

# Referrals for equipment in relation to the scope and degree of heel damage: an audit

## KEY WORDS

- ▶ Equipment
- ▶ Heel
- ▶ Pressure ulcer

Heels are the second most common site for the development of pressure ulcers (Fowler et al, 2008). Controversies have surrounded the prevention and management of heel damage in the UK. As a result, clinicians are uncertain about the choice of equipment and when it is appropriate to prescribe. An audit of an NHS equipment service was carried out to focus on heel damage. The available clinical evidence for different equipment types are reviewed, and highlighting ways to increase awareness to clinicians and the patient group found in the audit.

The feet are designed for weight-bearing when standing. They have a thickened dermis on the sole that acts as a hydraulic absorption system, protecting the heel from pressure (McGinnis and Stubbs, 2011).

However, if an individual is supine on a mattress or rests his/her feet on a stool, pressure will be concentrated over the calcaneal tuberosity, which is relatively wide for its skin surface area and has very little subcutaneous fat surrounding it. Tissue tolerance will be further compromised by altered circulation, neuropathy, oedema, absence of sebaceous glands, and increased levels of shear and friction (McGinnis and Stubbs, 2011).

According to the National Patient Safety Agency (2010), the majority of pressure ulcers (PUs) are preventable. Overall, up to £4 billion (4% of NHS spending) is spent treating PUs annually, with individual costs ranging from £11,000 to £40,000 (Posnett and Franks, 2007).

Managing patients at risk of PUs requires clinicians to demonstrate skills of rigorous assessment, knowledge of underlying aetiology and pathology, together with an awareness of prevention and treatment.

The Nurse Advisory Service (NAS) in the Sheffield Health and Social Care NHS Foundation Trust was established in 2006. Its purpose was to examine equipment usage more closely when skin damage was a potential concern.

The NAS also supports clinicians over the phone, visits patients and provides training for

healthcare professionals on the causes of skin damage, treatment options and appropriate equipment.

Cost savings have been made by ensuring all equipment for the prevention and treatment of pressure ulceration was used appropriately, reviewed regularly, changed accordingly and returned when not required.

When the service was first set up, there were approximately 79 referrals each month in 2006 from both primary and secondary care (Berry and Clarke, 2007); this has since risen to approximately 475 per month in 2012 (Berry, 2012).

It was decided to quantify the numbers and types of referrals made to the NAS requesting equipment for the prevention and management of pressure damage to the heels, and to see how requests have changed since the service was set up.

## LITERATURE SEARCH

A literature search was completed to find common themes to support data collection headings. Medical and nursing online databases were accessed (Cumulative and Allied Health Literature, Clinical Evidence, Web of Knowledge and medical literature online), along with the Department of Health and specialist wound care sites. This returned 49 articles on heel ulcers and two referring to heel damage.

From the search results, it appeared the vulnerability of the heel to damage was under-researched and the choice of equipment confusing.

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The literature also suggested consideration should be given to the function of the equipment as no single item will fit every case. The equipment used may differ depending on the patient, clinician, or the loan service, along with safety concerns, independent movement and the desired outcome.

## METHOD

The audit was conducted by the NAS based in Sheffield. From a population of 555,000, the NAS receives approximately 4,200 referrals per year. From May 2006 to July 2012, 25,265 referrals were received. Of these, 2330 patients had some skin damage to the foot or heel. Given the length of time the NAS had been in operation, it was impossible to survey all patients referred. Therefore, it was decided to compare the first complete year, June 2007–June 2008, with June 2011–June 2012.

In 2007/8, 3,396 patients were referred to the NAS, with 252 having heel damage (7.4%); in 2011/2, 411 patients had heel damage out of 5,173 referrals (7.9%).

The records of those with heel damage ( $n=663$ ) were reviewed. The sample included all patients living within the city with reported concern or damage to the heel (including damage to the inner or outer malleolus), but referrals were excluded if there was minimal information.

Due to the retrospective nature of the study, there was no need for approval from the local Research Ethics Committee. No consent was required from patients or clinicians because this study only examined the completed referral form. Consultation was sought from the head of service, the information manager and the Caldicott Guardian for guidance and permission.

