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Therapeutic wound and skin cleansing: Clinical evidence and recommendations

International Wound Infection Institute

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Foreword

The Board of the International Wound Infection Institute (IWII) has developed this document based on the perceived need for definitions, clarification and practice guidance regarding wound cleansing. The document extends the guidance provided in the 2022 *Wound Infection in Clinical Practice*: *Principles of Best Practice*[1] by presenting the best available evidence on the purpose of wound and skin cleansing, as well as the techniques, equipment and solutions used to perform it. The methodology for this document is detailed within and meets the IWII's high standards for developing practice guidance. This includes a systematic literature search, evaluation of the evidence, a Delphi consensus process and expert opinion reached through extensive group discussion.

In this document, we provide a foundation of information for clinical practice regarding wound cleansing. We highlight the concept of therapeutic wound cleansing, which conveys the importance of performing wound cleansing diligently and, at times, vigorously, using appropriately selected techniques, cleansing solutions and sequencing, while considering the holistic needs of the individual. We aim to reinforce that wound cleansing is a significant component in preventing and managing wound infection and preparing a wound for healing, rather than a ritualistic practice of anointment. Additionally, we highlight that there are multiple zones: the wound bed, wound edge, periwound and surrounding skin, all of which require therapeutic cleansing when performing a wound dressing procedure. Throughout the document, we provide decision-support tools and simple steps to assist healthcare professionals at all levels, as well as individuals and their informal carers or support people, in performing wound cleansing.

Finally, we hope this document will empower healthcare professionals to advocate for the allocation of time and resources, as well as the responsible use of antiseptics, to ensure that every individual with a wound receives effective therapeutic wound and skin cleansing.

Terry Swanson (Co-Chair), Emily Haesler (Methodologist) and Karen Ousey (Co-Chair)

How this document was developed

In this document, the IWII Expert Group provides evidence for therapeutic wound cleansing, informed by a comprehensive evidence review, in addition to their experiential evidence. The document was conceived through a consensus discussion within the IWII Expert Working Group. A list of inquiry questions emerging from the discussion was used to inform a targeted search of the literature to determine contemporary evidence on therapeutic wound cleansing. The evidence was reviewed and assigned a level based on the study design (see *Methodology* section) and synthesised in response to the inquiry questions. Where there was limited or no evidence, the IWII Expert Working Group drew on their clinical expertise to provide the current consensus addressing issues related to therapeutic skin and wound cleansing. We recommend incorporating this guidance into practice, alongside local and national guidelines.

This clinical guidance extends that provided in the *Wound Infection in Clinical Practice*.[1] The IWII Expert Working Group recommends reviewing the companion document for a comprehensive presentation of the prevention, assessment and management of wound infection, in which therapeutic wound cleansing plays a key role.

The photographs in this resource are provided by the IWII Expert Working Group with consent from the individuals with wounds.

Summary of the recommendations

1. Therapeutically cleanse all wounds when the wound dressing is changed or removed.
2. Therapeutically cleanse the wound bed and wound edge and the periwound skin with an inert wound cleanser prior to collecting a wound or tissue sample for microscopy, culture and sensitivity.
3. Therapeutically cleanse the wound bed and wound edge, the periwound skin and the surrounding skin when the wound dressing is changed or removed.
4. Select either sterile/surgical aseptic technique or clean/standard aseptic technique when performing a wound dressing procedure. Conduct a risk assessment that considers the individual, the wound and environmental considerations to guide technique selection.
5. Implement universal precautions when conducting a wound dressing procedure.
6. Assess the individual, the wound and the environment to determine whether it is appropriate to cleanse a postoperative or hard-to-heal wound in a shower.
7. Select a wound cleansing solution based on:
   - The type of wound dressing procedure and therapeutic cleansing technique that will be performed
   - Characteristics of the wound
   - The risk and/or presence of infection
   - The abundance and profile of microorganisms in the wound (where known)
   - Cytotoxicity, pH and allergenicity of the solution
   - Goals of care and other individual factors (e.g. immunocompromised)
   - Local policies, resources and availability.
8. Use a wound cleansing solution with antimicrobial properties as part of a comprehensive wound infection management plan when wound infection is confirmed or suspected.
9. Do not use a microwave to heat wound or skin cleansing solutions.
10. Therapeutically cleanse the skin using a mild skin cleanser with a pH close to normal skin.
11. Select a wound cleansing technique based on the following:
    - Presentation of the wound bed and wound edges, including signs and symptoms of wound infection, as outlined on the *IWII Wound Infection Continuum*
    - Presentation of the periwound
    - Presentation of the surrounding skin
    - Goals of care and other individual factors (e.g. pain experience)
    - Local policies and resources.
12. Therapeutically cleanse the surrounding skin and periwound first.
13. Therapeutically cleanse the wound bed from the most vulnerable to least vulnerable regions, based on assessment of the wound.
14. Adjust wound cleansing techniques and implement pain management strategies according to the individual's pain experience.

An introduction to wound cleansing in practice

The principles and practices of performing a wound dressing procedure are foundational knowledge within nursing and other health professions. The practice of dressing a wound dates back to ancient civilisations; however, as our knowledge has evolved, so too has the way in which we deliver wound care. The principles of wound care have advanced alongside our understanding of germ theory, asepsis, moist wound healing, the wound infection continuum and wound hygiene.

Despite the significant paradigm shifts in wound care, it is not uncommon for a wound dressing procedure to be taught and performed as a ritualistic task,[2] rather than as a skilled process that requires a strong understanding of the underpinning theoretical frameworks, application of clinical judgement and competency in complex procedures.[3]

As with all medical and health domains, the body of evidence underpinning the wound care process is continuously evolving. This document has been developed to provide simple and evidence-based guidance for both novice and expert clinicians about a critical step in the wound hygiene process — wound cleansing.

What is wound cleansing?

When performed correctly, wound cleansing is a process that is therapeutic for the tissue within and around the wound. To differentiate it from ritualistic or inadequately performed cleansing, the term therapeutic wound cleansing is used.

Therapeutic wound cleansing is a fundamental component of the process that is undertaken to prepare the wound bed for healing and the application of treatment such as wound dressings. The process involves the targeted removal of undesirable surface contaminants (e.g. exudate), loose debris, non-attached non-viable tissue, microorganisms and/or remnants of previous dressings from both the wound bed and periwound using a wound cleansing solution and mechanical action.[4,5] Therapeutic wound cleansing is closely aligned with, but different from, general skin hygiene and washing the surrounding skin.

Therapeutic wound cleansing is centred around three elements[6]:
1. Use of a solution to cleanse the wound
2. Application of an appropriate wound cleansing technique
3. Use of appropriate medical equipment to perform the procedure.

Proposed definition

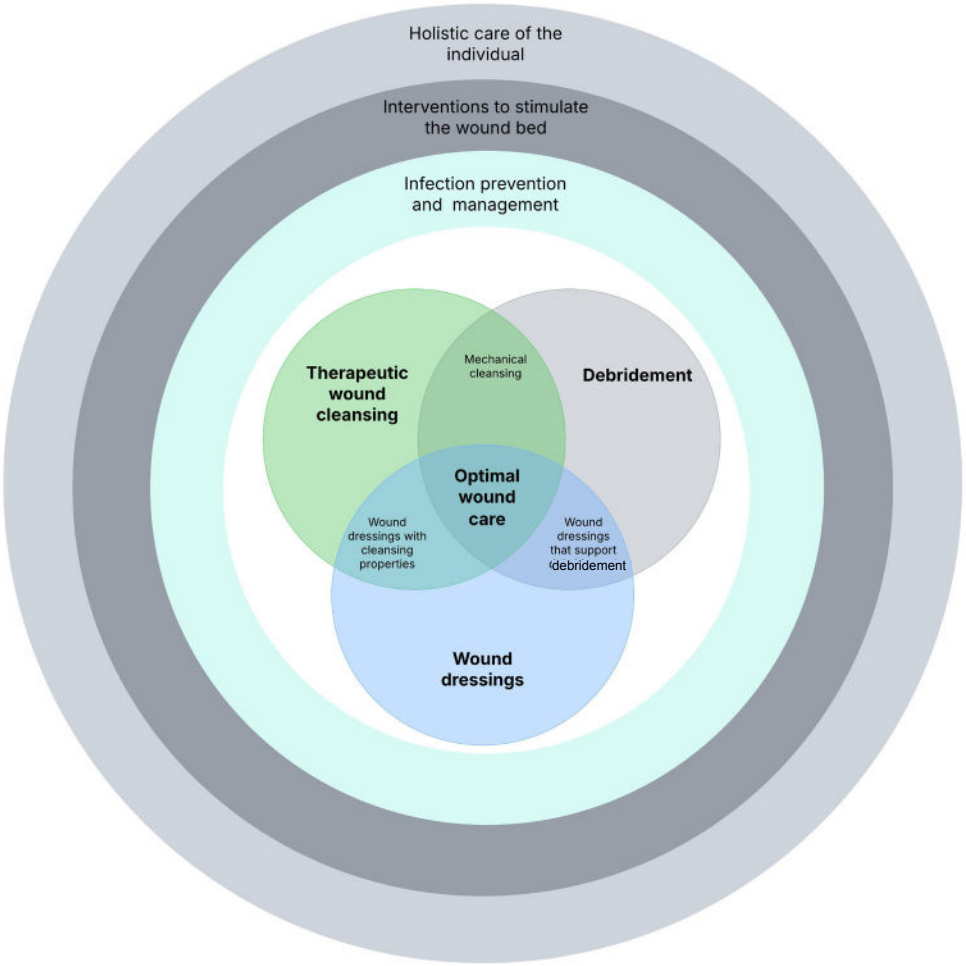
The term **therapeutic wound cleansing** refers to the active removal of surface contaminants, loose debris, non-attached non-viable tissue, microorganisms and/or remnants of previous dressings from the wound bed and periwound.

(Derived from a Delphi consensus process)

Therapeutic wound cleansing is only one component of the recognised best practice approach to preparing the wound bed for healing. Several steps are undertaken as part of the wound care process. This process, which occurs during a wound dressing procedure, has had several names over the years, including wound bed preparation (WBP),[7] TIME (tissue, infection/inflammation, moisture balance, wound edge),[8] biofilm-based wound care (BBWC),[9] TIMERS (tissue, infection/inflammation, moisture balance, wound edge, regeneration and social factors)[10,11] and more recently, Wound Hygiene.[12,13]

Wound hygiene, which is not a new concept, is akin to all hygiene (e.g. oral hygiene, body hygiene, food hygiene, etc.) that aims to keep an area clean and free of disease through regular therapeutic activity. Wound hygiene includes key activities: therapeutic cleansing, debridement with refashioning of the wound edge, and applying a wound dressing (or other covering). These processes work in unison to prepare the wound bed and wound edge for healing. As illustrated in the theoretical model **[Figure 1]**, the processes often overlap, as many wound treatments work in multiple ways to promote wound healing. For example, wound dressings may have moisture-

Figure 1. Theoretical model of optimal wound care



donating or other properties to help reduce maceration of the periwound, thereby playing a role in cleansing the wound bed. Similarly, some wound cleansing activities (e.g. cleansing with a debridement pad) can be considered to have mechanical debridement properties,[14] while certain wound cleansing solutions appear to have debriding properties.[15,16] Additionally, some wound dressings are selected for their properties in promoting autolytic debridement. Therefore, it's important to view the components of wound hygiene as interconnected rather than isolated techniques.

The theoretical model **[Figure 1]** also illustrates how therapeutic wound cleansing, debridement and wound dressings all address the key goals of wound hygiene: preventing and treating wound infection, stimulating the wound bed for healing and promoting the holistic needs of the individual. Infection management, for example, is conducted as a component of cleansing (e.g. use of antiseptics), debridement (e.g. removing devitalised tissue) and wound dressing application (e.g. dressing materials with active ingredients or that are active in the wound environment), as well as via other mechanisms outside of the wound dressing procedure (e.g. for spreading or systemic infection, use of systemic antibiotics). Similarly, all three main components of optimal wound care stimulate the wound bed in preparation for healing, and for some wounds adjuvant therapies (e.g. with topical growth factors, biophysical agents, etc.) will also be used for their stimulatory effect. Finally, the holistic needs of the individual (e.g. pain management, education, psychosocial support, etc.) are essential components of care centred on the individual that must be addressed when performing the components of wound hygiene in order to deliver optimal wound care.

Why does a wound need cleansing?

The overarching purpose of wound cleansing is to prepare the tissues in the wound bed for the healing process. When performed correctly, therapeutic wound cleansing:[17]

- Removes organic and inorganic debris
- Removes loose necrotic and non-viable tissue
- Reduces excess wound exudate
- Reduces the microbial burden (decontamination)
- Contributes to hydration of a desiccated wound bed.

The therapeutic process of cleansing the wound tissue optimises the healing environment. Debris within the wound bed, including non-viable tissue and foreign matter (e.g. residual material from previous wound dressings), provides an environment that encourages the growth of microorganisms, which promotes neutrophil influx and prolonged inflammatory response. Additionally, matrix metalloproteinases (MMPs) are released as a result of stimulation from pro-inflammatory cytokines, leading to destruction of the extracellular matrix, essential proteins, and receptors.[18,19] Adequate removal of debris and non-viable tissue from the wound bed reduces the opportunity for microorganisms and biofilms to proliferate, reduces the pro-inflammatory response and stimulates healing.[18–20]

The process of therapeutic wound cleansing also assists in hydrating the wound bed, which can facilitate and accelerate moist wound healing processes and may assist with relieving pain, itching and discomfort.[19,21–23]

Wound cleansing has other important benefits, including:[17,19,20,24]

- Improving the ability to visualise the wound bed and wound edges, thus improving the accuracy of wound assessment
- Reducing unpleasant signs and symptoms, including exudation and wound odour
- Reducing wound-related pain
- Increasing the individual's comfort and feeling of cleanliness.

Wound cleansing: the background

When does a wound need cleansing?

