Ten top tips: assessing darkly pigmented skin

Authors:
Joyce Black and Abigail Simende

The identification of early changes in skin colour, which may represent stage/category 1 pressure ulcers/injury, is difficult in patients with darkly pigmented skin. While most clinicians inspect the skin for changes in colour, texture and pain, assessments can be augmented with technology. Failure to recognise early signs of skin damage can have significant consequences, because both stage 1 and deep-tissue pressure injury are risk factors for the evolution of more serious stages of ulceration. Patients with darkly pigmented skin have been reported to have higher rates of full-thickness pressure ulcer/injury and a higher mortality from the wounds (Bauer et al, 2016). Some of these increased rates can be attributed to the difficulty in discovering pressure injury/ulcer in the earlier stages (Gunowa et al, 2017).

1 Have a high index of suspicion for pressure injury in patients with darkly pigmented skin: The development of visible signs of pressure and shear in the skin is delayed. Events leading to pressure can occur 48 hours prior to the visible changes of deep-tissue pressure injury and hours before visible changes seen with stage/category 1 pressure ulcer/injury develops. However, in patients with darkly pigmented skin, the early signs of skin colour change are blunted by the pigment in the skin. Obtain a thorough history of exposure to pressure, such as being found prior to admission, or being in surgery for over 3 hours in a supine position or a shorter timeframe in prone positions. A history of exposure to pressure is an excellent historical event to know and record. The exposure to high-intensity pressure or prolonged pressure provides the clinician a high index of suspicion that pressure injury may be evolving.

2 Use good lighting to see the skin: Place the patient in a position so that natural light is shining on the skin. If you cannot do that, use a pen light or light on your phone to see the skin. Fluorescent light casts a blue tone on darkly pigmented skin and should be avoided.

3 Compare the colour of skin subjected to pressure to the skin around the area: Pigmentation is the most obvious difference in skin characteristics between different racial groups. This racial variation is dependent on the quantity of melanin, amount of UV exposure, genetics, melanosome content and type of pigments found in the skin. Four chromophores are responsible for the varying colours found in human skin: haemoglobin, oxyhaemoglobin, melanin and carotenoids. Melanin is a natural skin pigment that protects the skin from UV damage. It is synthesised in melanocytes and packaged into melanosomes that are found dispersed throughout the epidermis. Melanosomes are found most prominently in the basal layer of the epidermis and serve to protect germinating nuclei of epidermal cells from UV radiation damage. The packaging and arrangement of skin pigments are responsible for the differences in skin pigmentation, which serve to protect an individual from UV light damage (Rawlings, 2006).

In more darkly pigmented skin, erythema is inapparent and is replaced by patches of darkened skin colour. Examine all the skin and note the usual degree of skin pigmentation for comparison. Pressure injury leads to red, maroon or purple skin in the area of damage. *Figure 1* shows an area of darker tissue on the left medial sacrum in a Fitzpatrick Type V patient (dark brown).

4 Describe variations in skin colour using an objective system: The National Pressure Injury Advisory Panel (NPIAP) et al's 2019 pressure injury prevention and treatment guidelines (NPIAP et al, 2019) recommend that objective assessment of the skin includes the use of a colour chart rather than an ethnic label, such as African American. There are two methods to do this: one is the Munsell skin tone chart and the other is the 6 Fitzpatrick skin types (Konishi et al, 2007).

5 Enhance your visual assessment by moistening the skin: Darkly pigmented skin is often thicker and drier than lightly coloured skin. The skin may appear ashen. The thickness of the skin is proportional to the degree of pigmentation (Sandby-Moller et al, 2003; Vashi et al, 2014). Black skin also has the highest sebum content of all ethnicities, but has the lowest ceramide level, and is thus the most

***Joyce Black** is Professor, College of Nursing, University of Nebraska Medical Center, Omaha, US;*
***Abigail Simende** is Staff Nurse, Fritch Surgery Center, Nebraska Medicine, Omaha, US*

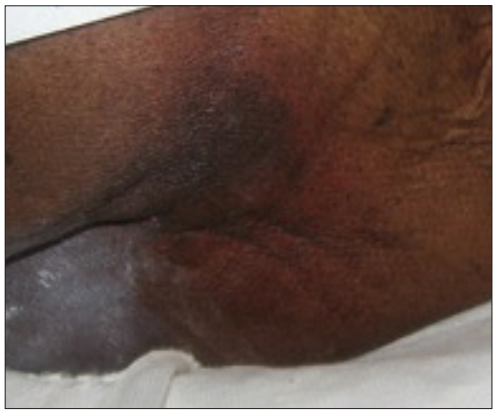


Figure 1. An area of darker tissue on the left medial sacrum in a Fitzpatrick Type V patient (dark brown). The gluteal cleft is visible on the left of the photo.

