The role of barrier protection in pressure ulcer prevention

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Abstract
This article considers the anatomy and physiology of the skin, the natural protection the skin provides in relation to barrier protection and the importance of barrier protection in pressure ulcer prevention. The current national pressure ulcer agenda including high impact actions and the SSKIN care bundle, along with their implementation within one NHS Health Care Trust are discussed.

Key words: Barrier protection ■ Pressure ulcer prevention ■ SSKIN bundle

The most significant role of the skin is to be a protective barrier against the external environment. The skin is covered with a naturally produced lipid layer, which helps to maintain moisture balance, prevents drying and provides an effective waterproof barrier. Normal skin pH is around 5.5, which significantly reduces the ability of bacteria to proliferate (Butcher and White, 2005). Skin dryness may occur from excessive washing or use of alkaline soaps, which alters the pH of the skin reducing its barrier function (Wysocki, 2000). Bodily fluids including urine and faeces can waterlog, macerate and corrode the outer layer of the epidermis (stratum corneum) leading to weakening and breakdown of the skin, often painful in nature (Wounds International, 2010). As the skin ages, the epidermis gradually thins and the papillae that lie between the epidermis and the dermis become flattened, reducing the skin’s resistance to shearing forces (Voegeli, 2010) and its ability to perform many of its essential functions (Wysocki, 2000).

Skin assessment
Identifying early signs of pressure damage is vital in the prevention of category II and II pressure ulcers. The European Pressure Ulcer Advisory Panel (EPUAP) (2009) and the National Institute for Health and Care Excellence (NICE) (2005) advocate that essential skin assessment should be undertaken and should be part of training for health professionals. Importantly, the need to protect vulnerable areas of the skin and prevent skin breakdown is considered to be a cornerstone of professional care across all spheres of practice (Voegeli, 2008). Consideration should be given in skin assessment to skin changes in the older person (Wounds UK, 2012) and skin changes at life’s end (Sibbald et al, 2009).

Newton and Cameron (2003) advocate four essential aspects of skin assessment: colour, texture, temperature and integrity. The skin should be observed for signs of colour change, reddening or blistering (white areas) in Caucasian skin types and for a bluish purple hue in darker skin types. Skin assessment should also include observation for increased heat, swelling, pain or guarding of an area and evidence of shiny areas or superficial breaks owing to shearing forces against the skin. The implementation of care rounds including assessing and monitoring of skin (Bartley, 2011) as part of harm-free care (Institute for Healthcare Improvement, 2011) has led to the implementation of a visual skin assessment during each care round (1–2 hourly) in community hospital and at each district nursing visit. Thomas-Hess (2000) proposes the following key areas for skin management:

■ Take caution with the force applied when washing the skin and avoid massaging areas that could be easily damaged
■ Offer prompt attention when incontinent episodes occur and protection of skin with barrier protection
■ Aim to avoid drying of the skin through extremes of temperature
■ Ensure that patients are positioned, transferred and turned properly to avoid friction and shear forces
■ Cleanse the skin at frequent intervals, using a pH-balanced cleansing agent followed by moisturisers and barrier cream.

Pressure ulcer agenda
There is a significant challenge in delivering high-quality care while improving its efficiency amid an era of growing demand for healthcare resources. In England, a recent White Paper, which is centered on efficiency improvements, outlined government strategy to address these issues (Department of Health (DH), 2010a). The Operating Framework for the NHS in England for 2012–13 requires that service quality and the patient experience must improve, and productivity increase (DH, 2012). The DH (2010a) identifies pressure ulcers as a future outcome indicator, reporting that in 2007/8 there were 42,995 episodes of pressure ulcers. Pressure ulcer prevention is an area that is recognised as having significant impact on quality of care and this has been increasingly elevated on political agendas in recent years. This is owing...
to the increasing emphasis on preventative health care and a belief that pressure ulcers are preventable (NHS, 2012). The National Patient Safety Agency (NPSA) has been urging NHS organisations across England and Wales to work towards preventing all pressure ulcers (NPSA, 2010a; 2010b).

**Pressure ulcer care delivery**

Current care delivery in relation to pressure ulcers is informed by NICE guidelines (2005), EPUPAP guidelines (2009) and, more latterly, through the introduction of High Impact Actions ‘Your Skin Matters’ (DH, 2010b) and the quality agenda Quality, Innovation, Productivity and Prevention (QIPP) (DH, 2010a). An initial target ambition was set out aiming to prevent category III and IV pressure ulcers; this has been expanded by the introduction of the elimination of avoidable pressure ulcers across the Midlands and East in the UK (NHS Midlands and East, 2012).