The purpose of wound cleansing is to clear the wound of visible and non-visible contaminants that can interfere with the healing process. However, there is ongoing debate regarding the necessity of performing wound cleansing.[25,26] This debate stems from the need to balance two key factors: ensuring optimal wound bed conditions for healing by removing debris, non-viable tissue and microbial contaminants, while minimising potential disruptions to the healing process, such as exposure to cleansing solutions, reductions in wound temperature, and mechanical trauma to the tissue.[25]

Current evidence is insufficient to establish definitive guidance about exactly when a wound should be cleansed (e.g. exact frequency),[6] but it does suggest that a wound should be cleansed at every wound dressing change.[5]

Recommendation 1

Therapeutically cleanse all wounds when the wound dressing is changed or removed.
(Underpinning evidence: Level 3 evidence[27])

A 2021 Cochrane review[6] found no studies comparing cleansing versus no cleansing in hard-to-heal wounds. The lack of research in this area may reflect the ongoing consensus that best practice includes performing wound cleansing whenever the wound dressing is removed and/or changed. A 2024 cohort study[27] explored the association between the frequency of wound cleansing and the healing of pressure injuries and found that more frequent cleansing was associated with faster healing. However, this study, which included bed-bound participants (n=12) with primarily sacral pressure injuries, had significant confounding factors. Nonetheless, the findings suggest that regular therapeutic cleansing may be beneficial, particularly for wounds that are more likely to be exposed to contaminants (e.g. faecal material).[27]

In many cases, the need for wound cleansing will be immediately evident by the visual condition of the wound bed if debris and non-viable tissue are present. However, even in healing wounds with healthy granulation tissue, there may be microbial contamination and non-visible debris (e.g. adhesive residues) in and/or around the wound. Several early clinical studies have demonstrated that wound cleansing can reduce microbial burden to levels that enable the host to manage and prevent infection.[28] Additionally, cleansing enables a better visual assessment of the wound bed, manages exudate and odour and promotes the individual's overall feeling of well-being.[29]

Recommendation 2

Therapeutically cleanse the wound bed, wound edge and periwound skin with an inert wound cleanser before collecting a wound or tissue sample for microscopy, culture and sensitivity.
(Underpinning evidence: Level 3 evidence[30-32])

There has been ongoing debate as to whether a wound requires cleansing prior to taking a sample for diagnostic purposes.[33] There are no studies directly comparing the diagnostic accuracy of wound swabs or biopsies between cleansing and non-cleansing prior to sample collection. However, diagnostic studies that have compared the validity of different specimen

collection methods typically include cleansing with an inert wound cleanser (e.g. sterile normal saline) as a standard step in swabbing and biopsy procedures.[30-32] The IWII Expert Working Group, based on available research, supports the practice of wound cleansing prior to microscopy, culture and sensitivity sample collection. This reduces the presence of surface contaminants, thereby reducing the likelihood of false positive results. Additionally, cleansing improves visibility of the wound bed, ensuring that samples are collected from the most appropriate tissue.

What areas of the wound require therapeutic cleansing?

Therapeutic wound cleansing should be applied across three zones:

- The wound bed and wound edge
- The periwound
- The surrounding skin [**see Figure 2 and descriptions below**].

All areas within the therapeutic cleansing zone require therapeutic cleansing.

Recommendation 3

Therapeutically cleanse the wound bed, wound edge, the periwound skin and surrounding skin when the wound dressing is changed or removed.
(Underpinning evidence: Level 3 evidence[34] and Level 5 evidence[1,13,35,36])

There are no studies directly comparing the effects of cleansing versus non-cleansing of the wound bed on healing outcomes. However, cleansing the wound bed and wound edge is widely considered best practice to support optimal healing.

A small observational cohort study[34] (n=5) explored the impact of cleansing the periwound and surrounding skin with a skin cleanser. Samples were taken at 1cm from the wound edge (periwound) and 10cm from the wound edge (surrounding skin). An immediate reduction in microbial counts was observed at the periwound and surrounding skin after cleansing. However, microbial counts returned to pre-cleansing levels within 24 hours.[34] The periwound may also have an accumulation of moisture in the region covered by the wound dressing, and this will be underneath the new wound dressing if the periwound region is not cleansed well when the dressing is changed.

Based on expert opinion and supporting evidence, the IWII Expert Working Group recommends that therapeutic wound cleansing include the wound bed and the wound edge. Additionally, therapeutic skin cleansing should be performed on the periwound and surrounding skin when the wound dressing is changed.

Where are the therapeutic cleansing zones?

Zone 1: The wound bed and wound edge

The wound bed [**Table 1**] includes the entire area where skin integrity is disrupted, exposing the underlying tissues. It includes the tissues within the wound, which will appear different depending on the stage of healing. The primary objective of therapeutic cleansing in this zone is to remove contaminants and promote the development of healthy wound bed tissue. Even when healthy tissue (e.g. epithelial tissue and granulating tissue) is predominant, cleansing the wound bed can facilitate healing by adding moisture, removing exudate and reducing contaminants (e.g. dressing remnants and non-visible microbial burden).[18,20]

The wound edge [**Table 2**] is the boundary, margin or perimeter of the wound where the periwound meets the open wound bed. When the wound is healing on a normal trajectory, the epithelial tissue at the wound edge will advance, ultimately covering the entire wound (referred to as epithelial advancement). Additionally, epithelial tissue may emerge from hair follicles that create epithelial islands.

Figure 2. Therapeutic cleansing zones

Zone 1 (red): wound bed and wound edge

Zone 2 (light blue): periwound 4cm from wound edge

Zone 3 (blue): surrounding skin zone 20cm from wound edge

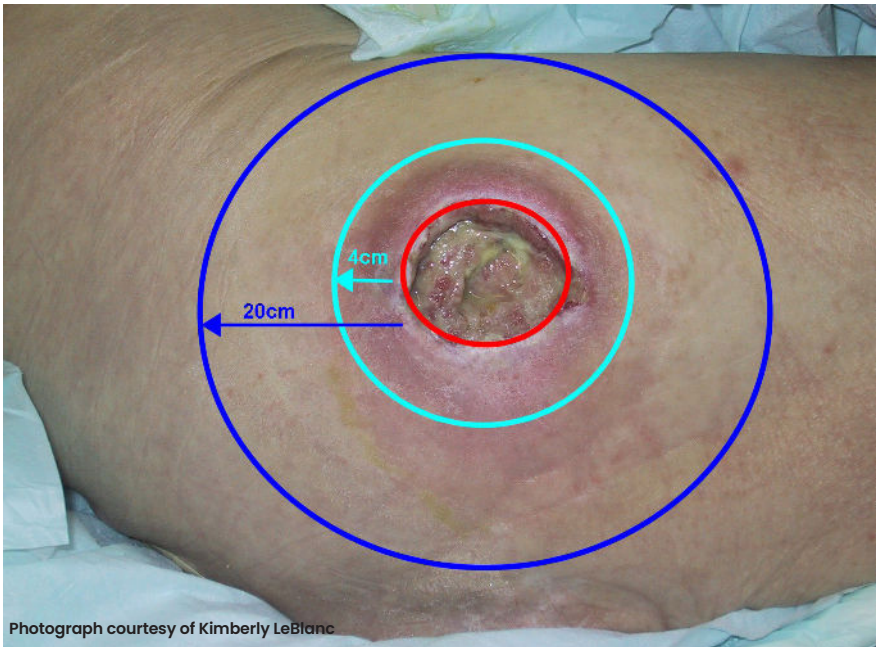
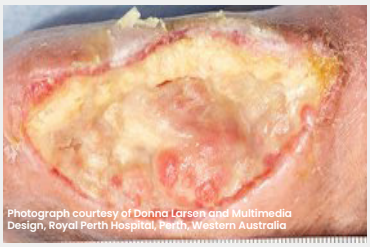


Table 1: Wound bed tissue appearance

Wound bed tissue	Appearance	
Non-viable adipose tissue	Non-viable body fat and loose connective tissue that appears white, brown or yellow (colour varies by hydration). It may resemble fat molecules or droplets and can sometimes be mistaken for slough	 
Epithelial tissue	Pink, lavender or pearly white in appearance, indicating the wound is viable and healthy. Note that epithelialisation will not occur in an unhealthy wound bed	 
Granulating tissue	Red, moist and well-vascularised, occurring during the reconstruction (proliferative) phase of healing and indicates the wound bed is viable and healthy	 

Table 1: Wound bed tissue appearance *(Continued)*

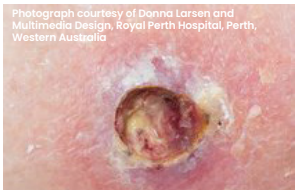
Wound bed tissue	Appearance	
Slough	Adherent tissue that appears yellow, brown or grey and indicates presence of devitalised tissue (i.e. dead cells) and debris that will impede wound healing	 
Eschar	Black and dry in appearance, indicates the presence of extensive dead tissue that will prevent wound healing	 
Infected necrotic tissue	Initially presents as red lumps or bumps that progress to a bruise-like appearance with a centre dark/dusky region that eventually turns black. The affected skin may break and ooze exudate. There will be evidence of surrounding erythema	 
Hypergranulation tissue	Red, uneven and granular, tissue usually growing above the level of the surrounding skin. Occurs during the proliferation stage and indicates that the tissue has overgrown. Associated with high bioburden or friction to the wound	 
Proteinaceous, mucilaginous or coagulum	Loosely adherent surface substance of various colourings that appear gelatinous	 

The wound edge is particularly susceptible to infection because it sits between the wound bed and periwound, making it more likely to have direct exposure to the skin's microbiome.[37] Debris and contaminants can accumulate underneath the wound edge, particularly when the wound edge is not advancing, is undermined, rolled or overhanging.

The condition of the wound edge is an important component of wound assessment, as it provides insight into the wound's healing trajectory[35]. For example, a hyperkeratotic wound edge suggests that the wound bed is not optimally prepared for healing. In such cases, the usual healing process in which integrins signal to keratinocytes to replicate may have occurred,[38] but there has been a failure of the cells to migrate due to an inability to attach to the wound bed tissue for various reasons.

Performing therapeutic cleansing is important to remove contaminants[1,13] and accumulated keratinocytes prior to realignment or refashioning the overhanging edge via debridement to facilitate epithelial advancement.

Table 2: Example of wound edge appearance

Wound edge	Appearance	
Hyperkeratotic	Abnormal thickening/callus-like tissue formation at the wound edges	 Photograph courtesy of Terry Swanson  Photograph courtesy of Donna Larsen and Multimedia Design, Royal Perth Hospital, Perth, Western Australia
Punched out/well-demarcated	Clearly defined wound edge that has a punched-out appearance	 Photograph courtesy of Donna Larsen and Multimedia Design, Royal Perth Hospital, Perth, Western Australia  Photograph courtesy of Terry Swanson
Undermining	Wound edge is separated from the healthy tissue around, causing a pocket to form underneath the surface	 Photograph courtesy of Kimberly LeBlanc  Photograph courtesy of Terry Swanson
Macerated	Wound edges are soggy, wrinkled and white/cream/grey in appearance, softened and break down easily. In darker skin tones, can appear as shiny, grey, purple or darker discolouration	 Photograph courtesy of Terry Swanson  Photograph courtesy of Patricia Idensohn
Rolled (epibole)	Wound edges are raised, rounded and harder, and may appear lighter in colour than the periwound skin	 Photograph courtesy of Kimberly LeBlanc  Photograph courtesy of Donna Larsen and Multimedia Design, Royal Perth Hospital, Perth, Western Australia

Proposed definition

The term **periwound** refers to the skin and tissue immediately adjacent to the wound edge extending out 4cm and/or including any skin and tissue under the wound dressing.

(Derived from a Delphi consensus process)

Zone 2: The periwound

The periwound is the skin and tissue immediately adjacent to the wound bed, extending up to 4cm from the wound. It includes the skin and tissue that is under the wound dressing (but not typically extending to skin under securement bandages or compression therapy). The periwound area is of particular significance because of the role of it plays in wound healing.[36] *Ex-vivo* and animal studies have demonstrated that the periwound donates fibroblasts, endothelial cells, basal epidermal cells and keratinocytes throughout the phases of wound healing.[36]

Maintaining the health of the periwound is therefore an important consideration in promoting wound healing. Investigations have demonstrated that the periwound area has a higher microbial burden than normal skin further from the wound edge.[34] Therapeutic cleansing of the periwound is important because the process removes:[39]

- Contaminants that may migrate into the wound, increasing the risk of infection
- Moisture that can cause moisture-associated skin damage at the periwound
- Excess proteases from exudate that can cause inflammation of the periwound
- Adhesive from wound dressings that can irritate the skin and become a source of infection.

As with cleansing of the wound bed, therapeutically cleansing the periwound improves visualisation of the skin.[19] This is important because the periwound status can be indicative of the wound's condition (e.g. periwound erythema and swelling indicate potential wound infection).[40]

Zone 3: Surrounding skin

The surrounding skin is the skin extending up to 20cm from the wound edge, including the area of skin under the wound dressing and bandaging. On the lower limb, this is considered to extend to one joint above the wound (e.g. if the wound is on the plantar aspect of the foot, the surrounding skin extends to the entire foot below the ankle).[13] For many individuals, the primary wound dressing, or secondary dressings and bandages, will cover a surrounding skin region greater than 20cm from the wound (e.g. a bandage may be wrapped around the limb to secure a dressing in place). For some individuals, additional treatments such as compression bandaging or pressure offloading boots/casts are applied to the surrounding skin/entire limb as part of the holistic management plan.[23,41]

Therapeutic skin cleansing includes the washing of the surrounding skin and the periwound skin. It is important to attend to the general hygiene of the skin surrounding a wound in order to remove visible contaminants, scales and debris to create a clean environment in which to perform wound care.[41,42] The skin underneath wound dressings, bandages and devices will also require cleansing as part of the wound care process. Often, the application of wound dressings, bandages and devices precludes normal hygiene, further highlighting the importance of including the surrounding skin in the cleansing and hygiene process when the bandages/wraps are removed or changed.[23,41] **Box 1** shows hyperkeratotic surrounding skin that requires vigorous cleansing and scale removal.

Box 1: Hyperkeratotic surrounding skin

Photograph courtesy of Patricia Idensohn

What are the considerations when deciding how to conduct therapeutic wound cleansing?

There is no one-size-fits-all approach to therapeutic wound cleansing. When determining how a wound should be therapeutically cleansed, three important considerations are made addressing the selection of the:[6]

- Wound dressing procedure (i.e. type of aseptic technique)
- Wound cleansing technique
- Wound cleansing solution.

Guidance on these three considerations is provided in this document.

The wound dressing procedure

A wound dressing procedure involves cleansing and debriding a wound, assessing it, and applying a new dressing to protect the wound, promote healing and prevent or manage infection. Additional activities may also be performed during the wound dressing procedure, including (but not limited to) applying topical agents to stimulate wound healing or performing a wound swab for microscopy, culture and sensitivity.

A wound dressing procedure is performed using an aseptic technique. An aseptic technique is a set of practices and procedures implemented to reduce the risk of introducing and/or spreading microorganisms to the wound when wound care is performed. These practices aim to address the risk of microorganism contamination arising from:

- **The surrounding environment** (i.e. air, equipment and people, including the wound clinician)
- **The surrounding skin** (i.e. microflora that is usually present on the skin)
- **Other endogenous sources** (e.g. the gastrointestinal or respiratory tracts).

What wound dressing procedure technique should be used?

There are two recognised standards of aseptic technique that are commonly used in wound dressing procedures, each of which has distinct protocols **[Figure 3]**:


- Sterile/surgical aseptic technique


- Clean/standard aseptic technique

Selection of the most appropriate aseptic technique to use when performing a wound dressing procedure has been a long-term debate in wound care.

Sterile/surgical aseptic technique

Traditionally, a sterile/surgical aseptic technique was preferred, based on the premise that it was important to avoid introducing any contamination into a wound.[43] A sterile/surgical aseptic technique uses sterile equipment and cleansing solutions, while the clinician wears sterile protective equipment. Additionally, a sterile field is created around the wound. When performing a sterile/surgical aseptic technique, extreme care is taken to avoid sterile equipment touching anything that is not sterile (i.e. equipment, fluids or body parts that may harbour microorganisms).

