

Developed in collaboration with the Wound Care Champions, Wound Care Specialists, Enterostomal Nurses, and South West Regional Wound Care Program (SWRWCP) members from Long Term Care Homes, Hospitals, and South West CCAC contracted Community Nursing Agencies in the South West Local Health Integration Network.



<p><b>Title</b></p>	<p><b>Guideline: The Assessment of People with Diabetic/Neuropathic Foot Ulcers</b></p>
<p><b>Background<sup>1-13</sup></b></p>	<ul style="list-style-type: none"> <li>• 2.3 million Canadians live with diabetes</li> <li>• The economic costs of diabetes in Canada in 1998 was between \$4.76 and 5.23 billion (USD)</li> <li>• Foot problems in people with diabetes are one of the most serious complications as they a major source of suffering and costs for the person, and as they are a financial burden on healthcare system and society in general</li> <li>• 15-25% of Canadians with diabetes (CWD) will develop a foot ulcer in their lifetime</li> <li>• Diabetic foot ulcer (DFU) recurrence rates range between 50-70% over 3-5 years</li> <li>• DFUs cost our healthcare system more than \$150 million annually</li> <li>• The average cost of treating a single DFU in 2007:             <ul style="list-style-type: none"> <li>○ \$8,000</li> <li>○ \$17,000 if infected</li> </ul> </li> <li>• CWD are 23 times more likely to be hospitalized for an amputation than Canadians without diabetes</li> <li>• 50% of all lower limb amputations in Ontario are directly related to diabetes</li> <li>• 85% of all lower leg amputations are the result of a non-healing diabetic foot ulcer, while 15% of DFUs end in amputation</li> <li>• In 1999 in Ontario, the odds of having a minor amputation were 24 times greater in persons with diabetes (PWD)</li> <li>• In 1999 in Ontario, the risk of major amputation was 14 times higher for PWD</li> <li>• There is a 3.2% increased risk of amputation where there is lack of foot care and foot care knowledge</li> <li>• CWD who see their family doctor or health team at least three times a year are 33% less likely to have a limb amputation</li> <li>• More than 4,000 CWD had a limb amputated in 2006</li> <li>• 50% of CWD and an amputation will have the opposite lower leg amputated within five years</li> <li>• 30% of CWD will die within one year of amputation</li> <li>• 69% of limb amputees with diabetes will die within five years of amputation</li> <li>• Although diabetes is the major cause of peripheral neuropathy, alcoholism, renal failure, HIV, syphilis, trauma, and/or surgery are other causes</li> <li>• Foot neuropathy is the main cause of diabetic foot ulcers as it leads to</li> </ul>

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	<p>changes in muscle and bone alignment which over time results in pressure over bony prominences, resulting in callus formation and eventual ulceration. Types of neuropathy:</p> <ul style="list-style-type: none"> <li>○ Sensory – loss of protective sensation. Renders people vulnerable to physical, chemical and thermal trauma</li> <li>○ Autonomic – associated with dry skin, which can result in fissures, cracking and callus development. May also present as a bounding pulse</li> <li>○ Motor – results in foot deformities and abnormal pressures over bony prominences</li> </ul> <ul style="list-style-type: none"> <li>● Most DFUs occur at areas of increased pressure. 90% of plantar DFUs are directly attributed to pressure</li> <li>● Peripheral arterial disease is present in up to 50% of people with a DFU, which complicates wound healing and contributes to amputation</li> <li>● The majority of DFUs are neuro-ischemic, i.e. they are caused by a combination of neuropathy and ischemia</li> </ul>
<b>Indications</b>	<p>This guideline is intended to be used by front line registered health care providers, to guide their assessment of individuals admitted/presenting with a foot ulcer, and who have been diagnosed with diabetes and/or foot neuropathy.</p>
<b>Guideline</b>	<p><b>NOTE: The assessment of a person with a diabetic or neuropathic foot ulcer follows “The SWRWCP’s Diabetic/Neuropathic Foot Ulcer Assessment and Management Algorithm”.</b></p> <ol style="list-style-type: none"> <li>1. Upon discovery of a wound on the foot of a person with diabetes and/or foot neuropathy or upon admission of a person with such a wound to your health care facility/service, conduct a history and focused physical assessment using the SWRWCP’s “Initial Wound Assessment Form” (see “Procedure: Initial Wound Assessment Form”), if not already done, to determine the persons: <ol style="list-style-type: none"> <li>a. Health/medical history (and the persons understanding of these)</li> <li>b. Nutritional status</li> <li>c. Wound history</li> <li>d. Wound related pain and quality of life (pain can be an indicator of infection)</li> <li>e. Extrinsic, intrinsic, and iatrogenic factors affecting wound healing</li> <li>f. Concordance concerns</li> </ol> <p>This form contains the “Nestle Mini Nutritional Assessment (MNA<sup>®</sup>) Tool”, used to evaluate whether a person is malnourished or at risk for malnourishment, which can negatively affect wound healing [see “Procedure: Nestle Mini Nutritional Assessment (MNA<sup>®</sup>) Tool”].</p> <p><b>NOTE: Individual permission must be obtained by each organization wishing to use the MNA<sup>®</sup></b></p> </li> <li>2. Complete the “Interdisciplinary Diabetic/Neuropathic Foot Assessment Form” (see “Procedure: Interdisciplinary</li> </ol>

