Taking wound assessment beyond the edge



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Findings from a recent global anthropological study have highlighted the importance of the periwound skin and its relevance to wound progression. The study reveals that both healthcare practitioners and patients view management of the periwound skin as an integral part of wound healing. While current wound assessment tools offer a standardised approach to assessment of the wound, there is no easy-to-use validated tool for periwound assessment. This article explores the concept of going beyond the wound edge and presents an intuitive model that integrates assessment of the periwound skin into the wound healing paradigm.

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The process of wound assessment is complex and requires a range of clinical skills and knowledge. While wound assessment tools are available to support practitioners, there is a lack of consensus on which tools should be adopted to provide a consistent approach to wound management. However, there is general agreement that tools should be easy to use by all healthcare practitioners involved in wound healing, regardless of level of expertise.

What do current wound assessment tools tells us?

The concept of wound bed preparation was first introduced by Vincent Falanga in 2000[1]. Since then it has gained international recognition as a holistic and systematic approach to the assessment and treatment of the barriers to wound healing[2]. The TIME framework, developed by The International Advisory Board on Wound Bed Preparation[3], summarises the four main components of wound bed preparation: (T = Tissue, non-viable or deficient; I = Infection or inflammation; M = Moisture imbalance; E = Edge of wound, non-advancing or undermined).

This framework offers practitioners a considered approach to selecting wound interventions by systematically going through each of the components. When used as part of a holistic assessment, it can help practitioners clarify the cause of the problem and facilitate clinical decision-making on how to restore the normal biological environment at the wound bed to promote wound healing[4].

The ongoing influence of TIME[5] and wound bed preparation are evident in the criteria within the many other wound assessment tools available. Some are designed specifically to evaluate particular wound types. For example, the Pressure Ulcer Scale for Healing (PUSH, http://bit.ly/1CSoQ8C), which categorises ulcers according to surface area, exudate, and tissue type in the wound bed in line with the latest NPUAP/EPUAP pressure ulcer guidance[6] and the Leg Ulcer Measurement Tool, which assesses wound status over time so that practitioners can accurately evaluate the effectiveness of their interventions[7].

A recent evaluation of 14 wound assessment tools found that while they provide a framework to record certain parameters of wound status, none met all of the criteria for the optimal wound assessment tool (e.g. easy to use, facilitates documentation, improves continuity of care) and many did not guide practice in terms of what to do next or allow practitioners to set goals for healing and planning care[8].

Although evidence from the literature supports the theory that education on wound bed preparation can aid correct use of these tools and improve care[2], many practitioners involved in wound management do not have access to this type of specialised training. Furthermore, there is no easy-to-use validated assessment tool that fully integrates the periwound skin. As such, there appears to be a gap between the available tools and the needs of practitioners for optimal clinical decision-making.

New perspectives on wound healing

To better understand clinical decision-making and how living with a wound affects human behaviour, a global anthropological study was

conducted in 2013–14. In total, 200 wound care patients and healthcare practitioners from the UK, Germany, Brazil, and China were included in the study organised by ReD Associates, a strategy and innovation consultancy based in Denmark. This was preceded in 2009 by a quantitative survey of 875 healthcare practitioners in Germany, UK, France, Italy and Spain, which provided baseline information for the more recent study.

The global study sought to observe the physical, social and cultural behaviours of patients with a wound and how their wound affects their daily life. The investigating team spent extensive time with patients and their families in their homes. The study also sought to explore everyday wound management practice, whereby the team accompanied patients on visits to their healthcare practitioners in clinics and hospitals.

Observations, comprising over 100 interviews, nearly 2,000 photos and approximately 150–250 hours in healthcare institutions, were subsequently collated, allowing the team to explore patterns in the data, build theories and explain the relationships and causalities between the various themes. The study conclusions were subsequently validated by a quantitative survey with 412 healthcare professionals and 104 patients in Brazil and China. This resulted in a series of insights that offer a new perspective on wound healing.

