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Implementing Wound Hygiene in the Italian Healthcare Context: Expert Recommendations for the Management of Venous Leg Ulcers

Alessandro Scalise¹ | Franco Bassetto² | Diego Ceci³ | Guido Ciprandi⁴ | Deborah Cesura Granara⁵ | Barbara De Angelis⁶ | Ciro Falasconi⁷ | Domitilla Foghetti⁸ | Francesco Giacinto⁹ | Alessandro Greco¹⁰ | Filippo Magnoni¹¹ | Marco Marchelli⁵ | Giuseppe Nebbioso¹² | Battistino Paggi¹³ | Giovanni Papa¹⁴ | Francesco Petrella¹⁵ | Salvatore Piazza¹⁶ | Marco Romanelli¹⁷ | Elia Ricci¹⁸ | Sara Sandroni¹⁹

¹Clinica Chirurgia Plastica e Ricostruttiva – Centro Ferite Difficili, Azienda Ospedaliero Universitaria Delle Marche, Ancona, Italy | ²Azienda Ospedaliera – Università Degli Studi di Padova (PD), Padova, Italy | ³Azienda Ospedaliero Universitaria Sant'Andrea di Roma, Rome, Italy | ⁴Reconstructive and Aesthetic Surgery Clinic, University Hospital of Padua, Padua, Italy | ⁵ATS Liguria (Azienda Tutela Salute Liguria), Area socio sanitaria locale 3, Genova, Italy | ⁶Surgical Science Department, Plastic and Reconstructive Surgery, University of Rome 'Tor Vergata', Rome, Italy | ⁷Ambulatorio di Chirurgia e Diagnostica Vascolare, Napoli, Italy | ⁸UOC Chirurgia Generale, Ospedale San Salvatore, AST Pesaro-Urbino, Pesaro, Italy | ⁹Ambulatorio di Chirurgia Vasculari e Rigenerativa, ASP Cosenza, Cosenza, Italy | ¹⁰Centro Ulcere Cutanee, ASL Frosinone, Frosinone, Italy | ¹¹Azienda USL di Bologna, Chirurgia Vascolare Metropolitana, Ospedale Maggiore, Bologna, Italy | ¹²Azienda Sanitaria Locale Napoli 1 Centro, Naples, Italy | ¹³Consulente Esperto in Wound Care, Novara, Italy | ¹⁴Head of Plastic Surgery Unit, MSD, University of Trieste, Trieste, Italy | ¹⁵ASL Napoli 3 SUD, Portici, Italy | ¹⁶S.C. Chirurgia Vascolare ed Endovascolare, Azienda Ospedaliera Ordine Mauriziano di Torino, Torino, Italy | ¹⁷UOC di Dermatologia, Dipartimento di Area Medica e Oncologica, Azienda Ospedaliero Universitaria Pisana, Presidio Ospedaliero Santa Chiara, Pisa, Italy | ¹⁸Policlinico di Monza, Presidio Clinica Eporediese, Università di Torino, Turin, Italy | ¹⁹Department of Biomedicine and Prevention, University of Rome 'Tor Vergata', Rome, Italy

Correspondence: Alessandro Scalise (alessandro.scalise@ospedaleiruni.marche.it)

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ABSTRACT

The 'Wound Hygiene Italia' project was designed to provide expert-driven recommendations for the assessment, management and monitoring of venous leg ulcers, tailored to diverse settings of care (hospital, ambulatory and home care). The recommendations, developed by a multidisciplinary panel, emphasise the implementation of the Wound Hygiene strategy, a systematic approach targeting biofilm as a primary barrier to wound healing. Wound management is structured around four steps: cleansing, debridement, edge refashioning and dressing selection adapted to the wound bed characteristics, care setting and clinical capabilities, embedded in a holistic approach through comprehensive patient assessment and monitoring of overall well-being. The findings highlight the necessity of interdisciplinary collaboration, standardised tools and continuous patient monitoring, as assessed by objective metrics, such as wound size measurements and photographic documentation. Effective communication with patients and caregivers is also essential to ensure treatment adherence and foster trust in the care process. This framework integrates evidence-based practices to optimise outcomes and patient quality of life. By addressing both clinical and psychosocial factors, the recommendations promote a holistic, patient-centred approach that underscores the importance of education, structured follow-ups and tailored interventions.

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Summary

- A panel of experts adapted the international Wound Hygiene strategy to the Italian healthcare system.
- The recommendations outline a four-step protocol for managing venous leg ulcers effectively.
- The project promotes interdisciplinary, patient-centered care across hospitals, clinics, and home settings.
- Regular monitoring with standardized tools ensures proper evaluation and follow-up.

1 | Introduction

Modern wound care has evolved significantly since Winter's 1962 concept of moist wound healing, yet chronic wounds remain a persistent global challenge due to their rising prevalence, prolonged healing times and misuse of antibiotics [1–3]. The International Wound Hygiene Consensus (2020) identified biofilm as the primary barrier to healing and advocated for its systematic removal and early intervention [4]. Subsequent consensus documents further refined clinical approaches, integrating evidence on biofilms to establish wound hygiene as the gold standard for managing hard-to-heal wounds [5–9]. This methodology has gained international recognition, transforming care through structured, evidence-based strategies.

Hygiene is a cornerstone of public health and has become even more critical with the identification of biofilm as a significant barrier to wound healing [10–13]. 'Hygiene' goes far beyond the simple meaning of 'cleanliness'. Rather, it embodies the concept of 'health': a set of healthy behaviours that promote and preserve well-being. Accordingly, the 'Wound Hygiene' approach focuses on restoring optimal healing conditions by identifying and treating underlying causes, systematically removing wound biofilm and undesirable materials while preventing their reformation. Its effectiveness relies on four key actions: cleansing, debridement, edge refashioning and appropriate dressing selection—executed methodically at each dressing change. These actions form the foundation of this transformative approach to wound management [2, 6].

