# Wound assessment and dressing selection: an overview

#### ABSTRACT

Wound healing consists of four overlapping phases. Holistic assessment of a wound is essential and can confirm whether healing is progressing as anticipated. Frameworks can assist the clinician to conduct the assessment in a systematic way and to plan appropriate care for the patient. Dressings form a relatively small part of the overall care plan, but with such an array available the choice can be overwhelming. This article provides an update on wound assessment using the TIMERS framework and considers the factors influencing dressing choice.

Key words: Assessment Framework TIMERS Dressing

ormal wound healing is a process consisting of four overlapping phases—inflammation, proliferation, epithelialisation, and remodelling (also known as maturation). Assessment of a wound can confirm that healing is progressing in a timely manner and identify any factors that may delay or stall the process.

'Acute' is the term used for a wound progressing through the phases of healing at the expected rate (Lazarus et al, 1994) whereas a 'hard-to-heal' wound (sometimes referred to as a 'chronic' wound) does not progress through the phases of healing in a timely and orderly manner. Definitions vary, but those that do not heal within 6 weeks to 3 months are often considered hard-to-heal (Kyaw et al, 2018).

Dressings are used to protect wounds from infection and assist with moist wound healing, but knowing what dressing to choose can be complex. Although appropriate dressing selection is important, dressings form just a small part of the holistic treatment package. Wound assessment guides the clinician in their dressing choice as part of a wider plan of care.

Guest et al (2015) calculated that 4.5% of the adult population in UK had a hard-to-heal wound in 2012/2013. A more recent study by Gray et al (2018) calculated point prevalence of hard-to-heal wounds across five community NHS Trusts in the north of England to be 16.4 cases per 10 000 people. The number of such wounds was estimated to increase by 12% per annum (Guest et al, 2017). Effective wound assessment can identify patients who are not healing as expected and informs the treatment and overall plan of

Alexandra Bishop, Senior Clinical Nurse, DDRC Healthcare and Tissue Viability Nurse Specialist, Plymouth Wound Care, ali. bishop@ddrc.org

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care. Early implementation of any action required can avoid the wound becoming problematic or healing being stalled, but can also divert the wound back onto the correct pathway for healing to occur.

Wound assessment should not focus on merely the wound itself. Holistic assessment will identify factors that may influence or interfere with healing, including comorbidities, medication, quality of life and social factors, aetiology of the wound and history of previous wounds. It should form a standard part of wound care and be clearly documented. Dressing choice must take into consideration the assessment encompassing the individual needs of the patient. Detailed holistic assessment including wound diagnosis followed by optimal delivery of care will ensure wound healing in most cases (Guest et al, 2017). This article will provide an update on assessment and dressing choice.

#### Normal wound healing

Characteristics of the different phases of wound healing are visible in open wounds and those healing by secondary intention, but are less so in closed wounds. Inflammation begins with initial first aid (haemostasis) culminating in the production of a fibrin clot before progressing to wound cleansing. Inflammation is characterised by erythema, mild swelling and functional disturbance. Exudate may be seen as white blood cells (namely neutrophils and macrophages) migrate to the area and activity is heightened. Slough may also be present; this will be broken down by the white blood cells.

Release of growth factors and cytokines will stimulate the start of proliferation, when the wound begins the process of repair. During this phase, inflammation subsides, the extracellular matrix provides scaffolding, angiogenesis occurs and granulation tissue fills the wound bed. Epithelial cells will begin their migration across the wound bed from the edges of the wound and epithelialisation begins. During this phase, the presence of new, lighter coloured skin can be seen at the wound edges, indicating healing.

Finally, the collagen realigns and changes from type III to type I during remodelling (Rangaraj et al, 2011). Scar tissue will change in appearance and strength. This final process can continue for number of months after full epithelialisation of the wound (Schultz et al, 2003).

The timeline for the healing process to completion of epithelialisation is dependent upon several factors, not least the size and type of wound. However, in a healing wound inflammation would be expected to subside within 2–5 days, but can last up to 10 days, and complete healing (100% epithelialisation) within 2–6 weeks.

