JWC International Consensus Document

Embedding Wound Hygiene into a proactive wound healing strategy

ConvaTec
Wound Hygiene

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Foreword. Wound Hygiene: the next stage

Since a panel published the first consensus document on Wound Hygiene in March 2020, there has been a flurry of activity in support of this newly established concept in proactive wound healing.[1] The document concluded that all wounds, particularly hard-to-heal ones, will benefit from Wound Hygiene, which should be initiated at the first referral, following a full holistic assessment to identify the wound aetiology and comorbidities, and then implemented at every dressing change until full healing occurs.[1]

The consensus has since been bolstered by educational webinars; competency-based skills training and support; development of international Wound Hygiene ambassadors; a survey of 1478 respondents, published in July 2021;[2] and a case study supplement, published in January 2022, featuring a range of wound types, anatomies and underlying conditions on the improvements in wound-healing progress that can be achieved.[3]

Wound Hygiene has gained its own identity and is now a term in and of itself, that encompasses a 4-step protocol of care. It is an antibiofilm approach that is increasingly being used across wound care. The results of the survey[2] were particularly encouraging for seeing how far Wound Hygiene has come, and how quickly:

- More than half (57.4%) had heard of the concept of Wound Hygiene
- Of those, 75.3% have implemented Wound Hygiene
- Overall, following implementation of Wound Hygiene, 80.3% of respondents reported improved healing rates.[2]

However, the top three barriers identified by the survey—lack of confidence, competence and research data—show that there is more to be done to support Wound Hygiene in practice.[2] As a result, a consensus panel of international key opinion leaders convened virtually in the summer of 2021 to discuss what has been done so far, the outputs of the survey, and ideas for addressing the unmet needs identified by the results. The result is this publication, which represents an addendum to the initial consensus document, broadening support for implementation of Wound Hygiene.

This document will reflect on the reasons Wound Hygiene has been successful in its first two years of implementation, reiterating its DNA:

1) Do not wait to treat hard-to-heal wounds

2) Use a simple 4-step approach

3) Enable all healthcare professionals to implement and use Wound Hygiene.

The document will also discuss the evolution of the Wound Hygiene concept, focusing on how and when to implement Wound Hygiene on all tissue types of hard-to-heal wounds, and proposing what these are. The panel has expanded the framework in which Wound Hygiene is used, with the ultimate objective of introducing the concept of 'embedding Wound Hygiene intro a proactive wound healing strategy.'

Key inefficiencies are often observed along the journeys of people living with hard-to-heal wounds. The limited number of specialised healthcare professionals and the resulting delays in reaching them may increase the likelihood of a hard-to-heal wound developing.

In a world where so much is happening so quickly that we may, at times, feel powerless to drive change, the panel wants to provide further guidance to propel the use of Wound Hygiene. The concept of Wound Hygiene is resonating, and the panel wants you to know that in whatever region you work, in whatever area of clinical practice, you are enabled to make this change. Wielding the 4-step Wound Hygiene protocol consistently is a key action every healthcare professional in every care setting can take to tackle the global wound care crisis.

Wound Hygiene has taken off—now, where do we want to land? In a place where Wound Hygiene is practised on all wounds, at every stage, until healing.

The panel once again recognises that the community of global healthcare providers should consider their local standards and guidelines when applying the recommendations of this document. To this end, the panel has created a flexible 3-phase framework that situates Wound Hygiene as integral to proactive wound healing. The panel hopes you will continue to implement Wound Hygiene and see the benefits it can bring to people living with wounds, as well as those who care for them.

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Section 1. The DNA of Wound Hygiene

In the first consensus document, published in 2020, the panel proposed that healthcare professionals (HCPs) involved in the practice of wound care move away from the term 'chronic wounds' and begin using 'hard-to-heal' wounds instead.[1] This call to change terminology is driven by two factors: to acknowledge the fact that any wound, independent of type and aetiology, may be hard-to-heal, and to rethink these wounds through language that indicates that barriers to healing can be overcome. Therefore, the panel reiterates that 'hard-to-heal' will be the terminology and wound type referred to throughout this document. (For a reminder of all key definitions, see Table 1).

Table 1. Key terminology definitions[1]

Hard-to-heal wound	A wound that presents with factors that impede achievement of healing. These factors may present at any time, and hard-to-heal wounds may be defined as such from the start—for example, due to underlying factors or difficult anatomical location. They may also be judged as hard-to-heal after failure to respond to evidence-based standard of care. The concept of Wound Hygiene is based on the premise that all hard-to-heal wounds contain some level of biofilm. Because of the speed with which biofilm forms, a wound that exhibits exudate, slough and an increase in size by the third day of its occurrence can be diagnosed as hard-to-heal
Complex wound	A wound that presents with complicating medical, clinical, psychological, socio-economic or wound-related factors that put the wound at risk of failing to heal with standard therapy in an orderly, consistent and timely manner
Chronic wound	Indicates a wound that will not heal, that will persist, and may even be viewed as incurable. This document dispenses with the term chronic wounds in favour of hard-to-heal wounds, signifying that barriers to healing posed by the presence of biofilm can be overcome
Wound biofilm	A complex community of different species of bacteria and fungi that causes a sustained, subclinical local wound infection, but can protect itself from the host's immune response and is tolerant to antibiotics and antiseptics.[2] Biofilm can form within hours and can reach maturity in 48–72 hours.[3] All wounds contain some level of biofilm, which is invisible to the naked eye[4]
Wound Hygiene	An established concept in wound care that promotes healing of hard-to-heal wounds. The biofilm must be addressed early with a strategy comprising wound cleansing (wound and surrounding skin), mechanical debridement (initial debridement if necessary, as well as maintenance), refashioning the wound edge, and biofilm-targeted management (or antibiofilm therapies) and prevention. Wound Hygiene comprises a set of four tasks that should be carried out regularly and repetitively