Patient insights

For patients, the impact of having a wound is immense. One lady reported: "It is like a bomb that detonates. You can't go back. And you don't want it to happen again." Even for those with other, more serious medical conditions, it is often their wound that is of primary concern due to the level of interference with their daily life. Feeling helpless and frustrated by the nonlinearity and unpredictability of the wound healing process, patients look for ways to act on their condition; this was apparent in the behaviour of some patients who used 'ointments' to treat the periwound area to give them a sense of control, considering the periwound skin a less risky area than the wound itself.

The quantitative evaluation confirmed that the majority of patients and relatives in the study were actively engaged in their wound treatment. Sixty-four per cent of patients perceived themselves or 'their relative' to be the most important helper in taking care of their wound, while more than 90% of patients or relatives had a desire to know more, seeking information from one or more source to learn about their wound and wound treatment.

This active engagement by patients is often driven by a need to have control over their lives, although people's ability to manage their wound varies. In this study 73% of patients and their relatives applied products to the wound area, although 60% of patients stated that they were not following the instructions from their healthcare practitioner by not using prescribed products, doing too little, or too much due to an eagerness to speed up healing.

Healthcare practitioner insights

For healthcare practitioners, their primary concern is to look for effective ways to accelerate the healing process and remove barriers to healing. They emphasised the importance of protecting the periwound skin to prevent further complications and delayed healing. One UK nurse reported: "The principle for all wounds is the same: you need to protect the periwound skin. If the periwound skin is not protected you will never get the wound healed." This view was shared by all those involved in the study.

Other authors support these findings, stating that all patients requiring wound care are at risk of periwound skin damage[9]. This may be due to increasing age, comorbidities, or contact with wound exudate and/or dressing adhesives. In addition, a survey of five English NHS Trusts (*n*=4772) found that 70% of patients had surrounding skin that could be characterised as dry, macerated, excoriated, or inflamed[10], and a recent publication reported that, depending on exudate level, between 60% and 76% of wounds (*n*=958) were surrounded by problematic or unhealthy periwound skin[11].

This suggests that there is a need for an intuitive assessment tool integrating periwound skin assessment with wound assessment. Such a tool that documents progress towards wound healing on several axes, may help to strengthen engagement of patients and their relatives and improve concordance with prescribed treatment plans.

Three axes of wound healing

A key finding from the study shows that practitioners separate wounds into three distinct, yet interconnected zones or axes that call for different approaches:

1. **Wound bed** — 'the erratic battle ground'. Here it is important to look for signs of granulation tissue, while seeking to remove dead or devitalised tissue, manage exudate level, and reduce potential inflammation. Due to its unpredictability, the wound bed is the most intensely monitored zone.
2. **Edge of the wound** — 'the frontline'.

The aim here is to lower barriers to wound healing by reducing dead space, debriding thickened or rolled edges, and improving exudate management.

3. **Periwound skin** — 'the defensive zone that contains the wound'. There is a need to demarcate this area from the existing wound and reduce the likelihood of skin breakdown by protecting the skin from exudate, avoiding damage to the periwound skin or preventing further damage.

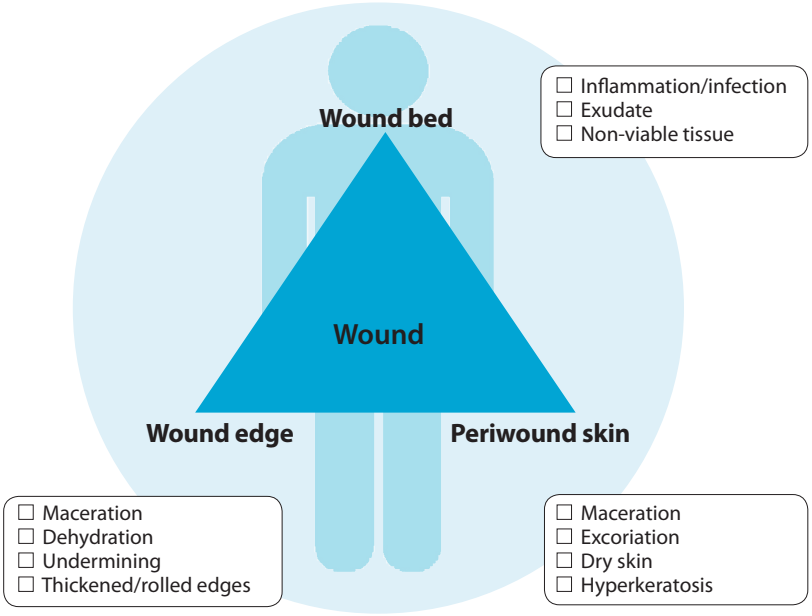
The wound bed, wound edge and periwound skin could be seen as three axes of a triangle, each with their significant importance for wound healing.

