

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.

PATHOPHYSIOLOGY

- A generally painful skin ulcer associated with underlying peripheral atherosclerotic vascular disease (PAD), which limits vascular supply to the skin. It can also be asymptomatic in the presence of neuropathy or atypical.
- Pain characteristics: continuous, intermittent, or nocturnal at rest (lying down or with legs elevated) or during exercise (claudication).
- Small, deep and punctiform, with regular, clean edges, wet necrosis, or black eschar, little or no exudate and granulation, loss of hair, deformed nails.
- A mummification effect of the wound by dry necrosis is severe arterial insufficiency.



⚠ *Based on current knowledge, arterial ulcers are more likely to affect people of advanced age.*

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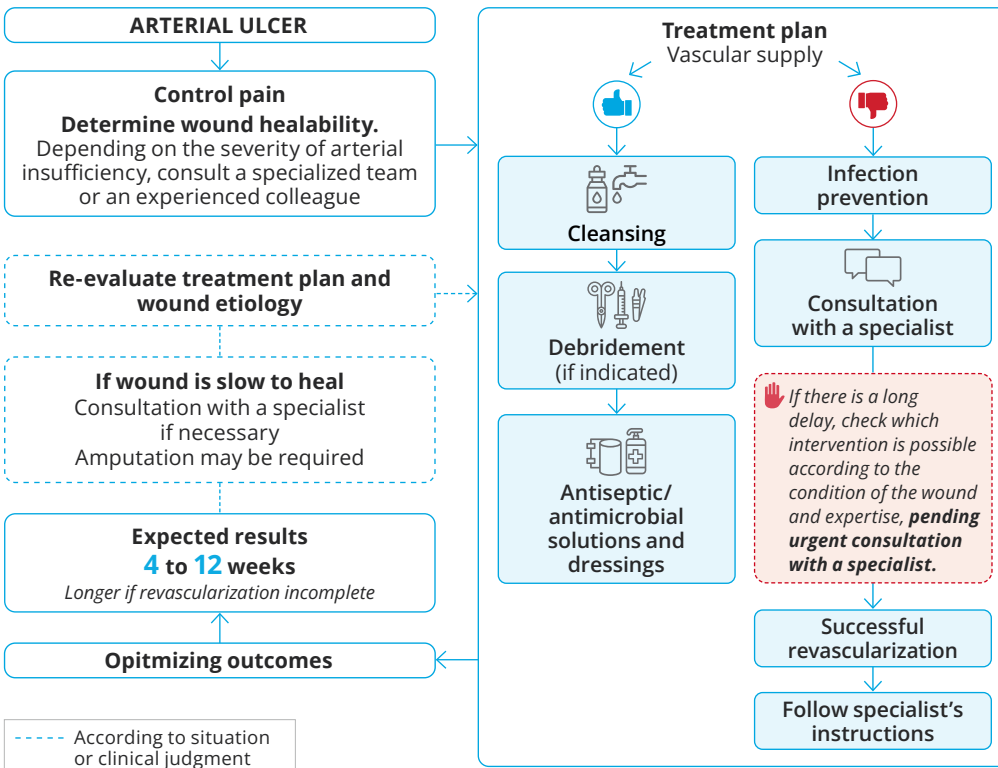
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TREATMENT PRINCIPLES



----- According to situation or clinical judgment

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"> • Ask the individual or family members about the wound, lifestyle habits, and health. • Verify relevant history of lab testing results to the etiology of the wound. • Document the location of the wound. 	<ul style="list-style-type: none"> • Between knee and toe • Especially <ul style="list-style-type: none"> - at the toes - at the heel - on bony prominences (malleoli) - on tibia • Rarely on upper limb 	<p>For this type of ulcer, abnormal or uncertain vascular supply is expected.</p> <ol style="list-style-type: none"> 1. General physical examination (initial assessment) Suspect arterial insufficiency if: <ul style="list-style-type: none"> - cold areas pale in colour when lying down, especially at leg elevation, and purple in colour when seated; - slow capillary return; - absence of pulse. 2. Subsequent assessment if arterial insufficiency suspected in step 1, complete vascular assessment with more than one measurement to detect peripheral atherosclerotic vascular disease (PAD). 3. In-depth investigation by a qualified professional or by a specialized service if abnormal or uncertain vascular contribution.
2	Causal and risk factors for pressure ulcers		
	Causal factor	<ul style="list-style-type: none"> • Arterial insufficiency due to arterial occlusion 	
	Risk factors	<ul style="list-style-type: none"> • Smoking • Diabetes • Hypertension • Dyslipidemia • Advanced age • History of arterial ulcer • Malnutrition – obesity or insufficient weight • Lack of exercise • Stress • Heart failure • Coagulation disorders • Chronic renal failure advanced/preterm/terminal 	
3	Paraclinical examinations and laboratory analyses		
	<ul style="list-style-type: none"> • Appreciation of nutritional status 	<ul style="list-style-type: none"> • Detection of neuropathy if diabetes 	<ul style="list-style-type: none"> • Vascular imaging • Appreciation of indicators contributing to arterial ulcer

DETERMINATION OF WOUND HEALABILITY

- If vascular supply is **inadequate** (ABPI < 0.8), healing potential is determined in collaboration with a qualified professional or specialized service.
- Consult the [Wound Assessment and Determination of Healing Potential Decision Support tool](#) to determine whether the wound is **curable**, **maintenance**, or **incurable**.