The first stage of the process was to identify the extent to which heel damage was occurring, to whom and why. The intention was to audit the referrals requesting equipment, which would also include age, gender, geographical location and any common risk factors.

The referral form contained predetermined questions and was developed by the NAS underpinned by guidelines (European Pressure Ulcer Advisory Panel, 1999; National Institute for Health and Care Excellence [NICE], 2005). According to Reid et al (2002), a referral tool

should ensure good quality information. Requests came from any clinician (e.g. nurse, physiotherapist, or occupational therapist) and were then used to monitor changes in health if the nurse adviser was to visit.

To collect data effectively from the referral form, a spreadsheet was developed using Microsoft® Excel®. Generalised data had always been collected from the referral forms with the expectation service success would have to be demonstrated.

The audit was designed to standardise the method for abstracting information retrospectively and was completed by the clerical officer and the nurse. Referrals for patients who had some concern or had heel damage were extracted from the NAS audit; this then provided the information for which to facilitate the statistical analysis.

It was decided to add further headings following the literature review (age, gender and risk factors) to enable comparison to published articles. Due to the time restraints of managing the service, the nurse could only look for information once, adding the further details (age and gender) from the loan service computer system, and manually from the referral form (risk factors).

This process also ensured information remained valid. All patient names were coded to enable identification while collecting information. Referrals remained in a locked cabinet in a locked room and electronic files were stored in the password-protected NHS safe network.

The completed information was checked prior to being counted. Results were produced

*“Cost savings have been made by ensuring all equipment for the prevention and treatment of pressure ulceration was used appropriately.”*

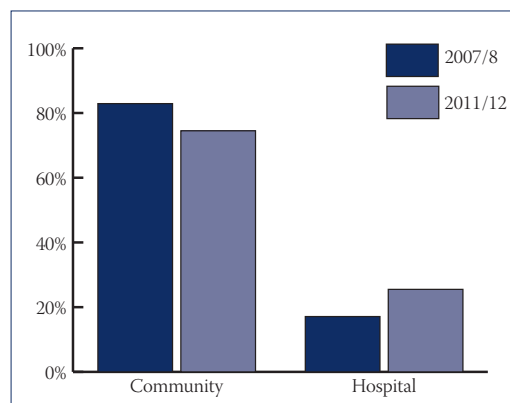


Figure 1. Source of referral to the nurse advisory service.

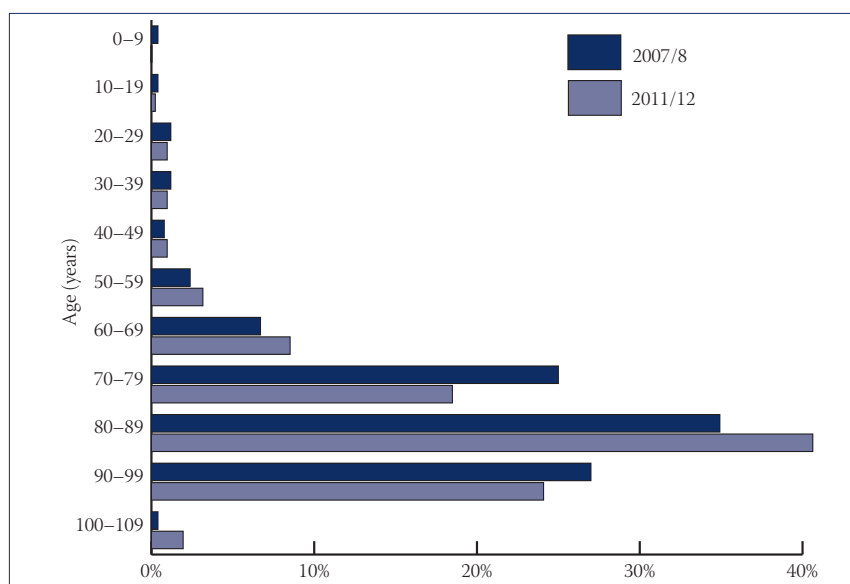


Figure 2. The age of patients referred to the nurse advisory service.

to include percentage values to compare the two specified one-year periods of the service.