Since its global introduction in 2020, Wound Hygiene has been implemented in over 40 countries, demonstrating remarkable clinical efficacy despite the challenges posed by chronic comorbidities [4, 7, 8]. Expanding this approach into 'Proactive Wound Healing' emphasises prevention and treatment through a structured and methodical assessment process, biofilm-targeted management and multidisciplinary monitoring tailored to lesion aetiology and patient-specific clinical and psychosocial conditions. Integrated within frameworks, such as Diagnostic Therapeutic Care Pathways, this strategy centres on patient well-being alongside wound management to optimise outcomes.

The 'Wound Hygiene Italia' project seeks to adapt these international guidelines to the specific logistical, organisational and regulatory context of the Italian healthcare system. It aims to provide tailored recommendations for implementing the Wound Hygiene strategy across diverse care settings, accounting for

professional competencies and wound types. This document outlines expert-driven guidelines for managing venous leg ulcers, ensuring an effective, realistic and affordable application of the Wound Hygiene principles within Italy's clinical framework.

2 | Methods

The 'Wound Hygiene Italia' project was undertaken to develop tailored recommendations for the assessment, management and monitoring of patients with venous leg ulcers within the Italian healthcare context. A panel of 20 wound care experts (hereafter termed the Scientific Board) collaborated to produce these guidelines, aligning them with the latest scientific evidence. The recommendations addressed the three primary care settings within the Italian National Health System: hospital-based care, outpatient services and home-based care (hereafter hospital, outpatient and home care). These settings were defined by their specific organisational and operational characteristics, ensuring the guidelines were applicable across a range of clinical environments.

The project began in October 2023 and was conducted in five structured phases (Figure 1). First, a kick-off meeting introduced the project to the Scientific Board, during which participants were divided into working groups corresponding to the three care settings. The next phase involved designing and disseminating a questionnaire to gather expert input on wound hygiene practices for venous leg ulcers, with questions tailored to each care setting. The collected responses were then harmonised, and summary documents for each setting were prepared. These findings were reviewed during a 2-day in-person meeting, called the 'Big Conversation', held in Rome in December 2023. This collaborative event allowed participants to finalise the recommendations based on the synthesised data. The project concluded with the drafting of a comprehensive manuscript outlining the recommendations for implementing Wound Hygiene strategies in the Italian healthcare system. The project workflow is summarised in Figure 1.

The questionnaire, completed by all members of the Scientific Board, was integral to the project's methodology. It was structured to capture insights across three key domains: assessment, management and monitoring of patients. The design ensured that the resulting recommendations addressed the unique requirements of each care setting. The full text of the questionnaire is available as [Supporting Information](#), providing additional details on the scope and focus of the inquiries.

3 | Results

3.1 | Patient Assessment

Table 1 outlines the key considerations for assessing patients with venous leg ulcers across different care settings: hospital, outpatient and home care. It emphasises the importance of an interdisciplinary approach involving specialised healthcare professionals, tailored to the specific needs of each setting. Key areas covered include behavioural and psychosocial factors, essential staff roles, diagnostic parameters and prognostic

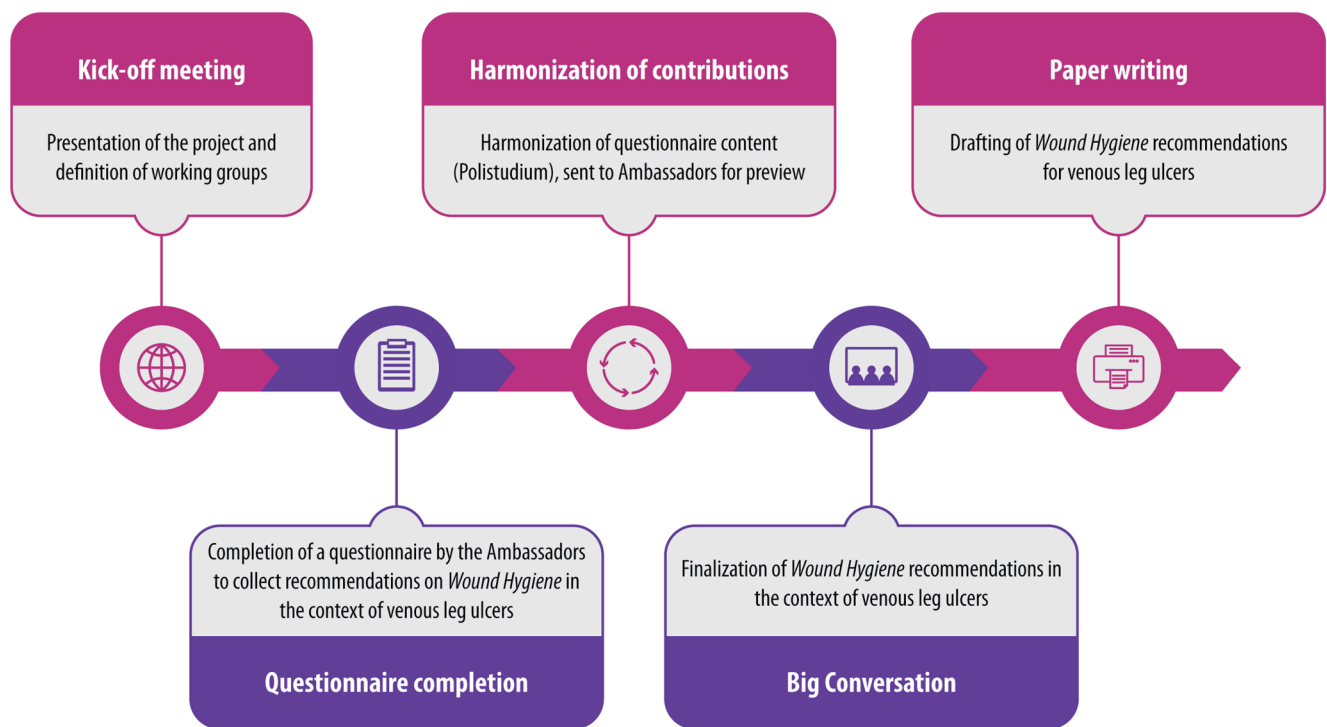


FIGURE 1 | The five structured phases of the Wound Hygiene Italia project.

