BPR BRIEFS

Diabetic Foot Ulcers

This BPR Brief is an abridged version of the **Best Practice Recommendations for the Prevention and Management of Diabetic Foot Ulcers.** In alignment with a global health-care perspective, Wounds Canada is committed to provide support to patients to help them adapt to and self-manage their condition in the face of social, physical and emotional challenges. This document uses the Wound Prevention and Management Cycle (WPMC) (Figure 1) as the basis for clinical decision making. For clinicians, this document is meant as a cue for treatment; it provides non-inclusive examples listed below each recommendation. For policy makers, it highlights (in ***bold italics***) actions and policies that support best practice.

Wounds Canada follows a population health strategy for wound care that enables us to address the entire range of individual and collective factors that determine health, including:

- Better health: health of the general population improved; behavioral, social, economic and environmental determinants addressed; preventative care rewarded
- Better health care: patient-centred, reliable, safe, evidence-based treatment; care managers co-ordinate total health-care delivery; evidence-based treatment with outcome tracking
- Better value: costs and cost improvements monitored; readmissions to hospital reduced; early interventions to reduce per patient cosst implemented; unnecessary or duplicate procedures eliminated; information management technologies utilized.

For more information on content, levels of evidence or tools related to a particular recommendation, click on the links provided.

We strongly recommend that before using this BPR Brief the user read the full best practice recommendation (BPR) document. To obtain a copy of the full document, go to: www.woundscanada.ca/docman/public/health-care-professional/bpr-workshop/895-wc-bpr-prevention-and-management-of-diabetic-foot-ulcers-1573r1e-final/file.

