

## Nonhealing Wounds, Part 2: Treatment in the Urgent Care Center

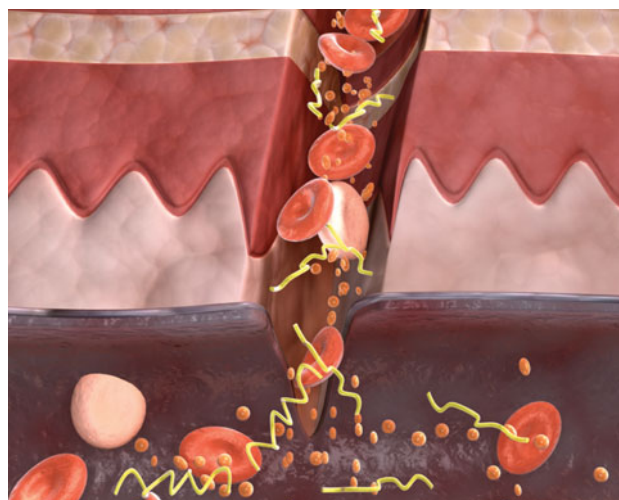
**Urgent message:** The etiology of nonhealing wounds is often multifactorial, with the likelihood of healing enhanced if all considerations are addressed, including evaluation and management of the blood supply in patients with peripheral arterial disease or diabetes mellitus, as well as local wound care.

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### Introduction

The diagnosis of a nonhealing wound is largely clinical, with diagnostic studies tailored to the suspected cause as well as to the underlying process. Part 1 of this article [see “Nonhealing Wounds, Part 1: Diagnosis in the Urgent Care Center,” at <http://www.jucm.com/nonhealing-wounds-part-1-diagnosis-urgent-care-center/>] discussed making the diagnosis. In this second part, the focus is on wound treatment, with specific case scenarios demonstrating treatment principles.

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### Treatment and Disposition

Whereas the diagnosis of a nonhealing wound may not be difficult, addressing the underlying problem may take some effort. Certain principles apply to management of all wounds, no matter the underlying etiology.

- Most patients with nonhealing wounds can be discharged and treated on an outpatient basis. Clinical instability, systemic illness, osteomyelitis, and an inability of the patient to provide self-care are indications for transfer to an acute-care setting.
- Actively debriding nonhealing wounds is best left for specialty care.<sup>1</sup>
- An exaggerated cutaneous inflammatory response is often confused with cellulitis. Current prescribing guidelines recommend that antibacterial preparations be used only in cases of clinical infection, not for bacterial colonization.<sup>2</sup>
- Wound cultures should be obtained if topical or systemic antibiotics will be initiated.<sup>3</sup>
- Topical antibiotics are first-line treatment.
- Cadexomer iodine is the best evidence-supported topical antibiotic preparation.<sup>2</sup>
- Neosporin ointment (bacitracin-neomycin-polymyxin) has a high tendency to cause a healing-inhibitive inflammatory response, so alternatives should be chosen.<sup>4</sup>
- Topical steroid cream may reduce itching and irritation if there is surrounding eczema or stasis dermatitis.
- Empiric antibiotics have not been shown to improve wound healing and should be initiated only for systemic signs and symptoms or cellulitis.<sup>2</sup>
- Empiric antibiotics for outpatient treatment of mild foot infections include clindamycin, levofloxacin, trimethoprim-sulfamethoxazole, and amoxicillin-clavulanic acid and should be chosen on the basis of your local antibiogram.
- Empiric antibiotics for inpatient care include imipenem, piperacillin-tazobactam, and broad-spectrum cephalosporins. Vancomycin should also be considered, to cover resistant gram-positive organisms such as methicillin-resistant *Staphylococcus aureus*.
- Pain control can be attained with topical analgesics, stocking compression, or systemic nonsteroidal anti-inflammatory drugs, gabapentin, or opioids.<sup>5</sup>
- Some evidence suggests that ibuprofen dressings may offer pain relief from painful venous leg ulcers, thus avoiding use of systemic analgesics.<sup>5</sup>
- Bleeding can usually be managed with direct pressure. Patients who have bleeding after debridement may have had graft material of some type placed in the ulcer, and such materials should be left in place.
- Instruct the patient to keep the area warm and protected from injury with thick socks, an extra layer of clothing, or padding over an ulcer.
- Compression increases wound healing rates compared with no compression and is the mainstay of pain management for venous insufficiency wounds.<sup>6</sup>
- Patients occasionally cannot tolerate the thigh-high compression stockings and may roll them down for comfort. They should be informed that doing so may create a tourniquet effect and may be unsafe.<sup>7</sup>
- Patients should be informed that failure to use appropriate footwear, adjuncts, and precautions will not allow for wound healing.
- Working with multidisciplinary wound-care teams significantly improves wound healing.<sup>8</sup>
- Long-term management requires lifestyle modification, optimization of comorbidities, weight loss, tobacco cessation, improved nutrition, and frequent debridement.<sup>1,9,10</sup>
- Wounds that manifest a chronic hypoxic state may be candidates for hyperbaric oxygen therapy (HBOT). HBOT exposes the patient to 100% oxygen delivered at pressures greater than 1 atmosphere. This allows for a huge amount of oxygen to be dissolved in the tissues. Oxygen dissolved in plasma reaches significantly farther into ischemic tissue than that delivered by hemoglobin. The hyperoxygenated state induces wound healing by stimulating the formation of new capillaries in chronic ischemic wound beds. This in turn enhances long-term oxygen delivery and converts a chronically ischemic wound to a well-oxygenated one. HBOT also enhances the antimicrobial effect of antibiotics and can accelerate healing in chronically infected wounds. HBOT is indicated in some chronic wounds in which local tissue hypoxia has been clearly demonstrated and in which good wound care and optimization of other factors such as glucose control, off-loading, and appropriate debridement have failed to heal the chronic wound.

