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Heel Pain – Plantar Fasciitis: Revision 2023

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health from the Academy of Orthopaedic Physical Therapy and American Academy of Sports Physical Therapy of the American Physical Therapy Association

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Summary of Recommendations

INTERVENTIONS – MANUAL THERAPY

A Clinicians should use manual therapy directed at the joints and soft tissue structures of the lower extremity to address relevant joint and flexibility restrictions, decrease pain, and improve function in individuals with plantar heel pain/plantar fasciitis.

INTERVENTIONS – STRETCHING

A Clinicians should use plantar fascia-specific and gastrocnemius/soleus stretching to provide short- and long-term pain reduction, as well as to improve short- and long-term function and disability.

INTERVENTIONS – TAPING

A Clinicians should use foot taping techniques, either rigid or elastic, in conjunction with other physical therapy treatments for short-term improvements in pain and function in individuals with plantar fasciitis.

INTERVENTIONS – FOOT ORTHOSES

B Clinicians should not use orthoses, either prefabricated or custom fabricated/fitted, as an isolated treatment for short-term pain relief in individuals with plantar fasciitis.

C Clinicians may use orthoses, either prefabricated or custom fabricated/fitted, when combined with other treatments in individuals with heel pain/plantar fasciitis to reduce pain and improve function.

INTERVENTIONS – NIGHT SPLINTS

A Clinicians should prescribe a 1- to 3-month program of night splints for individuals with heel pain/plantar fasciitis who consistently have pain with the first step in the morning.

INTERVENTIONS – PHYSICAL AGENTS – ULTRASOUND

A Clinicians should not use ultrasound to enhance the benefits of stretching treatment in those with plantar fasciitis.

INTERVENTIONS – PHYSICAL AGENTS – LOW-LEVEL LASER THERAPY

B Clinicians should use low-level laser therapy as part of a rehabilitation program in those with acute or chronic plantar fasciitis to decrease pain in the short term.

INTERVENTIONS – PHYSICAL AGENTS – PHONOPHORESIS

C Clinicians may use phonophoresis with ketoprofen gel to reduce pain in individuals with heel pain/plantar fasciitis.

INTERVENTIONS – PHYSICAL AGENTS – ELECTROTHERAPY

D Clinicians may use manual therapy, stretching, and foot orthoses instead of electrotherapeutic modalities to promote shot-term and long-term improvements in clinical outcomes for individuals with heel pain/plantar fasciitis. Clinicians may use iontophoresis or premodulated interferential current electrical stimulation as a second line of treatment.

INTERVENTIONS – EDUCATION AND COUNSELING FOR WEIGHT LOSS

E Clinicians may provide education and counseling on exercise strategies to gain or maintain optimal lean body mass for individuals with heel pain/plantar fasciitis. Clinicians may also refer individuals to an appropriate health care practitioner to address nutrition issues.

INTERVENTIONS – THERAPEUTIC EXERCISE AND NEUROMUSCULAR RE-EDUCATION

B Clinicians should prescribe therapeutic exercise that includes resistance training for the musculature of the foot and ankle.

INTERVENTIONS – DRY NEEDLING

B Clinicians should use dry needling to MTrP in the gastrocnemius, soles, and plantar muscles of the foot for short- and long-term pain reduction, as well as long-term improvements in function and disability.

List of Abbreviations

ACR: American College of Radiology
ADL: activities of daily living
AOFAS: American Orthopaedic Foot and Ankle Society
AOPT: Academy of Orthopaedic Physical Therapy
APTA: American Physical Therapy Association
CFO: custom foot orthotic

CI: confidence interval
CPG: clinical practice guideline
CSI: corticosteroid injection
DN: dry needling
ESWT: extracorporeal shockwave therapy
FAAM: Foot and Ankle Ability Measure
FADI: Foot and Ankle Disability Index
FAOS: Foot and Ankle Outcome Score
FFI: Foot Function Index
FHSQ: Foot Health Status Questionnaire
FPI-6: Foot Posture Index-6
HEP: home exercise program
IASTM: instrument-assisted soft-tissue mobilization
ICD: International Classification of Diseases
ICF: International Classification of Functioning, Disability and Health
***JOSPT*:** *Journal of Orthopaedic & Sports Physical Therapy*
LEFS: Lower Extremity Functional Scale
LLLT: low-level laser therapy
MCID: minimal clinically important difference
MD: mean difference
MFR: myofascial release
MPC: monophasic pulsed current
MTrP: myofascial trigger point
NPRS: numerical pain-rating scale
NSAID: nonsteroidal anti-inflammatory drug
PPT: pain pressure threshold
PRP: platelet-rich plasma
PT: physical therapy
RCT: randomized clinical trial
ROM: range of motion
SD: standard deviation
SEBT: Star Excursion Balance Test
SF-36: 36-Item Short-Form Health Survey
SMD: standardized mean difference
SR: systematic review
UPOD: usual podiatry
US: ultrasound
VAS: visual analog scale

Introduction

AIM OF THE GUIDELINES

The *Academy of Orthopaedic Physical Therapy* has an ongoing effort to create evidence-based practice guidelines for orthopaedic physical therapy (PT) management of patients with musculoskeletal impairments described in the World Health Organization's International Classification of Functioning, Disability and Health (ICF).[91]

The purposes of these clinical guidelines are as follows:

- Describe evidence-based PT practice, including diagnosis, prognosis, intervention, and assessment of outcomes for musculoskeletal disorders commonly managed by orthopaedic physical therapists
- Classify and define common musculoskeletal conditions using the World Health Organization's terminology related to impairments of body function and body structure, activity limitations, and participation restrictions
- Identify interventions supported by current best evidence to address impairments of body function and structure, activity limitations, and participation restrictions associated with common musculoskeletal conditions
- Identify appropriate outcome measures to assess changes resulting from PT interventions in body function and structure, as well as in activity and participation of the individual
- Provide a description to policy makers, using internationally accepted terminology, of the practice of orthopaedic physical therapists
- Provide information for payers and claims reviewers regarding orthopaedic physical therapist management for common musculoskeletal conditions
- Create a reference publication for orthopaedic PT clinicians, academic instructors, clinical instructors, students, interns, residents, and fellows regarding the best current practice of orthopaedic PT

STATEMENT OF INTENT

These guidelines are not intended to be construed or to serve as a standard of care for physical therapists. Standards of care are determined on the basis of all clinical data available for an individual patient and are subject to change as scientific knowledge and technology advance and patterns of care evolve. These parameters of practice should be considered guidelines only. Adherence to them will not ensure a successful outcome in every patient nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgment regarding a particular clinical procedure or treatment plan must be made in light of the clinical data presented by the patient; the diagnostic and treatment options available; and the

patient's values, expectations, and preferences. However, we suggest that significant departures from accepted guidelines should be documented in the patient's medical records at the time the relevant clinical decision is made.

SCOPE AND RATIONALE

The 2023 Heel Pain-Plantar Fasciitis Clinical Practice Guideline (CPG) is a revision of the 2014 CPG and represents the second update for this CPG from the Academy of Orthopaedic Physical Therapy (AOPT) on this topic.[51,54] Plantar heel pain is an umbrella term that may represent a number of different diagnoses. These diagnoses include plantar fasciitis and other pathoanatomical causes of heel pain, such as heel fat pad syndrome, heel spur syndrome, nerve irritation, and calcaneal stress fracture.[51,54] This CPG update will focus on the clinical entity of plantar fasciitis, the most commonly recognized cause of plantar heel pain. Plantar fasciitis is characterized by medial plantar heel pain with tenderness at the medial calcaneal tubercle and symptoms that are most noticeable with weight-bearing first thing in the morning or after a period of rest.[51,54]

The body of research concerning the treatment for individuals with plantar fasciitis is steadily expanding. In preparation for this update, a review done on the topic of plantar fasciitis identified 64 meta-analyses and 126 systematic reviews (SRs) that have been published after the search date of 12/31/2012 for the prior 2014 CPG revision. The topics addressed in this 2023 CPG revision will specifically attempt to answer the question: what is the evidence to support PT interventions directed at patients with plantar fasciitis?

Prevalence, pathoanatomical features, and clinical course were reviewed in detail in both the original 2008 CPG and 2014 CPG revisions and, therefore, will only be briefly reviewed in this 2023 update. Plantar fasciitis contributes to approximately 15% of foot pathology in the general population and occurs most commonly in those between 40 and 60 years of age, without a sex bias.[68,33,51] While the condition may affect both athletic and nonathletic populations, the incidence is reportedly higher among runners.[68] Occupations that require a considerable amount of standing time may also be more affected.[68,33,51] Plantar fasciitis presents as a gradual onset of pain usually related to a change in weight-bearing activity. The origin of the plantar fascia at the medial calcaneal tubercle may be subject to high levels of stress as it assists in supporting the medial longitudinal arch during the push-off phase of the gait cycle.[33] Those with plantar fasciitis usually have a symptom duration greater than 1 year prior to seeking treatment.[51] Although the name plantar fasciitis infers that the pathology is a primary inflammatory condition, it is widely understood that the pathology may exist along a spectrum that includes both inflammatory and degenerative characteristics.

The primary intent of this updated third CPG on the topic of plantar fasciitis was to focus on updating recommendations for interventions to be used in physical therapist practice. The recommendations for risk factors, diagnosis, differential diagnosis, and examination did not fundamentally change between the original 2008 and the 2014 revision CPG. This was also true for prevalence, pathoanatomical features, and clinical course. A search and review done in preparation for this update did not find additional literature after the last search completed for the 2014 revision (December 31, 2012) on prevalence, pathoanatomical features, clinical course, risk factors, diagnosis, differential diagnosis, and examination that would necessitate fundamental changes to the prior CPG to improve the management of patients with plantar fasciitis. An update on the imaging summary from the 2014 revision, primarily based on the American College of Radiology (ACR) recommendation is provided in this 2023 CPG. Therefore, a SR was conducted to only assess the evidence on interventions within the scope of physical therapist practice for those with the diagnosis of plantar fasciitis. This CPG excludes interventions outside the scope of physical therapist practice, including but not limited to pharmacological and surgical interventions, unless directly compared to PT management. Although used by some physical therapists outside the United States, extracorporeal shockwave therapy (ESWT) was also considered outside the scope of physical therapist practice for this update. A scoping review and summary are presented for ESWT, as well as corticosteroid injection (CSI) and platelet-rich plasma (PRP) injection, because they are frequently prescribed as conservative interventions and may be of interest for consideration in patients who are not benefiting from PT.

