Foot & Ankle RESEARCH REVIEW™

Making Education Easy

Issue 61 – 2024

In this issue:

Abbreviations used in this issue

AOFAS = American Orthopaedic Foot & Ankle Society
CI = confidence interval
CT = computed tomography
ESR = erythrocyte sedimentation rate
GP = general practitioner
MRI = magnetic resonance imaging
PEDIS = perfusion, extent, depth, infection and sensation
PROMs = patient-reported outcome measures
RR = relative risk
SMD = standardised mean difference
VAS = visual analogue scale

Welcome to Issue 61 of Foot and Ankle Research Review.

In this issue, I have highlighted recent publications with an emphasis on lower limb musculoskeletal conditions, including sesamoiditis, the efficacy of heel lifts, non-surgical management of posterior tibial tendon dysfunction, and the effects of foot exercises and customised arch support insoles in people with flexible flatfoot.

I hope you enjoy the issue.

Noho ora mai

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The development of recommendations for the assessment and management of sesamoiditis by podiatrists: A Delphi and content validity study

Authors: Stewart S et al.

Summary: This study used a four-round online Delphi survey of 18 New Zealand and Australian podiatrists (16 completed all four rounds) to develop a series of consensus-driven clinical recommendations on the assessment and management of sesamoiditis. Statements were refined from 118 statements in round one to 78 statements accepted as being important, with 62 statements having sufficient content validity (Content Validity Index 0.58) for inclusion in clinical recommendations. The recommendations included subjective assessment (pain characteristics/symptomology, activity/sports/training and medical history) objective assessment (establishing diagnosis, biomechanical factors, footwear/orthoses, differential diagnoses) and management (padding/strapping, education, footwear/orthoses and referral).

Comment: This Delphi study involved experienced podiatrists from Australia and New Zealand to create consensus-driven recommendations for assessing and managing sesamoiditis. Sesamoiditis encompasses a range of pathologies, from inflammation of sesamoid bones to complex injuries and fractures. The recommended assessments emphasise understanding pain characteristics, symptomology, and the patient's activity history, especially in sports that exert high forces on the sesamoids. Objective assessments focus on biomechanical and footwear factors contributing to the condition, though their subjective interpretation necessitates further research for reliability and validity. While advanced imaging like MRI and CT are helpful, only plain radiography is recommended to rule out bony pathology, reflecting practitioners' confidence in clinical assessments and concerns over costs and delays associated with advanced imaging. Management strategies prioritise temporary padding, education, footwear, and orthotics, focusing on offloading the sesamoids rather than altering joint biomechanics. Referrals for further assessment are advised when conservative measures fail, or underlying systemic disease is suspected.

Reference: J Foot Ankle Res. 2024;17(2):e12025

Abstract

To read previous issues of Foot and Ankle Research Review **CLICK HERE**

A survey of the treatment and management of ingrown toenails by UK podiatrists: A cross-sectional survey

Authors: Exley V et al.

Summary: This UK cross-sectional online survey of 396 practicing podiatrists (60.1% based in the private sector) assessed current practice in the treatment or management of ingrown toenails. Overall, 88.6% of podiatrists performed nail surgery, with 54.3% performing <5 per month. Nearly all podiatrists (95%) performed nail avulsion with or without chemical matrixectomy using phenol (97.2%). Application was most often applied three times (61.5%) for a total of 3 minutes (75%).

Comment: This study aimed to benchmark UK nail surgery practices. A significant majority of podiatrists (72%) perform five or more procedures monthly, confirming the commonality of nail surgery. Nail avulsion with or without chemical matrixectomy is the primary procedure, with 95% of respondents opting for this over incisional nail surgeries like Winograd (4.9%) and Zadeks (3.7%). Phenol is the dominant chemical used in 97.2% of cases, despite a systematic review indicating no clear superiority among different procedures or chemicals. Practices in phenol application vary, with most respondents using three one-minute applications, though public sector podiatrists more commonly use two applications. This variation, not precluded by guidelines, reflects the need for more evidence on optimal phenol application. While matrixectomy is common, 59.6% of podiatrists offer nail surgery without it, suitable for specific indications like fungal nail removal or cosmetic concerns. However, 40% of podiatrists do not offer this option, suggesting potential overuse of matrixectomy and a need for improved shared decision-making. Aftercare practices differ between the public and private sectors. Private podiatrists are more likely to offer one to six follow-up appointments, while the public sector often provides one to three, or none. The study notes the potential cost savings of reducing follow-ups if safe and effective. Notably, few respondents assess surgical outcomes, highlighting the need for future research on validated patient-reported outcome measures (PROMs) and core outcome sets. A point to note is that this data is from 2020 and may not reflect current practices, especially post 2021 UK safety guidelines on phenol use.