Hard-to-heal wounds: the cost of waiting

It is already estimated that 2–6% of the population worldwide are living with wounds, and that figure is expected to increase as the population of people 65 years or older—those most affected by hard-to-heal wounds—will see an additional 50+ million added to their ranks by 2050.[5,6] The costs attributed to care for people living with wounds stretch to $60 billion a year in the United States alone, and comprise 2–4% (and growing) of healthcare expenditures across Europe.[7–10] Additional concerns include rates of antibiotic use, which contribute to antibiotic resistance; disproportionate use of nursing time; and detrimental effects on quality of life for people living with wounds, including pain, impaired mobility and psychological effects.[10–17]

The time to act against this crisis and in support of each and every person living with a wound is now—both on a global level and at the individual wound management level. This begins with a significant contributor to delayed healing that should be assumed to be present in every wound: biofilm.[18–22]

Oral biofilm reforms within 24 hours of the performing of oral hygiene.[23] Similarly, in hard-to-heal wounds, biofilm can form and reform after disruption within hours, and its presence can be assumed to be the primary barrier and cause of hard-to-heal wounds (Table 1).[1] To initiate and support healing—reducing the burden of hard-to-heal wounds on individuals and health systems—antibiofilm strategies must be considered in order to continuously disrupt and remove biofilm, as well as avoid its reformation throughout the trajectory of wound care management.[24,25]

Antibiofilm strategies are a well-accepted part of wound care practice. In a recent survey, 87.8% (n=1,283) of respondents (N=1462) reported that they consider

whether biofilm is present when completing a routine wound assessment.[26] Furthermore, 70.1% (n=897) of respondents (N=1280) said they use an antibiofilm strategy to manage biofilm in wounds.[26] Over the last decade, biofilm management practices consisted of regular debridement followed by antibiofilm reformation strategies, including the use of topical antimicrobial dressings.[25]

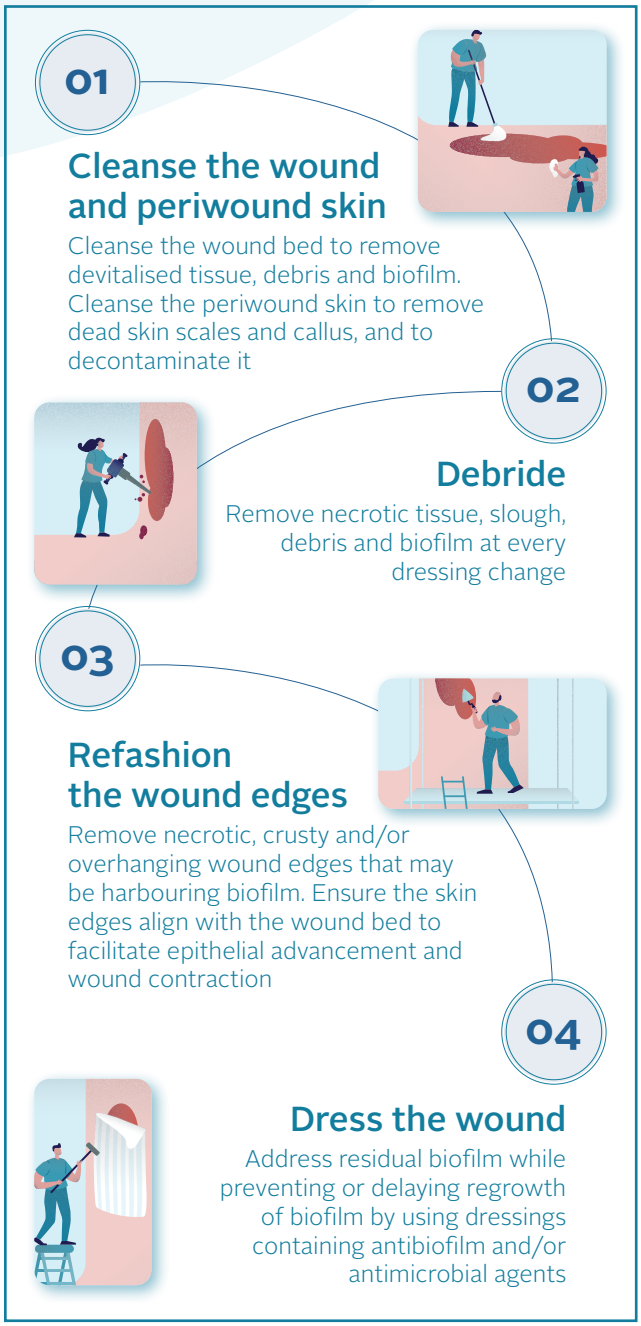

Figure 1. *The four activities of Wound Hygiene*[1]

Wound Hygiene: a simple, 4-step approach

Despite the awareness and use of antibiofilm strategies, the crisis in wound care has not abated. This consensus document reiterates the need to go further, with a structured approach for overcoming the barriers of biofilm to healing, called Wound Hygiene—an antibiofilm method that aims to uproot the cause of a common pathology in the population of people living with hard-to-heal wounds.[1]

Wound Hygiene comprises four key activities (Fig 1):[1]

- **Cleanse the wound and periwound skin.** Carried out at every dressing change, to prevent recolonisation of the wound originating in the wound bed or via the surrounding skin
- **Debride the wound.** Carried out at every dressing change, using a method determined by wound assessment and HCP skill level, to remove devitalised tissue, adherent exudate and senescent cells, and optimise the wound bed to move towards healing
- **Refashion the wound edges.** Carried out according to a method determined by wound assessment and HCP skill level, to remove areas that can harbour biofilm and ensure that skin edges are contiguous with the wound bed, to facilitate epithelial advancement and wound contraction
- **Dress the wound.** Applying an antimicrobial dressing that effectively manages residual bacteria to prevent regrowth/reformation of new biofilm (Fig 1).