Recommendation 4

Select either sterile/surgical aseptic technique or clean/standard aseptic technique when performing a wound dressing procedure. Conduct a risk assessment that considers the individual, the wound and environmental considerations to guide technique selection.
(Underpinning evidence: Level 1 evidence[43,44])

Clean/standard aseptic technique

However, it is now recognised that in clinical settings outside of a sterile operating room/theatre, it is not possible to fully implement a sterile/surgical aseptic technique because there is always a risk of contamination from the surrounding environment (e.g. airborne microorganisms). A clean/standard aseptic technique is an "adapted" procedural technique where some equipment used in the procedure is clean but not sterile.

The best available evidence suggests that sterile/surgical aseptic techniques and clean/

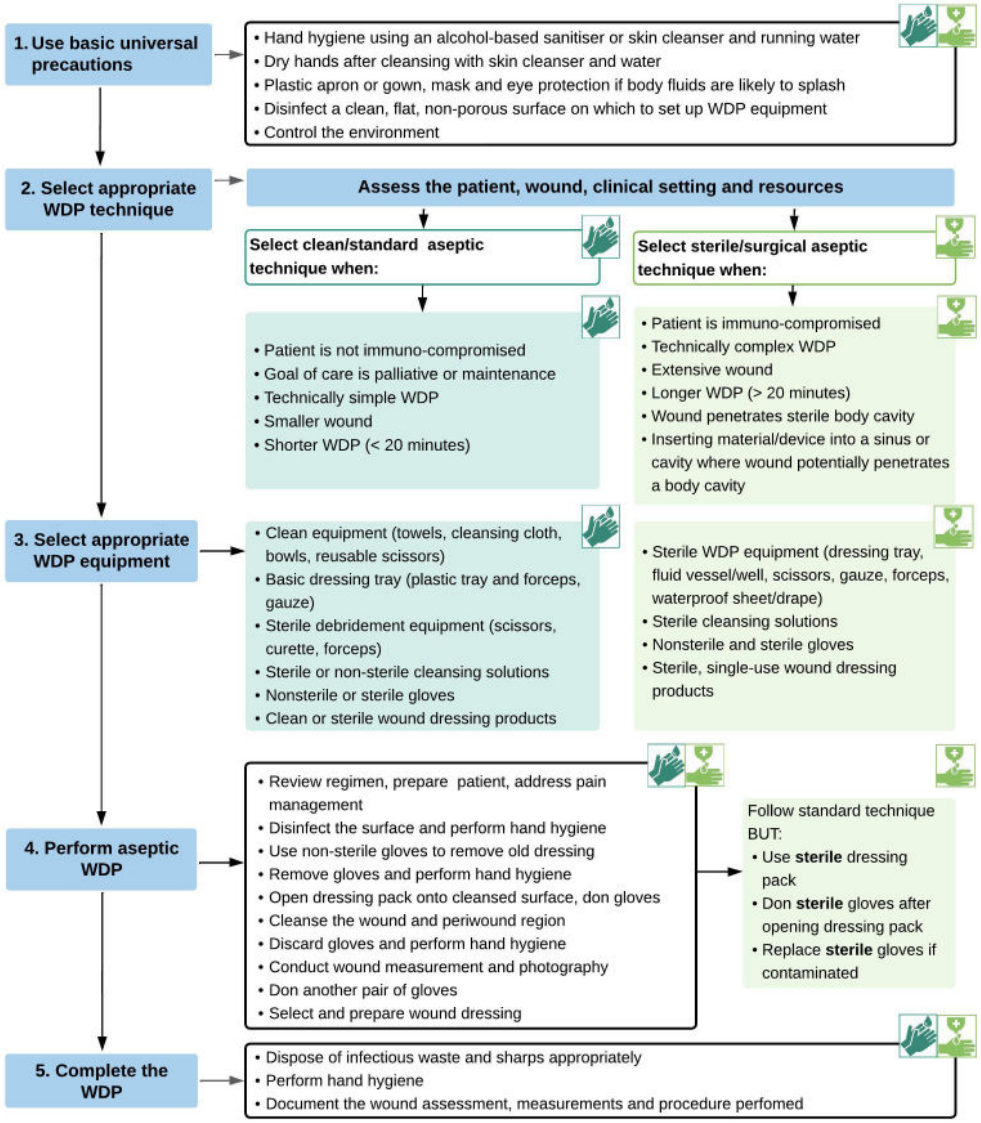


Figure 3. Overview of aseptic technique frameworks used when performing a wound dressing procedure (WDP)

standard aseptic techniques are equally effective. A systematic review and meta-analysis[43] of seven randomised controlled trials (RCTs) and two observational studies reported evidence of moderate certainty and a low risk of bias that neither technique is inferior to the other in preventing wound infection. The absolute effect of using a sterile/surgical aseptic technique instead of a clean/standard aseptic technique for wound dressing procedures was four fewer wound infections per 1,000 procedures performed (90% confidence interval [CI]: 9 fewer wound infections to 3 more wound infections).[43] The populations in these studies were varied, and the wounds included lacerations, minor skin excisions, surgical wounds and hard-to-heal wounds, suggesting that the findings are broadly applicable. It should be noted that the evidence does not clearly identify precise techniques and equipment used in all the studies, and it is likely that some elements of asepsis (e.g. using a sterile cleansing solution) were combined with elements of a clean technique (e.g. using non-sterile gloves), potentially confounding the analysis. The findings of this meta-analysis support those of an earlier systematic review.[44]

Although current best evidence[43] suggests that there may be no difference in the risk of wound infection between the two standards of aseptic technique, different clinical scenarios present different baseline risks of acquiring a wound infection. When there is a higher risk of microorganism contamination, additional precautions may be required.

Therefore, the IWII Expert Working Group recommends adopting a risk-based approach to

There is no one-size-fits-all approach to therapeutic wound cleansing. The context of the individual, the wound and the environment should inform clinical choices.

selecting an aseptic technique. Additionally, pragmatic considerations must be taken into account, including the resources available, challenges within the clinical setting, the clinician's skillset and local policies and procedures.[1,45]

When deciding on the type of aseptic technique to use, the following factors should be considered:[46-49]

- Immune status of the individual
- Size and location of the wound
- Entry into anatomical cavities or organs
- Extent of visualisation of the wound bed
- Complexity of the procedure
- Clinical setting
- Goal of care
- Preferences of the individual.

Recommendation 5

Implement universal precautions when conducting a wound dressing procedure.
(Underpinning evidence: Level 1 evidence[43,44])

Universal precautions outline the major strategies implemented in all clinical settings to reduce the risk of cross-contamination and healthcare-associated infections.[51] The most comprehensive and best available evidence on the effectiveness of universal precautions is a systematic review and guideline outlining the scientific basis of infection control in healthcare settings. The systematic review[50] outlines the historical context of the development of universal precautions, which are underpinned by the understanding that preventive strategies should be implemented for all individuals, whether their infectious status is known or not.

Regardless of the chosen aseptic technique, clinicians should consistently apply universal precautions when performing a wound dressing procedure and wound cleansing.

Important universal precaution considerations include:[47,50]

- **Hand hygiene:** Use an alcohol-based sanitiser or wash hands with a skin cleanser and running water before and after:
  - touching the individual's skin
  - exposure to bodily fluids
  - performing a wound dressing procedure
  - removing gloves
  - touching the individual's surroundings.
- **Well-fitted gloves:** Use non-sterile gloves when performing a standard/clean aseptic technique and sterile gloves for a sterile/surgical aseptic technique. Change gloves during the procedure if contaminated or there is a need to collect wound assessment data or images. Dispose of gloves as infectious waste
- **Personal protective equipment (PPE):** Select PPE appropriate to the procedure and in accordance with local policies. For example, a gown/apron, mask and eye protection should be worn when performing wound cleansing procedures with a risk of splash-back (e.g. wound irrigation) or aerosolisation
- **Environmental control:** Ensure the care environment is clean and free from unnecessary movement or airflow. Clean and disinfect the work surface appropriately (noting that this may not always be possible in community settings).

Refer to **[Box 2]** for an example of sequencing for a WDP using a surgical/sterile aseptic technique.

Box 2: Example of sequencing for a wound dressing procedure (WDP) using a surgical/sterile aseptic technique

NOTE: Skin cleansing (limb hygiene) is performed as a separate process. Its sequencing in relation to the WDP is discussed in ***Box 4****.*

The following sequence can be adapted when performing a clean/standard aseptic technique by using clean equipment and non-sterile gloves.

1. **Review** the individual's history, diagnosis, care goals, preferences, current wound condition and treatment regimen
2. **Prepare** the individual for the procedure by:
   - Explain the WDP, including the expected timeframe, and obtain consent
   - Discuss pain: If appropriate, use a validated pain assessment tool. If the individual is currently experiencing pain, has experienced pain during previous wound cleansing or dressing changes, or has anticipatory pain, consider administering an analgesic before undertaking the procedure.
3. **Prepare** the area where WDP will be performed:
   - Use a cleanser or wipe to disinfect the work area, including the non-porous surface where equipment will be prepared
   - Address environmental factors that can increase pathogen spread (e.g. air conditioning or pets).
4. **Collect and prepare** the required equipment, including:
   - Hand sanitiser/cleanser
   - Sterile and/or non-sterile gloves and other PPE
   - Equipment to cleanse the peri-wound area
   - Sterile wound cleansing solution
   - A simple or complex dressing kit/tray, anticipated equipment, wound dressings and devices
   - Equipment for assessing wound dimensions and depth, and a camera for wound photography
   - A bin or bag for disposing of infectious waste.
5. **Prepare and position** the individual for the WDP, ensuring comfort, privacy and safety
6. **Perform** hand hygiene and don non-sterile gloves
7. **Remove** the old outer wound dressing (according to the product instructions). For many wound dressings, it is appropriate to use moistened gauze or a cloth (with or without an alcohol-free adhesive remover). Dispose of the wound dressing appropriately in infectious waste
8. **Remove and dispose** of the non-sterile gloves and perform hand hygiene
9. **Open** the sterile dressing pack/kit onto the cleansed surface
10. **Perform** hand hygiene and don sterile gloves
11. **If** there is a primary wound dressing, remove it using sterile forceps. Thereafter, consider these forceps to be contaminated
12. **Place** a pack moistened with (preferably warmed) sterile solution on the wound for protection before proceeding to cleanse and pat dry the peri-wound and surrounding skin
13. **Remove** the moistened pack from the wound and dispose of it in contaminated waste
14. **Proceed** with wound cleansing and, when required, debriding the wound bed using sterile equipment. Thereafter, consider this equipment to be contaminated
15. **Conduct** wound assessment (measurements and photography). Photography after wound cleansing is recommended as this provides a full view of the wound (before/after photographs may also be taken). This can be conducted by a second clinician, if available. If not, remove sterile gloves and perform hand hygiene after measuring the wound
16. **Select** a wound dressing based on wound condition, level of exudate, presence or absence of local infection, the frequency with which the wound dressing will be changed and the individual's preferences
17. **Perform** hand hygiene and don sterile gloves if they have been removed for wound assessment
18. **Cut and apply** the new wound dressing using sterile equipment that has not touched tissue or exudate
19. **Discard** contaminated waste appropriately
20. **Perform** hand hygiene
21. **Document** the wound assessment and treatment, the ongoing wound treatment plan and communicate with the collaborative healthcare team, individual and their informal carer.

Selecting wound and skin cleansing solutions

What solution types are used for therapeutic wound cleansing?

Options for cleansing a wound include:

- Inert, non-sterile solution (e.g. potable tap water)
- Other inert solutions (e.g. sterile normal saline and water)
- Surfactants
- Antiseptics
- Combination solutions (e.g. surfactant plus antiseptic).

What are inert wound cleansing solutions?

Sterile saline, sterile water, and potable tap water are all inert substances; that is, substances with no active chemical ingredients. Inert wound cleansing solutions have no active ingredients that can facilitate loosening and removal of debris and non-viable tissue and have no antimicrobial properties to prevent and treat microbial burden. Therefore, these wound cleansing options are generally not an appropriate choice for a wound with heavy debris or signs and symptoms of local wound infection. They could be used for cleansing a healthy wound without visual signs of contamination and for cleansing the surrounding skin.

Non-sterile, potable tap water

There has been a long-standing debate over the role of non-sterile water in wound cleansing. Water is an inert, non-cytotoxic and non-allergenic solution, easily accessible at low cost in most clinical settings. However, it is not sterile; therefore, there is a risk of introducing contaminants to the wound, as reported in a clinical study.[52]

A Cochrane meta-analysis[53] found no significant difference in the rate of wound infection when comparing tap water to normal saline (0.9%) for cleansing wounds (risk ratio [RR]=0.84, 95% CI 0.59 to 1.19, with an absolute difference of 10 fewer wound infections per 1,000 [95% CI 25 fewer to 12 more]). Results were also similar when analysing studies in acute wounds (RR=0.85, 95% CI 0.59 to 1.22, an absolute difference of 9 fewer wound infections per 1,000 [95% CI 24 fewer to 13 more]) and when pooling studies conducted in chronic wounds (Rr=0.55, 95% CI 0.15 to 1.94, absolute difference of 106 fewer wound infections per 1,000 [95% CI 56 fewer to 118 more]).

The results were also similar when looking at different clinical outcomes (i.e. complete wound healing, healing rate, and reduction in wound bed size) and different types of water (i.e. distilled water and cool boiled water). There were 13 studies included in the review conducted in low, middle and high-resource countries.[53]

Overall, the results[53] suggest that cleansing with non-sterile water may make little difference to wound healing or wound infection rates, but this is very uncertain. However, the results are consistent with a previous meta-analysis[54] and numerous previous reviews.[55-57]

These findings should be considered carefully when applying them to clinical practice. The risk of wound infection in the study participants was unknown, but given the available details regarding context, most of the individuals were probably not immunocompromised. Additionally, the analysis included non-infected wounds and acute lacerations not requiring suturing.[53] Therefore, the baseline risk of wound infection may have been low. The technique used, and the skill of the clinician may have influenced the level of asepsis. This means that the findings should not be routinely extrapolated to chronic wounds that are confirmed or suspected to be infected or to individuals who are immunocompromised.

Selecting non-sterile water for cleansing might be safe when the baseline risk is low, and when

Tips when using sterile/ preserved solutions

- Refrigerate opened sterile/preserved solutions of sterile water and saline to maintain lower level of bacterial contamination
- Dispose of open sterile/ preserved solution within 24 hours if it has not been refrigerated
- Warm refrigerated sterile/preserved solutions to room temperature before use.

the environment is not appropriate for performing a sterile/surgical aseptic wound dressing procedure. However, it has no active ingredients to facilitate loosening and removal of debris and non-viable tissue, and no antimicrobial properties to prevent and treat microbial burden.

