

# Feet Can Last a Lifetime

A Health Care Provider's Guide to  
Preventing Diabetes Foot Problems



“Feet Can Last A Lifetime” was produced by the National Diabetes Education Program (NDEP). The NDEP is a partnership among the National Institutes of Health, the Centers for Disease Control and Prevention, and over 200 organizations. Partners who contributed to the development of this national effort include:



American Association of Diabetes Educators



American Diabetes Association



American Orthopaedic Foot & Ankle Society



American Podiatric Medical Association



Centers for Disease Control and Prevention



Health Care Financing Administration



Health Resources and Services Administration



Indian Health Service



Juvenile Diabetes Foundation International



New Mexico Medical Review Association



National Institute of Diabetes and Digestive and Kidney Diseases,  
National Institutes of Health



Pedorthic Footwear Association



Veterans Health Administration



A joint program of the National Institutes of Health  
and the Centers for Disease Control and Prevention

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# Acknowledgments

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    Monofilament Attached (See insert at page 15)

# Introduction

National Hospital Discharge Survey Data indicate that 86,000 people with diabetes in the United States underwent one or more lower-extremity amputations in 1996. Diabetes is the leading cause of amputation of the lower limbs. Yet it is clear that as many as half of these amputations might be prevented through simple but effective foot care practices. The 1993 landmark study, the Diabetes Control and Complications Trial funded by the National Institute of Diabetes and Digestive and Kidney Diseases, conclusively showed that keeping blood glucose, as measured by hemoglobin A1c, as close to normal as possible significantly slows the onset and progression of diabetic nerve and vascular complications, which can lead to lower extremity amputations.

People who have diabetes are vulnerable to nerve and vascular damage that can result in loss of protective sensation in the feet, poor circulation, and poor healing of foot ulcers. All of these conditions contribute to the high amputation rate in people with diabetes. The absence of nerve and vascular symptoms, however, does not mean that a patient's feet are not at risk. Risk of ulceration cannot be assessed without careful examination of the patient's bare feet.

Early identification of foot problems and early intervention to prevent problems from worsening can avert many amputations. Good foot care, therefore, is an essential part of diabetes management – for patients as well as for health care providers.

This kit is designed for primary care and other health care providers who counsel people with diabetes about preventive health care practices, particularly foot care. “Feet Can Last a Lifetime” is designed to help you implement four basic steps for preventive foot care in your practice:

**Early identification** of the high risk diabetic foot.

**Early diagnosis** of foot problems.

**Early intervention** to prevent further deterioration that may lead to amputation.

**Patient education** for proper care of the feet and footwear.

The kit includes all of the tools you need to identify and diagnose foot problems and to educate your patients:

- **A quick-reference pocket card on preventing diabetes foot problems.**
- **A disposable monofilament for sensory testing (attached to pocket card).**
- **Instructions for a visual foot inspection.**
- **Instructions and a reproducible form for an annual comprehensive foot exam.**
- **Prescription forms to facilitate Medicare coverage of therapeutic footwear.**
- **Additional tools to facilitate visual and comprehensive foot exams.**
- **A review of current research.**
- **A list of additional resources.**
- **Patient education materials.**

All of the materials in the kit may be reproduced without permission and shared with colleagues and patients. Feel free to duplicate the copier-ready masters for your practice. To obtain additional copies of this kit, “Take Care of Your Feet for a Lifetime” companion booklets, and other diabetes information for your patients, call 1-800-438-5383 or visit the NDEP website at <http://ndep.nih.gov> on the Internet.

# Tools for Diabetes Foot Exams

# Tools for Diabetes Foot Exams

The following section provides tools to help you and your staff incorporate diabetes foot exams into clinical practice and improve patient outcomes. Research indicates that when tools like these are used by providers, more examinations of lower extremities are performed, patients at risk for amputation are identified, and more patients are referred for podiatric care.<sup>1</sup> Using these tools also will help providers meet the Healthy People 2010 Diabetes Objectives that include increasing the proportion of persons with diabetes who have at least an annual foot examination and reducing the frequency of foot ulcers and lower extremity amputations in persons with diabetes.

Current clinical recommendations call for a comprehensive foot examination at least once a year for all people with diabetes to identify high risk foot conditions. People with one or more high risk foot conditions should be evaluated more frequently for the development of additional risk factors. People with neuropathy should have a visual inspection of their feet at every contact with a health care provider.<sup>2</sup>

In communities where the prevalence and incidence of diabetes foot problems are high, providers may determine that inspecting feet at every visit – for both low and high risk patients – is warranted.

The following tools will help you incorporate diabetes foot exams into your practice.

**Flow Chart for Diabetes Foot Exams** – depicts the desired sequence of exams for patients with low-risk or high-risk feet.

**Diabetes Foot Exam Procedures** – explains the recommended procedures for conducting comprehensive foot examinations and visual inspections.

**Quality of Care Measures** – specifies ways in which documented foot care practices can be audited to indicate short, intermediate, and long-term outcomes. These outcomes can be used by providers to improve diabetes foot care performance.

**Foot Exam Instructions** – provides step-by-step instructions for completing a visual inspection of the feet and an annual comprehensive foot exam.

**Annual Comprehensive Diabetes Foot Exam Form** – documents inspection of skin, hair, and nails, examination of musculoskeletal structures, pedal pulses, and protective sensation, assessment of risk for foot problems, assessment of footwear, and completing a management plan.

See “Additional Tools” for these items:

**High Risk Feet Stickers** – designed for creating brightly colored “high risk” feet stickers on Avery labels to place on the medical record.

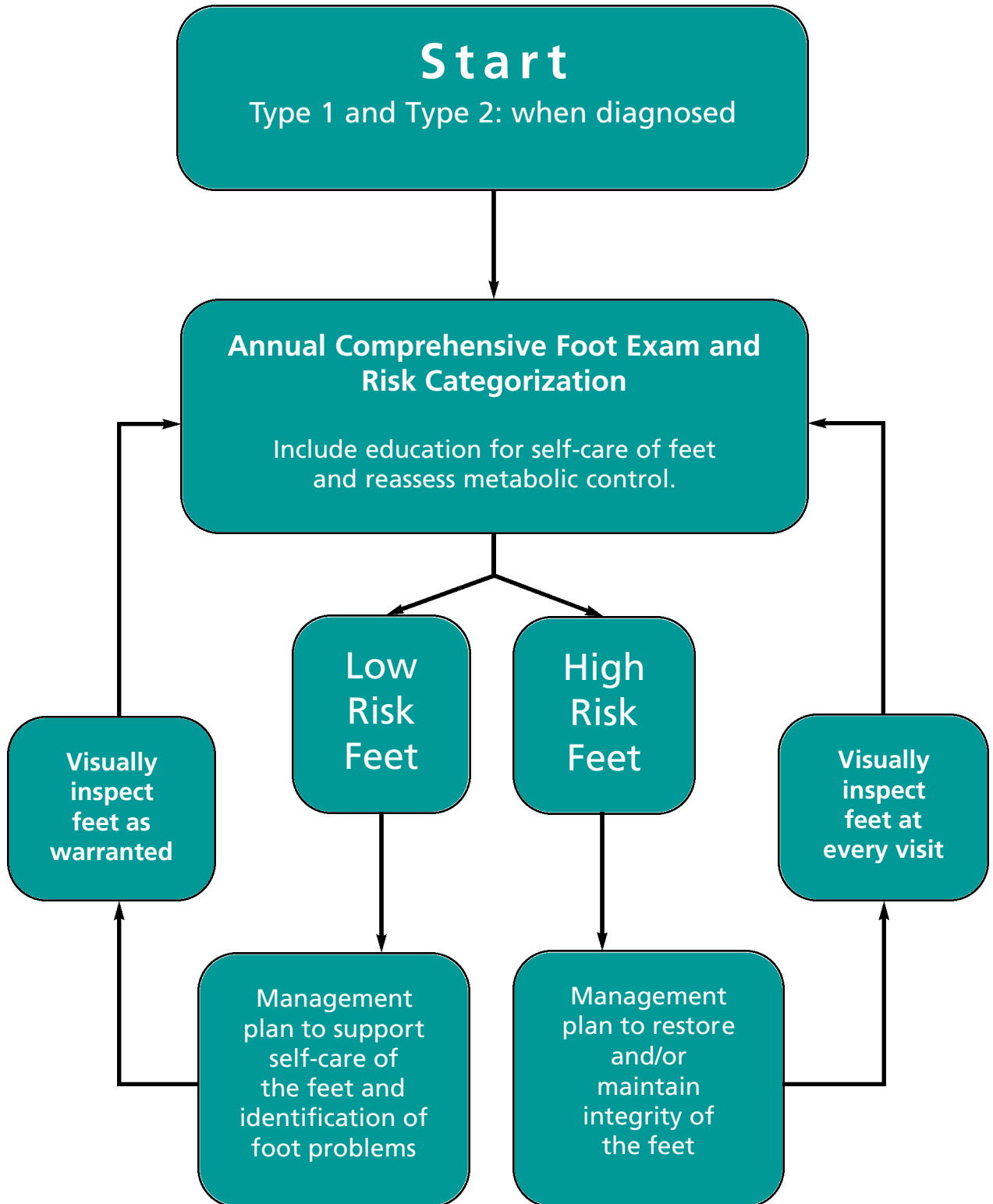
**ExaminationRoomFlyers (English and Spanish)** – encourage patients to remove shoes and socks in preparation for a foot exam.

<sup>1</sup> Litzelman DK, Slemenda CW, Langefeld, CD, et al. Reduction of lower extremity clinical abnormalities in patients with non-insulin-dependent diabetes mellitus. *Annals of Internal Medicine* 119(1):36-41, 1993.

<sup>2</sup> American Diabetes Association: Clinical Practice Recommendations 2000. *Diabetes Care* 2000;23(Suppl.1):S55-56.



