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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.

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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)

Strength of recommendation (SOR)

(A) Good-quality patient-oriented evidence

(B) Inconsistent or limited-quality patient-oriented evidence

(C) Consensus, usual practice, opinion, disease-oriented evidence, case series

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

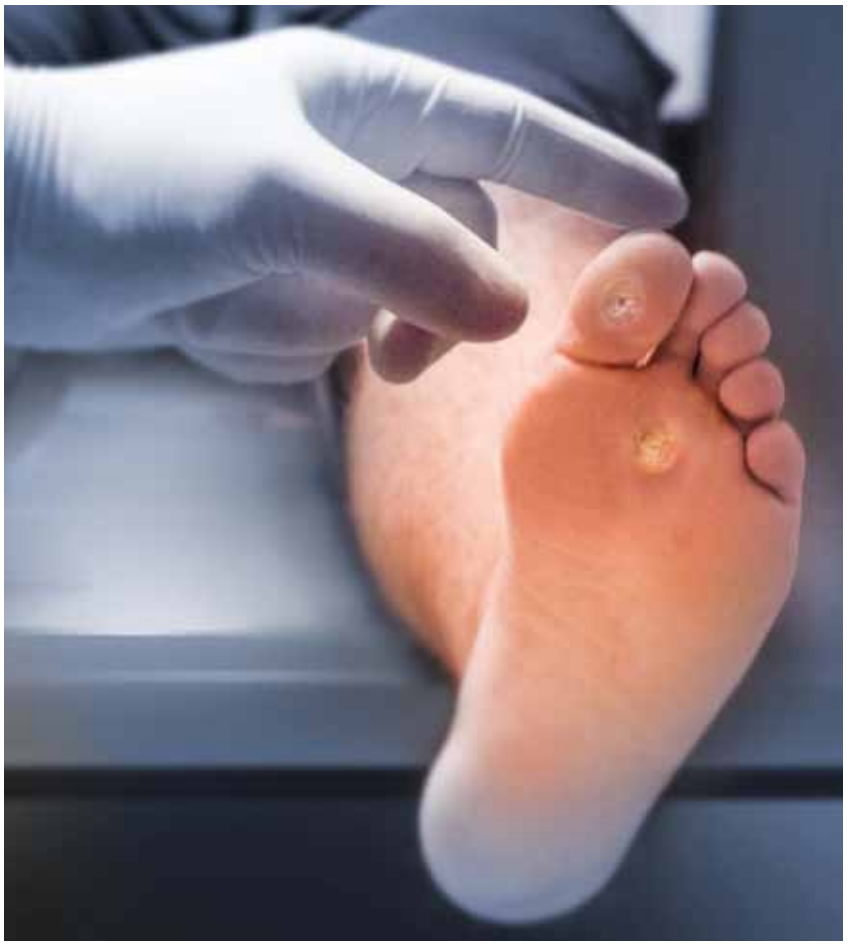


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This exam takes substantially less time to complete than a comprehensive exam and eliminates common barriers to frequent assessment.

education. And best of all, it should only take 3 minutes.

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**[5,12]). Patients with diabetes and suboptimal glycemic control have an increased risk for LOPS, chronic and recalcitrant ulcers, and wound infections.[2] Additionally, patients with diabetes and a previous lower extremity amputation are at high risk for reulceration.[5,12] Lastly, nicotine use and smoking are common pathogenic risk factors that contribute to peripheral artery disease (PAD).[13]

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,[14] 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.[5] **TABLE 2**[5,15,16] 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.[5] Skin discoloration or loss of hair growth may be the first signs of vascular insufficiency, while calluses and hypertrophic skin often

INSTANT POLL

What is the biggest obstacle to making foot exams a routine part of office visits for patients with diabetes?

- ☐ *Lack of time*
- ☐ *Lack of specialized equipment (eg, vibratory perception threshold device, Semmes-Weinstein monofilament)*
- ☐ *Need to focus on urgent clinical concerns*
- ☐ *There are no obstacles. It is a routine part of these visits*

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TABLE 1

What to ask (1 minute)[5,12]

Does the patient have a history of:

- previous leg/foot ulcer or lower limb amputation/surgery?
- prior angioplasty, stent, or leg bypass surgery?
- foot wound requiring more than 3 weeks to heal?
- smoking or nicotine use?
- diabetes? (If yes, what are the patient's current control measures?)

Does the patient have:

- burning or tingling in legs or feet?
- leg or foot pain with activity or at rest?
- changes in skin color, or skin lesions?
- loss of lower extremity sensation?

Has the patient established regular podiatric care?

TABLE 2

What to look for (1 minute)[5,15,16]

Dermatologic exam:

- Does the patient have discolored, ingrown, or elongated nails?
- Are there signs of fungal infection?
- Does the patient have discolored and/or hypertrophic skin lesions, calluses, or corns?
- Does the patient have open wounds or fissures?
- Does the patient have interdigital maceration?

Neurologic exam:

- Is the patient responsive to the Ipswich Touch Test?

Musculoskeletal exam:

- Does the patient have full range of motion of the joints?
- Does the patient have obvious deformities? If yes, for how long?
- Is the midfoot hot, red, or inflamed?