#### Table 1. Intrinsic and extrinsic factors affecting wound healing

- Psychological factors (eg confusion, anxiety)
- Mental health conditions
- Concurrent condition (eg heart disease, diabetes, renal disease, anaemia)
- Tissue perfusion
- Oedema
- Medication
- Smoking
- Age
- Nutritional status and BMI
- Radiotherapy/chemotherapy
  Immobility
- Neuropathy

Note: This list presents the key factors but there may also be others

#### Key assessment information

Initial assessment can be dynamic and relatively swift when a wound is newly presented. The process will take longer for wounds that have already become hard-to-heal and have more complex issues. The information required includes:

- Duration of wound
- Cause of wound (aetiology) and location
- Other health professionals involved in the care
- Investigations completed/required, eg vascular studies (ankle-brachial pressure index (ABPI), angiogram, duplex), X-ray
- Nutrition and other confounding factors (see *Table 1*)
- Neuropathy testing and deformity assessment of the foot for diabetic patients.

All these will affect the expected healing time of the wound and will inform the plan of care, including dressing choice. A more detailed assessment of the wound can occur after the basic history has been gathered and a wound diagnosis made. This will include the following observations:

- Condition of wound bed
- Wound size
- Condition of surrounding skin and wound edges
- Signs of infection
- Suture line—clips/sutures, leakage, redness, etc.
- Pain levels.

Comprehensive reassessment of the wound every 2–4 weeks by a health professional is generally accepted as appropriate (Wounds UK, 2018) and should include the above plus:

- Photograph—if local procedures and facilities allow
- Continued review of nutrition, footwear, blood glucose and other professional input.

The assessment informs care planning and indicates whether it is effective. Any care plan should have a planned review date. For example, a dressing might need changing twice or three times a week, but review of the care plan could be weekly or fortnightly depending on the wound, the care planned and when it is expected that progress will be seen.

A framework provides support during assessment. It is a tool allowing systematic review of the wound while supporting dressing choice. Frameworks will be discussed in more detail.

#### Factors that affect healing

Factors that influence healing can be intrinsic or extrinsic. These will affect the plan of care for the patient. Inhibitory factors that need to be considered can be seen in *Table 1*.

It may be possible to address some of the potentially confounding factors (eg, nutrition), but not others (eg, age). The former can be discussed and built into the patient's plan of care whereas the latter will identify risk areas and prompt early intervention to anticipate potential impedance of healing.

Addressing these factors incudes planning improvement of nutritional intake, stabilising anaemia/diabetes/other conditions, reduction or cessation of smoking and encouraging sleep and rest.

Nutrition can have a significant impact on healing and assessment should include weighing the patient when practical or noting whether they are under, ideal, overweight or significantly overweight. A brief discussion about what patients eat on a daily basis can be useful and will identify whether a more in depth look at diet would be beneficial. The NHS Eatwell Guide (Public Health England (PHE), 2016) advises what a balanced diet should include and can be accessed online or printed to give to patients.

#### Assessment frameworks

Many care providers use forms for assessing wounds to ensure consistency, effective recording and to make the overall process swifter. Some are bespoke and others are published documents. A framework is a tool that can be used alongside an assessment form to aid the clinician in their review and planning.

The TIME framework is a popular model that was first published in 2003 (Schultz et al, 2003). It is versatile and relatively simple to use. TIME encompasses Tissue, Inflammation/Infection, Moisture and Edge. The framework has been developed further and is superseded by the TIMERS framework—Tissue, Inflammation/Infection, Moisture, Edge, Repair, Social- and patient-related factors (Atkin et al, 2019) (*Figure 1*).

