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Abstract

At St Helens and Knowsley Teaching Hospitals NHS Trust, implementation of pressure management measures has reduced the incidence of hospital-acquired pressure ulcers. There is now a focus on those pressure ulcers still occurring despite these measures, particularly grade 2 ulcers on the heel, which are often attributed to friction and shear. During 2012 and 2013 low friction fabric bootees (Parafricta®) were used on at-risk patients (where possible) to attempt to address this issue. The bootees were first introduced in 2012. There was a decline in heel ulcers of 78% in the 2 years, which accounted for a sizeable portion of the overall decline in all grade 2 pressure ulcers. There was also a substantial change in the ratio of heel to all other grade 2 pressure ulcers, which fell from 0.67 to 0.24. On the basis of heel pressure ulcers avoided, there is an implied net saving to the NHS. The trust concluded that routine use of low-friction fabric bootees made a significant further contribution towards achieving zero harm targets and had done so while providing substantial cost benefits.

Key words: Product evaluation ■ Friction and shear ■ Heel ■ Pressure ulcer

The Department of Health and NHS England have put reduction of pressure-ulcer incidence at the forefront of their list of priorities for the reduction of patient harm (together with venous thromboembolism and healthcare-associated infections) (NHS England, 2015). Avoidable pressure ulcers are now a key quality indicator of nursing care, which is intrinsically linked to financial reward through initiatives that link a proportion of providers' income to the achievement of 'harm-free' care. The concept of harm-free care (www.harmfreecare.org) builds on and integrates quality, innovation, productivity, prevention (QIPP) initiatives, which have already seen a significant positive impact on the incidence of preventable hospital-acquired pressure ulcers. The national Commissioning for Quality and Innovation (CQUIN) programme (NHS England, 2014) promotes the use of the NHS Safety Thermometer which, along with serious incident reporting, is used to measure the incidence and prevalence of pressure ulcers, and delivers

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detailed monthly data comparing the performance of trusts in reducing pressure-ulcer incidence. The main implication is that failure to meet the targets set by commissioners to reduce pressure ulcers as measured by the NHS Safety Thermometer will result in payments being withheld from providers. At least 0.125% of the total value of the contract is linked to achievement of the agreed targets relating to the NHS Safety Thermometer (NHS England, 2014) and within that it is stated that providers should prioritise pressure-ulcer prevalence (above other elements of the NHS Safety Thermometer—venous thromboembolism, falls and catheter-related urinary tract infections).

The NHS in Wales, Scotland and Northern Ireland also emphasise the importance of preventing pressure ulcers through similar initiatives such as the 1000 Lives Plus programme in Wales (<http://tinyurl.com/q47ccqv>) and the Scottish Patient Safety Programme (<http://tinyurl.com/oa9qq9q>).

Pressure-ulcer reduction

At St Helens and Knowsley Teaching Hospitals NHS Trust, the incidence of newly acquired (72+ hours after admission) pressure ulcers has been reduced to well below the national average (0.21% versus 1.16% according to the NHS Safety Thermometer (year to December 2013) (Health and Social Care Information Centre, 2014). This has been achieved by vigilant implementation of measures such as care pathways incorporating the use of 4-sectional electric profiling beds, pressure-reducing foam and alternating air mattresses for patients at risk, coupled with education and training. This has increased attention on those pressure ulcers that are occurring despite these measures. The trust has noted that grade 2 heel pressure ulcers are a persistent problem and that many of these show the signs of being caused by friction and associated shear stresses. There is a growing literature on the often understated contribution of friction and shear to pressure-ulcer incidence, for example Lahmann and Kottner (2011).

Patients may develop skin damage from the movement of the heel on the bed linen in pushing themselves up the bed or, in some cases, by involuntary repetitive movements and/or as a result of poor manual handling techniques. Shear forces created by the friction between the heel skin and support surface affect the superficial tissues and lead to cellular breakdown which manifests itself as redness and then serum-filled blisters (Knapik et al, 1995). Unresolved friction and shear insult can lead to unhealed, open wounds typically characterised as grade 2 heel pressure ulcers. The question

arises, therefore, as to whether such pressure ulcers should be defined as avoidable (Wound, Ostomy and Continence Nurses Society, 2009; McIntyre et al, 2012).

