

DETECTING PRESSURE DAMAGE IN PEOPLE WITH DARKLY PIGMENTED SKIN

Identifying the early stages of pressure damage in patients with darkly pigmented skin can be difficult. This article explores current pressure ulcer categorisation systems and the advice for nurses who need to prevent pressure damage in all their at-risk patients. It will also examine technological advances that have been designed to overcome the difficulties there are in detecting pressure damage in people with darker skin.

“Skin pigmentation can mask the visual indication of erythema and category 1 pressure ulcers are more likely to go undetected and deteriorate to full thickness pressure ulcers in darkly pigmented skin.”

Pressure ulcers have a range of presentations. In their early stages they can appear as a discolouration of the skin that will disappear in a few hours if the pressure is relieved. The most serious ulcers can be deep wounds, often down to the bone which may require surgical intervention and result in a lengthy recovery for the patient (Romanelli et al, 2006).

The daily cost to the NHS of treating a pressure ulcer is estimated to range from £43 to £374 depending on severity (Dealey et al, 2012). Pressure ulcers have been discussed in the literature for many decades and their prevention and management have been the core of a tissue viability nurse’s daily workload (Guy et al, 2013). The findings from the Mid Staffordshire public enquiry published in February 2013 into patient neglect placed a particular emphasis on patient safety, nutrition, hydration and pressure ulcer prevention (McIntyre, 2014) and prevention is high on the agenda.

Pressure ulcers are caused when an area of skin and underlying tissue are damaged as a result of being placed under pressure sufficient enough to impair the blood supply and deprive it of nutrients and oxygen (National

Institute of Health and Care Excellence [NICE], 2014). Tissues are capable of withstanding extensive pressure briefly but prolonged exposure to pressure initiates a series of events that can lead to necrosis and ulceration of the tissue (Keogh et al, 2013). Since exposure to sustained mechanical loading is the prime factor contributing to the development of a pressure ulcer, they commonly occur in people who do not have the ability to reposition themselves (Moore and Cowman, 2012). Risk factors are shown in *Box 1*.

Traditionally, nurses assessing a patient’s skin are taught to look for redness to detect the first signs of pressure damage, but this proves to be a problem when assessing patients who have darkly pigmented skin (Scanlon, 2004). The erythema or redness of the skin can signal the inflammatory response of a category 1 pressure ulcer. Early identification of post-ischaemic erythema is clinically very important since early intervention can prevent progression to more serious ulceration (Sprigle et al, 2009).

Skin assessment is key when caring for patients who are at risk of developing pressure damage. The effectiveness of the visual skin assessment depends greatly on the skills of the carer or nurse

MICHELLE BAKER
Pressure Ulcer Prevention Nurse,
Tissue Viability, Leeds NHS
Teaching Hospital Trust

Box 1. Risk factors (NICE, 2014).

- ▶▶ Significant limitation in mobility
- ▶▶ Sensory impairment
- ▶▶ Malnutrition and dehydration
- ▶▶ Inability to reposition themselves
- ▶▶ History of pressure ulcers
- ▶▶ Significant cognitive impairment
- ▶▶ Acute illness.

and their ability to detect changes to the skin (Scanlon, 2004). It also depends on their ability to grade a pressure ulcer correctly (Box 2).

Skin assessment for darkly pigmented skin

Identification of erythema whether blanching or non-blanching offers early identification of pressure damage. This can pose a challenge when assessing patients with darkly pigmented skin (Bethall, 2005). Skin pigmentation can mask the visual indication of erythema and category 1 pressure ulcers are more likely to go undetected and deteriorate to full thickness pressure ulcers in darkly pigmented skin (Bennett, 1995, Sprigle et al, 2009). This may explain why Rosen et al (2006) found in their study of patients and staff in a large nursing home that black patients were more likely to develop category 2 to category 4 pressure ulcers. Furthermore, black patients with any pressure damage were also more likely to develop multiple category 2 pressure ulcers compared with white patients. Similarly, Baumgarten et al (2004) concluded that the incidence of pressure ulcers in nursing home residents were higher in those with darkly pigmented skin.

A high melanin concentration in the skin makes it difficult to detect erythema in patients with darkly pigmented skin (Bennett, 1995). Therefore, although erythema has been identified as the main indicator of pressure damage, this is not possible in darkly pigmented skin. However, there are other signs and symptoms that can be observed (Scanlon, 2004) (Box 3).

Box 2. Classification of pressure ulcers (NPUAP/EPUAP/PPPIA 2014).

Category 1

Intact skin with non-blanchable redness of a localised area, usually over a bony prominence. Darkly pigmented skin may not have visible blanching and its colour may differ from the surrounding area. The area may feel painful, firm, soft, warmer or cooler when compared with surrounding tissue.

Category 2

Partial-thickness loss of the dermis resulting in a shallow open ulcer with a red/pink wound bed. No slough will be present. It may also present as an intact or ruptured serum-filled blister.

Category 3

Full-thickness tissue loss. Subcutaneous fat may be visible but tendon, bone, or muscle will not be exposed. Slough may be present, but the depth of the tissue loss will not be obscured. May include undermining or tunnelling.