Descriptive statistics were undertaken to present the data in terms of measures of frequency, trend and distribution.

#### Source of referrals

In 2007/8, the majority of referrals (83%,  $n=209$ ) were from the community, with 17% ( $n=43$ ) from hospitals; in 2011/12, hospital referrals had increased to 26% ( $n=105$ ), with 74% ( $n=306$ ) being community referrals (Figure 1).

While there was an increase in the total number of referrals, those from the community reduced by 8.4% and there was an increase from hospitals of 7.4%. The increase in hospital referrals may be a result of the focus on prevention and the directive to reduce hospital-acquired PUs, suggesting clinicians have an increased awareness of the need to refer patients for preventative and treatment measures. Hospital referrals requested equipment for use after discharge, in comparison with community healthcare professionals who requested advice, visits and/or equipment.

#### Age

Figure 2 shows the ages of referred patients. The number of referrals received for those aged 70–79 years had increased, but declined as a percentage of all ages by 6.5%.

Conversely, the actual number of referrals for the 80–89 year age group had almost doubled, and increased as a percentage of all ages by 5.7%. The reason for this was unknown, but speculation may be deteriorating health.

As people age, the risk of skin damage increases. Intrinsic aging is caused by the structure and function of maturing skin (Norman, 2003) due to effects of medication and comorbidities. Cooper et al (2006) suggested extrinsic ageing was due to exposure to central heating, the weather and soaps.

Moisturising is generally advised for dry and vulnerable skin, particularly as the soles of the feet have no sebaceous glands resulting in a lack of skin lubrication (Scanlon and Stubbs, 2005). However, as movement deteriorates and reaching feet gets harder, some people may be forced to depend more on carers to apply moisturisers. Campbell et al (2010) suggested wearing socks would reduce friction, but did not clarify if this was in bed.

#### Gender

Despite differences in the total number of patients (104 increase for females, 55 increase for males), the ratio of males:females was approximately the same.

Council data indicated that life expectancy was better for females, but women spent a higher proportion of their life in poor health and tended to live to an older age. Men experienced more life-threatening chronic diseases and died younger, which may be a reason for the total increase being less (Sheffield City Council, 2010).

Bergstrom et al (1996) suggested males generally have better tissue tolerance than females due to muscle mass and anabolic hormones. Females generally score higher than males on the Waterlow (1995) risk assessment tool. However, it is not evident at what age men should equal females in terms of muscle mass and hormones.

#### Geographical location

Postcodes were compared for all patients (Figure 3). When the data were examined it was evident which areas referred the most patients. It was unclear why some postcode (PC) areas had noticeably increased referrals — PC 4 (by 1.8%),

PC 8 (by 2.8%), PC 10 (by 1%), PC 13 (by 3.5%) — while some areas decreased their referrals — PC 2 (by 4.1%), PC 3 (by 0.8%), PC 6 (by 4.3%), PC 9 (by 3.6%), PC 17 (by 1.4%), PC 35 (by 2.3%) and PC 36 (by 2.2%).

Interestingly, PC 5 increased referrals from 17 to 68, which was a distribution percentage increase of 9.8%, while in relative terms it has trebled. While social care homes had closed in PC 8, 6 and 36, new residential homes had opened in PC 5 and 35. No other explanations were apparent.

Google Maps was used to classify the 20 postcodes as urban ( $n=1$ ), semi-urban ( $n=9$ ), rural ( $n=6$ ) or mixed rural/semi-urban ( $n=4$ ). According to the combined postcode data, the majority of low referral areas were urban or semi-urban, with one rural area. The areas with highest referrals were rural locations except for PC 2, which cannot be explained. If the figures were expressed as a percentage of the population in these areas (although no data are available), then in all probability rural areas would have a higher percentage of the population with heel damage as they are less populated in comparison to urban or suburban areas.

Council data suggested there were areas within the rural community that contain hidden pockets of deprivation and health inequalities — particularly those who used to work in heavy industry and higher proportions of older residents who need extra support services (Sheffield City Council, 2010).

