

This decision support tool is intended primarily for front-line clinicians. It is provided for guidance only and does not replace the judgment of the clinician performing the activities reserved to him or her by law or regulation. This document has been designed on the basis of clinical recommendations developed by the INESSS using a systematic approach and supported by the scientific literature as well as by the knowledge and experience of clinicians from different specialties and areas of expertise. The content of this tool excludes newborns and young children. Tools to guide wound assessment and the determination of healing potential, as well as decision support on an optimal treatment plan based on wound etiology, vascular supply, and infectious risk, tissue type and exudate quality, are also provided, along with a reminder of dressing specifics. For further details, visit [inesss.qc.ca](http://inesss.qc.ca).

**PATHOPHYSIOLOGY**

- Chronic venous insufficiency increases venous pressure, leading to edema, inflammation, and tissue hypoxia, which limits the supply of nutrients to the skin. The ulcer may also occur in the presence of concomitant venous and lymphatic insufficiency.
- Shallow, irregular-edged, large, exudative appearance, with induration, stasis dermatitis, dry, scaly skin, edema, hemosiderin, and varicose veins.
- Characterized by pain on exertion, alleviated by elevation of the legs.
- May be concomitant with arterial insufficiency, a clinical situation called mixed ulceration and clarified by vascular evaluation.



⚠ According to current knowledge, venous ulcers are generally recurrent if untreated, and more often affect women.

**SUMMARY**

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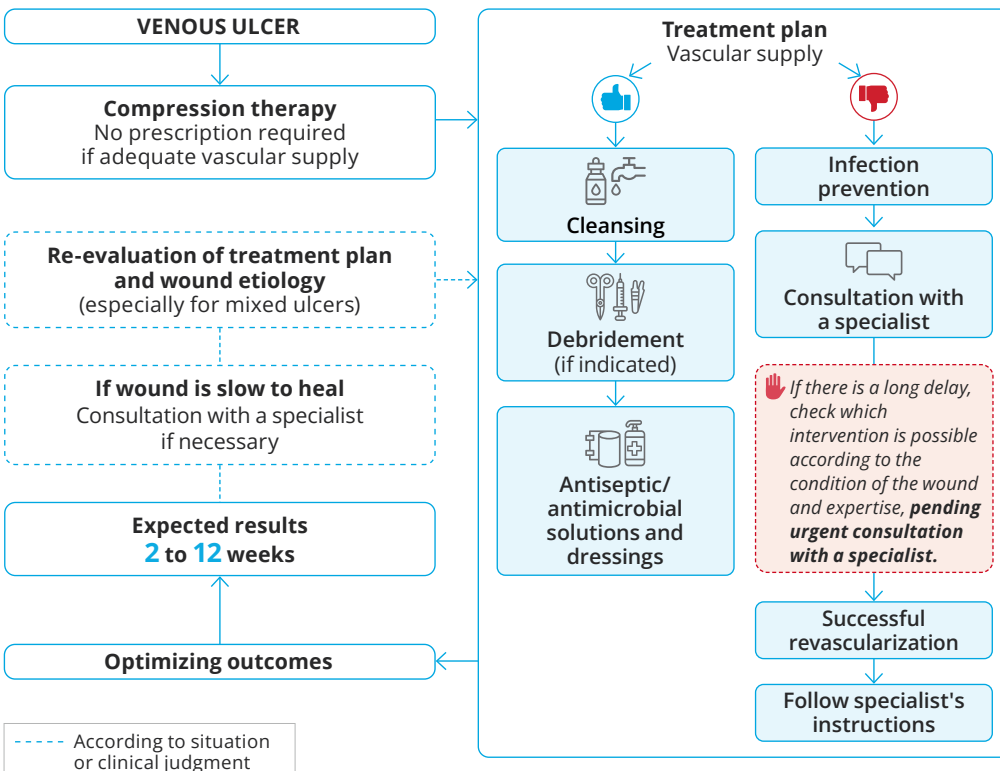
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**TREATMENT PRINCIPLES**




