

Assessment and Diagnosis of Foot Problems

Foot assessment is the systematic process of gathering information about the structure, function, and health of the foot. It begins with a thorough patient history, followed by visual inspection, palpation, and functional testing. Understanding the terminology used throughout this process is essential for accurate diagnosis and effective treatment planning. The following key terms and vocabulary are organized into categories that reflect the stages of assessment and the types of conditions commonly encountered in foot care practice. Each definition is accompanied by practical examples, typical applications, and potential challenges that may arise during evaluation.

Patient History Terms

Chief complaint – The primary reason the patient seeks care, described in the patient's own words. Example: "I have a sharp pain on the bottom of my heel when I walk." The challenge is distinguishing the chief complaint from secondary symptoms that may be unrelated.

Onset – The time when the problem first appeared. It may be described as acute (sudden) or gradual. Example: "The pain started three weeks ago after I started running." Accurate recall of onset helps differentiate traumatic injuries from progressive conditions.

Duration – How long the symptom has persisted. Example: "Pain has been present for six months." Chronic duration often suggests underlying biomechanical issues or systemic disease.

Progression – Whether the condition has improved, worsened, or remained stable. Example: "The pain has become more intense each week." Understanding progression informs the urgency of intervention.

Location – The specific area of the foot affected. Precise description (e.g., "Medial forefoot" vs "bottom of the heel") guides the examiner toward particular anatomical structures.

Quality – The character of the pain or discomfort (e.g., Burning, throbbing, aching). Example: "I feel a burning sensation in the toes at night." Quality often indicates the type of tissue involved, such as nerve versus muscle.

Aggravating factors – Activities or positions that worsen the symptom. Example: "Pain increases after prolonged standing." Identifying aggravators helps tailor functional tests.

Alleviating factors – Interventions that reduce pain. Example: "Ice and elevation provide temporary relief." Knowledge of what the patient has already tried prevents redundant recommendations.

Previous treatments – Any prior medical or self-care measures, including medication, orthotics, or surgery. Example: "I have used over-the-counter arch supports for six months." This history can reveal why a condition may be refractory.

Medical comorbidities – Systemic conditions that influence foot health, such as diabetes, peripheral vascular disease, or rheumatoid arthritis. Example: “I have type 2 diabetes diagnosed ten years ago.” These comorbidities increase the risk of complications and affect assessment priorities.

Medication – Current drugs that may affect foot health, including steroids, anticoagulants, or neuropathic agents. Example: “I am taking metformin and a low-dose aspirin.” Certain medications can mask pain or impair healing.

Family history – Genetic predispositions to foot problems, such as hereditary hyperkeratosis or Charcot-Marie-Tooth disease. Example: “My mother had severe bunions.” Recognizing familial patterns helps anticipate future issues.

Lifestyle factors – Activities, occupation, footwear choices, and exercise habits that influence foot stress. Example: “I work as a construction worker and wear steel-toe boots.” Lifestyle information guides ergonomic recommendations.

Footwear History – Types of shoes regularly worn, frequency of replacement, and any custom orthotics. Example: “I wear high-heeled shoes three times a week.” Inadequate footwear is a common contributing factor in many foot pathologies.

Assessment Terminology

Inspection – Visual examination of the foot in various positions (standing, seated, supine). The clinician notes skin condition, alignment, swelling, deformities, and gait patterns. Example: “Observe for forefoot abduction or hallux valgus.” Challenges include subtle deformities that may be missed without proper lighting.

Palpation – Tactile assessment using fingers to feel for tenderness, temperature changes, masses, and tissue integrity. Example: “Press along the medial longitudinal arch to assess for tenderness.” Palpation requires skill to differentiate deep structures from superficial skin.

Range of Motion (ROM) – The degree of movement available at a joint, measured in degrees or functional terms. Example: “Dorsiflexion of the ankle should reach at least 10° with the knee extended.” Limited ROM can indicate joint contracture or soft-tissue restriction.

Passive ROM – Movement performed by the examiner without patient muscle activation. Example: “Gently flex the toes to assess passive flexion.” This isolates joint structures from muscular influence.