**Reason for referral**

Data on the degree and the location of the pressure ulcer were obtained from patient records. The variability and validity of clinician’s abilities to stage wounds had to be questioned. Nixon et al (2005) suggest staging a wound is beneficial in ensuring a method of standardising the presence and severity. The data was scored as prevention or damage (Figure 4).

Referrals received for prevention had reduced from 22.6% ( $n=57$ ) in 2007/8 to 13.6% ( $n=56$ ) in 2011/12. This decrease could be due to increased knowledge, with clinicians advising treatment without referring to the NAS. The percentage distribution of heel damage had also reduced by 8%, from 60% ( $n=152$ ), to 52% ( $n=215$ ) in 2011/12.

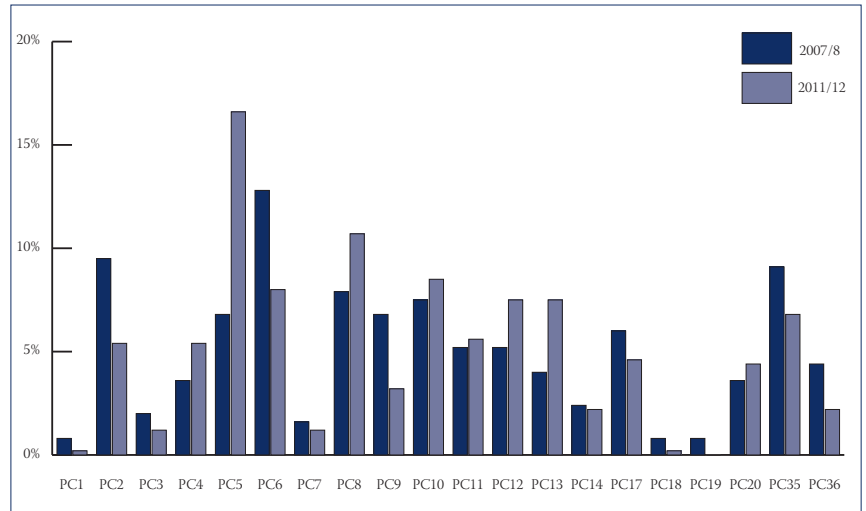


Figure 3. Geographical location by postcode for the referred patients.

On further investigation, it appeared more red areas with less actual broken skin were reported — possibly due to clinicians recognising the need to take action earlier. Referrals for damage to the malleolus had increased from 43 (17%) in 2007/8 to 140 (34%).

**Advice and equipment provided**

**Advice**

Advice only (without a piece of equipment) was once the seventh and is now the third most recommended option given (Table 1). Advice may include skin care, future equipment consideration, referral to other departments, and follow-up advice. It is expected that advice would be given by clinicians even if equipment was provided, but this was unable to be quantified within this audit.

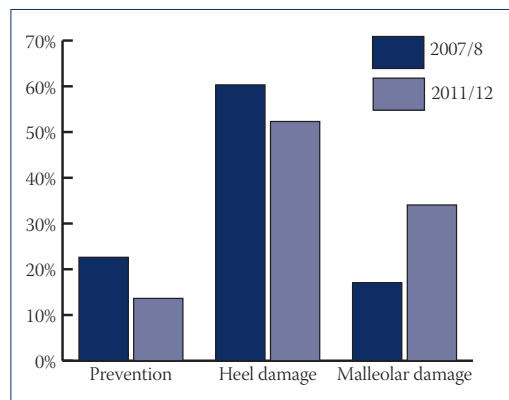


Figure 4. Reasons for referral to the service.

*“Offloading using the bed pillow... is now the fourth most recommended option.”*

Table 1. Advice and equipment supplied.

	2007/8 (n=252)	2011/12 (n=411)
Advice only	7 (2.8%)	47 (11.4%)
Offloading with pillow	0	46 (11.2%)
Offloading with boot	93 (36.9%)	78 (19%)
Offloading with wedge	0	8 (2%)
Offloading and mattress	12 (4.8%)	10 (2.4%)
Mattress	113 (44.8%)	138 (33.6%)
Cushion	11 (4.3%)	30 (7.2%)
Mattress and cushion	5 (2.0%)	15 (3.7%)
Mattress, cushion and boot	1 (0.4%)	1 (0.2%)
Nursing home	10 (4%)	38 (9.3%)

### Repositioning

Repositioning was advised for anyone who was unable to move, regardless of the provision of equipment. To relieve pressure, the 30° tilt remained the preferred positioning mechanism (Defloor, 2000), because it resulted in the lowest pressure applied to the skin when compared to traditional lateral turning. This is described within this organisation as using pillows, strategically placed to ensure an alternating tilted position.