TABLE 1 | Patient assessment for venous leg ulcers across different care settings.

Category	Details
Care pathway	<i>Hospital:</i> Multidisciplinary team includes wound care specialists, vascular and plastic surgeons, expert clinicians and dermatologists. Patients are reassessed regularly and referred for diagnostics or treatment as needed. <i>Outpatient:</i> Referral from general practitioners or specialists. Multidisciplinary care includes nurses, dietitians, diabetologists and vascular surgeons. <i>Home care:</i> Multidimensional assessment by medical and nursing staff, with support from social workers to design diagnostic and treatment plans.
Key behavioural and psychosocial factors	Pain, fear, neglect, substance use, caregiver availability and family or social support. Recommended tools include the Quality-of-Life Index, Quality of Life Scale and Wound-QoL.
Essential staff roles	<i>Hospital:</i> Dietitians, social care evaluators, psychiatrists, cultural mediators. <i>Outpatient:</i> Dietitians, psychologists, and social workers. <i>Home care:</i> Wound care specialists, social care evaluators, and specialised consultants (e.g., cardiologists, podiatrists, physiotherapists).
Clinical and diagnostic parameters	Ankle-Brachial Index or Toe-Brachial Index, metabolic and cardiovascular comorbidities, body mass index, immunosuppression status, pharmacological therapies and peripheral pulse presence. Additional assessments for abnormal Ankle-Brachial Index values include Doppler ultrasound, vascular specialist consultation, or peri-wound biopsy. Clinical examination covers edema, wound morphology, peri-wound skin condition, CEAP classification, and tools such as the Wound Assessment Triangle and Stemmer’s sign.
Prognostic factors for healing	Poor adherence to treatment, unclear diagnostic pathways, adverse social conditions, inadequate hygiene, wound recurrence, comorbidities (e.g., diabetes, cardiovascular disease), and systemic complications.
Patient and caregiver education	Focus on treatment and short-term goals such as pain reduction, exudate control, and odour management. Establishing verbal agreements on intermediate objectives and timelines enhances adherence to therapeutic protocols.

TABLE 2 | Tissue classifications and characteristics.

Tissue type	Description	Key differentiation
Necrotic (Eschar)	Black or brown tissue with a dry, leathery consistency or mildly moist texture; caused by ischemia or infection; may be either tightly or loosely adhered to the wound bed.	Differentiate from a hematoma, scab or crust.
Slough	Yellow or white necrotic tissue, typically moist and gelatinous, though occasionally dry; appears in patches or as a thin coating.	Differentiate from exposed tendons, joint capsules, medication residues or deep burns.
Unhealthy granulation	Dark red or pale pink tissue lacking signs of progression (e.g., pseudo-granulation, hypergranulation or dystrophic base); may indicate biofilm, infection or ischemia.	Differentiate from healthy granulation by colour, consistency and absence of healing indicators.
Healthy granulation	Bright red, compact, uniform and shiny tissue that signals healing; transitions to epithelialization.	Differentiate from hypergranulation, which protrudes above the wound surface due to infection or granuloma and may be friable and prone to bleeding.
Epithelium	Fragile, pale pink or white tissue indicating new epidermal growth; it represents the final stage of wound closure.	Differentiate from maceration, debris or superficial slough.

factors influencing healing outcomes. Key considerations also highlight the importance of patient and caregiver education in achieving adherence to treatment plans and optimising therapeutic results.

For instance, in hospital settings, the absence of specialist nurses and challenges in coordinating multidisciplinary care pathways often hinder optimal patient evaluation. Establishing specialised wound care units with dedicated personnel or seeking external support can help address these gaps.

For the outpatient care setting, essential resources such as digital or paper wound care records, diagnostic tools (e.g., handheld Doppler devices) and data collection systems are often limited. Possible solutions include shared resources, collaboration with external facilities and alternative methods such as manual measurements with photographic documentation.

In the home care setting, primary barriers include limited access to diagnostic tools, specialist consultations and integrated digital records. Addressing these will require improving telemedicine support, enhancing communication between care settings and ensuring standardised training and competence evaluation for each healthcare professional involved.

3.2 | Management of Wounds

The Scientific Board developed several recommendations to implement the four steps of the Wound Hygiene procedure: cleanse, debride, refashion the edge and dress. These recommendations are detailed below, with adjustments provided for

specific care settings where necessary. Each step is tailored based on the main type of tissue in the wound bed—necrotic (eschar), slough, unhealthy granulation, healthy granulation and epithelium. This classification, as outlined in the 2022 International Wound Hygiene Consensus Document, uses the predominant clinical feature as an indicator of biofilm presence and determines the required interventions (Table 2) [2, 6, 10]. According to the current literature [12, 14], two main strategies can be adopted to prevent biofilm from interfering with wound healing: (1) preventive measures, aimed at inhibiting the attachment of planktonic bacteria and (2) disruptive or inhibitory actions, focused on eradicating mature biofilm colonies and preventing their reformation. In the first case, the early administration of systemic antibiotics or the use of antimicrobial dressings, such as those containing silver or polyhexamethylene biguanide (PHMB), can be effective when applied prior to full biofilm maturation [15]. For instance, although PHMB has shown antibiofilm activity in vitro, its clinical efficacy remains unproven. A 2021 Cochrane Review found insufficient evidence to support its superiority over saline in treating venous leg ulcers [16]. Its use should therefore be considered part of a broader wound hygiene strategy, rather than as an isolated intervention.