# CLINICAL EMERGENCY

- [Signs of sepsis](#)
- [Infected gangrene](#)
- [Necrotizing fasciitis](#)
- [Cellulitis/lymphangitis with warning signs](#)


→  **Refer to emergency**

# HOLISTIC ASSESSMENT OF THE INDIVIDUAL

 **Evaluate and, if necessary, control pain.**

1	Medical history	Expected location	Vascular status
	<ul style="list-style-type: none"> <li>Ask the individual or family members about the wound, lifestyle habits, and health.</li> <li>Verify relevant history of lab testing results to the etiology of the wound.</li> <li>Document the location of the wound.</li> </ul>	<ul style="list-style-type: none"> <li>Distal third of lower limb</li> </ul>  <ul style="list-style-type: none"> <li>Mainly on the medial malleolus, but can also be located on:                             <ul style="list-style-type: none"> <li>- lateral malleolus</li> <li>- dorsal of the foot</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li><b>1. General physical examination (initial assessment)</b> Suspect arterial insufficiency if:                             <ul style="list-style-type: none"> <li>- <b>cold</b> areas <b>pale</b> in colour when lying down, especially at leg elevation, and purple in color when seated;</li> <li>- <b>slow capillary return</b>;</li> <li>- <b>absence of pulse</b>.</li> </ul> </li> <li><b>2. Subsequent evaluation</b> if arterial insufficiency is suspected in step 1, complete <b>vascular assessment</b> with more than one measurement to detect peripheral atherosclerotic vascular disease (PAD).</li> <li><b>3. In-depth investigation</b> by a qualified professional or by a specialized service if abnormal or uncertain vascular supply.</li> </ol>

2 Causal and risk factors for venous ulcers			
Causal factor	<ul style="list-style-type: none"> <li>Venous insufficiency resulting from:                             <ul style="list-style-type: none"> <li>- post-phlebotic syndrome</li> <li>- valvular incompetence or insufficiency (great saphenous vein insufficiency)</li> <li>- calf pump deficiency</li> </ul> </li> </ul>		
Risk factors	<table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 50%;"> <ul style="list-style-type: none"> <li>Advanced age</li> <li>Family history of venous ulcer</li> <li>Reduced mobility, lack of exercise or paraplegia</li> <li>Malnutrition - obesity or insufficient weight</li> <li>History of varicose veins and phlebitis</li> <li>Prolonged standing or sitting posture</li> <li>Pregnancy and after multiple pregnancies</li> <li>Surgery on lower limbs</li> <li>Diabetes</li> </ul> </td> <td style="vertical-align: top; width: 50%;"> <ul style="list-style-type: none"> <li>Heart failure</li> <li>Smoking</li> <li>Coagulation disorder</li> <li>Liver disease</li> <li>Inflammatory disease (ulcerative colitis, lupus, Behçet's disease)</li> <li>Kidney disease, especially if terminal stage of renal failure</li> <li>Autoimmune disease</li> <li>Chemotherapy</li> <li>Vasopressor and vasoconstrictor</li> </ul> </td> </tr> </table>	<ul style="list-style-type: none"> <li>Advanced age</li> <li>Family history of venous ulcer</li> <li>Reduced mobility, lack of exercise or paraplegia</li> <li>Malnutrition - obesity or insufficient weight</li> <li>History of varicose veins and phlebitis</li> <li>Prolonged standing or sitting posture</li> <li>Pregnancy and after multiple pregnancies</li> <li>Surgery on lower limbs</li> <li>Diabetes</li> </ul>	<ul style="list-style-type: none"> <li>Heart failure</li> <li>Smoking</li> <li>Coagulation disorder</li> <li>Liver disease</li> <li>Inflammatory disease (ulcerative colitis, lupus, Behçet's disease)</li> <li>Kidney disease, especially if terminal stage of renal failure</li> <li>Autoimmune disease</li> <li>Chemotherapy</li> <li>Vasopressor and vasoconstrictor</li> </ul>
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 **Mixed ulcer** (arterial and venous origin) suspected if the ulcer is ischemic and the risk factors listed above are present. Consult a specialist or colleague experienced in the management of mixed ulcers.