## Specific Wounds

### Arterial

Arterial insufficiency, also known as peripheral arterial disease, results from a decrease in blood flow, typically to the lower extremities, and increases the risk of trauma and pressure injury and may result in tissue necrosis.

### Risk Factors

Risk factors include older age, diabetes, tobacco use, hypertension, cardiovascular disease, sickle cell disease, vasculitides, renal failure, and previous vascular surgery.

### Characteristics

Patients with arterial insufficiency may have the following characteristics:

- Thin and shiny skin, pale skin, an absence of hair growth, and thickened and/or brittle nails
- Dependent rubor, a purplish-red discoloration caused by the retention of deoxygenated blood in dilated skin capillaries; may mimic cellulitis
- Pain in the affected area secondary to ischemia, which can be divided into three categories in order of worsening severity:
  - Intermittent claudication
  - Nocturnal pain
  - Rest pain

### Nonhealing Wounds

The following are common characteristics of nonhealing wounds from arterial insufficiency:

- The wounds are often small and have a punched-out appearance.
- The wound bed is typically pale pink with minimal drainage (unless infection is present). In severe cases, the wound may appear brown or black from tissue necrosis.
- The wounds are often painful, though the pain may be from arterial insufficiency to the extremity and not from the wound itself.

### Urgent Treatment

Any sign of cellulitis, abscess, gangrene, or deep ulceration in an arterial ulcer indicates a serious condition. Because of limited blood flow, these patients' bodies do not always have the ability to mount a normal inflammatory response, so such wounds can worsen rapidly. Transfer to an acute-care center is indicated for any such finding.

### Definitive Management

Definitive management of arterial ulcers consists of the following measures:

- Protecting the wound from further damage and providing pain relief in the absence of infection or rapid deterioration
- Keeping the area warm and protected from injury. Advising the patient to use simple methods such as wearing thick socks may be a good starting point. External heating is not advised, because of the risk of burn injuries.
- Providing padding over the ulcer with nonadherent wound dressings (e.g., extra layers of gauze),

although securing padding with compressive dressings is contraindicated

- Additional off-loading with a wound-healing shoe or wheelchair
- Avoidance of elevation and constriction, because these will worsen symptoms and hasten progression of the wound
- Wound specialty follow-up, which is critical; these patients will often undergo advanced testing and vascular consultation

### Venous

Chronic venous insufficiency stems from venous valve dysfunction. These one-way valves become incompetent and allow for bidirectional flow of blood. The resulting increased venous pressure leads to capillary leakage, edema, and ulceration. An estimated 85% of chronic skin ulcers in the lower extremities are due to this process.<sup>7</sup>