Active ROM – Movement performed by the patient using their own muscles. Example: “Patient actively extends the toes while seated.” Discrepancies between active and passive ROM may reveal pain inhibition or weakness.

Strength testing – Evaluation of muscle force using manual resistance or dynamometry. Commonly assessed muscles include the tibialis anterior, gastrocnemius-soleus complex, and intrinsic foot muscles. Example: “Test great toe extension against resistance to assess extensor hallucis longus.” Weakness can predispose to deformities such as hammertoes.

Gait analysis – Observation of walking pattern to identify abnormalities in stride length, foot strike, and propulsion. Example: "Note if the patient exhibits a forefoot strike pattern." Gait assessment may require video capture for detailed analysis, which can be a logistical challenge in some settings.

Dynamic pressure mapping – Use of pressure plates or in-shoe sensors to quantify plantar pressure distribution during walking. Example: "High peak pressures under the second metatarsal head suggest overload." The technology provides objective data but may be limited by cost and calibration requirements.

Foot posture index (FPI) – A standardized scoring system that evaluates foot alignment in three planes using six criteria. Scores range from highly supinated to highly pronated. Example: "An FPI of +6 indicates moderate pronation." Proper training is essential to achieve inter-rater reliability.

Arch height index (AHI) – Ratio of arch height to foot length measured in seated and standing positions to assess arch integrity. Example: "An AHI difference greater than 0.05 Suggests flexible flatfoot." The measurement requires a calibrated ruler or digital scanner.

Skin assessment terms

Callus – A localized thickening of the stratum corneum caused by repeated friction or pressure. Example: "A callus over the metatarsal head may indicate abnormal loading." Management includes debridement, padding, and off-loading strategies.

Corn – A small, concentrated area of hyperkeratosis often surrounded by inflamed skin. Corns commonly develop on the dorsal aspect of toes where bony prominences press against footwear. Example: "A corn on the hallux interphalangeal joint can cause sharp pain."

Fissure – A crack or split in the skin, frequently occurring in the heel due to dryness or excessive pressure. Example: "Heel fissures may become infected if left untreated." Moisturization and appropriate footwear are primary interventions.

Ulcer – A breach in the skin that extends into deeper layers, potentially exposing subcutaneous tissue or bone. Ulcers are classified by depth (e.G., Superficial, deep, full-thickness) and etiology (e.G., Neuropathic, ischemic). Example: "A neuropathic ulcer on the plantar surface of the hallux may develop without pain." Early detection is critical to prevent infection and amputation.

Hyperkeratosis – Generalized thickening of the skin, often seen in areas of chronic pressure. Example: "Hyperkeratosis on the lateral forefoot can be a sign of metatarsalgia."

Dermatological signs

Erythema – Redness of the skin indicating inflammation or infection. Example: "Erythema surrounding an ulcer suggests possible cellulitis."

Edema – Swelling caused by fluid accumulation, which can be localized (e.G., Ankle edema) or systemic. Example: "Pitting edema in the distal foot may indicate venous insufficiency."

Induration – Hardening of tissue, often a sign of chronic inflammation, infection, or tumor. Example: "Indurated tissue around a plantar lesion warrants further investigation."

Temperature changes – Areas of increased warmth may indicate infection, while coolness can suggest vascular compromise. Example: "Cool distal foot temperature in a diabetic patient may signal peripheral arterial disease."

Neurological assessment terms

Peripheral neuropathy – Damage to peripheral nerves resulting in altered sensation, often seen in diabetes. Symptoms include numbness, tingling, and loss of protective sensation. Example: "Reduced monofilament detection in the great toe is indicative of neuropathy."

Monofilament testing – Use of a 10-gram nylon filament to assess protective sensation. A failure to perceive the filament suggests increased ulcer risk. Example: "Patient cannot feel the monofilament at the plantar surface of the first metatarsal head."

Vibration perception – Assessment using a tuning fork (typically 128 Hz) to evaluate large-fiber nerve function. Example: "Absence of vibration sense on the hallux is a red flag for neuropathy."

Two-point discrimination – Ability to distinguish two separate points placed on the skin. Reduced discrimination indicates sensory loss. Example: "Two-point discrimination greater than 10 mm on the plantar surface suggests sensory impairment."

