

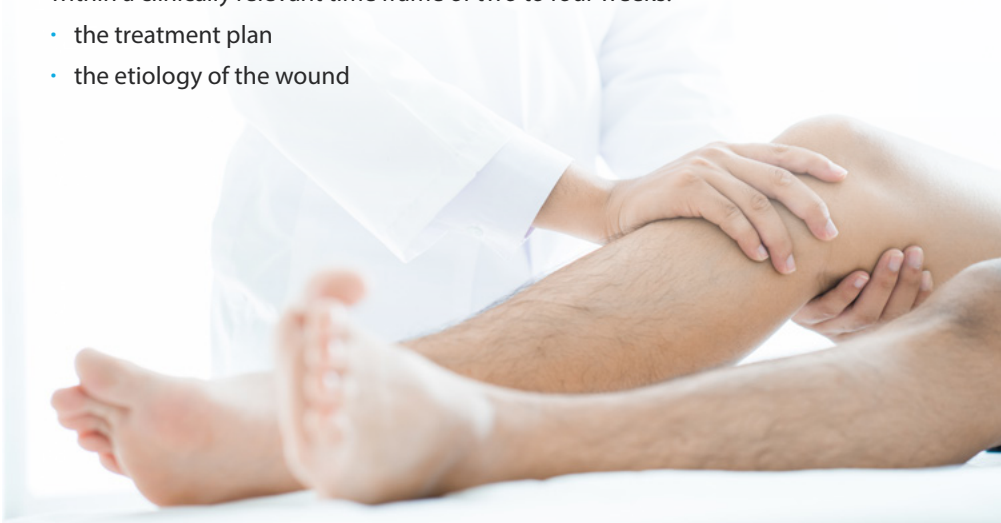
This clinical tool is intended for use by health care professionals. It is provided as a guide and does not replace the judgment of the clinician who carries out the activities reserved to him or her by law or by regulation. This document was designed on the basis of clinical recommendations developed by the INESSS using a systematic approach and supported by the scientific literature as well as by the knowledge and experience of Quebec clinicians and experts. The content of this tool excludes newborns and young children. A tool to guide decision-making on an [optimal treatment plan](#) based on the etiology of the wound, the risk of infection, the type of tissue and the amount of exudate, and a [dressing specifics reminder](#) are also provided. For more details, visit inesss.qc.ca.

BACKGROUND

- There are four successive phases of wound healing: hemostasis, inflammation, proliferation/re-epithelialization and maturation.
- All wounds have the potential to become more complex and chronic when the healing process is interrupted, especially when the cause cannot be avoided or controlled. When the healing process does not progress normally, it usually stagnates in the inflammatory phase.
- Contributing factors changing an acute wound into a chronic wound:
 - microbial critical mass
 - age - e.g., skin fragility, immobility, comorbidities, slowing of biological healing processes
 - hypoxia
- Wound assessment is initiated by engaging with the individual about the details of the wound in order to determine the etiology, causes and risk factors.
- The wound is then categorized as curable, in maintenance or non-healing, based on its healability.
- For a wound on a limb, particularly a lower limb, a vascular supply assessment is fundamental before management and any intervention.
- After these steps, the various aspects that characterize the wound are documented - e.g., dimensions, appearance, tissue type, amount of exudate and presence or absence of infection.
- The information gathered during the holistic assessment is used to develop a wound-specific treatment plan.
- When the wound is slow to heal despite optimal treatment, it is necessary to reassess within a clinically relevant time frame of two to four weeks:
 - the treatment plan
 - the etiology of the wound

SOMMAIRE

| | |
|--|----|
| Background | 1 |
| Decision-making algorithm .. | 2 |
| Individual Assessment | 3 |
| • History and location | 3 |
| • Vascular supply | 4 |
| • Causes and risks | 5 |
| • Etiology | 6 |
| • Healability | 7 |
| Wound Assessment | 8 |
| • Area and appearance | 8 |
| • Tissue and exudate | 9 |
| • Infection and biofilm | 11 |
| Follow-up | 12 |
| Consultation with specialist .. | 13 |
| Main references | 13 |
| Appendix | 14 |
| • Atypical wounds | 14 |
| • Laboratory tests | 16 |

