

Case Study: Diabetic Foot Ulcer with Peripheral Arterial Disease

Patient Profile

Patient: 67-year-old female

Primary Conditions: Type 2 diabetes mellitus and peripheral vascular disease

Current Problem: Full-thickness diabetic foot ulcer

Additional Findings: Bilateral hemosiderin staining; inadequate glycemic control; no therapeutic/offloading footwear

Vascular Assessment

Assessment	Right	Left
ABI	0.90	0.60
Interpretation	Borderline/near-normal	Abnormal; consistent with PAD

Clinical consideration: Because diabetes can cause arterial calcification and potentially misleading ABI results, vascular assessment should not rely on ABI alone. Consider pedal Doppler waveforms, toe pressure/TBI and/or other perfusion testing when clinically indicated.

I. Nursing Assessment

A. Wound Assessment

Current wound findings:

- Full-thickness diabetic foot ulcer
- Wound size: **3.8 cm** (document complete length × width × depth when available)
- Depth: **1.8 cm**
- Hyperkeratotic/callused wound edges
- Purulent drainage
- Approximately **3 cm of surrounding erythema and induration**
- Findings concerning for active diabetic foot infection
- Assess and document:
 - Exact anatomical location
 - Length × width × depth
 - Undermining/tunneling

- Wound-bed tissue percentages
- Drainage amount, color, consistency, and odor
- Periwound temperature
- Erythema and induration
- Exposed or palpable structures
- Pain
- Probe-to-bone findings when performed by an appropriately trained clinician
- Photograph according to organizational policy

Immediate Clinical Concern

Purulent drainage with 3 cm of erythema/induration is concerning for an **infected diabetic foot ulcer**. The depth of 1.8 cm also raises concern for deeper soft-tissue involvement and possible osteomyelitis.

The nurse should promptly notify the treating provider and facilitate evaluation for infection severity, need for systemic antibiotic therapy, appropriate cultures, laboratory testing, imaging, and potential surgical/podiatric evaluation.

Escalate urgently for systemic illness, rapidly spreading erythema, crepitus, necrosis/gangrene, severe ischemic pain, hemodynamic instability, altered mental status, or other evidence of limb- or life-threatening infection.

II. Lower-Extremity Vascular Assessment

Complete and document a bilateral lower-extremity assessment including:

- Dorsalis pedis pulse
- Posterior tibial pulse
- Doppler signals when pulses are not readily palpable
- Skin temperature
- Capillary refill
- Skin color
- Dependent rubor or pallor with elevation
- Hair distribution
- Nail changes
- Claudication
- Rest pain
- Previous vascular procedures
- Previous ulceration or amputation

- Lower-extremity edema
- Location and extent of hemosiderin staining

Interpretation

Right ABI: 0.90

Borderline result requiring correlation with clinical findings.

Left ABI: 0.60

Abnormal and consistent with clinically significant peripheral arterial disease.

If the ulcer is located on the left foot, impaired arterial perfusion becomes an especially important contributor to delayed healing and risk of limb loss.

Because the patient has diabetes, consider **TBI/toe pressure, Doppler waveform analysis and/or other perfusion assessment** when results would affect the treatment plan.

III. Venous Assessment

Bilateral hemosiderin staining suggests chronic venous hypertension/venous insufficiency may also be present.

Assess for:

- Pitting/non-pitting edema
- Varicosities
- Lipodermatosclerosis
- Venous dermatitis
- Previous venous ulcers
- Lower-leg skin changes
- Ankle flare
- History of DVT
- Previous venous procedures

Compression Precaution

Do **not** initiate routine high-strength compression based solely on the presence of hemosiderin staining.

With a **left ABI of 0.60**, compression decisions require careful vascular assessment and clinician-directed selection of the appropriate compression level. Significant arterial disease must be considered before compression is prescribed.

IV. Neurologic/Diabetic Foot Assessment

Perform and document:

- 10-g monofilament testing
- Protective sensation
- Vibration sensation when appropriate
- Foot deformities
- Charcot changes
- Callus formation
- Prominent bony structures
- Previous amputations
- Nail abnormalities
- Footwear condition and fit

The hyperkeratotic wound margin suggests repetitive pressure/shear and inadequate pressure redistribution may be contributing to the ulcer.

V. Glycemic Assessment

Hemoglobin A1c: 7.8%

CBG range: 180–350 mg/dL

The patient's frequent hyperglycemia may impair leukocyte function, increase infection risk, and interfere with wound healing.

