# Guideline: The Management of People with Diabetic/Neuropathic Foot Ulcers

## Background

- See “Guideline: The Assessment of People with Diabetic/Neuropathic Foot Ulcers”

## Indications

This guideline is intended to be used by front line registered health care providers, to guide their management of individuals admitted/presenting with a foot ulcer, and who have been diagnosed with diabetes and/or foot neuropathy.

## Guideline

### NOTE: The management of a person with a diabetic or neuropathic foot ulcer follows “The SWRWCP’s Diabetic/Neuropathic Foot Ulcer Assessment and Management Algorithm”.

### Healable Wounds

1. Upon completion of a thorough, holistic patient and wound assessment as per the SWRWCP’s “Guideline: The Assessment of People with Diabetic/Neuropathic Foot Ulcers”, and upon determination that the wound in question is ‘healable’, cleanse the wound as per the “SWRWCP’s Dressing Selection and Cleansing Enabler – HEALABLE”

2. As you have previously determined that the wound is healable:
   a. Debride any loose, non-viable tissue in the wound and/or periwound callus, using techniques within your scope of practice (the exception is dry stable heel eschar – this should be managed in a maintenance fashion). See “Guideline and Procedures: Wound Debridement (except conservative sharp wound debridement)” and “Guideline and Procedure: Conservative Sharp Wound Debridement”
   b. Cleanse the wound again post debridement using the “SWRWCP’s Dressing Selection and Cleansing Enabler – HEALABLE”. Gently pat the wound dry with dry non-sterile gauze
   c. Choose an appropriate conventional moist wound dressing or combination of dressings as per the “Guideline: The Assessment and Management of Moisture in Acute and Chronic Wounds”, using the Program’s “Dressing Selection and Cleansing Enabler – HEALABLE”, unless otherwise directed by a physician or nurse practitioner. This may involve the use of topical antimicrobials if identified as a need (see “Guideline: The Assessment and Management of Bacterial Burden in...
Acute and Chronic Wounds"). Consider:
   i. How well the dressing can manage and/or control the wound environment
   ii. If the dressing will keep the wound bed continuously moist, yet periwound tissue dry
   iii. If the dressing can control exudate, but not dry the wound bed
   iv. A dressing that can eliminate dead space by loosely filling all cavities with dressing material

   NOTE: Occlusive dressings such as hydrocolloids are not recommended for ulcers on the plantar foot. In addition, foam dressings do not reduce interface pressure and cannot replace offloading devices

d. Choose an appropriate dressing change frequency based on:
   i. Your wound assessment, including the person’s risk for infection or presence of infection
   ii. Dressing products used and their ability to manage the drainage anticipated
   iii. Person’s comfort and acceptability

Maintenance/Non-Healable Wounds
1. Upon completion of a thorough, holistic patient and wound assessment as per the SWRWCP’s document, “Guideline: The Assessment of People with Diabetic/Neuropathic Foot Ulcers”, and upon determination that the wound in question is ‘maintenance’ or ‘non-healable’, cleanse the wound as per the “SWRWCP’s Dressing Selection and Cleansing Enabler – MAINTENANCE/NON-HEALABLE”

2. If you have determined that the wound is maintenance/non-healable:
   a. **DO NOT DEBRIDE**
   b. Paint and/or cleanse the wound with antiseptics as indicated on the “SWRWCP’s Dressing Selection and Cleansing Enabler – MAINTENANCE/NON-HEALABLE”, and allow the antiseptic to air dry
   c. Choose an appropriate dry gauze based non-adherent dressing or combination of dressings, as per the “Guideline: Assessment and Management of Moisture in Acute and Chronic Wound Care”, using the “SWRWCP’s Dressing Selection and Cleansing Enabler – MAINTENANCE/NON-HEALABLE”, unless otherwise directed by a physician or nurse practitioner. This may involve the use of topical antimicrobials if identified as a need (see “Guideline: The Assessment and Management of Bacterial Burden in Acute and Chronic Wounds”). It may also be appropriate to leave dry, stable eschar open to the air. **NOTE: Application of moisture retentive**
d. Choose an appropriate dressing change frequency based on:

i. Your wound assessment, including the person’s risk for infection

ii. Dressing products used and their ability to manage the drainage anticipated

iii. Person’s comfort and acceptability

Management Guidelines for ALL Diabetic/Neuropathic Foot Ulcers, Regardless of Healability

1. Treat the cause:

a. Modify any identified intrinsic, extrinsic, and iatrogenic factors affecting wound healing to increase the chance of preventing foot ulcers, to promote the healing existing foot ulcers (or stabilization if healing is not the goal), and to prevent limb loss through infection and amputation.