Once a multispecies biofilm has matured, as often occurs in chronic, non-healing wounds, the antimicrobial action of dressings must be augmented with specific anti-biofilm agents. As stated by Wolcott, ‘Biofilm-based wound care is predicated on using multiple different treatment strategies simultaneously’ [17]. This is especially relevant because it is now well established that antiseptics alone are unable to penetrate the extracellular polymeric substance matrix once it has formed [18].

TABLE 3 | Anti-biofilm strategies.

	Description	Agents with anti-biofilm activity
Anti-biofilm strategies	Apply anti-biofilm dressings until healthy granulation tissue forms, inflammation resolves, edema reduces and venous deficits stabilise.	Ajoene, ethylenediaminetetraacetic acid, farnesol, gallium, iberin, lactoferrin, manuka honey, polyhexamethylene biguanide, betaine and xylitol.

Currently, only a limited number of anti-biofilm agents have demonstrated efficacy supported by scientific evidence and can enhance the effects of antimicrobials [12]. These include ajoene, ethylenediaminetetraacetic acid, farnesol, gallium, iberin, lactoferrin, manuka honey, PHMB combined with betaine and xylitol. Among these, only a few are available in advanced wound dressings and can be considered practical tools against biofilm. The most notable, based on their spectrum of activity and the strength of supporting evidence, are ethylenediaminetetraacetic acid, PHMB with betaine and manuka honey (Table 3) [12]. These recommendations ensure precise interventions tailored to the wound bed's condition, optimising care and promoting healing through systematic implementation of the Wound Hygiene procedure (Tables 4–8) [19].

The availability of appropriate tools and qualified personnel is crucial for all care settings and tissue types. Equally important is the involvement of the patient and/or caregiver in the wound care process, particularly in the home care setting, to ensure adherence and optimal outcomes.

3.3 | Patient Monitoring

Monitoring of patients with venous leg ulcers should be conducted at every visit, regardless of the care setting. This process encompasses evaluation of both wound status (when feasible to remove the dressing) and the patient's overall health, incorporating lifestyle and social factors that may significantly influence therapeutic outcomes. Key indicators of positive clinical progress include reduced limb edema, decreased local pain, improved general health and adherence to compression therapy. Pain monitoring should consider both psycho-emotional and procedural components.

Photographic documentation, as required by the National Healthcare Standards, is crucial and should be performed at every visit or at least twice a week in all care settings. Essential wound elements requiring constant follow-up include the wound bed, edges and peri-wound skin, accompanied by a millimetre scale and date to allow early intervention in case of stagnation or regression.

Patient quality of life should also be assessed, with attention to their outlook on daily living, return to routine activities, and ability to maintain personal hygiene. This evaluation can be facilitated through structured conversations with the patient or caregiver, validated assessment scales and supporting photographic records. In the case of recurrence, additional monitoring

measures and therapeutic education for both the patient and caregiver are recommended, with consideration of social determinants of health.

Signs of patient disengagement, such as missed appointments, non-adherence to treatment or refusal to follow medical advice, should be promptly identified and addressed. To minimise the risk of treatment withdrawal, particularly in outpatient and home care settings, intermediate treatment goals should be agreed upon with the patient and effectively explained. Engagement can also be enhanced by involving general practitioners and offering user-friendly compression therapy devices.

In addition to these guidelines, the Scientific Board formulated 11 recommendations detailing best practices for monitoring patients with venous leg ulcers across all care settings (Table 9).

The implementation of a multidisciplinary approach to Wound Hygiene in Italy is currently being operationalised through regional Diagnostic Therapeutic Care Pathways (PDTA), which define structured, evidence-based processes for the assessment, treatment and follow-up of patients with hard-to-heal wounds. At present, two regions—Marche and Campania—have formally adopted PDTAs specifically dedicated to chronic cutaneous lesions, aligning clinical practice with the Wound Hygiene protocol.

These regional pathways are supported by the National Health Service (SSN) and co-funded through allocations from both the State and regional budgets. These resources cover implementation costs, including personnel training, technological infrastructure and clinical monitoring systems. A set of standardised key performance indicators (KPIs), consistent with national guidelines (NSG-PDPA and Ministerial frameworks), is employed to assess protocol adherence and clinical outcomes. These include: average healing time, wound size reduction, incidence of complications (e.g., infection, pain), rates of appropriate debridement, use of advanced therapies and quality of photographic documentation.

Scientific societies such as the Italian Association for Cutaneous Ulcers (AIUC) and the Nursing Association for the Study of Skin Wounds (AISLeC) actively support dissemination through continuing education programs, aiming to harmonise implementation across diverse clinical settings. While this paper focuses on clinical recommendations, future publications will detail the broader implementation frameworks and system-level outcomes.

TABLE 4 | Management of necrotic tissue.

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Cleanse	Wash the wound and surrounding area with mechanical scrubbing; consider escharolytic soaking. Apply an antiseptic solution for the recommended contact time, then rinse thoroughly.	Ensure a clean wound environment to prevent bacterial spread and promote healing. Avoid leaving solution residues under exposed substructures such as tendons or bones.	Physiological-temperature solutions, antiseptic or surfactant solutions, gauze, sponges, forceps, curettes and blades.	Hospital/clinic: physicians, nurses and support staff. Home care: wound care specialists, physicians and nurses.
Debride	Use surgical (in septic wounds), mechanical, or enzymatic/autolytic methods depending on the care setting. Remove non-viable tissue to establish healthy wound conditions.	Select rapid-action methods for septic cases. In home care, slower approaches such as enzymatic debridement may be appropriate when no signs of infection are present. Consider pain, bleeding risk and patient expectations.	Surgical instruments, PADs, enzymatic/autolytic dressings, pain and bleeding management tools (e.g., local anaesthetics, calcium alginates). Dermatological curettes may also be used as a precise sharp debridement tool, particularly for small or localised areas of devitalized tissue.	Surgical debridement: specialist surgeons. Mechanical/enzymatic debridement: wound care physicians and specialist nurses.
Refashion	Remove obstacles at wound margins using sharp, mechanical or ultrasonic methods. Smooth the edges and ensure blood flow is visible to stimulate healing.	Rapid-action tools are preferred for effective results. Consider pain management and bleeding risk. In home care, stop at minimal bleeding to prevent complications.	Ultrasonic debriders, curettes, scalpel blades, microfiber pads and gauze.	Hospital/clinic: specialist surgeons, wound care physicians and nurses. Home care: trained wound care professionals.