Reflex testing – Evaluation of tendon reflexes (e.g., Achilles reflex) to assess neural integrity. Example: "Absent Achilles reflex may be associated with peripheral neuropathy."

Vascular assessment terms

Pedal pulses – Palpation of the dorsalis pedis and posterior tibial arteries. Presence, quality, and symmetry of pulses indicate arterial flow. Example: "Weak dorsalis pedis pulse on the left side suggests possible arterial occlusion."

Ankle-brachial index (ABI) – Ratio of ankle systolic pressure to brachial systolic pressure, expressed as a decimal. Values
Toe-brachial index (TBI) – Similar to ABI but uses toe pressures, useful when ankle arteries are incompressible. Example: "TBI of 0.6 suggests significant distal arterial disease."

Capillary refill time – Observation of color return after blanching the skin; delayed refill (> 2 seconds) may indicate poor perfusion. Example: "Capillary refill of 3 seconds in the toes raises concern for ischemia."

Duplex ultrasonography – Imaging modality that evaluates blood flow and vessel patency. It is often employed when ABI results are ambiguous. Example: "Duplex reveals a stenosis of the posterior tibial artery."

Biomechanical terminology

Pronation – Eversion and abduction of the foot, allowing shock absorption during weight bearing.

Over-pronation can lead to excessive stress on the medial arch and plantar fascia. Example: "Excessive pronation may contribute to plantar fasciitis."

Supination – Inversion and adduction of the foot, providing rigidity for propulsion. Over-supination can increase the risk of stress fractures. Example: "Supination can cause lateral column overload."

Midfoot – The central region of the foot encompassing the navicular, cuboid, and cuneiform bones. Problems in the midfoot often involve the Lisfranc joint complex. Example: "Lisfranc injuries affect the midfoot and may be missed without proper imaging."

Forefoot – The anterior portion of the foot containing the metatarsals and phalanges. Forefoot overload is a common cause of metatarsalgia. Example: "Metatarsalgia often presents as pain beneath the second metatarsal head."

Rearfoot – The posterior portion of the foot, including the calcaneus and talus. Rearfoot pathology includes Achilles tendinopathy and calcaneal fractures. Example: "Achilles tendinopathy originates in the rearfoot."

Plantar fascia – A thick band of connective tissue extending from the calcaneal tuberosity to the metatarsal heads, supporting the longitudinal arch. Example: "Plantar fasciitis involves inflammation of the plantar fascia."

Achilles tendon – The tendon of the gastrocnemius-soleus complex inserting on the posterior calcaneus. Example: "Achilles tendon rupture presents with a palpable gap and inability to plantarflex."

Metatarsophalangeal (MTP) joint – The articulation between the metatarsal heads and proximal phalanges, crucial for toe-off during gait. Example: "Hallux rigidus affects the first MTP joint."

Interphalangeal (IP) joint – The joint between phalanges of the toes. Example: "Hammer toe deformity involves the proximal IP joint."

Sesamoid bones – Small, rounded bones embedded within tendons near the first MTP joint, providing leverage. Example: "Sesamoiditis presents as pain under the first metatarsal head."

Structural terminology

Medial longitudinal arch – The arch formed by the tibial, navicular, and cuneiform bones, providing shock absorption. Example: "Flatfoot indicates a collapsed medial arch."

Lateral longitudinal arch – The arch on the outer side of the foot, formed by the cuboid and calcaneus, contributing to foot stability. Example: "Over-supination may elevate the lateral arch."

Transverse arch – The arch across the metatarsal heads, maintaining foot width. Example: "Collapse of the transverse arch can lead to splay foot."

Hallux valgus – Lateral deviation of the great toe and medial deviation of the first metatarsal, commonly known as a bunion. Example: "Hallux valgus often requires orthotic support or surgical correction."

Hallux rigidus – Degenerative arthritis of the first MTP joint, limiting dorsiflexion. Example: "Patients with hallux rigidus may experience pain during toe-off."

Claw toe – Hyperextension of the MTP joint with flexion of the IP joints, creating a claw-like appearance. Example: "Claw toes can be associated with diabetic neuropathy."