There are few clinically-proven products commercially available for use in the NHS that have been specifically designed to eliminate or reduce friction and associated shear stresses and which could potentially prevent grade 2 heel ulcers. The most recently published National Pressure Ulcer Advisory Panel (NPUAP)/European Pressure Ulcer Advisory Panel (EPUAP)/Pan Pacific Pressure Injury Alliance (PPPIA) guidelines (2014) advise considering the prophylactic use of dressings and silk-like fabrics to reduce friction and shear. Where prophylactic dressings are used to protect the vulnerable area, these may have a number of potential disadvantages in terms of causing skin damage, preventing inspection of the vulnerable skin and creating a moist environment. The Parafricta® slip-on bootees are lined with two layers of a low-friction fabric that the manufacturers state can mitigate the friction and associated shear stress-related damage to heels and other parts of the foot (APA Parafricta, 2013). The bootees are shown in *Figure 1*. Clinical results using the bootees have previously been reported by Hampton et al (2009), Smith and Ingram (2010) and Stephen-Haynes and Callaghan (2011). It could be argued that the bootees have potential advantages over the use of prophylactic dressings, particularly their ease of use, ready removal to permit skin inspection and reusability. In this article, the author will discuss the results of using the slip-on version of the bootees at Whiston Hospital over a 2-year period.

Implementation

The St Helens and Knowsley Teaching Hospitals NHS Trust has annual admissions of 35 500 and typical bed occupancy of 630 beds, which remained unchanged through the period 2011–2013. About 260 of the 630 beds are likely to be occupied by patients at a very high risk of pressure ulcers, namely trauma and orthopaedics, burns and plastics, intensive care and care of the elderly.

Parafricta bootees were first introduced in 2012 onto six wards at Whiston Hospital (three care of the elderly and three orthopaedic) with a high proportion of patients at risk of getting a pressure ulcer (Maelor Score >19). The hospital initially acquired 232 bootees for this purpose. The results were sufficiently encouraging that, after 6 months, their use was extended to all 27 wards and a further 600 bootees were purchased. A further 192 bootees were purchased in 2013, meaning that up to 1024 bootees were in circulation at the hospital. This does not mean that all the bootees were on patients at any given time, as most will either be stored ready for use or out for laundry (and some will have been lost or discarded). It has been the Trust's experience that, with this number of bootees in circulation, it is not always possible to provide correctly sized bootees for every patient at risk of a heel pressure ulcer, and therefore some patients are provided with a transparent film dressing to protect the heel, e.g. Tegaderm™ Film (3M Healthcare).

The majority of the bootees were issued, as per request, by the equipment pool in the Trust and a number were

issued and allocated directly to six individual high-risk wards. While this makes it difficult to establish precisely how many patients were given the bootees during the first 12-month period, it was recorded that a minimum of 600 allocations of the booties were made during 2012 from the equipment pool. Soiled bootees were returned from the wards to the equipment pool for separate laundry (and washed at 70°C for 10 minutes) before eventual return to the wards. The use of the bootees has also been incorporated into a risk protocol which assists in prioritising those patients at risk of pressure ulcers (with a Maelor Score >19) who are at particular risk of getting a heel pressure ulcer.

The St Helens and Knowsley Teaching Hospitals NHS Trust implements an even stricter standard for recording pressure-ulcer incidence than is required by standard reporting for the NHS Safety Thermometer. For the NHS Safety Thermometer the Trust is required to report as 'new' a pressure ulcer that occurs 72+ hours following admission (otherwise it is assumed to be pre-existing or old). For the Trust's own incident reporting, any pressure ulcer occurring at any time following admission is recorded. This is because pressure ulcers can develop in less than 72 hours if all measures are not taken as soon as possible following admission (Gefen, 2008). A team is assembled to conduct root cause analysis (Ross, 2009) for any incidence of pressure ulcers of grades 2–4, not only 3 and 4 as is the case in some trusts.