	<p>Diabetic/Neuropathic Foot Assessment Form”), or review the form if one has been previously completed, to determine the person’s diabetes diagnosis and management history, diabetes related complications (if the person has been diagnosed with diabetes), history of previous ulcer/amputation, end stage renal disease and/or barefoot walking, and to systematically physically assess the persons:</p> <ol style="list-style-type: none"> <li>a. Feet and toenails for bony/structural deformities/prominences, range of motion of foot joints, signs of neuropathy, and signs of infection. <b>NOTE: you may wish to consider x-rays and/or pressure mapping to determine the extent of plantar pressures and those forces on the foot and/or to rule out Charcot foot (if suspected).</b> Neuropathy can be assessed using the following techniques:       <ol style="list-style-type: none"> <li>i. Symptoms, i.e. tingling, pain, etc.</li> <li>ii. Pressure perception, i.e. Semmes-Weinstein monofilament testing</li> <li>iii. Vibration perception, i.e. 128Hz tuning fork testing</li> <li>iv. Discrimination, i.e. pin prick testing on the dorsal aspect of the person’s feet</li> <li>v. Tactile sensation, i.e. lightly touching cotton wool to the dorsal aspect of the person’s feet</li> <li>vi. Reflexes, i.e. Achilles tendon reflexes</li> </ol> </li> <li>b. Gait</li> <li>c. Inside and outside of footwear/orthotics and socks (worn when at home and when outside), for functional appropriateness and to ensure they are not a source of pressure</li> <li>d. Edema, lymphedema, lipidema (if they so present with such issues)</li> <li>e. Signs of venous/arterial disease</li> <li>f. The quality of the persons venous/arterial circulation - pedal pulses and ankle brachial index (ABI) testing, performed by a healthcare profession trained in ABI testing, i.e. an Enterostomal Therapy (ET) Nurse or Wound Care Specialist (WCS) – <b>NOTE: if a person has long-standing diabetes, hypertension or advanced age, the vessels may not be compressible and segmental compression studies or toe pressures may need to be ordered through a diagnostic imaging department in order to accurately determine the status of the person’s lower limb circulation</b></li> <li>g. Signs of unusual ulcers, i.e. malignant ulcers</li> </ol> <p>3. Conduct a psychosocial assessment to determine the:</p> <ol style="list-style-type: none"> <li>a. Persons understanding of the wound and their risk factors and any history of previous foot education</li> <li>b. Impact of the wound on the person and their body image</li> <li>c. Financial concerns and availability of support systems to address such concerns</li> </ol>
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	<ul style="list-style-type: none"> <li>a. Healable</li> <li>b. Maintenance</li> <li>c. Non-healable/palliative</li> </ul> <p>11. Once you have completed a thorough assessment of the person and their foot ulceration and determined their ‘healability’, proceed to implement appropriate interventions as outlined in “Guideline: The Management of People with Diabetic/Neuropathic Foot Ulcers”.</p>
<p><b>References</b></p>	<ol style="list-style-type: none"> <li>1. Institute for Clinical Evaluative Sciences. Diabetes In Ontario: An ICES Practice Atlas [Online]. Available: <a href="http://www.diabetes.ca/Files/DM%20Homepg.pdf">http://www.diabetes.ca/Files/DM%20Homepg.pdf</a>.</li> <li>2. Sibbald RG, Queen D. Demonstration project for community patients with lower leg and foot ulcers. Wound Care Canada. 2007;5(1).</li> <li>3. Public Health Agency of Canada. National diabetes fact sheets [Online]. Available: <a href="http://www.phac-aspc.gc.ca/ccdpc-cpcmc/ndss-snsd/english/facts_figures-eng.php">http://www.phac-aspc.gc.ca/ccdpc-cpcmc/ndss-snsd/english/facts_figures-eng.php</a>.</li> <li>4. Abbott C, Carrington H, Ash S, et al. The North-West diabetes foot care study: Incidence of, and risk factors for, new diabetic foot ulceration in a community-based patient cohort. Diabetic Medicine. 2002;19(5):377-384.</li> <li>5. Canadian Diabetes Association. Clinical practice guidelines for the prevention and management of diabetes in Canada [Online]. Available: <a href="http://www.diabetes.ca/cpg2003/">http://www.diabetes.ca/cpg2003/</a>.</li> <li>6. American Diabetes Association. Consensus development conference: Diabetic foot wound care. Journal of the American Podiatric Medical Association. 1999;89(9):475-483.</li> <li>7. Apelqvist J, Larsson J, Agardh C. Long-term prognosis for diabetic patients with foot ulcers. Journal of Internal Medicine. 2003;233(6):485-491.</li> <li>8. Bloomgarden TZ. American Diabetes Association 60th scientific sessions, 2000: The diabetic foot. Diabetes Care. 2001;24(5):946-951.</li> <li>9. Mason J, O’Keeffe C, McIntosh A, et al. A systematic review of foot ulcer in patients with type 2 diabetes mellitus. I: Prevention. British Diabetic Association. Diabetic Medicine. 1999b;16(11):801-812.</li> <li>10. Armstrong D, Lavery LA, Harkless LB. validation of a diabetic wound classification system: The contribution of depth, infection and ischemia to risk of amputation. Diabetes Care. 1998;21(5):855-859.</li> <li>11. Lavery LA, Armstrong DG, Harkless LB. Classification of diabetic foot wounds. J Foot Ankle Surg. 1996;35:528-531.</li> <li>12. Robbins JM, Strauss G, Aron D, et al. Mortality rates and diabetic foot ulcers: Is it time to communicate mortality risk to patients with diabetic foot ulcers? J Am Podiatr Med Assoc. 2008;98(6):489-493.</li> <li>13. Orsted H, Searles G, Trowell H, et al. Recommendations for the prevention, diagnosis and treatment of diabetic foot ulcers: Best practice updated. Wound Care Canada. 2006;4(1):R39-51.</li> <li>14. Snyder RJ, Cardinal M, Dauphinee DM, et al. A post-hoc analysis of reduction in diabetic foot ulcer size at 4 weeks as a predictor of healing by 12 weeks. Ostomy Wound Management. 2010;56(3):44-</li> </ol>