3 Paraclinical examinations and laboratory analyses		
• Appreciation of <a href="#">nutritional status</a>	• Detection of <a href="#">neuropathy</a>	• Appreciation of indicators contributing to venous ulceration

# DETERMINATION OF WOUND HEALABILITY

→ Consult the [wound assessment and determination of wound healability decision support tool](#) to determine whether the wound is **curable**, **under maintenance**, or **incurable**.

## ASSESSMENT OF VASCULAR SUPPLY FOR A WOUND LOCALIZED ON A LIMB

- Wound healability is directly associated with the quality of vascular supply.
- A vascular evaluation should be performed in all individuals who present with a **wound on a lower or upper limb**.
- Symptoms and signs of peripheral atherosclerotic vascular disease (PAD) should be investigated before:
  - any form of debridement - e.g., autolytic, conservative sharp, enzymatic;
  - compression therapy.

*Further vascular evaluation may be required at the onset of a new wound if PAD is present.*

### Vascular assessment for a lower limb wound

#### Initial assessment

- Check for abnormal clinical signs - e.g., coldness, pallor, pain, slow capillary return.
- Palpation of dorsalis pedis **and** posterior tibial artery pulses.
- Auscultation of femoral sounds and inspection of legs and feet.

*When in doubt consult an experienced colleague or a specialist*

#### Subsequent assessment

- Ankle-brachial systolic pressure index (ABPI) at dorsalis pedis **and** posterior tibial artery in supine position.
- If necessary, toe brachial index or toe pressure.

#### In-depth investigation

- Clinical signs of inadequate or uncertain vascular supply - non-palpable or weak pulses, critical ABPI values - should be confirmed by arterial wave quality analysis with portable Doppler by an appropriately qualified professional, vascular laboratory, vascular surgeon, or other.

**!** ABPI is less accurate in some **diabetic individuals, chronic renal failure** or with **advanced age** or **cardiac arrhythmias** due to possible calcification of the arteries.

Vascular assessment by at least TWO methods to determine adequate vascular supply in a limb				
Vascular supply	Presence of palpable pulses	Ankle-brachial systolic pressure index (ABPI)	If available in the setting and if knowledgeable for interpretation of collected values	
			Toe brachial index (TBI)	Toe pressure (TP, mmHg)
Uncertain or inadequate  Suggests calcified vessels	No	ABPI > 1.4	If non-compressible arteries identified by ABPI are present, measurement of toe brachial index or toe pressure is recommended.	
Adequate Reduces the possibility of PAD	Yes	1.0 < ABPI ≤ 1.4	TBI > 0.7 <sup>2</sup>	TP ≥ 70
Uncertain/grey area <sup>1</sup> May suggest mild PAD	Weak	0.8 ≤ ABPI ≤ 1.0	0.6 < TBI ≤ 0.7	TP < 70
Inadequate  ABPI < 0.5 suggests significant to severe PAD	No	ABPI < 0.8	TBI ≤ 0.6	TP < 70
Critical limb ischemia	No	ABPI < 0.4	TBI ≤ 0.2	TP < 30


Adapted from AHA 2016, HSE 2018 and Wounds Canada (Beaumier *et al.* 2020)

Consultation with a specialist or experienced colleague

1. ABPI values between 0.91 and 0.99 correspond to a grey area that requires assessment of the clinical picture - e.g., modifiable, or non-modifiable risk factors.

2. A toe brachial index value of over 0.75 generally rules out PAD.

## WOUND PREPARATION PRIOR TO EVALUATION

 Evaluate and, if necessary, control pain.