Methods

Content experts were appointed by the AOPT to conduct a review of the literature and develop an updated CPG for plantar fasciitis. This second revision aims to provide a concise summary of contemporary evidence since the publication of the 2014 revision and to develop new recommendations, reaffirm, or revise previously published recommendations to support evidence-based practice. The authors of this guideline revision worked with the CPG editors and medical librarians for

methodological guidance. Two authors (C.M.M. and R.L.M.) served as the team's methodologists. The research librarians were chosen for their expertise in SR and rehabilitation literature searching, and to perform systematic searches regarding intervention strategies for plantar fasciitis. Briefly, the following databases were searched from December 2012 to March 2023: MEDLINE, CINAHL, Cochrane Library, and PEDro (see **APPENDIX A** for full search strategies and **APPENDIX B** for search dates and results, available at www.orthopt.org).

The authors declared relationships and developed a conflict management plan, which included submitting a conflict-of-interest form to the AOPT. Articles that were authored by a reviewer were assigned to an alternate reviewer. Funding was provided to the CPG development team for travel and expenses for CPG development training by the AOPT. The CPG development team maintained editorial independence from funding agencies, including the AOPT Board of Directors.

Articles contributing to recommendations were reviewed based on specified inclusion and exclusion criteria, with the goal of identifying evidence relevant to physical therapist clinical decision making for patients with plantar fasciitis. The title and abstract of each article were reviewed independently by 2 members of the CPG development team for inclusion (see **APPENDIX C** for inclusion and exclusion criteria, available at www.orthopt.org). A full-text review was then similarly conducted to obtain the final set of articles for contribution to recommendations. The team leader (C.M.M.) provided the final decision on discrepancies that were not resolved by the review team (see **APPENDIX D** for the flowchart of articles, available at www.orthopt.org). Data extraction and assignment of level of evidence were also performed by 2 members of the CPG development team. Evidence tables for this CPG are available on the Clinical Practice Guidelines page of the AOPT website (www.orthopt.org).

This guideline was issued in 2023 based on the published literature through March 22, 2024, and will be considered for review in 2028, or sooner if new evidence becomes available. Any updates to the guidelines in the interim period will be noted on the AOPT website (www.orthopt.org http://www.orthopt.org).

LEVELS OF EVIDENCE

Individual clinical research articles were graded according to criteria adapted from the Centre for Evidence-Based Medicine, Oxford, UK (http://www.cebm.net) for the studies related to interventions.[12] In teams of two, each reviewer assigned a level of evidence and evaluated the quality of each article using a critical appraisal tool (see **APPENDICES D** and **E** for the levels-of-evidence table and details on procedures used for assigning levels of evidence, available at www.jospt.org). If the 2 content experts did not agree on a grade of evidence for a particular article, a third content expert was used to resolve the issue. The evidence update was organized from the highest level of evidence to the lowest level of evidence. An abbreviated version of the grading system is provided in **TABLE 1**.

TABLE 1 LEVELS OF EVIDENCE

I	Evidence obtained from systematic reviews, high-quality diagnostic studies, prospective studies, or randomized controlled trials
II	Evidence obtained from systematic reviews, lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (eg, weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)
III	Case-controlled studies or retrospective studies
IV	Case series
V	Expert opinion

STRENGTH OF EVIDENCE AND GRADES OF RECOMMENDATION

The strength of the evidence supporting the recommendations was graded according to the established methods provided below (**TABLE 2**). Each team developed recommendations based on

TABLE 2 GRADES OF RECOMMENDATION

Grades of Recommendation		Strength of Evidence	Level of Obligation
A	Strong evidence	A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study	Must or should
B	Moderate evidence	A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation	Should
C	Weak evidence	A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts, support the recommendation	May
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies	
E	Theoretical/ foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic sciences/bench research supports this conclusion	May
F	Expert opinion	Best practice based on the clinical experience of the guideline development team	May

the strength of evidence, including how directly the studies addressed the question relating to plantar fasciitis. In developing their recommendations, the authors considered the strengths and limitations of the body of evidence and the health benefits, side effects, and risks associated with the interventions.

GUIDELINE REVIEW PROCESS AND VALIDATION

The AOPT selected consultants from the following areas to serve as reviewers throughout the development of these CPGs:

- Athletic training
- Claims review
- Coding
- Guideline methodology
- Foot and ankle rehabilitation
- Medical practice guidelines
- Manual therapy
- Movement science
- Orthopaedic PT clinical practice
- Orthopaedic PT residency education
- Orthopaedic surgery
- Outcomes research
- Patients with plantar fasciitis
- Physical therapy academic education
- Physical therapy patient perspective
- Rheumatology
- Sports PT residency education
- Sports rehabilitation

Identified reviewers who are experts in the management and rehabilitation of those with plantar fasciitis reviewed a prepublication draft of this CPG content and methods for integrity, accuracy, validity, usefulness, and impact. Any comments, suggestions, or feedback from the expert reviewers were delivered to the author and editors for consideration and appropriate revisions. These guidelines were also posted for public comment on the AOPT website (www.orthopt.org), and a notification of this posting was sent to the members of the AOPT. Any comments, suggestions, and feedback gathered from public commentary were sent to the authors and editors to consider and make appropriate revisions to the guidelines, prior to submitting them for publication to the *Journal of Orthopaedic & Sports Physical Therapy* (*JOSPT*).

DISSEMINATION AND IMPLEMENTATION TOOLS

In addition to publishing these guidelines in the *JOSPT*, these guidelines will be posted on the CPG (free access) areas of the *JOSPT* and AOPT websites and submitted for free access on the ECRI Guidelines Trust (guidelines.ecri.org) and the Physiotherapy Evidence Database (www.PEDro.org.au). The planned implementation tools for patients, clinicians, educators, payers, policy makers, and researchers, and the associated implementation strategies are listed in **TABLE 3**.

ORGANIZATION OF THE GUIDELINE

Prevalence, pathoanatomical features, and clinical course of plantar fasciitis are briefly reviewed in the introduction. The 2014 CPG recommendations are restated for risk factors, diagnosis, and differential diagnoses, as well as examination related to outcome measures, activity/participation restriction measures, and physical impairment measures. The authors of this 2023 CPG update have provided an outline for a foot and ankle-specific examination based on expert opinion. Related to PT interventions for those with plantar fasciitis, a SR was conducted to identify randomized clinical trials (RCTs) or SRs and meta-analyses of RCTs that support specific actionable recommendations. When appropriate, the prior 2014 recommendation was provided, followed by a summary of updated literature with the corresponding evidence levels, synthesis of evidence, and rationale for the recommendation(s) with harms and benefits statements, gaps in knowledge, and updated recommendation(s).

TABLE 3 Planned Strategies and Tools to Support the Dissemination and Implementation of This CPG

Tool	Strategy
JOSPT's "Perspectives for Patients" and "Perspectives for Practice" articles	Patient- and clinician-oriented guideline summaries available at www.jospt.org
Mobile app of guideline-based exercises for patients/clients and health care practitioners	Marketing and distribution of app via www.orthopt.org and www.handpt.org
Clinician's Quick-Reference Guide	Summary of guideline recommendations available at www.orthopt.org and www.handpt.org
JOSPT's Read for Credit℠ continuing education units	Continuing education units available for physical therapists at www.jospt.org
Webinars and educational offerings for health care practitioners	Guideline-based instruction available for practitioners at www.orthopt.org and www.handpt.org
Mobile and web-based app of guideline for training of health care practitioners	Marketing and distribution of app via www.orthopt.org
Non-English versions of the guidelines and guideline implementation tools	Development and distribution of translated guidelines and tools to *JOSPT*'s international partners and global audience via www.jospt.org
APTA CPG+	Dissemination and implementation aids

Abbreviations: APTA, American Physical Therapy Association; CPG, clinical practice guideline; JOSPT, Journal of Orthopaedic & Sports Physical Therapy.

CLINICAL GUIDELINES

Impairment/Function-Based Diagnosis

CLASSIFICATION

The primary International Classification of Diseases 10th Revision (ICD-10) code and condition associated with heel pain is **M72.2 Plantar fascial fibromatosis/Plantar fasciitis**. The primary ICF body function codes associated with plantar fasciitis are **b28015 Pain in lower limb** and **b2804 Radiating pain in a segment or region**. The primary ICF body structure codes associated with plantar fasciitis are **s75023 Ligaments and fasciae of ankle and foot**. The primary ICF activities and participation codes associated with plantar fasciitis are **d4500 Walking short distances**, **d4501 Walking long distances**, **d4154 Maintaining a standing position**, **d4552 Running**, **d4553 Jumping**, and **d9201 Sports**. A comprehensive list of codes was published in the previous 2014 CPG.[51]

Risk Factors

2014 RECOMMENDATION

B Clinicians should assess the presence of limited ankle dorsiflexion range of motion (ROM), high body mass index in nonathletic individuals, running, and work-related weight-bearing activities—particularly under conditions with poor shock absorption—as risk factors for the development of heel pain/plantar fasciitis.

Diagnosis

2014 RECOMMENDATION

B Physical therapists should diagnose the ICD category of plantar fasciitis and the associated ICF impairment-based category of heel pain (**b28015 Pain in lower limb**, **b2804 Radiating pain in a segment or region**) using the following history and physical examination findings:

- Plantar medial heel pain: most noticeable with initial steps after a period of inactivity, but also worse following prolonged weight-bearing
- Heel pain precipitated by a recent increase in weight-bearing activity
- Pain with palpation of the proximal insertion of the plantar fascia
- Positive windlass test
- Negative tarsal tunnel tests
- Limited active and passive talocrural joint dorsiflexion ROM
- Abnormal Foot Posture-6 (FPI-6) score
- High body mass index in nonathletic individuals

Differential Diagnosis

2014 RECOMMENDATION

C Clinicians should assess for diagnostic classifications other than heel pain/plantar fasciitis, including spondyloarthritis, fat-pad atrophy, and proximal plantar fibroma, when the individual's reported activity limitations or impairments of body function and structure are not consistent with those presented in the Diagnosis/Classification section of this guideline, or when the individual's symptoms are not resolving with interventions aimed at normalization of the individual's impairments of body function.