	<p>50. 15. Bolton L. Chronic wounds and delayed healing risk. Wounds. 2010;22(6):8-12.</p>
<p><b>Related Tools</b> <b>(NOTE: these tools and their instructions can be found on the SWRWCP's website: <a href="http://swrwoundcareprogram.ca">swrwoundcareprogram.ca</a>)</b></p>	<ul style="list-style-type: none"> <li>• The SWRWCP's Diabetic/Neuropathic Foot Ulcer Assessment and Management Algorithm</li> <li>• Initial Wound Assessment Form</li> <li>• Procedure: Initial Wound Assessment Form</li> <li>• Nestle Mini Nutritional Assessment (MNA<sup>®</sup>) Tool</li> <li>• Procedure: Nestle Mini Nutritional Assessment (MNA<sup>®</sup>) Tool</li> <li>• Interdisciplinary Diabetic/Neuropathic Foot Assessment Form</li> <li>• Procedure: Interdisciplinary Diabetic/Neuropathic Foot Assessment Form</li> <li>• International Working Group on the Diabetic Foot Diabetic Foot Risk Classification System and Associated Interventions</li> <li>• NPUAP PUSH Tool 3.0</li> <li>• Procedure: NPUAP PUSH Tool 3.0</li> <li>• Bioburden Assessment Tool</li> <li>• Procedure: Bioburden Assessment Tool</li> <li>• Guideline: Assessment and Management of Bacterial Burden in Acute and Chronic Wounds</li> <li>• Guideline: Assessment and Management of Moisture Balance in Acute and Chronic Wounds</li> <li>• Guideline and Procedures: Wound Debridement (excluding conservative sharp debridement)</li> <li>• Guideline and Procedure: Conservative Sharp Wound Debridement</li> <li>• University of Texas Staging System for Diabetic Foot Ulcers</li> <li>• Procedure: University of Texas Staging System for Diabetic Foot Ulcers</li> <li>• Determining Healability Tool</li> <li>• Procedure: Determining Healability Tool</li> <li>• Guideline: The Management of People with Diabetic/Neuropathic Foot Ulcers</li> </ul>