(Continues)

TABLE 4 | (Continued)

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Dress	Apply primary dressings that facilitate debridement, conform to wound bed exposure, break down and inhibit mature multispecies biofilm, provide antiseptic action and adequately protect the wound edges and peri-wound skin. The secondary dressing must be free of potentially harmful components or adhesive edges, have both absorptive and retentive capacity under compression, and ensure appropriate moisture vapour transmission rate according to the desired moisture balance. Appropriate protection of the surrounding skin may include the use of barrier creams or protective films.	Key criteria for selecting the appropriate primary dressing include, in order of importance: signs of infection, debridement needs, wound edge protection, wound depth and morphology, frequency of patient access for dressing changes, exudate quantity and quality, social context, patient's hygienic conditions and the availability of a valid caregiver. For the secondary dressing, also consider impermeability to contaminants and external agents, assurance of sub-occlusion in case of autolytic or enzymatic debridement and protection of peri-wound and healthy skin.	Antimicrobial/absorptive dressings, hydrogels, compression bandages, protective films and barrier creams.	Wound care physicians, specialist nurses and trained caregivers.
Pain and bleeding management	Use local or regional anaesthetics, calcium alginates, tranexamic acid or fibrillar haemostatics as needed.	Choose methods appropriate to the patient's health status and care setting. Optimise comfort and minimise procedural disruptions.	Local/systemic anaesthetics, haemostatic agents (e.g., calcium alginates, hydrogen peroxide).	Physicians and trained nurses with procedural expertise.

Abbreviation: PADs: polyabsorbent debridement pads.

TABLE 5 | Management of slough.

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Clean	Wash the wound bed and limb using vigorous mechanical scrubbing; apply a surfactant solution to the wound bed, followed by an antiseptic solution and thorough rinsing.	Remove soft necrotic tissue, debris and bacterial biofilm to establish a clean environment for healing. Ensure proper rinsing to eliminate residual impurities and potential sensitising agents.	Physiological-temperature surfactant solutions with antiseptics, gauze, sponges, forceps, curettes and blades.	Physicians, nurses and trained caregivers across all care settings.
Debride	Prior to any debridement procedure, a comprehensive vascular assessment—including evaluation of arterial perfusion—must be conducted to exclude contraindications such as critical limb ischemia. Preferred methods include sharp or mechanical techniques; autolytic or enzymatic debridement is appropriate in non-septic cases, particularly in home care. Surgical debridement is required in septic conditions.	Select tools based on the clinical setting, provider expertise, and patient condition. Autolytic and enzymatic methods are slower but suitable when rapid intervention is not necessary.	Surgical instruments (e.g., scalpels, curettes), mechanical devices (e.g., PADs, ultrasonic tools) and autolytic and enzymatic dressings. Pain management tools to enhance procedural comfort.	Surgical debridement: specialist surgeons. Mechanical, autolytic or enzymatic methods: physicians and trained nurses.
Refashion	Use sharp, mechanical, or ultrasonic methods to remove obstacles, smooth wound edges and stimulate healing by inducing pinpoint bleeding.	Prioritise rapid-action tools for efficient removal of non-viable tissue, while carefully managing pain and bleeding. In home care, limit interventions to achieving minimal bleeding to reduce the risk of complications.	Ultrasonic debriders, curettes, scalpel blades, microfiber pads and gauze.	Surgical interventions: specialist surgeons. Mechanical or ultrasonic methods: trained wound care physicians and nurses.

(Continues)

TABLE 5 | (Continued)

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Dress	Apply a contouring primary dressing that inhibits and eradicates mature multispecies biofilm, protects against maceration under compression, maintains an acidic pH, and supports autolytic debridement. Cover with a secondary dressing that is free of potentially harmful components or adhesive edges, offers both absorptive and retentive capacity under compression, and allows dressing change frequency compatible with compressive therapy while limiting bacterial cross-migration.	Key criteria for selecting the appropriate primary dressing include, in order of importance: presence of biofilm-related signs, debridement needs, protection of wound edges and healthy skin from maceration, vertical absorptive and retentive capacity under compression, wound depth and morphology, frequency of patient access for dressing changes, exudate quantity and quality, preservation of dressing integrity, social context, patient's hygienic conditions and the availability of a valid caregiver. For the secondary dressing, consider additional factors such as signs of inflammation or damage to the peri-wound skin, and the need for bacterial load control.	Antimicrobial dressings, hydrogels, compression bandages, silicone or polyacrylate skin barrier sprays and creams.	Wound care physicians, specialist nurses and trained caregivers.
Pain and bleeding management	Use local or systemic anaesthetics, calcium alginates, tranexamic acid or fibrillar haemostatics based on patient needs and procedural context.	Tailor interventions to minimise discomfort and bleeding while preserving procedural efficiency.	Local/systemic anaesthetics, haemostatic agents (e.g., calcium alginates, hydrogen peroxide), and adjunctive pain management tools.	Physicians and trained nurses with expertise in pain and bleeding management.

Abbreviation: PADs: polyabsorbent debridement pads.

TABLE 6 | Management of unhealthy granulation tissue.