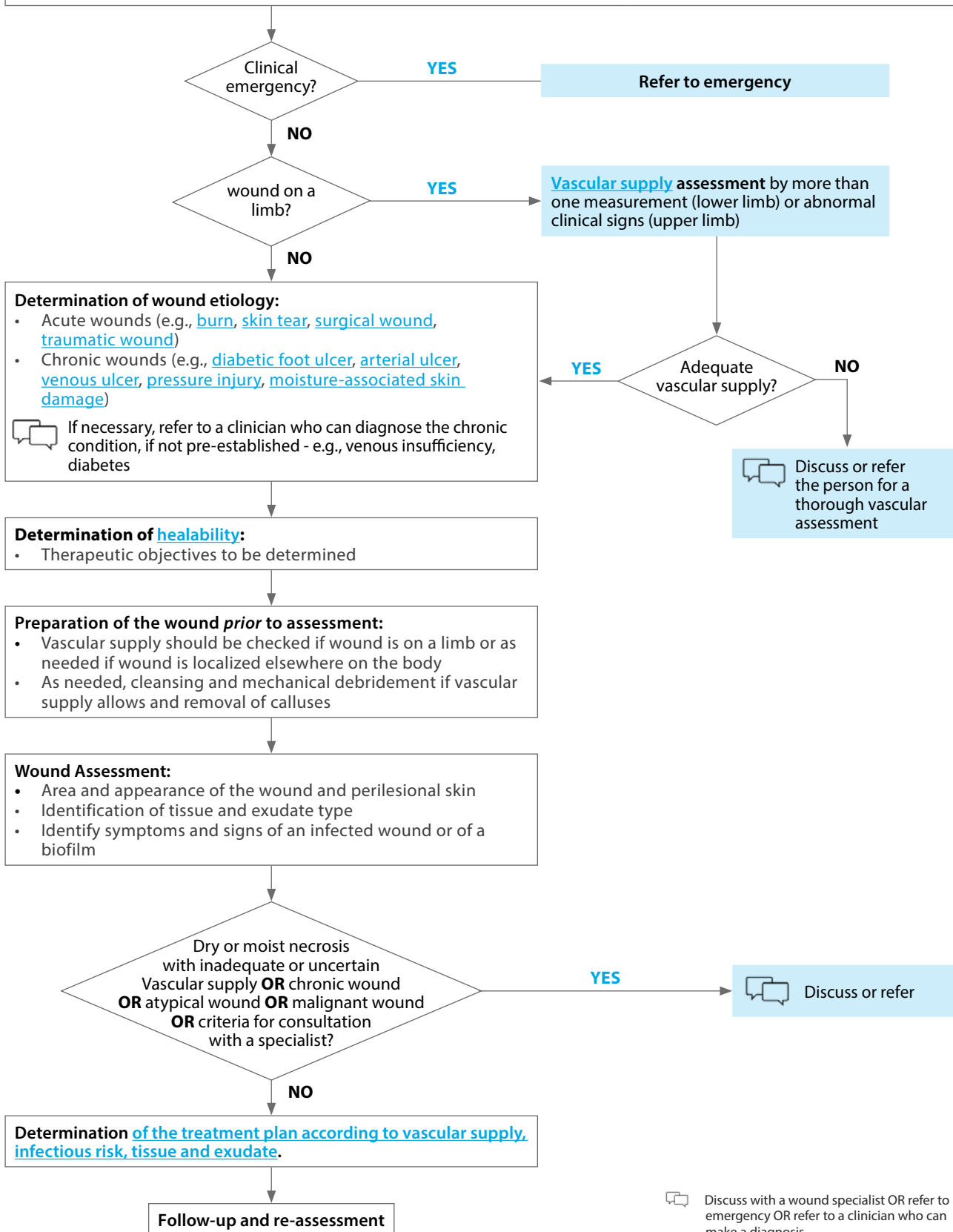



DECISION-MAKING ALGORITHM

Assessment of the individual presenting with a wound:

- Wound history and health history
- Location
- Identification of [risk factors and uncontrolled comorbidities](#)
- Pain

If necessary, stop the bleeding, check immunization status and complete the [Incident/Accident Report \(AH-223\)](#)



 Discuss with a wound specialist OR refer to emergency OR refer to a clinician who can make a diagnosis.

- BACKGROUND
- DECISION-MAKING ALGORITHM
- HISTORY AND LOCATION
- VASCULAR SUPPLY
- CAUSES AND RISKS
- ETIOLOGY
- HEALABILITY
- AREA AND APPEARANCE
- TISSUE AND EXUDATE
- INFECTION AND BIOFILM
- FOLLOW-UP
- CONSULTATION WITH SPECIALIST
- APPENDIX

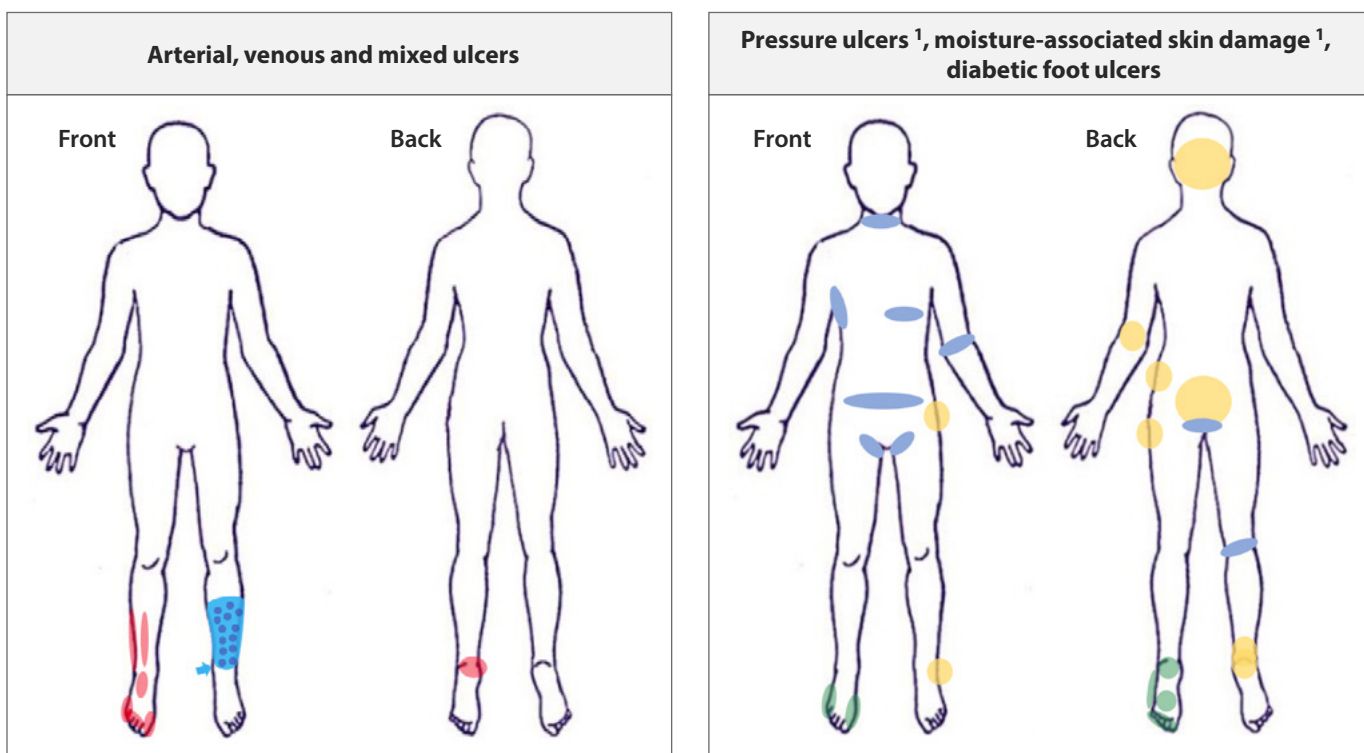
INDIVIDUAL ASSESSMENT

OBTAIN HISTORY BY QUESTIONING THE INDIVIDUAL:

- is it a sudden or gradual onset?
- is the onset:
 - secondary to trauma?
 - from a prolonged immobilization?
 - following lifestyle changes?
- Document the anatomical location of the wound.
For specifics on [acute wounds](#), refer to management tools.

Clinical indicators for typical chronic wounds

- Usually, wound location allows to differentiate between the chronic wounds.
- Some wounds may have a non-typical pattern and can be independent of their location. Below are the **expected** locations of various typical chronic wounds - **not exhaustive**.



Note: Ulcers and lesions can be located on both the right and left sides of the body.