Reference: J Foot Ankle Res. 2024;17(2):e12017
Abstract

INDEPENDENT COMMENTARY BY
Professor Matthew Carroll

Matthew is a Professor of Podiatry within the School of Clinical Sciences at Auckland University of Technology (AUT). **FOR FULL BIO CLICK HERE.**

Efficacy of heel lifts for lower limb musculoskeletal conditions: A systematic review

Authors: Bourke J et al.

Summary: This systematic review assessed the benefits and harms of heel lifts for lower limb musculoskeletal conditions based on eight trials (n = 903) compared to exercise, ultrasound, cryotherapy orthotics, stretching, footwear, activity modification, felt pads and analgesic medication. None of the outcomes assessed were at low risk of bias and few effects (2/47) were considered clinically important. Low-certainty evidence (1 trial) suggested improved pain relief with custom orthotics versus heel lifts at 12 weeks for calcaneal apophysitis (55.7 points on a 100 mm VAS; 95% CI 50.3-61.1). Very low-certainty evidence (1 trial) suggested improved pain and function with heel lifts over indomethacin (35.5 points on Foot Function Index; 95% CI 21.1-49.90) at 12 months for plantar heel pain.

Comment: The systematic review explores the efficacy and safety of heel lifts in treating lower limb musculoskeletal conditions. It identifies that while heel lifts are recommended for conditions like posterior leg muscle strains, the evidence base remains limited, comprising only eight trials across mid-portion Achilles tendinopathy, plantar heel pain, and calcaneal apophysitis. Key findings indicate that heel lifts demonstrate potential effectiveness for mid-portion Achilles tendinopathy and plantar heel pain compared to specific interventions such as eccentric exercise and indomethacin. However, when contrasted with custom orthotics, they do not appear effective for calcaneal apophysitis. Notably, uncertainties persist regarding the harms associated with heel lifts. A significant finding is the perceived benefit of heel lifts over exercise for Achilles tendinopathy in pain reduction and improved functional scores, despite exercise being the recommended treatment in clinical guidelines. Heel lifts are highlighted as a cost-effective, easily accessible alternative to complex interventions like exercise, potentially lowering behavioural barriers to treatment adherence. Critically, the review underscores methodological weaknesses in the trials, including a high risk of bias and low certainty of evidence, predominantly due to inadequate blinding protocols. While heel lifts show promise for certain musculoskeletal conditions, robust evidence is lacking to support widespread clinical adoption.

Reference: J Foot Ankle Res. 2024;17(2):e12031
Abstract

Non-surgical management of posterior tibial tendon dysfunction: A UK survey

Authors: Miller A et al.

Summary: This UK cross-sectional online survey (n = 153) assessed current Posterior Tibial Tendon Dysfunction (PTTD) practice by multi-professional clinicians (48% physiotherapists; 38% podiatrists) within the National Health Service (NHS). Ultrasound scanning was used most commonly (67%) during initial imaging. A core set of education/advice, foot orthoses, and foot specific and general exercise treatment modalities were most commonly used. Outcome measures were pain scale (96/269) and single leg heel raise (84/269), but PROMs were not used routinely. The most frequent reason for care escalation was failure of symptom management with conservative treatment (86.2%), and fixed deformity (8.2%).