# Flow Chart for Diabetes Foot Exams\*



\*Adapted from Population-Based Guidelines for Diabetes Mellitus. Health Promotion and Chronic Disease Prevention Program, Oregon Health Division and Oregon Department of Human Resources, 1997.

# Diabetes Foot Exam Procedures

Category of Patient	Recommended Procedure	Frequency
<p>Persons with:</p> <ul style="list-style-type: none"> <li>• Type 1 diabetes</li> <li>• Type 2 diabetes</li> </ul>	<p><b>Comprehensive foot exam to identify high risk foot conditions.</b> A physician or other trained health care provider should:</p> <ul style="list-style-type: none"> <li>• Assess skin, hair and nails, musculoskeletal structure, vascular status, and protective sensation.</li> <li>• Inspect footwear for blood or other discharge, abnormal wear patterns, foreign objects, proper fit, appropriate material, and foot protection.</li> <li>• Educate about self-care of the feet.</li> <li>• Educate about the importance of blood glucose monitoring including the use of the Hemoglobin A1c test.</li> <li>• Reassess metabolic control.</li> </ul> <p><b>Management plan.</b></p> <ul style="list-style-type: none"> <li>• The subsequent foot care management plan depends on risk category, foot status, and metabolic control.</li> <li>• High risk patients should be referred to a health care provider with training in foot care.</li> </ul>	<p>Annually or when a new abnormality is noted</p>
<p>Persons at:</p> <ul style="list-style-type: none"> <li>• High risk</li> <li>• Low risk</li> </ul> <p>(Refer to chart on page 13 for definitions of risk)</p>	<p><b>Visual foot inspection to identify foot problems.</b> A physician or other trained staff should perform the foot inspection.</p>	<p>At every visit</p> <p>As warranted</p>

# Quality of Care Measures

Clinical Documentation	Measures
<p>The following should be documented in the medical record:</p> <ul style="list-style-type: none"><li>• Results of the annual comprehensive foot examination including risk assessment.</li><li>• Results of the visual foot inspection.</li><li>• Occurrence of patient education.</li></ul>	<p><b>Short-term Impact:</b> A successful program will show an increase in the percentage of the population with diabetes for whom the following is documented:</p> <ul style="list-style-type: none"><li>• A comprehensive foot exam and risk assessment in the past year.*</li><li>• A visual foot inspection at each routine visit in the past year.</li><li>• Foot care education in the past year.</li></ul> <p>A survey could be conducted to ask patients to report when they last had a sensory test, foot inspection, and self-care education in the past year.</p> <p><b>Intermediate-term Impact:</b> A successful program will show a decrease in the incidence of hospital admissions or emergency room visits for lower extremity infections, osteomyelitis, and ulcerations.</p> <p><b>Long-term Outcomes:</b> A successful program will show a decrease in the incidence of distal and proximal lower extremity amputations.</p>

\* This is the only action needed for providers to be in accord with the foot care component of a current set of national quality improvement measures. The Diabetes Quality Improvement Project (DQIP) is a collaborative effort to improve diabetes care and the quality of life for people with diabetes. DQIP uses a set of eight performance measures for diabetes, one of which specifies that "an annual foot exam for adults with diabetes" be documented.

Numerous public agencies (the Department of Defense, the Health Care Financing Administration, the Indian Health Service, and the Veterans Health Administration) and private groups (the American Diabetes Association Provider Recognition Program and the National Committee for Quality Assurance) are using some or all of the DQIP measures.

# Foot Exam Instructions

## Visual Foot Inspection

### Objectives

- Quickly identify an obvious foot problem.
- Document foot inspection findings.
- Determine the need for a comprehensive foot exam.
- Schedule follow-up care and referrals.

### Instructions

A physician, nurse, or other trained staff may complete this inspection.

1. Inspect the foot between the toes and from toe to heel. Examine the skin for injury, calluses, blisters, fissure, ulcers, or any unusual condition.
2. Look for thin, fragile, shiny, and hairless skin—all signs of decreased vascular supply.
3. Feel the feet for excessive warmth and dryness.
4. Remove any nail polish. Inspect nails for thickening, ingrown corners, length, and fungal infection.
5. Inspect socks or hose for blood or other discharge.
6. Examine footwear for torn linings, foreign objects, breathable materials, abnormal wear patterns, and proper fit.
7. If any new foot abnormality is found, the patient should be scheduled immediately for a comprehensive foot examination.
8. Document findings in the medical record.

### Frequency of Inspection

Current clinical recommendations<sup>1</sup> call for visual inspection of the feet:

- At every visit for people who have neuropathy.
- At least twice a year for people with one or more high risk\* foot conditions to screen for the development of additional risk factors.
- At least annually, or more often if warranted, for low risk feet.\*

In populations where the prevalence and incidence of diabetes foot problems are high, providers may determine that inspection of the feet at every visit — for both low and high risk patients — is warranted. To facilitate foot inspection and examination, consider adopting a policy such as **“For all patients with diabetes, remove shoes and socks in preparation for examination.”**

*\*Refer to chart on page 13 for definitions of risk.*

<sup>1</sup> American Diabetes Association: Clinical Practice Recommendations 2000. Diabetes Care 2000;23(Suppl.1): S55-56.

# Annual Comprehensive Diabetes Foot Exam

## Objectives

Completing the comprehensive annual foot exam will enable you to:

- Collect the necessary data to assess feet for risk of complications.
- Determine the patient's risk status.
- Document foot exam findings.
- Determine the need for therapeutic foot wear.
- Determine the need for referral to foot care specialists.
- Schedule self-management education.
- Develop an appropriate management plan.
- Schedule follow-up care and referrals.

## Instructions

Use copies of the annual comprehensive foot exam form to document findings, or incorporate the assessment questions and foot exam into an already existing overall diabetes care plan. A physician or other trained health care provider should conduct the foot exam. Prepare the patient for examination by removing shoes and socks/hose.

### I. Presence of Diabetes Complications *Complete the questions as directed.*

#### Question 1: Does the patient have any history of the macro- and micro-vascular complications of diabetes or a previous amputation?

Patients who have been diagnosed with peripheral neuropathy, nephropathy, retinopathy, peripheral vascular disease or cardiovascular disease are likely to have had diabetes for several years and to be at risk for diabetes foot problems. A positive history of a previous amputation places the patient permanently in the high risk category. Specify the type and date of amputation(s).

#### Question 2: Does the patient have a foot ulcer now or a history of foot ulcer?

A positive history of a foot ulcer places the patient permanently in the high risk category. This person always has an increased risk for developing another foot ulcer, progressive deformity of the foot, and ultimately, lower limb amputation.

### II. Current History *Complete the questions as directed.*

#### Question 1: Is there pain in the calf muscles when walking—i.e., pain occurring in the calf or thigh when walking less than one block that is relieved by rest?

This question is to determine whether the patient experiences intermittent claudication when walking. This pain is an indication of peripheral vascular disease or impaired circulation.

#### Question 2: Has the patient noticed any changes in the feet since the last foot exam?

Patients may notice changes in skin and nail condition or sensory perception if they are performing self-tests with a monofilament.

**Questions 3 and 4: Has the patient experienced any shoe problems? Has the patient noticed any blood or other discharge in socks or hose?**

New shoes can cause unexpected pressure and irritate underlying skin. Blood or other discharge from a foot wound can be the first indication of a severe foot problem.

**Question 5: What is the patient's smoking history?**

Cigarette smoking is a major risk factor for microvascular and macrovascular disease and is likely to contribute to diabetes foot disease.

**Question 6: What is the patient's most recent hemoglobin A1c test result?**

Elevated hemoglobin A1c values are independently associated with a twofold risk of amputation.

**III. Foot Exam** *Complete the questions or fill in the items as directed.*

**Item 1. Condition of the skin, hair and toenails.**

**Questions: Is the skin thin, fragile, shiny and hairless? Are the nails thick, too long, ingrown, or infected with fungal disease?**

- Examine each foot between the toes and from toe to heel. Record any problems by drawing or labeling the condition on the foot diagram. Skin that is thin, fragile, shiny, and hairless is an indication of decreased vascular supply. Loss of sweating function may cause cracking of the skin and fissures that can become infected.
- Remove any nail polish. Check toenails to see if they are ingrown, deformed, or fungal. Thick nails may indicate vascular or fungal disease. If severe nail or dry skin problems are present, refer the patient to a podiatrist or a nurse foot care specialist.

**Measure, draw in, and label the patient's skin condition.**

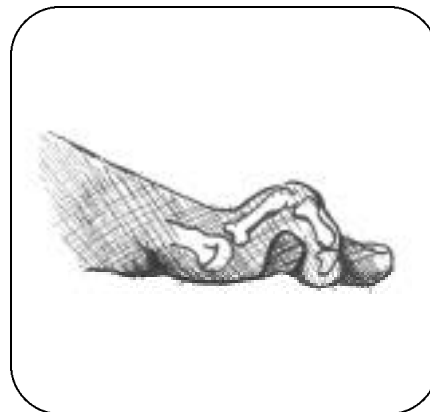
- Measure and draw on the form any corns, calluses, pre-ulcerative lesions (a closed lesion, such as a blister or hematoma), or open ulcers.
- Use the appropriate symbol to indicate what type of lesion is present—i.e., callus, ulcer, redness, warmth, maceration, pre-ulcerative lesion, fissure, swelling or dryness. Maceration is present if the tissue is friable, moist, and soft.
- Label areas that are significantly dry, red, or warm (warmer than other parts of the foot or the opposite foot).

### Item 2: Musculoskeletal Deformities

- Foot deformities may be the result of diabetic motor neuropathy. The function of intrinsic muscles is lost, causing the toe digits to buckle as other muscles become imbalanced. Muscle wasting occurs. The plantar fat pad becomes displaced and the metatarsal heads become more prominent. Limited joint mobility occurs and contributes to the potential for toe and foot injury. If Charcot foot is present, there are severe bone and joint changes and the foot is swollen and warm to the touch.



