportive evidence for the use of this product. In conclusion, KerraPro has a role to play in preventing avoidable pressure ulcers and reducing the incidence of avoidable harm to patients.

A pressure ulcer is localised tissue damage that can occur at the point where the skin is in constant contact with a surface, such as a patient's bed or chair, or with another part of the body, for example, where the knees or ankles rest together. The high pressure that builds up can deform skin and soft tissues, thereby distorting cells, reducing the flow of blood and oxygen and causing the skin to break down. Pressure ulcers are graded from category I to IV, according to the extent of observable tissue damage. Although anyone can develop a pressure ulcer, those who are seriously ill, have a neurological condition, impaired mobility, impaired nutrition, poor posture or a deformity are at the greatest risk (National Institute for Health and Care Excellence [NICE], 2014).

According to recent and ongoing research, pressure ulcer development results from a complex relationship between the extrinsic factors shear, friction and microclimate (Orsted et al, 2010). Pressure, which is still considered the most important extrinsic factor, and shear are closely linked: pressure is the result of a force that is applied perpendicular (at a right angle) to the surface of an object; shear stress results from the application of a force parallel (tangential) to the surface of an object while the base of the object remains stationary (Orsted et al, 2010; Reger et al, 2010; Takahashi et al, 2010). Friction is not considered a direct cause of pressure ulcers, but is believed to have a role in the development of shear. Microclimate influences the susceptibility of skin and soft tissues to the effects of pressure, shear and friction (Reger et al, 2010).

Pressure ulcers are a source of long-term pain and emotional distress for patients and present a large financial burden to the NHS. Nearly 700,000 people are affected by pressure ulcers each year (NHS, 2014). They occur across all care settings, including in patients' own homes, with the most vulnerable of patients being those over 75 years of age (NHS, 2014).

Pressure ulcer care is necessarily labour intensive. Nurse or healthcare assistant time accounts for almost 90% of the overall cost, and for 96% of the cost in category I and II ulcers (Dealey et al, 2012). For more severe ulcers (categories III and IV), the main determinant of cost is the incidence of wound complications, such as infection, which lead to delayed healing and the need for inpatient admission (Dealey et al, 2012). The daily costs of treating a pressure ulcer are estimated to range from £43 to £374,

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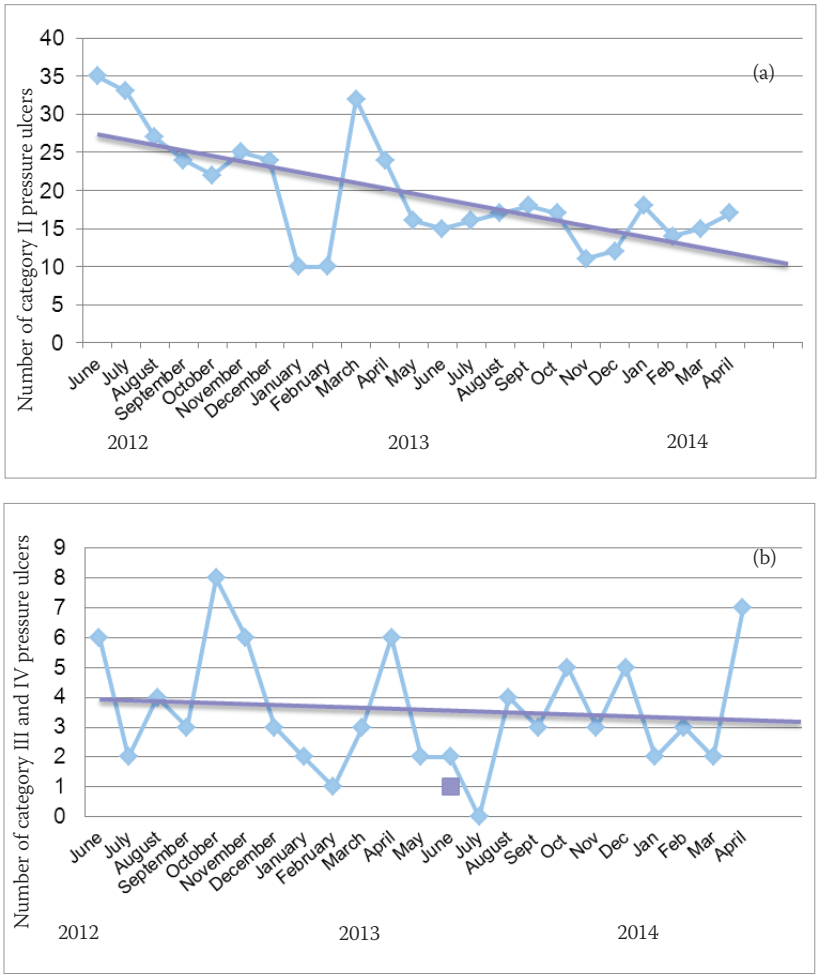