A key underpinning component of Wound Hygiene is that everyone can do it. Wound Hygiene can be implemented by everyone, regardless of their skill level (for example, to debride does not always mean sharp debridement, but recognises that certain HCPs can be trained in methods such as curette).[1] The mentioned survey found that 80.3% (513/639 respondents) of those who have implemented Wound Hygiene say that they have seen improvements in healing rates with the use of Wound Hygiene at each wound assessment.[26] The survey also found three key barriers to implementing Wound Hygiene, self-identified by the respondents:[26]

1 **Lack of confidence.** In particular, ar1ound debridement. However, the survey found that large numbers of HCPs who have implemented Wound Hygiene are using a wide variety of debridement methods (not just sharp debridement) to ensure this critical step is carried out at each dressing change. Recent research shows that repeated debridement to pinpoint bleeding helps achieve wound-healing aims, and HCPs caring for wounds can be reassured that there is a need for vigour in this step of Wound Hygiene.[27,28] Further guidance is provided in Sections 2 and 3

2 **Desire for more research.** Further research specific to the effects of Wound Hygiene on healing is underway. A series of 12 case studies was published in 2022,[29] to demonstrate real-world evidence for using Wound Hygiene. The supplement covered a range of wound types: leg ulcers, diabetic foot ulcers, infected insect bites, surgical wounds, non-healing traumatic wounds, and a wound on difficult anatomy (Achilles tendon). With persistent, regular performance of Wound Hygiene, all progressed towards healing, with eight of those achieving healing over time[29]

3 **Lack of competence.** Educational efforts and training provided by industry and institutions are needed to help overcome this barrier. The development and validation of a comprehensive Wound Hygiene Clinical Capabilities Framework is in progress to guide practice and institutional guideline development, which can further enable HCPs caring for wounds.[30]

Overcoming these three factors should be prioritised by facilities in which wounds are managed, in order to ensure that Wound Hygiene can—and is—carried out by any practitioner, at every assessment, as a proactive antibiofilm approach.

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Key takeaway message

All hard-to-heal wounds have some level of biofilm

It is widely known that host health factors provide obstacles to healing. Additionally, the impact of suboptimal health directly affects the wound environment, in part by encouraging biofilm growth as a direct mechanism of delayed healing.[18,19,24,31,32] However, antimicrobial testing at every dressing change is neither realistic nor practical. This document proposes that it should always be assumed that hard-to-heal wounds contain some level of biofilm. Wound Hygiene represents a structured approach for overcoming the barriers to healing posed by biofilm, seeking to uproot the cause of a common pathology in people living with hard-to-heal wounds.

Section 2. Evolving the notion of Wound Hygiene

A hard-to-heal wound remains hard-to-heal until it has fully healed. That is not to say that these are impossible-to-heal wounds but, rather, that the conditions that pose challenges to wound healing are always present and may result in regression of the wound, even if they can be overcome. Therefore, it is important that the healthcare professional (HCP) monitors the rate of wound healing, implements strategies to accelerate wound healing, and ensures the wound is managed through to closure.

Biofilm, in particular, poses a serious threat to wound healing, due to the speed with which it forms and reforms. As a result, a wound that exhibits exudate, slough and an increase in size by the third day of its occurrence may already be defined as hard-to-heal.[1] The concept of Wound Hygiene is based on the premise that all hard-to-heal wounds contain some level of biofilm, and that Wound Hygiene is an effective antibiofilm approach that should be practised at each dressing change, at every tissue stage, until the wound has fully healed.

Why biofilm is a key barrier

It is currently known that biofilm is present in 78% of hard-to-heal wounds, is invisible to the naked eye (often <100µm in size), can reform in as little as 24 hours, and leads to chronicity.[2] It is a significant contributor to delayed healing that should be assumed to be present in every wound.[3–7] Although biofilm is primarily located on the wound surface, it can aggregate in deeper tissue, and is inconsistently distributed across and within the wound.[4,8–11] In addition, any open wound can be colonised by opportunistic pathogens, which do not discriminate between tissue that appears 'healthy' or 'unhealthy.' Studies have shown that biofilm exists in granulation tissue, even as the wound begins to heal.[12–14]

Furthermore, hard-to-heal wounds can regress and therefore should always be treated as hard-to-heal until closure. The same practice is adopted in the UK with pressure ulcer (PU) classification, where reverse staging should be avoided—for example, when healing, a Stage 4 PU is documented as a healing Stage 4 PU, not a Stage 3, 2 or 1. Because biofilm can reform rapidly in any tissue, and lead to regression of progress towards wound healing, Wound Hygiene should be applied as soon as possible, at every stage, until healing.

However, biofilm is not the only aspect that leads to hard-to-heal wounds. Factors related to the patient, medical and psychosocial situation can also drive the presence of biofilm (Box 1). The panel proposes that, while biofilm may be the factor that tips a wound into hard-to-heal status, there is a cycle at play that needs to be disrupted through both appropriate management of the patient and any underlying conditions, and the implementation of Wound Hygiene to tackle biofilm.

Box 1. Contributing factors to hard-to-heal wounds[15,16]

Behavioural and psychosocial risk factors

- Psychological stressors (isolation; unhealthy family relationships; fear, depression and anxiety; stress; pain; lack of sleep and poor sleep quality/sleep style due to, for example, sitting)
- Smoking
- Inappropriate alcohol consumption
- Imbalanced diet/malnutrition/poor glucose control
- Poor hydration
- Hiding wounds/making do-it-yourself dressings

Medical status risk factors

- Body type (obese or underweight status)
- Diabetes mellitus
- Cardiovascular disease (such as peripheral arterial disease, coronary artery disease, chronic venous disease, lymphoedema)
- Immunosuppression (for example, due to medication, pharmacological management or radiation therapy)
- Cancer
- Laboratory values (such as haemoglobin level, hepatic, renal, thyroid function)

