

# Best practice in wound assessment

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## Abstract

Accurate and considered wound assessment is essential to fulfil professional nursing requirements and ensure appropriate patient and wound management. This article describes the main aspects of holistic assessment of the patient and the wound, including identifying patient risk factors and comorbidities, and factors affecting wound healing to ensure optimal outcomes.

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*THE CODE: PROFESSIONAL Standards of Practice and Behaviour for Nurses and Midwives* (Nursing and Midwifery Council 2015) states that its values and principles are not 'negotiable or discretionary', although they may be interpreted in a range of different settings. This means that, where possible, practice must be high quality, consistent and designed to meet the standards that patients and members of the public expect. Our professional responsibilities as healthcare professionals dictate that appropriate dressing and/or therapy choices should follow holistic assessment of the patient and the wound, with consideration of the patient's experiences and preferences and their acceptance of the proposed management.

It is estimated that up to 4% of the UK's NHS budget is spent on wound care, which is approximately £1.4-2.1 billion annually and is

increasing (Bennett *et al* 2004, Dowsett and Shorney 2010). Much of this expenditure comprises hidden costs. As Dowsett (2015) identified, the challenge for healthcare providers is to balance demands for cost efficiency with high quality outcomes for patients. Evaluating costs and successful management of wounds is not only about dressing choices, but also the number of people with wounds, how long these have been present, any complications, the effect on the time spent by healthcare professionals and the cost of hospital admission when management proves ineffective (Drew *et al* 2007).

## Patient assessment

The best quality wound management is ineffective if the patient's risk and other contributing factors are not considered during the assessment, along with their involvement in and acceptance of treatment. Conditions such as diabetes, cardiovascular disease, respiratory disease, anaemia, immune disorders, renal failure and obesity, and concurrent systemic influences such as ageing, smoking, mobility, nutrition and stress, are important in determining the development or occurrence of a wound and how, or whether, it heals. This is because optimal healing relies on the wound environment being clean, not infected, adequately perfused, nourished and free of foreign or devitalised material.

Assessment involves identifying, gathering and interpreting information about the patient to ensure diagnosis is accurate, appropriate treatment decisions can be made, the patient and the wound can be monitored, and complications can be avoided. It is also important to ensure cost-effective use of resources and a positive experience for the patient. Assessment includes consideration of the patient's age, the history of the presenting problem and the individual's past and current medication, medical and family background, nutritional status, chronic medical conditions, lifestyle choices, psychological status and socioeconomic circumstances (Fletcher 2010). The practitioner must be knowledgeable and aware of the importance of the assessment as well as allowing sufficient time to conduct the assessment thoroughly and efficiently, making the appropriate links and documenting the information accordingly.

Wounds should be prevented, where possible, to ease the burden of distress, anxiety, pain,

embarrassment, inconvenience, morbidity, hospital admission and even death associated with wound complications and suboptimal treatment of underlying comorbidities. An accurate, holistic assessment should identify potential barriers to healing and inform the wound care plan. However, successful healing, where possible, is ultimately determined by the general health of the patient (Box 1). It is acknowledged that the emphasis of palliative wound care is wound management because most of these wounds do not heal. In addition to the patient's medical history, the cause of the wound, any medication or allergies, the patient's lifestyle and environment, the availability of social support and any psychological problems should be considered. Baranoski *et al* (2008) provided a useful framework to guide the assessment process, the 'Nine Cs of wound assessment', comprising:

- ▶ Cause of the wound.
- ▶ Clear picture of what the wound looks like.
- ▶ Comprehensive picture of the patient.
- ▶ Contributing factors.
- ▶ Communication to other healthcare practitioners.
- ▶ Continuity of care.
- ▶ Centralised location for wound care information.
- ▶ Components of the wound care plan.
- ▶ Complications from the wound.

Patient assessment involves a thorough physical examination of all skin areas for: signs of dermatological disorders; scarring, particularly over pressure points; skin changes, such as those associated with venous stasis; the condition of the skin, hair and the nails of the extremities; skin colour; temperature; pulse; capillary refill; and oedema. Failure to complete a holistic assessment of the patient may result in a multitude of problems and has the potential to misdirect treatment.