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Clean	Wash the wound bed and limb with vigorous mechanical scrubbing; use a surfactant solution on the wound bed, followed by antiseptic solution application and thorough rinsing.	Remove unhealthy granulation tissue, visible debris and bacterial biofilm to promote healing. Rinse thoroughly to eliminate impurities beneath wound substructures and any sensitising agents.	Physiological-temperature surfactant solutions, antiseptic solutions, gauze, sponges, forceps, curettes, blades.	Physicians, nurses and trained caregivers in hospital/clinic and home care settings.
Debride	Hypergranulation tissue, which protrudes above the wound margins and may delay re-epithelialization, is considered a manifestation of unhealthy granulation and should be debrided to restore tissue level continuity with the surrounding skin. Prefer surgical, sharp or mechanical methods. Enzymatic or autolytic approaches are acceptable in home care when no sepsis is present. Surgical debridement is indicated in septic conditions.	Prioritise rapid-action tools when possible; use slower enzymatic or autolytic methods cautiously to avoid subclinical infection. Tailor the intervention to the patient's condition and wound severity.	Sharp instruments (e.g., scalpels, curettes), mechanical devices (e.g., PADs, ultrasonic tools), autolytic and enzymatic dressings, and pain management tools for comfort.	Surgical debridement: specialist surgeons. Sharp and/or mechanical approach: wound care physicians and trained nurses. Autolytic/enzymatic methods: general practitioners or nurses.
Refashion	Use sharp, mechanical or ultrasonic methods to remove tissue barriers, smooth wound edges and stimulate new tissue growth.	Use precise, rapid-action tools to ensure complete removal of non-viable tissue while managing procedural pain and bleeding. In home care, limit interventions to minimal bleeding.	Ultrasonic debriders, curettes, scalpel blades, microfiber pads and gauze.	Surgical interventions: specialist surgeons. Sharp and/or mechanical methods or ultrasonic approaches: wound care physicians and nurses.

(Continues)

TABLE 6 | (Continued)

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Dress	Apply a contouring primary dressing that inhibits and eradicates mature multispecies biofilm, protects against maceration under compression, maintains an acidic pH and supports autolytic debridement. Cover with a secondary dressing that is free of potentially harmful components or adhesive edges, provides both absorptive and retentive capacity under compression, and allows dressing change frequency compatible with compressive therapy while limiting bacterial cross-migration.	Key criteria for selecting the appropriate primary dressing include, in order of importance: presence of biofilm-related signs, debridement needs, protection of wound edges and healthy skin from maceration, vertical absorptive and retentive capacity under compression, wound depth and morphology, frequency of patient access for dressing changes, exudate quantity and quality, preservation of dressing integrity, social context, patient's hygienic conditions, and the availability of a valid caregiver. For the secondary dressing, also consider the presence of signs of inflammation or damage to the peri-wound skin and the need for bacterial load control.	Antimicrobial dressings, hydrogels, compression bandages, silicone or polyacrylate skin barrier sprays and creams.	Wound care physicians, specialist nurses and trained caregivers.
Pain and bleeding management	Use local anaesthetics, calcium alginates, tranexamic acid or fibrillar haemostatics to control procedural discomfort and bleeding.	Select management methods based on the patient's condition and care setting, prioritising both procedural efficiency and patient comfort.	Local/systemic anaesthetics, haemostatic agents (e.g., calcium alginates, hydrogen peroxide) and adjunctive pain management tools.	Physicians and nurses trained in advanced wound care techniques.

Abbreviation: PADs: polyabsorbent debridement pads.

TABLE 7 | Management of healthy granulation tissue.

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Clean	Wash the wound bed and limb with moderate mechanical scrubbing; use surfactant solutions on the wound bed as needed, followed by antiseptic solution application and thorough rinsing.	Focus on restoring and maintaining a healthy wound environment while protecting newly formed granulation tissues. Ensure complete rinsing to remove impurities and potential sensitising agents.	Physiological-temperature surfactant solutions, antiseptic solutions, gauze, sponges, forceps and curettes.	Physicians, nurses and wound care specialists in hospital/clinic and home care settings.
Debride	Use mechanical methods; autolytic or enzymatic approaches are appropriate in home care for non-septic conditions.	Select tools based on the patient's condition and care setting. Prioritise preservation of healthy granulation tissue while effectively removing residual necrotic or devitalized material.	Mechanical devices (e.g., textured pads, woven gauze), autolytic or enzymatic dressings and pain management tools.	Wound care physicians, nurses and trained caregivers skilled in debridement techniques.
Refashion	Perform gentle mechanical debridement to maintain healthy wound edges, focusing on removing biofilm while preserving newly formed tissues.	Use tools that allow precise modulation of action intensity to ensure patient comfort and minimise trauma to healthy tissue.	Microfiber pads, gauze, fine mesh dressings and, more rarely, scalpels and forceps.	Wound care physicians and nurses experienced in wound edge reactivation techniques.
Dress	Select primary dressings that stimulate granulation tissue, preserve it from trauma, inhibit and eradicate mature multispecies biofilm and prevent maceration under compression. Apply a secondary dressing free of potentially harmful components or adhesive edges, with both absorptive and retentive capacity under compression, while ensuring dressing change frequency compatible with the compressive therapy, as well as providing an action that inhibits residual biofilm growth.	Key criteria for selecting both primary and secondary dressings include, in order of importance: stimulation and protection of granulation tissue, debridement of the wound bed and inhibition of biofilm regrowth, protection of wound edges and healthy skin from maceration, vertical absorptive and retentive capacity under compression, exudate quantity and quality, frequency of patient access for dressing changes, wound depth and morphology, preservation of the dressing integrity, social context, patient's hygienic conditions and the availability of a valid caregiver.	Antimicrobial dressings, hydrogels, silicone or polyacrylate skin barrier sprays and creams, thin hydrocolloids, compression bandages.	Wound care physicians, nurses and trained caregivers.
Pain and bleeding management	Use local anaesthetics, calcium alginates, tranexamic acid or fibrillar haemostatics to manage procedural pain and bleeding.	Tailor interventions to balance procedural intensity with patient comfort and minimise trauma.	Local/systemic anaesthetics, haemostatic agents (e.g., calcium alginates, hydrogen peroxide), and adjunctive pain relief tools.	Physicians and nurses trained in advanced wound management techniques.