**NOTE:** For those with an ABI of <0.5 consider an urgent vascular referral for imaging and possibly revascularization. Ideally, revascularization should be considered before amputation. Teaching must also be done re smoking cessation, and control of hypertension and dyslipidemia

b. Provide or encourage the purchase and faithful use of an offloading device if the person has an ulcer on the plantar aspect of their foot and loss of protective sensation, to reduce pressure forces over the wound site. The device selected MUST be worn EVERY TIME THEIR FOOT TOUCHES THE GROUND (removable devices are best).

Selection of the appropriate offloading device should be done by the interdisciplinary team, taking into consideration infection, vascular status, person characteristics, environmental factors, and resources.

Examples of offloading devices:

<table>
<thead>
<tr>
<th>Device</th>
<th>Wound Location</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Contact Cast</td>
<td>XX XXX XXX XXX XX</td>
<td>Gold standard; requires training to apply; not for infected/ischemic wounds</td>
</tr>
<tr>
<td>Removable Walker</td>
<td>XXX XXX XX NO</td>
<td>Can be removed; ok for infected wounds</td>
</tr>
<tr>
<td>Half Shoe (forefoot)</td>
<td>XX XX NO NO X</td>
<td>Transfers pressure to mid and rear foot; unstable; low cost</td>
</tr>
<tr>
<td>Half Shoe (rear foot)</td>
<td>NO NO NO X</td>
<td>Unstable; low cost</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Surgical Shoe</th>
<th>XX</th>
<th>Low cost; short term mgmt.; use with orthotic insert</th>
</tr>
</thead>
<tbody>
<tr>
<td>OTC Orthopedic Shoe</td>
<td>XX XX X X</td>
<td>Offloading limited; use with orthotic; easy to access; affordable; preventative care</td>
</tr>
<tr>
<td>OTC Walking Shoe</td>
<td>X XX X X</td>
<td>Offloading limited; use with orthotic; easy to access; affordable; preventative care</td>
</tr>
<tr>
<td>Footwear Modifications (rocker toe)</td>
<td>XX XX X NO</td>
<td>Moves pressure to rear foot; requires trained professional; expensive</td>
</tr>
<tr>
<td>Custom Shoe</td>
<td>XX XX XX XX</td>
<td>Distributes pressure evenly under foot; ideal for deformities; expensive; requires trained professional</td>
</tr>
<tr>
<td>Custom Orthotic</td>
<td>X XX XX X</td>
<td>Distributes pressure evenly under foot; use with OTC footwear; requires trained professional; expensive</td>
</tr>
<tr>
<td>Total Contact Inserts</td>
<td>X XX XX X</td>
<td>Distributes pressure evenly under foot; use with OTC footwear; requires trained professional</td>
</tr>
<tr>
<td>Padding</td>
<td>X X X X</td>
<td>Low cost; offloading limited</td>
</tr>
<tr>
<td>Crutches, cane</td>
<td>X X X X</td>
<td>Low cost; offloading limited; can cause shoulder dislocation</td>
</tr>
</tbody>
</table>

X = device indicated (the more X’s, the more the device is indicated for that wound location)

c. For heel ulcers, have the person elevate their heels completely off the bed surface and other pressure causing surfaces, using pillows or a wedge, to remove pressure when lying (even on therapeutic surfaces)

d. In non-plantar ulcers, offload with shoe-modifications, temporary footwear, toe-spacers or orthoses

e. For those diagnosed with Charcot foot, manage based on the stage of the defect\(^1\)-\(^3\), i.e.:

<table>
<thead>
<tr>
<th>Charcot Stage</th>
<th>Description</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>O Prodromal</td>
<td>Dermal flush, increased skin temp +/- edema/bounding pulses. Evidence of instability of foot.</td>
<td>Non-weight bearing cast (8-12 weeks)</td>
</tr>
<tr>
<td>1 Developmental, acute</td>
<td>Minor trauma results in fragmentation of bone and joint dislocation/subluxation.</td>
<td>Non-weight bearing cast and graduate to removable cast walking</td>
</tr>
<tr>
<td>2 Coalescence, sub-acute</td>
<td>Person presents with lessening of edema and healing of fractures.</td>
<td>Patellar tendon-bearing brace CROW walker</td>
</tr>
<tr>
<td>3 Reconstruction, chronic</td>
<td>Healing of bone and remodeling evident on x-ray, and evidence of deformity</td>
<td>Custom shoes with/without brace</td>
</tr>
</tbody>
</table>

f. Consider surgical offloading, i.e. Achilles tendon lengthening, joint arthroplasty, single or pan metatarsal head resection, osteotomy or a digital flexor tenotomy
when more conservative efforts fail, to prevent and treat DFUs

2. Person centered concerns:
   a. Manage pain using the SWRWCP’s modified “WHO Pain Ladder with Pain Management Guidelines”. Consider:
      i. Coordinated pre-dressing change analgesia
      ii. Regular dosing of pain medications
      iii. Use of appropriate medications to manage neuropathic pain
      iv. Use of topical analgesics (i.e. morphine) or anesthetic (i.e. EMLA or lidocaine) if person is experiencing pain during dressing changes
   b. Consider non-pharmacological methods of pain management, i.e. appropriate dressing choice, distraction, guided imagery, pressure redistribution, music, time-outs during dressing changes, less frequent dressing changes, etc.
   c. Consider surgical management of pain, i.e. revascularization for ischemic pain
   d. Ensure the plan of care is created with input of the person with the wound and/or their caregiver, including their concerns, motivations, abilities and preferences for treatment

3. Debridement:
   a. Determine if debridement is appropriate for the person and the wound
   b. Prior to debriding wounds on lower extremities, ensure a complete vascular assessment has been conducted to rule out vascular compromise
   c. If debridement is appropriate, select the appropriate method of debridement considering:
      i. Goals of treatment, i.e. healability
      ii. Person’s overall health condition
      iii. Type, quantity and location of necrotic tissue
      iv. Wound depth and amount of drainage
      v. Availability of resources. **NOTE: Lower extremity ulcers with dry eschar in people who are acutely palliative should NOT be debrided if they do not have edema, erythema, fluctuance or drainage**
   d. Consider referrals to a Enterostomal Therapy (ET) Nurse or Wound Care Specialist (WCS) for conservative sharp debridement of non-viable tissue and/or for serial callus debridement, using sterile instruments
   e. Consider requesting a referral to a surgeon for surgical sharp debridement in the presence of necrotic tissue in a wound that requires debridement secondary to the
4. Infection control:
   a. Infection in the foot of a person with diabetes is a serious threat to that limb and must be evaluated and treated promptly
   b. Signs of infection may be muted due to neuropathy and/or ischemia and systemic factors are often absent
   c. Teach that new onset or worsening pain is a sign of infection and requires immediate medical attention
   d. Assess and manage increased bacterial burden/infection as per the “Guideline: The Assessment and Management of Bacterial Burden in Acute and Chronic Wounds”, using the “Bacterial Burden in Chronic Wounds” tool. **NOTE:** *Topical antimicrobials can be used to reduce bacterial burden in the presence of superficial wound infection, but never take the place of systemic antibiotics when those are needed for deeper infections*
   e. If you are not sure of the nature of the infection, choose a non-occlusive dressing as the secondary dressing. Dressing frequency for infected DFU should be increased until the symptoms of the infection are progressively improving
   f. For clinically infected wounds, obtain a wound culture, see “Procedure: Quantitative Wound Swab Technique”
   g. Implement strategies to prevent infection, i.e. proper hand washing and infection control measures
   h. Consider a referral to an Infectious Diseases Specialist in the presence of a wound complicated by bacteremia, sepsis, advancing cellulitis or osteomyelitis. **NOTE:** *Assess for osteomyelitis in the presence of a longstanding or deep DFU, a DFU with overlying bone, or when it is possible to probe bone in a DFU. Clinical observation, plain x-rays and evaluation of serum inflammatory markers (especially erythrocyte sedimentation rate) are often sufficient for screening for osteomyelitis. To treat osteomyelitis a six week course of antibiotics is often required for those who do not have the infected bone resected. If the bone is resected, no more than one week of antibiotic therapy is indicated*
5. Consider referrals to (see “Criteria for Interdisciplinary Referrals”):
   a. Registered Dietician (diet, nutrition, glycemic control, supplementation, weight control). **NOTE: to be most**
efficient, the following blood work could be ordered and the results obtained before making a dietician referral:
serum albumin, CBC (if anemic, proceed to checking Serum Iron, Total Iron Binding, Ferritin, Transferrin, B12 and Red Blood Cell Folate Level), BUN, Creatinine, and Potassium