## Wound assessment

A simple definition of a wound is 'an injury or damage, usually restricted to those caused by physical means with disruption of normal continuity of structures' (Farlex Partner Medical Dictionary 2012). Once the cause of the wound is confirmed, it is important to consider parameters such as whether the wound is acute or chronic, the stage of healing, how it is healing, whether there are any obvious impediments to healing and the patient's attitude to having a wound. However, two difficulties that arise are that assessment of these parameters is largely subjective and accurate assessment relies on the knowledge, experience and skill of the practitioner. Failure to assess a wound accurately can result in life-changing sequelae for patients

and disciplinary and/or legal repercussions for the practitioner.

## Type of wound

Acute wounds progress through the normal stages of wound healing and usually heal without complication in a healthy person. Chronic wounds do not progress normally through the stages of healing, resulting in extended healing times and/or non-healing. Healing of chronic wounds may occur between four weeks (Cullum *et al* 1997) and 12 weeks (Mustoe *et al* 2006). Lacerations, contusions, skin tears and surgical wounds are generally categorised as acute wounds; however, it is possible that acute wounds could become chronic in people with significant comorbidities and risk factors. These wounds require monitoring, since they may deteriorate into chronic wounds. Pressure ulcers, leg ulcers, diabetic foot ulcers and malignant wounds are classified as chronic wounds, with the associated underlying risk factors of immobility and chronic venous hypertension, or the effects of diabetes or cancer influencing their development. In these cases, the wound is effectively chronic from its development and should be treated as such.

The production of exudate is an essential part of the moist wound healing process. However, the amount produced and the components of exudate in acute and chronic wounds differ. Growth factors, wound debris, electrolytes, enzymes, glucose, white blood cells, red blood cells, platelets, fibrin and fibrinogen are found in normal wound exudate (Cutting 2003). In an acute wound,

## BOX 1

### Factors affecting wound healing

#### General factors:

- ▶ Underlying disease.
- ▶ Vascularity.
- ▶ Nutritional status.
- ▶ Immune status.
- ▶ Obesity.
- ▶ Disorders of sensation or movement.
- ▶ Psychological state.
- ▶ Radiation therapies.
- ▶ Drugs – prescribed, recreational and/or alternative therapies.
- ▶ Allergies and/or sensitivities.

#### Local factors:

- ▶ Hydration.
- ▶ Wound management.
- ▶ Wound temperature.
- ▶ Pressure, friction and shearing forces.
- ▶ Foreign bodies.
- ▶ Wound infection.
- ▶ Pain levels.

(Carville 2005)

the exudate is rich in endogenous proteases that contribute to the proliferation and growth of new cells, thus facilitating wound closure and healing. Wysocki *et al* (1993) compared levels of activated metalloproteinases (MMP) in acute (mastectomy) wound fluid and chronic (leg ulcer) wound fluid. The authors found elevated levels of MMP in the chronic wound fluid, which they suggested may result in slower tissue turnover and failed wound closure.

Physiologically, the healing of chronic wounds may be affected by an extended inflammatory phase (Eming *et al* 2007), repeated infections (Edwards and Harding 2004) and the formation of biofilms (Wolcott *et al* 2008). These factors increase the inconvenience, pain and stress to patients, as well as increasing related healthcare costs. An understanding of the healing process and whether a wound is acute or chronic is necessary in the early stages of wound assessment to develop an appropriate treatment plan.

### Type of healing

Wounds heal in different ways according to the mechanism of injury and the amount of tissue loss. In primary or first intention healing, tissue is restored directly in uncomplicated wounds, such as deliberate incisional wounds with no or minimal tissue loss where the wound edges are held in apposition to each other (Dealey 2012), with no formation of granulation tissue. Where the wound edges cannot be apposed, fibroblasts proliferate and capillaries

bud around the base and sides of the wound to form granulation tissue to fill the defect. This occurs during secondary intention healing in wounds in which there is a varying amount of tissue loss, often presenting as ulceration. If the tissue loss is extensive, grafting may be required to preserve structure and function. Tertiary intention or delayed primary closure may be required in heavily contaminated wounds and where the superficial layers are left open and packed lightly with dressings followed by closure after four to five days. These may be bite wounds or dehisced surgical wounds complicated by infection (Waldrop and Doughty 2000).

### Assessment parameters

Wound assessment should be carried out by a practitioner who has been trained and is competent to consider carefully the overall health of the patient in relation to what they observe about the wound. Recognising personal limitations, knowing when to ask for help and team working are vital to successful wound management. The initial wound assessment should be accurate and sufficiently detailed to provide a baseline for subsequent assessments to be compared and measured against. A standardised, systematic approach to assessment facilitates accurate ongoing evaluation of wound progress, whether positive or negative. The World Union of Wound Healing Societies (2007) provides a sequence of assessment to ensure best practice (Figure 1).