Hammer Toes



Claw Toes



Bunions  
(Hallux Valgus)



Plantar View of  
Charcot Joint

- Indicate any of the foot deformities listed—i.e., toe deformities, bunions, foot drop, prominent metatarsal heads, or Charcot foot. The more serious deformities are illustrated above. Prominent metatarsal heads are evidence of major deformity such as midfoot collapse.

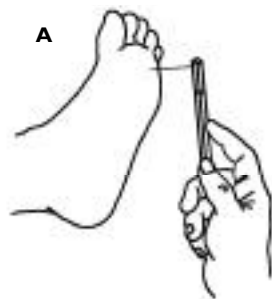
### Item 3: Pedal Pulses

Check the pedal pulses (posterior tibial and dorsalis pedis) in both feet and note whether pulses are present or absent.

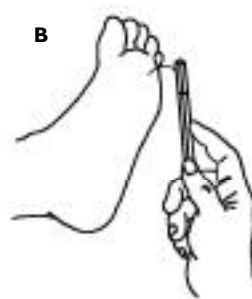
#### Item 4: Sensory Exam

The sensory testing device supplied in this kit is a 5.07 (10-gram) Semmes-Weinstein nylon monofilament mounted on a holder that has been standardized to deliver a 10-gram force when properly applied. Research has shown that a person who can feel the 10-gram filament in the selected sites is at reduced risk for developing ulcers. Because sensory deficits appear first in the most distal portions of the foot and progress proximally in a “stocking” distribution, the toes are the first areas to lose protective sensation.

- The sensory exam should be done in a quiet and relaxed setting. The patient must not watch while the examiner applies the filament.
- Test the monofilament on the patient’s hand so he/she knows what to anticipate.
- The five sites to be tested are indicated on the examination form.
- Apply the monofilament perpendicular to the skin’s surface (see diagram A below).
- Apply sufficient force to cause the filament to bend or buckle, using a smooth, not a jabbing motion (see diagram B below).
- The total duration of the approach, skin contact, and departure of the filament at each site should be approximately 1 to 2 seconds.
- Apply the filament along the perimeter and NOT ON an ulcer site, callus, scar or necrotic tissue. Do not allow the filament to slide across the skin or make repetitive contact at the test site.
- Press the filament to the skin such that it buckles at one of two times as you say “time one” or “time two.” Have patients identify at which time they were touched. Randomize the sequence of applying the filament throughout the examination.
- To order additional disposable or reusable monofilaments, see the Resource List on page 35.



Apply the monofilament perpendicular to the skin’s surface.



Apply sufficient force to cause the filament to bend or buckle.

#### IV. Risk Categorization

Based on the foot exam, determine the patient’s risk category. A definition of “low risk” or “high risk” for recurrent ulceration and ultimately, amputation, is provided in the following chart, along with minimum suggested management guidelines. Individuals who are identified as high risk may require a more comprehensive evaluation.

See the Resource List for obtaining information about other foot exam forms and risk categorization schemes developed by the Bureau of Primary Health Care’s Lower Extremity Amputation Prevention (LEAP) Program, Health Care Financing Administration, and the Veterans Administration.



Once feet are categorized as high risk, it is unlikely that risk status will change unless vascular surgery is performed. At subsequent visits the provider should assess for the development of additional risk factors and focus on maintaining the integrity of the feet and on metabolic control. Patients should be educated about avoidance of injury, use of therapeutic footwear, and preventive self-care.

Risk Category Defined	Management Guidelines
<p><b>Low Risk Patients</b> None of the five high risk characteristics below.</p>	<ul style="list-style-type: none"> <li>• Perform an annual comprehensive foot exam.</li> <li>• Assess/recommend appropriate footwear.</li> <li>• Provide patient education for preventive self-care.</li> <li>• Perform visual foot inspection at provider’s discretion.</li> </ul>
<p><b>High Risk Patients</b> One or more of the following:  <b>Loss of protective sensation</b>  <b>Absent pedal pulses</b>  <b>Foot deformity</b>  <b>History of foot ulcer</b>  <b>Prior amputation</b></p>	<ul style="list-style-type: none"> <li>• Perform an annual comprehensive foot exam.</li> <li>• Perform visual foot inspection at every visit.</li> <li>• Demonstrate preventive self-care of the feet.</li> <li>• Refer to specialists and an educator as indicated. (Always refer to a specialist if Charcot foot is suspected.)</li> <li>• Assess/prescribe appropriate footwear.</li> <li>• Certify Medicare patients for therapeutic shoe benefits.</li> <li>• Place a “High Risk Feet” sticker on the medical record.</li> </ul>
<p align="center"><b>Management Guidelines for Active Ulcer or Foot Infection</b></p>	
<ul style="list-style-type: none"> <li>• Never let patients with an open plantar ulcer walk out in their own shoes. Weight relief must be provided.</li> <li>• Assess/prescribe therapeutic footwear to help modify weight bearing and protect the feet.</li> <li>• Conduct frequent wound assessment and provide care as indicated.</li> <li>• Demonstrate preventive self-care of the feet.</li> <li>• Provide patient education on wound care.</li> <li>• Refer to specialists and a diabetes educator as indicated.</li> <li>• Certify Medicare patients for therapeutic footwear benefits.</li> <li>• Place a “High Risk Feet” sticker on the medical record.</li> </ul>	

## V. Footwear Assessment

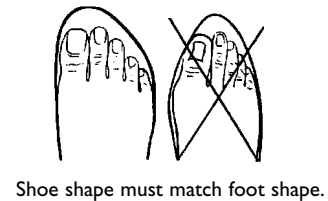
**Question 1. Does the patient wear appropriate shoes?**

**Question 2. Does the patient need inserts?**

**Question 3. Should corrective footwear be prescribed?**

Check inside shoes for foreign objects, torn lining, and proper cushioning. Improper or poorly fitting shoes are major contributors to diabetes foot ulcerations. Counsel patients about appropriate footwear. All patients with diabetes need to pay special attention to the fit and style of their shoes and should avoid pointed-toe and open-toe shoes, high heels, thongs and sandals. Assess the material and construction of footwear. Unbreathable and inelastic materials such as plastic should be avoided. Recommend use of materials such as canvas, leather, suede, and other materials that are breathable and/or elastic. Footwear should be adjustable with laces, Velcro, or buckles. Record the results of your footwear assessment.

Properly fitted athletic or walking shoes are recommended for daily wear. If off-the-shelf shoes are used, make sure that there is room to accommodate any deformities. High risk patients may require depth-inlay shoes or custom-molded inserts (orthoses), depending on the degree of foot deformity and history of ulceration. (See Medicare Coverage of Therapeutic Footwear on page 18.)



## VI. Education

**Question 1: Has the patient had prior foot care and other relevant diabetes education?**

**Question 2: Can the patient demonstrate appropriate foot care?**

Indicate whether the patient has received prior education by checking yes or no in the blank. Patient education about foot care and other aspects of self-care is an essential component of preventive diabetes care. Observe whether the patient can demonstrate appropriate self-care of the feet. Refer for smoking cessation counseling if necessary. Determine whether the patient understands the need for, and results of, hemoglobin A1c tests.

## VII. Management Plan

Complete the management plan, indicating actions for patient education, any diagnostic tests including hemoglobin A1c, footwear recommendations, referrals, and follow-up care.

**Note:** The management of foot problems may be the responsibility of different health care providers. For example, in some communities, certified nurses provide home health services or practice in primary care or foot care clinics to provide specialized diabetes foot care.

# Annual Comprehensive Diabetes Foot Exam Form

Name: \_\_\_\_\_ Date: \_\_\_\_\_ ID#: \_\_\_\_\_

<p><b>I. Presence of Diabetes Complications</b> 1. Check all that apply.</p> <p><input type="checkbox"/> Peripheral Neuropathy  <input type="checkbox"/> Nephropathy  <input type="checkbox"/> Retinopathy  <input type="checkbox"/> Peripheral Vascular Disease  <input type="checkbox"/> Cardiovascular Disease  <input type="checkbox"/> Amputation (Specify date, side, and level)</p> <hr/> <p>Current ulcer or history of a foot ulcer? Y ___ N ___</p> <p><i>For Sections II &amp; III, fill in the blanks with "Y" or "N" or with an "R," "L," or "B" for positive findings on the right, left, or both feet.</i></p> <p><b>II. Current History</b> 1. Is there pain in the calf muscles when walking that is relieved by rest? Y ___ N ___</p>	<p>2. Any change in the foot since the last evaluation? Y ___ N ___</p> <p>3. Any shoe problems? Y ___ N ___</p> <p>4. Any blood or discharge on socks or hose? Y ___ N ___</p> <p>5. Smoking history? Y ___ N ___</p> <p>6. Most recent hemoglobin A1c result _____% _____ date</p> <hr/> <p><b>III. Foot Exam</b> <b>1. Skin, Hair, and Nail Condition</b> Is the skin thin, fragile, shiny and hairless? Y ___ N ___</p> <p>Are the nails thick, too long, ingrown, or infected with fungal disease? Y ___ N ___</p>	<p><i>Measure, draw in, and label the patient's skin condition, using the key and the foot diagram below.</i>  C=Callus U=Ulcer PU=Pre-Ulcer  F=Fissure M=Maceration R=Redness  S=Swelling W=Warmth D=Dryness</p> <p><b>2. Note Musculoskeletal Deformities</b></p> <p><input type="checkbox"/> Toe deformities  <input type="checkbox"/> Bunions (Hallus Valgus)  <input type="checkbox"/> Charcot foot  <input type="checkbox"/> Foot drop  <input type="checkbox"/> Prominent Metatarsal Heads</p> <p><b>3. Pedal Pulses</b> Fill in the blanks with a "P" or an "A" to indicate present or absent.  Posterior tibial Left ___ Right ___  Dorsalis pedis Left ___ Right ___</p>
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**4. Sensory Foot Exam** Label sensory level with a "+" in the five circled areas of the foot if the patient can feel the 5.07 (10-gram) Semmes-Weinstein nylon monofilament and "-" if the patient cannot feel the filament.