b. Speech Language Pathologist (presence or risk of developing a swallowing impairment)
c. Certified Diabetic Educator (diet, nutrition and lifestyle counseling)
d. Physician/Primary Care Nurse Practitioner (HgbA1c, poorly controlled co-morbid health conditions, smoking cessation, medication adjustments, annual foot/footwear exams)
e. Physiotherapy (mobility/exercise plan, mobility/gait/range of motion assessment, footwear, adjunctive therapies for wound healing +/– neuropathic pain)
f. Occupational Therapist (assistive devices, assessment of functional status, fall risk assessment and recommendations)
g. Orthotist/Pedorthist/Podiatrist (appropriate footwear/offloading device, professional foot assessment and care)
h. Social Work (psychosocial and economic/community supports)
i. Endocrinologist/Diabetologist (glycemic control, diabetes education)
j. Vascular surgeon (vascular assessment +/– surgical correction)
k. Orthopedic surgeon (for recurrent forefoot ulcerations, refer for consideration of surgical interventions, i.e. Achilles tendon lengthening)
l. General surgeon (for Acute Charcot joint or infected diabetic foot if non-surgical interventions are not achieving healing)
m. Infectious Diseases (for wounds complicated by bacteremia, sepsis, advancing cellulitis or osteomyelitis)
n. ET or WCS for wounds that have one or more of the following FUN criteria:
  i. F (Frequency) – frequency of dressing change has not decreased to three times per week or less by week three
  ii. U (Unknown) – the cause (etiology) of the wound is unknown, or the nurse is unsure of best practices
iii. **N** (Number) – the surface area of the wound has not decreased 50% within the first four weeks of treatment\(^8\)\(^-\)\(^9\), or a minimum of 20-30% in 3-4 weeks of treatment, or there is not an ongoing decrease or reduction in wound surface area

6. Teach the person and/or their caregiver, using adult education principles and repetition, the importance of the following (you may need to consider interdisciplinary referrals):
   a. Washing their feet daily (with water below 37\(^\circ\)C), drying well (especially between the toes) and moisturizing dry skin with emollients (not between the toes), whilst avoiding foot soaks
   b. Limiting foot soaks (if necessary) to five minutes per day three times weekly
   c. Assessing their feet daily, including between the toes – you must determine if the person with diabetes can perform this task, and if not, discuss who can assist
   d. Assessing shoes daily, and shaking out shoes before putting them on (every time)
   e. Changing their socks daily and wearing socks without seams (or with the seams inside out)/holes/wrinkles and that light colored and are not too tight nor knee-high in length
   f. Avoiding walking barefoot, in socks without footwear, in thin-soled slippers, in sandals, flip flops, narrow pointed shoes, high heels or Crocs, whether at home or outside
   g. Wearing socks and properly fitting footwear at all times, indoors and out, i.e. shoes that are not too tight or that have rough edges or uneven seams
   h. Having their shoes professionally chosen/fitted (closed toes)
   i. The importance of regular professional foot care and how to cut toenails properly (straight across)
   j. Protecting their feet from heat/cold/injury
   k. Avoiding the use of chemical agents or plasters to remove corns and calluses
   l. Routine diabetic foot and footwear assessments by their family physician/nurse practitioner, i.e. yearly at a minimum (your “International Working Group on the Diabetic Foot Diabetic Foot Risk Classification System with Associated Interventions” score, done in the assessment process, will guide the frequency of such foot/footwear assessments)
   m. Controlling their blood sugar thru exercise, diet, and medication, i.e. HgbA1c less than 7%, and the relationship between high glycemic levels and complications
n. The effects of acute illness and infection on their blood glucose
o. Getting their blood lipid levels and blood pressure monitored regularly
p. Quitting smoking
q. Exercising regularly (low impact, i.e. swimming, bicycling) and eating a well-balanced diabetic diet
r. Signs and symptoms of infection/complications and when/how/who to seek IMMEDIATE help