PAD CONTINUUM

- **Inadequate** vascular supply has three levels of severity: mild, moderate, or severe.
- As long as there is no critical limb ischemia (CLI), healing of the arterial ulcer may occur in each of the stages, with a longer delay than in the presence of an adequate vascular supply.

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;

Further vascular evaluation may be required at the onset of a new wound in the presence of PAD.

Vascular assessment for a wound on an upper limb

Assessment

- Check for abnormal clinical signs - e.g., coldness, pallor, pain, slow capillary return, Allen maneuver.
- Pulse palpation.

Vascular assessment for a wound on a lower limb

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 assessment

- 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 ²	TP ≥ 70
Uncertain/grey area ¹ 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.

! **Open arterial ulcers with moist necrosis** are at high risk of infection and complications as long as the vascular supply is inadequate.
Prior to any intervention, ensure that an appointment with a vascular specialist has been requested.

WOUND PREPARATION PRIOR TO EVALUATION

CLEANSING

Before revascularization	After effective revascularization ¹
<ul style="list-style-type: none"> ✔ Dry necrosis: Disinfection with povidone-iodine (10%) or alcohol-free chlorhexidine (2%) if necessary and according to clinical judgement. ✔ Moist necrosis: Disinfection with povidone-iodine (1%) or other antiseptic/antimicrobial solution compatible with the dressing, if necessary and according to clinical judgement. 	<ul style="list-style-type: none"> ✔ With physiological solution (NaCl 0.9%) at room or body temperature. <i>Consult techniques used</i>

DEBRIDEMENT

Before revascularization	After effective revascularization ¹
<ul style="list-style-type: none"> ✘ No debridement. Consult treatment plan for details. ⚠ Consult an experienced colleague or specialist if foul-smelling moist necrotic tissue requires debridement. 	<ul style="list-style-type: none"> ✔ Removal of dry or moist necrosis, debris, foreign bodies or blood clots that prevent wound assessment using tweezers or a water stream or physiological solution.

1. Supported by a medical report stating that the revascularization procedure was successful and effective.

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"> • Parameters such as size and depth are, ideally, quantified before, during and after treatment for accurate wound monitoring. Visible structures are also documented. • Pain, absent or intense, may indicate an urgent clinical condition linked to severe infection. 	<ul style="list-style-type: none"> • Tissue type influences subsequent steps. • 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). 	<ul style="list-style-type: none"> • Clinical observations are generally sufficient, and wound culture is not recommended. <i>Symptoms and signs of infection may be altered in the presence of arterial or venous vascular insufficiency.</i> <p>Local infection, deep soft-tissue infection</p> <ul style="list-style-type: none"> • Suspect arterial ulcer infection if highly exudative if maceration of surrounding skin or foul odour. 🗨 Immediate consultation with an experienced colleague, and if necessary, referral to an infectious disease microbiologist
	<ul style="list-style-type: none"> ⚠ Suspect mixed ulcer (venous with arterial component) if clinical signs of venous insufficiency. Consult a specialist or experienced colleague for management. 		Clinical tools for assessing the severity of infection of an infected arterial ulcer: <ul style="list-style-type: none"> • Wifi • Scottish Ropper Scale
2	Exposure of deep structures (e.g., tendons, nerves or bones)		
	<ul style="list-style-type: none"> 🗨 Consult a specialist department or experienced colleague about management specifics, including the appropriateness of initiating antibiotic prophylaxis if a bone is exposed. • Keep exposed area moist. 		

🖐️ Signs to look for regarding osteomyelitis

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

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

⚠️ Control pain as needed



- ➔ 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 quantity](#).
- ➔ The information below complements the treatment plan specific to the arterial ulcer.

TISSUE TYPE



- ⚠️ Pay attention to interventions not recommended in the [treatment plan](#) when vascular supply is compromised.
- The main objective is to **avoid infection while awaiting revascularization** of the ischemic region.