Nursing Interventions

- Monitor blood glucose according to orders.
 - Report persistent or significant hyperglycemia.
 - Review prescribed diabetes medications/insulin and adherence.
 - Evaluate dietary intake and nutritional patterns.
 - Assess for symptoms of hyperglycemia and dehydration.
 - Coordinate diabetes-management review with the provider.
 - Increase glucose surveillance during active infection as clinically indicated.
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VI. Nursing Problem List

1. **Impaired skin/tissue integrity** related to diabetes, repetitive pressure, and vascular impairment as evidenced by full-thickness foot ulcer.
 2. **Diabetic foot infection** as evidenced by purulent drainage and 3 cm of surrounding erythema/induration.
 3. **Impaired peripheral tissue perfusion** related to peripheral arterial disease, particularly on the left with ABI 0.60.
 4. **Risk for delayed wound healing** related to diabetes, hyperglycemia, PAD, infection, and inadequate pressure redistribution.
 5. **Risk for limb-threatening complications/amputation** related to infected diabetic foot ulcer and vascular disease.
 6. **Inadequate pressure redistribution/offloading** related to absence of appropriate therapeutic footwear.
 7. **Possible chronic venous insufficiency** as evidenced by bilateral hemosiderin staining, requiring further evaluation.
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VII. Treatment Plan

Goal 1 — Control Infection

Goal: Prevent progression of the local infection to deeper tissue, bone, systemic infection, or hospitalization.

Interventions

- Notify treating provider promptly of purulent drainage and 3 cm erythema/induration.
- Mark or measure erythema when appropriate to monitor progression.
- Monitor temperature and vital signs.
- Assess for systemic signs of infection.
- Obtain cultures when ordered; for an infected DFU, appropriately collected tissue specimens after cleansing/debridement are generally more clinically useful than superficial swabs.
- Administer systemic antimicrobial therapy as prescribed.
- Monitor response to therapy.
- Evaluate for deeper infection.

- Consider plain radiography and additional imaging such as MRI when osteomyelitis remains suspected.
- Obtain podiatry/surgical consultation when indicated.

Expected Outcome

- Purulent drainage resolves.
 - Erythema/induration decreases.
 - No systemic infection develops.
 - No progression to deep-space infection or osteomyelitis.
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VIII. Wound-Bed Management

Goal 2 — Promote Wound Healing

Interventions

1. Cleanse wound using an appropriate wound-cleansing solution according to orders and facility policy.
2. Protect the periwound from excessive moisture.
3. Select dressing based on:
 - Drainage amount
 - Wound depth
 - Infection status
 - Tissue type
 - Periwound condition
 - Frequency of dressing changes
4. Maintain an appropriately moist wound-healing environment while controlling excess exudate.
5. Reassess wound measurements at least weekly or according to organizational protocol.
6. Monitor wound trajectory, including percentage reduction in wound area over time.

Debridement Considerations

Hyperkeratotic/callused tissue may increase plantar pressure and conceal the true wound margin.

Sharp debridement of callus and devitalized tissue should be performed only by a qualified clinician and after considering perfusion status.

Caution: Aggressive debridement should be avoided when there is inadequate perfusion or stable, dry ischemic eschar until vascular status and the treatment strategy have been appropriately evaluated.

IX. Offloading Plan

Goal 3 — Eliminate Repetitive Pressure and Shear

The absence of therapeutic footwear represents a significant modifiable risk factor.

Interventions

- Determine whether the ulcer is plantar, dorsal, interdigital, heel, or another location.
- Evaluate gait, foot deformity, and pressure points.
- Initiate an evidence-based offloading strategy appropriate for ulcer location, infection severity, ischemia, fall risk, and patient mobility.
- Refer to podiatry/orthotics for therapeutic footwear.
- Obtain appropriately fitted diabetic shoes and custom inserts when indicated.
- Educate patient not to walk barefoot.
- Inspect current shoes for foreign objects, seams, pressure points, and improper fit.

For plantar neuropathic ulcers, non-removable knee-high offloading devices are often preferred when appropriate, but the presence of infection and ischemia requires individualized clinical decision-making.

X. Vascular Plan

Goal 4 — Establish Adequate Perfusion for Healing

Interventions

- Refer for vascular evaluation because of abnormal ABI and active foot ulcer.
- Consider:
 - Toe-brachial index
 - Toe pressure
 - Pedal Doppler waveforms
 - Duplex ultrasound
 - Additional vascular imaging when indicated
- Evaluate candidacy for revascularization if perfusion is inadequate for wound healing.

- Monitor closely for:
 - Rest pain
 - Increasing ischemic pain
 - Pallor
 - Cyanosis
 - Cool extremity
 - Tissue necrosis
 - Gangrene
 - Loss/change of Doppler signals

Expected Outcome

Objective perfusion status is established and, when necessary, vascular intervention is completed to maximize healing potential and reduce amputation risk.