Notes



Right Foot

Notes



Left Foot

**IV. Risk Categorization** Check appropriate box.

<input type="checkbox"/> <b>Low Risk Patient</b>	<input type="checkbox"/> <b>High Risk Patient</b>
All of the following:	One or more of the following:
<input type="checkbox"/> Intact protective sensation	<input type="checkbox"/> Loss of protective sensation
<input type="checkbox"/> Pedal pulses present	<input type="checkbox"/> Absent pedal pulses
<input type="checkbox"/> No deformity	<input type="checkbox"/> Foot deformity
<input type="checkbox"/> No prior foot ulcer	<input type="checkbox"/> History of foot ulcer
<input type="checkbox"/> No amputation	<input type="checkbox"/> Prior amputation

**V. Footwear Assessment** Indicate yes or no.

1. Does the patient wear appropriate shoes? Y \_\_\_ N \_\_\_

2. Does the patient need inserts? Y \_\_\_ N \_\_\_

3. Should corrective footwear be prescribed? Y \_\_\_ N \_\_\_

**VI. Education** Indicate yes or no.

1. Has the patient had prior foot care education? Y \_\_\_ N \_\_\_

2. Can the patient demonstrate appropriate foot care? Y \_\_\_ N \_\_\_

3. Does the patient need smoking cessation counseling?  
Y \_\_\_ N \_\_\_

4. Does the patient need education about HbA1c or other diabetes self-care? Y \_\_\_ N \_\_\_

Provider Signature \_\_\_\_\_

**VII. Management Plan** Check all that apply.

**1. Self-management education:**  
Provide patient education for preventive foot care. Date: \_\_\_\_\_  
Provide or refer for smoking cessation counseling. Date: \_\_\_\_\_  
Provide patient education about HbA1c or other aspect of self-care. Date: \_\_\_\_\_

**2. Diagnostic studies:**

Vascular Laboratory  
 Hemoglobin A1c (at least twice per year)  
 Other: \_\_\_\_\_

**3. Footwear recommendations:**

None  
 Athletic shoes  
 Accommodative inserts  
 Custom shoes  
 Depth shoes

**4. Refer to:**

Primary Care Provider  
 Diabetes Educator  
 Podiatrist  
 RN Foot Specialist  
 Pedorthist  
 Orthotist  
 Endocrinologist  
 Vascular Surgeon  
 Foot Surgeon  
 Rehab. Specialist  
 Other: \_\_\_\_\_

**5. Follow-up Care:**  
Schedule follow-up visit. Date: \_\_\_\_\_

Detach and reproduce for your practice

# Medicare Information

# Medicare Coverage of Therapeutic Footwear for People With Diabetes

Medicare provides coverage for depth-inlay shoes, custom-molded shoes, and shoe inserts for people with diabetes who qualify under Medicare Part B. Designed to prevent lower-limb ulcers and amputations in people who have diabetes, this Medicare benefit can prevent suffering and save money.

## How Individuals Qualify

The M.D. or D.O. treating the patient for diabetes must certify that the individual:

1. Has diabetes.
2. Has one or more of the following conditions in one or both feet:
  - history of partial or complete foot amputation
  - history of previous foot ulceration
  - history of pre-ulcerative callus
  - peripheral neuropathy with evidence of callus formation
  - poor circulation
  - foot deformity
3. Is being treated under a comprehensive diabetes care plan and needs therapeutic shoes and/or inserts because of diabetes.

## Type of Footwear Covered

If an individual qualifies, he/she is limited to one of the following footwear categories within each calendar year:

1. One pair of depth shoes and three pairs of inserts
2. One pair of custom-molded shoes (including inserts) and two additional pairs of inserts.

Separate inserts may be covered under certain criteria. Shoe modification is covered as a substitute for an insert, and a custom-molded shoe is covered when the individual has a foot deformity that cannot be accommodated by a depth shoe.

## What the Physician Needs to Do

1. The **certifying physician** (the M.D. or D.O.) overseeing the diabetes treatment must review and sign a “Statement of Certifying Physician for Therapeutic Shoes” (see form on page 19).

2. The **prescribing physician** (the D.P.M., D.O., or M.D.) must complete a footwear prescription (see form on page 19). Once the patient has the signed statement and the prescription, he/she can see a podiatrist, orthotist, prosthetist or pedorthist to have the prescription filled. The supplier will then submit the Medicare claim form (Form HCFA 1500) to the appropriate Durable Medical Equipment Regional Carrier (DMERC), keeping copies of the claim form and the original statement and prescription.

*Note that in most cases, the certifying physician and the prescribing physician will be two different individuals.*

## Patient Responsibility for Payment

Medicare will pay for 80% of the payment amount allowed. The patient is responsible for a minimum of 20% of the total payment amount and possibly more if the dispenser does not accept Medicare assignment and the dispenser’s usual fee is higher than the payment amount. The maximum payment amounts per pair as of 2000 are:

	Total Amount Allowed	Amount Covered by Medicare
Depth shoes	\$126.00	\$100.80
Custom-molded shoes	\$378.00	\$302.40
Inserts or modifications	64.00	\$51.20

## ICD-9 codes

Because this benefit is available only to people with diabetes, an appropriate ICD-9 code (250.00-250.93) is required when completing the Statement of Certifying Physician.

# Statement of Certifying Physician for Therapeutic Footwear

Patient Name: \_\_\_\_\_ HIC #: \_\_\_\_\_

Address: \_\_\_\_\_

I certify that all of the following statements are true:

1. This patient has diabetes mellitus. —ICD-9 Code: \_\_\_\_\_  
(ICD-9 diagnosis codes 250.00-250.93)
2. This patient has one or more of the following conditions (*check all that apply*):
  - History of partial or complete amputation of the foot
  - History of previous foot ulceration
  - Peripheral neuropathy with evidence of callus formation
  - Foot deformity
  - History of pre-ulcerative callus
  - Poor circulation
3. I am treating this patient under a comprehensive plan of care for his/her diabetes.
4. This patient needs special shoes (depth or custom-molded shoes) and/or inserts because of his/her diabetes.

## Certifying Physician Information

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ DEA # \_\_\_\_\_

Medicare UPIN # \_\_\_\_\_ Medicaid Provider # \_\_\_\_\_

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# Prescription Form for Therapeutic Footwear

*(Prescribing physician may be different from certifying physician.)*

Patient Name: \_\_\_\_\_ HIC# : \_\_\_\_\_

Address: \_\_\_\_\_

Diagnosis: \_\_\_\_\_

Change to be effected: \_\_\_\_\_

Additional relevant information, such as systemic conditions or allergies to specific materials:

## Prescribing Physician Information

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ DEA # \_\_\_\_\_

Medicare UPIN # \_\_\_\_\_ Medicaid Provider # \_\_\_\_\_

# Reference and Resource Materials

# Prevention and Early Intervention for Diabetes Foot Problems: A Research Review

Research articles, most published since 1990, were identified and retrieved through computerized searches of the National Library of Medicine database (MEDLINE). This review is not meant to summarize the entire literature on the subject, but rather to present a condensation and consolidation of the major findings concerned with prevention of and early intervention for diabetes foot disease.

## The Scope of the Problem

### National Goals for Diabetes Foot Care

During their lifetime, 15 percent of people with diabetes will experience a foot ulcer and between 14 and 24 percent of those with a foot ulcer will require amputation (1). National Hospital Discharge Survey data for 1996 indicate that 86,000 people with diabetes underwent one or more lower-extremity amputations (2). Diabetes is the leading cause of amputation of the lower limbs. Yet it is clear that at least half of these amputations might be prevented through simple but effective foot care practices.

Healthy People 2010, the U.S. Department of Health and Human Services' report (3) that specifies health objectives for the nation, calls for:

- a) An increase in the proportion of people with diabetes aged 18 years and older who have at least an annual foot examination (baseline 55 percent, target 75 percent).
- b) A decrease in foot ulcers due to diabetes (baseline and target figures are "developmental").
- c) A decrease in lower extremity amputations due to diabetes (baseline 11 per 1,000, target 5 per 1,000 per year). This objective is based on the estimate that at least 50 percent of the amputations that occur each year in people with diabetes can be prevented through screening for high risk patients and the provision of proper foot care.

### Ethnic Groups At Higher Risk for Amputation

Analysis of a statewide California hospital discharge database indicated that in 1991, the age-adjusted incidence of diabetes-related lower extremity amputations per 10,000 people with diabetes was 95.3 in African Americans, 56.0 in non-Hispanic whites, and 44.4 in Hispanics. Amputations were 1.72 and 2.17 times more likely in African Americans compared with non-Hispanic whites and Hispanics, respectively. Hispanics had a higher proportion of amputations (82.7 percent) associated with diabetes as opposed to other causes of amputation, than did African Americans (61.6 percent) or non-Hispanic whites (56.8 percent) (4).

Age-adjusted amputation rates in south Texas in 1993 were 60.68 per 10,000 for non-Hispanic whites, 94.08 for Mexican Americans, and 146.59 for African Americans (5). The incidence of amputations for Pima Indians in Arizona was 24.1 per 1,000 person-years compared to 6.5 per 1,000 person-years for the overall U.S. population with diabetes (6). Increased awareness and identification of diabetes-related foot disease is especially important in these high-risk ethnic groups.

The President's Initiative to Eliminate Racial and Ethnic Disparities in Health is focused on eliminating serious disparities in health access and outcomes experienced by racial and ethnic minority populations in six areas of health. Diabetes is one of the targeted areas. A near term goal for this initiative is to reduce lower extremity amputation rates among African Americans with diabetes by 40 percent (7).



### Frequency of Foot Examinations

Foot examinations, both by people with diabetes and their health care providers, are critical preventive actions. In the 1989 National Health Interview Survey (NHIS), 52 percent of all people with diabetes stated that they checked their feet at least daily, but 22 percent stated that they never checked their feet. More self-exams were reported by insulin-treated individuals than those who did not use insulin (8).