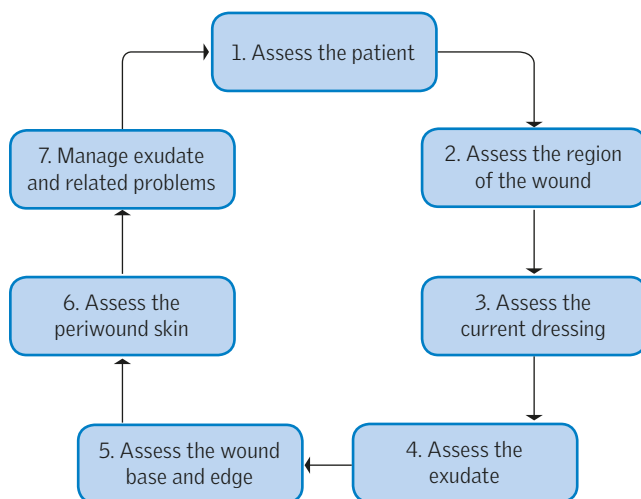
### Initial observation and measurement

Observation of the condition of the wound and surrounding skin is essential to assess whether the wound requires cleaning and/or removal of slough or necrotic tissue to improve visualisation of the wound. Removal of slough and/or necrotic tissue may be achieved quickly using moistened debridement products, de-sloughing products or irrigation (Table 1).

When the wound type has been identified, the age of the wound and its location should be considered and should help to confirm the aetiology of the wound. For example, the sudden appearance of a wound on the foot of a patient with diabetes may indicate a diabetic foot ulcer. However, there may be confusion about whether a wound on the heel of a patient with diabetes is a diabetic foot ulcer or a pressure ulcer, and this requires further exploration. Non-healing ulcers in unusual locations should prompt suspicion of malignancy (Grey *et al* 2006). The anatomical location must be documented accurately using appropriate terminology and noting the correct side of the body. For example, an ischial tuberosity pressure ulcer is not the same as a sacral pressure

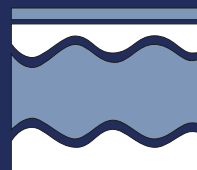
**FIGURE 1**

#### Wound assessment sequence



(World Union of Wound Healing Societies 2007)

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ulcer; the cause, management and care plan for both types of pressure ulcer are different.

One of the few objective parameters of wound assessment is measurement of the size of the wound, which provides an idea of the amount of tissue loss. Simple linear measurements with a ruler should be taken at the greatest length and width perpendicular to each other. Validated measurement techniques such as transparency tracings and/or photographs (National Institute for Health and Care Excellence (NICE) 2014) are useful to compare change over time and establish an important record. NICE (2014) also recommends estimating the depth of wounds but not the volume. The usefulness of measuring the depth of a wound has been questioned, since obtaining an accurate measurement is quite difficult (Benbow 2005).

Wound photography is an adjunct to documentation of assessment and serves to support the written wound documentation only (Wound Ostomy and Continence Nurses Society (WOCN) 2012). The WOCN (2012) fact sheet provides essential guidance and advice on consent to photography, who should take the photographs, and practical issues such as photographs being taken from the same vantage point and the same distance from the wound, use of a measuring guide and not altering clinical photographs. Ongoing consistent measurements, in centimetres and millimetres, at reassessment are useful, and an awareness of the effect of treatment with de-sloughing products, for example, which cause the wound to enlarge in the early stages, is necessary. Tracings and photographs should be appropriately annotated and stored in the patient's clinical record.

Wounds may be classified according to depth – superficial, partial thickness and full thickness – but accuracy of assessment relies on the practitioner's knowledge of anatomy. Different wounds may be classified according to wound type-specific classification systems that reflect their depth,

such as the European Pressure Ulcer Advisory Panel and National Pressure Ulcer Advisory Panel (2009) categorisation of pressure ulcers, the STAR classification for skin tears (Stephen-Haynes and Carville 2011) and the Texas diabetic foot classification system (Lavery *et al* 1996). However, the same caveat applies. Wound classification tools are effective only if practitioners are confident in using the tools and understanding the findings to ensure accurate diagnosis and appropriate treatment. Without a universal approach and understanding, such tools may represent a barrier to effective multidisciplinary working and optimal patient outcomes (Watret 2005).