Wound assessment tools traditionally focus on the wound itself. Yet this research indicates a wider focus that moves assessment beyond the wound edge to include the periwound area. The triangle of wound assessment [*Figure 1*], presents a simple framework that integrates assessment of the wound bed, wound edge and periwound skin to aid clinical-decision making.

Going beyond the wound edge

Given that unhealthy periwound skin is a significant problem in chronic wounds[11] further exploration of the concept of periwound skin and its relevance to wound progression needs to be considered within the wound healing

Figure 1. Triangle of wound assessment model showing the three axes of healing



Box 1: How far does the periwound extend?

Periwound skin has been defined as the skin surrounding a wound within 4cm of the wound edge. While this definition covers the majority of wounds, it should be recognised that damage can extend outward whereby any skin under the dressing may be at risk of further breakdown (e.g. due to adhesives, moisture, exudate leakage) and should be included in an assessment.

paradigm to advance practice and improve patient outcomes.

The periwound area has previously been defined as the area of skin extending to 4cm beyond the wound edge[12] *[Box 1]*. Frequent problems in this area include maceration, excoriation, dry (fragile) skin and hyperkeratosis.

Most commonly seen in clinical practice are problems associated with exudate and the term 'periwound moisture associated skin damage' is used to describe erythema and inflammation of the skin within 4 cm of the wound edge, sometimes accompanied by erosion and denudation[12,13].

Periwound skin damage contributes to protracted healing times, can cause pain and discomfort for the patient and can adversely affect a patient's quality of life[9].

Factors that increase the risk for periwound skin damage include the amount of exudate and presence of heparin-binding proteins, bacteria and associated toxins, histamine produced by specific bacteria, proteolytic enzymes such as matrix metalloproteinases (MMPs), and inflammatory cytokines (interleukin-1) in the wound exudate[14].

When periwound skin is initially exposed to exudate, the stratum corneum absorbs the fluid and swells. Greater moisture exposure saturates the lower layers of the epidermis, which reduces the protective epidermal function (as a barrier to water), and increases the likelihood of maceration. Reduction in the skin barrier function allows increased transepidermal water loss, leading to dryness of the skin from a decrease in skin surface lipids. This can also make patients more susceptible to developing contact dermatitis[15].

Exudate is created by the normal inflammatory process of wound healing. However, when high volumes of exudate occur, it poses clinical challenges and healing may be affected as the overhydrated skin becomes macerated, potentially leading to skin breakdown. Generally, in acute wounds, exudate promotes the healing process but exudate from chronic wounds has increased protease levels which may inhibit

healing by damaging the wound bed and surrounding skin[16]. Overhydrated skin may delay healing, increase the risk of infection, increase friction risk and skin damage, and can result in wound enlargement[17].

Periwound skin presentations

The terms maceration and excoriation are often used interchangeably to describe periwound skin damage. Maceration is the softening and breakdown of the skin resulting from prolonged exposure to moisture and wound exudate and can prevent cell migration across the surface of the wound and cause pain and discomfort for the patient. Maceration can be white in appearance where there is little inflammation *[Figure 2]* and erythematous when the periwound skin is inflamed *[Figure 3]*. Inflammation of the periwound skin can also be a sign of clinical infection. Excoriation is an injury to a surface of the body caused by trauma, such as scratching, abrasion or a chemical or thermal burn *[Figure 4]*. Repeated application and removal of adhesive tapes and dressings can cause trauma, skin stripping and irritation.