Comment: This survey highlights significant engagement from healthcare professionals treating PTTD within the NHS, spanning community, primary, secondary, and tertiary care. Over 30% of respondents see PTTD patients more than fortnightly. Imaging is used by 63%, with ultrasound being the preferred initial diagnostic tool, aligning with European recommendations for foot and ankle tendinopathies. Ultrasound imaging helps manage decisions and assess tendon condition due to its suitability for superficial structures and ability to perform dynamic testing. The primary treatment approaches include education/advice, exercise-based interventions, and orthotics, varying by profession, physiotherapists focus on exercise programmes, while podiatrists prefer orthotics. This diversity reflects the lack of standardised management guidelines. Pain scale and single-leg heel raise are the most common outcome measures, valued for their ease of use and reliability. It provides new insights into PTTD care and highlights practice variations in the UK.

Reference: J Foot Ankle Res. 2024;17(2):e12033
Abstract

Exploring the psychosocial burden of foot complications in diabetes: A cross-sectional survey and qualitative interview study in a United Kingdom coastal community

Authors: Chapman LS et al.

Summary: This UK study used the two-item Diabetes Distress Scale (DDS2) screening questionnaire to assess experiences of psychosocial burden and perceptions and psychosocial support among 183 patients with diabetes and foot complications (amputation, ulceration and/or Charcot neuroarthropathy) living in a coastal area. Overall, 56 (30.6%) respondents screened positive for diabetes distress; 27 patients completed the 17 item DDS (DDS17), General Anxiety Disorder-7 (GAD-7) and Patient Health Questionnaire 9 (PHQ-9) questionnaires, of whom 11 (40.7%) had high levels of diabetes distress and 4 (14.8%) had moderate distress. Interviews were conducted with 17 participants (age 52-81 years; 12 men). Four key themes were impact and emotional consequences of living with foot problems, experiences of psychological support, and strategies for coping with the emotional impact of foot problems.

Comment: This study explores the psychosocial burden and supports perceptions among podiatry patients with diabetes-related foot complications. Consistent with previous research, diabetes-related foot ulcers, Charcot neuroarthropathy, and lower limb amputations significantly impacted daily activities, social lives, work ability, and psychological health, as evidenced by high levels of diabetes distress, anxiety, and depression in survey data. Despite significant emotional challenges, only three participants recalled being offered formal psychological support, highlighting a gap between physical and mental health services. Participants showed varied attitudes towards formal psychological support; many preferred discussing their emotional issues with friends, family, or podiatrists rather than seeking help from a GP or psychologist. Podiatrists were often seen as a primary source of emotional support due to the long-term patient-provider relationships, emphasising the importance of continuity of care. However, this reliance on podiatrists raises concerns about the added pressure on NHS staff, especially in coastal areas struggling with workforce retention. The study suggests potential benefits from training podiatrists in motivational interviewing and the "Making Every Contact Count" approach to better address patients' emotional well-being. The findings advocate for integrating psychosocial support into clinical practice and designing tailored interventions to address the emotional impact of living with diabetes-related foot complications, recognising that not all patients may need or want formal psychological support.

Reference: J Foot Ankle Res. 2024;17(3):e12038
Abstract

Clinical outcomes in people with diabetes-related foot infections: Analysis from a limb preservation service infection database

Authors: Malone M et al.

Summary: This analysis of data from a prospectively collected tertiary referral hospital limb preservation service database examined clinical outcomes from 397 people with diabetes-related foot infections (skin and soft tissue infections [SST-DFI] n = 326; osteomyelitis [OM] n = 321). Most infections were classified as moderate (PEDIS 3; 51%) or mild (PEDIS 2; 36%) with a small number classified severe (PEDIS 4; 13%). Infections were resolved in 69% of episodes with failure in 31%; infection failures were more common with OM than SST-DFI (71% vs 29%; $p < 0.00001$). SST-DFI patients had a greater number of infection failures in the presence of peripheral arterial disease (PAD) versus without PAD (30% vs 12%; $p < 0.001$). Observed infection failures in OM episodes were similar with and without PAD (45% vs 55%).