XI. Diabetes Management

Goal 5 — Improve Glycemic Control

Current Findings

- A1c: **7.8%**
- CBG: **180–350 mg/dL**

Interventions

- Notify provider of persistent hyperglycemia.
- Review diabetes treatment regimen.
- Monitor CBG according to prescribed frequency.
- Evaluate for medication adherence and barriers.
- Coordinate dietary/nutritional consultation.
- Individualize glycemic targets based on comorbidities, functional status, hypoglycemia risk, and provider recommendations.

Expected Outcome

Reduced frequency of significant hyperglycemia without hypoglycemia and improved metabolic conditions for wound healing.

XII. Nutrition Plan

Goal 6 — Support Tissue Repair

Assess:

- Weight and recent weight loss
- Appetite
- Hydration
- Protein/calorie intake
- Dental/swallowing problems
- Food insecurity when applicable
- Nutritional risk

Interventions

- Dietitian referral when indicated.
 - Provide adequate calories and protein based on individualized nutritional assessment.
 - Encourage adequate hydration unless medically contraindicated.
 - Correct identified nutritional deficiencies in collaboration with the medical team.
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XIII. Patient Education and Prevention Plan

Teach the patient to:

- Inspect **both feet every day**.
- Use a mirror or caregiver assistance to inspect the plantar surfaces.
- Never walk barefoot, including inside the home.
- Check inside shoes before putting them on.
- Wear properly fitted diabetic footwear.
- Avoid heating pads and hot water bottles on the feet.
- Avoid self-treatment of calluses/corns with blades or chemical removers.
- Report new blisters, redness, drainage, cracks, calluses, discoloration, or skin breakdown promptly.
- Keep scheduled podiatry and vascular appointments.
- Take diabetes medications as prescribed.
- Follow the individualized nutrition plan.
- Avoid tobacco/nicotine exposure.

- Understand that infection, poor circulation, repetitive pressure, and hyperglycemia can work together to increase amputation risk.

XIV. Interdisciplinary Care Team

Discipline	Primary Responsibility
Nursing	Daily foot/skin surveillance, wound assessment, dressing care, infection surveillance, glucose monitoring and education
Wound-care clinician	Wound diagnosis, treatment plan, debridement strategy and healing surveillance
Primary/medical provider	Diabetes management, infection treatment and overall medical management
Podiatry	Foot biomechanics, callus management, debridement, infection evaluation and preventive foot care
Vascular specialist	PAD assessment, perfusion testing and consideration of revascularization
Orthotist/Pedorthist	Pressure redistribution, diabetic footwear and custom inserts
Dietitian	Nutrition assessment and individualized nutritional intervention
Diabetes educator	Glucose-management education and self-management support
PT/OT	Mobility, gait, fall risk and safe use of offloading devices

XV. Measurable Care-Plan Outcomes

Short-Term: 1–2 Weeks

- Infection demonstrates clinical improvement.
- Erythema and induration decrease from baseline.
- Purulent drainage resolves or substantially decreases.
- Appropriate offloading is implemented.
- Vascular referral/evaluation is initiated.

- Glucose-management plan is reviewed.
- Patient demonstrates understanding of daily foot inspection.

Intermediate: 4 Weeks

- Wound demonstrates measurable reduction in area/depth.
- No new diabetic foot ulcer develops.
- No progression of infection.
- No new necrosis or ischemic deterioration.
- Therapeutic footwear/offloading plan is established.
- Glycemic trends improve.

Failure to demonstrate meaningful healing should trigger reassessment of **perfusion, infection, pressure/offloading, wound diagnosis, glycemic control, nutrition, adherence, and treatment strategy.**

Long-Term

- Complete wound closure.
- Maintenance of intact skin.
- No recurrent ulceration.
- No major lower-extremity amputation.
- Consistent use of prescribed therapeutic footwear.
- Continued podiatric and vascular surveillance based on risk level.

XVI. Case Summary

This 67-year-old woman presents with a **high-risk diabetic foot ulcer complicated by suspected infection, peripheral arterial disease, inadequate pressure redistribution, and hyperglycemia.** The left ABI of 0.60 demonstrates significant arterial impairment, while bilateral hemosiderin staining raises concern for a concurrent venous component.

The combination of a **full-thickness 1.8-cm-deep ulcer, purulent drainage, 3 cm of erythema/induration, diabetes, PAD, hyperglycemia, hyperkeratotic margins, and lack of appropriate footwear** places the patient at substantial risk for delayed healing, deeper infection, osteomyelitis, hospitalization, and lower-extremity amputation.

Successful management requires more than topical wound treatment. The care plan should simultaneously address **infection control, perfusion, offloading, wound-bed management, glycemic control, nutrition, appropriate footwear, patient education, and recurrence prevention,** with coordinated nursing, wound-care, podiatric, vascular, and medical management.