### Risk Factors

The following are some of the risk factors for chronic venous insufficiency wounds:

- Varicose veins
- Previous surgery or trauma of the lower extremities
- A sedentary lifestyle
- Obesity
- Pregnancy
- Previous deep vein thrombosis
- Weakness or paralysis of the lower extremities

### Characteristics

Patients with venous insufficiency may have the following characteristics:

- Edema, typically uniform on both legs
- Varicose veins (dilated, enlarged, palpable, and often bluish in color)
- Hemosiderin staining (reddish-gray or brown discoloration of the skin, most commonly on the anterior portion of the lower leg), caused by the breakdown of red blood cells that have leaked into the interstitial spaces; this may be confused with cellulitis
- Pain in the dependent position that is relieved with elevation or compression
- Hardening of the soft tissue of the lower extremities. In a process called *lipodermatosclerosis*, the skin may take on a woody texture, and the lower legs may resemble an inverted bottle. This is a sign of very advanced disease.

*“Most patients with nonhealing wounds can be discharged and treated on an outpatient basis.*

*Clinical instability, systemic illness, osteomyelitis, and an inability of the patient to provide self-care are indications for transfer to an acute-care setting.”*

#### *Nonhealing Wounds*

The following are common in nonhealing wounds caused by venous insufficiency:

- A shallow, large, and irregular shape
- A red, edematous, warm lesion that precedes the ulcer
- Location in the pretibial and ankle regions
- A wound bed that is red with copious drainage that can be easily confused with the drainage of cellulitis; in venous insufficiency, the drainage will respond to compression

#### *Urgent Treatment*

In urgent care, treatment of wounds caused by venous insufficiency should include the following elements:

- Assessment for infection and deep vein thrombosis, as with all nonhealing wounds
- Compression, elevation, ambulation, and absorptive dressings to reduce pain and drainage and improve function. Compression should not be initiated for patients with abnormal ankle-brachial indexes (ABIs).<sup>7</sup>
- Reviewing with patients the proper use of compression stockings; they must be informed that rolling down a thigh-high stocking because of discomfort may create a tourniquet effect<sup>7</sup>

#### *Definitive Management*

Definitive management of wounds caused by venous insufficiency includes the following measures:

- Daily use of graduated compression stockings and frequent debridement. These have been shown to improve outcomes, but it is best to refer patients with such ulcers to wound-care specialists.<sup>1,6,11</sup>
- Ibuprofen dressings, which may offer pain relief to patients with painful venous leg ulcers and may prevent the need for systemic analgesia<sup>5</sup>
- Standard non-adherent dressings or alginate dressings; they perform equally as well<sup>11</sup>

#### *Pressure*

Pressure ulcers, also known as decubitus ulcers, are the end product of sustained pressure that exceeds the pressure at the capillary beds and leads to tissue ischemia. Because of the resulting increased oxygen

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requirements, muscle undergoes greater tissue destruction from prolonged pressure. Therefore, a small area of pressure on the skin often conceals a deeper area of damage beneath.<sup>7</sup>

#### *Risk Factors*

Risk factors for pressure ulcers include the following:

- Advanced age
- Poor nutrition
- Altered sensation
- Limited mobility
- Altered mental status
- Bowel or bladder incontinence
- Inadequate nursing care

#### *Characteristics*

In examining pressure wounds, keep this information in mind:

- Weight-bearing surfaces and areas of bony protrusion are at highest risk, and ulcers occur over bony prominences and weight-bearing areas:
  - Sacrum
  - Ischial tuberosities
  - Greater trochanter
  - Heel
  - Elbow
  - Knee
  - Ankle
  - Occiput
- Erythema over a bony prominence that blanches is not considered a pressure ulcer, but it may be an early indication of increased risk.
- Wounds range from nonblanching, discolored skin to deep craters extending to the bone and are categorized most commonly into four stages:
  - I: nonblanching erythema of intact skin
  - II: necrosis, superficial or partial-thickness, involving the epidermis and/or dermis
  - III: deep necrosis with crateriform ulceration and full-thickness skin loss extending to, but not through, fascia
  - IV: full-thickness necrosis with involvement of supporting structures such as muscle and bone

#### *Nonhealing Wounds*

Wound characteristics vary greatly depending on the depth or stage of the wound. Progression is as follows:

- Nonblanching erythema
- Well-demarcated crateriform ulcer
- Full-thickness necrosis with indeterminate borders

#### *Urgent Treatment*

In the urgent care setting, note the following regarding pressure ulcers:

- Because these wounds occur over bony prominences, there is an increased risk for osteomyelitis.
- Fever, increased pain, purulent drainage, progressing erythema, and foul odor all suggest infection, and the presence of any of these is an indication for transfer of the patient to an acute-care setting.
- Stage I and II ulcers without signs of acute infection may be treated with topical antibiotics or moist sterile gauze, pressure reduction, and close follow-up.
- Stage III and IV ulcers typically require surgical debridement and skin grafts, and patients with them should be referred accordingly.

#### *Definitive Management*

Definitive management of pressure ulcers includes the following:

- Off-loading or limiting pressure over the area around the ulcer
- Reduction of skin friction and shear forces
- Minimization of skin exposure to excessive moisture from incontinence, perspiration, or wound drainage
- Evaluation of and correction of nutritional status; consider prescribing increased intake of vitamin C and zinc.
- Mobilization of patients as soon as possible
- Keeping wounds clean, well debrided, moisturized, possibly dressed with occlusive dressings, and free of active infection<sup>7</sup>

#### *Diabetic and Neuropathic*

In diabetic and neuropathic wounds, atherosclerotic changes of the microvasculature leads to decreased oxygen delivery, nerve damage, and atrophy, resulting in sensory and motor deficits and, ultimately, structural changes in the feet. Autonomic dysfunction decreases secretions, creating dry skin prone to cracking, fissuring, and callusing. Finally, ulceration arises from repetitive pressure, shearing, and friction over the deformities on the dorsal and distal surfaces of the toes and the plantar surface of the feet.<sup>3</sup> Trauma is a common precipitant, possibly caused by something as minor as improperly fitted shoes.

#### *Risk Factors*

Risk factors for diabetic and neuropathic wounds include the following:

- Chronic diabetes

- Human immunodeficiency virus
- Neurologic or neuromuscular diseases
- Spinal cord injuries
- Arthritis
- Prior foot ulcers
- Amputations
- Peripheral neuropathy
- Foot deformities
- Visual impairment
- Tobacco use

### Characteristics

Patients with diabetic and neuropathic wounds exhibit the following characteristics:

- Thin, dry skin with loss of hair on the feet and legs and decreased capillary refill
- Pronounced metatarsal heads with loss of the normal amount of fat, clawing of the toes, flattening of the feet, and callus formation over the prominent regions of the feet
- Numbness and tingling in the feet, with loss of sensation in a stocking distribution
- Repeated fracture of the bones of the midfoot in chronic cases, causing complete collapse, termed *Charcot foot*; a foot with this condition is prone to ulceration

### Nonhealing Wounds

The following is usually true of nonhealing diabetic and neuropathic wounds:

- Wounds commonly occur in weight-bearing areas, such as the heel, plantar metatarsal head areas, and the tips of the most prominent toes.
- Wounds are secondary to repetitive stress and may tunnel deep into the tissue.
- Callus formation around the wound is common.

### Urgent Treatment

In the urgent care setting, treatment of diabetic or neuropathic ulcers should include the following elements:

- Evaluation for cellulitis, abscess, osteomyelitis, and gangrene
- Consideration of debridement of the callus and wound bed
- Methods to avoid placing pressure on the ulcer (i.e., ensuring that the patient can avoid weight-bearing by using crutches or a walking cast or walking shoe)
- Avoidance of soaking; soaking the wound macerates the tissue but does not debride the necrotic tissue

### Definitive Management

Definitive management of diabetic or neuropathic ulcers includes the following methods:

- Use of a specialty off-loading boot or total contact casting
- Maintenance of good glycemic control and optimization of additional comorbidities
- Limitation of weight-bearing on the affected foot
- Regular callus debridement by a wound-care specialist
- HBOT in some patients

### Presentation of Cases

#### Case 1

A 65-year-old man presents with fatigue and fever that he has for the last 2 days. He is accompanied by family members and is unable to provide a full medical history. He has a history of poorly controlled type 2 diabetes with associated lower-extremity neuropathy and hypertension. His temperature is 101.2°F (38.4°C), and his heart rate is 102 beats/min. There is a foul-smelling 3-cm wound on the plantar surface of his right foot.