Several intrinsic and extrinsic factors contribute to pressure ulceration development. Intrinsic factors include sensory impairment, immobility, age, poor nutrition, incontinence, and chronic illness (NICE, 2005). Extrinsic factors include pressure, shear, friction, and the impact of incontinence (NICE, 2005; EPUPAP, 2009). The significance of each is not fully understood (EPUPAP, 2009) and the cause of pressure ulcers has been the subject of much research and discussion. Pressure has been considered to be the most significant physical force responsible for the development of pressure ulceration (NICE, 2005). Pressure over a bony prominence will compress the capillaries and prevent nutrients and oxygen accessing the skin. Unrelieved pressure leads to tissue ischaemia, with metabolic wastes accumulating in the interstitial tissue, ultimately resulting in hypoxia and cell death. Sample biopsies from tissues reddened through pressure have been demonstrated to show an increase in bacterial loading within the tissues as a result of the hypoxia (Sugama et al, 2005). As the amount of shear/friction increases, the amount of pressure required to cause ulceration is reduced (Conner and Clack, 1993). Shear, friction, and microclimate have also recently been identified by an expert panel as a major cause of tissue damage (Wounds International, 2010). Specifically, there is an inverse relationship between shear, friction and pressure. The cause of pressure damage and the rate at which this occurs is clinically important and clinicians need to be alert to the reduced time for pressure damage to occur when shear/friction is a consideration (Wounds International, 2010).

Importantly, pressure ulcers are a considerable burden for the NHS, being a significant cause of morbidity and mortality (Posnett et al, 2009). Gorecki et al (2009) conducted a review of 31 studies, reporting the impact of pressure ulcers and pressure ulcer interventions on health-related quality of life (HRQoL). Pressure ulcers were found to significantly affect physical, social, psychological, and financial aspects of HRQoL. Pain was identified as a significant concern and, importantly, patients attributed their pressure ulcers to inadequate health care and a lack of knowledge on the part of health professionals regarding the prevention of pressure ulceration.

The financial cost of pressure ulcers has been estimated at £2.3–£3.1 billion per year in the UK, which would account for 3% of the annual NHS expenditure at 2005/6 levels (Posnett and Franks, 2007). The DH (2010a) estimates that a category III pressure ulcer costs between £363000 and £443000 to treat and that a category IV ulcer costs between £447000 and £668000. The majority of these wounds are chronic in nature and are cared for in the community setting by GPs and community nurses (Drew et al, 2007).

Once the level of risk has been ascertained, the key to reducing it relies on appropriate preventative care and treatment plans being developed and implemented (NICE, 2005). The education of staff at all levels and disciplines on risk assessment using validated tools, care planning, documentation and the implementation of appropriate pressure reducing equipment is paramount in the identification and subsequent prevention of pressure ulcers (Institute for Healthcare Improvement, 2008).

**High Impact Actions and SSKIN bundles**

The high impact actions (DH, 2010b) indicate the majority of pressure ulcers that develop in NHS-provided care are avoidable, stating that it is the processes regarding prevention that fail. It identifies that to eliminate pressure ulcers requires input from the multidisciplinary team. This requires development of simple processes that will reduce avoidable pressure ulcers (DH, 2010b).

The latest guidance relates to the actual delivery of prescribed care in the prevention of pressure ulcers through the use of SSKIN bundle documentation packages (Institute for Healthcare Improvement, 2011). Following the successful implementation of the SSKIN care bundle in Wales, it was implemented in Scotland in 2011 and is supported by Healthcare Improvement Scotland (2013). A bundle of care is defined as a structured way of improving processes of care and significantly improving patient outcomes (Institute for Healthcare Improvement, 2011).

McCarron (2011) clarifies the crucial aspect of a successful care bundle as ensuring that every identified intervention is performed in a sequence of steps and that no component is eliminated. Omitting any one of the interventions in a SSKIN bundle is likely to result in the development of a pressure ulcer. The critical difference between a SSKIN bundle and a traditional care plan is that a bundle is an essential set of steps in a process where a complication may arise if one is missed (Institute for Healthcare Improvement, 2011). Bundles were initially used to reduce ventilator-associated pneumonia (Resar et al, 2005) and are now advocated as a structured method for preventing pressure ulceration (Lloyd Jones, 2012).