Figure 1. Incidence of (a) category II and (b) category III and IV hospital-acquired pressure ulcers from June 2012 to April 2014.

with total cost per episode averaging £5,672 (Dealey et al, 2012). These costs are solely for pressure ulcer treatment and are in addition to the costs of standard care. To put this into context, an acute NHS hospital with 10,000 new admissions annually can expect around 600 patients to develop a pressure ulcer between admission and discharge, leading to a cost of £3.36 million annually (Dealey et al, 2012).

Until recently, the incidence of pressure ulcers in the UK had remained static (Samuriwo, 2012). Despite some improvement, pressure ulcer prevention remains high on the NHS agenda, being highlighted in improvement area 5.3 from domain 5 of the Department of Health's *NHS Outcomes Framework 2014/15* 'Treating and caring for people in a safe environment and protecting them from avoidable harm' (Department of Health, 2013). As such, avoidable pressure ulcers are a key indicator of the quality of nursing care.

NORFOLK AND NORWICH UNIVERSITY HOSPITALS NHS TRUST

The Norfolk and Norwich University Hospitals NHS Foundation Trust set a target to eliminate avoidable category II, III and IV pressure ulcers, as set out in NHS Midlands and East regional ambition (2012) and 'Your Skin Matters' (NHS Institute for Innovation and Improvement, 2010). Prevalence rates for all hospital-acquired pressure ulcers in the Trust have declined since June 2012 (*Figures 1a* and *1b*). This positive trend has not, however, been observed for heel hospital-acquired pressure ulcers (*Figures 2a* and *2b*). Therefore, to achieve the target of eliminating all avoidable category II, III and IV pressure ulcers there clearly remains a need to find novel, simple and effective ways of integrating pressure ulcer prevention into everyday nursing care. To achieve this, the Trust has employed a multifaceted approach, which includes:

- Transparency of prevalence through use of the NHS Safety Thermometer
- Close monitoring of incidences using Datix web-based patient safety software (datix.co.uk)
- Introduction of prevention methods, such as KerraPro™, a pressure-relieving pad.

KERRAPRO EVALUATION

KerraPro Pressure Reducing Pads (Crawford Healthcare) are a range of shaped pads made from 100% silicone that are designed to help protect the skin of at-risk patients as part of a pressure ulcer prevention programme.

The manufacturers claim the shaped pads are flexible, hard-wearing and have the ability to redistribute pressure, protecting the skin on bony prominences (Crawford Healthcare, 2014). KerraPro pads have been shown to be comfortable, durable and easy to use, with the advantage of being re-used over several weeks with no visible damage to the pad (Hughes, 2014). KerraPro should only ever be used on intact or recently-healed skin to protect it from pressure ulcers and is not designed for use as a primary dressing on broken skin. The features and benefits of KerraPro are summarised in *Table 1.*

Since its launch, clinicians across the UK interested in trialling KerraPro as a method by which to prevent patients developing pressure

damage have been invited by the manufacturer to complete an evaluation of their experience. The primary objectives of the evaluation have been to understand the experiences of clinicians across the UK regarding the clinical effectiveness and safety of KerraPro, and the patient experience of KerraPro in pressure ulcer prevention. Norfolk and Norwich University Hospitals NHS Trust carried out a 6-week evaluation of KerraPro on 11 wards. The results of 23 evaluations were then combined with identical evaluations performed across the UK to allow clinical inferences to be drawn from the results.