7. Provide the person with the SWRWCPs “My Diabetic Foot Ulcer” pamphlet and “The Importance of Nutrition in Wound Healing” pamphlet, and review the pamphlet contents with them. **NOTE: the goals of education are to improve the person’s foot care knowledge, awareness and self-protective behaviors, and to enhance their motivation and skills to facilitate adherence to this behavior**

8. Re-evaluate (see “Guideline: Wound Re-Assessment and Consideration of the Use of Adjunctive/Advanced Therapy”):
   a. Regularly and consistently measure the ulcer, weekly at a minimum, using the same method
   b. Conduct a comprehensive reassessment to determine wound progress and the effectiveness of the treatment plan, i.e. using the “NPUAP PUSH Tool 3.0”, weekly at a minimum (see “Procedure: NPUAP PUSH Tool 3.0”). Identification of variances indicates the need for reassessment
   c. Calculate the % reduction in wound surface area to ensure that the wound has closed 50% by week 4 as this is a predictor of complete wound closure by week 12\(^8\). If the wound is not closing at an expected rate, reassess for additional correctable factors, vascular status, infection, and pressure
   d. If the wound is not healing at an expected rate despite the implementation of best practice interventions, you may need to consider:
      i. A referral to a WCS or ET nurse for assessment
      ii. A referral to an orthopedic or general surgeon for consideration of surgical offloading, i.e. Achilles tendon lengthening, osteoarthropathy, arthroplasty, osteotomy
      iii. Diagnostic testing to rule out the presence of underlying infection/osteomyelitis +/- a referral to an Infectious Diseases Specialist
      iv. Adjunctive therapies, i.e. electrical stimulation, hyperbaric oxygen therapy, biologically active dressings or negative pressure wound therapy
      v. A request for a wound tissue biopsy to rule out
Diabetic/Neuropathic Foot Ulcer Management

Barriers to concordance

e. Reassess pain at EVERY dressing change and more frequently as reported by the person, using the same pain tool/scale each time. Report pain management issues to the person’s primary care physician or primary care nurse practitioner using the SWRWCP’s “Comprehensive Assessment of Chronic Pain in Wounds” form (see “Procedure: Comprehensive Assessment of Chronic Pain in Wounds Tool”)

f. Reassess the person’s quality of life using the “Cardiff Wound Impact (Quality of Life) Questionnaire” if the person reports alterations in their quality of life or if their caregiver verbalizes that they suspect as much [see “Procedure: Cardiff Wound Impact (Quality of Life) Questionnaire”]

9. Notify the primary care physician or primary care nurse practitioner immediately if the following occur:
   a. Acute onset of pain or increasing pain
   b. Wound probes to bone (if this is a new finding)
   c. Gangrene develops or worsens
   d. Rest pain develops in the foot
   e. Previously palpable peripheral pulses are diminished or absent
   f. Signs of localized and/or systemic infection develop

10. Documentation:
   a. Document initial and ongoing assessments as per your organization’s guidelines
   b. Document care plans, implementation strategies, and outcome measurements as per your organization’s guidelines