Comment: This study of 397 people and 647 diabetic foot infections found that nearly one-third of infection episodes failed treatment, with rates rising to almost half in cases of OM. PAD and higher PEDIS grades were linked to increased treatment failures. Despite management at a multidisciplinary centre, 18% of SST-DFIs and 44% of OM cases ended in treatment failure. Variability in recurrence rates is noted in the literature, with differences likely due to varying definitions of treatment failure. This study defined failure as any clinical infection requiring increased antibiotic management or unplanned surgery/hospitalisation. OM is associated with lower infection resolution and higher amputation risks, emphasising the need for accurate diagnosis and treatment. Higher ESR levels were noted in OM infections. The study underscores PAD's significant negative impact on DFI outcomes and stresses the importance of early intervention for PAD in DFI patients.

Reference: J Foot Ankle Res. 2024;17(3):e12040
Abstract

The effect of early weight-bearing and later weight-bearing rehabilitation interventions on outcomes after ankle fracture surgery: A systematic review and meta-analysis of randomised controlled trials

Authors: Chen B et al.

Summary: This systematic review examined the effect of early (EWB) versus late weight bearing (LWB) on rehabilitation outcomes after ankle fractures based on 11 studies including 862 patients. Patients undergoing EWB interventions (6 weeks post-operatively) had enhanced ankle function scores (Olerud-Molander, AOFAS or Baird-Jackson score) at 6 (SMD 0.69; 95% CI 0.49-0.88; $p < 0.01$), 12 (SMD 0.57; 95% CI 0.22-0.92; $p < 0.01$) and 24-26 (SMD 0.52, 95% CI 0.20-0.85; $p < 0.01$) weeks. Subgroup analyses suggest the effects were influenced by ankle range-of-motion exercises. EWB also allowed patients to return to daily life and work earlier (time to resume preinjury activities mean difference -2.74; 95% CI -3.46 to -2.02; $p < 0.01$), with no increase in incidence of complications (RR 1.49; 95% CI 0.85-2.61; $p > 0.05$).

Comment: This study compared EWB and LWB interventions in post-operative ankle fracture patients, finding that EWB significantly improved ankle function scores in the early stages of recovery. Although there was no significant difference in ankle function at 1-year post-surgery, EWB allowed patients to return to daily activities and work sooner. The complication rates between EWB and LWB were similar. The study combined the Olerud-Molander, AOFAS, and Baird-Jackson scores to assess ankle function for a meta-analysis. EWB consistently showed better outcomes at 6 weeks and 12-26 weeks post-operatively. Biomechanical simulations and animal studies supported EWB's feasibility and safety, with minimal fracture displacement and beneficial mechanical stress. No significant functional differences were found between EWB and LWB at 6 months. The meta-analysis highlighted that EWB combined with active movement led to better outcomes than passive movement, which could cause complications like oedema and pain. EWB also facilitated quicker returns to work, potentially reducing financial stress for patients. However, studies showed mixed results on this benefit. Despite similar overall complication rates, some evidence suggested fewer severe complications with EWB. The review's findings support EWB as a safe and effective rehabilitation strategy for improving early ankle function post-surgery, with the potential for faster recovery and return to daily activities.

Reference: J Foot Ankle Res. 2024;17(2):e12011
Abstract

Exploring the relationship between the supination resistance test and the effects of foot orthoses on the foot and ankle biomechanics during walking

Authors: Payen E et al.

Summary: This small cross-sectional descriptive study examined the effects of two commonly prescribed types of foot orthoses (FOs) on lower limb biomechanics during gait in 23 participants with flat feet. Both thin-flexible (TFO) and medially wedged FOs (MWFO) appeared to reduce angle at midfoot dorsiflexion and moment of ankle inversion. The MWFOs also appeared to decrease midfoot and ankle abduction angles, and midfoot plantarflexion moments versus TFOs and shoes. There were moderate to good correlations between the Supination Resistance Test (SRT) and MWFOs for the transverse and frontal ankle moments and angles.