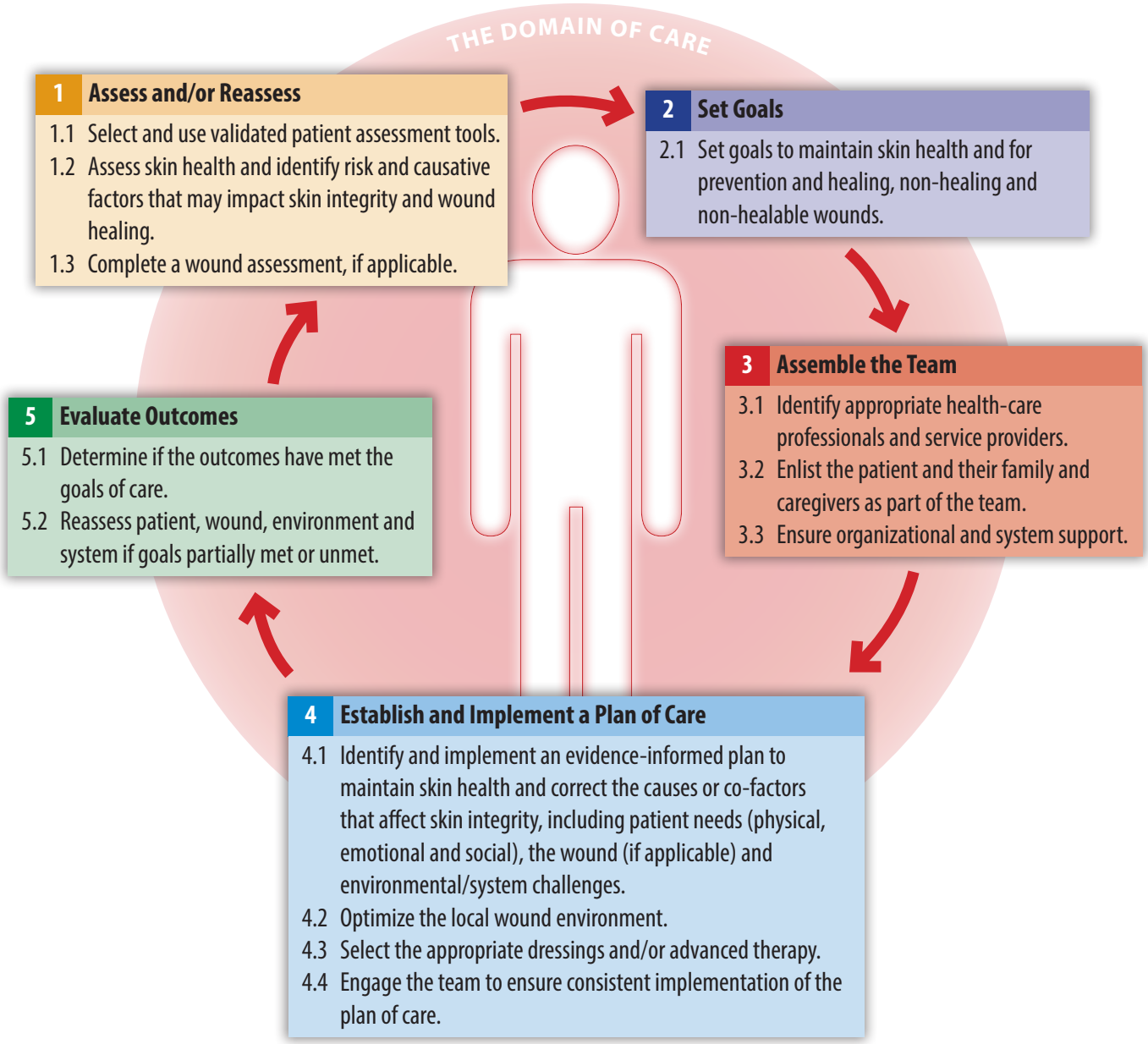
Introduction

Foot health should be a major consideration for people with diabetes and for those who care for them. Foot complications in this high-risk population can lead to a cascade of complications, potentially resulting in loss of limb and life. The lifetime risk for foot ulceration in people with diabetes is higher, at 19–35%, compared with the general population, with a yearly incidence in higher income countries of 2.4%.

The CIHI states "diabetes accounts for about two-thirds of lower limb amputations in Canada" CIHI data from 2020 to 2023 indicates that there are approximately 7,720 hospitalizations each year related to diabetes-associated lower limb amputations, with 3,080 involving major leg amputations. These cases often result in extended hospital stays, averaging days per admission, with each hospitalization costing around $47,000. Collectively, the healthcare costs associated with diabetic foot ulcers and amputations amount to $750 million annually.

Disclaimer: *This document provides a brief clinical enabler for the content provided in the relevant chapter(s) of Best Practice Recommendations for Skin Health and Wound Management 2025. It is not intended to provide comprehensive information on the given topic(s). For more complete information on specific best practice recommendations, refer to the full publication at: https://www.woundscanada.ca/news/752-bpr-new*

Figure 1: Wound Prevention and Management Cycle (WPMC)



For the complete version of Best Practice Recommendations for the Prevention and Diabetic Foot Ulcers, visit here.

1 Assess and/or Reassess

1.1 Select and use validated patient assessment tools.
1.2 Assess skin health and identify risk and causative factors that may impact skin integrity and wound healing.
1.3 Complete a wound assessment, if applicable.

Assessment must occur to determine the causes and factors that may impact skin integrity and wound healing. Patient assessment includes history and current health status; skin status (and wound status, if applicable); environmental factors and system factors. If, after the WPMC has been completed, goals of care have not been fully met, reassessment must take place, followed by the rest of the recommendations in the WPMC steps. ***Assessment tools need to be available and in use in all care settings, supported by staff education and policy.***

1.1 Select and use validated patient assessment tools

There are multiple tools to consider, such as Inlow's 60-Second Diabetic Foot Screen, which addresses four key areas: 1. assess skin health and nail changes, 2. peripheral neuropathy (Figure 2), 3. peripheral arterial disease (Table 1), 4. bony deformity and footwear. By using this tool clinicians are able to provide risk assessment, risk stratification and care recommendations. The Diabetes Distress Scale and the World Health Organization's WHO-5 Well-being Index are also available.