Hammer toe – Flexion of the proximal IP joint while the MTP joint remains neutral or mildly extended. Example: "Hammer toe may cause corns on the dorsal aspect of the toe."

Flatfoot (pes planus) – A condition where the medial arch collapses, often accompanied by pronation. Example: "Flexible flatfoot may be asymptomatic but can predispose to plantar fasciitis."

High arch (pes cavus) – An excessively elevated medial arch, often leading to supination and forefoot pressure. Example: "High arches increase the risk of stress fractures of the metatarsals."

Charcot foot – A neuroarthropathy characterized by bone and joint destruction in patients with peripheral neuropathy, most commonly diabetics. Example: "Charcot foot may present with a warm, swollen foot without pain." Early detection and immobilization are vital to prevent deformity.

Diagnostic Imaging Terms

Weight-bearing radiograph – An X-ray taken while the patient stands, revealing alignment under functional load. Example: "Weight-bearing AP view shows the degree of hallux valgus."

Non-weight-bearing radiograph – An X-ray taken in a supine position, useful for assessing bony detail without load. Example: "Non-weight-bearing lateral view evaluates the plantar fascia thickness."

Stress fracture – A small, incomplete fracture caused by repetitive loading. Often identified on MRI or bone scan before radiographic changes appear. Example: "Second metatarsal stress fracture may present with localized tenderness."

MRI (magnetic resonance imaging) – Imaging modality providing detailed soft-tissue contrast, useful for detecting ligamentous injuries, tendon pathology, and early bone stress changes. Example: "MRI confirms plantar fascia thickening and edema."

CT (computed tomography) – Cross-sectional imaging that offers high-resolution bone detail, beneficial for complex fractures or foot deformities. Example: "CT assists in pre-operative planning for Lisfranc injuries."

Ultrasound – Real-time imaging for evaluating tendon thickness, fluid collections, and dynamic movement. Example: "Ultrasound can detect Achilles tendon tears during active plantarflexion."

Bone scan – Nuclear medicine study highlighting areas of increased metabolic activity, often used for early detection of stress fractures. Example: "Increased uptake in the third metatarsal indicates a stress reaction."

Classification Systems

Wagner Classification – A grading system for diabetic foot ulcers ranging from 0 (intact skin) to 5 (gangrene)

of the foot). Example: "A Wagner grade 3 ulcer extends to bone."

University of Texas (UT) Classification – A matrix that incorporates ulcer depth, presence of infection, and ischemia. Example: "UT grade 2A indicates a deep ulcer without infection or ischemia."

International Working Group on the Diabetic Foot (IWGDF) guidelines – Evidence-based recommendations for assessment, classification, and management of diabetic foot disease. Example: "IWGDF recommends annual foot examinations for all diabetic patients."

Pedorthic Terminology

Custom orthotic – A device fabricated to the patient's foot shape, designed to correct biomechanical abnormalities. Example: "A custom foot orthotic with medial arch support reduces pronation."

Prefabricated orthotic – Off-the-shelf inserts that provide general support but lack individualized contouring. Example: "Prefabricated arch supports may be adequate for mild over-pronation."

Heel cup – A molded insert that surrounds the heel, providing cushioning and stability. Example: "Heel cups can alleviate pressure in patients with Achilles tendinopathy."

Metatarsal pad – A cushioning element placed distal to the metatarsal heads to redistribute pressure. Example: "A metatarsal pad reduces forefoot peak pressures in metatarsalgia."

Metatarsal bar – A rigid bar placed proximal to the metatarsal heads to off-load the forefoot. Example: "Metatarsal bars are useful for patients with neuropathic ulcers."

Footwear Assessment Terms

Last – The shape of the mold used to construct a shoe, determining its fit and support. Example: "A shoe with a wide last accommodates forefoot width."

Toe box – The front portion of a shoe that houses the toes. A narrow toe box can cause crowding and deformities. Example: "A roomy toe box prevents compression of the fifth toe."

Heel counter – The rigid component at the back of the shoe that stabilizes the heel. Example: "A firm heel counter limits excessive pronation."

Midsole – The cushioning layer between the outsole and the insole, providing shock absorption. Example: "EVA midsole offers lightweight cushioning."