#### Case 2

A 36-year-old man with a history of paraplegia from a long-ago car accident presents with a wound on the back of his left heel that he first noticed 2 weeks earlier. He is concerned that the wound is worsening. His vital signs are within normal limits, and his physical examination findings are concerning only for a well-demarcated ulcer on his heel. A moderate amount of drainage is present on the patient's sock.

#### Case 3

A 58-year-old woman presents with leg pain. She reports that she has had bilateral foot, ankle, and calf pain for the past 3 months. These symptoms are worse throughout the day and seem to decrease when she lies down at night. She has a history of hypertension and morbid obesity. Her physical examination findings are remarkable for symmetric swelling of the distal lower extremities, with associated erythema and tenderness on palpation. There is a 4-cm shallow, irregularly shaped wound in the left pretibial area with marked serous drainage. Pulses are equal in the lower extremities.

#### Case 4

A 78-year-old man presents with coughing and congestion. He has a history of coronary artery and peripheral vascular disease. Your evaluation findings are consistent

with those for a viral upper respiratory infection. However, as you are leaving the room, he asks if you would be willing to look at a wound he has on his right leg. It has been there for “some time” and was treated in the past by his primary-care physician, but he is no longer seen by that physician. He says that there has been no change in wound size or color, and no pain or drainage. Examination reveals hairless, shiny, thin lower extremities with a punched-out wound over the right lateral malleolus that is mildly tender to palpation. The dorsalis pedis and posterior tibia pulses are faint but symmetric.

## Discussion of Cases

### Case 1

The wound described is most consistent with a diabetic foot ulcer with possible surrounding cellulitis. This may or may not be the source of this patient’s presenting illness. Because he is both febrile and tachycardic, sepsis should be considered, and emergency transfer to an acute-care setting is indicated.

### Case 2

Though the patient is young, paraplegia places him at increased risk for wound development. The location and characteristics of his wound are consistent with those of a pressure ulcer. The wound should be staged and probed because patients with such lesions are at increased risk for the development of osteomyelitis. If there is concern about the possibility of osteomyelitis, transferring the patient to an acute-care setting is indicated. Otherwise, this patient can be treated on an outpatient basis. His description of wound expansion and the drainage noted on his sock raise concern about infection. Because he has no signs of systemic illness or cellulitis, topical antibiotic ointment should be the first-line treatment; wound cultures should be obtained prior to antibiotic application. The patient will require pressure off-loading when he is discharged to home, and arrangements must be made for regular follow-up care to ensure wound healing.

### Case 3

This patient’s presentation is typical of someone with a venous insufficiency ulcer. Her risk factors include hypertension and obesity. Wound drainage is to be expected. Other clues are the description of worsening pain through the day when her legs are dependent and the relief with elevation as she lies down at night. The erythema described is likely secondary to hemosiderin staining, which can be further evaluated by elevating the legs to assess fading or resolution of the erythema. There are

no indications of infection, so she can be treated conservatively with absorptive dressings, compression, and outpatient follow-up. Even with palpable pulses, ABIs should be determined prior to applying compression.

### Case 4

Though the presenting symptoms are not related to a nonhealing wound, the patient has a wound that he would like evaluated. His medical history, risk factors, and examination findings are consistent with those for arterial insufficiency. The patient’s condition is otherwise stable, with no signs of local or systemic infection. Faint pulses are to be expected. Measurement of ABIs is indicated because severe arterial obstruction cannot be ruled out by palpation alone, and ABIs could reveal critical obstruction requiring emergency transfer. With non-emergency ABIs, this patient can be discharged with instructions for symptom control and avoidance of wound progression, and, most importantly, with resources for close follow-up with a wound specialist.

## Conclusion

Nonhealing wounds are the by-product of prolonged and complex disease processes. Though chronic in nature, they can pose acute threats to life and limb, in addition to lifelong debilitation. By differentiating the signs and symptoms of acute illness from the expected course of nonhealing wounds and understanding indications and best evidence for wound treatment thereof, urgent care providers play a critical role in the treatment of nonhealing wounds and may serve as the stimulus that leads to improved outcomes and quality of life. ■

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