The objective of a bundle is to make a process more reliable by improving motivation, compliance and implementation of a strategy for care (Stephen–Haynes, 2011). Therefore, SSKIN care bundles are essential in the prevention of pressure ulcers and should be implemented for every patient at risk to achieve the elimination of avoidable pressure ulcers. The SSKIN bundle acronym represents the five essential elements of pressure ulcer prevention (Institute for Healthcare Improvement, 2011):
**Surface**

Ensuring the appropriate surface is available within a 24-hour period, that it is being used correctly and is clinically effective and fit for purpose with an Electro-Biomedical Engineering Department (EBME) and Portable Appliance Testing (PAT) undertaken.

**Skin**

Early visual inspection of skin with a focus on early detection and prevention of breakdown or deterioration by early intervention of pressure relieving regimes, cleansing, moisturising and skin barrier protection.

**Keep moving**

Ensuring patients are repositioned or encouraged to mobilise independently at every care round in community hospitals and at every district nursing visit and recorded in the SSKIN care bundle.

**Incontinence**

At each care round, staff ensure that the patient is clean, dry and comfortable. Incontinence assessments are undertaken and barrier protection is implemented both preventively and as a treatment strategy.

**Nutrition**

Ensuring patients have an appropriate dietary and fluid intake to maintain their nutritional status and hydration levels. This should be conducted 2-hourly as part of care rounds within community hospitals and at every district nursing visit. Intake and supplement therapy is monitored and documented accordingly.

Following the implementation of the SSKIN bundle, the Midland and East have reduced the incidence of pressure ulcers by 36% in 6 months (Ford, 2012).

**Barrier film protection: prevention, treatment and management**

The aim of a barrier film or cream is to mimic the skin’s natural barrier function with the purpose of protecting, repairing, restoring or preventing skin damage. The moisturising capability lays down a durable protective barrier affording the optimum protection. The use of no-sting barrier films began in the UK in the late 1990s and this has increased steadily. Guest et al (2011) found that despite barrier films being more expensive to purchase than zinc oxide and petroleums-based products, the reductions in labour more than offset the additional cost. According to Guest et al, the potential savings in the right care settings could reach several millions of pounds.

### Sorbaderm barrier protection

Sorbaderm No-Sting Barrier Film is a non-cytotoxic acrylate co-polymer liquid film that forms a flexible long-lasting waterproof barrier for the protection of intact or the treatment of damaged skin. With its high-moisture vapour transmission rate, it acts as a protective interface between the skin and bodily fluids, adhesive products, and mechanical stress and aims to mimic the body’s natural protection function. The barrier film can be used clinically for incontinence, peristomal skin protection, peri-wound skin protection and adhesive trauma protection. It provides up to 72 hours of skin protection depending upon the severity of the corrosive fluid or exposure and as it does not contain alcohol, it does not sting. It is transparent, allowing for continuous visualisation and monitoring of skin at risk of breakdown.

Sorbaderm No-Sting Barrier Cream is a highly concentrated, long-lasting latex and fragrance-free protective barrier that does not clog incontinence or dressing devices, providing effective skin moisturising and long-term barrier protection from bodily fluids.

Stephen-Haynes and Stephens (2012) report a study with two arms involving 95 subjects within a UK primary care organisation. The objective was to determine the clinical outcomes and acceptability of a no-sting barrier film and cream product.

**Study outcomes**

The indications included in the study were peri-wound protection, incontinence and pressure ulcers.

The clinical indications explored were:

- Prevention of skin breakdown
- Maintenance of skin condition
- Peri-wound maceration
- Excoriation and incontinence-related skin protection
- Adhesive skin stripping

Of the 95 patients recruited, the barrier cream was evaluated in 39 patients and the no-sting barrier film in 53 patients.

**Inclusion criteria**

- Patient >18 years of age
- Patient is willing to participate and has capacity to consent
- Patient has an indication suitable for treatment with a barrier product
- Patient will be seen regularly by the evaluator.

**Exclusion criteria**

- Patient is <18 years of age
- Patient does not wish to participate or have capacity to
also be considered (Clark, 2010; Deakin et al, 2010). Economic models including nursing time and material costs, favour the use of barrier films and creams (Clark, 2010; Deakin et al, 2010).

There is increasing evidence relating to the clinical and financial benefits of skin protection and, in particular, to that of no-sting barrier films and barrier creams when compared with more traditionally used skin protection such as petroleum-based creams (Stephen-Haynes and Stephens, 2012). The author acknowledges that the current emphasis on pressure ulcer prevention led to a low number of patients with pressure damage taking part in this 95-patient study. In addition, subjectivity was a limitation of the original study due to reflective comparison to previous treatment regime rather than any form of direct comparator.