Outsole – The external sole of the shoe, typically made of rubber or polymer, providing traction. Example: "A slip-resistant outsole is essential for healthcare workers."

Insole – The interior layer that contacts the foot, often removable and replaceable. Example: "A removable insole allows for custom orthotic insertion."

Fit assessment – Evaluation of shoe length, width, and overall comfort. Example: "A thumb's width of space

between the longest toe and shoe front indicates proper length.”

Biomechanical Footwear Modifications

Medial posting – Adding material to the medial side of an orthotic to control pronation. Example: “A 4 mm medial post reduces excessive eversion.”

Lateral posting – Adding material to the lateral side to limit supination. Example: “Lateral posting can improve stability in a supinated foot.”

Heel lift – Raising the heel relative to the forefoot to address leg length discrepancy or gastrocnemius tightness. Example: “A 5 mm heel lift alleviates calf strain.”

Forefoot wedge – A built-in elevation under the forefoot to reduce forefoot pressure. Example: “A forefoot wedge assists in off-loading a metatarsal ulcer.”

Intrinsic muscle strengthening – Exercises targeting the small muscles within the foot to improve arch support. Example: “Toe-scrunches and short-foot exercises enhance intrinsic strength.”

Functional Testing Terms

Single-leg stance – Balancing on one foot to assess proprioception and muscular endurance. Example: “Patients with peripheral neuropathy often demonstrate reduced single-leg stance time.”

Heel-to-toe walking – Rolling the foot from heel to toe in a controlled manner, evaluating gait smoothness. Example: “Heel-to-toe walking reveals deficits in ankle dorsiflexion.”

Squat test – Observing foot positioning during a squat to identify pronation or supination patterns. Example: “Knees tracking inward during squat suggests over-pronation.”

Windlass test – Stretching the plantar fascia by dorsiflexing the great toe, used to assess plantar fasciitis. Example: “Pain elicited during the windlass test confirms plantar fascia involvement.”

Clinical Challenges and Pitfalls

Subjectivity in pain reporting – Patients may under-report or exaggerate symptoms, making objective assessment essential. Use of visual analogue scales and standardized questionnaires can mitigate variability.

Limited access to advanced imaging – In many community settings, MRI or ultrasound may not be readily available. Clinicians must rely on thorough physical examination and plain radiographs while prioritizing referrals for suspicious findings.

Comorbidities influencing presentation – Diabetes, peripheral vascular disease, and rheumatoid arthritis can mask typical signs, such as pain or swelling. A high index of suspicion and routine vascular and neurological testing are required.

Footwear bias – Patients often forget to disclose all footwear types worn throughout the day (e.G., Indoor

slippers, work boots). Conducting a footwear diary or asking specific questions about each activity helps uncover hidden contributors.

Inter-rater reliability – Variability among clinicians in measuring ROM, strength, or FPI scores can affect consistency. Regular calibration sessions and adherence to standardized protocols improve reliability.

Patient adherence to orthotic use – Even when orthotics are correctly prescribed, patients may neglect to wear them consistently. Education, follow-up appointments, and addressing comfort issues are key strategies for improving compliance.

Complex deformities – Advanced hallux valgus or Charcot foot may present with multiple overlapping issues, requiring multidisciplinary collaboration with podiatrists, orthotists, and surgeons.

Infection risk in compromised tissue – Ulcers in diabetic patients can rapidly progress to infection. Prompt identification of signs such as increased warmth, exudate, and elevated inflammatory markers is vital for early intervention.

Assessment of pediatric foot problems – Children's feet are still developing, and many deformities are flexible and resolve with growth. Over-diagnosing rigid deformities can lead to unnecessary interventions.

Documentation terminology – Precise language in charting ensures clear communication among healthcare providers. Using standardized terms (e.G., "Grade 2 ulcer, Wagner classification") facilitates continuity of care.

Practical Applications

Case example 1 – A 55-year-old male with type 2 diabetes presents with a painless ulcer on the plantar surface of the first metatarsal head. History reveals poor glycemic control and inadequate footwear. Assessment includes monofilament testing (failed), ABI (0.85), And wound measurement. Classification using the Wagner system yields a grade 2 ulcer. Management involves off-loading with a total contact cast, infection surveillance, and referral to a multidisciplinary foot clinic.