1.2 Identify risk and causative factors that may impact skin integrity and wound healing

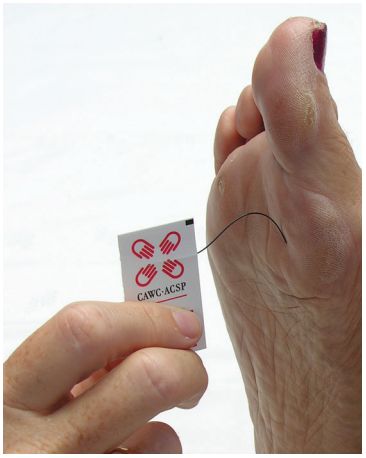
1.2.1 Physical

Admission tools standardized for all patients need to be available to identify risk and causative factors, supported by staff education and policy. Assessment must address the following:

- First, it is essential to identify individuals with an 'at-risk foot' before complications arise. This involves assessing risk factors such as neuropathy, PAD and foot deformities and the patient's ability to engage in self care activities.
- Second, regular examination of the feet in at-risk individuals is key for early detection of potential issues that could lead to ulceration.
- Third, structured, repeated education is emphasized, targeting patients, their care partners, family members and health-care professionals. Education focuses on raising awareness about diabetic foot risks, self-management, mental health, preventative care and the importance of early intervention.
- Fourth is the critical element of providing recommendations to patients about accessing and wearing appropriate footwear (seasonal). They should also be dissuaded from soaking their feet, as it causes maceration. Footwear protects feet (skin/nails), reduces pressure points and prevents injuries that could lead to pre-ulceration/ulceration.
- Finally, addressing risk factors for ulceration, such as blood glucose levels, skin and nail care, biomechanical abnormalities and footwear issues, forms a critical part of the prevention strategy. These combined efforts aim to significantly reduce the risk of foot ulceration in individuals with diabetes, thereby improving their overall health outcomes.

For the complete version of Best Practice Recommendations for the Prevention and Management of Diabetic Foot Ulcers, visit here.

Figure 2: Monofilament Testing Sites
See Appendix D for additional information on conduction sensation tests (SWMT), the 128 mHz Tuning Fork Vibration Testing, and the Ipswich Touch Test (IpTT) (Light Touch Test).



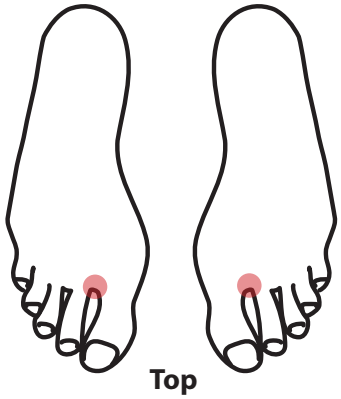


Table 1: Assessing Arterial Flow and Perfusion

Grade	Ankle-Brachial Pressure Index	Toe Brachial Index	Toe Pressure	Waveforms	Transcutaneous Oxygen Pressure (indicating perfusion)
Non-compressible	> 1.40 Be aware of possible **falsely** elevated measures	Preferred when vessels are non-compressible	Preferred when vessels are non-compressible		Preferred when vessels are non-compressible
Normal Range	1.0–1.40	> 0.7	> 70 mmHg	Triphasic	> 40 mmHg
Borderline	0.91–0.99	> 0.6	> 70 mmHg	Biphasic/ monophasic	> 40 mmHg
Abnormal	< 0.90	< 0.6	< 70 mmHg	Biphasic/ monophasic	< 40 mmHg
Mild	0.7–0.9	> 0.4	> 50 mmHg	Biphasic/ monophasic	30–39 mmHg
Moderate	0.41–0.69	> 0.2	> 30 mmHg	Biphasic/ monophasic	20–29 mmHg
Severe	< 0.4 critical limb-threatening ischemia (CLTI)	< 0.2	< 30 mmHg	Monophasic	< 20 mmHg

For the complete version of Best Practice Recommendations for the Prevention and Diabetic Foot Ulcers, visit here.