1. Pressure lesions and moisture associated skin damage may be collocated.

Legend:

- Arterial ulcer
- Venous ulcer (especially medial malleolus)
- Mixed ulcer (often similar to venous ulcer)
- Moisture-associated skin damage
- Pressure ulcers
- Diabetic foot ulcer

Other matters to keep in mind when determining the etiology

- Wounds on the lower limbs: assess vascular supply.
- Acute and chronic wounds: identify causative factors, risk factors and uncontrolled comorbidities

To guide the examination of atypical chronic wounds, see [Appendix I](#).

BACKGROUND

DECISION-
MAKING
ALGORITHM

HISTORY AND
LOCATION

VASCULAR
SUPPLY

CAUSES
AND RISKS

ETIOLOGY

HEALABILITY

AREA AND
APPEARANCE

TISSUE AND
EXUDATE

INFECTION
AND BIOFILM

FOLLOW-UP

CONSULTATION
WITH
SPECIALIST

APPENDIX

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

- Wound healability is directly associated with the quality of vascular supply.
 - A vascular assessment 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;
 - compressive therapy.
- 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
- Pulses palpation.

VASCULAR ASSESSMENT FOR A WOUND ON A LOWER LIMB

First 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.

Second assessment

- Ankle-brachial systolic pressure index (ABPI) at the dorsalis pedis and posterior tibial artery in the supine position.
- If needed, 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 the portable Doppler by an appropriately qualified professional, vascular laboratory, vascular surgeon, or other.

When in doubt, consult an experienced colleague or specialist



*The ABPI is less accurate in some **individuals with diabetes, chronic renal failure, 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 in the interpretation of the values collected | |
| | | | 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 ABPI of 0.9 to 1.4 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 | Low | 0.8 ≤ ABPI ≤ 1.0 | 0.6 < TBI ≤ 0.7 | TP < 70 |
| Inadequate ABPI < 0.5 suggests significant to severe | No | ABPI < 0.8 | TBI ≤ 0.6 | TP < 70 |
| Limb-threatening chronic critical 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 an 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 more than 0.75 generally rules out PAD

CAUSAL FACTORS, RISK FACTORS AND UNCONTROLLED COMORBIDITIES ASSOCIATED WITH WOUND DEVELOPMENT OR DELAYED HEALING

→ Some risk factors, comorbidities, and treatments may:

- alter the skin;
- cause infections;
- increase wound discharge;
- slow down the inflammatory process necessary for healing.

→ Identification and control (if possible) of these factors is part of wound care management.

→ Laboratory investigation ([Appendix II](#)) to complement the individual's clinical assessment may be relevant in the presence of uncontrolled comorbidities or wounds with slow healing.

| Causal and Risk Factors | Specifications (non-exhaustive list) | |
|---|--|---|
| Medical conditions | <ul style="list-style-type: none"> • History of ulcers, amputations, fractures, and Charcot foot • Advanced age • Smoking • Uncontrolled comorbidities: <ul style="list-style-type: none"> - anemia - diabetes - hypertension - chronic venous insufficiency or venous thromboembolism - peripheral arterial disease - autoimmune or inflammatory disease - thyroid disorder | <ul style="list-style-type: none"> - atherosclerotic cardiovascular disease - liver disease - renal disease, especially if end-stage renal failure - chronic respiratory disease - skin disease or other skin conditions - obesity - immunosuppression caused by disease or treatment of disease - malnutrition and dehydration - other diseases and transplantation |
| Current and past treatments | <ul style="list-style-type: none"> • Anticoagulant or vitamin K antagonist • Antiplatelet agent, antithrombotic agent • Non-steroidal anti-inflammatory drug • Topical or systemic corticosteroid • Immunosuppressant | <ul style="list-style-type: none"> • Transplant therapy • Radiation • Chemotherapy • Hypolipidemic (e.g., statin) • Vasopressor and vasoconstrictor |
| Psychosocial and environmental aspects | <ul style="list-style-type: none"> • Anxiety, stress, aggressiveness, dementia, stress, personality disorder, depression • Reduced cognitive capacity • Inadequate hygiene and living conditions • Risk of falling | <ul style="list-style-type: none"> • Non adherence to treatment • Reduced mobility or lack of exercise, paraplegia • Inadequate social support - e.g., lack of a caregiver |
| Other factors | <ul style="list-style-type: none"> • Presence of foreign bodies in the wound • Mechanical stress and pressure • Allergens and irritants • Alcohol or drug use • Presence of calluses, foot deformity, inadequate footwear in the presence of a diabetic foot ulcer • Loss of sensory perception in the foot - e.g., pain, proprioception | <ul style="list-style-type: none"> • Prolonged contact with moisture sources - e.g., incontinence, perspiration or skin folds • Female gender in the case of atypical wounds and venous ulcers • Travel history • Sun exposure |

BACKGROUND

DECISION-
MAKING
ALGORITHM

HISTORY AND
LOCATION

VASCULAR
SUPPLY

CAUSES
AND RISKS

ETIOLOGY

HEALABILITY

AREA AND
APPEARANCE

TISSUE AND
EXUDATE

INFECTION
AND BIOFILM







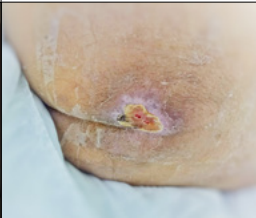

FOLLOW-UP

CONSULTATION
WITH
SPECIALIST

APPENDIX

DETERMINATION OF THE ETIOLOGY OF A TYPICAL CHRONIC WOUND

⚠ Misinterpretation of classic signs can lead to misdiagnosis if the individual's clinical condition is not examined in its entirety, including wound history, risk factors and comorbidities. Refer to the [Appendix I](#) for more information on atypical chronic wounds.