Results

In 2011, 50 grade 2 heel pressure ulcers out of a total of 125 grade 2 pressure ulcers were recorded. In 2012, when the bootees were first used, there were 34 grade heel 2 pressure ulcers out of a total of 117 total pressure ulcers at the Trust (a reduction in the incidence of heel ulcers of 32% across all wards in the hospital, not just the six wards where the bootees were first used. In 2013 there were only 11 grade 2 heel pressure ulcers out of a total of 56. These results can be seen in *Table 1*.

Discussion

The figures suggest that the bootees, when used in routine practice, have played a part in the reduction, and in particular the decline in the ratio, of heel pressure ulcers to pressure



Figure 1. Parafricta slip-on low-friction fabric bootees

Table 1. Comparison of pressure ulcer incidence (2011-2013)

	2011	2012	2013
Number of bootees in circulation*	0	832	1024
Incidence of all grade 2 pressure ulcers	125	117	56
Incidence of grade 2 heel pressure ulcers	50	34	11
Ratio of grade 2 heel pressure ulcers to grade 2 pressure ulcers on other sites	0.67	0.41	0.24

*not all bootees would have been in use at any given time

ulcers on other sites. While general improvements in practice and awareness will have contributed to the overall incidence of grade 2 pressure ulcers, the decline in the proportion of heel pressure ulcers is certainly associated with the increasing use of bootees. It should be noted that with so many bootees in use, only one at-risk patient out of the 45 reported with a grade 2 heel pressure ulcer in 2012 and 2013 had been allocated a bootee, suggesting that the bootees are effective.

The financial implications of reducing the incidence of even grade 2 pressure ulcers are considerable. The acquisition of 1024 bootees to the end of 2013 cost the Trust (at Drug Tariff price £35.14) approximately £36 000. The cost of laundering the bootees (50 pence per item at the Trust) would have added £3075 assuming each bootee is washed six times. The manufacturer recommends disposing of the bootees if there are signs of damage. At the Trust, tracked numbered bootees have been through at least 6 washes and were found to be completely reusable. On the basis that the ratio of grade 2 heel pressure ulcers to grade 2 ulcers on other sites would not have changed without using the bootees, there would have been 13 more heel pressure ulcers in 2012 and 13 in 2013. Working on this assumption, it is possible to estimate the savings to the NHS that may have been made. According to the widely quoted benchmark provided by Dealey et al (2012), the cost of treating an uncomplicated grade 2 pressure ulcer is £4399. Therefore the cost of treating the 26 heel pressure ulcers that might have occurred without the use of the bootees is £11374 or an implied net saving to the NHS of almost £75 000 in 2 years from just one site. The savings are likely to have been significantly more because some of the grade 2 ulcers that were avoided would

have progressed to more severe pressure ulcers, most of the bootees were still available for re-use at the end of the 2-year period (only 20 needed replacing in the past 18 months) and other expensive preventive measures were no longer required (e.g. use of film dressings or heel supports). While the figures reported in this article are compelling, a thorough audit is required to provide conclusive evidence.

Conclusion

Implementing the use of the low-friction fabric bootees has proved a good strategy for St Helens and Knowsley Teaching Hospitals NHS Trust, for ensuring a reduction not only in heel pressure-ulcer incidence but also in achieving harm-free targets. As a consequence, the use of this product is now routinely advocated for at-risk patients at the Trust and is measured against tissue viability key performance indicators.

The definition put forward by the Department of Health (DH) in the Position Paper (National Patient Safety Agency (NPSA) and DH, 2010) states that pressure ulcers can only be determined as unavoidable if all risk factors have been evaluated and planned, and implemented interventions are carried out which meet the person's needs. The definition raises the question of whether a heel pressure ulcer is unavoidable if available products designed to address friction and associated shear stress have not been considered. **BJN**

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KEY POINTS

- Heel pressure ulcers may require additional approaches to prevention to those successfully used in reducing overall pressure-ulcer incidence
- Low-friction fabric bootees have been used at an acute trust for 2 years
- Total grade 2 heel pressure-ulcer incidence has declined, as has the proportion of heel pressure ulcers to grade 2 pressure ulcers on other sites
- Reduction in heel pressure ulcers has considerable cost-benefit implications
- A reduction in heel pressure ulcers would make a significant contribution to achievement of harm-free targets