### CLEANSING

- With aqueduct water (unless deep structures are exposed) or physiological solution (NaCl 0.9%).
- Applied in large quantities at room or body temperature. Consult the [techniques](#) used.
- ✔ **If vascular supply is inadequate or uncertain:** for dry necrosis, disinfection with povidone-iodine (10%) or alcohol-free chlorhexidine (2%); for moist necrosis, povidone-iodine (1%) or other antiseptic/ antimicrobial solution compatible with the dressing, if necessary and according to clinical judgment.

### DEBRIDEMENT

- |   |   |
|---|---|
| ✔ <b>Removal of dry or moist necrosis</b> , debris, foreign bodies or blood clots that prevent assessment of the wound using tweezers or a pressure stream of aqueduct water or physiological solution. | ✘ <b>If inadequate or uncertain vascular supply (e.g., weak, or absent pedal pulses).</b> |
|---|---|

## WOUND ASSESSMENT

→ [Wound assessment](#) should consider the following:

1	Appearance of wound and surrounding skin	Identification of tissue type and exudate type	Identify symptoms and signs of an infected wound or biofilm		
	<ul style="list-style-type: none"> <li>• Parameters such as size and depth are, ideally, quantified before, during and after treatment for accurate wound monitoring. Visible structures are also documented.</li> <li>• Pain, absent or intense, may indicate an urgent clinical condition linked to severe infection.</li> </ul>	<ul style="list-style-type: none"> <li>• Tissue type influences subsequent steps.</li> <li>• The type of exudate, together with other clinical symptoms and signs, or with other factors, helps to identify clinical conditions that are urgent (e.g., severe infection) or less urgent (e.g., presence of underlying disease).</li> </ul>	<ul style="list-style-type: none"> <li>• Clinical observations are generally <b>sufficient</b>, and wound culture is not recommended.</li> </ul> <p>Symptoms and signs of infection may be altered in the presence of venous insufficiency.</p> <table border="1"> <tr> <td> <b>Local infection</b> <ul style="list-style-type: none"> <li>• Can be fully managed by front-line health-care professionals.</li> </ul> </td> <td> <b>Deep-tissue infection</b> <ul style="list-style-type: none"> <li>☞ <b>Immediate</b> consultation with an experienced colleague, and if necessary, referral to an infectious disease microbiologist</li> </ul> </td> </tr> </table> <p><b>Clinical tool</b> for evaluating the severity of infection of an infected venous ulcer:</p> <ul style="list-style-type: none"> <li>• Scottish Ropper Scale</li> </ul>	<b>Local infection</b> <ul style="list-style-type: none"> <li>• Can be fully managed by front-line health-care professionals.</li> </ul>	<b>Deep-tissue infection</b> <ul style="list-style-type: none"> <li>☞ <b>Immediate</b> consultation with an experienced colleague, and if necessary, referral to an infectious disease microbiologist</li> </ul>
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2	Exposure of deep structures (e.g., tendons, nerves or bones)
	<p>☞ Consult a specialist department or experienced colleague about management specifics.</p> <ul style="list-style-type: none"> <li>• Keep exposed area wet, avoiding maceration.</li> </ul> <p>Venous ulcers are generally shallow. If deep structures are exposed, suspect a mixed ulcer (arterial insufficiency concomitant with venous ulcer) especially if pedal pulses are not palpable, a venous ulcer concomitant with a pressure ulcer, a deep infection or another more atypical etiology (e.g., vasculitis).</p>


### Factors to watch out for in osteomyelitis

- Risk factors for osteomyelitis:
  - local infection on a prominent bone infection
  - deep foot injury (e.g., fascia, tendon, muscle, cartilage, bone)
  - exposed bone
  - rough, soft or discoloured bone
- Explore the wound with a sterile metal stilet to exclude any bone contact. This also helps evaluate depth and the presence of underlying sinuses.

# USE OF COMPRESSION THERAPY

## FACTS TO REMEMBER

- **Compression therapy is the corner stone treatment for venous ulcers, promoting healing by correcting venous hypertension.**
- It is a **lifelong treatment** that prevents recurrence.
- **Before** considering compression therapy, evaluate [vascular supply](#) to rule out arterial complications.
- **Before** initiating or continuing compression therapy, **check for infection and stasis dermatitis**, and before each application, measure the circumference of the ankle and calf for the correct compression level.