| NON-EXHAUSTIVE ETIOLOGICAL INDICES OF CHRONIC WOUNDS | | | | | |
|--|--|--|--|--|--|
| Arterial function | Palpable pedal pulses | | | | |
| | Absents | Presents | | | |
| Location |  <ul style="list-style-type: none"> Especially tibia, toe, heel and bony area |  <ul style="list-style-type: none"> Mostly medial malleolus and possibly lateral malleolus, dorsum of foot |  <ul style="list-style-type: none"> Especially lateral edges, deformed bony area | <ul style="list-style-type: none"> Area with pressure, friction, bony prominences, medical device | <ul style="list-style-type: none"> Skin folds Seat, upper thigh, lower back Other area in contact with source of moisture e.g. incontinence |
| Possible etiology | Arterial ulcer  | Venous ulcer  | Diabetic foot ulcer¹  | Pressure ulcer¹  | Moisture associated skin damage  |
| Appearance | <ul style="list-style-type: none"> Small, deep punctiform, well defined borders Moist necrosis or black eschar Little to no granulation Little to no exudate Loss of hair Deformed nails Possible: <ul style="list-style-type: none"> - exposed tendon or bone - gangrene in toes - edema | <ul style="list-style-type: none"> Large, shallow, irregular shape Moist necrosis or granulation Moderate to heavy exudate Stasis dermatitis, dry, scaly skin Varicose veins, edema, hemosiderin Induration of skin and underlying tissues | <ul style="list-style-type: none"> Presence of calluses Ulcer associated with diabetes and the following risk factors <ul style="list-style-type: none"> - Mixed neuropathy - Peripheral atherosclerotic vascular disease (PAD) - Foot deformity - e.g. Charcot foot | <ul style="list-style-type: none"> Distinct shape Variety of intact skin with non-blanching erythema to total skin loss Necrosis and soft tissue infection may be present Intact, indurated or inflamed periwound skin | <ul style="list-style-type: none"> Diffuse form With or without partial or total skin loss Erythema, dermatitis Irritated, red, and macerated periwound area Phlyctenes and swelling Satellite lesions if fungal infection |
| Pain | <ul style="list-style-type: none"> Severe at all times, increases with elevation of the legs | <ul style="list-style-type: none"> Pain or fatigue after exercise or at the end of the day, decreases with elevation of the legs | <ul style="list-style-type: none"> Loss of sensation Sometimes neuropathic pain without cause or stimulus | <ul style="list-style-type: none"> More or less painful depending on severity, sensation ranging from burning to pain | <ul style="list-style-type: none"> Burning, itching, and tingling Numbness |
| Others | <ul style="list-style-type: none"> Arterial insufficiency Fatigue or cramp after exercise | <ul style="list-style-type: none"> Chronic venous insufficiency Absence of PAD | <ul style="list-style-type: none"> High mechanical stress caused by unbalanced foot loading | <ul style="list-style-type: none"> Coexistence of pressure injury and moisture associated skin damage | |

1. Possible concomitant PAD with palpable pulses or concomitant PAD WITHOUT palpable pulses.

Mixed ulcer (25% of ulcers localized on the lower limbs):

- Observed on lateral or medial part of the leg, similar to venous ulcer and may extend around this area.
- Clinical characteristics of chronic venous insufficiency with a PAD component.

WOUND HEALABILITY

- Determining the healability helps define the therapeutic objectives of the wound.
- An individual with inadequate wound healing potential, i.e., a wound in maintenance or an unhealable wound, may require urgent **consultation** and prompt management by a wound specialist.

| HEALABILITY BASED ON INDIVIDUAL CHARACTERISTICS | | | |
|---|--|---|---|
| | Healable wound | Wound in maintenance | Non-healable wound |
| Healability | OUI | OUI | NON |
| | + ALL of the conditions below | + AT LEAST ONE of the conditions below | + AT LEAST ONE of the conditions below |
| Causal or risk factors | <ul style="list-style-type: none"> Identified and controlled | <ul style="list-style-type: none"> Modifiable but lack of adherence to treatment | <ul style="list-style-type: none"> Not modifiable - e.g. end of life Malignant wound |
| Comorbidities | <ul style="list-style-type: none"> Controlled | <ul style="list-style-type: none"> Not optimally controlled | <ul style="list-style-type: none"> Uncontrolled |
| Vascular supply | <ul style="list-style-type: none"> Adequate | <ul style="list-style-type: none"> Inadequate until revascularization Adequate with lack of adherence to treatment | <ul style="list-style-type: none"> Inadequate and without possibility of revascularization |
| Adherence to treatment | <ul style="list-style-type: none"> Yes | <ul style="list-style-type: none"> Inability or unwillingness to initiate treatment | <ul style="list-style-type: none"> Not applicable |
| Resources ¹ and treatment | <ul style="list-style-type: none"> Available | <ul style="list-style-type: none"> Little or no availability | <ul style="list-style-type: none"> Not applicable |
| Wound care objectives | <ul style="list-style-type: none"> Wound healing Maintain adequate moisture control <p>Specific to moisture associated skin damage:</p> <ul style="list-style-type: none"> Remove sources of irritation - e.g., perspiration, urine, or diarrhea | <ul style="list-style-type: none"> Prevent wound deterioration until wound becomes curable or is reassessed Maintain adequate moisture control Reduce bacterial load | <ul style="list-style-type: none"> Improve comfort and quality of life Reduce: <ul style="list-style-type: none"> moisture microbial load to prevent infection |

1. Access to family caregiver, medical caregiver, financial ability, or insurance coverage to purchase treatments.

DIMENSIONS AND APPEARANCE









→ Several assessment tools are available in institutions in addition to the [validated BWAT tool](#), which assigns a score to the observed parameters, making it easier to compare measurements during wound follow-up.

| | ASPECTS TO DOCUMENT | CHARACTERISTICS | |
|---------------------------------|---|--|---|
| Wound | Wound bed | <ul style="list-style-type: none"> Grooves, underlying spaces Bleeding Presence of foreign bodies | |
| | Edges | <ul style="list-style-type: none"> Detachment | |
| | Shape | <ul style="list-style-type: none"> Regular, irregular, round, oval, square, linear | |
| | Dimension (size and depth) | <ul style="list-style-type: none"> Anatomical axis: the length is measured from the head to the feet and the width is at right angles to the length. | <ul style="list-style-type: none"> Independent of anatomical axis: the length is the biggest measurement and the width is at right angles to the length. |
| | | <ul style="list-style-type: none"> For follow-up, calculate the area of the wound by multiplying the length by the width. | |
| | Location | <ul style="list-style-type: none"> Anatomical site | |
| Color | <ul style="list-style-type: none"> Red, yellow, black | | |
| Tissue | Quantity (%) and quality - e.g., friable granulation | <ul style="list-style-type: none"> Granulation, necrosis, epithelialization, hypergranulation, cavity Details of tissue type | |
| Exudate | Amount, color, viscosity and consistency | <ul style="list-style-type: none"> Serous - possible cardiac, venous or malnutrition problem Sanguineous - possible cardiac, venous, traumatic or malnutrition problem Serosanguineous - possible trauma Seropurulent, purulent or haemopurulent - infection highly possible Haemorrhagic | |
| perilesional skin | Integrity, appearance, color | <ul style="list-style-type: none"> Maceration, excoriation, erythema, scaling Edema, stasis dermatitis, induration of skin and underlying tissue, varicose veins. If present, suspect an ulcer of venous origin. Calluses | |
| Symptoms and signs of infection | Local warmth and inflammation | <ul style="list-style-type: none"> Not applicable | |
| | Malodor <i>Use an odor scale, especially during palliative care (e.g., TELER system)</i> | <ul style="list-style-type: none"> Absent, mild, moderate or strong | |
| | Pain <i>Use of an individualized pain scale - Present/absent and neuropathy assessment</i> | <ul style="list-style-type: none"> Present/absent and neuropathy assessment Severity Controllable or uncontrollable | |
| | | <ul style="list-style-type: none"> Details, symptoms and signs of an infected wound or biofilm | |