Frequency of repositioning was never mentioned on the referral form. The NICE (2001) guidelines do not state frequency, but suggests it is dependent on patient need.

### Offloading with pillow

Offloading using the bed pillow was not advised by the NAS in 2007/8 because the benefits were not known. It is now the fourth most recommended option. Other pieces of equipment supplied include boots or pressure reducing/relieving mattresses.

The use of pillows is cost effective, according to NICE (2005), and they are immediately available. Two concerns expressed by Heyneman et al (2009) were if the foot was to come off the pillow, and variability in application.

The most effective way is with the longest dimension of the pillow orientated to the length of the leg and the heel suspended over, according to the NICE (2003) guidelines.

In the community setting, pillows are not always viewed as equipment, but rather are considered the property of the patient. Therefore, a high percentage of trust is required between the

clinician and the patient for concordance.

European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel guidelines (2009) suggest relieving pressure by floating heels off the bed. The pillow was the only equipment where concerns were noted with the ankle because boots would only offload the heel. The pillow was totally unsuccessful in cases where skin damage was a result of shear and friction, when a boot attached to the foot with straps or tubular bandage would be considered.

### Offloading with boot

Within the NAS, boots (fibre filled, static air or foam) were regularly requested, but had reduced by 16.9% (from 36.9% distribution to 19%); even so, they remain the second most requested item.

The aim of the boot is to offload pressure from the heel, but they are useless if applied incorrectly (Campbell et al, 2010). There were potential issues with some boots, including increased sweating affecting attempts to keep a necrosed heel dry, discomfort due to the size of the boot, and safety if the patient decided to get out of bed.

In a study of one particular boot, Donnelly et al (2011) indicated patients did not develop heel damage when elevated off the mattress during treatment. This also was observed by Campbell et al (2010), who found zero ulcers on discharge after hip surgery. However, Donnelly et al (2011) also found that while the boot prevented heel damage it did not meet patients' needs in terms of comfort, which affected concordance.

### Offloading with wedge

The static air wedge used now was not available in 2007/8. Within the NAS wedges have been used to facilitate offloading; they are attached to the bed to maintain a safer environment where patients cannot get their legs tangled, which is not the case with pillows.

However, Heyneman et al (2009) compared pillows to a wedge and found the wedge was more supportive as it followed the anatomical shape of the calf, thus maximising the contact surface area.

The height of the wedge is of significance — if it became compressed when using with heavier legs, then it would result in pressure on the heel (Campbell et al, 2010).

### Mattress

The mattresses remained to the favoured piece of equipment (but this has reduced from 44.8% of all distributed equipment to 33.6%), as clinicians are understanding the benefits of different types of equipment.

Donnelly et al (2001) suggested devices which protect the heel were more effective than either powered or static mattresses, but no further evidence has been found for this statement. There is no evidence to determine the selection of one mattress over another and consideration should be given to patient's quality of life, activity, and mobility, intrusiveness (noise and size), ease of use, reliability and direct/indirect costs (Donnelly et al, 2001).

Other equipment that supported the reduction of heel damage included the slide sheet (NICE, 2001), and profiling bed frames, both of which may reduce shear forces if used correctly. The recommendation of providing offloading and using a mattress have remained fairly consistent between the years.

### Medical condition

The referral forms specified which patients had a diagnosed medical condition and was identified as a risk factor using the Waterlow risk assessment tool (Table 2). The most noted percentage value of distribution decrease was neurological (motor neurone disease, multiple sclerosis, Parkinson's disease, cerebral palsy, spina bifida and muscular dystrophy) by 5.3%, cerebrovascular accident (by 4.0%) and lower body orthopaedic surgery (by 3.3%).

Table 2. Individual patient risk factors.