Examination

OUTCOME MEASURES

2014 Recommendation

A Clinicians should use the Foot and Ankle Ability Measure (FAAM), Foot Health Status Questionnaire (FHSQ), or the Foot Function Index (FFI) and may use the computer-adaptive version of the Lower Extremity Functional Scale (LEFS) as validated self-report questionnaires before and after interventions intended to alleviate the physical impairments, activity limitations, and participation restrictions associated with heel pain/plantar fasciitis.

ACTIVITY LIMITATION MEASURES

2014 Recommendation

F Clinicians should utilize easily reproducible performance-based measures of activity limitation and participation restriction measures to assess changes in the patient's level of function associated with heel pain/plantar fasciitis over the episode of care.

Physical Impairment Measures

2014 Recommendation

When evaluating a patient with heel pain/plantar fasciitis over an episode of care, assessment of impairment of body function should include measures of pain with initial steps after a period of inactivity and pain with palpation of the proximal insertion of the plantar fascia and may include measures of active and passive ankle dorsiflexion ROM and body mass index in nonathletic individuals.

Foot and Ankle Examination Outline

To assist with the collection of body structure limitation measures, the authors of this CPG formulated an outline for a foot and ankle specific examination based on expert opinion. It should be noted that a comprehensive lower quarter screen can be performed if needed based on the individual's presentation.

Supine range of motion	Dorsiflexion with knee extended Dorsiflexion with knee flexed Plantar flexion Supination/inversion Pronation/eversion Great toe extension *Joint mobility assessment when deficits are identified
Manual muscle testing	Anterior tibialis Posterior tibialis Fibularis longus and brevis Flexor hallicus longus Soleus/gastrocnemius
Standing	Heel raise (gastroc-soleus muscle strength) Dorsiflexion lunge test/tibio-pedal dorsiflexion range of motion Foot Posture Index-6 Single-leg squat Gait Leg length Single-leg balance
Special tests	Windlass in both weight-bearing and non–weight-bearing positions Tinel's with dorsiflexion eversion
Palpation	Medial calcaneal tubercle Trigger point assessment of the gastrocnemius and soleus Body of the calcaneus to asses for stress fracture Plantar surface of the calcaneus to assess for fat pad atrophy Posterior aspect of the calcaneus to assess for insertional Achilles tendinopathy Midsubstance of the plantar fascia to asses for plantar fibromatosis

Imaging

Imaging studies are usually not indicated for patients that meet clinical examination criteria for plantar fasciitis until they fail conservative interventions. When clinicians are considering imaging studies, the ACR Appropriateness Criteria for "Chronic Foot Pain" aligns with the imaging recommendations for those with plantar fasciitis. (https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria). These recommendations note that conventional weight-bearing radiography is the first imaging study of choice for those with chronic foot pain. If radiographs are negative and clinical examination potentially indicates plantar fasciitis, plantar fascia tear, tarsal tunnel syndrome, and/or Baxter's neuropathy, magnetic resonance imaging without contrast or diagnostic ultrasound (US) is usually appropriate as the next imaging study. When specifically looking for increased plantar fascia thickness, no significant differences have been found between diagnostic US and magnetic resonance imaging.[71] The ACR Appropriateness Criteria noted that some of the findings associated with plantar fasciitis are nonspecific and may also be seen

in asymptomatic patients.[71] If therapists are using point-of-care diagnostic US, findings suggested to be diagnostic of plantar fasciitis include fascial thickening (exceeding 4 mm) and hypoechoic appearance.[10,53] For those potentially with Baxter's neuropathy, diagnostic US may be combined with diagnostic and therapeutic injections around the inferior calcaneal nerve. In addition to imaging studies, electrophysiologic studies may be helpful in the evaluation of differential diagnosis, including tarsal tunnel syndrome, entrapment of the medial calcaneal nerve, and S1 radiculopathy (https://www.acr.org/Clinical-Resources/ACR-Appropriateness-Criteria).

Interventions

MANUAL THERAPY

Operational Definitions

The terms used in the manual therapy section require operational definitions of the terms to avoid confusion. Joint mobilization can include thrust and nonthrust techniques and cover a continuum of skilled passive movement applied at varying speeds and amplitudes within or at the end ROM of a joint. Techniques that address soft tissue restrictions and/or pain can include soft tissue mobilization, massage, and dry cupping techniques. Soft tissue mobilization is defined as skilled passive movement of soft tissue, including fascia, muscles, and ligaments, to reduce pain and/or improve ROM. Specific soft tissue mobilization techniques may include instrument-assisted soft-tissue mobilization (IASTM), myofascial release (MFR), myofascial trigger point (MTrP) therapy, muscle energy, and strain/counterstrain techniques. Massage is a general term referring to techniques using the hands to promote relaxation of underlying muscles. Muscle energy is a term that describes techniques involving either isometric mobilization procedures where a contraction intends to pull on a bone to mobilize it, a procedure to induce reflexive relaxation immediately following a contraction, or a relaxation of the antagonist during a contraction of the agonist. Dry cupping is an intervention that uses heated ceramic or glass cups put directly on the skin. As the cups cool, a suction effect is created to mobilize tissue while increasing blood flow and tissue relaxation.[27]

2014 Recommendation

A Clinicians should use manual therapy, consisting of joint and soft tissue mobilization, procedures to treat relevant lower extremity joint mobility and calf flexibility deficits and to decrease pain and improve function in individuals with heel pain/plantar fasciitis.

Dry Cupping

I Two RCTs by AlKhadhrawi and Alshami[3] and Malik et al[50] investigated the immediate effect of dry cupping and stretching. In the study by AlKhadhrawi and Alshami,[3] dry cupping and stretching (n = 36; mean age, 41 ± 10 years; 21 males, 15 females) was compared to active ROM and stretching (n = 35; mean age, 44 ± 10 years; 19 males, 16 females). Primary outcomes included the pain visual analog scale (VAS), pressure pain threshold (PPT), the Patient-Specific Functional Scale, the Star Excursion Balance Test (SEBT), and the figure-of-eight hop test. Secondary outcomes included dorsiflexion ROM. With dry cupping, a greater decrease of approximately 2 points on the pain VAS at the time of treatment and an improvement in pain pressure threshold, at the calf, were reported with a large effect size observed (partial eta-squared, 0.174). These differences were not maintained after 2 days for either pain measure. There were no differences between groups in other outcomes. Immediate ankle dorsiflexion ROM was measured with the knee extended and the knee flexed in a modified lunge position. The intervention group showed significantly improved ROM compared to the control, with a large effect size observed (partial eta-squared, 0.223) but was not observed 2 days later. Malik et al[50] showed greater improvement in 100-point pain VAS of –34.03 points in the dry cupping group after 4 weeks of treatment. These studies indicate that dry cupping combined with conventional interventions reduces short-term pain and briefly increases ROM.

MTrP Therapy

I A RCT by Lilly et al[47] investigated the effects of MTrP therapy, US, and stretching (n = 21; mean age, 42.85 ± 11.2 years; 7 males, 14 females) compared to US and stretching (n = 21; mean age, 42.66 ± 12.25 years; 7 males, 14 females). The parameters used for the MTrP therapy group included pressure over trigger points of the gastrocnemius, soleus, and fibularis muscles until release of the taut band within the muscle was felt by the therapist. Outcomes included PPT, the numerical pain-rating scale (NPRS), and the FAAM. Measurements were taken at baseline and at the conclusion of treatment (2 weeks). Large between-group effect sizes were observed and found to be statistically significant for pain on the VAS (2.9), the FAAM (1.5), and PPT (0.7). Estimates of variability were not reported. Results favored the use of trigger point release in

conjunction with US and stretching for short-term (2 weeks) effects.

Joint Mobilization

II A RCT with by Grim et al[29] compared impairment-based foot, ankle, and spine joint mobilization ("manual therapy"), customized foot orthoses, and manual therapy combined with customized foot orthoses (n = 63; mean age, 48.8 ± 9.8 years; 44 males, 19 females). The impairment-based intervention included identification of impairments of the foot, ankle, and spine, and treating the identified impairments with joint mobilizations to increase overall joint mobility. Pain and function were evaluated using the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot Scale and the Foot Pain and Function Scale. The manual therapy group showed greater improvements when compared to the customized foot orthoses and combined therapy group (P<.01) over the 3-month intervention period. Manual therapy, when compared to customized foot orthoses and combined interventions, offered greater clinical benefits for decreasing pain and improving function. The magnitude of effect was not reported.

II An RCT by Kashif et al[40] compared subtalar mobilization (n = 25; mean age, 32.40 ± 8.02 years; 11 males, 14 females) to "conventional physiotherapy" (n = 27; mean age, 32.59 ± 7.00 years; 16 males, 11 females). The subtalar mobilization group received joint mobilization with movement for 15 minutes, stretching to the gastroc soleus complex for 15 minutes, and rigid taping. The conventional therapy group received therapeutic US for 15 minutes, stretching for 15 minutes, and rigid taping. Each patient received 2 sessions per week for a total of 3 weeks. Pain and function were evaluated at baseline and after 3 weeks using the VAS and the Foot and Ankle Disability Index (FADI). Patients who received subtalar mobilization with movement, stretching exercise plus rigid taping showed greater improvement in pain and function when compared to those who received US, stretching exercise, and rigid taping. The results for the VAS after 3 weeks of treatment indicated a mean difference (MD) of 0.41, standard error: 0.20, P = .023. The results for the FADI after 3 weeks of treatment indicated a MD of 2.04, standard error: 1.01, P = .024.

II Kumar et al[44] conducted a RCT investigating the effect of "conventional therapy": US, electrical stimulation, and home stretching (n = 10) versus conventional therapy plus subtalar mobilization (n = 11). Outcomes included pain (VAS) and disability (FADI). Participants were assessed at baseline, day 3, and day 5. The VAS results in the conventional therapy group had a MD of 3.5 (standard deviation [SD] ± 1.26) from day 1 to 5, whereas the subtalar mobilization group had a MD of 7.56 (SD ± 0.93) from day 1 to 5. The results for both groups showed improvement; however, the subtalar mobilization group showed almost full recovery on the VAS. The statistical analysis suggested that the P value for intergroup and intragroup comparisons was significant for day 5, and for the MD between day 1 to 5 (P = .005). The FADI results for the conventional group improved on average 28.2 points (SD ± −15.3) where the joint mobilization group improved 48.1 (SD ± 7.91) points (P = .003) between days 1 to 5. The findings from this study suggest that subtalar mobilization combined with conventional therapy was more effective than conventional therapy alone in reducing short-term pain and disability.