Assessing the Pathophysiology of the Diabetic Foot

Understanding the pathophysiology of diabetes is very important as it represents an awareness of the physiology of altered health. Pathophysiology deals with the structural and functional changes in the patient's cells, tissues and organs caused by diabetes.

The pathophysiology of diabetic foot complications is directly linked to amputation risk.

Key factors contribute to this risk:

- Peripheral neuropathy (sensory, autonomic, motor) reduces protective foot sensation
- PAD and vascular problems hinder wound healing
- Foot and bony changes affect footwear fit and, along with neuropathy, lead to trauma. Unnoticed, untreated wounds may become infected, further weakened by impaired blood flow, ultimately causing tissue damage,infection, gangrene and, in severe cases, a necessity to amputate to prevent infection spread, other complications and death.

1.2.2 Environmental: Socio-economic, care setting, potential for self-management

A significant risk factor for the development of diabetic foot complications may be the financial cost of managing diabetes. Purchasing protective footwear, prescribed offloading such as pressure redistributing devices (e.g., boots, footwear) for employment, seasonal and leisure activities is unachievable for some patients without financial support. It is therefore essential that an environmental assessment be completed and communicated to the team to determine if the patient has the support in place to engage in a sustainable plan of care and self-management. Other determinants may include language, culture, education level, adequate housing, access to nutritious food and fluids, social networks and access to services or equipment, as well as family knowledge, comfort or capacity in providing support or care. ***It is critical to provide a culturally sensitive environment for care.***

See appendices in DFU BPR for additional screening tools:

- Appendix A: Patient Quality-of-Life Screening Tools
- Appendix B: Care Partner Stress Screening Tools.
- Appendix C: Quality-of-Life Tools and Scales for Persons Experiencing an Amputation and/or Prosthesis

1.2.3 Systems: Health-care support and communication

Determine if an organized, interprofessional, and collaborative approach to care is in place, as it is critical to improve diabetes-associated outcomes. Assess access to funding, availability of services and wound-related products, pressure redistribution (footwear) surfaces, diagnostic services, service delivery personnel and co-ordination of care.

1.3 Complete a wound assessment, if applicable

The choice of wound assessment tool should be consistent across all care settings and supported by education and policy (Table 2). Assess wound and periwound (if present), including callus, size, indications of infection.

The presence or absence of infection and osteomyelitis should be assessed. Assess for infection using the IWII (2022) continuum. Other tests may include swabs, bone biopsy, x-rays, blood tests for inflammatory markers, MRI.

Table 2: Common Classification Systems for Diabetic Foot Ulcers

System	Description	Comments
SINBAD	Site, Ischemia, Neuropathy, Bacterial infection, Area Ulcer, Depth	▪ Simple and quick to use ▪ Requires only clinical examination ▪ Contains necessary information to communicate for triaging purposes
WIfI	Wound Ischemia and Foot Infection Ischemia: based on ABPI or $TcPO_2$, Infection: based on the IWGDF criteria	▪ Estimates the risk of amputation and potential benefit of revascularization ▪ Co-morbidities are not included ▪ With confirmed infection and diagnosed peripheral artery disease, with vascular surgical expertise available this system should be considered
IWGDF/ IDSA	Classification system for the extent of infection and guide for management	▪ Assesses the severity of infection based on levels (1–4) ▪ Diagnosis is based on local or systemic signs and symptoms of inflammation ▪ Adds the presence of bone infection to the level (e.g., 3 [O-osteomyelitis])

2 Set Goals

2.1 Set goals to maintain skin health and for prevention and healing, non-healing and non-healable wounds.

Goals of care need to revolve around the patient. Achieving goals will depend on the interplay of the patients' health status and lifestyle, the availability of resources and the knowledge and ability of care partners to provide optimal interventions. If these factors are not taken into consideration the goals of care may be unrealistic and unrealizable. The team should aim to set goals according to the SMART principle: **S**pecific, **M**easurable, **A**ttainable, **R**elevant and **T**imely.