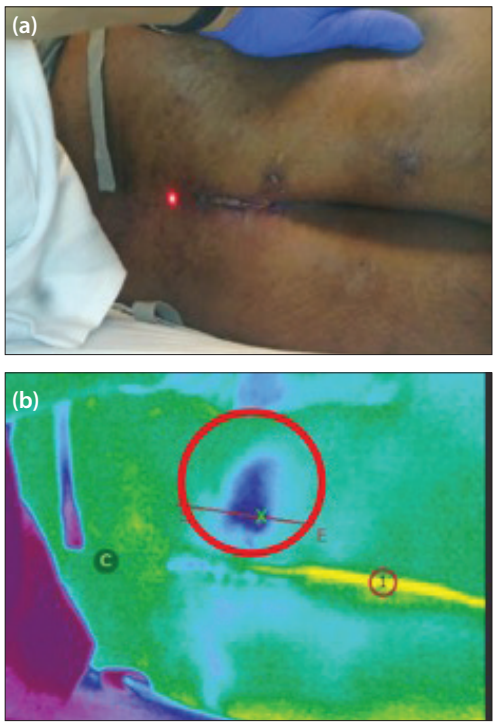


Figure 2. (a) Visual inspection of the patient on admission shows no color change in the skin. (b) Thermographic assessment reveals an area of poor perfusion consistent with deep tissue pressure injury. The letters and numbers on the thermographic image are to help determine the amount of temperature change in the tissue.

susceptible to transepidermal water loss and xerosis of any ethnic group. This physiological change makes the skin dry and at times scaly or ashen. Moistening the skin with tap water will rehydrate the epidermis to improve inspection.

6 Palpate the skin in areas that may have been exposed to pressure or shear: Pressure injury in the skin and soft tissue creates oedema from the inflammatory response. The oedema is palpable as hardness or coolness in the tissues. To get the best assessment, use the back of your hand and remove your gloves to feel a change in skin temperature (Steven et al, 2015).

7 Appreciate variation in presentation of deep tissue pressure injury : Deep tissue pressure injury (DTPI) does not always appear purple or maroon in patients with darkly pigmented skin. A study of 96 African American patients with 274 pressure injuries found that 88 (32.2%) were stage 1 and 186 (67.8%) were DTPI. Patients with stage/category 1 pressure ulcer/injury predominately had non blanchable erythema (75%) with 14% of those patients had hyperpigmentation. No change in skin colour was noted in 11.4% of patients. DTPI had a more variability in the presentation: 130 areas (70%) were purple; 26 areas (14%) were grey; 20 areas (10.8%) were black; 17 areas (9.1%) were brown; 11 areas (5.9% were blue and 10 areas (5.4%) were maroon (Sullivan, 2014).

8 Consider enhancing your assessment of darkly pigmented skin with technology designed to assess perfusion or subepidermal moisture changes: NPIAP et al's pressure injury prevention and treatment guidelines (NPIAP et al, 2019) recommend that when assessing darkly pigmented skin, skin temperature and sub-epidermal moisture are important adjunct assessment strategies. Impaired perfusion causes tissue to feel cool; however, pure tactile measurement of skin temperature can vary. Thermographic measurement of skin perfusion can provide more objective data (Sprigle et al, 2009; Black, 2018). A study of 67 residents in long-term care/aged care were examined with infrared thermography upon the onset of discoloured skin. At one week, 16% of the residents had skin necrosis and an additional 32% had necrotic skin by day 14. Patients whose skin was cooler were more likely to develop necrotic skin.

Any form of tissue injury creates inflammation, which increases both temperature and fluid in interstitial spaces (Moore et al, 2017; Gershon, 2020). A study of 182 hospitalised and post-hospitalised patients compared sub-epidermal moisture (SEM) readings on the sacrum and heels from admission to day 21. Pressure injury developed in 26.4%, with 68% stage/category 1, 23% deep tissue injury and 9% stage/category 2 or unstageable. Changes in SEM occurred 4.7 (+/- 2.4) days prior to wound being visible. Okonkow et al (2020) determined the sensitivity at 87.5% and specificity of 32.9%. Interventions were in place to reduce risk and may have altered some of the findings.