	2007/8 (n=232)	2011/12 (n=366)
Diabetes	35 (15.1%)	69 (18.9%)
Peripheral vascular disease	19 (8.2%)	25 (6.8%)
Lower body surgery	42 (18.1%)	55 (15%)
Anaemia	7 (3%)	6 (1.6%)
Cerebrovascular accident	52 (22.4%)	68 (18.6%)
Heart disease	26 (11.2%)	57 (15.6%)
Spinal	4 (1.7%)	9 (2.5%)
Cancer	19 (8.2%)	53 (14.5%)
Neurological conditions	28 (12.1%)	24 (6.6%)

Patients diagnosed with cancer had a percentage value distribution increase of 5.5%, heart disease by 3.6% and people with diabetes (by 2.8%). Within this audit, it was unknown how many medical conditions were well controlled in respect of disease pathology, having treatment for or if there were external causes resulting in heel damage.

The use of generalised risk assessment tools had no effect on assessing risk of reducing heel damage (Moore and Cowman, 2008). In research by Campbell et al (2010), a prevention programme was universally applied to all orthopaedic patients instead of only those calculated to be high risk. The NAS does not request a scoring system on the referral form, but appreciates clinicians are aware of the risk factors identified and should view patients as an individuals.

According to Gilcreast et al (2005), individuals most at risk of developing heel damage are those with peripheral vascular disease or diabetes, and Campbell et al (2010) acknowledged a high incidence in orthopaedics.

Comorbidities such as memory loss, arthritis, mental health, learning disabilities and deep vein thrombosis were not included as they were not noted in the Waterlow tool as potential risks, but would certainly influence heel damage; whether due to lack of concordance or physical disability.

### CONCLUSION AND RECOMMENDATIONS

By way of a local audit analysing data collected by a NAS, the results demonstrated an increase in the number of referrals from hospitals compared to the community, patients were most often referred between the ages of 80 to 89 years, with more females at risk and the highest number referred from rural areas.

The majority of increased referrals were a result of damage to the malleolus. This can only be explained as better reporting in more recent years, and acknowledgement by clinicians of the issue, but further work is required. In comparison, heel damage had reduced.

The results of this audit were interesting and gave an insight into how the referral requests have changed and what equipment is actually asked for. The change of equipment requests also

*“There is no evidence to determine the selection of one mattress over another.”*

***“Patients and carers require information that reinforces the importance of looking after their feet.”***

reflects similar results in the literature, for example, demonstrating that offloading was more effective in prevention and treatment.

Pressure ulcers will never disappear, however, prevalence rates can be reduced, costs to clinical environments decreased and patient suffering eliminated or reduced.

Future research should focus on earlier identification of who is at risk, consideration of an assessment tool appropriate to the heel and understanding the characteristics of patients who do go on to develop heel damage, along with an assessment of equipment.

As a result of this audit, a series of recommendations was produced. Firstly, through training and adherence to local guidelines, clinicians will be made aware that it is imperative that heels are considered and treated accordingly when assessing pressure areas. Secondly, patients and carers require information which reinforces the importance of looking after their feet, encouraging moisturising the skin, and preventing pressure and friction (particularly if the patient is immobile), in order to reduce skin damage and the associated discomforts. Thirdly, a device needs to be found for each patient that will not hinder day-to-day living, and is cost-effective and safe. And finally, due to the limited clinical evidence on skin damage to the heel, to disseminate the findings to a wider audience.

While there are national and international guidelines available, the responsibility of the NAS is at a local level. The NAS provides a service underpinned with rich, high-quality, up-to-date literature that reflects best practice guidelines and supports improvements in clinical practice. It is also crucial to highlight the importance of parts of the foot and how they are taken for granted.

The feet are distinct from other body sites and are designed for weight-bearing in the standing position. However, they are not necessarily the most attractive part of the body as it ages and, commonly, in many cases the older person cannot even see, reach or care for their feet correctly so would rather ignore them. When they ache or look misshapen and oddly coloured, patients acknowledge it is just part of growing old. During an average lifespan, they are subject to considerable stress and trauma, so let's stand up and support them by preventing any damage to heels and malleoli.