Soft Tissue Mobilization

II Pollack et al[62] and Fraser et al[25] conducted SRs of the literature examining the effect of manual therapy on pain and function. The studies included in these reviews had limitations that resulted in lowering the level of evidence. Fraser et al[25] included 7 trials, all of which were included in Pollack et al.[62] Trials included both soft tissue mobilization and joint mobilization as the intervention. Within these 2 reviews, 3 studies specifically assessed the effect of soft-tissue mobilization techniques[1,15,70] and assessed deep massage to the posterior calf with neural mobilization compared to US and self-stretch. Their results favored the manual therapy group with a mean change of 15 points (95% CI: 9, 21) compared to 6 points (95% CI: 1, 11) on the Foot & Ankle Computerized Adapted Test over the 6-week intervention period. Ajimsha et al[1,15] found large between-group effect sizes ranging from 1.45 to 1.63 (95% CI: 0.4, 1.7) for PPT when using MFR directed specifically at the gastrocnemius, soleus, and the plantar myofascia. Assessments were taken at baseline, week 4, and week 12. Cleland[15] and Shashua[76] used aggressive soft tissue mobilization directed at the triceps surae and insertion of the plantar fascia at the medial calcaneal tubercle and found between-group differences for soft tissue mobilization and simple stretching. Results favored manual therapy ranged from 5.89 (95% CI: −3.69, 15.47) to 13.5 (95% CI: 6.3, 20.8) at baseline, 4 weeks, and 6 months.

II Four RCTs by Tamil Nidhi et al,[82] Shah and Varadharajulu,[75] Shenoy et al,[77] and Shah[74] assessed the effects of MFR added to "conventional therapy" compared to conventional therapy. All the studies included the VAS and the FFI, among other measures. There were variations in the definition of "conventional therapy," but most interventions consisted of stretching, strengthening, and modality use. Modalities included kinesiology tape, US, and thermal modalities. Sample sizes and results varied across all studies, but all results were statistically significant and favored the addition of MFR to conventional therapy and modalities. The magnitude of effects were not reported.

Instrument-Assisted Soft-Tissue Mobilization

II One RCT conducted by Bhurchandi and Phansopkar[8] compared the effects of IASTM (n = 30; mean age, 33.17 ± 8.43 years; 43% males, 57% females) to therapeutic US (n = 34; mean age, 36.60 ± 11.59 years; 57% males, 43% females). Both groups were provided a twice-per-day home exercise program (HEP) that consisted of calf and plantar fascia stretching for 30 seconds each for 3 repetitions. The IASTM group included aggressive instrument-assisted STM to the triceps surae and plantar fascia. Outcomes included FAAM scale and the NPRS. Data were collected at baseline (pretest), after 8 sessions of treatment (posttest), and 90 days after treatment. At the 90-day follow-up, mean values for FAAM scores increased 52 points in the IASTM group to 99.00 and 4 points in the US group to 89.88, respectively. Estimates of variability were only presented with graphical representations. Secondary outcomes increased as well, favoring the use of IASTM. The results indicated that IASTM and a HEP were superior to US in decreasing the pain intensity and improving function in patients with heel pain.

II Three RCTs[36,42,57] assessed the effect of IASTM using the Graston technique. Two studies[43,57] had 66 patients randomized into 2 groups. Follow-up assessments were taken at baseline and 2 weeks[57] and 4 weeks.[42] Outcome measures included the NPRS, FADI, and the lunge test. Pretest and posttest comparisons of 2.58 on the NPRS, 5.0 on the FADI, and 4.76 on the Lunge test were significantly different and favored the use of IASTM. Jadhav et al[36] compared the effectiveness of IASTM using the Gua Sha technique, Cryostretch, or positional release on patients with plantar heel pain. Thirty-six patients were randomized into 3 groups of twelve. NPRS, FFI, and physical activity assessments took place at baseline and after 7 days. Mean differences pretest and posttest were statistically significant and favored the use of IASTM but did not reach the minimal clinically important difference (MCID) for any outcome.

Muscle Energy

III A RCT by Tanwar et al[83] investigated the effects of muscle energy and conventional therapy compared to conventional therapy alone. The muscle energy technique was performed with the participant in a supine position with the knee flexed for the soleus and the knee in an extended position for the gastrocnemius. The parameters for the conventional therapy included (1) US at a frequency of 1 MHz with the output of 1.5 W/cm^2 for 7 minutes, (2) plantar fascia stretching, (3) intrinsic muscle exercises, and (4) towel gripping (curls). Outcome measures for this study included ROM of passive dorsiflexion, pain intensity measured using the NPRS, and foot function using the FFI. The results favored manual therapy with superior gains in all measures when muscle energy technique was combined with conventional therapy.

Evidence Synthesis

Overall, recent studies add to the body of evidence supporting the use of manual therapy directed at the joints and soft tissue structures of the lower extremity to improve pain, function, and disability. There was 1 additional level I study and 3 level II studies, supporting joint mobilization, identified since the previous update. Four additional level II studies supported techniques directed at soft tissue. No new side effects or adverse events were reported. Therefore, based on the low risk and the consistent likely benefits of improved pain and function, the preponderance of evidence continues to support manual therapy.

2023 Recommendation

A Clinicians should use manual therapy directed at the joints and soft tissue structures of the lower extremity to address relevant joint and flexibility restrictions, decrease pain, and improve function in individuals with plantar heel pain/plantar fasciitis.

STRETCHING

Operational Definitions

Gastrocnemius/soleus stretching involves stretching of the posterior calf structures, including gastrocnemius, soleus, Achilles tendon, and related structures. It may be performed by the patient in weight-bearing or non–weight-bearing positions. Gastrocnemius/soleus stretching may include stretching the ankle into dorsiflexion with the knee in extension to target the gastrocnemius muscle and structures or in knee flexion to target the soleus muscles, and other short plantar flexors. Gastrocnemius/soleus stretching may be conducted in long-sitting or straight-leg-raise position to provide additional stretching to posterior knee and hip structures. We refer to this as hamstring stretching.

Plantar fascia stretching is intended to localize the stretch to the plantar fascia. It is performed in weight-bearing or non–weight-bearing positions, by applying pressure to the metatarsal heads to stretch the forefoot while the toes are stretched into dorsiflexion (extension). Pressure may be applied to the plantar fascia during the stretch. The ankle is placed in a neutral or dorsiflexed position.

2014 Recommendation

A Clinicians should use plantar fascia-specific and gastrocnemius/soleus stretching to provide short-term (1 week to 4 months) pain relief for individuals with heel pain/plantar fasciitis. Heel pads may be used to increase the benefits of stretching.

Evidence Update

One high-quality SR and meta-analysis[78] of 8 RCTs (n = 681) evaluated the impact of plantar fascia stretching and gastrocnemius/soleus stretching on pain VAS (0-100) in patients with plantar fasciitis. There was moderate-quality evidence that plantar fascia stretching was superior to gastrocnemius/soleus stretching (MD pain VAS, −2.37; 95% confidence interval [CI]: −0.63, −17.10) and plantar fascia stretching combined with ESWT was superior to ESWT alone (MD pain VAS, −13.46; 95% CI: −16.00, −10.92) in the short term (less than 3 months). There was very low-quality evidence that (1) combined gastrocnemius/soleus and plantar fascia stretching was superior to other therapies in the short term (MD pain VAS, 3.66; 95% CI: 6.77, 14.09), (2) combined gastrocnemius/soleus and plantar fascia stretching was superior to sham (MD pain VAS, −14.00; 95% CI: −21.07, −6.93), (3) combined gastrocnemius/soleus and plantar fascia stretching was superior to no stretching (MD pain VAS, −16.00; 95% CI: −23.57, −8.43), (4) gastrocnemius/soleus stretching was superior to sham (MD pain VAS, −11.40; 95% CI: −23.37, 0.57), and (5) plantar fascia specific stretching was superior to ESWT in the short term (MD pain VAS, −0.52; 95% CI: −23.82, −3.23). The overall treatment effect of stretching was large and was comparable to other interventions. There was variation in the duration of gastrocnemius/soleus and plantar fascia specific stretching, which ranged from 10 seconds to 60 minutes and 10 to 30 seconds, respectively. The duration of treatment ranged from 4 days to 8 weeks, and there was limited evidence for outcomes longer than 3 months.

Plantar Fascia Compared to Gastrocnemius/Soleus Stretching

A RCT by Gupta et al[32] compared the effectiveness on pain (FFI) and disability (FADI) of 4 different treatments: (1) Indomethacin or Diclofenac (group 1:"conventional treatment", n = 35; mean age, 44.4 ± 9.4 years), (2) heat treatment with silicone heel pad (group 2, n = 35; mean age, 41.5 ± 10.9 years), (3) active plantar fascia stretching with sham gastrocnemius/soleus stretching (group 3, n = 35; mean age, 46.4 ± 11.9 years), and (4) active gastrocnemius/soleus stretching with sham plantar fascia stretch (group 4, n = 35; mean age, 41.5 ± 10.3 years). The results indicated plantar fascia stretching with sham gastrocnemius/soleus stretching was more effective than the other 3 treatments (P<.05) over 12 months.

Combined Plantar Fascia, Gastrocnemius/Soleus, Hamstring, and Fibularis Stretching

A RCT by Kamonseki et al[38] investigated the effect of stretching with and without muscle strengthening exercises for the foot and hip on balance as measured by the SEBT. Patients were randomly allocated into 3 groups: a stretching-alone exercise group (n = 28; mean age, 44.5 ± 11.5 years; 21.5% males, 78.5% females), a foot exercise group (n = 27; mean age, 47.7 ± 9.9 years: 23% males, 77% females), and a foot and hip exercise group (n = 28; mean age, 47.7 ± 9.9 years; 77% males, 23% females). The stretching intervention included gastrocnemius, soleus, plantar fascia, and gastrocnemius/soleus combined with hamstring stretching. No statistically significant differences were present among the 3 groups in balance (P>.05) after 8 weeks.