Category 4

Full-thickness tissue loss. Bone, tendon and muscle will be exposed. Slough or eschar may be present on some parts of the wound bed. The wound often has undermining and tunnelling. Osteomyelitis is a possibility due to exposed structures.

Unstageable

Full-thickness tissue loss in which the base of the wound is obscured by either slough (yellow, tan, grey, green, or brown), and/or eschar (tan or brown). Until enough slough and/or eschar is removed, the true depth of the wound is unknown.

Suspected deep tissue injury

Purple or maroon localised area of skin discolouration or blood-filled blister due to damage of the underlying tissue from either pressure or shear, may be preceded by pain or the immediate area may feel firm, mushy, boggy, warm or cool when compared with the surrounding tissue. May be very difficult to detect on dark skin.

Advances in skin assessment

A number of studies have looked at infrared spectroscopy to help detect the blanch response regardless of the amount of melanin present in the skin. Matas et al (2001) suggested that a spectroscopic blanch test will enable the detection of category 1 pressure ulcers, regardless of the level of pigmentation. Furthermore, the study provided a sound scientific basis for the development of a spectroscopic blanch response tool that could be a hand-held device that could be used on all patients who are at risk of pressure damage, regardless of colour. Sprigle et al (2009) looked at the use of tissue reflective spectrometry (TRS) as an indicator of deep-tissue damage. They suggested that although TRS does have a place in observing areas of discolouration located at weight-bearing bony prominences or typically high-

risk sites, it should not replace good clinical assessment.

Sprigle et al (2009) identified that currently, no tools are available to assist the detection of erythema. Although full function spectrometers and multi-spectral imaging systems are capable of detecting erythema regardless of skin colour, they state these devices are not well suited for clinical environments. Kong et al (2010) explained that from their findings, multispectral imaging technology does have applications in many fields, however, due to the current imaging systems they are costly and bulky and this prevents them from having practical applications.

An innovative technology that detects the early signs of tissue damage is being trialled in a number of hospitals, including the James Cook University

Box 3. Signs/symptoms of skin damage (NPAUP/EPUAP/PPPIA 2014).

- ▶▶ Purple/bluish discolouration
- ▶▶ A purple hue where ischaemia is present
- ▶▶ Oedema
- ▶▶ Localised swelling due to the inflammatory response
- ▶▶ Temperature change — initial warmth due to the inflammatory response which will become cooler as tissue death occurs
- ▶▶ Pain and discomfort
- ▶▶ Alteration in sensation in response to either inflammation or ischaemia
- ▶▶ Change of texture
- ▶▶ Induration due to excessive inflammation and necrosis. May also become soft and 'boggy'.

Hospital, South Tees NHS Trust. The SEM Scanner™ from Bruin Biometrics, Europe is a handheld, portable skin tissue assessment device which uses non-invasive biosensor technology to measure sub-epidermal moisture (SEM). In addition to the James Cook University Hospital trial, six other hospitals have piloted the SEM Scanner, all suggesting significant reduction in PU incidence, as a result (Clendenin et al, 2015).

A critical challenge with PU detection is skin colour/pigmentation. The SEM Scanner provides objective, quantifiable data on what is occurring below the skin's surface is agnostic to skin colour/pigmentation.

The SEM Scanner identifies early, pressure-induced tissue damage, including pressure ulcers and deep tissue injuries. It does this by detecting changes in SEM associated with localised oedema, which occurs during the inflammatory process. Bruin Biometrics claims that it can detect the damage 3–10 days before it is visible to the naked eye (Moore et al, 2016).

Training and education

It is imperative that all patients undergo

a full skin assessment to ensure early detection of pressure damage. This is a skill that is based on clinical expertise (Scanlon, 2004) as erythema which indicates inflammation is difficult to detect for nurses who lack the appropriate training and experience (Bennett, 1995).

As a pressure ulcer prevention nurse working in a large NHS teaching hospital trust, the author works alongside staff assessing patients skin and educating them on pressure ulcer prevention documentation. One of the main issues identified by staff is the difficulty identifying early stages of pressure damage in darkly pigmented skin. NICE (2014) states that a patient who is considered to be at risk of developing a pressure ulcer should have a skin assessment by a trained healthcare professional. The Trust and individual nurses should ensure appropriate training is available and taken up by all nurses who are providing care for patients who are at risk of developing pressure damage (Scanlon, 2004). Education is critical in ensuring that all members of the clinical team can strive to prevent and treat pressure ulcers according to the best evidence available (MacGregor et al, 2010).

Conclusion

Despite advancements in medical treatment, care and technology, pressure ulcers remain a huge worldwide health problem (Hanonu and Karadag, 2016) and it seems that healthcare professionals are still experiencing difficulty identifying damage in its early stages.

Skin assessment is fundamental to identifying category 1 pressure damage (Scanlon, 2004) but the accurate assessment of darkly pigmented skin continues to prove to be difficult. Erythema has traditionally been the main factor in recognising pressure damage, but nurses need to also look at the temperature, texture and presence of oedema to carry out a true skin assessment in patients with darkly pigmented skin.

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