Use of compression therapy according to vascular evaluation		
Vascular supply	Ankle-brachial systolic pressure index (ABPI)	Use of compression therapy according to ABPI values
Uncertain or inadequate Suggests mild PAD	ABPI > 1.4	Consult a vascular or diabetes specialist.
Adequate ABPI of 0.9 to 1.4 reduces possibility of PAD	1.0 < ABPI ≤ 1.4	Possible
Uncertain/grey area Suggests mild PAD	0,8 ≤ ABPI ≤ 1.0	Possible with caution. Prescription required if ABPI less than 0.9
Inadequate Suggests significant to severe PAD	ABPI < 0.8	After consulting a specialist, modified compression possible with caution if <b>IPSCB ≥ 0.5</b>  <b>ABPI values &lt; 0.5 make the use of compression impossible and require urgent consultation with a specialist.</b>

## COMPRESSION SYSTEMS

- Choose the system according to the individual's tolerance to the pressure produced and apply the highest tolerable compression gradient (compression over 40 mmHg, if tolerated, is rarely necessary).
- **Elastic systems:** exert compression both at rest and when walking and may be less well tolerated than inelastic compression systems. Preferred for people with limited mobility, paraplegics or bedridden.
- **Inelastic systems:** provide minimal compression at rest and greater when walking and are useful if pain limits the use of elastic compression. Preferred for active people.

Compression system choice according to therapy stage	
Decongestion stage (using temporary therapies to reduce edema)	Maintenance stage (by permanent therapies when edema is reduced)
<ul style="list-style-type: none"> <li>• Elastic systems - e.g., bandages, tubular stockings.</li> <li>• Inelastic systems - e.g., inelastic gauze bandages impregnated with zinc oxide.</li> <li>• Elastic and inelastic systems - e.g., mixed elastic and inelastic bandages.</li> </ul>	<ul style="list-style-type: none"> <li>• Elastic systems - e.g., custom-made stockings 20-30 mmHg.</li> <li>• Inelastic systems - Compression garment.</li> </ul>
<ul style="list-style-type: none"> <li>• The <b>intermittent pneumatic compression system</b>, mainly available in hospitals, is a possible choice if other compression systems cannot be used.</li> <li>• RAMQ reimbursement: inelastic gauze bandages impregnated with zinc oxide (e.g., Viscopaste) only. There is also a <i>Quebec assistance program for the purchase of compression garments for lymphedema</i>. Consult <a href="#">RAMQ/Compression garments for lymphedema</a>.</li> </ul>	

Information taken from consultations. For commercial examples, consult Table 5 of [wound care/2013.pdf](#).

## EXPECTED RESULTS ON EDEMA

- Reduction of edema within **2 weeks** with daily wearing of the compression system and as recommended by the manufacturer and the care team. If hyperkeratosis appears under compression bandages, bathe and gently wash leg with aqueduct water or saline solution.

## DETERMINE TREATMENT PLAN ACCORDING TO VASCULAR SUPPLY, INFECTIOUS RISK, TISSUE TYPE, AND EXUDATE AMOUNT



- Control pain as required
- Ensure adequate vascular supply **BEFORE** cleaning, debridement, and dressing application

→ The treatment plan steps by tissue type are described in the [optimal treatment plan decision support tool, based on wound etiology, vascular supply, infectious risk, tissue type, and exudate amount](#).

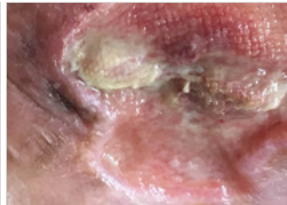
→ The information below complements the treatment plan specific to venous ulcers.