Vascular exam:

- Is the hair growth on the foot dorsum or lower limb decreased?
- Are the dorsalis pedis and posterior tibial pulses palpable?
- Is there a temperature difference between the calves and feet, or between the left and right foot?

Carefully examine the areas between the toes, where deeper lesions may go unnoticed.

are precursors to ulcers.[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.[5]

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.[20-23] Consequently, skin deterioration may unknowingly progress to ulceration that requires extensive medical intervention or amputation.

Neuropathic LOPS is easily detectable, yet

TABLE 3

What to teach (1 minute)[5,15,45]

Recommendations for daily foot care:

- Visually examine both feet, including soles and between toes. If the patient can't do this, have a family member do it.
- Keep feet dry by regularly changing shoes and socks; dry feet after baths or exercise.
- Report any new lesions, discolorations, or swelling to a health care professional.

Education regarding shoes:

- Educate the patient on the risks of walking barefoot, even when indoors.
- Recommend appropriate footwear and advise against shoes that are too small, tight, or rub against a particular area of the foot.
- Suggest yearly replacement of shoes—more frequently if they exhibit high wear.

Overall health risk management:

- Recommend smoking cessation (if applicable).
- Recommend appropriate glycemic control.

TABLE 4

Time for a specialist? Mapping out a treatment and follow-up plan*[5]

Priority	Indications	Timeline	Suggested follow-up by specialist
Urgent (active pathology)	Open wound or ulcerative area, with or without signs of infection New neuropathic pain or pain at rest Signs of active Charcot neuroarthropathy (red, hot, swollen midfoot or ankle) Vascular compromise (sudden absence of DP/PT pulses or gangrene)	Immediate referral/consult	As determined by specialist
High (ADA risk category 3)	Presence of diabetes with a previous history of ulcer or lower extremity amputation Chronic venous insufficiency (skin color change, or temperature difference)	Immediate or "next available" outpatient referral	Every 1-2 months
Moderate (ADA risk category 2)	Peripheral artery disease +/- LOPS DP/PT pulses diminished or absent Presence of swelling or edema	Referral within 1-3 weeks (if not already receiving regular care)	Every 2-3 months
Low (ADA risk category 1)	LOPS +/- longstanding, nonchanging deformity Patient requires prescriptive or accommodative footwear	Referral within 1 month	Every 4-6 months
Very low (ADA risk category 0)	No LOPS or peripheral artery disease Patient seeks education regarding: foot care, athletic training, appropriate footwear, preventing injury, etc.	Referral within 1-3 months	Annually at minimum

ADA, American Diabetes Association; DP, dorsalis pedis; LOPS, loss of protective sensation; PT, posterior tibial.

*All patients with diabetes should be seen at least once a year by a foot specialist.

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



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

FIGURE 2

Ulcer formation



PHOTO COURTESY OF: DAVID G. ARMSTRONG, DPM, MD, PHD

Ulceration due to diabetic neuropathy.

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 risk[26-28] 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]

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

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

FIGURE 3

The Ipswich Touch Test



PHOTO COURTESY OF: DAVID G. ARMSTRONG, DPM, MD, PHD

The clinician rests his or her index finger on the tip of the first, third, and fifth toes and asks the patient to indicate when he or she feels something.

FIGURE 4

Claw toe



PHOTO COURTESY OF: DAVID G. ARMSTRONG, DPM, MD, PHD

Deformities such as a claw toe (shown), hammertoe, or bunion place the patient at additional risk for friction-induced skin breakdown and ulceration.

FIGURE 5

Charcot neuroarthropathy



PHOTO COURTESY OF: DAVID G. ARMSTRONG, DPM, MD, PHD

Note the red and swollen appearance of the collapsed midfoot. Acute Charcot neuroarthropathy generally requires an urgent referral (or consult) with a specialist.

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.[32] Charcot neuroarthropathy is hypothesized to be a dysregulation of normal bone metabolism typically occurring secondary to diabetic neuropathy and repetitive minor trauma.[33,34] This dysregulation leads to joint instability and disorganization of normal midfoot bone architecture.[31,32] Charcot neuroarthropathy is an urgent pathology that requires management by a foot specialist.[35]

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.[13,18,36-39] 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.[40,41] 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.[12,42] Patient education improves patients' self-reported home care behaviors, even at the most fundamental levels.[43,44] **TABLE 3**[5,15,45] lists topics to cover during patient education.

Patients' lack of understanding about self-care for diabetes is a common barrier to prevention.[23] El-Nahas et al[46] found a lack of appropriate education regarding diabetes was a factor in more than 90% of recurrent ulcers, which emphasizes the need for repeated education for at-risk patients.[47,48] Involve all levels of medical staff in the effort to educate patients on the importance of foot screenings, both at home and in-office. Even with proper patient education, many patients may be in various stages of coping with this all-consuming yet frequently asymptomatic condition, which makes the need for repeated patient education even more critical.

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.[5] 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. JFP

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A lack of appropriate patient education regarding diabetes is a factor in >90% of recurrent ulcers.

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