Some wounds will have dehydrated skin resulting in dry skin and or hyperkeratosis *[Figure 5]*. Patients with venous leg ulcers often have lipodermatosclerosis, hyperpigmentation and dry skin in the periwound area and the surrounding skin.

All of these periwound skin presentations will require an individual treatment plan based on treatment of the underlying cause.

Assessment and treatment: challenging current wound healing paradigms

Accurate assessment of the wound bed, wound edge and periwound skin within the context of a holistic approach is essential for effective wound management and treatment. However, there is no easy-to-use validated assessment tool specific to assessing periwound skin. Many existing wound assessment tools use limited descriptors such as healthy/intact and macerated to describe the periwound area. Whilst assessment of exudate can offer a valuable insight into the potential for periwound skin damage, it does not provide the full details necessary to inform management.

Assessment in the first instance should aim to identify those patients at increased risk of periwound skin damage to ensure preventative measures are put in place to reduce the risk of damage. This should include minimising periwound contact with wound exudate; protect the area with an appropriate barrier and use of atraumatic or soft silicone dressings to avoid skin stripping. Where the patient has hyperkeratosis or callous this can be reduced through debridement and a structured skin care regimen to include cleansing and emollients.

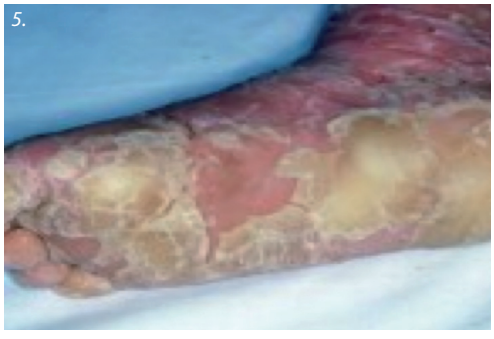
Treatment choices should aim to improve the wound bed, promote healing/edge migration and protect the periwound skin. Wound dressings have a therapeutic role in managing exudate and protecting the periwound skin from maceration and excoriation[18]. An effective dressing should protect the wound, absorb exudate, preserve a moist wound base, and remove excess exudate.

Figure 2. Maceration with minimal inflammation

Figure 3. Maceration with erythema and inflammation

Figure 4. Excoriation due to trauma

Figure 5. Hyperkeratosis formation on lower plantar surface



Wear time is an equally important consideration; increased exudate levels decrease dressing wear times and require dressings designed for greater absorption capacity. An effective dressing should also be easily removed to prevent mechanical stripping or irritation of the periwound skin, which renders it more vulnerable to moisture associated skin damage[19]. The evolution of less aggressive adhesive systems, such as soft silicone technology, allows dressing changes to be undertaken without causing tissue trauma during removal and may reduce the need for a protective barrier against maceration of periwound skin[20].

Future approaches

Extending our understanding of wound assessment beyond the wound edge challenges current paradigms of wound healing and has important implications for future approaches to wound assessment. The triangle of wound assessment *[Figure 1]* offers a model of wound assessment of the wound bed, wound edge and periwound skin within the context of holistic patient care.

Developing and integrating assessment tools that focus on the skin beyond the edge to include the periwound area and surrounding skin are necessary to advance practice by early identification of patients at risk and appropriate prevention and treatment strategies to improve patient outcomes. Economically, prevention is better than treatment of periwound skin maceration, excoriation, secondary increased bacterial burden and infection. An understanding of these factors is fundamental for developing new and more impactful interventions that help improve clinical decision-making and meet the needs of patients living with a wound.

Conclusion

Wound assessment should be comprehensive, systematic and evidence-based, providing baseline information against which healthcare practitioners can establish the current status of the wound, set realistic treatment goals and monitor progress over time using appropriate interventions. The research presented in this paper indicates a wider focus that moves assessment and treatment beyond the edge of the wound to include the periwound skin as part of wound assessment. While, this increases the demand for effective assessment and treatment tools, it also raises the bar for solutions to be sufficiently intuitive to resonate with specialists and non-specialists, including patients and relatives, in the daily management of wounds. The triangle of wound assessment model presented here offers a simple framework for the consistent inclusion of periwound skin into wound assessment. WINT

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