Estimates of the frequency of provider-performed annual foot examinations vary. Data from the Centers for Disease Control's Behavioral Risk Factor Surveillance System (BRFSS) indicate that 55 percent of adults with diabetes ages 18 years and older reported having at least an annual foot examination by a health care provider in 1998 (mean value from 39 states) (9). BRFSS data from 1995 to 1998 indicate that 86.3 percent of people with diabetes had seen a physician or other health care provider for diabetes care in the previous 12 months; 67.7 percent of adults with diabetes reported having had their feet examined in the previous 12 months (10). In an earlier nationwide survey, primary care physicians reported performing semi-annual foot examinations for 66 percent of patients with type 1 diabetes and for 52 percent of patients with type 2 diabetes (11).

### Personal and Financial Costs

Diabetes foot disease is a major burden for both the individual and the health care system and may increase as the population ages. The total annual cost for the more than 86,000 amputations is over \$1.1 billion dollars. This cost does not include surgeons' fees, rehabilitation costs, prostheses, time lost from work, and disability payments (12). Regarding quality of life, a study

of patients with diabetes showed that those with foot ulcers scored significantly lower than those without foot ulcers in all eight areas of a measure of physical and social function (13).

Foot disease is the most common complication of diabetes leading to hospitalization. In 1995, foot disease accounted for 6 percent of hospital discharges listing diabetes and lower extremity ulcers, and in 1995 the average hospital stay was 13.7 days. The average hospital reimbursement from Medicare for a lower-extremity amputation in 1992 was \$10,969, and from private insurers it was \$26,940. At the same time, rehabilitation was reimbursed at a rate of \$7,000 to \$21,000 (14).

Prevalence estimates for ulcers in diabetes patient populations vary. Fifteen percent of all patients with diabetes in a population-based study in southern Wisconsin experienced ulcers or sores on the foot or ankle. The prevalence increased with age, especially in patients who were aged 30 or under at diagnosis of diabetes (15). In a large staff-model health maintenance organization, the incidence, outcomes and costs of treatment for foot ulcers were studied over two years in a group of patients with diabetes. In this population, the incidence was nearly 2 percent per year and the direct medical care cost for a 40- to 65-year-old male with a new foot ulcer was \$27,987 over the two years after diagnosis (16).

After an amputation, the chance of another amputation of the same extremity or of the opposite extremity within 5 years is as high as 50 percent. The 5-year mortality rate after lower extremity amputation ranges from 39 to 68 percent (8).

## Causative Factors

### Risk Factors for Lower Extremity Amputation (LEA)

Peripheral neuropathy, peripheral vascular disease, and prior foot ulcer are independently associated with risk of LEA (17,18). A 1996 study of Pima Indians with diabetes confirmed this finding and included the presence of foot deformity as another independent risk factor (19). The presence of plantar callus also is highly predictive of subsequent ulceration in patients with diabetic neuropathy and is more predictive of ulceration than increased plantar foot pressures (20).

Hyperglycemia is an additional risk factor. In a 1996 study, Finnish researchers determined risk factors for amputation in 1,044 middle-aged patients with type 2 diabetes who were followed for up to 7 years. Because the incidence of amputation was similar in both sexes (5.6 percent men and 5.3 percent women), all statistical analyses were carried out combining men and women. This study found that high fasting plasma glucose levels at baseline, high HbA1c, and the duration of diabetes were independently associated with a two-fold risk of amputation. Signs of peripheral neuropathy, bilateral absence of vibration sense, and bilateral absence of Achilles tendon reflexes were two times more frequent in patients with amputation than in patients without amputation (21).

The Diabetes Control and Complications Trial (DCCT), a ten-year clinical study that concluded in 1993, demonstrated that keeping blood glucose levels as close to normal as possible slows significantly the onset and progression of eye, kidney, and nerve diseases caused by diabetes. The study showed that any sustained lowering of the blood glucose helps, even if the person has a history of poor control (22). A follow-up study indicated that the reduction in risk for microvascular changes persisted for at least four years after the

DCCT ended, despite increasing blood glucose levels (23). The United Kingdom Prospective Diabetes Study reported that type 2 patients randomized to intensive blood glucose control with sulfonylureas or insulin had a significantly lower prevalence of neuropathy at 9 and 15 years than patients randomized to conventional therapy (24).

Evidence for a relationship between use of tobacco and/or alcohol and ulcers or amputation is variable (14). Cigarette smoking, however, is a major risk factor for microvascular and macrovascular disease and is likely to contribute to diabetes foot disease (25). People with foot and ankle neuropathy are more likely to have gait abnormalities, postural instability, and sway, and are 15 times more likely to suffer some type of injury during ambulation than those without neuropathy (26,27,28,29,30).

The most important risk factors for diabetes foot problems, however, are peripheral neuropathy and peripheral vascular disease, as noted by Shaw and Boulton. There also is a complex interplay between these abnormalities and a considerable number of other contributory factors such as limited mobility, altered foot pressures, glycemic control, ethnic background, and more. The authors stress, however, that identification of patients at high risk for ulceration is simple and preventive care should focus on patient education (31).

### Causal Pathways for Lower Extremity Amputations (LEA)

A study of the causal pathways for LEA in patients with diabetes identified the most common sequences of events. Seventy-three percent of the amputations in study subjects were a result of the causal sequence

of minor trauma, cutaneous ulceration, and wound-healing failure. Estimates of the cumulative proportions of various causes indicated that 86 percent of amputations were attributed to initial minor trauma causing tissue injury (32).

### **Precipitating or Pivotal Events**

In the causal pathway study noted above, foot trauma was caused by shoe-related repetitive pressure leading to cutaneous ulceration in 36 percent of all cases, accidental cuts or wounds in 8 percent, thermal trauma (frost-bite or burns) in 8 percent, and decubitus ulceration in 8 percent (32). Similarly, another study found that in one-third of diabetic amputees with peripheral arterial disease, the initial lesion was self-induced. The most common cause of self-injury was ill-fitting new shoes; the second most common cause was cutting toenails improperly (33). Other investigators identified external precipitating factors in 84 percent of study patients with foot ulcers. The most common factors were ill fitting shoes/socks, acute mechanical trauma, stress ulcer, and paronychia (34).

### **Identifying Patients at Risk**

#### **Tools to Identify High Risk Feet**

The importance of identifying individuals at risk for foot ulceration and LEA and the need for preventive foot care practices for both the provider and the patient are significant (35). Identifying patients' risk category for foot ulceration helps to determine the frequency needed for provider foot examinations, the level of emphasis on self-care of the feet, and patient responsibilities (36).

Several simple tools have been developed to identify people at high risk for ulceration. These tools include a patient report and a clinical examination to quantify

loss of peripheral sensation (using a monofilament or vibration perception threshold testing), and to detect the presence of foot deformities, peripheral vascular disease, and prior foot ulcers (37,38). The largest study to use the Semmes-Weinstein 5.07 (10-gram) monofilament is the Strong Heart Study of 3,638 American Indians living in Arizona, North and South Dakota, and Oklahoma (39). Use of these measures has been shown to predict subsequent ulceration and amputation (37).

In one study, during annual patient examinations, researchers recorded the presence of a foot deformity, history of lower extremity ulceration or amputation, and the ability to perceive the Semmes-Weinstein 5.07 (10-gram) monofilament at eight sites on the plantar surface of each foot. Based on the findings, subjects were classified as sensate or insensate and placed in one of four risk categories. Insensitivity to the monofilament occurred in 68 (19 percent) of the patients screened. Over a 32-month follow-up period, 41 of these patients developed ulcerations and 14 amputations occurred (37).

The recommended number of monofilament applications needed to assess the risk for ulceration varies. One study shows that an 8-site 5.07 (10-gram) monofilament examination (4 sites per foot) can be completed in 40 seconds and has 90 to 95 percent of the sensitivity of a 16-point examination. The four-site-per-foot examination specifies two of the touch sites – the first and third metatarsal heads. For the other two sites, the authors suggest any toes or other metatarsal heads. All sites should be free of calluses (40). Another study suggests that reasonable sensitivity and specificity (80 and 86 percent, respectively) to detect patients with an insensate foot can be

achieved when the plantar aspect of either the first or fifth metatarsal head cannot feel a 5.07 (10-gram) monofilament (41).

A self-administered sensory test with a 5.07 (10-gram) monofilament may be useful to identify high risk feet. In a study that compared patient and provider sensory test findings for 145 subjects, 68 percent of patients self-tested without the assistance of another person, and patient/provider disagreement with findings occurred in 12 percent (18) of cases. Sensory loss, previously undetected by providers, was found in 16 percent (23) of patients. Self-administered tests provided patients an opportunity to become more active team members and resulted in early detection of insensate feet. The authors caution that self-testing should not replace regular foot evaluation by a health care provider (42).

## Provider and Patient Education

### Education Reduces Lower Extremity Abnormalities

In a randomized, controlled study, researchers provided intervention patients with foot care education, behavioral contracts, and telephone and postcard prompts. The researchers placed foot care prompts on the medical record, and provided practice guidelines and flow sheets to clinicians assigned to those patients. Results showed that primary care physicians in the intervention group conducted more examinations of lower extremities, identified those at risk for amputation, and referred more patients for specialized foot care. Patients in the intervention group received more patient education, made more changes in appropriate self-care behaviors, and had fewer short-term foot problems than patients in the control group (43).

Ollendorf et al. developed a model to estimate the economic benefits of amputation prevention strategies targeted at individuals with a history of foot ulcer over a period of three years. Estimates were based on an

average lifetime cost of \$48,152 for lower extremity amputation. For an estimated 679 individuals during the first year, the total potential economic benefits of strategies to reduce amputation risk ranged from 2–3 million dollars over three years (\$2,900 to \$4,442 per person with a history of foot ulcer). Benefits were highest for patient/provider educational interventions, followed by therapeutic shoe coverage, and multidisciplinary care (44).