Based on the literature, the IWII Expert Working Group suggest the following precautions when using non-sterile, potable water for wound cleansing:[28,58-60]

- Ensure the water is potable, meaning it meets drinking water standards
- Do not use water from a stagnant source
- Preferably use boiled, cooled, lukewarm water rather than water directly from the tap
- If using tap water, allow the cold-water tap to run for 2–5 minutes before use. This helps clear potential contaminants from the plumbing system, as microbial contamination can be present even in healthcare facilities.[61]

Sterile normal (0.9%) saline and sterile water

Traditionally, sterile normal saline and sterile water have been preferred for wound cleansing due to their inert, non-allergenic, non-cytotoxic properties[20]. They are also generally cost-effective and sterile. Sterile saline is generally considered more appropriate than sterile water because it is isotonic[53] and does not disrupt the healing wound bed. Sterile water is hypotonic. Although the lower solute concentration of hypotonic solutions causes alterations in osmosis and thus affects cell structures within the wound bed, there is no strong evidence that healing is delayed if a hypotonic inert solution is used. It has been assumed that the risk of wound infection would be lower with a sterile solution based on the premise that it would not introduce microbes into the wound. However, as noted above, several studies and meta-analyses have demonstrated otherwise.[53,54]

Additionally, an observational study[62] found an increase in microbial burden when sterile saline was used to perform a scrubbing wound cleansing technique, potentially due to transfer of microbes from the periwound, demonstrating that a sterile cleansing solution does not prevent the introduction of contamination to a wound.

Can a wound be cleansed in a shower?

The Cochrane review[53] cited earlier included wounds of many types. The method of applying potable water to the wound was not specified in many studies; it appears that applying potable water in a shower would not increase the risk of wound infection, particularly for a chronic wound. Traditional advice on showering postoperatively is variable. It might be influenced by surgeon preference, the site of the surgical wound, and the size and complexity of the wound.[63]

Recommendation 6

Assess the individual, the wound and the environment to determine whether it is appropriate to cleanse a postoperative or hard-to-heal wound in a shower.
(Underpinning evidence: Level 1 evidence[29,53,63])

A 2024 meta-analysis[29] of 11 studies with almost 3,000 participants showed no significant difference in surgical site infection rates between early postoperative showering/bathing (1-3 days post-surgery) and delayed showering/bathing (early group: 4.71% infection rate versus late group: 3.57% infection rate, odds ratio [OR] 0.84, 95% CI 0.58 to 1.22). This analysis also identified increased satisfaction for the individual when showering/bathing was commenced earlier following surgery (OR 101.91, 95% CI 36.92 to 281.29).[29] An earlier meta-analysis[63] of seven studies with almost 2,000 participants who had undergone a variety of different surgeries showed that there is no difference in adverse events (e.g. infection rates) between showering in the first 1-2 days following surgery compared to waiting over one week for showering (risk difference: 0.00, 95% CI -0.01 to 0.01). The certainty of evidence for all the above analyses is low. Although no differences were shown for surgical site infection and general adverse events,[29,63] the IWII Expert Working Group recommends that a risk-based assessment is undertaken with consideration to the clinical and immune status of the individual, condition of the wound (e.g. the closure type, presence of drains, etc.) and environmental factors (e.g. cleanliness of the bathing facilities).

Tips for using a shower for wound cleansing

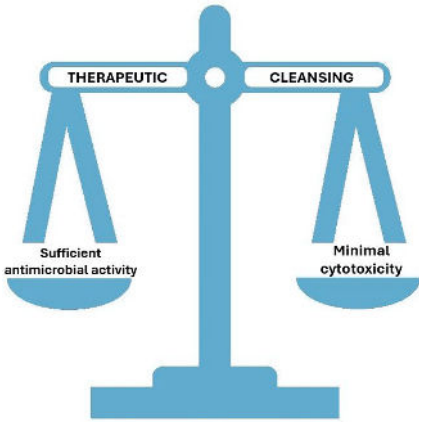
- **Water quality:** Hot water taps generally come from header/storage tanks. While initially cold, the water may contain a high microbial load, including *coliform bacteria, Mycobacterium spp., Legionella bacteria,* etc. Ensure the tap is run for several minutes to flush microbial burden from the taps before placing the wound in the shower
- **Consider cross-contamination:** Ensure the shower is disinfected before and after cleansing the wound, particularly if it is a shared shower facility.

Consideration of the preferences of the individual is important, given the demonstrated relationship between satisfaction and showering/bathing.[29,63]

What are antiseptic wound cleansing solutions?

Antiseptics, also known as antimicrobial solutions, are used to prevent, control, and treat infections caused by microorganisms, including bacteria, viruses, fungi, and protozoa. Several concerns are noted in the early literature regarding the use of antiseptics in wound cleansing. Some commentary has noted that the activity of antiseptics might decrease when they come in contact with body fluids/tissues,[58,64] or that antiseptics may not be in contact with the wound bed for a sufficient duration to have a meaningful impact on microorganisms.[58] Much of the research conducted on antiseptics is laboratory-based (in cell or animal models) and reflects concerns that the activity of antiseptics in laboratory conditions does not reflect *in-vivo* use.

Additional concerns about antiseptics arise from (primarily laboratory-based) evidence that suggests that antiseptics are cytotoxic to human cells involved in wound healing, including neutrophils, macrophages, keratinocytes and fibroblasts, particularly when they are used at higher concentrations.[65]



However, modern antiseptic cleansers have been developed with safer clinical profiles, and they are increasingly used to cleanse wounds with or at risk of infection.[24,65,66] Expert experience suggests that antiseptics have a favourable impact on preventing and treating wound infection (including biofilm), especially when used in conjunction with other strategies such as wound debridement and antimicrobial dressings.[1,4,12,67-69]

Nevertheless, when there is no wound infection, or a wound is not at risk of infection, the use of an antiseptic is generally not required from a risk perspective. Although there appears to be a lower risk of bacterial resistance with antiseptic use compared to topical or systemic antibiotics, judicious use of antiseptics is an important component of antimicrobial stewardship.[1,69]

As noted above, the largest body of evidence for the efficacy of antiseptics is from laboratory-based research, which is considered Level 5 evidence. However, various systematic reviews[5,53,54,69-71] have compiled the evidence on the effectiveness of antiseptics in treating different types of wounds. The most recent (2021) Cochrane review[6] found four eligible randomised studies. These studies explored octenidine dihydrochloride (OCT), aqueous oxygen peroxide and polyhexamethylene biguanide (PHMB); however, none reported wound infection as an outcome measure, and those that reported wound healing included insufficient data for meta-analysis and clear conclusions to be made.

An earlier Cochrane meta-analysis[70] that explored the use of antimicrobial agents for cleansing chronic wounds found no significant results for reducing wound infection when an antiseptic (povidone-iodine) was used compared to inert solutions (sterile normal saline). However, there was only one study, and the evidence was of very low certainty. A third systematic review[5] found only three randomised studies meeting its inclusion criteria. The studies compared antiseptic cleansing solutions (sodium hypochlorite with amino acids, Dakin's solution and hypertonic saline) with normal saline or no cleansing and reported improved wound healing outcomes with the antiseptic cleansers. However, once again, the studies were at a high risk of bias. Another systematic review,[71] focused on wound cleansing for acute traumatic wounds, also reported only four RCTs, all of which were at high overall risk of bias. This review indicated that antiseptics were associated with a reduction in wound infection rates and bacterial loads.

A summary of individual clinical studies, most of which provide low or very low certainty evidence supporting the use of specific antiseptics, is available in the *IWII (2022) Wound Infection in*

Clinical Practice.[1] The available studies provide evidence that various antiseptics have a role in reducing laboratory-confirmed infection, reducing signs and symptoms of local wound infection, promoting complete wound healing or improving the type of tissue in a wound bed **[Table 1]**. Some literature reviews also provide evidence that specific antiseptics have other benefits, including low risk of adverse events and high levels of satisfaction from clinicians and individuals with wounds.[72,73]

Additionally, early use of topical antiseptics is effective in suppressing the development of biofilms.[67,68] Where biofilms are already present within the wound, antiseptics with proven anti-biofilm effects are recommended for use in conjunction with debridement (used after debridement).[74] Antiseptics formulated with surfactants to aid in the dispersion of biological debris and biofilm may also be helpful.[13]

What are surfactant wound cleansing solutions?

A surfactant is a type of wound cleanser that has specific chemical properties that enhance the solution's ability to cleanse by reducing the tenacity of debris in the wound.

Surface tension is the force that helps a droplet of solution maintain its shape when it touches a surface. A solution with a high surface tension will hold its droplet shape more, reducing its ability to spread across the entire surface. A surfactant is a substance that is added to a solution to reduce the surface tension, increasing the ability of the solution to spread across the surface to which it is applied.[75]

In addition to better penetrating a wound bed, surfactants appear to directly influence wound healing through properties that stimulate autolytic debridement and reduce inflammation.[76] Even when they are not combined with antimicrobials, surfactants appear to play a role in reducing the adherence properties of microbes, both impeding their attachment to the wound bed and potentially reducing their ability to form biofilm.[76,77] When a surfactant solution spreads within the wound, it mixes with the debris and non-viable tissues (emulsification), softening and loosening their adherence.[75] This means that less force is required to remove detritus from a wound when the cleansing agent contains a surfactant.[76]

Which solutions should be selected to cleanse a wound?

The choice of a cleansing solution should be made based on the specific requirements of the wound, the individual and the clinical context.[26] Careful consideration should be given to the clinical condition of the wound, the goals of care for the individual, the characteristics of the available wound cleansers, any local policies and known allergens.[62,78-80] The profiles of commonly used wound cleansing solutions are in **Table 3**.

The IWII Expert Working Group made the above recommendations based on the best available evidence from meta-analyses, systematic reviews and RCTs[5,53,54,69-71] as discussed above.

There is a large body of evidence on the efficacy of various antimicrobial wound cleansers; however, the research has significant confounding factors that often reduce its generalisability. This includes failure to confirm presence of wound infection or contaminants at baseline, lack of reporting on the individual's clinical status and variations in wound care regimens beyond the

Recommendation 7

Select a wound cleansing solution based on the following factors:

- Type of wound dressing procedure and therapeutic cleansing technique that will be performed
- Characteristics of the wound
- Risk and/or presence of infection
- Abundance and profile of microorganisms in the wound (where known)
- Cytotoxicity, pH and allergenicity of the solution
- Goals of care and other individual factors (e.g. immunocompromised status)
- Local policies, resources and availability

(Underpinning evidence: Level 1 evidence[5,53,54,69-71])

Recommendation 8

Use a wound cleansing solution with antimicrobial properties as part of a comprehensive wound infection management plan when wound infection is confirmed or suspected.
(Underpinning evidence: Level 1 evidence[5,6,70])

Interpret laboratory-based study results with caution. Laboratory research does not always replicate the conditions of a real-world wound, meaning that the performance of an antiseptic solution in a controlled lab setting may differ from how it performs in an actual patient's wound.

wound cleanser. Additionally, a significant volume of the research on the efficacy of antiseptics explores in vitro and/or animal wound models.[68] However, the way microbes (particularly when sessile or living with biofilms) behave in laboratory settings varies from how they behave in wounds,[81] and the ways in which antimicrobials are used in laboratory research often do not reflect use in clinical settings.[19,82]

Table 3. Profiles of commonly used wound and skin cleansing solutions

Cleansing solution*	Properties	Concentration	pH	Therapeutic index**	Safety profile#	Mode of action
Acetic Acid	Antimicrobial	1%–5% (3% conc. should be preferred)	2.4	No data	Cytotoxicity to human cells is reported at concentrations as low as 0.25%[83] Allergic reaction is rare[84]	• Passively diffuses into bacterial cells, resulting in anion accumulation and osmotic alternations that impair metabolic processes[85]
Aluminium acetate	Antimicrobial Astringent	13% aluminium acetate dissolved in water at 1:40 concentration[86]	3–4.5	No data	May cause hypersensitivity[87] Not recommended under an occlusive dressing[87]	• High acidity causes deformations on the bacterial cell wall and cytoplasm[88] • Astringent properties that cause contraction of cells, reducing inflammation • Drying action reduces maceration in skin folds
Betaine and Poly-hexamethylene biguanide (PHMB)	Surfactant (betaine) Antimicrobial (PHMB)	0.1%	6–8	Mean therapeutic indices:[69] MRSA 12.12 *P aeruginosa* 1.14 *E coli* 0.66 *S aureus* 0.60 (Note: studies in this analysis used PHMB without added betaine at a range of concentration[69])	Minimal cytotoxicity is reported[69,89,90] Potential for allergic reaction is low[91]	• Polyhexanide increases bacterial membrane permeability and disrupts adenosine triphosphate production,[77,92] interferes with bacterial production of homoserine and interferes with quorum sensing ability[26] • Betaine reduces the adherence quality of microbials, reducing the force required to remove bacteria and debris[76,77]

Table 3. Profiles of commonly used wound and skin cleansing solutions *(Continued)*

Cleansing solution*	Properties	Concentration	pH	Therapeutic index**	Safety profile#	Mode of action
Chlorhexidine	Antimicrobial	0.05%	5.5-7	Mean therapeutic indices:[69] MRSA 2.43 *P aeruginosa* 0.70 *E coli* 1.15 *S aureus* 0.07	Cytotoxicity reported[69,89] Reported to damage granulating tissue[93] Hypersensitivity reported[94,95]	• Binds to bacterial cell wall, interfering with the metabolic capacity of the cell, interferes with the cell membrane integrity causing leakage of cellular material from the bacteria[96] • Tolerance and resistance has been reported in gram-negative and gram-positive bacterial species[95,96]
Citric acid	Antimicrobial Used in other preparations to adjust pH	3%	3–6	No data		• Disrupts the bacterial cell membrane and lowers the pH, slowing bacterial growth[97] • Alters bacterial metabolic activity[97]
Gentle soap	Surfactant	No data	7	No data	No cytotoxicity in humans reported[98]	• May stimulate autolytic debridement and reduce inflammation by degrading collagen and influencing protein activity[76] • Reduces the adherence quality of microbials, reducing the force required to remove bacteria and debris[76,77]
Hypochlorous acid (HOCl)	Antimicrobial Hypotonic	0.03%	3.5–7	Mean therapeutic indices:[69] *P aeruginosa* 8.81 *S aureus* 6.31 *E coli* 5.49	No cytotoxicity[4]	• Passively diffuses into bacterial cells, leading to anion accumulation and osmotic alternations that impair metabolic processes[99] • Oxidises the surfaces of bacterial cells to disrupt membrane function and softens tissue, aiding its removal during cleansing and debridement[98,100,101] • Has an anti-inflammatory effect through reducing activity of histamines, MMPs, mast cell and cytokine activity[98,102]

Table 3. Profiles of commonly used wound and skin cleansing solutions *(Continued)*

Cleansing solution*	Properties	Concentration	pH	Therapeutic index**	Safety profile#	Mode of action
Normal saline (NaCl)	Isotonic	0.9%	5.5	No data	Allergic reaction rare[84]	• Exact mechanism of normal saline is not known • At high concentrations, saline disrupts bacteria through osmotic alternations[14]
Octenidine Dihydrochloride (OCT)	Antimicrobial Surfactant Cationic	0.5%	1.6–12.2	Mean therapeutic indices:[69] *E coli* 1.33 *P aeruginosa* 0.95 *S aureus* 1.15 MRSA 3.33	Allergic reaction rare[84]	• Disrupts outer cell membrane and loss of cell wall and bind to bacteria leading to cell death • Has anti-inflammatory effects[4]
Povidone-Iodine (PI)	Antimicrobial	10%	4.0	Mean therapeutic indices:[69] *E coli* 0.40 *S aureus* 0.69 MRSA 0.35	Dose dependent cytotoxic effect on cells[103] Contraindicated in neonates, iodine sensitivity, thyroid or renal disorders and very large wounds[65,103]	• Oxidises and subsequently destabilises bacterial cell membranes leading to cytosolic enzyme deactivation and cell death[92] • Has anti-inflammatory effects[4]
Sodium hypochlorite (NaOCl)	Antimicrobial	0.057–0.125%	9–12	Mean therapeutic indices:[69] MRSA 0.008 *E coli* 0.004 *S aureus* 0.003 *P aeruginosa* 0.002	Dose dependent cytotoxic effect on cells,[104] concentration below 0.025% is suggested[102]	• Free radicals react with and oxidise nitrogen- and sulphur-containing groups on the surface of bacterial cells to disrupt membrane function[100]
Blended super-oxidised solutions (combination of HOCl and NaOCl)[105]	Antimicrobial	Varies	Varies[105]	No data	No cytotoxicity reported[106]	• A low concentration of a salt dissolved in water through which electrical current is passed through to create charged ions that react with microbes[107] • Free radicals and ions react to denature bacterial cell walls, disrupting their structure[106] • Has anti-inflammatory effects[105]