Case example 2 – A 30-year-old runner reports sharp heel pain after increasing mileage. Inspection shows no swelling, but palpation elicits tenderness at the calcaneal insertion. The windlass test is negative, but dorsiflexion ROM is limited to 5°. Diagnosis: Early Achilles tendinopathy. Treatment includes eccentric calf strengthening, heel lifts, and activity modification.

Case example 3 – A 70-year-old woman with rheumatoid arthritis complains of forefoot pain and visible bunions. Inspection reveals hallux valgus with a 15 mm intermetatarsal angle. Radiographs confirm joint erosion. Management includes custom orthotics with medial arch support, footwear recommendations (wide toe box), and referral for possible surgical correction if conservative measures fail.

Implementation Tips

Standardize assessment protocols – Use a checklist that incorporates history, inspection, palpation, ROM, strength, gait, and vascular-neurologic testing. This reduces omissions and improves efficiency.

Utilize visual aids – Diagrams of foot anatomy and deformities aid patient education and enhance clinician understanding of terminology.

Incorporate technology wisely – Pressure mapping systems and gait analysis software provide objective data but must be calibrated regularly and interpreted in the context of clinical findings.

Maintain ongoing education – Foot care knowledge evolves rapidly, especially regarding diabetic foot management and orthotic materials. Continuing professional development ensures clinicians remain competent.

Develop interdisciplinary relationships – Collaboration with physicians, podiatrists, orthotists, and wound-care specialists strengthens the diagnostic process and improves patient outcomes.

Regular re-evaluation – Chronic foot conditions require periodic reassessment to monitor progression, adjust treatment plans, and detect new issues early.

Key Vocabulary Summary – The following list consolidates the most frequently encountered terms, each paired with a brief definition for quick reference.

Abduction – Movement of a digit away from the midline of the foot.

Adduction – Movement of a digit toward the midline.

Abrasion – Superficial skin injury caused by friction.

Achilles tendon – The strong tendon connecting calf muscles to the calcaneus.

Arch height index – Ratio used to quantify arch support.

Biomechanics – Study of forces and motion affecting foot function.

Callus – Thickened skin from repeated pressure.

Charcot foot – Neuropathic joint destruction leading to deformity.

Claw toe – Deformity with hyperextended MTP and flexed IP joints.

Corn – Small, localized hyperkeratotic lesion.

Cushioning – Material that reduces impact forces.

Degeneration – Gradual loss of tissue integrity, often due to aging or disease.

Dermatology – Study of skin conditions affecting the foot.

Edema – Fluid accumulation causing swelling.

Exostosis – Bone outgrowth, often seen in bunions.

Fascia – Connective tissue sheet supporting structures.

Forefoot – The anterior part of the foot containing metatarsals and toes.

Gait – The manner of walking, including stride and foot strike.

Hallux valgus – Lateral deviation of the great toe (bunion).

Heel cup – Insert that encircles the heel for support.

Hyperkeratosis – Generalized thickening of the skin's outer layer.

Impingement – Compression of a structure causing pain.

Intrinsic muscles – Small muscles located within the foot itself.

Joint space – The area between articulating bones.

Kinematics – Study of movement without regard to forces.

Ligament – Fibrous tissue connecting bone to bone.

Metatarsalgia – Pain in the metatarsal region.

Neuropathy – Nerve damage leading to altered sensation.

Orthotic – Device placed inside footwear to modify foot mechanics.

Plantar fascia – Tissue supporting the foot's arch.

Pressure ulcer – Localized injury caused by prolonged pressure.

Radiograph – X-ray image of bone and joint structures.

Supination – Inward rolling of the foot, providing rigidity.

Toe box – The front compartment of a shoe housing the toes.

Wound classification – System for grading ulcer severity.

Weight-bearing – Assessment performed while the foot supports body load.

These terms constitute the foundational language needed for competent assessment and diagnosis of foot problems within the Certificate in Foot Care curriculum. Mastery of this vocabulary enables practitioners to communicate clearly with colleagues, document findings accurately, and develop effective, evidence-based treatment plans for a diverse patient population.