The updated and extended framework allows for a more holistic patient wound assessment and advises ten actions embedded into standard care to ensure it is effective (Atkin et al, 2019: S15):

- Holistic patient assessment
- Wound assessment
- Decide the desired outcome and care plan
- Address/manage the underlying pathology or plan maintenance care
- Implement local wound care according to wound bed preparation/TIME, etc. or maintenance/palliative care
- Follow-up, reassessment and measurement
- Modify the care pathway and refer if necessary to specialists or multidisciplinary team
- Patient/family education throughout
- Discharge or transition to maintenance treatment to prevent recurrence

Record actions/outcomes at every episode of care. Another popular framework is the Triangle of Wound Assessment (Dowsett et al, 2015). The triangle represents the wound and indicates three areas for assessment—the wound bed, the wound edge and periwound skin (*Figure 2*). For the

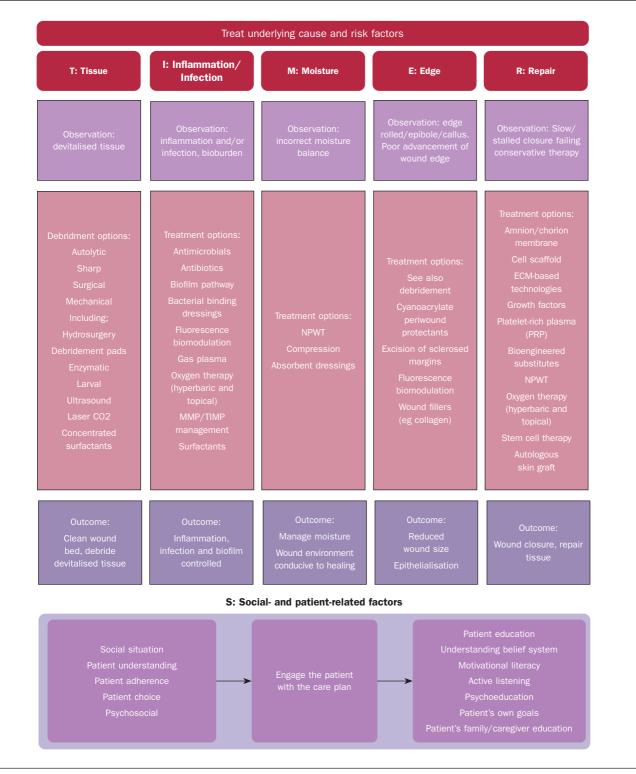


Figure 1. TIMERS framework (Atkin et al, 2019)

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purposes of this article, and to ensure a comprehensive holistic overview, TIMERS will be used to discuss assessment in practice, but the principles remain the same with other models. TIME is widely used in clinical practice, training programmes and throughout the literature. However, a clinician or team may prefer to use an alternative published framework to assist their practice particularly as TIMERS may be considered complex compared with some simpler, less detailed tools.

#### Assessment and care planning in practice

In practice clinicians often have limited time to carry out a holistic assessment and provide care. Where possible, appointments and patient visits should be planned to allow more time for initial assessment. The more detailed this first review is, the more likely the clinician is to identify potential or actual concerns and plan effective care. A systematic process can enable swifter gathering of relevant information.

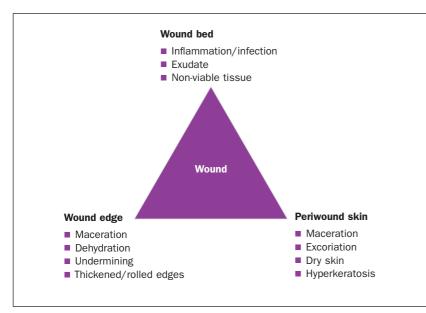


Figure 2. The triangle of wound assessment (Dowsett et al, 2015)

Some information about the patient and the wound can be gathered as the dressing is removed or as equipment is being prepared when time is limited. Duration and cause of wound may already be known, but getting the patient's perspective on this can be informative. Understanding which other professionals are involved in care can give an idea of the pathway already experienced by the patient and offers contacts for accessing more detailed information or ensuring effective communication between multidisciplinary teams.