2.1 Set goals for prevention, healing, non-healing and non-healable wounds

2.1.1 Identify goals based on prevention or healability of wounds

Goals should be relevant to skin and foot health, mental health and well-being and, especially, urgency and timelinessto wound assessment and healing, pain reduction, odour, controlled infection, frequency of dressing changes and need for offloading. Measuring patient outcomes using validated tools is important for research, education and to understand the need for system changes. This includes identifying patient-reported outcome measures (PROMS) that capture the experiences of patients while living with wounds.

2.1.2 Identify quality-of-life and symptom-control goals

Goals may include:

- Awareness of plan of care and the importance of appropriate footwear for prevention
- Lifestyle and environment changed (e.g., smoking cessation, increased physical activity) to reduce risk of re-ulceration within 1 month

For the complete version of Best Practice Recommendations for the Prevention and Diabetic Foot Ulcers, visit here.

A special note on pain: Reducing painful diabetic neuropathy can be a key goal for patients living with diabetic foot complications. According to the Diabetes Canada guidelines, few patients have complete relief of painful symptoms with any treatment, and reduction of 30 to 50% in pain levels is clinically meaningful. For example, a goal might be that neuropathic pain is controlled in 3–7 days with regular reassessments of progress.

Many clinicians struggle with the decisions surrounding limb preservation and need support when exploring all goals of care with the team. It is important to note that some patients may elect to undergo amputation, as the wound may be interfering with their occupation, mental health, social and family support systems, access to care and financial resources.

3 Assemble the Team

3.1 Identify appropriate health-care professionals and service providers.
3.2 Enlist the patient and their family and caregivers as part of the team.
3.3 Ensure organizational and system support.

An integrated team is necessary to implement, adjust and sustain a plan to meet the patient-specific goals. The team should include the relevant health-care professionals and other service providers as required as well as the patient, family and their support system.

3.1 Identify appropriate health-care professionals and service providers

Team members may include a primary care physician, nurse specialized in wound, ostomy and continence care (NSWOC), wound care clinician, chiropodist/podiatrist, orthotist and/or cast technician, vascular specialist, infectious disease physician, orthopedic surgeon, pedorthist or shoe fitter, diabetes educator, dietitian, social worker or spiritual advisor.

3.2 Enlist the patient and their family and caregivers as part of the team

The team must include the patient and/or their family and care partners, with successful prevention and management of diabetic foot ulcers hinging on their collaboration and communication with other members of the team.

3.3 Ensure organizational and system support

Wounds Canada's resources and education align with a population health management model. This model encourages the proactive management of a total population at risk for adverse outcomes through a variety of individual, organizational and cultural interventions to improve patient, clinical and financial outcomes. The interventions are based on a risk-stratified needs assessment of the population, supported by a comprehensive governance infrastructure.

To support this model and secure successful outcomes, decision makers must:

- ***Use globally recognized risk classifications to identify risk, support prevention and develop management strategies by allocating appropriate resources such as therapeutic shoes, patient education and clinical visits.***

For the complete version of Best Practice Recommendations for the Prevention and Management of Diabetic Foot Ulcers, visit here.

- ***Develop policies (federal, provincial/territorial, regional and institutional) based on current evidence that acknowledge and designate human, material and financial resources to support the team in the development of a diabetic foot management program.***
- ***Establish a pathway for referral of people with diabetes with an active foot problem to a multidisciplinary foot care service or foot care service within one working day and triaged within one additional working day.***
- ***Work with community and other partners to develop a process to facilitate patient referral and access to local diabetes resources and health professionals with specialized knowledge in diabetic foot management.***
- ***Work with community and other partners to advocate for strategies and funding for all aspects of preventative foot care, including preventative and treatment footwear.***
- ***Ensure foot care services and programs exist for the assessment and continuing surveillance of those defined as being at increased risk in order to prevent diabetic foot ulcers, and to support management in their health-care or community setting.***
- ***Establish, train and support an integrated team composed of interested, skilled and knowledgeable persons to address and monitor quality improvements in the prevention and management of diabetic foot complications.***
- ***Establish and sustain a communication network between the person with diabetes and the necessary health-care and community systems.***
- ***Audit all aspects of the service to ensure that local practice meets accepted national and international standards of care.***

In order to achieve these steps and improve patient outcomes, establish or adopt a system-wide care pathway.