Nonmodifiable risk factors

- Immobility/lack of dexterity (to a certain extent) leading to repetitive stress or overload of the skin surface
- Neuropathy
- Increasing age
- Immune system/autoimmune disorders (for example, rheumatoid arthritis)
- Genetic conditions (such as rare diseases and chromosomal disorders)

Wound healing and Wound Hygiene

All wounds (particularly hard-to-heal ones) will benefit from Wound Hygiene.[1] Because biofilm is likely to be present at every stage of the healing process, Wound Hygiene should be initiated at the first referral, and then implemented at every dressing change until full healing occurs.[1]

When visually evaluating a wound's progression towards healing, tissue type and colour are often considered. There is a universally accepted 'healing trajectory' across four tissue types: from necrotic or sloughy tissue, to granulation and epithelialisation tissue. However, this progression is rarely a linear process. In fact, many hard-to-heal wounds are stuck in an undefined tissue type (despite presenting with an appearance akin to granulating wounds) and will struggle to move on to the next phase. This is often due to biofilm presence; therefore, implementing Wound Hygiene can be especially crucial in wounds with such characteristics.

To address this problem, the panel proposes the addition of a fifth tissue type by delineating unhealthy granulation from healthy granulation tissue.

Tissue types and unhealthy granulation tissue

The healing 'trajectory' has often been seen as happening across the evolution of tissue types in the wound bed. The four historically accepted tissue types, from what is generally considered dead tissue to most actively healing tissue, are:[17]

- **Necrotic.** Dead tissue that is usually the result of lack of blood supply (ischaemia) to the tissues and cells in the wound bed, but may also arise due to infection. Presents as black/brown in colour, with either hard/dry/leathery or soft/wet texture, and can be either firmly or loosely attached to the wound bed. Differentiate from: haematoma, dry scab or sero-crust. This tissue may also be called 'devitalised'
- **Sloughy.** Yellow/white material in the wound bed that is typically wet, but sometimes dry. May present in thick patches over the surface of the wound or as a thin coating. Differentiate from: exposed tendon, joint capsule, dressing debris, and deep-dermal or full-thickness burn
- **Granulation (healthy).** Presents as bright red and cobblestone-like in appearance, and should be moist and shiny. This phase needs to resolve in order to allow epithelialisation to occur. Observe for hypergranulation (the result of abnormal wound bed conditions, such as granuloma and chronic infection), where the tissue extends above the level of the surrounding skin. Hypergranulation can also be a tumour manifestation (eg, basal cell carcinoma)
- **Epithelialisation.** The final stage of wound closure, in which new skin cells begin to grow at the wound edges or on the surface, to cover and close it, restoring barrier function. Presents as matte in appearance, pale pink/white, and can be very fragile. In partial-thickness wounds, small islands of epithelium will form structures such as hair follicles. Differentiate from: maceration, debris or superficial slough (if presenting in 'small islands').

However, wound healing does not always flow in that chronological order—many wounds will get stuck and stop progressing. Therefore, the consensus panel proposes adding a fifth tissue type in the healing continuum, with the caveat that where it fits is based on tissue type, but will not necessarily occur in the order depicted (Fig 2). This type will be called:

- **Unhealthy granulation.** A previously undefined stage in which the wound does not necessarily appear outwardly unhealthy and where granulation tissue is present, but also is failing to progress. Healthy granulation tissue is pink in colour and is an indicator of healing, whereas unhealthy granulation is typically dark-red in colour (although it may sometimes present as pale when there is a poor blood supply),[18] often bleeds on contact and may indicate the presence of wound infection.[19,17,20–22] It may also be prone to bleeding (friable),[17,20–22] and could be due to a number of factors including ischaemia, untreated pathology, and biofilm. It can be kickstarted towards healing through indication-specific treatment and the implementation of Wound Hygiene.

Because of its ambiguity, and the previous lack of definition in the literature, this type of tissue is often managed inappropriately—as if it were healthy granulation tissue that would progress to full healing. However, this approach underestimates the presence of biofilm and the level of intervention needed to spur healing. In fact, the presence of unhealthy granulation tissue is indicative of heavy bioburden, and highlights the importance of implementing some level of Wound Hygiene on all tissue types, at every assessment and dressing change, until closure. The consensus panel's experience has shown that debridement in particular is the key step to move towards healthy granulation tissue, which should be considered separate from this unhealthy granulation type.

Without the implementation of Wound Hygiene, unhealthy granulation tissue represents a tissue type that is predisposed to regress, thereby frustrating HCPs and perpetuating the misperception of 'chronic' wounds that will never heal. The use of Wound Hygiene in wounds with unhealthy granulation tissue will instead help

Figure 2. *Tissue types and examples of unhealthy granulation tissue*

reinforce the idea that this type of tissue is a barrier that can be overcome in hard-to-heal wounds.

When assessing the wound for tissue type, it is important to remember that the state of the tissue is not connected to duration and/or when the wound is entered to the HCP's caseload. Using these five categories, HCPs can more accurately recognise where the wound is and what interventions it requires when it enters their care. All tissue types should receive Wound Hygiene at every dressing change, at every stage, until healing.