DETERMINATION OF THE TYPE OF TISSUE IN THE WOUND

→ It is important to identify, quantify, and document:





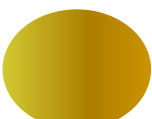


- the type of tissue, including exposure of tendons, ligaments, muscles, bones, fascia, or the presence of hematomas.
- condition, color, and friability of tissue in the wound bed.

| | TISSUE | CHARACTERISTICS ACCORDING TO THE TYPE OF TISSUE |
|-------------------|---|--|
| Dry necrosis |  | <ul style="list-style-type: none"> • Black or brownish color • Forms a physical barrier to the formation of new epidermis • Resulting from tissue death by ischemia |
| Moist necrosis |  | <ul style="list-style-type: none"> • Yellowish or whitish color • Filamentous texture, poorly adherent and contains white blood cells, bacteria, cellular debris and dead tissue |
| Malignant |  | <ul style="list-style-type: none"> • Cratering or overgrowth or both |
| Macerated tissue |  | <ul style="list-style-type: none"> • Whitish appearance and thickening of the skin due to moisture excess |
| Hyperkeratosis |  | <ul style="list-style-type: none"> • Thickening of the stratum corneum of the epidermis leading to callus formation in response to local pressure or repetitive trauma |
| Granulation |  | <ul style="list-style-type: none"> • Healthy: pale pink to bright red, moist, granular texture and rich in macrophages and fibroblasts • Unhealthy: reddish/purple color and friable |
| Hypergranulation |  | <ul style="list-style-type: none"> • Overgrowth of granulation tissue that extends beyond the level of the skin around the wound and delays epithelialization |
| Epithelial tissue |  | <ul style="list-style-type: none"> • Pinkish color, may be translucent or mistaken for macerated tissue • Often present at the wound periphery, but the wound may also have re-epithelialization islands |

Adapted from HSE 2018, NHS 2019, NSWOC 2021, Orsted *et al* 2017

DETERMINATION OF EXUDATE TYPE IN THE WOUND

- Determination of exudate type allows the assessment of the wound condition based on color, consistency, odor and quantity of exudate. It is done at dressing changes during assessment and follow-up.
- Control of exudate contributes to wound healing by promoting:
 - a moist environment;
 - the migration of reparative cells
 - the circulation of immune mediators and growth factors
 - the autolysis process of dead tissue.

| CHARACTERISTICS AND SIGNIFICANCE OF EXUDATE IN THE WOUND | | |
|---|---|--|
| EXUDATE | COLOR AND CONSISTENCY | SIGNIFICANCE |
| SEROUS  | <ul style="list-style-type: none"> • Light amber, or straw color, liquid and fluid consistency | <ul style="list-style-type: none"> • A normal healing process, unless the amount reaches a moderate to high level or increases, in which case there will be suspicion of infection. |
| SEROSANGUINOUS  | <ul style="list-style-type: none"> • Clear and pink in color and may turn pale red, fluid in consistency and slightly thicker than water | <ul style="list-style-type: none"> • Presence of red blood cells due to damage to blood capillaries - • e.g. dressing changes after surgery or trauma |
| SANGUINEOUS  | <ul style="list-style-type: none"> • Light reddish color, liquid and fluid consistency | <ul style="list-style-type: none"> • May be normal in small amounts - e.g. trauma to the wound bed or growth of blood vessels |
| SEROPURULENT  | <ul style="list-style-type: none"> • Creamy, yellow or bronze in color, viscous or sticky in consistency | <ul style="list-style-type: none"> • Possible infection, presence of liquefied necrosis, or substance from an enteric or urinary fistula |
| PURULENT  | <ul style="list-style-type: none"> • Opaque, milky, yellow, brown or bronze and sometimes green in color, often thick, viscous and sticky in consistency | <ul style="list-style-type: none"> • Possible bacterial infection, mainly composed of pus - neutrophils, inflammatory cells and bacteria. It could include wet or liquefied necrosis or the presence of substances from an enteric or urinary fistula |
| HAEMOPURULENT  | <ul style="list-style-type: none"> • Reddish, milky and opaque, viscous or thick consistency | <ul style="list-style-type: none"> • Presence of possible infection with blood and pus, which may include neutrophils and dying bacteria |
| HAEMORRAGIC  | <ul style="list-style-type: none"> • Red in color, may be dark or opaque, viscous or thick | <ul style="list-style-type: none"> • Possible bacterial infection or damage to vessels in affected tissues or organs affected |

Taken and adapted from HSE 2018, WUWHS 2019 and Orsted *et al* 2017

IDENTIFYING SYMPTOMS AND SIGNS OF AN INFECTED WOUND OR BIOFILM

→ Wound infection is established by clinical observations and does not usually require laboratory testing ([Appendix II](#)). Laboratory testing could be used to assess the condition if symptoms and signs of deep soft tissue or systemic infection are present.



The following situations should be assessed in the emergency department:

- **Signs of sepsis** - systemic impairment of the condition (persistent fever, impaired consciousness, hypotension and abdominal pain, nausea, vomiting)
- **Infected gangrene** especially if arterial insufficiency – purulent and cloudy discharge, moist necrosis, foul odour, significant pain, cellulitis in non necrotic tissues, fever, chills, decrease in general condition.
- **Necrotizing fasciitis** - red, hot, swollen tissue reminiscent of severe cellulitis, severe pain out of proportion to clinical signs, and a stabbing sensation in the wound
- **Cellulitis/lymphangitis** with warning signs (refer to the clinical tool specific to [cellulitis](#))

Local Infection

→ Neuropathy, PAD, or immunosuppression may mask symptoms or signs of local wound infection.