The use of technology to enhance assessments at admission has clear advantages to determining if tissue injury has occurred but is not yet visible. DTPI develops from the inside out and is not visible for 48 hours after the injury occurred. In the US, hospitals are not

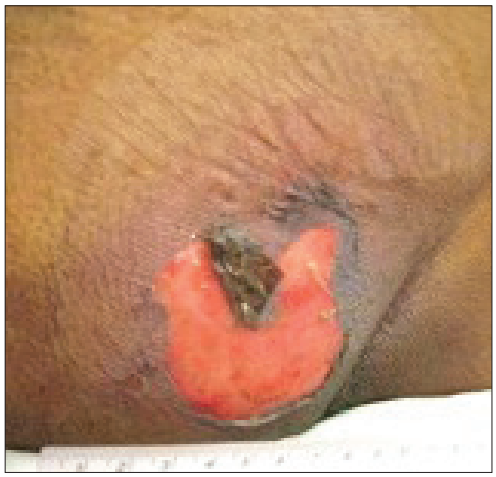
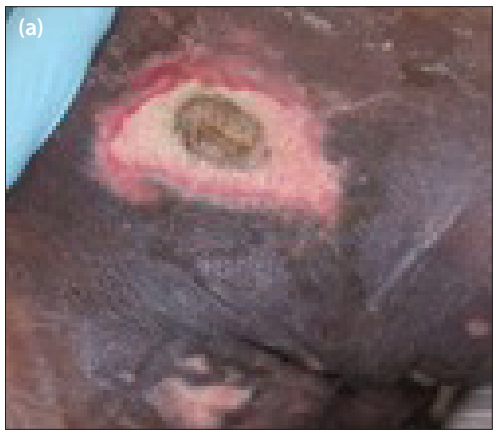


Figure 3. Stage/Category 2 pressure injury/ulcer in a patient with medium brown skin (Fitzpatrick IV) shows the remnants of the blistered epidermis.



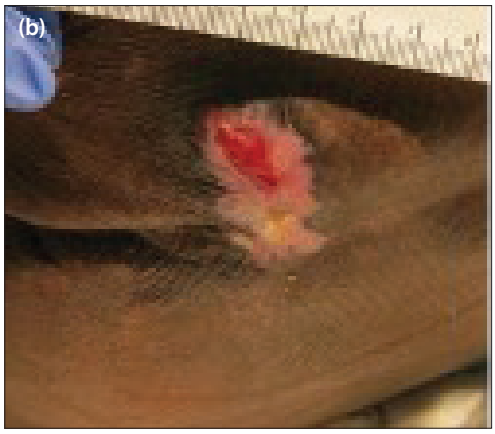


Figure 4. (a) Hyperpigmentation is present in much of skin surrounding the unstageable pressure injury/ulcer. (b) Areas of hypopigmentation are present after the sacral pressure ulcer/injury has healed.

paid when pressure ulcer/injury occurs during the hospitalisation; therefore, determining the true condition of skin and soft tissue at the time of admission is imperative. A study in the US examined 114 patients on admission for perfusion of the buttocks and heels. Twelve patients showed areas of warmer or cooler tissues and two of these patients did develop DTPI. However, with the imaging results, the hospital was allowed to document these wounds as Present on Admission (Koerner et al, 2019). Thermography can detect evolving deep tissue injury not visible to the naked eye (Cox et al, 2016).

9 Superficial wounds are more easily identified and open blisters often retain the epidermis: Darkly pigmented skin is thicker because it has more corneocyte layers too. Therefore, while open areas are easily seen due to the sharp contrast in the bed dermis and dark skin, the thicker epidermis also remains present on the wound edge.

10 Healing wounds can lead to changes in pigmentation: Darker skinned individuals are more prone to hyperpigmentation in general, and when healing wounds, changes in colour of the skin are seen. Inflammation results in the release of inflammatory mediators that increase melanogenesis by the melanocytes, resulting in post-inflammatory hyperpigmentation. The skin involved turns tan, brown, or purple, which brings about the term hyperpigmentation. Severe inflammation or trauma can disrupt the bottom layer of the epidermis, which contains melanocytes, causing the pigment to leak into and become trapped in the dermis. This results in a deeper and more treatment-resistant pigmentation. As healing commences though, hypopigmented skin is often present. The lighter areas correlate with the distribution and configuration of the original wound. Keloids can also form.

Conclusion

The identification of early changes in skin colour, which may represent stage/category 1 pressure ulcers/injury, can be made easier and more reliable in patients with darkly pigmented skin. Simple changes in bedside assessment can enhance inspection and technological advances allow a more definitive diagnosis of subclinical alterations in perfusion. WINT

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