### Clinical appearance

The type of tissue in the wound bed may be necrotic, sloughy, infected, granulating or epithelialising, or may present as a combination of some or all of these. Appropriate identification determines the wound status and directs treatment.

Identification of the tissue types present in the wound bed enables the practitioner to select the appropriate dressings and course of treatment. As part of ongoing monitoring of healing progress, or lack of progress, the percentage of different tissue types should be estimated and documented (Fletcher 2010). A logical colour classification may be useful for descriptive purposes: black for necrotic, yellow for sloughy, green for infected, red for granulation and pink for epithelialising tissue. This concept has been further developed as a wound healing continuum to incorporate intermediate colour combinations (Gray *et al* 2005), recognising that not all wound appearances fit neatly into one of the five categories since there is often more than one tissue type in a wound at the same time. Treatment is usually aimed at managing the dominant tissue type, but it also depends on exudate levels.

Necrotic and sloughy tissue or devitalised tissue is the end product of the death of cells that accumulate as a result of tissue damage in either a dry or moist medium. The basic principles of management of necrotic and sloughy wounds are to remove the tissue so that healing can proceed in a moist environment (Parnham 2002) and also to reduce the risk of infection (Eagle 2009). Debridement or de-sloughing is achieved using gels to assist the natural process of autolysis or by mechanical means such as moistened debriding pads or with a scalpel by a practitioner who has been trained and is competent in the procedure. There are exceptions that require special consideration and referral to specialist services, such as patients with diabetes or peripheral vascular disease, which should have been identified in the patient assessment. The presence of granulation or epithelialising tissue in the wound

**TABLE 1**

Types of debridement	
Type	Setting and/or mechanism
Sharp	At the bedside, using a scalpel or curette.
Surgical	In the operating theatre.
Autolytic	Facilitation of the body's mechanism of debridement with appropriate dressings.
Biological	Larval therapy.
Enzymatic	Not widely used; pawpaw (papaya) or banana skin is used in developing countries.
Mechanical	Wet to dry dressings – not used in the UK.

(Grey *et al* 2006)



bed indicates that the wound is healing and requires a more gentle approach because of its fragility. Normal granulation tissue has a beefy, red, shiny and textured appearance, and bleeds readily (Figures 2 and 3). Necrotic tissue is usually hard, dark in colour and leathery (Figure 4), while slough may present from light yellow-white to dark brown or grey and is usually soft but can be thick and stuck-down to the wound surface making it difficult to remove. Over-granulation or hypergranulation tissue is red with a soft texture and looks different from normal granulation tissue. Non-adherent silicone, foam or gel products may be used to maintain a moist wound environment, taking care that they do not adhere to the surface in granulating and epithelialising wounds.

Wounds may become infected at any stage, so they must be monitored for early signs of infection at each dressing change. Traditionally, wounds are examined for the classic signs of redness, heat, pain, swelling and loss of function, but these may not be obvious in older patients, people with depressed immune function or those with diabetes. Therefore, additional criteria have been identified that include delayed healing, discoloration, friable granulation tissue that bleeds easily, unexpected pain or tenderness, increased exudate, abnormal smell, bridging, pocketing or otherwise unexplained wound breakdown (Cutting and Harding 1994). All wounds contain bacteria, but not all wounds succumb to infection, owing to the constant balance in wounds between bacteria and the disruption threshold of the host's immune system (Heinzelmann *et al* 2002); hence the need to assess the patient's immune system status.

### Exudate

Assessment of exudate is possibly one of the most important aspects of wound assessment in terms of identifying underlying health problems and infection, patient satisfaction with care and dressing and/or therapy selection. The type, nature, amount, odour and consistency of exudate should be assessed in addition to why it is excessive in the case of heavily exuding wounds. Recording exudate as '+' or '+++' is not particularly helpful, but measuring exudate is difficult unless a therapy such as negative pressure wound therapy or a wound drainage bag is in use. Therefore, documentation of the assessed amount of exudate varies between practitioners depending on their background and experience. For patients, excess exudate can be the most distressing and inconvenient aspect of their wound management.

### Wound edges and periwound skin

A wound's edges can provide important information about its aetiology and status.