Determining the intensity of Wound Hygiene

Wound Hygiene is a practice that seeks to remove biofilm through repeated implementation at every tissue type, until healing. To use the oral hygiene analogy: every person who manages wounds needs to be able to brush the teeth—clean the wound—effectively enough, perhaps with more rigour than is currently being done in practice. The Wound Hygiene survey revealed that lack of confidence, in particular around debridement, continues to exist.[23]

A study of 20 patients who underwent sharp debridement (18 curette, 1 scalpel, 1 tissue nipper) until bleeding sought to understand the impact on host physiology and wound microbiota based on swab analysis of the wounds' surfaces before and after debridement.[24] The study found no significant differences in microbiome composition, but instead uncovered anaerobe depletion at 2 weeks post-debridement, resulting from a gradual decline over days.[24] In hard-to-heal wound beds, delivery of oxygen via microvasculature can be impeded by underlying factors, anatomic location or the state of the wound bed itself. In this environment, anaerobes proliferate and form biofilm communities, and have been shown to pose a major barrier to healing in various wounds, potentially even resulting in necrotising fasciitis.[25] Although the sample size was small, these results demonstrate the need for frequent and aggressive debridement to reduce anaerobic proliferation and ensure effectiveness against biofilm.[24,26] Encouraging news from the survey was that large

Table 2. Implementation of Wound Hygiene by clinical competency*[1]

Skill level	Wound Hygiene task
General caregiver (routine care)	▪ Cleanse the wound bed and periwound skin ▪ Debride the wound bed and periwound skin with a soft debridement pad or gauze ▪ Refashion the wound edges with a soft debridement pad or gauze ▪ Assess for signs of infection ▪ Apply a wound dressing ▪ Refer patient to an advanced/registered practitioner
General wound care provider	▪ Cleanse the wound bed and periwound skin ▪ Assess the patient, wound (including vascular supply and infection status) and environment holistically ▪ Identify local and spreading infection ▪ Perform selective sharp debridement of non-viable tissue (and determine when it is appropriate) or larval therapy ▪ Refashion the edges to achieve pinpoint bleeding with soft debridement pad or ring curette ▪ Select and apply a wound dressing ▪ Refer patient to an advanced practitioner
Expert wound care provider	▪ Diagnose and manage the underlying pathophysiology ▪ Use pharmacotherapy, as required ▪ Select and undertake an appropriate method of debridement (eg, surgical sharp debridement) ▪ Cleanse the wound bed and periwound skin ▪ Refashion the wound edges ▪ Suture, if required ▪ Select and apply a wound dressing

*Refer to local regulations for competency requirements and specific policies in your area

Table 3. Guidance for performing Wound Hygiene tasks

Tissue type	Recommended cleansing intensity	Recommended debridement methods	Recommended refashioning intensity
Necrotic	Vigorous (using physical force)	Intensive: ▪ Surgical ▪ Sharp selective (curette, scalpel, scissors, forceps) ▪ Larval* ▪ Mechanical debridement (including soft debridement pad, gauze or wipes)	Agitate the wound surface to pinpoint bleeding
Sloughy	Vigorous	Intensive: ▪ Surgical ▪ Sharp selective (curette, scalpel, scissors, forceps) ▪ Larval ▪ Mechanical debridement (including soft debridement pad, gauze or wipes)	Agitate the wound surface to pinpoint bleeding
Unhealthy granulation	Vigorous	Intensive: ▪ Surgical ▪ Sharp selective (curette, scalpel, scissors, forceps) ▪ Larval ▪ Ultrasonic debridement ▪ Mechanical debridement (including soft debridement pad, gauze or wipes)	Agitate the wound surface to pinpoint bleeding
Healthy granulation	Moderate or gentle, depending on confidence and competence	Gentle: ▪ Mechanical cleansing/debridement (including soft debridement pad, gauze or wipes)	Selectively rub in circular motion over wound bed and periwound skin, as needed
Epithelialisation	Gentle	Not required	Not required

*Contraindicated in dry necrotic tissue

numbers of HCPs are using a wide variety of debridement methods.[23] In order to further support this practice and supplement the guidance around the skill levels and Wound Hygiene tasks that are appropriate for each level (Table 2), the panel has developed recommendations regarding the intensity of Wound Hygiene, and the methods that are recommended to focus on removing biofilm (Table 3). The hope is to clarify and build on the simplicity of Wound Hygiene for all levels of people who care for wounds, so that implementation of Wound Hygiene can achieve greater consistency across practice.

The panel encourages everyone who manages wounds to 'clean it like you mean it' (providing there are no contraindications, such as bleeding and pain, and patient consent), 'debride it as much as possible,' and 'don't be afraid of bleeding.' In other words, to be more vigorous, aggressive and confident in using the cleanse-debride-refashion steps to remove unwanted tissue on the surface of the wound. At the same time, the panel re-enforces that practice specific to Wound Hygiene must be in line with the HCP's professional registration code of conducts, licensure scopes of practice and locally recognised guidelines, and that there are cases in which vigorous application of Wound Hygiene should be used with caution or is contraindicated (Table 4). Wound Hygiene protocols can still be implemented in patients when debridement and edge refashioning are contraindicated. In such instances, the protocol comprises cleansing and application of dressing.[27]

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Table 4. Contraindications and precautions to debridement and refashioning in Wound Hygiene[22]

Contraindications	Precautions for debridement that can cause bleeding*	Other precautions
▪ Wound aetiology is unknown ▪ Acute infection† ▪ Inadequate perfusion ▪ Inflammatory or malignant conditions such as: • Critical ischaemia pyoderma gangrenosum • Gangrene (wet or dry) • Calciphylaxis • Vasculitis • Malignant wounds	▪ Bleeding disorders ▪ Antiplatelet therapy, anticoagulation therapy†	▪ Patients in intolerable or unavoidable pain ▪ Patients with a palliative condition where healing is not the ultimate goal ▪ Patients with biologics, such as extracellular matrix products, in situ (as could result in removal of the product)

*Debridement may induce bleeding

†Decision regarding debridement should be made in consultation with an expert/advanced (certified wound specialist, surgeon or other specialist consultant) practitioner

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Key takeaway message

Look out for 'unhealthy granulation' tissue

Biofilm is invisible to the naked eye, and can rapidly reform.[14] It is important to consider biofilm and practise some level of Wound Hygiene at all healing stages, because a hard-to-heal wound remains hard-to-heal until fully healed. The three steps (cleanse, debride and refashion) should be performed proactively at every stage, with varying intensities according to tissue type and skill level. It is important to acknowledge a previously undefined type of tissue, where the wound does not necessarily appear unhealthy and where granulation tissue is present, but also is failing to progress: unhealthy granulation tissue.