** There are multiple different preparations available for most cleansing solutions. Data is indicative only, always read the product information.*

*** The therapeutic index is a ratio of the lowest concentration that causes cytotoxicity to human cells over the minimum bactericidal concentration. A high therapeutic index indicates the wound cleanser is safer and has potential greater clinical effectiveness, noting the data is from in vitro studies[69]*

 # Always review the manufacturer's information regarding safe product use.

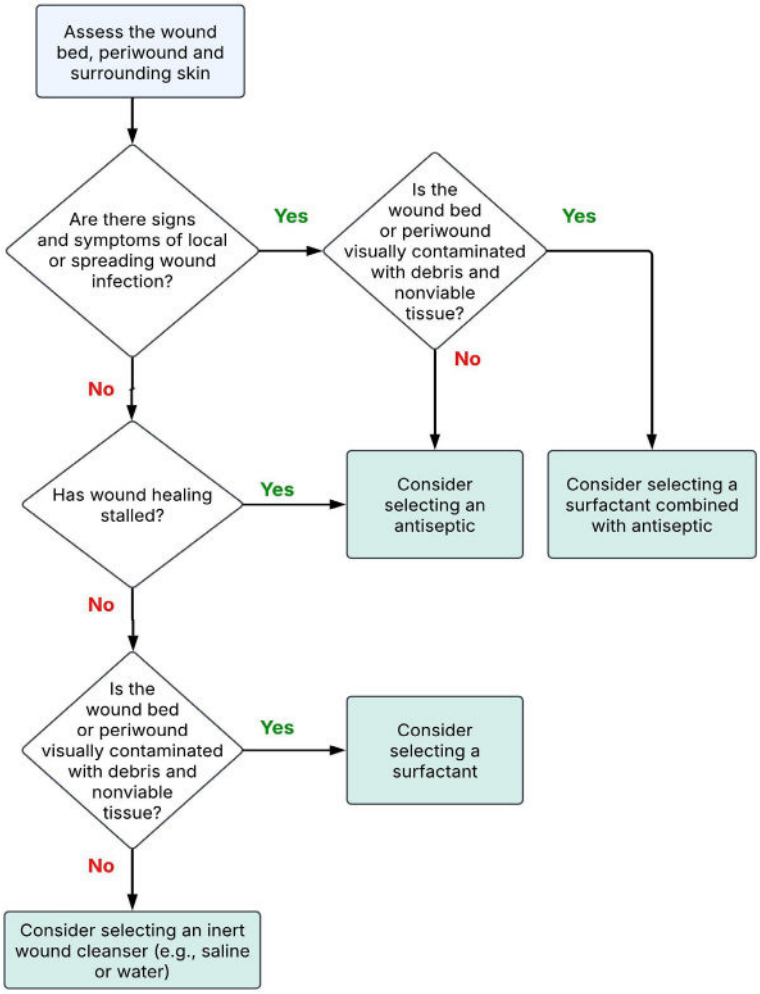
What should be considered when selecting the wound cleansing solution?

Table 4 outlines how the considerations in the recommendation above might be considered and addressed. Clinicians should evaluate the effectiveness of the wound cleansing solution for the individual wound as part of their wound care process.[82] Figure 4 provides a simple decision tree to assist in selecting a wound cleansing solution.

Table 4: Considerations when selecting a wound cleansing solution

Considerations	Choices
The type of wound dressing procedure and therapeutic cleansing technique	• When performing sterile/surgical aseptic technique, a sterile solution must be selected • Select a cleansing solution that is available in the volume needed and that is feasible for the cleansing application technique
Characteristics of the wound	• When healthy granulation and epithelial tissue is predominant, an inert solution may be all that is required • When the wound bed is sloughy, necrotic or stagnant, surfactants and antimicrobial cleaners will be required. The exception is dry necrotic tissue on heels where the goal of care is to keep dry
The risk and/or presence of infection	• When the individual is at higher risk of infection (e.g. due to co-morbidities, wound location, or wound pathology) use an antiseptic solution for therapeutic cleansing • When infection is suspected based on the signs and symptoms of wound infection, use an antiseptic solution for therapeutic cleansing • When infection is confirmed through diagnostic testing, use an antiseptic solution for therapeutic cleansing
The abundance and species of microorganisms present	• When infection is suspected, use an antiseptic with broad antimicrobial properties. Most antiseptics have a broad-spectrum. • When infection has been confirmed, use an antiseptic solution with known activity against the organism species
Cytotoxicity and allergenicity	• Check the individual's allergies • Therapeutic index can be used as an indication of the balance between safety and clinical effectiveness • Balance the toxicity profile with the benefits in promoting healing
Promoting optimal pH	• Monitor the wound bed pH • Antiseptics could be used strategically to optimise wound bed pH
Goals of care and other factors related to the individual	• Consider whether the goal is to promote healing, prevent infection, or palliative management • A non-sterile solution might be selected for palliative management of a wound with no signs or symptoms that are concerning to the individual • If the wound has purulent exudate and/or malodour, consider using an antiseptic solution • Some individuals experience pain or discomfort with some cleansing solutions. If pain occurs, consider reviewing the cleansing solution. • Time constraints (i.e. the length of time available with the individual[108])
Product information	• Review product information for the recommended contact time with the wound • Review product information for any safety considerations
Local policies, resources and availability	• Consider what is available in the dispensary and/or can be acquired by the individual • Consider the cost and resources required, and who will be responsible • Consider any local policies and microbial stewardship guidelines

Figure 4. Decision tree: Selecting a wound cleansing solution



Therapeutic index

The therapeutic index is a relatively new measure that has been increasingly used in the literature to assess the safety of a solution. It is a quantitative measure of the relative safety of an antiseptic solution.[69] The therapeutic index in in vitro tests refers to the ratio of the minimal cytotoxic (the concentration that kills 50% of mammalian cells (usually fibroblasts or keratinocytes) divided by the minimal bactericidal concentration, such as *E. coli, P. aeruginosa* and *S. aureus)*. The therapeutic index is the ratio of the lowest concentration that causes cytotoxicity to human cells to the minimum bactericidal concentration. A high therapeutic index indicates that the wound cleanser is safer and has potentially greater clinical effectiveness.[69] A therapeutic index greater than 1 indicates that the antiseptic has broad-spectrum activity against microorganisms and a low level of cytotoxicity to mammalian cells.[69,73,109]

pH

The pH of a wound bed is usually different from the pH of normal skin. The pH of the skin usually ranges between 4.0 and 5.5. Clinical studies have demonstrated that the pH of the wound bed in both chronic and acute wounds is usually alkaline (pH>7), which is consistent with the profile of the inner body tissues.[110,111] There is also some evidence that chronic wounds have a higher pH (on average 7.4 to 8.9) than acute wounds (on average 7.4).[110] The alkaline status of the wound bed is generally maintained until re-epithelialisation, upon which the slightly acidic state of the stratum corneum (pH 4 to 5.5) returns.[113] The alkaline environment of a wound facilitates bacterial proliferation[110] Therefore, antiseptics often have a neutral or slightly acidic pH to create an environment more hostile to microbes.[110] If the wound bed pH is monitored during wound assessment using pH strips, meters or sensors, antiseptics could be strategically selected to optimise the pH of the wound environment **[Box 3]**.

Box 3: Examples of wound pH testing equipment

pH test strip

pH meter

pH test strips with wound photograph courtesy of Patricia Idensohn

pH meter photograph courtesy of Geoff Sussman

Temperature

The temperature of the cleansing solution is important for optimal healing. The ideal solution temperature is at the same temperature as the body (approximately 37°C). If the wound bed temperature falls below 33°C, the healing process can be disrupted because cell miotic activity is impeded.[114] Therefore, therapeutic wound cleansing should be conducted using strategies that promote maintenance of an optimal wound bed temperature. These include:

- Using a wound cleansing solution that has been warmed to approximately body temperature (37°C to 42°C)[115]
- Reducing frequency of wound dressing procedures, where this is consistent with managing infection and promoting healing
- Minimising the duration of the wound dressing procedure to reduce the time the wound bed is exposed (e.g. avoid the ritualistic practice of early removal of the wound dressing in anticipation of ward rounds or medical reviews).

Local policies and procedures should be followed when warming wound cleansers. Methods to warm the wound cleansing solution include leaving it at room temperature for 40-60 minutes or using a bottle warmer. Consideration should be given to infection control when selecting the warming method. The IWII Expert Working Group recommends that a microwave should not be used because the cleansing solution can be overheated or heated unevenly, increasing the risk of burns.

Recommendation 9

Do not use a microwave to heat wound and skin cleansing solutions.
(Underpinning evidence: Expert opinion)

Excipients in wound cleansing solutions

Beyond the active ingredient in a wound cleansing product, clinicians should be aware of excipients [Table 5]. Excipients are inactive substances added to cleansing solutions for various purposes, including stabilising the active ingredient, enhancing shelf life, preserving the solution until and after it is opened and adjusting the pH level to be more suited for wound cleansing. These may include stabilisers, preservatives, emulsifiers or surfactants, which can affect the product's consistency, absorption and tolerability. Excipients are typically listed in the product information and may have secondary effects on wound care. Being aware of additives is important, particularly for individuals with sensitivities or allergies.

Table 5: Common excipients used in cleansing solutions

Excipients	Description
Polysorbates	• Act as a surfactant to help remove debris and impurities from the wound. Note, polysorbates are associated with allergic reactions
Chelating agents e.g. ethylenediaminetetraacetic acid	• Chelate metal ions, aid in immune regulation, downregulate MMPs, and remove heavy metals such as calcium, magnesium and iron, which help maintain the biofilm matrix
Benzalkonium chloride	• Provides antiseptic properties that help prevent infection but highly cytotoxic
Citric acid	• Used to moderate pH level

How long should an antiseptic be in contact with the wound?

Evidence on the minimum contact time for clinical effectiveness of solutions is variable and there are several confounding factors. Evaluation of antiseptics is often performed in research settings that do not accurately reflect clinical use. In clinical use, it is likely the contact time is influenced by the concentration of the preparation and potentially the way it is applied to the wound (i.e. the level of vigour in its application such as soaking versus scrubbing). This is discussed in more detail in Section 6 of this document. Clinicians should review the manufacturer's recommendations to determine the minimum contact time for the product's best performance.[4]

What solution should be used to perform therapeutic skin cleansing?

Recommendation 10

Therapeutically cleanse the skin using a mild skin cleanser with a pH close to normal skin. *(Underpinning evidence: Level 1[112] and Level 2 evidence[41])*

Cleansing of the periwound and surrounding skin is undertaken to remove wound dressing residue, dirt/debris, accumulated sebum/oil and hyperkeratotic tissue (scale).[13] Additionally, in the case of lower limb/venous ulcers, the surrounding skin is often completely covered by compression bandaging/wraps, reducing the ability of the individual to maintain their skin between wound dressing procedures.

An assessment of the periwound[116] and surrounding skin condition should be undertaken to identify skin and tissue damage including maceration, desiccation, inflammation and hyperkeratosis that will be managed during the skin cleansing procedure and may influence the selection of a wound cleansing technique. This is of particular significance in lower limb/venous leg ulcers that have high rates of skin inflammation, contact dermatitis and hyperkeratotic tissue.[41]

Systematic reviews of RCTs[112] and non-randomised studies[41,112] suggested that the most appropriate solution for skin cleansing is potable water or normal saline,[41] with the addition of a mild skin cleanser with a pH close to that of normal skin.[41,112]

The pH for skin usually ranges between 4.0 and 5.5,[112,117] although this can vary based on the individual and depends on their usual hygiene routine and the products/solutions that regularly come in contact with their skin.[59] At this pH, normal skin biome is supported, pathogenic microbials are inhibited and there is a lower risk of wound bed contamination from the surrounding skin. If the skin becomes too alkaline (e.g. from application of alkaline soaps or from infection), pathogenic microbials can proliferate. Traditional soap and water, due to their alkaline nature (pH 8 to 11), can alter skin pH, cause dryness, skin irritation and disruption to the skin barrier, and the potential overgrowth of bacteria and fungi. [41,112]

Selecting a wound cleansing technique

Wound cleansing technique refers to the way in which the wound cleansing solution is applied to the wound to achieve therapeutic cleansing. Wound cleansing techniques vary in how vigorously the wound bed is cleansed. In this context, vigour refers to the level of mechanical strength or force that is used when applying the wound cleansing solution and performing the wound cleansing technique.

How vigorously should a wound be cleansed?

For wounds to heal in an orderly and timely manner, some experts recommend minimal, gentle cleansing to avoid disrupting granulation tissue and reepithelialisation. However, hard-to-heal wounds (healable but non-healing wounds) require more vigorous therapeutic cleansing to dislodge loose devitalised tissue, microorganisms and debris in the wound bed in preparation for healing.[1,118,119]

There are several wound cleansing techniques that are commonly used, including but not limited to irrigation, soaks, swabbing, scrubbing and instillation. Research on the most effective type of wound cleansing technique is sparse and inconclusive. This is most likely because the most appropriate wound cleansing technique is wound-dependent.

Recommendation 11

Select a wound cleansing technique based on:

- Presentation of the wound bed and wound edges, including signs and symptoms of wound infection, as outlined on the IWII Wound Infection Continuum1
- Presentation of the periwound
- Presentation of the surrounding skin
- Goals of care and other individual factors (e.g. pain experience)
- Local policies and resources

(Underpinning evidence: Level 1 evidence,[120,121] Level 3 evidence,[62] and Level 5 evidence[17,22,122])

The IWII Expert Working Group recommend evaluating the signs and symptoms of wound infection to guide the selection of a wound cleansing technique. When the wound presentation is indicative of signs and symptoms of local wound infection or spreading wound infection, more vigorous wound cleansing techniques are likely to be required compared to a wound with no delayed healing in order to remove microbial burden and loosely adhered non-viable tissue that harbours infection. **Figure 5**, the *IWII Therapeutic Wound and Skin Cleansing Continuum*, illustrates the relationship between the wound infection continuum and the selection of a wound cleansing technique.