Multidisciplinary team care can be a cost-effective method for foot screening, preventive care, and treatment of active ulcers (43,45,46). One study of team care for high risk patients with a history of foot ulcers found a 2-year foot ulcer incidence rate of 30 percent in the intervention group compared with 58 percent in the standard treatment group. The team involved physicians, nurses, podiatrists and shoe specialists (47).

A study of 639 patients in a rural primary care clinic showed significant reductions in lower extremity amputations. This prospective study of American Indians with diabetes, compared three consecutive 2- to 3-year time periods:

- a “standard care” period during which patients received foot care at the discretion of the primary care provider;
- a “public health” period during which patients were screened for foot problems and high risk individuals received foot care education and protective footwear;
- and a “stepped care” period during which comprehensive guidelines for foot management were adapted to their practice and implemented by a 6-person primary care team.

The average annual amputation incidence per 1,000 diabetic person-years was 29 in the first period, 21 in the second, and 15 in the third, an overall 48 percent reduction (48).

A study was conducted at six Veterans Affairs Medical Centers to determine how accurately and reproducibly primary care providers could carry out a screening examination (including use of a monofilament) for foot ulcer risk among patients with diabetes. Forty primary care providers (including non-physicians) examined 147 patients; 2 primary care providers examined each patient; and a foot care specialist also examined 88 patients. The results showed that the foot examination was reproducible among primary care providers and accurate when compared with a foot care specialist, except in the assessment of foot deformity and pedal pulses (49). When training providers to conduct foot exams, particular attention to these skills may be important.

### Components of Effective Self-Management

Findings from several studies indicate effective components of patient education that contribute to successful patient outcomes. These include giving detailed foot care recommendations, requesting patient commitment to self-care, demonstrating and practicing foot care procedures, and communicating a persistent message that foot complications can be avoided by self-care. In comparing the effectiveness of intensive versus conventional education, researchers found that patients in the intensive group showed greater improvement in foot care knowledge, better compliance with the recommended foot care routine, improved satisfaction with foot care, and greater reduction in the number of foot problems requiring treatment (50,51).

Foot care recommendations and demonstrations should include: washing, drying, and inspecting the feet; applying an emollient; cutting toenails; treating minor foot problems; selecting suitable footwear;

dealing with temperature extremes; and contacting the physician if problems do not resolve quickly.

Lubricating the feet may be a simple yet very important way to help prevent foot ulcers. Over a one-year period, study patients who infrequently lubricated their feet were 3.1 times more likely to have a foot lesion than those who frequently lubricated their feet (52).

Patients with high risk feet should inspect them twice a day. Those with peripheral neuropathy, vascular disease, or eye disease should not attempt to cut their own toenails as this can lead to serious self-inflicted injury.

It is important for a health care provider or diabetes educator to review with the patient all written take-home instructions for self-care of the feet (36). In a program for African Americans, patients reported that the most useful parts of a take-home packet were the patient instruction booklet, the large hand mirror, and the foot care knowledge self-test with explanations of the answers (53).

Researchers found that the frequency of desired self-care behaviors improved when patients were given specific instructions stated as precisely as possible such as “dry between toes,” “file calluses,” and “never go bare-foot” rather than more general instructions such as “avoid injury to your feet” (43). Patients should never be allowed to walk on open plantar ulcers since continuous application of mechanical load will prevent healing. Walking aids, footwear modifications, or other interventions must be used to relieve weight (54).

Step-by-step guidelines have been published to assist providers to conduct patient education workshops on foot care including how to attract participants, promote the workshop, develop the agenda, identify appropriate speakers, and conduct a post-workshop evaluation (55).

## Clinical Issues

### Provider Foot Care Practices

A documented annual comprehensive foot examination is included in a set of national quality improvement measures for diabetes care as part of the Diabetes Quality Improvement Project (DQIP) (56). Numerous public agencies (the Department of Defense, the Health Care Financing Administration (HCFA), the Indian Health Service, and the Veterans Health Administration) and private groups (the American Diabetes Association Provider Recognition Program and the National Committee for Quality Assurance) are using some or all of this set of eight DQIP performance measures. HCFA is responsible for Medicare and managed care plans that serve Medicare beneficiaries, as well as Medicaid programs. DQIP measures are likely to increase the frequency of documented annual foot exams by health care providers.

A study of provider practices found that clinicians were likely to prescribe preventive foot care behaviors when they were aware of a patient's high risk for LEA as evidenced by prior history of foot ulcer. Clinician awareness of two other major risk factors (peripheral neuropathy or peripheral vascular disease), however, did not increase preventive care practices. The study's authors concluded that physicians and patients need periodic reminders to identify patients in all high risk categories for ulcer or amputation and to schedule visits for foot care and education in self-care (17). To prevent unnecessary progression of foot problems, proactive communication is recommended between foot care specialists and providers less familiar with diabetes foot care management, as well as timely referral from primary care providers to specialists as necessary (1).

### Self-care Limitations in the Elderly

Barriers to carrying out daily foot care noted by elderly study subjects included lack of motivation,

forgetfulness, vision problems, joint and knee problems, and family responsibilities (53). The ability of elderly people to identify foot lesions was investigated further in a matched comparison, controlled study. Findings showed that 43 percent of patients with a history of foot ulcers could not reach and remove simulated lesions on their toes; over 50 percent of the older subjects reported difficulty trimming their toe nails; and only 14 percent had sufficient joint flexibility to allow inspection of the plantar aspect of the foot. It can be concluded that elderly people who are unable to perform daily self-care of the feet would benefit more from regular foot care given by others than from intensive education (57).

### Exercise

In people with diabetes, regular exercise can lower blood glucose, improve insulin sensitivity, raise HDL cholesterol, improve blood flow and heart muscle strength, enhance fibrinolysis, control weight, increase muscle mass, and provide an overall sense of well-being. Because of these effects, regular exercise may also delay the onset of neuropathy and atherosclerosis. People who have had type 1 diabetes for more than 10 years, or type 2 diabetes for more than 5 years, should be screened for medical risk prior to beginning an exercise program. While the presence of neuropathy does not rule out exercise, care should be taken not to worsen soft tissue and joint injury or cause foot ulcers or bone injury. Stretching muscles before exercise is important to prevent ligament strain. Swimming or bicycling are recommended forms of exercise because they avoid abrasion to the feet (58). Attention to the construction and fit of footwear is essential.



## Special Footwear for the Insensate Foot

### Repetitive Stress and Special Footwear

People with intact sensation respond to repetitive stress that occurs during walking either by shifting the pressure to another part of the foot, by modifying the way the foot meets the ground, by resting, or by checking their shoes for problems. With the loss of peripheral sensation, however, many people with diabetes have no indication of lower extremity pain, pressure, or trauma and do not take measures to modify repetitive pressures. Lack of feeling makes shoe-fitting assistance essential.

Properly-constructed and well-fitting shoes and shoe inserts can minimize localized stresses by redistributing forces during walking. Besides helping patients keep feet healthy, shoes and orthoses also can help prevent diabetes complications. Investigators in a recent study found that after healing of the initial ulcer, re-ulceration occurred after one year in 58 percent of patients who resumed wearing their own footwear, compared to 28 percent of those who wore therapeutic footwear (59).

Shoe color can contribute to thermal injury of the insensate foot when shoes are worn in the sun for a prolonged period (2 to 3 hours). One study showed that after 30 minutes of exposure to radiant heat, the mean increase in temperature was between 7.8 and 13.6 degrees Fahrenheit greater in a black leather walking shoe than in a similar white shoe (60).

Another study compared the prevalence and severity of foot deformities and the development of ulceration in people with diabetes after a great toe amputation. Due to altered pressure distribution, the foot with great toe amputation developed more frequent and more severe deformities of the lesser toes and metatarsophalangeal joints compared to the other intact foot. Because these patients were at high risk for subsequent ulceration, the use of special inserts and footwear to protect the feet was highly recommended (61).

### Footwear and the Medicare Shoe Benefit

Professionally fitted shoes and prescription footwear are an important part of the overall treatment of the insensate foot because they aid in preventing limb loss. Footwear should relieve areas of excessive pressure, reduce shock and shear, and accommodate, stabilize, and support deformities. The type of footwear provided will depend on the patient's foot structure, activity level, gait, and footwear preference (1).

Shoes should be long enough, and have room in the toe area and over the instep. Shoes with laces or Velcro allow adjustment for edema and deformities. Most people with early neuropathic changes can wear cushioned commercial footwear such as walking or athletic shoes. When used in conjunction with an off-the-shelf soft accommodative insole (plastazote/urethane viscoelastic), comfort shoes and athletic footwear were as effective as prescribed depth shoes in reducing certain metatarsal and great toe pressures (62). Some people, however, may need the pressure areas redistributed with custom orthotics that often require prescribed depth footwear.

Custom-molded shoes, depth shoes, inserts, and shoe modifications can be fitted and furnished by a podiatrist, orthopedic foot surgeon, orthotist, or pedorthist. Depth-inlay shoes provide more room for toe deformities and for the insertion of customized insoles. Extra-wide shoes provide more room for bunions and other abnormalities. Rocker sole shoes reduce pressure under metatarsal heads and toes. They are particularly useful for reducing the risk of ulceration in patients with a stiff and rigid first metatarsal joint (63).

Since 1993, the Medicare footwear benefit has made special footwear available to more patients than ever before. To obtain coverage, patients must have physician certification that they are at high risk for ulceration or amputation, receive a written footwear prescription from a podiatrist or other qualified physician,

and obtain the footwear from a qualified provider or supplier who will then file the appropriate claim forms (64). Utilization of the Medicare benefit was low in 1995 for three states studied – Washington, Alaska, and Idaho. Altogether, less than one percent of beneficiaries with diabetes meeting the appropriate criteria for the footwear benefit had a therapeutic footwear claim (65). Clearly, there is an opportunity to increase awareness of the availability of this benefit and how to obtain reimbursement.