A RCT by Pinrattana et al[61] compared the immediate and short-term effects of kinesiology taping (n = 10; mean age, 23.33 ± 1.83 years), self-stretching (n = 10; mean age, 22.00 ± 1.25 years), and a combination of kinesiology taping and self-stretching (n = 10; mean age, 24.63 ± 5.42 years) on pain (VAS 0-10) and function (Manchester Foot Pain and Disability Index). The stretching intervention included gastrocnemius/soleus, plantar fascia, fibularis, and gastrocnemius/soleus combined with hamstring. There were no significant differences between the groups for VAS scores or the Manchester Foot Pain and Disability Index (P>.05) immediately following the treatment session or after 1 week.

Combined Plantar Fascia and Gastrocnemius/Soleus Stretching

A RCT by Ranbhor et al[64] compared the effects of foam rolling (n = 25; mean age, 33.08 ± 10:83 years) to self-stretching (n = 25; mean age, 38.28 ± 13:67 years). The stretching intervention included gastrocnemius/soleus and plantar fascia stretching. Immediately following the interventions, there was no significant difference between groups in mean VAS (0-10), plantar fascia, gastrocnemius, and soleus PPT (pounds), or dorsiflexion ROM (P = .171, .372 and .861, respectively), whereas the stretching group had a significantly greater decrease in gastrocnemius PPT (P = .029) and soleus PPT (P = .013) compared to the foam roller group. At the end of treatment, the self-stretching group had better outcomes for gastrocnemius PPT (PPT % change: stretching group: 32.28; foam roller group: 445.46, P = .029) and soleus PPT (PPT % change: stretching group: 30.45; foam roller group: 44.54, P = .013). There were no significant differences for PPT (P = .372) between groups for the plantar fascia.

Combined Plantar Fascia Stretching and Monophasic Pulsed Current

Two articles reporting on 1 RCT conducted by Alotaibi et al[4,5] compared the effects of monophasic pulsed current (MPC) (n = 22; mean age, 49.7 ± 11.7 years; 8 males, 14 females) to MPC combined with plantar fascia stretching (n = 22; mean age, 49.0 ± 9.7 years; 7 males, 15 females) on heel pain VAS (0-10), heel tenderness (pressure algometer), activities of daily living (FAAM), and plantar fascia thickness (millimeters). There were

no significant differences between the 2 groups in all outcome measures (P = .57) after 4 weeks. There was no correlation between heel pain and plantar fascia thickness (r = –.006, P = .97) after 4 weeks.

Plantar Fascia Stretching

II In a RCT by Engkananuwat et al[23] compared the effects of Achilles tendon stretching (n = 25; mean age, 49.8 ± 6.5 years; 10 males, 15 females) to Achilles tendon and plantar fascia stretching (n = 25; mean age, 49.7 ± 6.5 years; 8 males, 17 females) on first step in the morning pain, average pain at the medial plantar calcaneal region over 24 hours, PPT, ankle dorsiflexion/plantarflexion ROM, and VAS-foot and ankle questionnaire values after 4 weeks. The Achilles tendon stretch fits within the gastrocnemius/soleus stretching category on this CPG. The results of this study indicated that the Achilles tendon and plantar fascia stretching group showed a significantly greater PPT at 4 weeks than the Achilles tendon alone (MD, 1.3, P = .04). There were no significant differences between the 2 groups for all other outcomes.

Gastrocnemius/Soleus Stretching

II A RCT by Lipa et al[48] compared MFR, US, and stretching (n = 15; mean age, 45.40 ± 3.22 years) to MFR and US (n = 15; mean age, 44.47 ± 3.79 years) over 24 sessions in 6 weeks. The stretching intervention included gastrocnemius/soleus stretching completed both by the therapist and the patient. The results indicated significantly greater improvement in the pain VAS (t = 4.25, P = .00) and FFI (t = 4.52, P = .00) in the group that received stretching added to MFR and US.

Home Stretching Compared to Physical Therapy-Based Stretching

III A RCT by Kaiser et al[37] investigated the differences between home-based plantar fascia stretching (n = 30; mean age, 57 years; 12 males, 18 females) and formal PT (n = 27; mean age, 56 years; 6 males, 21 females) consisting of plantar and gastrocnemius/soleus stretching in addition to other approaches (such as dry needling (DN), acupuncture, massage, shock wave therapy, US, and iontophoresis treatments) as needed. The results indicated no significant differences between groups for the VAS (0-10), the FAAM ADL & sports subscales, and for the physical component summary and mental component summary scores of the 36-Item Short-Form Health Survey (SF-36) questionnaire (P>.05).

Evidence Synthesis

The studies included in this update add to the body of evidence supporting the existing recommendation. One high-quality SR of moderate- to low-quality studies including 8 RCTs found that combined gastrocnemius/soleus and plantar fascia stretching was superior to sham and no stretching, plantar fascia stretching was superior to gastrocnemius/soleus stretching, and plantar fascia stretching with ESWT was superior to ESWT alone. Therefore, plantar fascia stretching is an essential component of stretching.

One high-quality RCT found that plantar fascia stretching was more effective than oral nonsteroidal anti-inflammatory drugs (NSAIDs), heat therapy and a heel pad, and active gastrocnemius/soleus stretching. One high-quality RCT found no effect of gastrocnemius/soleus, plantar fascia, and gastrocnemius/soleus combined with hamstring stretching with and without muscle strengthening exercises on balance. Since balance is not a key target of treatment for plantar fasciitis, this result did not impact the existing recommendation. One high-level RCT found no effect of gastrocnemius/soleus, plantar fascia, fibularis, and gastrocnemius/soleus combined with hamstring stretching on pain or function; however, results were only measured 1 week after treatment. This substantially limited its applicability for this guideline. One high-quality RCT and 1 lower-quality RCT supported plantar fascia stretching over gastrocnemius/soleus or foam rolling to improve PPT immediately after treatment. The lack of long-term follow-up in this study limits the applicability of this evidence. Two articles reporting on 1 RCT found no effect of MPC combined with plantar fascia stretching on heel pain and tenderness, and no correlation between heel pain and plantar fascia thickness. One lower-quality RCT supported gastrocnemius/soleus stretching combined with MRF and US over MRF and US alone to improve pain at 6 weeks. Lastly, 1 lower-quality RCT found no difference in pain and function between home-based plantar fascia stretching compared to plantar fascia and gastrocnemius/soleus stretching in addition to other conventional interventions used in a PT setting.

The evidence supports the effectiveness of plantar fascia-specific and gastrocnemius/soleus stretching exercises for improving pain, function, and disability, with treatment times ranging from 1 week to 12 months. There were no serious side effects or adverse events reported within any of these studies. The only reported side effects were mild to moderate increase in pain while stretching, which ceased at the conclusion of the stretch. There was not enough evidence that isolated the effect of adding hamstring or fibularis muscle stretching to plantar fascia and gastrocnemius/soleus stretching. Therefore, the recommendation was not changed.

Gaps in Knowledge

Future research should investigate long-term outcomes (>3 months) and isolate the effects of stretching other muscles in conjunction with plantar fascia and gastrocnemius/soleus stretching, such as the hamstring and fibularis. Studies should specify stretching parameters, duration, and frequency of treatment.

2023 Recommendation

A Clinicians should use plantar fascia-specific and gastrocnemius/soleus stretching to provide short- and long-term pain reduction, as well as to improve short- and long-term function and disability.

TAPING

Operational Definitions

Within this review, taping includes the use of rigid (such as athletic or Leukotape®) and elastic (Kinesiology or Dynamic Tape®) tape applied for any period of time and in any manner to the foot or ankle region of the body. Rigid taping techniques may attempt to provide mechanical support, while elastic tape may attempt to offer support while allowing movement. All tape when applied to the skin may provide afferent input that potentially affects different responses.

2014 Recommendation

A Clinicians should use antipronation taping for immediate (up to 3 weeks) pain reduction and improved function for individuals with heel pain/plantar fasciitis. Additionally, clinicians may use elastic therapeutic tape applied to the gastrocnemius and plantar fascia for short-term (1 week) pain reduction.

Evidence Update

I Two SRs found taping to be an effective short-term treatment for those with plantar fasciitis.[31,73] The meta-analysis by Guimarães et al[31] found low-dye taping to significantly decrease pain compared to controls (4 studies, n = 231) in the short term (1 to ≤6 weeks) with a MD of −3.60 (95% CI: −4.16, −3.03). A RCT by Castro-Méndez et al[11] compared an elastic tape (Dynamic Tape®) to low-dye taping at 1-week follow-up in 57 subjects (28 women and 29 men) with a mean age of 41.7 SD ± 8.9 years. The Dynamic Tape® significantly decreased pain VAS scores compared to low-dye taping (MD, −2.05 [95% CI: −2.37, −1.63] vs MD, −1.10 [95% CI: −1.74, −0.47]; P = .015; eta-squared = 0.10). However, low-dye taping was able to significantly decrease pronation on the Foot Posture Index-6 (FPI-6) compared to Dynamic Tape® (MD, −0.47 [95% CI: −0.71, −0.22] vs MD, 0.034 [95% CI: −0.08, 0.15]; P<.001; effect size, 0.02).

I Two studies included in the SR of Schuitema et al[73] directly compared taping to ESWT. Ordahan et al[59] compared a group receiving ESWT (n = 37; mean age, 47.8 years; 9 males, 28 females) to a group with kinesiology taping (n = 33; mean age, 47.7 years; 7 males, 26 females) at a 5-week follow-up. Both groups showed significant improvement (P<.05), with no significant differences between ESWT and kinesiology taping on the pain VAS (MD, −3.1 vs −3.8; P = .670), and heel tenderness index (MD, −1.3 vs −1.3; P = .731) and the 5 Foot and Ankle Outcome Score (FAOS) subscales (P = .3-.673). Tezel et al[85] investigated the effectiveness of kinesiology taping (n = 36; mean age, 46.7 years; 7 males, 29 females) compared with ESWT (n = 42; mean age, 46.2 years; 7 males, 35 females) at 6-week follow-up. The results indicated that there was a statistically significant improvement on the pain VAS for both kinesiology taping and ESWT (MD, −2.72; P = .001 vs −2.42; P = .001). Both groups also had significant improvement on 7 of the 8 Medical Outcomes Study SF-36 subscale scores, including pain (MD, 16.81; P = .001 vs 14.92; P = .001) and physical function (MD, 13.96; P = .004 vs 5.71; P = .043) subscales. Only the kinesiology taping group showed a significant decrease on FFI subscales score for pain (MD, −20.17; P = .001 vs −4.65; P = .075), disability (−20.27; P = .007 vs −6.79; P = .377), and activity restriction (MD, −28.57; P = .001 vs −8.04; P = .162).