4 Establish and Implement a Plan of Care

4.1 Identify and implement an evidence-informed plan to maintain skin health and correct the causes or co-factors that affect skin integrity, including patient needs (physical, emotional and social), the wound (if applicable) and environmental/system challenges.
4.2 Optimize the local wound environment.
4.3 Select the appropriate dressings and/or advanced therapy.
4.4 Engage the team to ensure consistent implementation of the plan of care.

Ensure that the plan addresses the goals of care and considers patient needs, factors relating to the skin and wound (if applicable), as well as the environment and the system in which the team is situated.

For the complete version of Best Practice Recommendations for the Prevention and Diabetic Foot Ulcers, visit here.

4.1 Identify and implement an evidence-informed plan to correct the causes or co-factors that affect skin integrity, including patient needs (physical, emotional and social), the wound (if applicable) and environmental/system challenges

Identify recommended treatment strategies based on risk. Interventions may include:

- Patient/care partners taught to assess and provide foot care to both feet daily
- Management of blood glucose levels
- Plantar pressure reduced or eliminated through offloading
- Emotional and/or spiritual support
- Professional shoe fitting for BOTH feet
- Education and support around skin care, diabetes management, lifestyle, environment and activities of daily living (ADL) to reduce risk
- Surgical intervention

4.2 Optimize the local wound environment: Cleansing, debriding, managing bacterial balance and managing moisture balance

4.2.1 Cleansing: Cleanse the wound using non-irritating wound cleansers such as potable water, normal saline or commercially prepared wound cleansers, depending on patient needs (see Wounds Canada's Product Pickers, below).

4.2.2 Debriding: Debridement of non-viable tissue, including peri-ulcer callus, to promote wound closure (if appropriate) (see Wounds Canada's Product Pickers, below).

It's not what you put on the foot, it's what you take off the foot.

4.2.3 Managing bacterial balance: Local, spreading or systemic infection must be treated, including osteomyelitis if present (see Wounds Canada's Product Pickers, below).

- In general, mild soft tissue infections require two weeks of oral treatment.
- For more severe soft-tissue infection or for larger necrotic wounds a longer course may be required.
- For osteomyelitis, four to six weeks of antibiotic therapy (IV and/or oral) is recommended, although the duration varies based on severity, chronicity of infection, need for surgical intervention and clinical response.

4.2.4 Managing moisture balance: Moisture can be contained or provided through appropriate dressing selection and is based on wound exudates, reducing periwound skin excoriation, maceration or desiccation (see Wounds Canada's Product Pickers, below).

Wounds Canada's Product Pickers

Offloading Plantar Pressure in Diabetes: helps users choose the most appropriate offloading device for patients with plantar diabetic foot ulcers based on the needs of the patient, their wound and environmental and system factors

Skin and Wound Clean-up: helps users choose appropriate skin and wound cleansers as well as irrigating solutions

Wound Dressing Formulary: describes common wound dressings in generic categories and lists usage considerations

Wound Dressing Selection Guide: helps users choose appropriate primary and secondary dressings based on common clinical situations and wound care goals

For the complete version of Best Practice Recommendations for the Prevention and Management of Diabetic Foot Ulcers, visit here.

4.3 Select the appropriate dressings and/or advanced therapy

- Select products and therapies that will address the local wound environment needs as well as prevent trauma to fragile/friable tissue—including periwound skin (see Wounds Canada's Product Pickers, below).
- Products should support slight moisture at wound base in healable wounds and should not contribute to increased pressure.