## Conclusion

The staggering human and economic costs of diabetes foot disease may be reduced significantly with increased practice of several simple preventive care measures designed to prevent foot ulcers and lower extremity amputations. Routine annual foot

exams to identify high risk feet facilitate early interventions to help reduce the incidence of the most common precipitating events including injury and footwear-related trauma to the insensitve foot. The key elements of preventive care include: annual examination of the feet by health care providers to determine risk factors for ulceration; subsequent examination of high risk feet at each patient visit; patient education about daily self-care of the feet; use of proper footwear; and careful glucose management. National recommendations and objectives support the application of these practices based on the strong and time-tested evidence for the prevention of lower extremity ulcers and amputations. These national objectives can serve as a galvanizing call to action for policy makers, health care providers, and people with diabetes to make diabetes foot care and prevention a high priority.



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# Resource List

## 1. Monofilaments for Sensory Testing

To order monofilaments, call or write to any of the following organizations:

### Center for Specialized Diabetes Foot Care

PO Box 373-405 Hayden St.  
Belzoni, MS 39038  
Phone: (800) 543-9055  
Single 5.07 (10gm): \$10.00

### Connecticut Bioinstruments Inc.

P.O. Box 2567  
Danbury, CT 06813  
Phone: (800) 336-1935  
Single 5.07 (10 gm): \$15

### Lower Extremity Amputation Prevention (LEAP) Program

HRSA/BPHC/DPSP  
4350 East-West Highway, 9th Floor  
Bethesda, MD 20814  
Phone: (888) 275-4772  
Internet: <http://www.bphc.hrsa.gov/leap>  
Disposable 5.07 (10gm): Free (maximum 50)  
(A sample is attached to the pocket card inside this kit)

### Medical Monofilament Manufacturing, LLC

116 Long Pond Road  
Plymouth, MA 02360  
Phone: (508) 746-7877  
Internet: <http://www.medicalmonofilament.com>  
Disposable 5.07 (10gm): Prices available upon request

### North Coast Medical, Inc.

18305 Sutter Blvd.  
Morgan Hill, CA 95037-2845  
Phone: (800) 821-9319  
Set of six assort. size: \$124.95  
Single 5.07 (10gm): \$24.95

### Sensory Testing Systems

1815 Dallas Drive, Suite 11A  
Baton Rouge, LA 70806  
Phone: (225) 923-1297  
Single 5.07 (10gm): \$10.00

### Smith & Nephew Inc.

P.O. Box 1005  
Germantown, WI 53022-8205  
Phone: (800) 558-8633  
Set of five assort. size: \$99.99  
Single 5.07 (10gm): \$19.99

## 2. National Diabetes Education Program (NDEP)

– a partnership among the National Institutes of Health, the Centers for Disease Control and Prevention, and over 200 organizations  
Internet: <http://ndep.nih.gov>  
To order materials, call: (800) 438-5383

### Feet Can Last a Lifetime – A Health Care Provider's Guide to Preventing Diabetes Foot Problems

Copies of this kit are available through the National Diabetes Information Clearinghouse by calling (800) 438-5383. In addition, the entire text of the kit may be downloaded from the NDEP website at <http://ndep.nih.gov> on the Internet.

### Take Care of Your Feet for A Lifetime

This 12-page, easy-to read, illustrated patient booklet provides step-by-step instructions for proper foot care. It includes a tear-off reminder sheet of foot care tips and a patient "To Do" list. Available in English and Spanish on the NDEP website at <http://ndep.nih.gov> on the Internet.

## 3. National Diabetes Information Clearinghouse (NDIC)

of the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)  
1 Information Way  
Bethesda, MD 20892-3560  
Internet: <http://www.niddk.nih.gov/health/diabetes/ndic>  
(301) 654-3327

### Foot Care and Diabetes 1993 - Present.

The database from the diabetes subfile of the Combined Health Information Database (CHID) can be searched for foot care and diabetes information. Each citation includes the author, title, source, a summary, where to obtain the item, and its price. Formats of audiovisuals are provided. CHID is available at <http://chid.nih.gov> on the Internet.

### Diabetic Neuropathy: The Nerve Damage of Diabetes

This 12-page fact sheet for patients describes the causes, symptoms, and major types of neuropathy, provides information about diagnosis and treatment, as well as the findings of the Diabetes Control and Complications Trial as they relate to neuropathy.

## 4. American Association of Diabetes Educators

100 West Monroe St., Suite 400

Chicago, IL 60603

Internet: <http://www.aadenet.org>

Phone: (800) TEAM-UP4

(312) 424-2426 for main location

*Use the toll-free number to receive the names and phone numbers of three certified diabetes educators in the location you specify.*

### Diabetes Foot and Skin Care

This is one of a series of informative videotapes for patient education. *To order or for a free preview, call (800) 432-8433.*

## 5. American Diabetes Association

1701 N. Beauregard St.

Alexandria, VA 22311

Internet: <http://www.diabetes.org>

Phone: (800) 232-6733 for publications

(800) 342-2383 for general diabetes information

(703) 549-1500 – National Office

*Information about local activities including materials also is available by calling your local American Diabetes Association at 1-888-DIABETES.*

### Clinical Practice Recommendations

- The American Diabetes Association: Standards of Medical Care for Patients With Diabetes Mellitus. Diabetes Care 23 (suppl.1):S32-S42, 2000.
- The American Diabetes Association: Preventive Foot Care in Patients With Diabetes Mellitus. Diabetes Care 23 (suppl.1):S55-S56, 2000.

### Diabetes, What to Know Head to Toe

This patient brochure briefly covers self-care of the heart, eyes and feet and is available in English and Spanish.

### First Thing First Series: Foot Care (5093-10)

This patient brochure briefly describes the importance of and methods for proper foot care.

### 101 Foot Care Tips for People with Diabetes (4834-01)

This book for people with diabetes provides information about keeping the feet healthy and preventing foot complications.

## 6. American Orthopaedic Foot & Ankle Society

1216 Pine Street, Suite 201

Seattle, WA 98101

Phone: (206) 223-1120

Fax: (206) 223-1178

E-mail: [aofas@aofas.org](mailto:aofas@aofas.org)

Internet: <http://www.aofas.org>

*You may order a copy of any brochure by sending a self-addressed, stamped envelope to the address above or download a copy from the internet.*

### Guidelines for Referral

This journal reprint outlines five criteria for patient referral to an orthopedist to prevent deterioration or complications of a diabetic ulcer.

### The Diabetic Foot

This patient brochure answers basic questions about diabetic foot problems and offers information on day-to-day-care to help prevent them.

### Patient Brochures

These are short brochures to help patients prevent injury and care for their feet:

- How to Care for Your Diabetic Feet
- The Diabetic Foot and Risk: How to Prevent Losing Your Leg
- Shoes and Orthotics for Diabetics
- Charcot Joints, or Neuropathic Arthropathy
- Foot Ulcers and the Total Contact Cast

### Newsletter

“FootCare” is a quarterly newsletter offering advice on foot care topics for people with diabetes.

## 7. American Podiatric Medical Association

9312 Old Georgetown Road

Bethesda, MD 20814-1698

Internet: <http://www.apma.org>

To order materials, call (301) 581-9200

### Your Podiatric Physician Talks about Diabetes

This patient brochure covers preventive foot care, warning signs, and the role of the podiatric physician in foot care.

### Don't Let Diabetes Get a Foothold on Your Life

This patient brochure presents an overview of potential foot problems affecting people with diabetes. It discusses diabetes warning signs, preventive foot care, and the role of the podiatric physician in the management of diabetes foot problems.

## 8. Centers For Disease Control and Prevention– Division of Diabetes Translation Clearinghouse

P.O. Box 8728

Silver Spring, MD 20910

Internet: <http://www.cdc.gov/diabetes>

To order, call toll free (877) CDC-DIAB (232-3422)

### Take Charge of Your Diabetes

This 76-page spiral-bound book for adults with diabetes focuses on the value of glucose control, team work, community and family support, and simple preventive steps for helping to promote health and prevent complications (Chapter 9 covers foot care). Yellow record sheets are provided for recording tests that should be done once a year and at every visit.

## The Prevention and Treatment of Complications of Diabetes: A Guide for Primary Care Practitioners

This 93-page book describes ways to help the primary care provider prevent, detect, and treat major diabetes complications. An office guide in the appendix offers a brief synopsis of the recommendations contained in the body of the text. The guide may be photocopied and placed in the medical record. *This book is available only on the Internet.*

## The Economics of Diabetes Mellitus: An Annotated Bibliography

This bibliography contains most of the important economic studies currently available regarding the direct health care costs related to diabetes and interventions to reduce the burden of diabetes.

## Diabetes Surveillance, 1997

This report documents the number of diabetes-related hospital discharges with lower extremity amputations as a reported procedure between 1990 and 1994.

## 9. Health Care Financing Administration

To order materials, call the Texas Medical Foundation at (888) 691-9167.

### Foot Exam Materials for Academic Detailing

A tool kit for implementing an academic detailing intervention for increasing foot exams. The kit includes: an implementation plan for the Peer Review Organization, guidelines for the detailer, principles of academic detailing, podiatry consult request and report forms, exam documentation sheet, chart stickers, references and resources, and a 10-minute video of a foot exam.



### MedQuest Data Abstraction and Analysis System, User's Guide for DQIP

This toolkit includes an introductory video, detailed DQIP specifications and appendix, instructions for installing and using the MedQuest software, instructions for medical record abstraction and running a pre-programmed analysis report, and ten medical records for practice abstraction.