Additional considerations include the condition of the wound edge and periwound (e.g. maceration, desiccation, etc.) because this will inform the requirement for moisture-enhancing techniques versus protecting the periwound and reducing any maceration. The condition of the surrounding skin (e.g. dry, scaly, rashes, etc.) and the extent of skin cleansing required may also contribute to selection of a wound cleansing technique. The experience and preferences of the individual may also determine the type of therapeutic wound cleansing technique that can be performed (e.g. pain and tolerance of mechanical force). These factors together inform the goals of therapeutic cleansing (e.g. reduction of inflammation, prevention or treatment of wound infection, promote comfort, etc.). Finally, the resources available and local policy will influence the choices the clinician has available. **Table 6** provides an overview of the most used wound cleansing techniques.

IWII THERAPEUTIC WOUND AND SKIN CLEANSING CONTINUUM

INTERNATIONAL WOUND INFECTION INSTITUTE

- Three zones for therapeutic cleansing: wound bed and edge, periwound and surrounding skin
- Apply antiseptics for the recommended contact time to achieve antimicrobial activity
- Follow local policies and procedures

Increasing microbial burden in the wound

As the continuum green shading darkens, microbial burden increases

	HEALING	CONTAMINATION	COLONISATION	LOCAL WOUND INFECTION COVERT (subtle)	LOCAL WOUND INFECTION OVERT (classic)	SPREADING INFECTION	SYSTEMIC INFECTION
		• Microorganisms are present within the wound but are not proliferating • No significant host reaction is evoked • No delay in healing is clinically observed	• Microorganisms are present and undergoing limited proliferation • No significant host reaction is evoked • No delay in wound healing is clinically observed	• Hypergranulation • Bleeding, friable granulation • Epithelial bridging and pocketing in granulation tissue • Increasing exudate • Delayed wound healing beyond expectations	• Erythema • Local warmth • Swelling • Purulent discharge • Wound breakdown and enlargement • New or increasing pain • Increasing malodour	• Extending induration • Spreading erythema • Inflammation or erythema >2cm from wound edge • Crepitus • Wound breakdown/ dehiscence with or without satellite lesions • Lymphangitis (swelling of lymph glands)	• Malaise • Lethargy or nonspecific general deterioration • Loss of appetite • Fever/pyrexia • Severe sepsis • Septic shock • Organ failure • Death
PAIN	• Continual pain assessment: Remember the 3 As of pain management: Anticipate, Administer and Assess						
WOUND CLEANSING SOLUTION	• Inert solutions	• Inert solutions	• Inert solutions • High risk: surfactants and/or antiseptics	• Antiseptics • Surfactants • Inert solutions		• Antiseptics • Surfactants • Inert solutions	
WOUND CLEANSING INTENSITY	• Gentle	• Gentle to moderate	• Moderate/ rigorous	• Moderate to vigorous		• Vigorous	
WOUND CLEANSING TECHNIQUE	• Therapeutic cleansing • Irrigation • Soaks	• Therapeutic cleansing • Irrigation • Soaks • Compress • Swabbing • Scrubbing/mechanical action • Instillation • Hydroresponsive dressings					
CLEANSING EQUIPMENT	• Cleansing wipes/cloth • Irrigation equipment • Cleansing pad/microfilament pad • Gauze						
SKIN CLEANSING	• Mild skin cleanser with pH close to normal skin (4 to 5.5) • Cleansing wipes/cloths/gauze • Soaks, swabbing, scrubbing/mechanical action						

Figure 5. International Wound Infection Institute (IWII) Therapeutic Wound and Skin Cleansing Continuum

Irrigation/flushing

Irrigation/flushing of the wound involves applying a continuous stream of wound cleansing solution at the recommended pressures of 8–15 pounds per square inch (PSI) in order to loosen and remove debris and microbes from the wound without causing tissue damage.[79,123] The appropriate irrigation pressure can be achieved using a 35ml syringe with a 19-gauge angiocatheter (this is safer than using a needle).[19] This cleansing technique is considered to be light irrigation when minimal pressure is used (e.g. water from a running tap or from an aerosol application).[124]

One systematic review[120] comparing irrigation to wound swabbing demonstrated that irrigation was associated with statistically and clinically significant faster wound healing for chronic wounds that showed no signs and symptoms of infection (one RCT, median of 9 days versus 12 days, p=0.007). An earlier systematic review that focused on military wounds was unable to clarify whether wound irrigation plays a role in preventing wound infection.[121] Some evidence also indicates that irrigation/flushing might decrease the level of microbial burden in a wound;[120] however, if the goal of therapeutic wound cleansing is to manage local or spreading wound infection, irrigation/flushing is not the first-line choice for the wound cleansing technique.[120]

Soaks/wet packing

Wound soaks are achieved by applying highly absorbent cloth/gauze that is saturated in a lukewarm wound cleansing solution. The soaked cloth is placed in layers over the wound bed (and the periwound, where this is consistent with the periwound condition), and the cleansing solution is left to soak into the tissues.[122] This process hydrates the wound bed and loosens debris in the wound bed.[22,79,122] Alternatively, for some chronic wounds (e.g. lower leg ulcers), the wound can be soaked in a clean and disinfected container (e.g. a bucket or jug) containing lukewarm wound cleansing solution.[108] In this case, gentle agitation by moving the limb in the solution might also aid the loosening of dried exudate, debris and hyperkeratotic tissue, allowing it to be more easily removed with a gauze/wound cleansing cloth or forceps.[23,41] Traditionally, a wound soak was performed for 15–20 minutes, but contemporary evidence suggests that soaking for as little as 3–5 minutes[122] is clinically effective, depending on the solution used. The manufacturer's instructions for use should guide soaking times. Review **Table 6** for further considerations in use.

Compress

The wound compress technique is used to remove excess moisture and surface debris from the wound bed[22,122] via the astringent action of a wound cleanser.[22] The technique can also be used to cleanse a healthy wound bed in a manner that reduces trauma to the wound tissue and minimises discomfort.[122] Layers of absorbent cloth are saturated with lukewarm wound cleanser and then excess solution is wrung out to create a slightly damp cloth that is positioned on the wound bed. The absorbent cloth will wick moisture from the wound until the saturation point of the cloth is reached.[122] Review **Table 6** for further considerations in use.

Swabbing

Wound swabbing is a technique in which cleansing wipes/cloths/cotton soaked with a wound cleansing solution are used to wipe contaminants, non-viable tissue and exudate from the periwound and wound bed.[120] A systematic review[120] identified one RCT comparing wound swabbing to irrigation. While the study showed that irrigation was associated with faster wound healing (see report above), there was no significant differences in other outcomes, including infection rates and wound closure. Another study[62] reported that vigorous mechanical cleansing performed for 30 seconds using gauze soaking in an antiseptic was more efficacious in removing moderate to high bacterial loads from the wound bed and periwound than a 10-minute soak. The study highlighted that passive cleansing techniques (e.g. soaking) may be inadequate for hard-to-heal wounds because they do not physically disturb the protective extracellular matrix.[13,62] However, where the debris and non-viable tissue is tenacious, a more vigorous mechanical force will be required, which creates a risk of damaging any granulating tissue in the wound,[125] or causing pain and discomfort. Review **Table 6** for further considerations in use.

Scrubbing/cleansing pad/monofilament/microfibre pad

Wound scrubbing is a cleansing technique that uses more vigorous mechanical action to cleanse

the wound of more tenacious material. A specially designed cleansing/debridement pad soaked in wound cleanser can be used. The monofilaments are designed to agitate and absorb debris, keratotic tissue and exudate, removing it from the wound bed.[126,127] Some pads include different surfaces for loosening debris and for absorbing and capturing debris.[126] Where a cleansing/debridement pad is not available, scrubbing can be performed with gauze. The scrubbing technique should produce more vigorous mechanical action than irrigation, soaking, swabbing or compress, and the pad or gauze surface should be used more aggressively to remove debris and non-viable tissue than wound swabbing. Although the pad is sometimes referred to as a debridement pad, its use is primarily for cleansing the wound bed and improving visualisation in preparation for debridement and/or other topical therapies to stimulate wound healing. The efficacy of cleansing/debridement pads for promoting formation of healthy wound tissue has been demonstrated in observational studies.[126] Importantly, clinical reports indicate that the cleansing/debridement pad did not damage granulation tissue and may be associated with less pain than other therapeutic cleansing techniques.[126]

Instillation and dwell with negative pressure wound therapy

Instillation therapy is a technique in which a wound cleansing solution is instilled in the wound bed and allowed to dwell (i.e. sit in the wound), before being removed via a negative pressure wound therapy (NPWT) system.[128] This process provides automatic cleansing of the wound, facilitating the removal of wound exudate, non-viable tissue and microbial burden.[128,129] Clinical studies have demonstrated that compared with NPWT without instillation and dwell, NPWT with instillation and dwell can decrease the time required to attain a wound condition appropriate for surgical reconstruction.[129] Compared with other therapeutic cleansing techniques, clinical studies have demonstrated shorter times to wound closure with NPWT instillation and dwell time.[129] In general, the recommended negative pressure time is 2–2.5 hours (sometimes up to 3 hours depending on the type of NPWT) with a pressure setting of 125mmHg and the recommended dwell time is 10 minutes.[128,129] The technique is only appropriate for certain wound types **[Table 6]** and requires specific equipment and is generally only an option within an inpatient setting at present.[128]

Hydro-responsive dressings

Hydro-responsive dressings are an example of a wound care management strategy that intersects therapeutic wound cleansing and use of wound dressings **[Figure 1]**. Hydro-responsive dressings promote wound cleansing through delivery and/or removal of moisture to the wound bed in response to the fluid balance of the wound environment. These wound dressings contain both Ringer's solution and absorptive material that balances the moisture level, softening non-viable tissue in the wound and contributing to its detachment.[130] Observational studies have reported improvements in wound bed tissue type,[131,132] reduction in wound size,[133] and signs and symptoms of local wound infection[131] in wounds treated with hydro-responsive dressings.

Table 6: Overview of wound cleansing techniques

Technique	When to use	Considerations for use
Irrigation/flushing	• Wounds with minimal exudate • Wounds without slough • Wounds with minimal microbial burden	• When performed at higher pressures, be aware of the risk of environmental contamination from of splash back or aerosolisation[2] • Potential adverse effects include:[123,134] – Localised tissue/wound bed oedema – Potential for propagation of bacteria deeper into wound tissues – Cooling of the wound bed • Although pain is reported [123], it may be lower than with other techniques such as wound swabbing[120]

Table 6: Overview of wound cleansing techniques *(Continued)*

Technique	When to use	Considerations for use
Swabbing	• Wounds with exudate • Wounds visible debris, slough and other non-viable tissue • Wounds with signs and symptoms of infection	• May re-distributes bacteria within the wound bed, or spread contaminants from the periwound to the wound bed[62] • May damage newly granulating tissue[125] • Implement infection control strategies. DO NOT: - Reuse a cleansing cloth (instead, pass the cloth over the wound and then use a new cleansing cloth/gauze)[13] - Use the same cleansing cloth to cleanse the surrounding skin and the wound bed[13]
Scrubbing/cleansing pad/ monofilament fibre pad or when pad is unavailable, use gauze	• Wounds with exudate • Wounds visible debris, slough and other non-viable tissue • Wounds with signs and symptoms of infection	• Implement infection control strategies. Use a new pad/gauze used for different wounds and parts of the body[42] • Cleansing pad must be rinsed when it becomes saturated with wound debris[42] • Apply pressure in a circular motion[42] • If using gauze, implement infection control strategies and do not reuse the same gauze for multiple applications to the wound bed due to adherence of microbes to the gauze weave
Compress	• Healthy wounds with granulation or new epithelialisation with healthy or dry wound edges[122] • Wet wound beds with macerated wound edges[22,122] • Wounds with:[22,122] - Loose debris - Signs and symptoms of local wound infection	• Ensure all fluid is removed from the wound bed following compress to enable wound bed visualisation[22] • Consider using moistened ribbon cloth to gently compress cavities or tunnelling[22] • May be less traumatic than irrigation and therefore tolerated by individuals experiencing more severe pain[22]
Soaking/bathing/wet packing	• Wounds that require increased hydration/ moisture including:[122] - Dry healable wounds - Moisture-balanced wound bed but with desiccated wound edges • Signs and symptoms of local wound infection and spreading infection[122] • Dislodging visible debris[122] • Surrounding skin or periwound with visible debris or hyperkeratotic tissue[41]	• A container used for soaking should be disinfected before use[108] • Containers used for soaking should not be shared between different individuals • Avoid soaking both feet/multiple limbs in the same cleansing solution to prevent cross-contamination • May disrupt the moisture balance of the wound bed[22] • Avoid oversaturating the cloth or extended soaking to prevent maceration to the periwound and/or surrounding skin[22,79] • Can soak a single layer of gauze in wound cleanser and place on the wound bed – may need to hold in place[79] • May be less traumatic than irrigation and therefore tolerated by individuals experiencing more severe pain[22]

Table 6: Overview of wound cleansing techniques *(Continued)*

Technique	When to use	Considerations for use
Instillation	• Wounds with:[128] - small debris particles that are more difficult to dislodge - poor wound bed integrity - need for grafting or granulation tissue formation • Use cautiously in wounds with explored tunnelling or undermining[128] • Not recommended for wounds with unprotected organs/vessels, undrained abscess, acutely ischaemic wounds or over split-skin grafts or dermal substitutes[128,12]	• Do not use routinely in non-complicated wounds[129] • Only use wound cleansing solutions that are compatible with foam dressings and the disposable NPWT system[128,129] • Reconsider use if the wound is not improved within 7 days after adjustment of therapy[128] • Reduce the volume of fluid in wounds where gravity causes excess fluid pooling at the wound edge[128] • Consider shorter dwell time in wounds that are difficult to seal[128] • Consider longer dwell times in wounds with fibrinous tissue[128]
Hydro-responsive dressings	• Wounds with:[132] - devitalised tissue requiring removal - either dry or moist wound bed	• Does not contain any antimicrobial agents • Uses physical activity to loosen and remove non-viable tissue • Use in conjunction with wound bed preparation (e.g. cleansing and debridement

Therapeutic wound and skin cleansing technique

How should therapeutic wound and skin cleansing be sequenced?

Recommendation 12

Therapeutically cleanse the surrounding skin and periwound first.

Therapeutically cleanse the wound bed from the most vulnerable to the least vulnerable regions, based on the assessment of the wound.

(Underpinning evidence: Expert opinion)

Suggested sequencing for cleansing the wound bed, the wound edge, the periwound and surrounding skin is presented in **Box 4**.

Sequencing cleansing of the wound bed, wound edge and periwound

There is ongoing debate about the best way to sequence the cleansing of the wound bed and wound edge. A key goal of sequential cleansing is to reduce contamination, lower microbial burden and prevent the formation or persistence of biofilms. Commonly used strategies include cleansing from the "inside to outside" (i.e. commencing at the innermost point of the wound and moving out to the wound edges and periwound) and cleansing from "outside to inside" (i.e. starting at the periwound and wound edge and moving inwards to the wound centre). Both of these techniques are based on theories related to the spread of microbes from more contaminated regions of the wound to less contaminated areas of the wound.