The TIMERS framework (Atkin et al, 2019) begins with **Tissue**. This includes assessment of the wound bed—what colour is it and what type of tissue is present? Tissue type can be categorised into colour group, which can be a useful descriptor (Nichols, 2015):

- Pale pink/white = epithelial tissue
- Deep pink/red = granulation tissue
- Yellow/white = slough
- Black/brown = necrotic tissue.
  Another common assessment technique is to try to quantify



Figure 3. An example wound for assessment

the amount of tissue present. Using the wound in Figure 3 as an example, the wound is almost half covered with slough so that would be noted as approximately 40% slough or white/ yellow tissue, 50% granulation or red tissue and 10% epithelial or pale pink/white tissue. This allows a gross comparison with previous assessments, although there can be some inconsistency regarding actual figures between clinicians. The wound bed tissue would guide the clinician towards treatment required. For example, the presence of slough indicates debridement is necessary, so a route to manage this including a dressing to support removal of the tissue would be implemented, in agreement with the patient. The aim is to achieve a clean wound bed and ensure devitalised tissue is eradicated (Atkin et al, 2019). Caution is required when considering debridement for wounds with poor perfusion (Atkin et al, 2019) and advice should be sought regarding these patients before progressing.

**Inflammation and infection** includes observing for signs of either, in and around the wound, considering how the patient is feeling systemically and pain levels. Signs of infection include (International Wound Infection Institute (IWII), 2016);

- Wound bed: friable bright red granulation tissue, pocketing in granulation tissue or epithelial bridging
- Fluid: green/yellow/cloudy drainage or pus, offensive odour, increased exudate; leaking around clips/sutures
- Periwound area: tracking/spider web-like patterns, redness and inflammation
- Swelling/raised skin: note it is normal for raised skin to appear as a scar develops, new collagen can create a healing ridge under suture line or a rim around wound edges in wounds healing by secondary intention; observe for enlarged lymph nodes
- Fever: elevated temperature in combination with other factors may indicate infection; beware of a low temperature following a period of high temperatures
- Pain: increased pain, new pain or change in sensation.
  When a wound is infected and healing is affected and/

or the patient is systemically unwell, oral antibiotics are appropriate. A swab or tissue sample may be indicated, in line with local policies and guidance. An antimicrobial dressing can be used to support antibiotic therapy. Many are now available; silver, honey, iodine and polyhexamethylene biguanide (PHMB) impregnated dressings and topical applications are usually included on local formularies. It is advisable to use an antimicrobial dressing for a short period, 2 weeks being generally accepted (IWII, 2016; Joint Formulary Committee, 2021), when review of the care plan should then occur. The antimicrobial dressing may be continued if it is appropriate to do so.

Hard-to-heal wounds develop biofilms. A biofilm is made up of bacteria strongly attached to surfaces/tissues, encapsulated in a self-produced protein matrix and tolerant to antimicrobial agents both topical and systemic (Bjarnsholt et al, 2017). There is debate over whether the presence of a biofilm can be identified using visual indicators. The IWII (2016) suggested the criteria listed in *Table 2* were key in establishing the presence of a biofilm.

Where a biofilm is suspected (this will include most wounds that are failing to progress), treatment should include thorough cleansing and debridement of the wound bed. Cleansing can be done using a surfactant-based wound cleansing solution (such as Octenilin or Prontosan), particularly when sharp debridement cannot be performed in clinic (Bjarnsholt et al, 2017). An antimicrobial dressing is likely to be more effective when the biofilm has been disturbed.

Holistic treatment of the patient remains crucial (IWII 2016)—consider the influencing factors listed in *Table 1*. Can diabetic control be further optimised? Can nutritional intake be altered to support the immune system? Do oxygen levels need to be considered—could the area be hypoxic?

**Moisture** levels must be carefully monitored. A wound that is too dry or wet will not heal and may lead to further tissue damage and infection. Dry wounds do not allow effective migration of cells and will not support effective debridement. They may need a dressing that will supply moisture, except in the case of some wounds, such as necrotic heels in diabetic patients. Wet wounds need management of that fluid. Several options are available—more absorbent primary and/or secondary dressings, increasing the frequency of dressing changes or introducing a device such as negative pressure wound therapy (NPWT). Superabsorbent dressings are more widely available and some do not require a separate primary dressing. Some patients find the smell of exudate upsetting. In these cases, a charcoal dressing or liner can be used while the factors leading to the odour and levels of fluid are addressed.