⚠ The presence of two or more clinical signs AND a delay in the normal progression of healing or wound deterioration usually indicates infection.

| | Wound | Tissue | Other symptoms and signs |
|--|---|--|---|
| | <ul style="list-style-type: none"> • Change in wound bed color • Increased or changed exudate • Foul odor present or changed • Tunnels and underlying spaces • Increased size • Wound reopening | <ul style="list-style-type: none"> • Excoriation - e.g., white flaking in moisture associated skin damage • Hypergranulation • Dry or moist necrosis • Granulation that is friable or bleeds easily to the touch | <ul style="list-style-type: none"> • Local warmth • Redness, increased inflammation, excessive swelling • Pain or tenderness present, increased or changed • Induration |

Deep soft tissue and systemic infection

→ In some cases, investigation of deep soft tissue infection is undertaken by a physician or specialized nurse practitioner, especially if osteomyelitis is suspected¹, pending management by a infectious microbiologist specialist.

| | Wound | Individual | Laboratory tests and additional examinations |
|--|--|--|--|
| | <ul style="list-style-type: none"> • Aggravation of the wound • Crepitus • Erythema/cellulitis • Induration • Satellite lesions | <ul style="list-style-type: none"> • Septic shock • Confusion or delirium • Sepsis • Fever • Inflamed lymph nodes or lymphangitis • Malaise, lethargy, or general deterioration of condition • Loss of appetite | <ul style="list-style-type: none"> • Severe or worsening hyperglycemia, electrolyte abnormalities, acidosis, emerging or worsening azotemia • Elevated level of: <ul style="list-style-type: none"> - C-reactive protein - lactate • Abnormal white blood cell count |

1. **Osteomyelitis** is suspected if:

- local infection on a prominent bone;
- deep injury to the foot - e.g., fascia, tendon, muscle, cartilage, bone
- presence of exposed bone
- the bone is rough, soft or changes color;
- failure of appropriate treatment of a Stage 4 pressure ulcer;
- recurrent wound with deep orthopedic device.

CLINICAL FEATURES FOR WOUND FOLLOW-UP

| CHARACTERISTICS | | SIGNS OF IMPROVEMENT | SIGNS OF DETERIORATION |
|--------------------|---|---|--|
| Wound | Size and Depth | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Increase |
| | Edges | <ul style="list-style-type: none"> Attached | <ul style="list-style-type: none"> Underlying spaces Maceration With hyperkeratosis |
| | Color | <ul style="list-style-type: none"> Decreased redness | <ul style="list-style-type: none"> Redness or non-blanching brownish-violet color of the wound |
| Tissue | Granulation (quantity, quality) | <ul style="list-style-type: none"> Increase, raspberry red | <ul style="list-style-type: none"> Decrease Friable Bleeding |
| | Devitalized | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Increase |
| Exudate | Color, viscosity, consistency | <ul style="list-style-type: none"> Decrease Lightened | <ul style="list-style-type: none"> Increase Color changed from clear to opaque Thickening from liquid to viscous Purulent |
| | Quantity - frequency of dressing change | <ul style="list-style-type: none"> Reduction | <ul style="list-style-type: none"> Increase |
| Peri wound skin | Maceration ¹ , excoriation, erythema or edema of perilesional area | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Increase |
| Symptoms and signs | Local warmth and inflammation | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Increase, appearance |
| | Foul odor | <ul style="list-style-type: none"> Disappearance, alleviation | <ul style="list-style-type: none"> Increase, appearance |
| | Pain | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Increase, appearance, disappearance² |
| | Other signs of infection | <ul style="list-style-type: none"> Decrease | <ul style="list-style-type: none"> Induration Appearance of tunnels and underlying spaces Any other signs of local, deep soft tissue or systemic infection <p>Wounds associated to moisture:</p> <ul style="list-style-type: none"> Presence of phlyctenes or satellite lesions, severe inflammation and denudation of the epidermis |

1. Epithelialization may be mistaken for macerated tissue.
 2. The disappearance of pain may indicate a complication.

BACKGROUND

DECISION-
MAKING
ALGORITHM

HISTORY AND
LOCATION

VASCULAR
SUPPLY

CAUSES
AND RISKS

ETIOLOGY

HEALABILITY

AREA AND
APPEARANCE

TISSUE AND
EXUDATE

INFECTION
AND BIOFILM

FOLLOW-UP

CONSULTATION
WITH
SPECIALIST

APPENDIX

CONSULTATION WITH SPECIALIST

→ When wound management is beyond the scope of the health care professional's expertise, he or she is strongly advised to consult a specialist or discuss with an experienced colleague.

Refer promptly to emergency services

- Signs of bacteremia or general health impairment
- Infected gangrene
- Necrotizing fasciitis
- Cellulitis/lymphangitis
- Suspected acute ischemia with or without motor or sensory deficit of the upper or lower limb
- Severe infection
- Full thickness burn - third- and fourth-degree burns
- Traumatic laceration and wound, if deemed necessary
- Infected wounds that require a method or choice of antibiotherapy that is unavailable
- Wounds that require assessment by another professional
- If the individual's condition is deteriorating AND the individual cannot be seen by their family physician or primary care nurse practitioner

Refer to a health care professional who can make a diagnosis if not previously established (non-exhaustive list)

- To confirm:
 - Arterial insufficiency
 - Venous insufficiency
 - Diabetes
- **Before** managing:
 - Persistent edema
 - Suspected or confirmed new malignant wound - e.g., asymmetry or irregular border, heterogeneous color or ≥ 2 colors, increased size
 - Severe wound infection depending on the individual's condition
 - Suspected Charcot's foot
 - Vasculitis
 - Failure of medical treatment

Refer the person for a thorough assessment of their vascular condition by a qualified professional, to a vascular laboratory, vascular surgeon, or other specialist

- No palpable pulse
- Abnormal ABPI

Refer to the appropriate surgeon or an experienced colleague




- Infected surgical wound
- Dehiscent surgical wound

MAIN REFERENCES

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








CLINICAL PRESENTATION OF ATYPICAL WOUNDS (non-exhaustive list and examples)

→ Corresponds to 20% of chronic wounds. Recurrences are usually observed over the years.