Unless a device that enables visualisation of microbial burden in the wound is used (e.g. fluorescent imaging), it is not always possible to know where microbes are most present. Biofilm can be deep within the wound tissues and is not visible to the clinician during routine wound care. It is reasonable to assume that areas of the wound bed that have more non-viable tissue and visible debris are likely to be harbouring a higher microbial burden. The wound edge and periwound has been demonstrated to frequently harbour higher bacterial loads, particularly if it is undermined.[135]

Emerging assessment option: fluorescent imaging

Fluorescent imaging (when available) is an emerging option that can provide objective, real-time data to guide wound cleansing, particularly for wounds in which healing has stagnated for two weeks or more.[136]

Bacterial fluorescence imaging provides information about the type of bacteria present in a wound, and the location within the wound bed that has higher levels of contamination. The imaging technique is demonstrated to detect many common Gram-positive, Gram-negative, aerobic and anaerobic bacterial species.[137] When using fluorescent imaging, porphyrin-producing bacteria is detected with red fluorescence and cyan/aqua fluorescence indicates pyoverdine-producing bacteria (primarily Pseudomonas aeruginosa).[136] However, there are limitations to this technology, for example, bacteria can be missed in the presence of surface blood, bacteria deep within the wound tissue cannot be detected, not all infective microbes are demonstrated to be detectable and some other sources may be detected (e.g. bed sheets, tattoos and fluorescent dye).

Viewing the fluorescent image provides a guide for the clinician as to the most vulnerable area of the wound in which therapeutic cleansing should commence, parts of the wound requiring greatest focus during wound cleansing, and feedback after the procedure as to the effectiveness of therapeutic wound cleansing.[135,138] Explaining the imaging purpose and sharing the results with the individual might reinforce the importance of diligent wound cleansing and increase the individual's tolerance of the procedure; however, these potential benefits are yet to be explored.[136]

Box 4. Example of sequencing for cleansing the wound bed, wound edges, periwound and surrounding skin

1 **Communication**
- Explain the therapeutic wound and skin cleansing procedure and the rationale to the individual
- Obtain informed consent before proceeding
- Discuss pain: Use a validated pain assessment tool. If the individual is currently experiencing pain, has experienced pain during previous wound cleansing or dressing changes, or has anticipatory pain, consider administering an analgesic or topical anaesthetic before undertaking the procedure

2 **Preparing the individual and the environment**
- Ensure the environment is appropriate (consider privacy and risks to contamination such as air flow, foot traffic, etc.)
- Perform hand hygiene on entering the care area
- Ensure all required equipment (e.g. PPE and waste disposal bag) is readily available to minimise exposure of the wound bed (i.e. reduce risk of cooling and contamination)
- Ensure the individual is comfortable and positioned to allow ease of access to the wound and skin

3 **Removal of old dressing and/or bandages**
- Perform hand hygiene and don non-sterile gloves
- Carefully remove the old dressing and dispose in a biohazard bag
- Assess presence of exudate (including type, amount, any leakage, etc.) and condition of the wound bed, and wound edges, periwound and surrounding skin
- Remove gloves and perform hand hygiene

4 **Therapeutic skin cleansing**
- When required (e.g. for procedural pain), topical anaesthetic can be applied to the wound while the surrounding skin and/or periwound is cleansed
- A soak/wet pack could be applied and left on the wound to commence loosening debris and non-viable tissue while cleansing and debriding the surrounding skin and periwound
- Cleanse periwound and surrounding skin using warm potable water, mild skin cleanser (e.g. pH 4-5.5) and cleansing cloths/gauze or devices/pads. If using a liquid skin cleanser, apply/massage into the skin.
- Use a clean moistened cloth/gauze (i.e. that has not been used on another individual or another part of the body), start proximally and work down the limb or area. Do not contaminate the water by putting the cloth back into the water. Use a new cloth/gauze and repeat this process until the area is clean
- Pat dry if required, starting proximally, and working down

5 **Therapeutic wound cleansing**
- Proceed with a wound cleansing technique best suited to the wound, the individual and the environment. Refer to the *IWII Therapeutic Wound and Skin Cleansing Continuum* for options
- The condition of the wound bed will guide the selection of therapeutic cleansing technique and the amount of vigour that should be applied when therapeutically cleansing
- Use an aseptic technique best suited to the wound, the individual and the environment. Refer to **Figure 3** for options
- Use non-preserved sterile water, normal (0.9%) saline or potable water for a final rinse before any wound culture samples are taken

6 **Debridement**
- Debride all devitalised and necrotic tissue using the most appropriate method. Refer to *IWII's Wound Infection in Clinical Practice: Principles of Best Practice* for further guidance on debridement methods

7 **Post-debridement cleansing**
- Cleanse the wound again to remove any remaining debris

8 **Wound examination**
- Examine wound bed and wound edges under good lighting; use sterile forceps or gloves to expose wound tissue as needed
- Measure the wound, assess for undermining, tunnelling and assess the condition of the wound bed and wound edges. Refer to **Table 1** for descriptions of wound bed tissue and **Table 2** for examples of wound edges
- Assess the periwound condition

9 **Complete the wound dressing procedures**
- Apply the appropriate wound dressing according to protocol

Addressing pain associated with therapeutic wound cleansing

Remember the 3 A's of pain:
- Anticipate
- Administer
- Assess.

Does wound cleansing contribute to the individual's wound-related pain?

Pain during wound cleansing can be an issue for some individuals.[139] It may occur due to the removal of wound dressings[140] (e.g. when they adhere to the wound bed), in response to application of a wound cleansing solution used (e.g. stinging, burning are sometimes described sensations)[139] or due to the mechanical force used during the chosen therapeutic cleansing technique.

In a survey of 96 individuals receiving wound dressing procedures, 22% indicated that the wound cleansing solution caused some pain on application, and pain was experienced equally by those receiving sterile saline, diluted antiseptics or non-diluted (neat) antiseptics. However, a similar proportion of individuals indicated that the wound cleansing solution relieved wound-related pain. About 50% of people in the study did not experience any change in their wound-related pain associated with wound cleansing.[139] However, a second observational study reported more widespread experiences of procedural-related wound pain, with over 90% of the 109 individuals in the study reporting pain associated with the wound dressing procedure.[141] This highlights that the individual's experience with pain associated with therapeutic cleansing is unique. A key component in managing procedural pain is understanding the individual's experience and perception of their pain.

The IWII Expert Working Group recommends that holistic management of the individual underpins the wound assessment and management process. The individual's pain experience should be assessed as a component of person-centred wound assessment and management models (see *IWII (2022) Wound Infection in Clinical Practice*[1]). Strategies to engage the individual in their wound care, particularly in the context of preventing and managing wound infection, are also discussed in *IWII (2022) Wound Infection in Clinical Practice*.[1]

Assessment of the severity, quality and pain characteristics experienced by an individual during the wound cleansing procedure should be undertaken using validated pain assessment tools.

What strategies can be used to address procedural pain during therapeutic wound cleansing?

There are several approaches to effectively managing pain experienced by the individual during therapeutic wound cleansing. These include adjusting the way in which the therapeutic wound cleansing is performed (e.g. technique and equipment), implementing adjuvant non-pharmacological pain management strategies and, for more severe wound pain, using pharmacological options. **Remember the 3 As of pain: Anticipate, Administer and Assess.** The following strategies for managing wound-related procedural pain were synthesised in a systematic review of 33 studies.[142]

Recommendation 13

Adjust wound cleansing techniques and implement pain management strategies according to the individual's pain experience.

(Underpinning evidence: Level 1 evidence[142])

Wound cleansing strategies to reduce the risk of procedural wound pain:
- Manage signs and symptoms associated with increased wound pain (e.g. inflammation and infection)
- Select a wound cleansing solution that the individual finds comfortable: some wound cleansing solutions may cause pain or discomfort for some individuals

- Warm the wound cleansing solution to body temperature and limit exposure to the air to reduce temperature-related pain
- Maintain moisture balance in the wound bed and periwound. Select a wound cleansing technique that will increase moisture to reduce desiccation
- Commence with a gentle cleansing technique (e.g. soaking or compress) to initially loosen non-viable tissue and debris in the wound. This may reduce the mechanical force or the duration required for more vigorous cleansing to therapeutically cleanse the wound bed
- Select non-adherent wound dressings to reduce pain associated with wound dressing removal.

Adjuvant non-pharmacological pain management strategies:

- Individualise care: assess the individual's personal pain triggers and stressors, and develop an individualised wound-related pain management plan
- Psychological support: Consider using psychological interventions (e.g. relaxation techniques, adaption of the environment to reduce stress, music therapy and other forms of distraction)
- Education and explanation: Explain each step of the procedure and answer any questions to ensure the individual understands what to expect
- Minimise potential distress: Forewarn the individual before conducting potentially painful procedures
- Referral: Collaborate with a healthcare team (e.g. pain specialist, psychologist, etc.) to ensure long-standing and/or severe wound-related pain is appropriately assessed and managed.

Pharmacological pain management strategies:

- When required, implement pharmacological interventions at an appropriate duration before commencing the wound dressing procedure
- Consider using topical anaesthetic and/or anti-inflammatory preparations
- Discuss appropriate dosing and administration of non-steroidal anti-inflammatory drugs, opioids and other pharmacological options with the collaborative wound care team.

Antimicrobial stewardship in the context of therapeutic wound cleansing

Antimicrobial resistance occurs when microorganisms naturally evolve in ways that cause infection-treating medications to be ineffective. This is a significant issue in contemporary healthcare. Resistance of microorganisms to antimicrobial therapies is occurring faster than the rate at which new antimicrobial agents are being developed. This means there is a global risk of serious infections for which we have no adequate treatments.[143] Antimicrobial resistance is driven by the improper and overuse of antibiotics and antimicrobials. This includes:

- Using an antibiotic or antiseptic when it is not indicated
- Using a broad-spectrum antibiotic or antiseptic when a narrow-spectrum agent would suffice
- Using antibiotics or antiseptics at the wrong dose, concentration or for the wrong duration.

Antimicrobial stewardship refers to the supervised and organised use of antimicrobial agents. Growing evidence suggests that antiseptic wound cleansing solutions can be useful in reducing antimicrobial resistance when used appropriately.[71,144] For example, using antiseptics to disrupt biofilm activity reduces the likelihood that an antibiotic will be required to treat a wound infection.[90]

Although the risk of bacteria developing resistance to antiseptics is considered low, there is some evidence that widespread use of certain antiseptics (e.g. triclosan and chlorhexidine) may be associated with cross-resistance to antibiotics.[69,134,145] Therefore, judicious use of antiseptics is important. In the context of therapeutic wound cleansing, clinicians should promote infection control and the appropriate use of antiseptic solutions. This includes:[1,4,69,144]

- Implementing effective infection control procedures when performing therapeutic wound and skin cleansing
- Advocating for access to a range of different wound cleansing solutions and skin cleansers within healthcare services providing wound care
- Monitoring and evaluating the use of antiseptics, including within existing antimicrobial stewardship programmes
- Educating patients, families and clinicians about antimicrobial resistance and the responsible use of antiseptics
- Avoiding prophylactic use of antiseptics, unless warranted within the context of the wound, the individual and/or the environment.

Refer to the *IWII (2022) Wound Infection in Clinical Practice*[1] for more information on antimicrobial stewardship.

Glossary

Acute wound: (2016 IWII consensus definition) A wound with an aetiology that occurs suddenly, either with or without intention, but then heals in a timely manner.

Adjuvant/adjunctive interventions: Therapies that are used in addition to what are considered to be the standard/usual primary interventions for wound care. Adjuvant therapies enhance the impact of primary wound care interventions.

Antibiotic: A natural or synthetic medicine administered systemically or topically that has the capacity to destroy or inhibit bacterial growth.[1] Antibiotics target specific sites within bacterial cells while having no influence on human cells, thus they have a low toxicity.

Antimicrobial: A substance that kills or inhibits the growth of microorganisms (e.g. bacteria, viruses, fungi and parasites)

Antimicrobial resistance: (2022 IWII consensus definition) Antimicrobial resistance occurs when microorganisms change over time in ways that render the medications used to treat the infections they cause ineffective.[1,143]

Antimicrobial stewardship: The supervised and organised use of antimicrobials in order to decrease the spread of infections that are caused by multidrug-resistant organisms and to improve clinical outcomes by encouraging appropriate and optimised use of antimicrobials.[146]

Antimicrobial tolerance: (2022 IWII consensus definition) Antimicrobial tolerance occurs when microorganisms have a lower susceptibility to an antimicrobial.[147]

Antiseptic: (2022 IWII consensus definition) A topical agent with broad-spectrum activity that inhibits the multiplication of, or sometimes kills, microorganisms. Depending upon its concentration, an antiseptic may have a toxic effect on human cells. Development of resistance to topical antiseptics is uncommon.[147]

Asepsis: A state of being free from infectious (pathogenic) agents.[47]

Aseptic technique: A practice framework to prevent microorganism cross-infection when performing a wound dressing procedure.[47] The two accepted standards of aseptic technique are: sterile/surgical aseptic technique and clean/standard aseptic technique.[45]

Bioburden: See microbial burden

Biofilm: (2022 IWII consensus definition) Aggregate microorganisms that have unique characteristics and enhanced tolerance to treatment and host defences. Wound biofilms are associated with impaired wound healing and signs and symptoms of chronic inflammation.[147]

Cellulitis: An acute, diffuse and spreading infection of the skin and subcutaneous tissues that occurs when bacteria (commonly S. aureus or Beta-haemolytic streptococci[148]) and/or their products have invaded surrounding tissues characterised by acute inflammation and erythema.[149] When noted on periwound skin, requires culture and sensitivities of the involved wound, and management with systemic antibiotics.[148]

Chronic wound: (2016 IWII consensus definition) A wound that makes slow progression through the healing phases or displays delayed, interrupted or stalled healing. Inhibited healing may be due to intrinsic and extrinsic factors that impact the person, their wound and their healing environment.[12]

Circle of care: People with a personal connection to the individual with a wound and who are involved in their care. This might include significant others, family members, neighbours, colleagues and other people who are providing support (e.g. advocacy, care planning, direct

care or other levels of support) to the individual.

Colonisation: (2022 IWII consensus definition) Refers to the presence of microorganisms within the wound that are undergoing limited proliferation. No significant host reaction is evoked and no delay in wound healing is clinically observed.[147]

Contamination: (2022 IWII consensus definition) Refers to the presence within the wound of microorganisms that are not proliferating. No significant host reaction is evoked and no delay in wound healing is clinically observed.[147]

Cytotoxic: Refers to a substance that has a toxic effect on an important cellular function. In the context of wounds, cytotoxicity generally refers to the potential adverse effect of destroying cells that are involved in tissue healing, including keratinocytes, fibroblasts, macrophages and neutrophils that may be a risk associated with applying substances to the wound.[37]

Cross infection: Transfer of microorganisms (e.g. bacteria, virus) from one person, object or location (e.g. anatomical location) to another person, object or location.

Debridement: (2025 IWII consensus definition) The removal of devitalised (non-viable) tissue from or adjacent to a wound. Debridement also removes foreign matter, exudate and microorganisms from the wound bed and promotes a stimulatory environment.