## REFERENCES

- Bergstrom N, Braden B, Kemp M et al (1996) Multi-site study of incidence of pressure ulcer and the relationship between risk level, demographic, characteristics, diagnosis and prescription of preventative interventions. *J Am Geriatr Soc* 44(1):22–30
- Berry L (2012) *Nurse Advisory Service Data Collection (2007-2008, 2011-2012)*. Trent Region, England
- Berry L, Clarke B (2007) Nurse advisor for pressure relieving/reducing equipment: The story so far. *Equipment Services* 108–11
- Campbell KE, Woodbury MG, Houghton PE (2010) Implementation of best practice in the prevention of heel pressure ulcers in the acute orthopaedic population. *Int Wound J* 7(1):28–40
- Cooper P, Clark M, Bale S (2006) *Best practice statement: Care of the older person's skin*. London, Wounds UK
- Defloor T (2000) The effect of position and mattress on interface pressure. *Appl Nurs Res* 13(1):2–11
- Donnelly J (2001) Hospital-acquired heel ulcers: A common but neglected problem. *J Wound Care* 10(4):131–6
- Donnelly J, Winder J, Kernohan WG, Stevenson M (2011) An RCT to determine the effect of a heel elevation device in pressure ulcer prevention post hip fracture. *J Wound Care* 20(7):309–18
- European Pressure Ulcer Advisory Panel (1999) Guide to pressure ulcer grading. *EPUIAP Rev* 3(1):75
- European Pressure Ulcer Advisory Panel, National Pressure Ulcer Advisory Panel (2009) Treatment of pressure ulcers: Quick Reference Guide. National Pressure Ulcer Advisory Panel, Washington DC
- Fowler E, Scott-Williams S, McGuire JB (2008) Practice recommendations for preventing heel pressure ulcers. *Ostomy Wound Manage* 54:42–57
- Gilcreast DM, Warren JB, Yoder LH et al (2005) Research comparing three heel ulcer-prevention devices. *J Wound Ostomy Continence Nurs* (32):112–20
- Heyneman A, Vanderwee K, Grypdonck M, Defloor T (2009) Effectiveness of two cushions in the prevention of heel pressure ulcers. *Worldviews Evid Based Nurs* 6(2):114–20
- McGinnis E, Stubbs N (2011) Pressure-relieving devices for treating heel pressure ulcers. *Cochrane Database Syst Rev* 9:CD005485
- Moore ZE, Cowman S (2008) Risk assessment tools for the prevention of pressure ulcers. *Cochrane Database Syst Rev* 3:CD006471
- National Patient Safety Agency (2010) *NHS to adopt zero tolerance approach to pressure ulcers*. Available at: [www.npsa.nhs.uk](http://www.npsa.nhs.uk) (accessed 01.04.2014)
- National Institute for Health and Care Excellence (2001) *Pressure Ulcer Risk Assessment and Prevention*. NICE, London
- National Institute for Health and Care Excellence (2005) *The management of pressure ulcers in primary and secondary care. Clinical Guideline 29*. Available at: <http://www.nice.org.uk/cg29> (accessed 01.04.2014)
- Nixon J, Thorpe H, Barrow H et al (2005) Reliability of pressure ulcer classification and diagnosis. *J Adv Nurs* 50(6):613–23
- Norman RA (2003) Geriatric dermatology. *Dermatol Ther* 16(3):260–8
- Posnett J, Franks PJ (2007) The costs of skin breakdown and ulceration in the UK. Smith & Nephew Foundation, Hull
- Reid R, Haggerty J, McKendry R (2002) *Defusing the Confusion: Concepts and Measures of Continuity of Healthcare*. Canadian Health Services Research Foundation, Ottawa, ON
- Scanlon E, Stubbs N (2005) Pressure relieving devices for treating heel pressure ulcers. *Cochrane Database Syst Rev* (4):CD005485
- Sheffield City Council (2010) *Sheffield's Health and Wellbeing. Joint Strategic Needs Assessment Report*. Available at: <http://bit.ly/P15iij> (accessed 25.04.2014)
- Waterlow JA (1995) The use of the Waterlow pressure sore prevention/treatment policy card. *Primary Intention* 3(2):14–21