| WOUNDS | PRESENTATIONS | INDICATORS |
|------------------------------------|---|---|
| Pyoderma gangrenosum | <ul style="list-style-type: none"> Severe pain  | <ul style="list-style-type: none"> Lower limbs and peristomal skin Blue/red-purple edges Affected wound edges, pustules Lack of response to antibiotics Pathergy <p>Risk factors:</p> <ul style="list-style-type: none"> Inflammatory bowel disease, rheumatoid arthritis, blood cancer, sarcoidosis |
| Vasculitides | <ul style="list-style-type: none"> Pain <p>See figures 4-7 in the following article: Isoherranen K, O'Brien JJ, Barker J, Dissemond J, Hafner J, Jemec GBE, <i>et al.</i> European wound management association document: Atypical wounds. Best clinical practice and challenges. J Wound Care 2019;28(Sup6):S1-S92.</p> | <ul style="list-style-type: none"> Palpable purpura, racemosa livedo, subcutaneous nodules Necrosis and purplish-blue borders Lower limbs with multifocal lesions Pathergy <p>Risk factors:</p> <ul style="list-style-type: none"> Rheumatoid arthritis, connective tissue disease |
| Occlusive vasculopathy |  <p>Embolisms Coagulopathy</p> <p>Intravascular thrombosis</p> | <ul style="list-style-type: none"> Retiform purpura with purplish lesions Often associated with cerebrovascular, renal or visceral involvement Purple toe syndrome <p>Risk factors:</p> <ul style="list-style-type: none"> Multiple and varied such as cardiovascular disease, history of thrombosis, pathological immobilization, or others |
| Martorell HYTILU and calciphylaxis | <ul style="list-style-type: none"> Severe pain  <p>Martorell HYTILU (M)</p> <p>Calciphylaxis</p> | <ul style="list-style-type: none"> In the lower laterodorsal part of the leg, thigh, abdominal apron, breasts, upper arm Purplish wound with necrosis (M) resistant to glucocorticoids and other immunosuppressive treatments (C) Gangrene of fingers, toes or penis <p>Risk factors:</p> <ul style="list-style-type: none"> Vitamin K antagonist (M) hypertension, obesity, type 2 diabetes (C) renal insufficiency, hyperparathyroidism |

Taken and adapted from the specific document on atypical wounds published by EWMA 2019

APPENDIX I (CONTINUED)

| WOUND | PRESENTATIONS | INDICATORS |
|--|--|--|
| Hidradenitis suppurativa | <ul style="list-style-type: none"> Severe case of hidradenitis suppurativa: painful, uncomfortable and disfiguring lesions <p>See Figure 23 in the following article: Isoherranen K, O'Brien JJ, Barker J, Dissemond J, Hafner J, Jemec GBE, <i>et al.</i> European wound management association document: Atypical wounds. Best clinical practice and challenges. J Wound Care 2019;28(Sup6):S1-S92.</p> | <ul style="list-style-type: none"> Peri-genital and underarm lesions Inflammation or not of nodules, abscesses, fluid draining <p>Risk factors:</p> <ul style="list-style-type: none"> Smoking Difficult healing |
| Malignant wounds | <ul style="list-style-type: none"> Unpleasant odor Increased pain Bleeding <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">Carcinomas Melanomas</p> | <ul style="list-style-type: none"> Hypergranulation with atypical pigmentation Atypical location Irregular shape Enlargement of the wound and hypertrophic edges Bloody wound <p>Risk factors:</p> <ul style="list-style-type: none"> Advanced age, immunosuppression, long persistence |
| Artefactual wounds (secondary traumatic wounds) | <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">Abdominal Facial</p> | <ul style="list-style-type: none"> Self-injury Face, chest and extremities Geometric and demarcated ulcers, regular shape Automutilation <p>Risk factors:</p> <ul style="list-style-type: none"> Personality disorders Related to periods of stress |
| Ecthyma and ecthyma gangrenosum | <div style="display: flex; justify-content: center; margin-bottom: 10px;">  </div> <p style="text-align: center;">Abdominal</p> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">Ecthyma gangrenosum</p> | <ul style="list-style-type: none"> Vesicles or pustules with grey-yellow exudate Multiple lesions Ulcers with dry necrosis bordered by erythema Black necrosis for Ecthyma gangrenosum <p>Risk factors:</p> <ul style="list-style-type: none"> Ecthyma: <ul style="list-style-type: none"> Biting, hygiene, malnutrition, travel Ecthyma gangrenosum: <ul style="list-style-type: none"> Immunodeficiency |

Taken and adapted from the specific document on atypical wounds published by EWMA 2019

BACKGROUND

DECISION-
MAKING
ALGORITHM

HISTORY AND
LOCATION

VASCULAR
SUPPLY

CAUSES
AND RISKS

ETIOLOGY

HEALABILITY

AREA AND
APPEARANCE

TISSUE AND
EXUDATE

INFECTION
AND BIOFILM

FOLLOW-UP

CONSULTATION
WITH
SPECIALIST

APPENDIX

APPENDIX II

LABORATORY AND PARACLINICAL TESTS

→ It is important to check laboratory tests that have already been done before ordering new ones

| NUTRITIONAL STATUS ASSESSMENT | |
|-------------------------------|--|
| Why | <ul style="list-style-type: none"> Nutritional state, including hydration, is related to skin integrity such as structure and function as well as the individual's ability to heal. |
| When | <ul style="list-style-type: none"> A chronic or acute wound during the initial clinical assessment and follow-up. |
| How | <ul style="list-style-type: none"> By a trained professional using standardized questionnaires such as the subjective global nutritional assessment [SGNA] |

| IDENTIFICATION OF FACTORS CONTRIBUTING TO DELAYED RECOVERY | | | |
|--|---|--|---|
| Why | <ul style="list-style-type: none"> Uncontrolled co-morbidities can impede healing and promote the development of a wound complication. | | |
| When | <ul style="list-style-type: none"> A chronic wound with a palpable pulse that shows no signs of improvement despite optimal treatment. | | |
| How | <ul style="list-style-type: none"> According to recommended standard practice for each of the comorbidities. | | |
| Results Interpretation Examples | Delayed healing <ul style="list-style-type: none"> Prealbumin or serum albumin levels below 30 g/L Hemoglobin levels below 100 g/L | Very difficult or untreatable wound <ul style="list-style-type: none"> Hemoglobin levels below 70-80 g/L | Non healable wound <ul style="list-style-type: none"> Prealbumin or serum albumin levels below 20 g/L |