TABLE 8 | Management of epithelializing tissue.

Step	Actions	Criteria/considerations	Instruments/tools	Key staff
Clean	Gently wash the wound bed and limb using atraumatic techniques. Apply surfactant solutions as needed, followed by an antiseptic solution and thorough rinsing.	Maintain a healthy wound environment to support re-epithelialization while avoiding damage to newly formed epithelial layers. Focus on gentle cleansing of the surrounding skin to reduce the risk of bacterial spread.	Physiological-temperature surfactant solutions, antiseptic solutions, microfiber pads, gauze and forceps.	Physicians, nurses and wound care specialists in hospital/clinic and home care settings.
Debride	Generally, not required. If necessary, perform minimal, gentle abrasive actions to remove non-viable tissue without damaging neo-epithelium.	Limit interventions to preserve fragile epithelial layers. Ensure that debridement is performed only when strictly necessary and in a controlled, gentle manner.	Soft wipes, gauze, atraumatic tools.	Wound care physicians, specialist nurses, and trained caregivers.
Refashion	Not typically applicable at this stage, as the focus shifts to maintaining healthy tissue integrity and promoting epithelialization.	Any intervention on wound edges should be non-traumatic and support the progression of healing.	Not required unless specialised care dictates otherwise.	Wound care physicians and nurses experienced in advanced wound healing phases.
Dress	Use primary dressings that promote and protect epithelialization, minimise trauma during removal, and prevent maceration of wound edges. Apply a secondary dressing that is free of potentially harmful components or adhesive edges, and offers both absorptive and retentive capacity under compression.	Key criteria for selecting primary and secondary dressings include, in order of importance: stimulation and protection of newly formed epithelial tissues, protection of wound edges and healthy skin from maceration, atraumatic removal, wound morphology, frequency of patient access for dressing changes, vertical absorptive and retentive capacity under compression, social context, patient hygiene status, availability of a valid caregivers, compression devices, and anatomical allocation and signs of inflammation.	Silicone or polyacrylate skin barrier sprays and creams, eudermic primary dressings, thin hydrocolloids and/or low-absorbency secondary dressings.	Wound care physicians, specialist nurses and caregivers trained in advanced dressing techniques.
Pain and bleeding management	Rarely required at this stage due to the use of atraumatic procedures. If needed, use local anaesthetics and haemostatic agents to manage any discomfort or minimal bleeding.	Maintain a gentle approach to avoid unnecessary interventions. Use anaesthetics or haemostatic measures sparingly to support healing without disruption.	Local anaesthetics (e.g., topical creams or sprays); limited use of alginates for haemostasis if necessary.	Physicians and nurses trained in advanced wound care techniques.

TABLE 9 | Recommendations for the patient's monitoring.

Recommendation	Details
Monitoring wound progress	Measure the wound's three dimensions (width, height, depth) at each visit or at least weekly. Assess wound contraction, reduction in inflammation signs, pain and exudate levels, as well as the morphology and activity of wound edges.
Indications for reassessment	Reassess the patient in case of wound stagnation, regression, edema recurrence, unstable clinical condition, new wounds or signs of systemic infection. Involve specialists or general practitioners as needed and consider therapy adjustments.
Biopsy considerations	Perform a biopsy if wounds regress, stagnate or in the presence of hypergranulation, pseudo-granulation or visible neoplasms.
Objective evaluation tools	Use standardised and validated tools such as the Wound Assessment Triangle, Bates-Jensen scale, digital methods and Wound Bed Preparation score to track wound evolution.
Indicators for treatment re-evaluation	Watch for increasing wound area, odour, exudate changes in terms of quantity or quality, signs of inflammation or infection, or unrelieved pain. Reevaluate the plan of care after 3 days of non-responsiveness to appropriate therapy.
Diagnostic and therapeutic re-evaluation	Conduct multidisciplinary assessments focusing on circulatory health, edema management, bacterial load, signs of infection and nutritional status, supported by photographic and clinical documentation.
Prevention of recurrence post-healing	Recommend continuous hygiene, skin hydration, graded compression therapy, therapeutic education, regular physical activity and a balanced diet. Schedule periodic follow-ups, including ultrasonography for monitoring venous and nutritional health.
Compression therapy recommendations	Use flat-knit compression stockings (K1: 15–21 mmHg; K2: 23–32 mmHg; K3: 34–46 mmHg) based on venous deficit severity and patient compliance. Adjustable non-elastic compression devices are also a valid option.
Follow-up frequency	Schedule regular follow-ups every 3 or at least 6 months based on patient adherence, specific clinical factors and socio-environmental conditions.

4 | Conclusion

The Wound Hygiene strategy offers a structured, multidisciplinary framework for the assessment, management and monitoring of patients with venous leg ulcers [2, 6]. Recommendations from the Scientific Board highlight the need to tailor care pathways to the unique characteristics of each clinical setting, while upholding core, universally applicable principles. Accurate assessment requires the involvement of a multidisciplinary team, precise identification of predominant clinical signs within the wound bed, and a thorough understanding of the patient's clinical status and social context.

During the management phase, the Wound Hygiene approach emphasises the importance of clearly defined professional roles, adequate resources and a collaborative decision-making process involving both healthcare providers and patients. Monitoring should be conducted consistently at each visit to ensure adequate follow-up, adherence to treatment protocols, and clear communication of therapeutic goals to patients and caregivers. A key component of wound monitoring is the objective measurement of the wound size, which serves as an early indicator of the healing trajectory. To ensure timely and actionable insights, standardised and accessible measurement methods are essential. Moreover, social and lifestyle factors play a pivotal role at

all stages of care and must be systematically incorporated into patient-centred treatment plans.