4.4 Engage the team to ensure consistent implementation of the plan of care

Education/instruction should be available to all levels of care providers including the patient and care partners on topics such as:

- Potential risks for diabetic foot ulcers
- Daily foot assessment and care
- Diet and exercise
- Use of offloading devices
- Wound care
- Signs of infection
- Self-management

5 Evaluate Outcomes

5.1 Determine if the outcomes have met the goals of care.

5.2 Reassess patient, wound, environment and system if goals partially met or unmet.

Evaluation of the plan of care should be routine and ongoing to identify whether the plan is effective in meeting the goal(s). If, after the cycle has been completed, the goals of care have not been fully met, reassessment (Step 1) must take place, followed by the rest of the Wound Prevention and Management Cycle steps. ***The plan of care needs to be revisited at discharge to ensure that self-management strategies are in place to support the patient to sustain the outcomes achieved after discharge.***

5.1 Determine if the outcomes have met the goals of care

Determine if the goals of care have been met use of validated and responsive tools as well as patient feedback. Outcomes may include:

- Blood glucose, blood pressure and weight normalized
- Skin and nail hygiene and care routine in place
- Plantar pressures managed with offloading and appropriate footwear
- Skin remains intact and/or wound closes
- Lifestyle and environmental changes established to decrease risk of skin trauma
- Further skin breakdown prevented, wound stable and not infected

5.2 Reassess patient, wound, environment and system if goals are partially met or unmet

When goals of care are not met, go back to Step 1 of the Wound Prevention and Management Cycle. Reassessment needs to consider gaps in care or the patient's ability to adapt to their condition and engage in self-management.

For the complete version of Best Practice Recommendations for the Prevention and Diabetic Foot Ulcers, visit here.

5.3 Ensure sustainability to support prevention and reduce risk of recurrence

Ensure appropriate discharge planning, including educational materials for patients and their care partners. The plan of care needs to be revisited at discharge to ensure that self-management strategies are in place to support the patient to sustain the outcomes achieved after discharge.

If the plan of care is appropriate and the wound is not improving, consider a biopsy to rule out skin disorders or a malignancy.

For additional Wounds Canada resources including monofilaments and brochures, go to:
www.woundscanada.ca/health-care-professional/resources-health-care-pros/boutique

Care at Home Series:

- Caring for Your Feet: Safe Foot Care if You Have Diabetes
- Diabetic Foot Complications: When is it an emergency?
- Caring for Your Wound at Home: Changing a Dressing

Diabetes, Healthy Feet and You:

- https://www.woundscanada.ca/for-patients-public/240-diabetic-healthy-feet-and-you/for-patients-and-public/267-information-about-diabetes-and-healthy-feet

BPR BRIEFS

Diabetic Foot Ulcers

Production:
Editor, Major Publications: Ian Corks
Editorial Assistant: Loukia Papadopoulos BA MSc
Communications & Administrative Coordinator: Zahra Haider
Research Assistant: Sandi D. Maxwell BA(Hon)
Librarian: Jasmine Hoover Bsc MLIS
Art Direction and Layout: Sydney Vajda, Willow Graphix
Medical Illustrator: Robert Ketchen BASc ACIDO

Authors:
Mariam Botros DCh CDE IIWCC MEd
Janet L. Kuhnke RN BA BScN MS NSWOC DrPsychology
Robyn Evans BSc (Hon BioChem) MD CCFP FCFP
John Embil BSc (Hon) MD FRCPC FACP
Christine Morin BSc DPM
Laurie Parsons MD FRCPC
Virginie Blanchette BSc MSc DPM PhD
Amanda Mayo MD MHSc FRCPC
Kathleen Stevens RN PhD
Ranjani Somayaji BScPT MD MPH FRCPC
Kirsten Hansen LPN
Marc Despatis MD MSc FRCSC

Wounds Canada
P.O. Box 35569, York Mills Plaza
North York, ON M2L 2Y4
416-485-2292
www.woundscanada.ca

Printed in Canada · Last updated 2025 09 13 · 1954r3E
DOI: 10.56885/138737gqeknx