11. Discharge Planning:
   a. Discharge planning (if it is anticipated) should be initiated during the initial encounter with the person. Timely discharge should be supported along with optimal person independence
   b. If the care of the person is being transferred across sectors, ensure that the receiving site/facility/service is provided with a care plan that outlines the current care and wound prevention and management strategies, and copies of:
      i. Initial Wound Assessment Form
      ii. Interdisciplinary Diabetic/Neuropathic Foot Assessment Form

Outcomes

1. Intended:
   a. The wound closes and drainage ceases, if the wound is underlying malignancy, if suspected

OUTCOMES
deemed ‘healable’, at an expected rate, i.e. surface area reduction of 50% within the first four weeks of treatment, or a minimum of 20-30% in 3-4 weeks of treatment. OACCAC Diabetic Foot Ulcer Outcome-Based Pathway (OBP) outcome intervals (September 2013 release):

i. Interval 2 (28 days) – 20-30% reduction in surface area

ii. Interval 3 (84 days) – wound closed

b. The wound is maintained and infection free if the wound is deemed ‘maintenance or non-healing’. Amputation is prevented or delayed

c. The person indicates that pain is resolved or manageable (less than 3/10) with appropriate use of analgesia/adjunctive/alternative methods

d. The patient understands and acts on the need for daily foot inspection and appropriate foot care, accurate dietary and glycemic control, and pressure redistribution

e. The person can identify signs and symptoms of infection, and can describe how, when and whom to contact when problems occur

f. The person becomes independent in the self-management of their wound

2. Unintended:

a. The wound dose not close, if the wound is deemed ‘healable’

b. The wound becomes infected

c. The person develops gangrene

d. The person expresses concerns about poorly managed pain

e. The person requires an amputation where one was not anticipated. NOTE: Amputations may be required in the following circumstances:

i. Ischemic rest pain that cannot be adequately managed

ii. A life-threatening infection that cannot otherwise be managed

iii. A non-healing ulcer accompanied by a higher burden of disease than would result from amputation

f. The person does not understand the need for daily foot inspection and other measures needed to decrease the risk of future tissue damage and diabetic complications

g. The person shows no evidence of understanding and acting on educational information received

h. The person does not understand the signs and symptoms of infection/complications, and when, how and whom to seek help from

i. The person does not become independent in self-management of their wound

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References


Related Tools (NOTE: these tools and their instructions can be found on the SWRWCP’s website: swrwoundcareprogram.ca)

- The SWRWCP’s Diabetic/Neuropathic Foot Ulcer Assessment and Management Algorithm
- Guideline: The Initial Assessment of People with Diabetic/Neuropathic Foot Ulcers
- The SWRWCP’s Dressing Selection and Cleansing Enabler - HEALABLE
- Guideline: Wound Debridement (excluding conservative sharp wound debridement)
- Guideline: Conservative Sharp Wound Debridement
- Guideline: The Assessment and Management of Moisture in Acute and Chronic Wounds
- Guideline: The Assessment and Management of Bacterial Burden in Acute and Chronic Wounds
- The SWRWCP’s Dressing Selection and Cleansing Enabler – MAINTENANCE/NON-HEALABLE
- Criteria for Interdisciplinary Referrals
- WHO Pain Ladder with Pain Management Guidelines
• Guideline: The Assessment and Management of Bacterial Burden in Acute and Chronic Wounds
• Bacterial Burden in Chronic Wounds Tool
• Procedure: Bacterial Burden in Chronic Wounds Tool
• Procedure: Quantitative Wound Swab Technique
• International Working Group on the Diabetic Foot Diabetic Foot Risk Classification System with Associated Interventions
• My Diabetic Foot Ulcer pamphlet
• The Importance of Nutrition in Wound Healing pamphlet
• Guideline: Wound Re-Assessment and Consideration of the Use of Adjunctive/Advanced Therapy
• NPUAP PUSH Tool 3.0
• Procedure: NPUAP PUSH Tool 3.0
• Comprehensive Assessment of Chronic Pain in Wounds
• Procedure: Comprehensive Assessment of Chronic Pain in Wounds Tool
• Cardiff Wound Impact (Quality of Life) Questionnaire
• Procedure: Cardiff Wound Impact (Quality of Life) Questionnaire
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• Interdisciplinary Diabetic/Neuropathic Foot Assessment Form