Section 3. Wound Hygiene: a proactive wound healing strategy

The last decade has seen a movement for healthcare professionals (HCPs) to look at the patient holistically, and the need for this approach has never been more relevant. In hard-to-heal wounds, HCPs must look beyond the wound at other factors including comorbidities, nutrition, mental health and socioeconomic challenges. This emerging trend in wound management demands integrating Wound Hygiene into a more holistic framework, where proactive wound healing (rather than reactive wound management) is endorsed. Therefore, the panel proposes a new framework to adopt a Wound Hygiene protocol of care complemented by a patient-centric approach.

This 3-phase framework (Fig 3) reinforces the importance of assessment, management (using Wound Hygiene) and monitoring, in order to support a more centralised approach by which all HCPs who care for wounds are comfortable with performing Wound Hygiene.

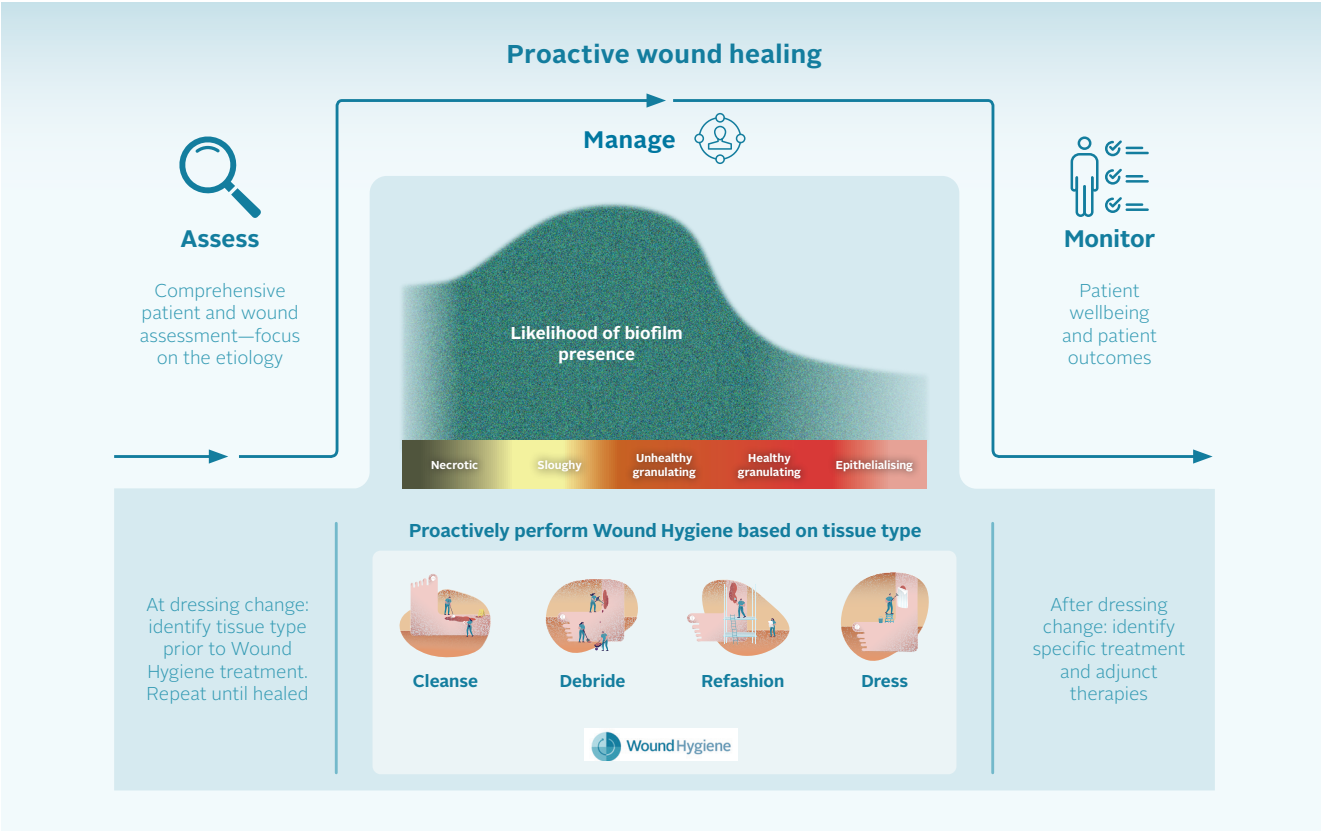

Figure 3. *Framework for proactive wound healing*

Assess the patient and wound

Accurate patient and wound assessment are critical to ensure that the correct wound management approaches are undertaken, as well as to set goals for management and healing, so that objectives can be achieved. The panel agreed that several aspects of assessment should be non-negotiable, to optimise outcomes:

1. Perform a holistic assessment of overall patient risk and quality of life
2. Give the wound a first name (wound type) and last name/surname (aetiology). Identifying the underlying cause will help determine the desired healing outcome. For example: leg ulcer, venous; or leg ulcer, arterial insufficient

3. Identify adjunct therapies to be implemented in the next stages. These may include vascular intervention, compression therapy, offloading and nutrition, to treat underlying causes and support healing of the wound. Ensure referrals as necessary for indication-specific treatment
4. Determine wound-management strategies to be implemented in the next stages. In addition to the use of Wound Hygiene, this may include debridement type and dressing selection
5. Set objectives for the overall outcome. In order to accurately monitor achievement along the wound healing trajectory, the aims must be mapped.

Assessment should lead to diagnosis of the aetiology and tissue type—as part of proactive wound healing, people with a hard-to-heal wound should not wait for a plan to be developed while receiving only Wound Hygiene. For healing to progress, the plan and goals should be set as early as possible, ideally as part of every assessment. When undertaking the assessment phase, there are a number of tools that are validated to provide reliable, multifactorial assessment (Table 5).