I Tulasi Ratna et al[88] compared a group receiving conventional therapy that consisted of US, plantar fascia and Achilles stretching, and intrinsic foot muscle strengthening to conventional therapy combined with kinesiology taping (n = 45; age range, 20-55 years). Primary findings found a significantly greater improvement at 3-week follow-up for patients who received kinesiology taping along with conventional therapy on VAS pain levels (MD, −2.50 vs −4.69; P = .000) and decreased disability with the Plantar Fasciitis Pain/Disability Scale (MD, −13.39 vs −24.79; P = .000).

II Three lower-quality RCTs [39,43,63] demonstrated positive effects of kinesiology taping at a 2-week follow-up. Kirthika et al[43] investigated the effectiveness of kinesiology tape application (n = 20) compared to stretching exercises for the plantar fascia and calf muscles (n = 20) on balance and functional performance. At the 2-week follow-up, the mean SEBT (95.98 vs 90.28) and FAAM scores (83.99 vs 72.54) were significantly greater (P<.001) in the kinesiology taping group. Rahane et al[63] also found kinesiology taping and therapy (n = 20) to have improved outcomes at a 2-week follow-up when compared to a therapy-alone group (n = 20) (lower 2-week pain VAS decrease [−1.25 vs −3.95; P<.001] and decreased FFI total score [−22.04 vs −12.13; P<.0001]). Therapy consisted of US, contrast baths, intrinsic muscle and calf strengthening, plantar fascia, and Achilles stretching. Karishma et al[39] compared kinesiology taping and stretching to US and stretching in 30 subjects. At the 2-week follow-up, the kinesiology tape group had lower pain VAS (1.13 vs 4.2; t = −9.92, P<.0005) and FADI scores (11.46 vs 39.46; t = −19.32, P<.0005).

II Two lower-quality RCTs[79,84] compared taping to manual therapy techniques. Solanki[79] investigated the effectiveness of a taping technique aimed at stabilizing the foot compared to calcaneal glide mobilizations in 30 subjects with symptoms of greater than 3 months in duration. While both groups significantly improved

(*P*<.05), the taping group improved significantly more on the pain VAS (t = 1.821, *P*<.05) and FFI total score (t = 1.830, *P*<.05). Tariq et al[84] compared a calcaneal taping technique to a muscle energy technique aimed at increasing dorsiflexion ROM in 52 subjects (46.2% males, 53.8% females, 19.2% between ages 20 and 30 years, 34.6% between ages 31 and 40 years, 30.8% between ages 41 and 50 years, and 15.4% between ages 51 and 60 years). Both groups received 7 treatments on alternate days that also included US, foot intrinsic muscle strengthening exercises, and tibialis anterior stretching exercises. After the 7 treatments, both groups improved, with the taping groups having lower FFI scores (13.53 ± 5.25 vs 21.27 ± 9.30 *P* = .001) and lower pain on the VAS (1.42 ± 0.758 vs 2.92 ± 1.354, *P*<.000).

Evidence Synthesis

Two SRs continue to support the use of taping for short-term (1 to ≤6 weeks) pain relief. Two types of taping techniques have been studied; a rigid low-dye taping technique that aims to provide mechanical support and an elastic tape that offers dynamic support along with other proposed positive effects (decreasing pain). One level I study favored the elastic form of taping over the rigid form for decreased pain at 1 week. Another level I study found there was a greater improvement in pain and disability for patients who received kinesiology taping along with conventional therapy at 3 weeks. Lower-level RCTs have supported the use of elastic taping in short-term (2 weeks) outcomes with improved pain and function when compared to stretching or manual therapy alone or when taping was added to other PT interventions. Two RCTs found no difference between kinesiology taping and ESWT in decreasing pain in follow-up ranging from immediately posttreatment to a 6-week follow-up. Only 1 of the 3 studies found results for function that favored kinesiology taping over ESWT. The only reported harm related to taping has been mild skin irritation. Therefore, the benefits of taping outweigh the potential harm.

Gaps in Knowledge

Studies are needed to compare rigid versus elastic taping, as well as methods of tape application that may be influenced by foot shape (supination and pronation). Additionally, studies investigating long-term outcomes (>6 weeks) are needed.

2023 Recommendation

A Clinicians should use foot taping techniques, either rigid or elastic, in conjunction with other PT treatments for short-term improvements in pain and function in individuals with plantar fasciitis.

FOOT ORTHOSES

Operational Definitions

Within this review, foot orthoses included any external support applied to the foot (in shoe) or ankle (ankle-foot orthotic) made of any material with the general purpose of supporting the medial longitudinal arch and offloading the plantar fascia. Foot orthoses may include either custom or prefabricated varieties.

2014 Recommendation

A Clinicians should use foot orthoses, either prefabricated or custom fabricated/fitted, to support the medial longitudinal arch and cushion the heel in individuals with heel pain/plantar fasciitis to reduce pain and improve function for short- (2 weeks) to long-term (1 year) periods, especially in those individuals who respond positively to antipronation taping techniques.

Evidence Update

I This update includes 3 SRs with meta-analyses,[30,65,90] 1 SR without a meta-analysis,[73] and 1 comparative effectiveness SR with meta-analysis[7] that collectively provide a more conservative impression of the benefits of orthoses compared to the previous guidelines, particularly as an isolated treatment in the short term. The meta-analysis by Guimarães et al[31] found no significant effect for pain reduction when orthoses were compared with controls (including either sham or flat orthoses) at 1 to 6 weeks (4 studies; n = 259; pooled MD, −0.6 [95% CI: −1.74, 0.56]; *P* = .31) and 7 to 12 weeks (5 studies; n = 396; pooled MD, −0.74 [95% CI: −1.49, 0.02]; *P* = .06) follow-up. Additionally, this review found no significant effect for pain reduction when custom and prefabricated orthoses were compared at 1 to 6 weeks (3 studies; n = 304; pooled MD, −1.07 [95% CI: −3.26, 1.11]; *P* = .34) and 7 to 12 weeks (4 studies; n = 465; pooled MD, −0.11 [95% CI: −0.69, 0.60]; *P* = .72) follow-up.

II Not included in the SRs, a lower-quality RCT by Çaglar Okur and Aydin[9] investigated the differences between custom orthoses (n = 43; mean age, 46.94 years; 8 males, 35 females) and ESWT (n = 40; mean age, 48.84 years; 7 males, 33 females) on 4 pain VASs (at rest, walking, morning, and evening), FFI total score, and the 8 subscales of the FHSQ. There were no significant differences between the ESWT and custom foot orthoses groups at the 4-week follow-up (*P*>.05). Twelve weeks after treatment, the physical activity subscale of FHSQ was significantly higher for the custom foot orthotic (CFO) group (*P*<.05). Twenty-four weeks after treatment, there was a significant difference (all comparisons, *P*<.05) in evening pain VAS (CFO 4.7 vs ESWT 5.9), and on foot pain (CFO 60.2 vs ESWT 551.2), foot function (CFO 80.2 vs ESWT 70.5), general foot health (CFO 40.6 vs ESWT 32.6), and physical activity subscales (CFO 71.4 vs ESWT 61.6) of the FHSQ in favor of the custom orthosis group (*P*<.05). Forty-eight weeks after use of either CFO or ESWT, there was a significant difference in favor of the CFO group (all comparisons, *P*<.001) in pain VAS with

walking (4.1 SD ± 1.7 vs 5.5 SD ± 2.1) and evening pain VAS scores (4.5 SD ± 1.7 vs 6.2 SD ± 2.1), and FFI total scores (51.8 SD ± 18.1 vs 66.4 SD ± 21.1), as well as on the foot pain (40.4 SD ± 19.3 vs 56.2 SD ± 22.1), foot function (73.3 SD ± 16.9 vs 54.3), and physical activity (70.1 SD ± 21.8 vs 58.7 SD ± 20.9) subscales of FHSQ.

II Included in the review of Guimarães et al,[30] a lower-quality RCT by Coheña-Jiménez et al[16] investigated the differences between custom-made foot orthoses with ESWT and posterior muscle chain stretching versus placebo flat cushioning insoles with ESWT and posterior muscle chain (plantar and gastrocnemius) stretching (n = 76; mean age, 36.5 years; 35 males, 41 females). The VAS scores after 1 month were significantly lower between the custom orthoses (experimental) group and the placebo (control) group (3.41 [95% CI: 2.5, 4.4] vs 7.26 [95% CI: 6.3, 8.3]; P = .0001, effect size: d = 3.37) in favor of the custom orthoses group. The VAS scores at 6 months were also significantly different between the experimental group and the control group (3.29 [95% CI: 2.3, 4.3] vs 7.52 [95% CI: 6.1, 8.5]; P = .0001, effect size: d = 3.46), again in favor of the custom orthoses group.

Evidence Synthesis

The evidence from 4 meta-analyses suggest a small to no effect of the use of custom or prefabricated orthoses as a standalone treatment for the short term (<3 months) management of plantar fasciitis. New studies investigating the additive benefit of orthoses to a multimodal program on long-term outcomes are limited. When combined with other interventions, such as stretching and ESWT, the outcomes on pain are positive. Additionally, a level II study found that long-term (24-28 weeks) follow-up favored custom orthoses over ESWT on pain and function.

Gaps in Knowledge

Evidence on the type, materials, and design of foot orthoses is limited, while evidence clearly finds a similarity in outcomes between custom and prefabricated orthoses. Studies looking at the additive benefit of orthoses to a multimodal program on long-term outcomes are needed.

2023 Recommendation

B Clinicians should not use orthoses, either prefabricated or custom fabricated/fitted, as an isolated treatment for short-term pain relief in individuals with plantar fasciitis.

C Clinicians may use orthoses, either prefabricated or custom fabricated/fitted, when combined with other treatments in individuals with heel pain/plantar fasciitis to reduce pain and improve function.

NIGHT SPLINTS

Operational Definition

Night splints are prefabricated plastic orthoses that are used to prevent ankle plantar flexion while sleeping.

2014 Recommendation

A Clinicians should prescribe a 1- to 3-month program of night splints for individuals with heel pain/plantar fasciitis who consistently have pain with the first step in the morning.