The application of compression will usually lead to an increase in exudate from the wound as venous return is improved and any oedema is addressed. More frequent dressing changes and the use of a more absorbent dressing can be used to prevent skin damage or deterioration of the wound in these cases. When exudate levels are significantly high, patients may have depleted protein levels as well as reduced hydration. Advice given on how to increase protein and fluid intake should be included as part of the nutritional assessment.

**Edge** assessment encompasses the peripheries of the wound and the periwound skin. Observations should include what the areas look like. Are the wound edges rolled? Is there callus present? Can any undermining be detected with gentle probing?

Murphy et al (2020) presented the wound hygiene consensus (cleanse—debride—refashion—dress), highlighting the importance of refashioning the wound edges when the wound is not progressing as it should. For those not competent in sharp debridement, gauze or debridement pads can be used to stimulate and disturb the cells and this will remove devitalised tissue and reduce biofilm, which can be more prevalent at the edges (Murphy et al, 2020). The wound pictured in *Figure 3* would benefit from some refashioning to the rolled edges.

Wound size should be considered—is the wound getting larger, smaller or does it remain unchanged? Are the wound edges advancing as expected? Atkin et al (2019) suggested that a wound should have reduced in size by 40–50% after 4 weeks of treatment.

Are measurements consistent? Are maximum length and breadth being documented or are length and breadth being taken along north-south and east-west axes? A wound tracing can be a useful way of documenting wound size and observing for changes in the edges.

#### Table 2. Criteria indicative of potential biofilm

- Failure of appropriate antibiotic therapy
- Recurrence of delayed healing on cessation of antibiotic treatment
- Delayed healing despite optimal wound management and health support
- Increased exudate/moisture
- Low-level chronic inflammation
- Low-level erythemaPoor or friable granulation or overgranulation

Source: International Wound Infection Institute, 2016

The periwound skin needs to be observed for any scales, dry skin/eczema/psoriasis, irritation/pruritis/sensitivity and maceration. Although maceration should be considered under 'moisture', this is an opportunity to assess any specific skin damage and treat accordingly. Dry skin conditions can be addressed by cleansing and moisturising with an appropriate emollient or topical application.

If redness or inflammation to the periwound area is due to the dressing, an alternative is preferable and a skin barrier may be effective, as can an adhesive remover to reduce damage to skin during dressing removal.

**Repair** considers what factors will affect wound closure. The clinician should observe for signs that the wound is not progressing towards healing. TIMERS advises a wound that has been treated for 4 weeks should then be identified as 'hard-to-heal' and that referral to specialists or specialist clinics should now be considered (Atkin et al, 2019).

Prompt referral is crucial as the older a wound becomes the more complex the wound and the more significant the effect can be on the patient. As well as wound size, indicators that treatment is not successful include increased exudate, increased levels of devitalised tissue (such as slough, necrosis or rolled edges), increased or new pain, recurrent infections and increased maceration (Atkin et al, 2019).

Although listed last in the framework, **Social- and patient-related** factors are integral to the assessment and need to be addressed if any care plan is to be successful. *Figure 1* lists the areas to be considered. Engaging the patient and understanding their own goals and motivations will improve adherence to dressing plans.

#### **Dressing choice**

Nurses and other clinicians may often be overwhelmed by the wide choices of dressings available. Most local formularies provide support with selecting an application. Wound assessment will define an aim for care. For example, the treatment aim for the wound in *Figure 3* might be to remove slough (devitalised tissue) and refashion the rolled edges.

In addition to cleansing and debridement, using a debridement pad if sharp debridement is not possible, the selected dressing needs to support removal of that devitalised tissue. The amount of exudate will determine whether this is a wetter application, such as a hydrogel, or a dryer application such as a hydrofiber.

A list of dressing types and the most common indications for use can be seen in *Table 3* along with some examples of some common product names.