METHOD

Clinicians were invited by the manufacturer of KerraPro to complete an evaluation of their experience of the pressure-reducing pads (*Figure 3*). The evaluation form was designed to allow completion within 10 minutes to ensure a high response rate. The form was designed to monitor the following criteria:

- Product performance:
  - Duration of use
  - Whether it stays in place
  - Pressure reduction
- Patient acceptability
- Clinical acceptability.

The evaluation form also captured background information and baseline data, including patient demographics (age and gender), patient skin assessment (pressure ulcer risk score, skin assessment and area of skin requiring protection) and product selection (which KerraPro product was applied and how it was secured to the skin).

Education on how to use KerraPro was provided by the manufacturer prior to commencing the evaluation. Qualified ward staff were responsible for identifying at-risk patients using the Waterlow score, which gives an estimated risk for the development of a pressure sore in a given patient, and skin assessment combined with clinical judgement. These members of staff were responsible for conducting the assessments and completing the evaluation form. Redistribution of pressure was measured by clinical perception.

Patients selected for evaluation were either immobile or had restricted mobility. The use of

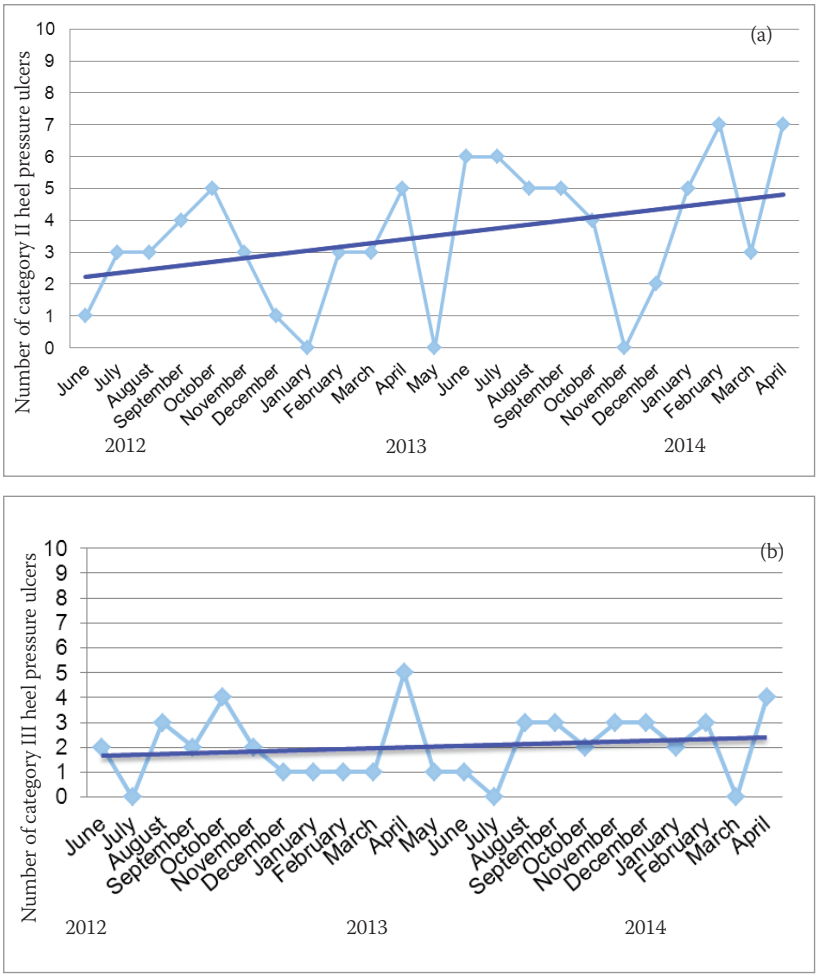
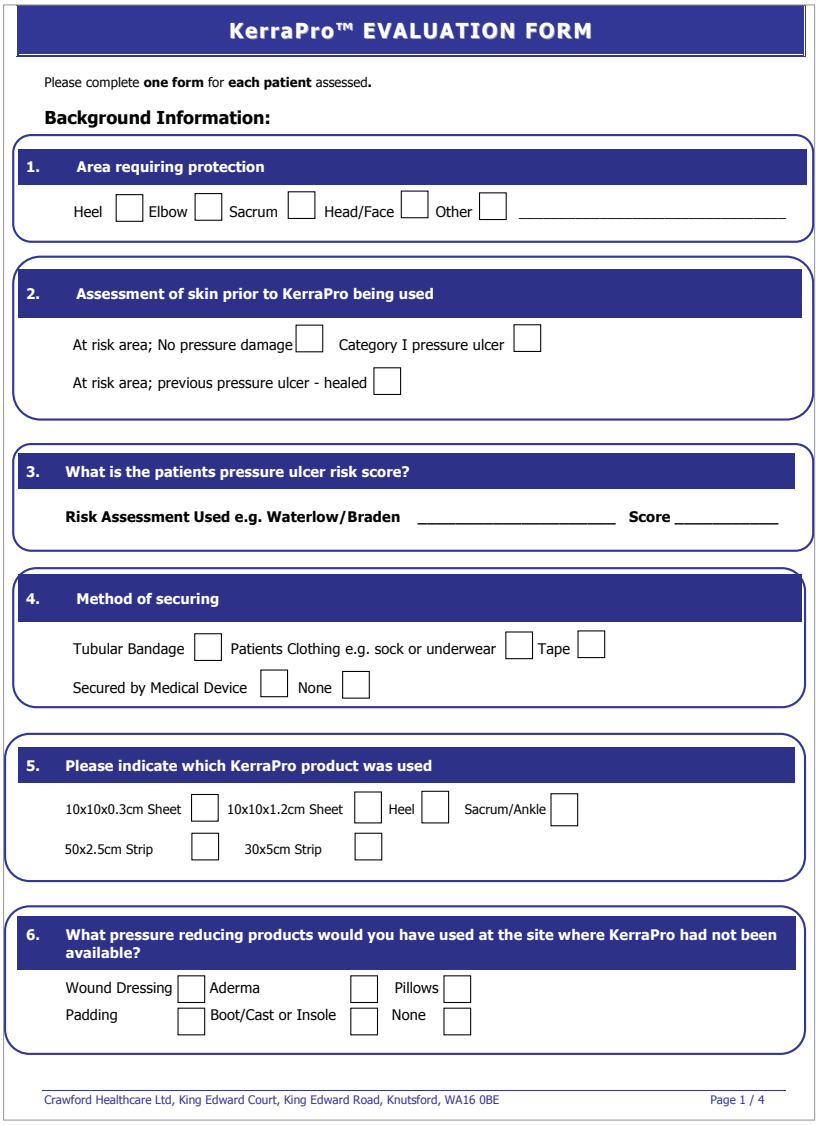


Figure 2. Incidence of (a) category II and (b) category III hospital-acquired heel pressure ulcers from June 2012 to April 2014.

Table 1. Features and benefits of KerraPro Pressure Reducing Pads

Feature	Benefits
Redistributes pressure, dissipating it over the pad	Protects the skin on bony prominences Can prevent early pressure damage Cost-effective solution, prevention being better than cure
Simple to use	Can be applied by non-clinicians, e.g. patients and their caregivers May improve concordance
Flexible	Can be applied to a variety of anatomical locations not always supported by the other pressure-relieving devices
Can be washed or autoclaved at 121°C	Is easy to clean Gives ownership of care to the patient and his or her caregiver
Can be used where specialised equipment, e.g. a pressure-relieving mattress, is not routinely available	Can be used in a variety of settings Inexpensive
Non-adhesive	Pain-free removal Can be removed regularly and the area examined



KerraPro™ EVALUATION FORM

Please complete **one form** for **each patient** assessed.

