How to do a 3-minute diabetic foot exam

This brief exam will help you to quickly detect major risks and prompt you to refer patients to appropriate specialists.

Foot ulcers and other lower-limb complications secondary to diabetes are common, complex, costly, and associated with increased morbidity and mortality.1-6 Unfortunately, patients often have difficulty recognizing the heightened risk status that accompanies the diagnosis of diabetes, particularly the substantial risk for lower limb complications.7 In addition, loss of protective sensation (LOPS) can render patients unable to recognize damage to their lower extremities, thus creating a cycle of tissue damage and other foot complications. Strong evidence suggests that consistent provision of foot-care services and preventive care can reduce amputations among patients with diabetes.7-9 However, routine foot examination and rapid risk stratification is often difficult to incorporate into busy primary care settings. Data suggest that the diabetic foot is adequately evaluated only 12% to 20% of the time.10

In response to the need for more consistent foot exams, an American Diabetes Association (ADA) task force lead by 2 of the authors of this article (AB and DA) created the Comprehensive Foot Examination and Risk Assessment.5 This set the standard for the detailed investigation of lower limb pathology by a specialist, but was not well suited for other practice settings, including primary care. One reason is that it would be difficult to complete the comprehensive examination during a typical 15-minute primary care office visit. In addition, certain examination parameters require the use of neurologic and vascular assessment equipment and training not available in all health care settings.11

With these thoughts in mind, we set out to develop an exam that could be done by a wide range of health care providers—one that takes substantially less time to complete than a comprehensive exam and eliminates common barriers to frequent assessment. The exam, which we’ll describe here, consists of 3 components: taking a patient history, performing a physical exam, and providing patient care.

**Practice Recommendations**

› Screen for lower extremity complications at every visit for all patients with a suspected or confirmed diagnosis of diabetes. (A)

› Consider implementing a risk-based referral system to connect primary screening with a specialist’s care. (A)

<table>
<thead>
<tr>
<th>Strength of recommendation (SOR)</th>
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<tbody>
<tr>
<td>A Good-quality patient-oriented evidence</td>
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<tr>
<td>B Inconsistent or limited-quality patient-oriented evidence</td>
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<tr>
<td>C Consensus, usual practice, opinion, disease-oriented evidence, case series</td>
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This exam takes substantially less time to complete than a comprehensive exam and eliminates common barriers to frequent assessment.

The patient history (1 minute)
Patients may present with concerns about their feet, but may not be able to differentiate between benign and threatening symptoms. A thorough medical history can identify factors that may increase patients’ risk of developing lower-limb complications. Reviewing the patient’s medical history also can help guide the physical exam.

Review the patient’s diabetic history, blood glucose control, and previous diabetic complications. Ask patients about their history of peripheral vascular disease, quality of peripheral protective sensation, and previous lower-limb interventions and operations (TABLE 1). Patients with diabetes and suboptimal glycemic control have an increased risk for LOPS, chronic and recalcitrant ulcers, and wound infections. Additionally, patients with diabetes and a previous lower extremity amputation are at high risk for re-ulceration. Lastly, nicotine use and smoking are common pathogenic risk factors that contribute to peripheral artery disease (PAD).

Physical examination (1 minute)
Careful inspection of the feet should be performed at every visit for patients with confirmed or suspected diabetes. Because up to 50% of patients with significant sensory loss due to neuropathy may be completely asymptomatic, failing to search for early signs of infection (FIGURE 1), skin breakdown, ulcer formation (FIGURE 2), skin temperature changes, and inadequate vascular perfusion may allow complications to develop. TABLE 2 outlines the essential components—dermatologic, neurologic, musculoskeletal, and vascular—of a rapid lower limb physical exam.

The dermatologic exam. This serves as a barometer for early intervention, and often results in a limb-saving referral to a specialist. It should begin with a global inspection for discolorations, calluses, wounds, fissures, macerations, nail dystrophy, or paronychia. Skin discoloration or loss of hair growth may be the first signs of vascular insufficiency, while calluses and hypertrophic skin often education. And best of all, it should only take 3 minutes.
are precursors to ulcers.\textsuperscript{5,17-19} Inspection of the toes should include a search for fungal, ingrown, or elongated nails. Carefully examine the areas between the toes, where deeper lesions may go unnoticed.\textsuperscript{5}

\textbf{The neurologic exam.} Without protective sensation, patients with neuropathy are at a heightened risk of unrecognized injury and are unlikely to mention their deformities to medical staff.\textsuperscript{20-23} Consequently, skin deterioration may unknowingly progress to ulceration that requires extensive medical intervention or amputation.