Evidence Update

No studies investigated the effectiveness of night splints. Therefore, the recommendation is unchanged.

2023 Recommendation

A Clinicians should prescribe a 1- to 3-month program of night splints for individuals with heel pain/plantar fasciitis who consistently have pain with the first step in the morning.

PHYSICAL AGENTS – LOW-LEVEL LASER THERAPY

2014 Recommendation

C Clinicians may use low-level laser therapy (LLLT) to reduce pain and activity limitations in individuals with heel pain/plantar fasciitis.

Evidence Update

I Five SRs came to similar conclusions finding a positive effect for the utilization of LLLT on decreasing pain in those with plantar fasciitis.[21,30,31,58,89] A total of 14 studies (n = 817) on LLLT were included in the most recent meta-analysis by Guimarães et al.[31] This analysis identified 5 studies (n = 231) that found LLLT improved pain compared to a control, with a MD of – 2.09 (95% CI: –2.28, –1.90) in a short-term follow-up (1 to ≤6 weeks). Also, LLLT was compared to ESWT in 4 studies (n = 175) and high-intensity laser therapy in 2 studies (n = 172) with no significant difference between the treatments in the short term (1 to ≤6 weeks) with pooled MD of 0.5 (95% CI: –2.0, 2.9) and –0.47 (95% CI: –2.81, 1.87), respectively.[31] Another meta-analysis found 2 studies (n = 90), where LLLT combined with rehabilitation improved pain with a MD of –2.0 (95% CI: –2.9, –1.1) in the short term (0 to ≤6 weeks) when compared to rehabilitation alone.[31]The meta-analysis by Wang et al[89] found the VAS score to be better in the LLLT group 3 months after treatment (standardized mean difference [SMD], –1.13; 95% CI: –1.53, –0.72; P<.001) compared to controls.

II When examining disability, the SR by Guimarães et al[31] identified 3 studies (n =190) and concluded that there was no significant difference in short-term disability when LLLT was compared to a placebo with

a MD of −10.0 (95% CI: −26.2, 6.2). Similar findings were noted in other SRs.[21,89]

II Not included in the SRs, a lower-quality RCT by Lamba[45] compared LLLT (780 N·m; 10 J/cm^2) and plantar fascia stretching (n = 40; mean age, 45.88 years) to sham LLLT and stretching (n = 40; mean age, 45.42 years). From baseline to week-4 follow-up, there was a significant decrease in pain on the VAS (−3.20 vs −0.83; P = .004), decrease in disability on the FFI (−32.87 vs −8.97; P<.000), and increase in ankle dorsiflexion ROM (5.13 vs 2.48; P = .005) in the LLLT group.

II Another lower-quality RCT compared a group receiving LLLT (n = 20; mean age, 46.8 years; 8 males, 12 females) to a group receiving ESWT (n = 27; mean age, 46.9 years; 1 male, 26 females) found that more subjects in the LLLT group achieved a clinically important difference on the FFI for pain (95% n = 19 vs 48% n = 13), activity limitation (80% n = 16 vs 19% n = 5), and disability (80% n = 16 vs 33% n = 9).[87]

Evidence Synthesis

The evidence from high-quality meta-analyses found that LLLT used alone or with other interventions provided a small improvement in pain in the short term (1-3 months) in those with either acute or chronic plantar fasciitis. Lower-quality and conflicting evidence does not consistently support LLLT for improving disability. The evidence to support LLLT over ESWT was also conflicting. The meta-analyses noted that the LLLT treatment parameters applied in studies were varied or poorly reported. Studies that used the World Association for Laser Therapy (WALT) recommendation, treating 2 to 3 points with a minimum dose of 2 J/point with a 904-N·m wavelength laser or 4 J/point with 780- to 860-N·m wavelength laser produced positive outcomes.[58] The typical treatment duration was 3 times per week for 3 weeks. No harms were reported for LLLT treatment.

Gaps in Knowledge

The optimal LLLT treatment parameters, including wavelength, energy dosage, duration, and frequency need to be further studied. Also, higher-quality research is needed to further investigate the effect of LLLT on foot function.

2023 Recommendation

B Clinicians should use LLLT as part of a rehabilitation program in those with acute or chronic plantar fasciitis to decrease pain in the short term.

PHYSICAL AGENTS – PHONOPHORESIS

2014 Recommendation

C Clinicians may use phonophoresis with ketoprofen gel to reduce pain in individuals with heel pain/plantar fasciitis.

Evidence Update

No studies investigated the effectiveness of phonophoresis. Therefore, the recommendation is unchanged.

2023 Recommendation

C Clinicians may use phonophoresis with ketoprofen gel to reduce pain in individuals with heel pain/plantar fasciitis.

PHYSICAL AGENTS – ELECTROTHERAPY

2014 Recommendation

D Clinicians should use manual therapy, stretching, and foot orthoses instead of electrotherapeutic modalities to promote intermediate and long-term (1-6 months) improvements in clinical outcomes for individuals with heel pain/plantar fasciitis. Clinicians may or may not use iontophoresis to provide short-term (2–4 weeks) pain relief and improved function.

Evidence Update

I A RCT by Razzano et al[67] compared noninvasive interactive neurostimulation (n = 59; mean age, 53 years; 30 males, 29 females) and ESWT (n = 55; mean age, 50.6 years; 23 males, 32 females) on the FFI-pain subscale, pain VAS, (0-100), and daily intake of Etoricoxib (60 mg). The noninvasive interactive neurostimulation group had a significant positive effect of treatment (P<.031) compared to ESWT for all outcomes after 4 and 12 weeks with moderate effect sizes for all outcomes.

II A RCT by Ge et al[26] compared the effects of dry cupping (n = 14; mean age, 40.1 ± 14.6 years; 4 males, 10 females) to premodulated interferential current electrical stimulation (n = 15; mean age, 39.3 ± 13.5 years;10 males, 5 females) on pain (VAS 0-100), FAAM, LEFS, and PPT. The VAS (0-100 cm) had MDs (at rest, first in the morning, and with activities) of −29.8 mm (95% CI: −39.4, −20.1) in the dry cupping therapy group compared to −28.0 mm (95% CI: −36.7, −19.2) in the electrical stimulation therapy group. The FAAM had MDs of 16.9 (95% CI: 7.8, 26.0) in the dry cupping therapy group compared to 12.9 (95% CI:8.2, 17.6) in the electrical stimulation therapy group. The LEFS had MDs of 19.6 (95% CI:8.6, 30.7) in the dry cupping therapy group compared to 11.4 (95% CI:7.7, 15.1) in the electrical stimulation therapy group. The PPT had MDs of 4.6 lbs (95% CI: 0.0, 9.1) in the dry cupping therapy group compared to 1.7 lbs (95% CI: −2.7, 6.0) in the electrical stimulation therapy group. There were no significant differences (P>.05) between the 2 groups in all outcome measures after 4 weeks.

II A RCT by Srivastava et al[81] compared the effectiveness of iontophoresis added to conventional therapy (n = 20) to conventional therapy alone (n = 20),

which consisted of ankle/foot exercises, stretching, and US on the VAS (0-10) and FFI. The VAS had significant differences between the iontophoresis-with-conventional-therapy group compared to the conventional therapy–alone group (t = .765, *P* = .000). The FFI had statistically significant differences between the iontophoresis-with-conventional-therapy group compared to the conventional therapy–alone group (t = 3.369, *P* = .003). Iontophoresis with conventional therapy was more effective than conventional therapy alone on pain and function over 2 weeks (6 sessions per week), with moderate estimates of effect on the MCIDs for all outcome measures.

II A RCT by Das and Dutta[18] compared the benefit of interferential therapy with conventional therapy (n = 15) to conventional therapy alone (n = 15), which consisted of US, a contrast bath, stretching of the plantar fascia and Achilles, and strengthening exercises for the intrinsic muscles of the foot on VAS (0-10), FFI, and dorsiflexion ROM. Interventions spanned 15 days (3 sessions per week). Interferential therapy with conventional therapy was superior to conventional therapy alone for VAS (t = 4.638, *P* = .00) and FFI (t = 4.38, *P* = .00). Dorsiflexion ROM effects were not significant, (t = –.642, *P* = .526).

Evidence Synthesis

One level II RCT found no difference in pain and function between premodulated interferential current electrical stimulation and dry cupping. One high-quality RCT supported noninvasive interactive neurostimulation over ESWT, with a small to moderate effect size, to improve pain and daily intake of Etoricoxib at 4 and 12 weeks. One level II RCT supported iontophoresis with conventional therapy. One level II RCT supported interferential therapy with conventional therapy; however, both RCTs had small effects. Follow-up times varied among these studies from 2 to 12 weeks. There were no reported adverse effects. Therefore, the estimates of effects from these studies were small and there was low confidence in their precision. The main recommendation, to use other evidence-based interventions versus electrotherapy, has not changed. Because of the low-level evidence available for the effect of premodulated interferential current electrical stimulation, this intervention was added to the second recommendation statement.

Gaps in Knowledge

Future research should investigate the effects of iontophoresis and premodulated interferential current in studies with sufficient sample sizes to provide more confidence in the estimates of effect.

2023 Recommendation

D Clinicians may use manual therapy, stretching, and foot orthoses instead of electrotherapeutic modalities to promote short-term and long-term improvements in clinical outcomes for individuals with heel pain/plantar fasciitis. Clinicians may use iontophoresis or premodulated interferential current electrical stimulation as a second line of treatment.

PHYSICAL AGENTS – US

2014 Recommendation

C The use of US cannot be recommended for individuals with heel pain/plantar fasciitis

Evidence Update

I Katzap et al[41] compared US and stretching (n = 28; mean age, 50.93 ± 12.87 years; 21.4% male, 78.6% female) to sham US and stretching (n = 26; mean age, 52.58 ± 12.36 years; 46.2% male, 53.8% female). Ultrasound was performed at 1 MHz, 1.8 W/cm^2, and continuous mode for 8 minutes to potentially maximize both thermal and nonthermal effects. Both groups received US treatments in addition to plantar fascia and the triceps surae stretching twice a week for 4 weeks. No significant differences were found for pain level during the day (MD, 0.01; 95% CI: –1.07, 1.09), self-reported function on a foot and ankle computerized adaptive test (MD, 1.44 95% CI: –3.61, 6.49), and PPT (MD, 0.11kg 95% CI: –0.82, 1.04).

