Orthotic Prescribing for Neurological Conditions

Foot Orthoses, Insoles and AFOs in the Context of Central and Peripheral Neurological Presentations

Neurological conditions alter the biomechanical environment through spasticity, weakness, sensory loss, coordination deficits, and abnormal tone. Orthotic intervention in this context aims to improve function, reduce fall risk, prevent deformity, relieve pain, and enhance participation. This reference covers the presentations most commonly encountered in podiatric practice: cerebral palsy, stroke/CVA, multiple sclerosis, peripheral neuropathy, and hereditary conditions.

1 Neurological Conditions: Overview and Foot/Gait Profile

Condition	Foot/Gait Profile	Primary Orthotic Goals	Device Type
Cerebral palsy (spastic diplegia / hemiplegia)	Equinus, toe walking, scissor gait, valgus foot, pes planovalgus. Spasticity increases muscle tone; GMFCS level guides function.	Improve heel contact; control equinus; prevent deformity; improve energy efficiency; reduce falls	Ankle-foot orthosis (AFO) first-line for equinus; foot orthoses for valgus correction; SMO (supramalleolar) for milder valgus
Stroke (CVA) hemiplegia	Foot drop on affected side; equinovarus deformity; circumduction gait; spasticity in plantar flexors; reduced proprioception	Control foot drop; assist clearance in swing; support equinovarus; prevent skin breakdown; improve balance	AFO (posterior leaf spring for foot drop; solid AFO for spastic equinovarus). Prefabricated AFO or custom depending on spasticity degree.
Multiple sclerosis	Foot drop (demyelination of corticospinal tracts); fatigue alters gait over time; variable presentation day to day	Control foot drop; manage fatigue-related gait changes; prevent falls; maintain independence	Lightweight AFO (posterior leaf spring); FES (functional electrical stimulation) as adjunct. Day-to-day variability may need adjustable options.
Peripheral neuropathy (diabetic / CMT / idiopathic)	Intrinsic muscle wasting; claw/hammer toes; high arch (cavus) deformity in CMT; reduced plantar sensation; foot drop in severe cases	Offload pressure points; accommodate deformity; prevent ulceration; improve stability	Accommodative insoles (diabetic); custom foot orthoses for cavus; AFO for foot drop component. Refer to M18 for diabetic foot protocol.
Hereditary spastic paraplegia / Charcot-Marie-Tooth	Progressive cavovarus deformity; intrinsic minus foot; claw toes; steppage gait; peroneal weakness in CMT	Accommodate deformity; reduce lateral column overload; stabilise ankle; prevent lateral stress fractures	Custom foot orthoses with lateral forefoot post; ankle stabilising orthosis if instability; AFO for foot drop component.

2 Ankle-Foot Orthosis (AFO) Types and Selection

AFO Type	Mechanism	Best Indicated For	Limitations
Posterior leaf spring (PLS)	Flexible thermoplastic upright behind calf; provides dorsiflexion assistance in swing without rigid control	Foot drop with no or mild spasticity; MS foot drop; mild CVA; lightweight patients	Insufficient control for spastic equinovarus; inadequate mediolateral stability for significant valgus/varus deformity
Solid AFO (rigid)	Full circumferential rigid shell; controls sagittal and frontal plane motion at ankle	Spastic equinovarus post-stroke; moderate-severe spasticity; ankle instability with neurological cause	Reduced ankle motion may affect energy efficiency; patient compliance lower; footwear compatibility essential
Hinged AFO	Articulated ankle joint allows dorsiflexion with limited plantarflexion stop; preserves some ankle motion	Where ankle motion is beneficial for energy transfer; moderate spasticity; patients with preserved partial dorsiflexion	More complex fitting; higher cost; requires careful gait analysis to optimise trim line
Supramalleolar orthosis (SMO)	Support below the malleoli only; controls subtalar and midfoot position without restricting ankle	Paediatric pes planovalgus; mild neurological valgus deformity; where ankle ROM must be preserved	Insufficient for significant foot drop or equinus; requires adequate ankle control from muscle function
Dynamic AFO (DAFO / TheraTogs)	Flexible, closely fitted thermoplastic; sensory feedback; used in CP and neurological rehab	Cerebral palsy (especially milder GMFCS levels); sensory processing benefit; paediatric neurological	Less mechanical control than rigid AFO; not suitable for severe spasticity or equinus > 5 degrees

3 Foot Orthoses in Neurological Practice

Clinical Context	Guidance
Peripheral neuropathy — sensory loss	Pressure redistribution is the primary goal. Total-contact insoles (Plastazote L40 moulded, Poron top cover). No rigid components in direct contact with neuropathic skin. Refer to M18 for full diabetic foot prescribing protocol. All devices require skin inspection instructions to the patient.
CMT / hereditary peripheral neuropathy	Cavovarus deformity is the typical presentation. Lateral column overload; peroneal weakness; claw toe deformity. Lateral forefoot posting (valgus wedge) to redistribute from lateral column. Metatarsal dome or bar for forefoot. Lateral ankle stabilising orthosis if recurrent inversion sprains.
Neurological flat foot (valgus collapse)	Medial arch support with rearfoot post; heel cup. Limit rearfoot correction to 2–3 degrees maximum — proprioceptive deficits mean overcorrection is poorly tolerated and increases fall risk. Prioritise stability over correction.
Post-stroke foot (functional orthoses)	Foot orthoses alone rarely sufficient for hemiplegia — AFO is typically the primary device. Where orthoses are used in addition, focus on accommodating the fixed deformity rather than attempting correction. Address footwear compatibility with AFO fit.
MS — fatigue management	Lightweight materials are essential. Thin carbon-fibre components where rigidity needed; avoid heavy polypropylene if possible. Fatigue worsens gait later in the day — consider the most critical footwear context and fit accordingly.
Casting and scan in neurological patients	Spasticity affects neutral casting. Assess at what tone level is optimal for casting — patient should be as relaxed as possible. 3D scanning can be more practical for patients with limited co-operation or involuntary movement. Document casting position and any compromise clearly.

4 Multidisciplinary Working and Referral Thresholds

MDT Consideration	Action / Guidance
Physiotherapy	Essential adjunct to orthotic management in all neurological conditions. PT addresses spasticity management, strengthening, gait rehabilitation, and balance. Orthotics and physiotherapy should be co-ordinated — a device that inhibits the PT programme is counterproductive.
Orthotics service / orthotist	AFO prescribing within NHS typically within orthotics service. Refer for complex AFO requirements: solid AFO, hinged AFO, KAFO. Podiatric foot orthoses can run alongside AFO provision as complementary devices.
Neurology / neurological rehabilitation	Refer back if new neurological symptoms emerge during orthotic review — changing gait pattern or increased tone may indicate disease progression requiring neurology review before orthotic modification.
Botulinum toxin (Botox)	Spasticity management with Botox (administered by neurology/rehab) changes the mechanical environment for orthotic prescribing. Review and potentially recast following Botox treatment — the muscle tone target changes.
Safeguarding and mental capacity	Neurological conditions may affect capacity to consent. Follow Mental Capacity Act guidelines. Involve carers/family in decision-making where appropriate. Document capacity assessment if there is any doubt.

Neurological orthotic prescribing requires an MDT approach. No single device resolves the complexity of a neurological gait disorder. The podiatrist's role is to optimise foot and ankle mechanics within the constraints of the neurological condition — always working alongside physiotherapy, orthotics services, and the neurological team.