### TISSUE TYPE

Dry necrosis



Moist necrosis



Granulation tissue





Epithelial tissue



Macerated tissue




### CHOICE OF CLEANSING AND DEBRIDEMENT

 <p><b>Cleansing</b></p>	<ul style="list-style-type: none"> <li>• Aqueous water or physiological solution (NaCl 0.9%) in large quantities and at room or body temperature.</li> <li>✓ <b>If vascular supply is inadequate or uncertain:</b> for dry necrosis, disinfection with povidone-iodine (10%) or alcohol-free chlorhexidine (2%); and for moist necrosis, povidone-iodine (1%) or other antiseptic/antimicrobial solution compatible with the dressing, if necessary and according to clinical judgment.</li> <li>✓ Antiseptic/antimicrobial solution if local infection is present or to facilitate the debridement step (e.g., prontosan) if there is a suspicion of biofilm in the wound.</li> <li>⚠ <b>Beware of hypersensitivity of the surrounding skin.</b></li> </ul>
 <p><b>Debridement</b></p>	<ul style="list-style-type: none"> <li>✓ <b>Conservative sharp</b> for curable wounds and maintenance.</li> <li>✓ Autolytic and enzymatic to be considered if non-infected ulcer and small amount of necrosis present.</li> <li><i>Other debridements possible, depending on the individual and the wound. Consult <a href="#">debridement methods</a> for details.</i></li> <li>✗ Dry necrosis with inadequate or uncertain vascular supply (e.g., weak, or absent pedal pulses).</li> <li>⚠ After discussion with an experienced colleague or specialist team and evaluation of the risks and benefits, debride <b>non extensively the ischemic moist necrosis</b> according to the comfort and skill of the professional and apply an antimicrobial agent pending urgent consultation with a specialist.</li> <li>✗ Non-infected granulation tissue and epithelial tissue.</li> </ul>

### APPLICATION OF AN ANTISEPTIC/ANTIMICROBIAL SOLUTION

<p><b>Local infection or presence of biofilm</b></p>	<p><b>Therapeutic use</b></p> <ul style="list-style-type: none"> <li>• If local infection is confirmed or the presence of biofilm is clinically suspected.</li> </ul> <p><i>Consult <a href="#">antiseptic/antimicrobial solutions</a> for details.</i></p> <p><b>Prophylactic use</b></p> <ul style="list-style-type: none"> <li>• Not generally recommended except in one of the clinical situations that require it.</li> </ul> <p><i>Consult <a href="#">reasons</a> for prophylactic use of antiseptic/antimicrobial solutions.</i></p>
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## DRESSING CHOICE

 <p><b>Dressings</b></p>	<p><b>General</b></p> <ul style="list-style-type: none"> <li>Depending on the amount of <b>exudate</b>, from <b>light</b> ● to <b>heavy</b> ●●●.</li> <li>Prefer semi-occlusive dressings as proposed in the <a href="#">treatment plan</a> avoiding adherent secondary dressings, as the skin is generally fragile with this type of ulcer.</li> <li>If dry necrosis with inadequate or uncertain vascular supply: possibility of protecting the necrosis with a non-adherent dry dressing (e.g., cotton pad).</li> <li>If moist necrosis with inadequate or uncertain vascular supply: apply iodine cadexomer.</li> <li>Consider anatomical location to avoid pressure, friction, and shearing.</li> <li>Place chosen dressings under the <a href="#">compression system</a> if its use is considered.</li> </ul>
<p><b>Considerations</b></p>	<p><b>Local infection</b></p> <ul style="list-style-type: none"> <li><a href="#">Antimicrobial dressings</a></li> </ul> <ul style="list-style-type: none"> <li>Consider topical corticosteroids, zinc-impregnated bandages, or other dermatological preparations to treat varicose eczema.</li> <li>Consider a skin protector to <b>prevent maceration</b> of surrounding skin.</li> </ul>

## OPTIMIZING OUTCOMES

- ⚠ A venous ulcer may take a long time to heal, or, more importantly, it may recur if the underlying cause and risk factors are not controlled.
- In addition, it is important to evaluate other [possible underlying causes](#) of the signs and symptoms observed.