Background Information:

1. Area requiring protection

Heel ☐ Elbow ☐ Sacrum ☐ Head/Face ☐ Other ☐ _____

2. Assessment of skin prior to KerraPro being used

At risk area; No pressure damage ☐ Category I pressure ulcer ☐

At risk area; previous pressure ulcer - healed ☐

3. What is the patients pressure ulcer risk score?

Risk Assessment Used e.g. Waterlow/Braden _____ **Score** _____

4. Method of securing

Tubular Bandage ☐ Patients Clothing e.g. sock or underwear ☐ Tape ☐

Secured by Medical Device ☐ None ☐

5. Please indicate which KerraPro product was used

10x10x0.3cm Sheet ☐ 10x10x1.2cm Sheet ☐ Heel ☐ Sacrum/Ankle ☐

50x2.5cm Strip ☐ 30x5cm Strip ☐

6. What pressure reducing products would you have used at the site where KerraPro had not been available?

Wound Dressing ☐ Aderma ☐ Pillows ☐

Padding ☐ Boot/Cast or Insole ☐ None ☐

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Figure 3. KerraPro patient evaluation form.

KerraPro for pressure ulcer prevention formed part of the routine skin care for at-risk patients. Ward staff had access to other prevention aids including repose boots, pillows, alternating pressure mattresses and cushions. Individualised patient treatment plans were created as appropriate.

Statistical analysis

Data were analysed using a stand-alone statistical analysis package (SPSS Version 17, SPSS Inc). All text was converted to numerical data to enable data-handling and analysis. Missing data codes were assigned where required and descriptive statistics generated for each variable to check for coding errors. No coding errors were found within the database.

RESULTS

One-hundred-and-fifteen evaluation forms were submitted for analysis from clinicians throughout the UK. The evaluation forms came from a wide variety of Trusts, including the Norfolk and Norwich University Hospitals NHS Trust. Not all of the forms contained the relevant background data, however, from the information given, 57% of patients were male and the ages of participants ranged from 32 to 93 years (mean 73.7, standard deviation 15.3 years).

Seventy-six evaluation forms reported where KerraPro was applied on the body. Of these, the heels were the most common application site (n=25), followed by the sacrum (n=10). All other anatomical location were reported to be covered with KerraPro in six or fewer evaluations (hip n=6, elbow n=5, spine n=5, ear n=5 and foot n=5). Overall KerraPro was applied to the lower leg in 37 patients, the trunk in 17 patients, upper limb/torso in 13 patients and to the head in nine patients.

Table 2 lists the products used, methods by which they were secured to the skin and duration of use. The data suggest that appropriate products were selected for each body site. KerraPro Heel pads were most frequently used on the lower leg and Sacrum/Ankle pads on the trunk. The methods by which the pads were secured differed by body location. The use of bandages was prevalent on the lower leg and upper arm/torso, whereas clothing was primarily used to secure pads to the trunk. The duration of product use also differed by body site, with a longer duration of use on the lower leg and shorter duration on the head. The difference in duration between body sites was statistically significant (p=0.005).

Clinicians gave KerraPro a median score of 8 for pressure redistribution (where 0 equals poor and 10 optimal pressure redistribution). There was no reported difference between pressure redistribution provided by the Heel and Sacrum/Ankle pads compared with the sheets and strips (p=0.45). KerraPro was considered effective at reducing pressure by clinicians, and either met or exceeded expectations in 89 out of 103 cases; 85%

of the respondents stated that they would continue to use the product.

Median reported scores of 8 were also recorded for the following parameters:

- The ease of application
- How well the product remained in place
- The acceptability of the product to patients compared with previous products
- The convenience of product use
- Changes in the condition of the skin under the KerraPro pad.

The main reasons given for these scores were that KerraPro was more effective at reducing pressure than pressure-relieving devices previously used, KerraPro is convenient and/or easy to use and it is comfortable for the patient. Examples of clinician feedback from Norfolk and Norwich University Hospitals NHS Trust are given in *Box 1*.

Issues with KerraPro

There were a small number of issues noted, primarily related to skin maceration (*n*=7). There were three instances of adverse reactions and on three occasions the patient was too agitated to wear the product. In one case, the product size was found to be inappropriate for the intended use. A pressure ulcer developed in one case.