As well as addressing the aim of care, dressing choice should consider patient choice, allergies or sensitivities, position of the

#### **WOUND ASSESSMENT**

Table 3. Common dressing types		
Dressing type	Indication	Examples
Wound contact layer/silicone wound contact layer	Prevent adherence of the secondary dressing to the wound Superficial wound (commonly used under compression)	Atrauman Cuticell Contact Adaptic Touch
Hydrocolloid	Debridement or removal of debris Self-adhesive (consider skin quality) Prevention of ingress of debris and impermeable to bacteria (do not use on infected wounds) Moist or dry wounds—will not absorb exudate	DuoDerm Granuflex Comfeel
Hydrogel (sheet or amorphous)	Dry wounds Debridement Comfort and some have a cooling effect, which can reduce pain	ActiformCool Hydrosorb Comfort Purilon gel
Hydrofiber	Wet wounds to absorb Debridement Infected wounds (antimicrobial versions available)	Aquacel Extra UrgoClean Exufiber
Foam (adhesive/ non-adhesive/ silicone)	Absorbent (mild to moderately exuding wounds) Comfort Protection of vulnerable areas (with silicone layer or simply by providing some padding) Infected wounds (antimicrobial versions available)	Allevyn Biatain Tegaderm Foam
Alginate	Absorbent (but should not be left in place for more than 2 days) Encourage granulation Biodegradable	Kaltostat Sorbsan
Superabsorbent	Absorbent for high levels of exudate	Zetuvit Plus Kliniderm Eclypse

wound, aetiology of the wound, condition of the wound bed, availability of dressing and cost. However, the dressing is just one part of a wider wound care plan and should not be the sole focus when reviewing a patient.

#### **KEY POINTS**

- Wound assessment informs care planning and indicates whether interventions are effective
- Holistic wound assessment is essential to implementing appropriate and effective care
- Factors that influence healing can be intrinsic or extrinsic and will affect the plan of care for the patient
- The dressing is just one part of a wider wound care plan
- Good, concise documentation is essential to monitor wound progress and communicate with colleagues

#### **Documentation and review**

Good, concise documentation is essential to monitor wound progress and communicate with colleagues. Wound assessment forms are often available to assist with documentation, but using a wound framework can also ensure all factors are considered and recorded.

A body map can be useful for recording location and a photograph is invaluable for documenting wound progress or lack of progress and sharing details without the restrictions of vocabulary. Indeed, it can support and substantiate the written assessment (Nichols, 2015). Documentation must be in line with good practice and photography is no exception. Local/ trust guidelines should be followed. Photographs should be taken in a consistent manner with an identification label and date, remembering to record the anatomical location (Hampton and Kilroy-Findley, 2016).

All care planning should document a planned review date. The frequency of dressing changes will not be the same as the planned review.

#### Conclusion

Effective wound assessment can identify patients who are not healing as expected and allows early intervention to address any concerns or any influencing factors. The initial wound assessment is an opportunity to gather information about the patient, their health state and the wound itself, leading to a diagnosis. This will form a general picture, which can be used to plan dressing choice and overall care as well as support the patient holistically. Regular holistic reassessment allows review of the wound and appraisal of the care plan. Recommendations suggest this should occur every 2-4 weeks (Wounds UK, 2018).

Assessment frameworks act as a reference for clinicians and advise observations to make and criteria to consider. They can be adapted to different clinical settings and wound types to support the clinician in practice when planning care. Clinicians should select a framework that best supports them in practice. TIMERS (Atkin et al, 2019) has been used in this overview but others are available, including the Triangle of Wound Assessment (Dowsett et al, 2015). The core principles remain the same with any framework.

Dressing choice can be overwhelming but a comprehensive wound assessment will allow dressing choice to be made in line with the aim of care and meet the needs of the patient. The dressing is a relatively small piece of the holistic wound care package and should not be the sole focus of care planning.

Wound assessment and dressing choice must be done holistically and with the involvement of the patient and/or their carer. Accurate documentation stating clear goals with regular review dates of the plan of care to assess progress are essential. **BJN** 

#### Declaration of interest: none

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#### **CPD** reflective questions

- What are some of the key factors that influence wound healing?
- How does utilising a framework, such as TIMERS, aid wound assessment?
- What factors need to be considered when selecting a wound dressing?

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