## CARE RELATED TO VENOUS ULCER TREATMENT

<p><a href="#">Compression therapy</a></p>	<p>Infection prevention</p>	<p>Revascularization if mixed ulcer</p>	<p>Exercise to activate calf pump</p>
<p>↑ Mobility</p>	<p>Smoking cessation</p>	<p>Optimization : <b>Nutrition</b> (important aspect)</p>	<p>Healthy weight</p>

## INFORMATION TO BE GIVEN TO THE INDIVIDUAL AND FAMILY

<p>Maintain good personal hygiene with mild, unscented soap, while protecting dry necrosis and exposed structures.</p>	
<p><b>Care</b></p> <ul style="list-style-type: none"> <li>Wear the compression system 24 hours a day when there is an active ulcer to heal.</li> <li>Once the ulcer has healed, wear the compression system on a daily basis (ideally before getting up in the morning to prevent swelling of the legs) at the highest tolerable force.</li> <li>Renew the compression system when it reaches the end of its service life.</li> </ul>	<ul style="list-style-type: none"> <li>Compression therapy is a lifelong therapy once the ulcer has healed, to prevent its recurrence.</li> <li>Raise legs above heart level for 30 minutes several times a day when compression therapy is discontinued.</li> <li>Avoid crossing your legs and standing or sitting for long periods.</li> <li>Practice the recommended exercises to stimulate the calf pump.</li> </ul>
<p><b>Hydratation</b></p> <ul style="list-style-type: none"> <li>Lubricate intact, dry surrounding skin with a neutral, fragrance-free, non-alkaline emollient.</li> </ul>	
<p><b>Frequent and regular inspection</b></p> <ul style="list-style-type: none"> <li>By a healthcare professional or</li> <li>By the person or their caregivers</li> </ul>	

## MONITORING AND FOLLOW-UP

! Evaluate and, if necessary, control pain.

### DRESSING CHANGE/FREQUENCY

Any dressing **more than 50%** soiled or detached should be changed, and the change frequency increased.

Non-infected wounds	<ul style="list-style-type: none"><li>Wear dressing according to manufacturer's maximum recommended duration or clinical judgment.</li></ul>
Infected wounds	<ul style="list-style-type: none"><li>Regular dressing changes, depending on wound properties, the individual's condition and, above all, the action mechanism of the dressing/antimicrobial product.</li></ul>

### WOUND MONITORING TECHNIQUES

- Clinical visual indicators with photographs taken if equipment available.**
- Calculated clinical indicators (wound area reduction):** a reduction of at least 40% in wound area after 4 weeks of optimal treatment is predictive of venous ulcer healing at 12 weeks.

*Symptoms and signs of local, deep soft-tissue or systemic infection are looked for in addition to taking photos or measuring wound-area reduction at follow-up.*

## CONSULTATION WITH SPECIALIST

### CLINICAL SITUATIONS REQUIRING CONSULTATION WITH A SPECIALIST

- Gangrene
- Severely infected ulcer
- Inadequate or uncertain vascular supply
- Exposure of bone or deep structure
- Uncontrollable pain
- No significant improvement after **4 to 12 weeks** despite appropriate treatment and clinical judgment
- Persistent infection despite appropriate treatment (a microbiologist-infectiologist may be consulted).

### INTERDISCIPLINARY TEAM

- The treatment plan implemented by the care team (nurses, physicians, occupational therapists, physiotherapists) could benefit from the intervention of other healthcare professionals depending on needs and availability of resources in the environment - e.g., venous compression specialist, dietician-nutritionist.

## MAIN REFERENCES

- References are presented in the INESSS [report](#) associated with this tool.



## APPENDIX I – POSSIBLE ASPECTS OF VENOUS INSUFFICIENCY

**Severe stasis dermatitis**



**Change in skin colour in the presence of venous insufficiency**