Neuropathic LOPS is easily detectable, yet
it is linked to at least 75% of all nontraumatic diabetic amputations. 20-23 A diminished vibratory perception threshold (VPT) is one of the earliest indicators of neuropathic LOPS and is the best predictor of long-term lower extremity complications. 1,24,25 However, VPT devices are

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FIGURE 1
Cellulitic infection

The redness in the toes and distal foot indicates a cellulitic infection.

FIGURE 2
Ulcer formation

Ulceration due to diabetic neuropathy.

No testing devices are needed to conduct the Ipswich Touch Test, and it is as sensitive and specific as the monofilament test.

expensive and time-consuming to operate, and they require training to ensure proper use. The Semmes-Weinstein monofilament is a well-documented alternative to VPT for predicting ulcer risk26-28 and has long been advocated as an essential component of a thorough foot exam.5 The 128 Hz tuning fork is another regularly used alternative.5 However, physicians would need to purchase one of these devices and receive training on how to use it, and, in the case of the monofilament, to regularly stock replacements to maintain accurate results.16

The Ipswich Touch Test (IpTT) is an alternative neurologic test that requires only the physician’s index finger. During the IpTT, the physician instructs the patient to close his or her eyes while the physician lightly rests his or her finger on each of the patient’s first, third, and fifth toes for 1 to 2 seconds (FIGURE 3). Patients are instructed to respond with a “yes” when they feel the physician’s touch. In a head-to-head trial, diagnostic results of the IpTT directly paralleled those of the monofilament in detecting LOPS; IpTT was also equally sensitive and specific (k=.88, indicating almost perfect agreement; P<.0001).29 The IpTT’s use of only 6 palpation points, constant availability, and accuracy make it a first-line neurologic test for rapidly screening the feet of a patient with diabetes.

Neuromuscular/musculoskeletal exam. Neuromuscular disturbances, such as a reduction in the strength of dorsiflexion and plantar flexion, may indicate a complicated neurologic compromise.5 In addition to being aesthetically problematic, musculoskeletal deformities such as a hammer toe, claw toe (FIGURE 4), or bunion can cause significant pain and/or gait disturbance, and can increase patients’ risk for ulceration.30 These deformities also may compromise patients’ general health and grossly escalate their risk of falls and resultant injuries.5,31 Therefore, patients who present with previously unreported musculoskeletal deformities should be referred to a specialist.31

CONTINUED
Charcot neuroarthropathy is a devastating complication that classically presents as a hot, red, swollen foot; the redness resolves upon elevation.

Also screen patients for Charcot neuroarthropathy (Figure 5), a devastating complication that classically presents as a hot, red, swollen foot; the redness resolves upon elevation. Charcot neuroarthropathy is hypothesized to be a dysregulation of normal bone metabolism typically occurring secondary to diabetic neuropathy and repetitive minor trauma. This dysregulation leads to joint instability and disorganization of normal midfoot bone architecture. Charcot neuroarthropathy is an urgent pathology that requires management by a foot specialist.

Vascular exam. PAD is particularly common in patients with diabetes and contributes to the development of impaired healing in up to half of foot ulcers. Bilateral femoral, popliteal, posterior tibial, or dorsalis pedis pulses should be assessed by palpation; a diminished or absent pulse is a key indicator of vascular compromise. An integrated care approach between foot specialists and vascular surgeons results in optimal treatment.
Patient education (1 minute)

It is imperative to include patients in their treatment process to reduce the likelihood of complications and, ultimately, decrease the incidence of amputations. Patient education improves patients’ self-reported home care behaviors, even at the most fundamental levels. It is imperative to include patients in their care behaviors, even at the most fundamental levels.43,44 Patient education improves patients’ self-reported home care behaviors, even at the most fundamental levels.43,44 Patient education (1 minute)

Who to refer, and when

After completing the 3-minute foot exam, create a treatment and follow-up plan, focusing on the need for referral to a specialist. TABLE 4 outlines suggested indications, priorities, and timelines for referral based on ADA guidelines. It incorporates the ADA’s patient risk categories (very low, low, moderate, and high risk) and also provides a recommended frequency for patient follow-ups.

Care for patients with lower extremity complications of diabetes mellitus is time-consuming and expensive. The brief exam described here can help you to rapidly identify patients at risk for these complications and prompt you to provide timely referrals to appropriate specialists.

TABLE 4

<table>
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<tr>
<th>Condition</th>
<th>Indication for Referral</th>
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<tr>
<td>Peripheral artery disease</td>
<td>High risk</td>
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<tr>
<td>Neurovascular disease</td>
<td>Moderate risk</td>
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<tr>
<td>Diabetic foot ulceration</td>
<td>Low risk</td>
</tr>
<tr>
<td>Amputation</td>
<td>Very low risk</td>
</tr>
</tbody>
</table>

References

2. Apelqvist J, Larsson J. What is the most effective way to reduce incidence of amputation in the diabetic foot? Diabetes Metab Res Rev. 2000;16 suppl 1:S75-S83.