Comment: This study investigated the biomechanical effects of two types of FOs, TFO and MWFO during gait, and how MWFO effects correlate with the SRT. It was hypothesised that MWFO would more effectively reduce foot and ankle pronation, arch flattening, and ankle inversion moments, with lower supination resistance correlating with greater MWFO effects. MWFO significantly modified gait biomechanics compared to TFO. Specifically, MWFO reduced midfoot dorsiflexion and altered midfoot moments, showing a 7.2° and 3.5° reduction in midfoot dorsiflexion compared to shod and TFO, respectively. These results suggest better pronatory control with MWFO. The increased medial arch stiffness in MWFO, achieved through thicker shells and medial wedges, likely accounts for these effects. Contrary to the hypothesis, greater supination resistance correlated with more pronounced MWFO effects, indicating individuals with higher resistance benefit more from MWFO. Significant correlations were found between supination resistance and ankle eversion, abduction angles, and moments. Clinically, MWFOs are more effective than TFOs in modifying lower limb biomechanics during walking, particularly in reducing pronatory forces. The findings suggest that individualised orthotic prescriptions based on supination resistance may optimise outcomes. Interpretation of the results must consider that only pain-free individuals with flat feet were recruited to participate in the study.

Reference: Gait Posture 2024:113:6-12
Abstract

Effects of foot exercises and customized arch support insoles on foot posture, plantar force distribution, and balance in people with flexible flatfoot: A randomized controlled trial

Authors: Kirmizi M et al.

Summary: This small study assessed the effects of foot exercises, customised arch support insoles, and exercises plus insoles in 45 people with flexible flatfoot. Foot posture improved in all patient groups, but the insole was less effective than exercise and exercise plus insole ($p < 0.05$), while plantar forces during standing and walking changed in all groups ($p < 0.05$). Superiority of interventions differed according to plantar regions and walking speeds ($p < 0.05$). Static balance was improved in all groups, but the limits of stability were improved in the exercise plus insole and exercise recipients ($p < 0.05$).

Comment: This study aimed to evaluate the effects of exercises, insoles, and a combination of both on foot posture, plantar force distribution, and balance in individuals with flexible flatfoot. The interventions showed significant impacts on all parameters. Exercises and the combination of exercises and insoles were more effective than insoles alone in improving foot posture and static standing balance. The combination provided greater plantar force lateralisation, while insoles reduced midfoot loading more effectively. The combination of exercises and insoles increased lateral heel and forefoot force, suggesting it supports foot supination and provides effective plantar force lateralisation. Balance improved across all groups, but dynamic balance was significantly better in the exercise and combination groups. The study highlighted the need for active interventions to enhance dynamic balance. Limitations included the lack of assessment of foot complaints and long-term effects. Overall, the study suggests that tailored interventions based on individual assessments are crucial for managing flatfoot, with combined exercises and insoles being effective for specific targets.

Reference: Gait Posture 2024:113:106-114
Abstract

The effects of vibrating shoe insoles on standing balance, walking, and ankle-foot muscle activity in adults with diabetic peripheral neuropathy

Authors: Hatton AL et al.

Summary: This randomised cross-over study examined whether vibrating insoles altered measures of balance, walking, and ankle-foot muscle activity in 18 people with diabetic peripheral neuropathy. Vibrating insoles reduced (improved) centre of pressure (CoP) elliptical area during standing on a foam surface with closed eyes ($p = 0.03$) and reduced electromyography (EMG) amplitude when standing with closed eyes on firm and foam surfaces in soleus ($p = 0.01$ and $p = 0.04$) and medial gastrocnemius ($p = 0.03$ and $p = 0.09$).

Comment: This study explores the impact of suprasensory vibrating insoles on balance and muscle activity in people with diabetic peripheral neuropathy. The findings indicate that wearing these insoles for the first time may reduce the CoP sway and ankle-foot muscle activity during challenging balance tasks. Vibratory stimulation reduced CoP elliptical area, suggesting greater postural stability, although this finding should be interpreted cautiously as only 1 of 16 CoP outcomes reached significance. Contrary to expectations, the vibrating insoles did not affect walking measures in people with diabetic peripheral neuropathy. The study also examined how vibrating insoles influence muscle control, finding significant reductions in plantar flexor activity when standing with eyes closed and vibration active. This suggests that vibrations enhance balance by promoting sensory re-weighting towards augmented proprioceptive cues, leading to more efficient muscle control. Overall, the study offers new insights into the design of sensory-stimulating insoles. It proposes that they improve balance and stability in people with diabetic peripheral neuropathy.

Reference: Gait Posture 2024:111:8-13
Abstract