This document consolidates the most recent evidence-based practices into actionable recommendations designed to support healthcare professionals in delivering effective and sustainable care for venous leg ulcers.

At its core, the Wound Hygiene philosophy emphasises treating the patient as a whole, rather than focusing solely on the wound. Healing is understood as a collaborative process that requires addressing underlying etiologies, managing comorbidities and maintaining continuous, holistic monitoring. The Wound Hygiene model serves as a foundation for consistent, systematic and rigorous evaluation and management at every clinical encounter, fostering a culture of shared responsibility among care teams and the patient.

Structured care pathways—defined by both macro- and micro-objectives, from stabilisation and symptom control to complete wound closure—are crucial for sustaining patient trust and engagement. These pathways must be supported by competent personnel, appropriate technologies and shared objectives that align with the patient's individual needs and preferences. Ultimately, optimal wound care involves transitioning from

simply treatment administration to genuine patient care through collaborative practice, transparency and the active involvement of the patient in the healing process.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

References

1. G. D. Winter, "Formation of the Scab and the Rate of Epithelization of Superficial Wounds in the Skin of the Young Domestic Pig," *Nature* 193 (1962): 293–294.
2. T. Swanson, K. Ousey, E. Haesler, et al., "IWII Wound Infection in Clinical Practice Consensus Document: 2022 Update," *Journal of Wound Care* 31, no. 1 (2022): S10–S21, <https://doi.org/10.12968/jowc.2022.31>.
3. J. Hurlow and P. G. Bowler, "Acute and Chronic Wound Infections: Microbiological, Immunological, Clinical and Therapeutic Distinctions," *Journal of Wound Care* 31, no. 5 (2022): 436–445.
4. C. Murphy, L. Atkin, T. Swanson, et al., "Defying Hard-to-Heal Wounds With an Early Antibiofilm Intervention Strategy: Wound Hygiene," *Journal of Wound Care* 29, no. Sup3b (2020): S1–S26.
5. C. Murphy, L. Atkin, J. Hurlow, T. Swanson, and M. V. de Ceniga, "Wound Hygiene Survey: Awareness, Implementation, Barriers and Outcomes," *Journal of Wound Care* 30, no. 7 (2021): 582–590.
6. D. C. Granara, A. Baxa, C. Viaggi, et al., "Effetto Della Tecnica Wound Hygiene Sulla Contrazione Della Lesione: Esperienza Vulnologia ASL3 Regione Liguria," *Italian Journal of Wound Care* 7, no. 3 (2023): 105.
7. C. Murphy, B. Mrozikiewicz-Rakowska, I. Kuberka, et al., "Implementation of Wound Hygiene in Clinical Practice: Early Use of an Antibiofilm Strategy Promotes Positive Patient Outcomes," *Journal of Wound Care* 31, no. Suppl 1 (2022): S1–S32.
8. C. Murphy, L. Atkin, M. de Vega Ceniga, D. Weir, and T. Swanson, "International Consensus Document. Embedding Wound Hygiene Into a Proactive Wound Healing Strategy," *Journal of Wound Care* 31, no. Suppl 4a (2022): S1–S19.
9. A. Oropallo, A. S. Rao, C. Del Pin, M. Ranire-Maguire, and A. Mathew, "An Objective Comparative Study of Non-Surgical Cleansing Techniques and Cleanser Types in Bacterial Burden Management," *International Wound Journal* 21, no. 2 (2024): e14730.
10. S. L. Percival, "Importance of Biofilm Formation in Surgical Infection," *British Journal of Surgery* 104, no. 2 (2017): e85–e94.
11. T. Bjarnsholt, "The Role of Bacterial Biofilms in Chronic Infections," *APMIS* 121, no. s136 (2013): 1–58.

12. World Union of Wound Healing Societies (WUWHS), "Florence Congress, Position Document," Management of Biofilm. Wounds International 2016, <https://woundsinternational.com/wp-content/uploads/2023/02/bb521d75b67202a92f18078becfa5389.pdf>.
13. M. Maruccia, G. Papa, E. Ricci, and G. Giudice, eds., *Pearls and Pitfalls in Skin Ulcer Management* (Springer, 2023).
14. R. J. Snyder, G. Bohn, J. Hanft, et al., "Wound Biofilm: Current Perspectives and Strategies on Biofilm Disruption and Treatments," *Wounds* 29, no. 6 (2017): S1–S17.
15. G. Zhao, M. L. Usui, S. I. Lippman, et al., "Biofilms and Inflammation in Chronic Wounds," *Advances in Wound Care* 2, no. 7 (2013): 389–399.
16. N. E. McLain, Z. E. Moore, and P. Avsar, "Wound Cleansing for Treating Venous Leg Ulcers," *Cochrane Database of Systematic Reviews* 3, no. 3 (2021): CD011675.
17. R. Wolcott, "Economic Aspects of Biofilm Based Wound Care in Diabetic Foot Ulcers," *Journal of Wound Care* 24, no. 5 (2015): 189–194.
18. M. Dittmer, F. H. H. Brill, A. Kampe, et al., "Quantitative Insights and Visualization of Antimicrobial Tolerance in Mixed-Species Biofilms," *Biomedicine* 11, no. 10 (2023): 2640.
19. R. Torkington-Stokes, K. Moran, D. S. Martinez, D. C. Granara, and D. G. Metcalf, "Improving Outcomes for Patients With Hard-to-Heal Wounds Following Adoption of the Wound Hygiene Protocol: Real-World Evidence," *Journal of Wound Care* 33, no. 5 (2024): 304–310.

Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** iwj70835-sup-0001-Supinfo.docx.