Patient opinions

Patients gave KerraPro a median rating of 8 for comfort compared with previous regimens, indicating that the pads were more comfortable than previous treatment they had received. They also gave the pads a median score of 8 for convenience, indicating that patients found the dressing convenient to use.

Other available products

Had KerraPro not been available, then clinicians indicated that a wound dressing would have been used to protect the skin in 33 cases, and Aderma, a dermal pad designed to help prevent pressure ulcers, would have been appropriate in a further 14 cases. Eight patients would have received repose boots, an insole or a cast, while six would have had to rely upon padding or a support surface to protect their skin. Three patients would have been allocated pillows.

Table 2. Use of KerraPro™, the method of securing it to the skin and the duration of use by body location*

	Lower leg (*n*=37)	Trunk (*n*=17)	Upper arm/ torso (*n*=13)	Head (*n*=9)
KerraPro product used				
Heel	17	0	5	0
Sacrum/Ankle	6	16	0	0
Sheet, 0.3 cm	4	1	2	0
Sheet, 1.2 cm	4	0	1	0
Strip, 30 cm × 5 cm × 0.3 cm	2	0	2	2
Strip, 50 cm × 2.5 cm × 0.3 cm	2	0	3	5
Securing method				
Bandage	16	1	5	0
Aderma Extra Thin	0	1	0	0
Clothing	8	9	1	0
Tape/dressing	6	1	3	0
Medical device (e.g. face mask)	0	0	0	4
Securing difficult	0	3	0	0
None	2	2	0	0
Duration of use				
Fewer than 7 days	5	1	2	3
1 week	1	2	0	4
2 weeks	2	5	1	1
3 weeks	2	1	1	0
4 weeks	7	2	2	1
Over 4 weeks	14	4	4	0

Where table totals do not equal the total number of evaluations at each body site, this reflects data missing from the evaluation forms

Box 1. Feedback from evaluation forms completed by Norfolk and Norwich Hospitals NHS Trust staff

Case study 1: Patient with Parkinson's disease

- Patient had a low body mass index with curvature of the spine and significant bony prominences
- 'I believe skin would have broken down without KerraPro'
- 'Skin maintained despite deterioration in patient overall health'

Case study 2: Patient using a device

- KerraPro was used on the nose of a patient requiring oxygen therapy
- 'Pressure reduced and made oxygen therapy more comfortable'
- 'Not suitable for confused patient – Kerrapro moves if not adhere to skin – high risk of patient digesting if used on nose'

Case study 3: Patient receiving palliative care

- KerraPro was used as part of end-of-life care
- 'I think that Kerrapro made the final hours more comfortable'

Box 2. When and how to use KerraPro

Appropriate use:

- On intact skin
- On areas where damage is likely to occur
- Where a category I pressure ulcer is already present
- With other pressure-relieving devices (e.g. a cushion), but with closer monitoring of the site as other devices may interfere with the properties of the pad, causing friction, excessive moisture or a reduction in its pressure-relieving properties

Inappropriate use:

- As a wound dressing
- Directly on broken skin

How to use KerraPro

- Cut to size, if required
- Clean the pad at least once a day with soap and water and dry thoroughly before reapplying
- The skin under the pad should be washed and dried at the same time as the pad is cleaned
- If KerraPro becomes damaged or the pad loses its natural 'tack', replace with a new KerraPro
- If additional securing is required, the following can be used:
  - Patient's underwear/netted knickers or sock
  - Tubular bandage
  - Bandage
  - Tape
  - Underneath other medical devices, e.g. oxygen mask ensuring airways are not compromised
- Do not wash and re-use a pad on a different patient due to the risk of cross-contamination.

Clinicians indicated that four patients would probably not have been allocated a preventive intervention; three of the clinicians stated the reason for this was due to nothing being available for the elbow.

DISCUSSION

The evaluation form was used to examine the use of KerraPro in the prevention of pressure ulcer development in 115 patients. The wide age range of patients treated (32 to 93 years) suggests that KerraPro can be used on adult patients of all ages. KerraPro was applied to a wide variety of anatomical locations, from the toes to around the nose, to prevent pressure damage. The appropriate product was selected depending on the body site, with Heel pads being used most frequently on the lower leg and Sacrum/Ankle pads used on the trunk.