Clinical care studies

*Figure 1* shows a 67-year-old female with a sacral pressure ulcer with a high exudate level due to damage to the peri-wound skin caused by wound exudate. Sorbaderm No-Sting Barrier Film was used for 48 hours. *Figure 2* demonstrates the impact of the barrier film on the peri-wound area; the peri-wound skin is now intact.

*Figure 3* shows the pressure ulcer and damage to the peri-wound area of a 50-year-old gentleman. The pressure ulcer occurred following a trauma injury. *Figure 4* demonstrates the improvement in his peri-wound skin following the application of Sorbaderm No-Sting Barrier Film for 72 hours.

*Figure 5* is a photo of a back ulcer on a 74-year-old lady who has arthritis renal failure and a curvature to the spine. She has been a very heavy smoker for most of her life and has a cough. On investigation, a tumour was noted but not treated at her request. This patient developed a pressure ulcer to her spine. This started as a small area with a large area of excoriation to the peri-wound area. When the author first saw this lady, the peri-wound area was excoriated from both exudate and the dressings being removed. The patient found dressing changes very painful and sat upright in bed, uncomfortable for many hours at a time. This left the skin on the curvature of her spine vulnerable and more easily damaged by shear and friction from movement in the bed. Sorbaderm No-Sting Barrier Cream was applied to the peri-wound and this has improved the peri-wound skin and decreased her discomfort.

*Figure 6* shows a 67-year-old gentlemen with Parkinson’s disease developed the ulcer shown in *Figure 6*. His Parkinson’s disease causes frequent movement, resulting in shear and friction. He developed this ulcer following a problem with his seating (he has a moulded wheelchair). The peri wound needed to be maintained during debridement. The excessive moisture during this period of debridement and the involuntary movements could have resulted in extensive peri-wound excoriation and enlargement of the ulcer. The exudate did cause excoriation as *Figure 6* shows, but the Sorbaderm No-Sting Barrier Film helped to reduce this (*Figure 7*). When barrier film is applied to the whole of the area, it supports the dressing in place and prevents irritation and skin stripping from the secondary dressing.

A 72-year-old lady acquired a category IV pressure ulcer...
to her sacrum (Figure 8) following an acute admission for breathing problems and dizzy spells (she was diagnosed with Guillain-Barré syndrome so carers and relatives had been unable to move her). This patient was previously mobile, very independent and healthy for her age. She looked after her husband who was found to have early dementia.

When this patient was transferred to a community hospital, this ulcer had very heavy exudate and the cavity was very large (12 cm x 9 cm x 4 cm deep) (Figure 9). The ulcer, and resulting loss of immobility, caused this patient to be depressed (she had loss of feeling in her legs although this was returning slowly).

The author and colleagues had to consider how to effectively manage the exudate while protecting the peri wound. Sorbaderm No-Sting Barrier Film was commenced upon her admittance to the community hospital owing to the high volume of exudate.

The wound was very painful to dress, requiring entonox (gas and air). Negative pressure wound therapy was used to dress the wound at the beginning; maintenance of the peri-wound area was very important in order to achieve a good seal and prevent the ulcer from getting bigger. Following a multidisciplinary team meeting, the team started physiotherapy with the patient and she began to walk within 5 weeks. Her ulcer has now almost healed (Figure 10) and she has returned home with her husband.

Conclusion
The prevention of pressure ulcers and maintenance of healthy skin integrity is a key government agenda and a significant clinical challenge for health professionals and carers. Pressure ulcer prevention and management are of particular significance in an increasingly elderly population owing to mobility issues, continence status and skin changes that can occur with ageing, chronic illness, and at the end of life. It is essential for all nurses and allied health professionals to consider pressure ulcer prevention and be knowledgeable regarding prevention and treatment processes. Ensuring fundamental nursing is delivered and the SSKIN care bundle is implemented every time for every patient is essential in the prevention of pressure ulcers. The evidence suggests the use of SSKIN bundles and the appropriate use of barrier film protection can contribute to the prevention, treatment and maintenance of the skin’s barrier function, helping to protect and restore.

Conflict of interest: Sorbaderm Barrier Cream and Sorbaderm Barrier Film used in the author’s study were supplied by Aspen Medical.
**KEY POINTS**

- The prevention of pressure ulcers is a key national agenda.
- SSKIN bundle implementation is an essential part of the elimination of avoidable pressure ulcers.
- Timely skin assessment, skin care and the use of barrier protection are an important component of the strategy for pressure ulcer prevention.
- An evaluation of barrier films and creams indicates the importance of barrier protection as an essential component of pressure ulcer prevention.