Table 5. Top-line selection of tools for holistic assessment of patients and wounds*

Tool	Short description
Risk assessment	
Braden Pressure Ulcer Risk Assessment[1]	Rigorously evaluated tool for predicting pressure injury risk in adults and children
Wound, ischaemia, foot infection (WIfI) system[2]	Brings together existing classification systems to predict amputation risk at one year, standardising outcome comparisons to help guide management of people living with a foot ulcer
Waterlow Pressure Ulcer Scale[3]	Assesses the risk of a person developing a pressure ulcer; however, it has been shown to have low reliability, high sensitivity and low specificity
Wound assessment	
Bates-Jensen Wound Assessment Tool[4]	Evaluates the wound across 13 factors, including size, type, wound edge, necrotic tissue, and exudate, with higher scores indicating more severe wound status
Leg Ulcer Measurement Tool[5]	The LUMT can be used 'with relatively little previous training, to make reproducible evaluations of lower-extremity ulcer appearance and to document change in appearance over time'
Pressure Ulcer Scale for Healing[6]	The tool has been validated for assessing and monitoring pressure injury, venous leg ulcers and diabetic foot ulcers
Revised Photographic Wound Assessment Tool[7]	The tool has been validated as reliable for assessing chronic wounds of various aetiologies using digital images
SmART Wound Tool[8]	Has been developed for acute surgical wounds caused by arthroplasty, and may provide a simple, objective method of assessing for the presence of early complications
Triangle of Wound Assessment[9]	A holistic framework that focuses on the wound bed, wound edge and periwound skin, to help guide clinicians in setting wound-management goals and selecting the most appropriate and effective intervention
Quality-of-life assessment	
Cardiff Wound Impact Schedule (CWIS)[10]	Validated, qualitative questionnaire that measures factors within four domains: physical and functional status, symptoms and side effects, social functioning and psychological state
Wound-QoL[11]	A questionnaire measuring quality of life through 17 items assessed in retrospect of the preceding seven days
Freiburg Life Quality Assessment[12]	A tool to measure 53 disease-specific, health-related, quality-of-life parameters in six dimensions for people living with wounds
The Medical Outcomes Study Short Form 36-item (SF-36) and 12-item (SF-12)[13]	Widely used across healthcare to measure quality of life (QoL); the SF-12 is a streamlined version of the SF-36. The two tools have been found to provide comparable scores for patient QoL

*Due to the large number of assessment tools, this table is not comprehensive, and provides an overview of some options. Check your local policies and follow local assessment protocols

The panel also determined a priority list of key factors to assess for and describe:

- Wound size and presence/extent of undermining
- Wound condition
- Periwound and skin condition (eg, for indications of underlying cause, such as skin signs of chronic venous disease, or pyoderma gangrenosum)
- Wound edges
- Level and type of exudate
- Pulse palpation, doppler assessment, ankle/brachial index, toe/brachial index
- Oedema
- Foot/limb deformities, along with type and suitability of footwear
- Patient's gait
- Mobility
- Baseline medication (eg, steroids, angiotensin-converting enzyme inhibitors)
- Glucose levels
- Observation of presence of varicose veins
- Vascular ultrasound (if indicated)
- Sensory perception
- X-ray examination (if indicated)
- Pain levels.

Manage the wound

After a full holistic assessment to identify the wound aetiology, comorbidities and other risk factors, Wound Hygiene should be instigated as part of proactive wound healing. The concept of 'embedding Wound Hygiene into a proactive wound healing strategy' will be most active at the management phase of the framework (Fig 3), and consists of:

- **Identifying tissue type:** at dressing change, evaluate the surrounding skin and assess the wound to identify tissue type before implementing Wound Hygiene. Repeat this action at every dressing change until healing
- **Determining tools/techniques for Wound Hygiene steps:** identify tissue type before treatment with Wound Hygiene (until healed). This will guide the HCP in determining the intensity and tools/techniques for an optimal practice of the first three Wound Hygiene steps (cleanse, debride and refashion)
- **Performing Wound Hygiene:** steps 1, 2 and 3 of Wound Hygiene (cleanse, debride and refashion) should be performed, to some degree, at each stage of a hard-to-heal wound until it has fully healed. The hard-to-heal wound should be cleansed, debrided and refashioned according to tissue type definition (as covered in Section 2), in preparation for the final step of the Wound Hygiene treatment and any other indication-specific treatments
- **Carrying out Wound Hygiene 'dress' step:** this step involves application of a dressing that will maintain a healthy wound environment, until the next episode of care.[14] Biofilm can reform rapidly, and repeated debridement alone is unlikely to prevent its regrowth.[14] Where appropriate, based on assessment of tissue type and patient circumstances, application of effective topical antimicrobials and antibiofilm agents after biofilm has been physically disrupted can address residual biofilm and suppress its reformation.[15] The dressing should also manage exudate effectively, in order to promote healing.[14] It may be appropriate to step-up or step-down dressing technologies, based on the appearance of the wound, duration of care, and healing response; the effectiveness of the dressing choice should be assessed every 2–4 weeks.[16] An antibiofilm dressing should be used only for as long as it is indicated, after which action should be taken to step-down to either a non-antibiofilm or non-antimicrobial dressing.[16] However, the Wound Hygiene protocol should continue to be applied[16]
- **Performing indication-specific treatment:** due to the frequent complexity of hard-to-heal wounds, ensuring indication-specific treatment to address the underlying aetiology has been proven highly successful

Apply Wound Hygiene proactively, until healed

Key takeaway message

Embedding Wound Hygiene into a proactive wound healing strategy is driven by an assess-manage-monitor cycle that focuses on the whole patient, supplemented by wound- and indication-specific activities, all of which are carried out at the earliest opportunity and then at every dressing change, until healing.

and is widely recommended.[17] Refer the patient on as necessary to a member of the multidisciplinary team for indication-specific treatments.[17]

A vital aspect of good wound management is to be able to recognise and have a clear understating about the underlying pathophysiology and how this impacts wound healing. Where possible, the underlying pathophysiology should be treated or medically managed:

- **Medical management:** for example, improving control of hyperglycaemia, renal insufficiency, nutrition, and other associated medical comorbidities in people with diabetes. People living with a PU may require the amelioration of nutritional deficits in order to optimise tissue repair; certain autoimmune disorders require management by rheumatology or gastroenterology
- **Venous leg ulcers:** if no evidence of peripheral arterial disease (PAD), people living with a venous leg ulcer (VLU) should be treated with strong compression therapy. Additionally, they will require assessment for venous insufficiency to assess whether there is a need for venous intervention to aid control of venous hypertension
- **Revascularisation:** a vascular specialist/surgeon or interventional radiologist should be involved to evaluate and address ischaemia in people living with ischaemic wounds, DFUs or VLUs. Perfusion should be reconfirmed for any previously revascularised wounds that are not progressing to ensure they are not not re-occluded
- **Infection:** for clinically non-infected wounds colonised by biofilm, Wound Hygiene is the recommended treatment. However, involvement of infectious disease specialists and surgeons will be warranted where clinical infection is diagnosed, and treatment may include surgical drainage of abscesses, debridement of infected bone, and tissue culture-guided systemic antimicrobial therapy
- **Compression:** venous insufficiency is typically initially addressed via adequate compression, with or without pneumatic compression, to counteract venous hypertension. Care should be taken to ensure that venous insufficiency is accurately delineated from mixed arterial and venous disease, so that the indication-specific treatment is prescribed and applied correctly
- **Offloading:** many wounds—in particular DFUs and PUs—are either partly caused, or prevented from healing, by extensive pressure on the area of the wound anatomy; offloading to redistribute pressure using devices such as pressure mattresses, casts/boots/specially designed shoes, and various types of foam dressings are recommended, based on the assessment of the underlying issue
- **Surgical intervention:** for example, patients may need to be referred for surgical drainage of abscesses, depending on the diagnosis.

The key to supporting the patient in their wound-healing journey is proactive Wound Hygiene: performed by every HCP who sees wounds, at every dressing change, until healing. Treatment of the wound aetiology and implementation of indication-specific treatments must also be implemented at the earliest opportunity, and reassessed whenever the wound does not progress as planned/anticipated. The key principle of embedding Wound Hygiene into a proactive wound healing strategy is to act as soon as possible, and then regularly at all contacts with the person living with a wound.

Monitor the patient and wound

Monitoring should be a strategic step that allows the HCP to think beyond individual episodes of care. It is informed by consistent observation and use of the chosen tools at every dressing change. That is, various factors should be tracked using the chosen assessment tool to determine trends in healing, such as:

- Wound size and presence/progress of undermining and/or tunnelling
- Wound bed tissue composition
- Health of wound edge
- Surrounding skin texture/inflammation, and any changes that have occurred
- Wound odour.

Other indication-specific treatment parameters should also be tracked, such as limb volume, nutrition status, and arterial status, depending on what management activities have been implemented. However, beyond those factors, the panel felt it important to reiterate that it is the whole patient being monitored. That means looking past whether the wound and aetiology are on target for healing expectations, and asking about the impact of the wound on quality of life, including:

- Pain
- Sleep
- Appetite
- Impact of wound odour
- Mobility
- Socialisation
- The person's ability to follow the treatment plan; reasons why and why not; and what education they require to ensure appropriate provision of wound management.

The tools in Table 5 can provide a guide for consistently monitoring these factors, but it is critical for the HCP to keep the whole person in mind—monitoring should,

therefore, be considered a more strategic step, while assessment is more tactical. Coordinate with the medical/surgical specialist in the overall plan to determine how monitoring should be implemented over the wound healing journey.

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Conclusion. A call to action for Wound Hygiene

The panel has established and demonstrated the need for a simple, 4-step approach to be used on any wound, at every stage, until healing: Wound Hygiene. It has also highlighted the rationale for being proactive while applying Wound Hygiene, which is summarised below.

The rationale for proactive wound healing

The key principle of Wound Hygiene is 'do something.' Wound Hygiene should be performed at every dressing change, at every stage, until healing. It has been designed with four simple steps that are meant to enable and inspire anyone who manages wounds. With this document, the panel has provided further guidance and information for implementing Wound Hygiene in practice. Everyone who manages wounds is equipped to be proactive, because:

- These wounds are considered hard-to-heal, rather than chronic—do not press the 'snooze button' on healing
- Biofilm is lurking throughout the whole healing trajectory, at every tissue type
- We consider key tissue types, including unhealthy granulation tissue
- We also consider the patient (not just the wound)
- Wound Hygiene should be considered a standard in wound healing
- A hard-to-heal wound can stall or regress at any time, tissue type, and all aspects (including biofilm, underlying cause/factors, psychosocial factors, etc.) must be consistently assessed and monitored.

Ten commandments of Wound Hygiene

This consensus document calls for ten key steps to be taken by all HCPs who work with patients living with hard-to-heal wounds, to advance the practice of wound care and take immediate steps to overcome the wound-care crisis affecting patients and healthcare systems.

Ten commandments of Wound Hygiene

1. Implement Wound Hygiene safely in any setting, regardless of your skill level
2. Use the term hard-to-heal wound, rather than chronic wound
3. Consider biofilm at all stages—it is invisible to the naked eye, and a key barrier to wound healing
4. Do not wait; treat the wound now
5. Proactively assess (give the wound a first name and a last name/surname)
6. Proactively manage (perform Wound Hygiene and appropriate, aetiology-specific supportive care)
7. Proactively monitor
8. Determine the intensity of Wound Hygiene at each healing stage/tissue type
9. Reassess the wound and the patient at every dressing change, and refer on if more extensive management is required
10. Acknowledge that a hard-to-heal wound remains hard-to-heal until closure, so practise some level of Wound Hygiene at every assessment, on all wounds, until healing

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