In this evaluation, KerraPro was most commonly applied to the heel (33% of cases). In clinical practice, heel ulcers are the second most common site of pressure ulcers. A variety of factors put heels at increased risk of pressure ulcer development, notably the size and shape of the calcaneus bone, which is surrounded by only a thin layer of fat and skin. Unlike the plantar surface of the heel, which is well adapted to resisting the forces involved in standing and ambulation, the posterior heel is not. Further, the blood supply to the skin is poor and there is no underlying muscle to cushion the bone and tendon or distribute pressure (Fowler et al, 2008). Strategies for off-loading heel pressure are recommended in NICE clinical guideline 179 (NICE, 2014), and in a recently-published evaluation where KerraPro Heel was shown to be effective at preventing deterioration and improving the skin condition of patients with category I pressure damage (Knowles et al, 2013).

KerraPro can be held in place using a number of methods. The most effective method is dependent on the area and the pad shape: bandages were preferred for the lower leg and upper arm/torso, whereas clothing was primarily used to secure pads to the trunk. KerraPro has a natural 'tack' due to its silicone composition and therefore 15% of respondents did not use anything to keep the pad in place. Generally, KerraPro was considered to remain in place, with clinicians giving it a median score of 8. It was used for 4 weeks or longer by 52% of clinicians, suggesting KerraPro can remain *in situ* for as long as pressure ulcer prevention is necessary.

Patients are central to the success of their care plan, hence acceptability of treatment and the products or devices used within the patient care plan is extremely important. A product is likely to be acceptable if it is comfortable during use and causes minimal disruption to patients' lives. KerraPro is made from 100% silicone and is designed to provide enhanced patient comfort. With a median rating of 8 for comfort, it seems that the majority of patients found KerraPro more comfortable than their previous pressure-relieving treatment. This improvement in comfort might be related to a decrease in

inflammation (Knowles et al, 2013). The high scores patients gave for convenience indicate that a number of patients found the dressing convenient to use. KerraPro causes minimal disruption to a patient's life, can be used multiple times and can be washed with soap and water to ensure convenience.

Given the positive opinions across the range of questions posed in the evaluation form, it was unsurprising that the use of KerraPro met or exceeded the expectations of 86% of clinicians. These clinicians stated that they would continue to use the product when they needed to relieve pressure on high-risk patients, with many recommending KerraPro to colleagues.

Although the feedback was mostly positive, there were a small number of negative comments regarding KerraPro being difficult to secure and maceration of the skin underneath the pad. Further training and more suitable fixation devices were recommended to clinicians who had these experiences in order to ensure that these problems would not occur with future use.

Had KerraPro not been available, pressure ulcer prevention would have been attempted with other dressings or devices in all but four cases. This indicates the importance clinicians ascribe to pressure ulcer prevention. In almost a third of cases, a wound dressing would have been used and Aderma would have been used in a further 14 cases. A small number of clinicians faced challenges during the evaluation, notably maceration, adverse reactions, inappropriate product size and patients being too agitated to support the product. A pressure ulcer developed in a single patient out of 115 at-risk patients. Some of these challenges could be avoided by ensuring that KerraPro is applied according to the manufacturer's instructions (*Box 2*).

CONCLUSION

The primary goal of pressure ulcer management should be prevention. Early risk assessment, as recommended in NICE clinical guideline 179, ensures that patients at high risk of pressure damage are identified and an individualised care programme initiated. Clinical evaluations of pressure-relieving products can help inform guidance documents to educate nurses and caregivers in the proper application of dressings in the prevention of pressure ulcers. This evaluation of KerraPro indicates that clinicians found it to be effective at reducing pressure in high-risk patients, and that patients found the product to be comfortable.

In conclusion, KerraPro has a role to play in the preventing pressure ulcers and thus reducing the incidence of avoidable harm to patients as part of a wider, comprehensive pressure ulcer elimination programme. WUK

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