For example, vascular ulcers usually are well demarcated with steep sides, whereas the wound edges in venous stasis leg ulcers slope and are not always clearly demarcated (Grey *et al* 2006) (Table 2). Undermining may be present where wound edges are unattached (Worley 2004). Observation of wound edges may reveal malignant changes over long periods of time. The colour, texture and temperature of wound margins should be assessed and documented, in addition to any observation of oedema, erythema and/or bruising.

Ineffective management of exudate may lead to maceration and/or excoriation or irritant dermatitis of the skin surrounding the wound, causing extension of the wound

**FIGURE 2**

**Small wound with granulation tissue**



**FIGURE 3**

**Large wound with granulation tissue**



**FIGURE 4**

**Leg wound with necrotic tissue**



and distress and discomfort for the patient. Regular reassessment indicates whether an underlying reason exists for the excess exudate and whether dressings are managing the exudate adequately. If the skin is dry and scaly, it should be hydrated with an emulsifying cream or ointment and the dead skin removed for comfort (Eagle 2009).

### Odour

The assessment of odour is subjective; however, the characteristic musty odour of *Pseudomonas aeruginosa* and acrid odour of *Staphylococcus aureus* can be identified and raise suspicion of infection. Necrotic tissue may give rise to wound odour and should be removed (Grey *et al* 2006).

### Pain

The International Association for the Study of Pain (2014) sets out the following minimum standards for practitioners: they should have knowledge of pain theories and mechanisms, types of pain and what influences patients' perception of pain and, in practice, have the ability to assess pain and the methods for relieving pain. Various pain assessment tools have been developed. Pain may be associated with the underlying pathology, be related to the dressing or therapy, or arise in anticipation of a painful procedure. The type, time of onset, frequency and severity of pain as well as how patients cope with pain should be assessed and documented. The realisation that practitioners

**TABLE 2**

Wound edge characteristics	
Type of wound edge	Type of ulcer
Sloping	Venous ulcer
Punched-out	Arterial or vasculitic ulcer
Rolled	Basal cell carcinoma
Everted	Squamous cell carcinoma
Undermining	Tuberculosis, syphilis
Purple	Vasculitic, such as pyoderma gangrenosum

(Grey *et al* 2006)

**TABLE 3**

Laboratory investigations	
Investigation	Rationale
Haemoglobin	Anaemia may delay healing.
White cell count	May indicate presence of infection.
Platelet count	May indicate thrombocytopenia.
Erythrocyte sedimentation rate and/or C-reactive protein	These non-specific markers of infection and inflammation are useful in diagnosis and monitoring treatment of infections or inflammatory ulceration.
Urea and creatinine	High urea levels impair wound healing; renal function is important when using antibiotics.
Albumin	Protein loss delays healing.
Glucose, glycated haemoglobin (HbA1c)	For patients with diabetes.
Markers of autoimmune disease, such as rheumatoid factor, antinuclear antibodies, anticardiolipin antibodies, lupus anticoagulant	May indicate rheumatic disease, systemic lupus erythematosus and other connective tissue disorders.
Cryoglobulins, cryofibrinogens, prothrombin time, partial thromboplastin time	May indicate haematological disease.
Deficiency or defect of antithrombin III, protein C, protein S, factor V Leiden	May indicate vascular thrombosis.
Haemoglobinopathy screen	Screens for sickle cell anaemia, thalassaemia.
Human immunodeficiency virus status	May indicate Kaposi's sarcoma.
Serum protein electrophoresis; Bence-Jones proteins	May indicate myeloma.
Urine analysis	Useful in connective tissue disease.
Wound swab	Not routine since all ulcers are colonised, which is not the same as infected; swab only when the wound is displaying clinical signs of infection.

(Grey *et al* 2006)

and patients required more guidance on pain assessment and management led to the development of two consensus documents (European Wound Management Association 2002, World Union of Wound Healing Societies 2004).

## Investigations

As part of the patient and wound assessment and to identify underlying and contributing factors, the laboratory investigations listed in Table 3 should be considered. A multidisciplinary approach to managing patients with wounds is necessary because of the variety of investigations that may be carried out in different healthcare specialities.

## Conclusion

Holistic assessment involves identifying, gathering and interpreting information about the patient and wound to ensure accurate diagnosis, appropriate treatment, ongoing monitoring and prevention of complications. For successful management of patients and wounds, practitioners require appropriate knowledge of the healing process. The use of a standardised, systematic approach to assessment assists the practitioner in the accurate evaluation of the wound, with the overall aim of ensuring optimal wound as well as patient outcomes **NS**

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