### Compendium of Diabetes Best Practices

This compendium includes peer reviewed studies and quality improvement projects that document successful interventions in screening, monitoring and treatment of diabetic patients for improved outcomes. Tables address barriers to high quality diabetes care and effective interventions. Many of the studies and quality improvement projects relate specifically to foot care improvements. *Also available at [www.hcfa.gov/quality/3r.htm](http://www.hcfa.gov/quality/3r.htm) on the Internet.*

### Diabetes Interventions Toolkit

This kit provides examples of resources and tools that have been used successfully by clinicians, diabetes educators, peer review organizations, managed care organizations and others to improve care. It includes flowsheets, algorithms, patient education materials, practitioner toolkits and abstraction tools. Many of the tools specifically address foot care. *Also available at <http://www.takingondiabetes.org/bestpractices/index> on the Internet.*

## 10. Indian Health Service

5300 Homestead Road, NE

Albuquerque, NM 87110

Internet: [http://www.ihs.gov/medical\\_programs/diabetes](http://www.ihs.gov/medical_programs/diabetes)

*To order, call (505) 248-4182.*

### Standards of Diabetic Foot Care

This 43-page manual for providers includes minimum standards for diabetes foot care within the scope of each IHS facility.

### The Basic Approach to the Diabetic Foot

This 41-page booklet for community health representatives covers foot problems, foot examinations, and how to care for the diabetic foot and patients with a foot ulcer.

### A Basic Approach to Caring for the Feet of People with Diabetes

This three-part, 75-slide set teaches providers about foot care. Part 1: Injury can lead to amputation; Part 2: Examining the feet of a person with diabetes; Part 3: Foot care for all people with diabetes. (Slides are a companion piece to "The Basic Approach to the Diabetic Foot" listed above.)

### Booklets

These illustrated patient booklets, each 10-13 pages, are written at or below 6th grade level.

- Taking Care of Your Feet
- Footwear for People with Diabetes

### Brochures

These are short patient information brochures.

- Take Care of Your Feet
- Numbness to Legs, Hands, and Foot/Pain
- Pain Related to Nerve Damage

### Practice Guidelines

Practice guidelines in the form of a decision tree that addresses criteria for diagnosis, risk-factor assessment, treatment options, therapeutic targets, monitoring, and follow-up. *To request a copy contact:*

Stephen J. Rith-Najarian M.D.

Bemidji Area Indian Health Service

Diabetes Program

522 Minnesota Avenue

111 Federal Building, Bemidji, MN 56601

E-mail: [Srithnajarian@nchs.com](mailto:Srithnajarian@nchs.com).



## 11. Juvenile Diabetes Foundation International

120 Wall Street  
New York, NY 10005  
Internet: <http://www.jdf.org>  
*To order call: (800) JDF-CURE*

### Diabetes and Foot Care

This brochure provides general information about the effects of diabetes on feet, special self-care, the prevention, detection, and proper treatment of foot care problems, and the physician's role in foot examination and treatment.

## 12. Lower Extremity Amputation Prevention (LEAP) Program

HRSA/BPHC/DPSP  
4350 East-West Highway, 9th Floor  
Bethesda, MD 20814  
Internet: <http://www.bphc.hrsa.gov/leap>  
*To order the LEAP materials listed below, call the BPHC Information Clearinghouse at (888)275-4772 or preview and download them from the LEAP website.*

### Free Brochure and Monofilament

Each LEAP monofilament comes with a brochure on how to perform a sensory foot exam. Single copies are available free to individuals. Clinicians and other health care organizations may obtain up to 50 monofilaments free of charge. Multiple requests from the same organization will not be honored.

Several versions of the LEAP brochure are available on the website—in normal and large print and in English and in Spanish. Other languages will be added. These brochures have no copyright restrictions and may be downloaded and reproduced.

### Diabetes Foot Screen Forms

Both an abbreviated and a comprehensive foot screen form have no copyright and may be downloaded from the website and reproduced.

### Video on Foot Assessment of the Adult Patient with Diabetes

This 5-minute video, produced in collaboration with Kaiser Permanente of the Mid-Atlantic States, shows a clinician discussing the importance of foot screening for patients with diabetes, explains the components of the LEAP Program, and demonstrates how to perform a simple foot screen using the LEAP monofilament.

This video can be viewed directly on the website. Call (888) 275-4772 to order a free VHS copy.

### Patient Education Booklet

Designed to go with the patient video, this simple, easy-to-read booklet reinforces the importance of proper foot care for a patient with diabetes who has lost protective sensation. It is illustrated with simple pictures and can be adapted to include the clinician's telephone number. Several translations of this booklet are available on the website.

### Video for Clinicians

This 10-minute video, produced by the Texas peer review organization, is a tool for clinicians and demonstrates how to perform a comprehensive foot examination for patients with diabetes. This video can be viewed directly on the website. Free single VHS copies are available.

## 13. Pedorthic Footwear Association

7150 Columbia Gateway Dr., Suite G  
Columbia, MD 21046-1151  
Internet: <http://www.pedorthics.org>  
Phone: (800) 673-8447

### Diabetes and Pedorthics: Conservative Foot Care

This patient brochure provides information on pedorthics and footwear, including the role that a certified pedorthist plays in preventing and alleviating diabetes foot complications.

### Pedorthics: Foot Care Through Proper Footwear

This brochure briefly explains the field of pedorthics and its practice of designing footwear to accommodate serious foot problems.

### **The Pedorthic Dispenser**

Properly fitting therapeutic footwear requires special skills and care. The pedorthic profession focuses on the design, fit, and modification of shoes and related foot appliances. In addition to pedorthists, other dispensers include podiatrists, orthotists, and prosthetists.

*For a listing of pedorthists, send a self-addressed stamped envelope to the Board for Certification in Pedorthics, 7150 Columbia Gateway Drive, Suite G, Columbia, MD 21046, or contact the website [www.cped.org](http://www.cped.org) on the Internet.*

## **14. Veterans Health Administration**

Jeffrey M. Robbins, DPM  
Director, VHA Headquarters, Podiatry Service  
Louis Stokes Cleveland DVAMC  
10701 East Boulevard  
Cleveland, Ohio 44106  
*To order, call (216) 231-3286 or  
fax (216) 231-3446  
E-mail: [jeffrey.robbins@med.va.gov](mailto:jeffrey.robbins@med.va.gov)*

### **Free Filaments**

Monofilaments are available free of charge to the entire Veterans Health Administration.

### **Foot Screening Tool**

This one-page screening tool documents a foot examination and risk status using monofilament sensory testing.

# Patient Education Materials

# Foot Care Tips

## Take Care of Your Feet for a Lifetime.

### 1. Take care of your diabetes.

- Work with your health care team to keep your blood sugar within a good range.

### 2. Check your feet every day.

- Look at your bare feet every day for cuts, blisters, red spots, and swelling.
- Use a mirror to check the bottoms of your feet or ask a family member for help if you have trouble seeing.

### 3. Wash your feet every day.

- Wash your feet in warm, not hot, water every day.
- Dry your feet well. Be sure to dry between the toes.

### 4. Keep the skin soft and smooth.

- Rub a thin coat of skin lotion over the tops and bottoms of your feet, but not between your toes.

### 5. Smooth corns and calluses gently.

- If your feet are at low risk for problems, use a pumice stone to smooth corns and calluses. Don't use over-the-counter products or sharp objects on corns or calluses.

### 6. If you can see and reach your toenails, trim them each week or when needed.

- Trim your toenails straight across and file the edges with an emery board or nail file.

### 7. Wear shoes and socks at all times.

- Never walk barefoot.
- Wear comfortable shoes that fit well and protect your feet.
- Feel inside your shoes before putting them on each time to make sure the lining is smooth and there are no objects inside.

### 8. Protect your feet from hot and cold.

- Wear shoes at the beach or on hot pavement.
- Wear socks at night if your feet get cold.
- Don't test bath water with your feet.
- Don't use hot water bottles or heating pads.

### 9. Keep the blood flowing to your feet.

- Put your feet up when sitting.
- Wiggle your toes and move your ankles up and down for 5 minutes, 2 or 3 times a day.
- Don't cross your legs for long periods of time.
- Don't smoke.

### 10. Be more active.

- Plan your physical activity program with your doctor.

### 11. Check with your doctor.

- Have your doctor check your bare feet and find out whether you are likely to have serious foot problems. Remember that you may not feel the pain of an injury.
- Call your doctor right away if you find a cut, sore, blister, or bruise on your foot that does not begin to heal after one day.
- Follow your doctor's advice about foot care.

### 12. Get started now.

- Begin taking good care of your feet today.
- Set a time every day to check your feet.
- Complete the "To Do" list on the back of this page and...

**take care of your feet  
for a lifetime.**

# To Do List

Make plans now to take care of your feet for a lifetime.

Check each item when completed.

By when:

- Use the list of foot care tips on the reverse side and put it where I will see it every day. \_\_\_\_\_
- Get a pair of nail clippers if my doctor recommends it. \_\_\_\_\_
- Get an emery board and a pumice stone if my doctor recommends them. \_\_\_\_\_
- Buy soft, cotton or wool socks. \_\_\_\_\_
- Buy a pair of shoes that fit well and cover my feet. \_\_\_\_\_
- Give away shoes that don't fit. \_\_\_\_\_
- Place slippers beside my bed to wear when I get out of bed. \_\_\_\_\_
- Get a mirror to help me see the bottoms of my feet. \_\_\_\_\_
- Ask for help from a family member or caregiver if I can't see my feet. \_\_\_\_\_
- Keep my next doctor's appointment. \_\_\_\_\_
- Ask my doctor if I qualify for special shoes covered by Medicare or other insurance plans. \_\_\_\_\_
- Ask my doctor or nurse to inspect my feet at every visit. \_\_\_\_\_
- Plan my physical activity program with my doctor. \_\_\_\_\_
- Stop smoking. \_\_\_\_\_

# Additional Tools



# SHOES *and* SOCKS

*take 'em off!*



**IF YOU HAVE DIABETES**

Have your doctor check your feet.



# MEDIAS *y* ZAPATOS

*¡Sáque los!*



**SI TIENE DIABETES**

Pídale a su médico que le vea los pies.



A joint program of the  
National Institutes of Health and  
the Centers for Disease  
Control and Prevention



National Institute of Diabetes and  
Digestive and Kidney Diseases



U.S. DEPARTMENT OF HEALTH  
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