CHOICE OF CLEANSING AND DEBRIDEMENT


	Before revascularization	After effective revascularization ¹
 Cleansing	If not previously done before: <ul style="list-style-type: none"> ✓ Dry necrosis: Disinfection with povidone-iodine (10%) or alcohol-free chlorhexidine (2%) if necessary and according to clinical judgment. ✓ Moist necrosis: Disinfection with povidone-iodine (1%) or other antiseptic/ antimicrobial solution compatible with the dressing, if necessary and according to clinical judgment. 	<ul style="list-style-type: none"> • Large quantities of aqueduct water or physiological solution (NaCl 0.9%) at room or body temperature. • Antiseptic/antimicrobial solution if local infection, or to facilitate debridement (e.g., prontosan) if there is a suspicion of biofilm in the wound.
 Debridement	<ul style="list-style-type: none"> ✗ Dry necrosis. ⚠️ After discussion with an experienced colleague or specialist team AND risk/benefit evaluation, debride non extensively the ischemic moist necrosis according to the comfort and skill of the professional, and apply an iodine-based antimicrobial agent pending urgent consultation with a specialist. ✗ Non-infected granulation and epithelial tissue. ✗ Black heel necrosis. 	<ul style="list-style-type: none"> ✓ Conservative sharp preferred. ⚠️ Autolytic and enzymatic (collagenase) to be considered if minimal arterial supply after effective revascularization to hope for healing of a non-infected ulcer with a small amount of necrosis. <p><i>Consult debridement methods for details</i></p>

1. Supported by a medical report stating that the revascularization procedure was successful and effective.

APPLICATION OF AN ANTISEPTIC/ANTIMICROBIAL SOLUTION

	Before revascularization	After effective revascularization ¹
Local infection or presence of biofilm	Prophylactic use at all times If not done before: <ul style="list-style-type: none"> • Dry necrosis: povidone-iodine (10%) or alcohol-free chlorhexidine (2%). • Moist necrosis: povidone-iodine (1%) or other antiseptic/antimicrobial solution compatible with the dressing. If the wound is not curable, povidone-iodine (10%) can be used. 	Therapeutic use <ul style="list-style-type: none"> • if infection is confirmed or biofilm is clinically suspected in the wound. <i>Consult antiseptic/antimicrobial solutions for details.</i> Prophylactic use <ul style="list-style-type: none"> • Not generally recommended except in one of the clinical situations that require it. <i>Consult the antiseptic/antimicrobial solutions for prophylactic use reasons.</i>

DRESSING CHOICE

	Before revascularization	After effective revascularization ¹
 Dressings	While waiting for an urgent consultation with a specialist <ul style="list-style-type: none"> • Dry necrosis: if necessary, use a dry, non-adherent dressing (e.g., cotton pad) to protect the necrosis. • Moist necrosis or curable wound (with minimal arterial supply): iodine cadexomer and semi-occlusive non-adherent dressing. 	<ul style="list-style-type: none"> • Depending on the amount of exudate, from light to heavy. • Prefer semi-occlusive dressings as suggested in the treatment plan.
	Local infection <ul style="list-style-type: none"> • Antimicrobial dressings 	

1. Supported by a medical report stating that the revascularization procedure was successful and effective.

OPTIMIZING OUTCOMES

- ! An arterial ulcer may be slow to **heal or may recur** if the underlying cause and risk factors are not controlled.
- ! It is important to evaluate, in addition, other possible [underlying causes](#) of the signs and symptoms observed.

CARE RELATED TO ARTERIAL ULCER TREATMENT

Revascularization	Infection prevention	Smoking cessation	Control: <ul style="list-style-type: none"> • diabetes • dyslipidemia • hypertension
↑ Mobility	Optimization: <ul style="list-style-type: none"> • Nutrition (important aspect) • Healthy lifestyle • Social support 	↓ Cardiovascular risks	

INFORMATION TO BE GIVEN TO THE INDIVIDUAL AND FAMILY

Maintain good personal hygiene with a mild, unscented soap, while protecting dry necrosis and exposed structures.

Care

- Position legs below heart level.
- Regular physical activity.
- Good foot hygiene.
- Avoid walking barefoot, especially if neuropathy present.
- Wear appropriate footwear indoors and outdoors.

Hydration

- Lubricate intact, dry surrounding skin with an emollient, avoiding the area between the toes.

Frequent and regular inspection

- By a healthcare professional or
- By the individual or their caregivers

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

WOUND MONITORING TECHNIQUES

1. **Clinical visual indicators with photographs taken if equipment available.**
2. **Calculated clinical indicators (wound area reduction).**

Symptoms and signs of local, deep soft-tissue, or systemic infection should be investigated in addition to taking photographs 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, especially if chronic critical limb-threatening ischemia is present
- 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., vascular surgeon, podiatrist, dietician-nutritionist, specialist in comorbidity control.

MAIN REFERENCES

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