| INFECTION | | | |
|--|---|--|---|
| Why | Skin infection: <ul style="list-style-type: none"> Delays healing and can progress to more severe infection, such as necrotizing fasciitis, deep soft tissue gangrene, systemic involvement, and bacteremia that can lead to death; May exacerbate peripheral arterial insufficiency. | | |
| When | <table border="0"> <tr> <td> Local Infection <ul style="list-style-type: none"> If symptoms and signs of local infection are present to guide systemic antibiotherapy if such treatment is being considered For the Methicillin-Resistant Staphylococcus aureus (MRSA) Screening Program </td> <td> Deep soft tissue infection and systemic infection <ul style="list-style-type: none"> If an infected open wound is present If there are symptoms and signs of a deep soft tissue infection or systemic infection </td> </tr> </table> | Local Infection <ul style="list-style-type: none"> If symptoms and signs of local infection are present to guide systemic antibiotherapy if such treatment is being considered For the Methicillin-Resistant Staphylococcus aureus (MRSA) Screening Program | Deep soft tissue infection and systemic infection <ul style="list-style-type: none"> If an infected open wound is present If there are symptoms and signs of a deep soft tissue infection or systemic infection |
| Local Infection <ul style="list-style-type: none"> If symptoms and signs of local infection are present to guide systemic antibiotherapy if such treatment is being considered For the Methicillin-Resistant Staphylococcus aureus (MRSA) Screening Program | Deep soft tissue infection and systemic infection <ul style="list-style-type: none"> If an infected open wound is present If there are symptoms and signs of a deep soft tissue infection or systemic infection | | |
| How | <table border="0"> <tr> <td> Local Infection <ul style="list-style-type: none"> Wound culture or biopsy may be considered based on clinical judgment to identify the pathogen. Refer to the Decision tool - Wound Culture: Appropriateness and Indications as needed. <p>A wound culture should not be prescribed to confirm an infection. The results obtained may not be representative of the organisms present in the wound.</p> </td> <td> If deep soft tissue or systemic infection is suspected <ul style="list-style-type: none"> Biochemical tests to measure blood glucose profile, electrolytes, C-reactive protein, acidosis, urea lactate, white blood cells and sedimentation rate <p>If osteomyelitis (open wound) is suspected</p> <ul style="list-style-type: none"> Bone contact with a sterile probe X-ray radiography Biochemical tests Magnetic resonance imaging if available or Bone scan </td> </tr> </table> | Local Infection <ul style="list-style-type: none"> Wound culture or biopsy may be considered based on clinical judgment to identify the pathogen. Refer to the Decision tool - Wound Culture: Appropriateness and Indications as needed. <p>A wound culture should not be prescribed to confirm an infection. The results obtained may not be representative of the organisms present in the wound.</p> | If deep soft tissue or systemic infection is suspected <ul style="list-style-type: none"> Biochemical tests to measure blood glucose profile, electrolytes, C-reactive protein, acidosis, urea lactate, white blood cells and sedimentation rate <p>If osteomyelitis (open wound) is suspected</p> <ul style="list-style-type: none"> Bone contact with a sterile probe X-ray radiography Biochemical tests Magnetic resonance imaging if available or Bone scan |
| Local Infection <ul style="list-style-type: none"> Wound culture or biopsy may be considered based on clinical judgment to identify the pathogen. Refer to the Decision tool - Wound Culture: Appropriateness and Indications as needed. <p>A wound culture should not be prescribed to confirm an infection. The results obtained may not be representative of the organisms present in the wound.</p> | If deep soft tissue or systemic infection is suspected <ul style="list-style-type: none"> Biochemical tests to measure blood glucose profile, electrolytes, C-reactive protein, acidosis, urea lactate, white blood cells and sedimentation rate <p>If osteomyelitis (open wound) is suspected</p> <ul style="list-style-type: none"> Bone contact with a sterile probe X-ray radiography Biochemical tests Magnetic resonance imaging if available or Bone scan | | |

OTHER TESTS ON THE NEXT PAGE

APPENDIX II (CONTINUED)

| NEUROPATHY ASSESSMENT | |
|-----------------------|---|
| Why | Neuropathy contributes to: <ul style="list-style-type: none"> Wound development Wound aggravation and may mask symptoms and signs of infection |
| When | <ul style="list-style-type: none"> When a diabetic foot ulcer is present Arterial ulcer Neurological impairment - e.g. multiple sclerosis, paresthesia |
| How | <ul style="list-style-type: none"> With a Semmes-Weinstein 10-g monofilament With a 128 Hz tuning fork. |

| VASCULAR FUNCTION | |
|-------------------|---|
| Why | Arterial function <ul style="list-style-type: none"> To confirm the presence of a detected PAD To assess the severity of the PAD To establish an appropriate care plan in the presence of a confirmed PAD |
| When | <ul style="list-style-type: none"> While waiting for a consultation with a specialist or experienced colleague if: <ul style="list-style-type: none"> Abnormal ABPI no palpable pulse When the wound shows no signs of improvement within the expected timeframe despite treatment When revascularization is considered |
| How | Vascular Imaging of Arterial Function <ul style="list-style-type: none"> According to standard vascular laboratory practice |
| Contraindication | <ul style="list-style-type: none"> Venous function imaging is not indicated for the diagnosis of venous insufficiency |

| OTHER TESTS FOR SPECIFIC CLINICAL SITUATIONS | |
|--|--|
| Why | <ul style="list-style-type: none"> To confirm the presence of a skin lesion associated with moisture To examine wounds that do not heal within the expected time frame Identify atypical malignant wounds, Martorell/HYTILU, calciphylaxis, Pyoderma gangrenosum and vasculitides |
| When | <ul style="list-style-type: none"> After consultation with an experienced colleague Presence of clinical manifestations suggestive of a problematic condition |
| How | <ul style="list-style-type: none"> Pathological examination (biopsy) |

BACKGROUND

DECISION-
MAKING
ALGORITHM

HISTORY AND
LOCATION

VASCULAR
SUPPLY

CAUSES
AND RISKS

ETIOLOGY

HEALABILITY

AREA AND
APPEARANCE

TISSUE AND
EXUDATE

INFECTION
AND BIOFILM

FOLLOW-UP

CONSULTATION
WITH
SPECIALIST

APPENDIX