Delayed wound healing: Wound healing that progresses at a slower rate than expected. Chronic wounds without infection can be expected to show signs of healing within two weeks.[118]

Devitalised (non-viable) tissue: Dead tissue presenting as necrotic tissue or slough.[118,150]

Erythrocyte sedimentation rate (ESR): A blood test that provides a non-specific indicator of inflammation activity in the body.[151]

Erythema: Superficial reddening of the skin.[118]

Eschar: Necrotic, devitalised tissue that appears black or brown, can be loose or firmly adherent and hard or soft, and may appear leathery.[118]

Exudate: (2022 IWII consensus definition) Fluid that is released from tissue and/or capillaries in response to injury, inflammation and/or microbial burden. It is mainly comprised of serum, fibrin, proteins and white blood cells.[147]

Fibrinous wound base/surface: (2022 IWII consensus definition) A metabolic by-product of healing occurring as a layer that is loosely adherent to the wound bed. It is composed of serum and matrix proteins that may be white, yellow, tan, brown or green, and has a fibrous or gelatinous texture and appearance.[147]

Foreign body: Presence in the wound of non-natural bodies that may be a result of the wounding process (e.g. gravel, dirt or glass) or might arise from wound treatment (e.g. sutures, staples, orthopaedic implants or drains).

Friable tissue: (2022 IWII consensus definition) Fragile tissue that bleeds easily.[147]

Fungi: Single-celled or complex multicellular organisms categorised in the biological kingdom of Fungi. This includes many ubiquitous organisms, a small number of which can be pathogenic in humans. Examples of fungi include yeasts, moulds and mildew.

Granulation tissue: The pink/red, moist, shiny tissue that glistens and is composed of new blood vessels, connective tissue, fibroblasts, and inflammatory cells that fill an open wound when it begins to heal. It typically appears deep pink or red with an irregular, granular surface.[118]

Hypergranulation: (2022 IWII consensus definition) An increase in the proliferation of granulation tissue such that the tissue progresses above or over the wound edge and inhibits epithelialisation. It presents as raised, soft/spongy, shiny, friable, red tissue.[147]

Hyperkeratotic tissue: Thick, scaly outer layer of skin displaying red/grey/brown patches of dry,

scaly, cracked and/or fissured skin.[13]

Induration: Hardening of the skin soft tissue around a wound due to inflammation that may be due to secondary infection.[118]

Inert: An inert solution is one that is biologically inactive.

Infection: Occurs when the quantity of microorganisms in a wound becomes imbalanced such that the host response is overwhelmed and wound healing becomes impaired.[152] Transition from non-infected to infected is a gradual process determined by the quantity and virulence of microbial burden and the individual's immune response.[1] See the IWII Wound Infection Continuum for more detailed information.

Irrigation: A therapeutic wound cleansing technique that involves flushing a wound with a stream of cleansing solution to remove non-viable tissue and other debris.

Limb hygiene: (2025 IWII consensus definition) The cleansing and drying of the affected limb to achieve and maintain skin integrity.

Local infection: (2022 IWII consensus definition) Local infection refers to the presence and proliferation of microorganisms within the wound that evokes a response from the host that often includes delayed wound healing. Local infection is contained within the wound and the immediate periwound region (less than 2cm). Local infection often presents as subtle (covert) signs that may develop into the classic (overt) signs of infection.[147]

Lymphangitis: Inflammation of lymph vessels, seen as streaking, linear erythema running proximally from a site of infection toward lymph nodes. Presentation reflects inflammation of the underlying superficial lymphatic system. Most often associated with acute bacterial infections including *S. aureus* and *S. pyogenes*, usually requiring management with systemic antibiotics.[153]

Maceration: (2022 IWII consensus definition) Maceration refers to wrinkled, soggy and/or soft peri-wound skin occurring due to exposure to moisture. Macerated peri-wound skin usually presents as white/pale and is at increased risk of breakdown.[147] In dark skin tones maceration can appear as shiny, grey, purple, or darker discolouration.

Microbial burden: (2022 IWII consensus definition) Microbial burden is the number of microorganisms in a wound, the pathogenicity of which is influenced by the microorganisms present (i.e. the species/strain), their growth and their potential virulence mechanisms.[147]

Microorganism: An organism that is microscopic in size (i.e. too small to see with the naked eye) including bacteria, fungi, yeasts, archaea and parasites. Although viruses are not considered to be living organisms, they are often included when using the general term "microorganism".

Necrotic tissue/necrosis: Dead (devitalised) tissue that is dark in colour and comprised of dehydrated, dead tissue cells. Necrotic tissue acts as a barrier to healing by preventing complete tissue repair and promoting microbial colonisation. It is usually managed with debridement, but only after a comprehensive assessment of the individual and their wound.[118]

Osteomyelitis: Infection of the bone that occurs through infection of the bloodstream or from a wound that allows bacteria to directly reach the bone.[118]

Periwound: (2025 IWII consensus definition) The skin and tissue immediately adjacent to the wound edge extending out 4cm and/or including any skin and tissue under the wound dressing.

pH: A measure on a scale from 0 to 14 of acidity or alkalinity, with 7 being neutral, greater than 7 being more alkaline and less than 7 being more acidic. The skin has a natural pH of around 5.5.

Phagocytosis: A cellular process by which certain living cells ingest and destroy other large cells or particles. Phagocytosis is a critical first-line component of the host's defence, with phagocytes (e.g. neutrophils and macrophages) detecting and binding to the cell surface

of invading microorganisms in order to eradicate them. The process of phagocytosis also initiates other host immune responses, including the release of proinflammatory cytokines.[154]

Planktonic bacteria: Unicellular bacteria growing in a free-living environment, meaning they are not part of a structured community or biofilm.[155]

Pocketing: (2022 IWII consensus definition) Pocketing occurs when granulation tissue does not grow in a uniform manner across the entire wound base, leading to a dead space that can potentially harbour microorganisms.[147]

Potable water: Water that is of a quality suitable for drinking, cooking and bathing. Unless the water supply is known to be safe for consumption, it should be considered non-potable. Tank water, pool water and dam water may or may not be of potable quality.[156]

Prophylaxis: The use of one or more measures to prevent the development of specific disease.[157] In the context of wound infection, prophylactic interventions can include topical antiseptic use and debridement. Prophylactic antibiotics are sometimes used to prevent surgical site infection; however, antimicrobial stewardship should guide prescribing to prevent overuse. For most procedures, antibiotic prophylaxis is not recommended. Appropriate indications include pre-surgical infection, high risk of post-surgical infection (e.g. contaminated surgery) or when consequences of infection are high (e.g. cardiac valve surgery).[158]

Pyrexia: Abnormal elevation of the core body temperature (above 38.3°C), usually occurring due to the host's inflammatory response to infection.[159,160]

Psychometric properties: A term that encompasses the reliability and validity of measurement scales, referring to the adequacy and accuracy of the measurement processes.[161]

Sepsis: Sepsis is a suspected infection with acute organ dysfunction, characterised by a range of signs and symptoms, arising from an overwhelming host response to bacterial, fungal or viral infection.[162] Sepsis occurs on a wide spectrum, with the most severe being septic shock and imminent risk of death. Presentation of sepsis varies and can be influenced by age, comorbidities and time since onset.[163] Signs and symptoms can include excessive pain, confusion or disorientation, shortness of breath, shivering, high fever; high heart rate, and clamminess, often with local signs such as necrotising soft tissue.[163]

Slough: (2022 IWII consensus definition) Slough is non-viable tissue of varying colour (e.g. cream, yellow, greyish or tan) that may be loose or firmly attached, slimy, stringy, or fibrinous.[147]

Spreading infection: Refers to microorganisms arising from a wound that spread into adjacent or regional tissues, evoking a response in the host in the structures in the anatomical area beyond the periwound region. Signs and symptoms of spreading infection include diffuse, acute inflammation and infection of skin or subcutaneous tissues.[1]

Surfactant: (2022 IWII consensus definition) A hydrophobic/lipophilic agent that reduces the surface tension between liquid and debris, slough and/or biofilm in a wound. The reduction in surface tension better disperses the liquid, improving the cleansing effect.[147]

Systemic infection: (2022 IWII consensus definition) Refers to microorganisms arising from the wound that spread throughout the body via the vascular or lymphatic systems, evoking a host response that affects the body as a whole. Signs of systemic infection include a systemic inflammatory response, sepsis and organ dysfunction.[147]

Therapeutic wound cleansing: (2025 IWII consensus definition) active removal of surface contaminants, loose debris, non-attached non-viable tissue, microorganisms and/or remnants of previous dressings.

Therapeutic skin cleansing: Skin hygiene is performed to remove debris, scales, exudate, microorganisms and excessive sweat and lipids from the wider area of skin, particularly when it has been covered by securing bandages or compression bandages/stockings/wraps.[41]

Toe flossing: (2025 IWII consensus definition) The action of cleaning and drying between the toes, usually with moistened gauze, cloth or a device designed for the purpose.

Undermining: An area of tissue destruction extending under intact skin along the periphery of a wound. It can be distinguished from a sinus tract in that it involves a significant portion of wound edge.[118]

Wound culture: A sample of tissue or fluid taken from the wound bed for laboratory testing. In the laboratory the sample is placed in a substance that promotes the growth of organisms and the type and quantity of organisms that grow is assessed by microscopy.[164,165]

Wound dressing procedure: The process of undertaking therapeutic cleansing, preparation of the wound for healing and protection of the wound with a wound dressing (i.e. the process referred to as "changing a wound dressing"). The procedure, which can be performed with differing considerations to asepsis, includes distinct steps and phases.[166,167]

Methodology

The recommendations and clinical guidance presented in this document are underpinned by the best available evidence addressing the topic of interest, and formal consensus processes

Identifying and classifying the best evidence
A systematic search was undertaken to identify research relevant to the inquiry questions. The search strategy used MeSH terms and EBSCO terms that were adapted for other databases. Broadly, controlled vocabulary searches covered the following concepts, which were combined with Boolean operators:

- Wound cleansing, cleaning, cleanse, wound irrigation, asepsis, cleansing, shower, technique, therapeutic cleansing, cleansing solution
- Wound, wound care, chronic wound, surgical wound
- Antimicrobials, antimicrobial, topical agent, antiseptic, surfactant.

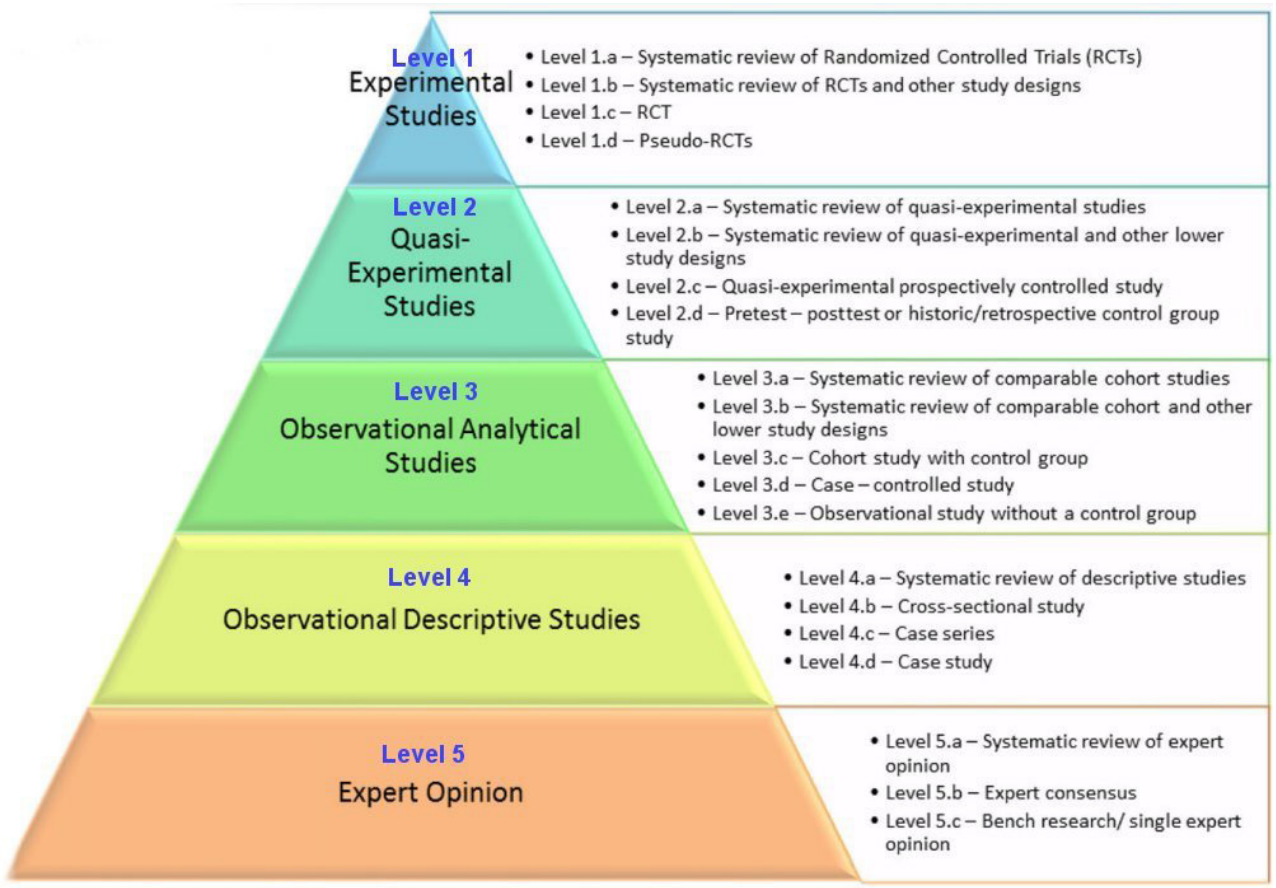
Searches were conducted in the following databases: Medline, PubMed, Embase, the Cochrane Library and Google Scholar. Google searches and targeted searches of wound-focused websites were undertaken to identify relevant consensus documents and statements. Additional publications recommended by the authorship team were added to those identified in the literature search, including seminal publications. The search was limited to reports in English since 2000 that addressed human subjects or bench science.

Identified evidence was screened based on title/abstract for relevance to the inquiry questions. All identified sources were classified based on their study design using the Joanna Briggs Institute (JBI) Levels of Evidence for Effectiveness, and this ranking was used to identify the type of evidence on which recommendations in this document are made **[Table 6]**. Where higher-level evidence was identified as addressing the clinical question, lower-level evidence was excluded, except where it contributed unique discussion points.

Consensus process
The IWII Expert Working Group also undertook a consensus process with a goal of attaining agreement on standardised definitions for some terms associated with wound cleansing. The consensus process was undertaken using the RAND/UCLA Appropriateness Method, a Delphi method for reaching formal agreement on the interpretation of science.[168] The consensus process extended previous work undertaken by the IWII to standardise wound terminology and used the same previously published methodology.[12,147] Participants in the current consensus process included wound experts from within and external to the IWII's Expert Working Group, as listed under the acknowledgements. Terms and definitions explored in the consensus process and discussed in this document were:

- **Consensus was reached on definitions**: periwound, debridement, limb hygiene, toe flossing, therapeutic wound cleansing
- **No consensus was reached on a definition**: mechanical cleansing.

Table 6: JBI Levels of Evidence for Effectiveness



Adapted from Munn Z, Lockwood C, Moola S (2015) The Development and Use of Evidence Summaries for Point of Care Information Systems: A Streamlined Rapid Review Approach. *Worldviews Evid Based Nurs* 12(3): 131-8

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