I Two meta-analyses compared US treatments to ESWT.[6,46] The most recent one by Al-Siyabi et al[6] identified 7 studies with a total of 369 subjects and found no difference in functional impairment (MD, –2.90; *P* = .22), on the AOFAS ankle-hindfoot scale (MD, 35; *P* = .20), and for pain with the first steps in the morning (MD; –4.72, *P* = .39). However, there was a significant improvement in pain during activity for the ESWT group (MD, –1.36; *P* = .005).

II A lower-level RCT with 82 subjects (37 males, mean age, 38.59 ± 7.06 years; 45 females, mean age, 38.32 ± 6.6 years), and those receiving 7 US treatments (3 MHz at 1.0 w/cm^2, continuous for 7 mins) with sham taping were compared to those receiving 7 ESWT treatments over a 35-day period. The group receiving ESWT had significantly less pain compared to the US group (1.54 SD ± 0.67 vs 2.6 SD ± 0.64; *P* = .001) at the end of the treatment sessions.[34]

Evidence Synthesis

Three RCTs were identified that investigated the effect of US on plantar fasciitis. Two of the RCTs investigated the effect of US compared to a control, whereas the other RCT found that that standard US treatment did not enhance the effect of stretching exercises. Other studies have compared ESWT to US treatments. It was noted that individuals

receiving either ESWT or US may both show improvement with ESWT having a benefit over US in improving pain during activity. No harms of US treatment have been reported.

Gaps in Knowledge

There is a lack of high-quality research for optimal US treatment parameters, including wavelength (W/cm^2), frequency, and duration of treatment for acute and chronic plantar heel pain.

2023 RECOMMENDATION

A Clinicians should not use US to enhance the benefits of stretching treatment in those with plantar fasciitis.

PHYSICAL AGENTS: THERMAL

2014 Recommendation

None

Evidence Update

II In a lower-level RCT, Petrofsky et al[60] investigated the effects of local heat applied to trigger points compared to sham heat on pain measured by a VAS and tenderness thresholds measured with a handheld pressure algometer (n = 20; mean age, 49.1 ± 11.7 years). Local heat was applied via ThermaCare back wraps (ThermaCare, Pfizer Consumer Healthcare, Richmond, VA), where 4 cells treated the medial and lateral gastrocnemius motor points at a temperature of 41°C ± 0.5 for 4 hours. Immediately after the 4-hour treatment, the heating group had a decrease in pain from 53.91-mm SD ± 21.32 to 30.13-mm SD ± 26.81 (P<.001), whereas the sham group changed from 53.91-mm SD ± 21.32 to 52.30-mm SD ± 23.42 (P = .868). For tenderness thresholds, there was a significant change in pressure threshold with the heat treatment increase in tenderness threshold (21.06 ± 11.38 N to 29.84 ± 14.72 N, P<.01), whereas the sham group decreased in pressure threshold (21.06 N, SD 11.38 to 14.11 N, SD 7.71; P = .022).

Evidence Synthesis

A single level II study supported the use of local heat applied using a specialized device that maintains a safe temperature for 4 hours to trigger points, to decrease local pain and improve pressure thresholds immediately after treatment. Because this treatment was applied for 4 hours, it may be more relevant for a home intervention as opposed to being performed in a clinic. No harms of this thermal treatment were reported.

Gaps in Knowledge

Based on 1 low-level RCT, a recommendation regarding the use of superficial thermal modalities cannot be made. Other areas that need to be studied include the effect of local heat on other outcomes when combined with other interventions, as well as if application parameters, such as frequency and duration, that are friendlier to clinical practice would produce similar outcomes.

EDUCATION AND COUNSELING FOR WEIGHT LOSS

2014 Recommendation

E Clinicians may provide education and counseling on exercise strategies to gain or maintain optimal lean body mass for individuals with heel pain/plantar fasciitis. Clinicians may also refer individuals to an appropriate health care practitioner to address nutrition issues.

Evidence Update

There were no articles addressing this topic.

2023 RECOMMENDATION

E Clinicians may provide education and counseling on exercise strategies to gain or maintain optimal lean body mass for individuals with heel pain/plantar fasciitis. Clinicians may also refer individuals to an appropriate health care practitioner to address nutrition issues.

THERAPEUTIC EXERCISE AND NEUROMUSCULAR RE-EDUCATION

Operational Definitions

Below, we provide operational definitions of the terms used in this section (**TABLE 4**).

TABLE 4 Operational Definitions for Therapeutic Exercise and Neuromuscular Re-Education Interventions

Intervention	Operational Definition
Muscle strengthening and endurance	Exercise training prescribed to restore strength, endurance, or power of muscle groups associated with plantar heel pain.
Specific muscle strengthening exercises	Exercise training prescribed to restore the strength, endurance, or power of specific muscles, including but not limited to toe flexors, ankle invertors, ankle evertors, ankle plantar flexors, and ankle dorsiflexors.
Eccentric exercise	Exercise training that focuses on muscle contraction during lengthening.
Concentric exercise	Exercise training that focuses on muscle contraction during shortening.
Isometric exercise	Exercise training that focuses on muscle contraction at a specific length.
Neuromuscular re-education	Exercise training prescribed to restore normal body movement patterns by retraining the central nervous system involuntary and reflex motor activities.

2014 Recommendation

F Clinicians may prescribe strengthening exercises and movement training for muscles that control pronation and attenuate forces during weight-bearing activities.

Evidence Update: Strengthening

I A high-quality RCT by Thong-On et al[86] compared the effects of strengthening (n = 42; mean age, 51.95 ± 10.10 years; 13 males, 29 females) and stretching exercise (n = 42; mean age, 52.86 ± 9.84 years; 9 males, 33 females) programs on pain and temporospatial gait parameters at baseline and 6 weeks. Strengthening focused on toe flexor, ankle invertor/evertor, and gastrocnemius exercises. Stretching focused on gastrocnemius, soleus, and plantar fascia. Primary outcomes included worst and morning pain measured by the number of first steps with pain. The secondary outcomes were gait cadence, step width, stride length, stride time, total double support time, and gait speed. For the primary outcomes, pairwise comparisons were significant (P<.0001) at all time points and for both groups indicating positive effects of the intervention. There were no significant differences between the groups in any of the outcomes at any of the time points. Additionally, the efficacy of stretching was similar to that of strengthening with neither demonstrating superiority.

I In a high-quality RCT, Rathleff et al[66] investigated the difference between high-load strength training (n = 24; mean age, 45 ± 8 years; 8 males, 16 females) and stretching (n = 24; mean age, 47 ± 7 years; 9 males, 15 females) The primary outcome was total change in FFI from baseline to a 3-month follow-up. Secondary outcomes included measurement of plantar fascia thickness using US with the subject in prone, ankle at 0 degrees, and toes in dorsiflexion, item 1 in the FFI (foot pain at worst), and item 2 (foot pain during first step in the morning), patient-reported satisfaction with the result of the treatment, physical activity level measured in terms of average time of sports participation, and average leisure time sports participation per week. At the primary end point (3 months), the authors found the strength group had a significantly greater improvement in FFI (MD, 29; 95% CI: 6, 52; P = .016) compared with the stretching group, corresponding to a large effect size of 0.81. Patients in the high-load strength training group reported significantly less foot pain (MD, −2.6 [−4.6; −0.6]; P<.05) at the primary end point. At 12 months, the change in the strength group FFI total score was 22 points (95% CI: 9, 36; P<.05). The stretch group showed a change of 16 points (95% CI: 0, 32; P<.05).

I A high-quality RCT by Reil et al[69] investigated the effectiveness of a self-dosed heavy-slow resistance training program (n = 35; mean age, 50 ± 10 years; 6 males, 29 females) compared to a predetermined heavy-slow resistance training program (n = 35; mean age, 49 ± 12 years; 6 males, 29 females) over 12 weeks. The self-dosed group was instructed to perform strengthening exercises as heavily as possible, but no heavier than 8 repetition maximum (RM), with a maximum tolerated number of sets and resistance. The parameters for the self-dosed group were to perform the exercise according to a standardized protocol progressing from 12RM to 8RM. Both groups performed standing heel raises every other day and were provided patient education and a silicone heel cup, which was continued for 12 weeks. The primary outcome measure for this study was the change in FHSQ scores. The secondary outcomes were the function, footwear, and general health domains for the FHSQ, change in global rating of change, plantar fascia thickness measured using US, with the subject in prone and the toes in maximal dorsiflexion, exercise compliance, the Pain Self-Efficacy Questionnaire, Patient Acceptable Symptom State, and physical activity level measured by the International Physical Activity Questionnaire short version. There was no significant between-group difference in the FHSQ pain after 12 weeks (adjusted MD, 27 points; 95% CI: −16, 2). The self-dosed heavy-slow resistance training program did not reduce pain more than a predetermined heavy-slow resistance training program that had previously been shown to be effective.

I A high-quality RCT by Cil et al[14] investigated supervised exercise for foot, ankle, and hip strengthening combined with modalities to a home foot, ankle, and hip strengthening program. The participants in the supervised rehabilitation group (n = 23; mean age, 48.1 years; 5 males, 18 females) performed an exercise program including foot, ankle, and hip strengthening and stretching exercises (7 days/week); MFR; and joint and soft tissue mobilization (2 days/week) under the supervision of the same physiotherapist for a duration of 8 weeks. The participants in the home rehabilitation group (n = 24; mean age, 49.6 years; 7 males, 17 females) were instructed to perform the HEP foot and ankle-hip strengthening and stretching exercises for 7 days/week. The primary outcome was the FFI. Secondary outcomes included morning first-step pain, the Y-Balance test, passive ankle ROM, and monofilament testing. Measurements were taken at baseline, after the intervention at 8 weeks, and then at 6 months. The supervised rehabilitation group showed moderate improvements in the FFI with a mean improvement of 66.6 (SD ± 15.4), whereas the home rehabilitation group showed a mean improvement of 26.9 (SD ± 12.5), t = 9.124, P<.001. Moderate improvements between timepoints persisted on the VAS with the supervised exercise group showing a change of 7.3 (SD ± 1.4) and the home rehabilitation group showing a change of only 3.1 (SD ± 1.4), t = 9.516, P<.001.

I A high-quality RCT by McClinton et al[52] investigated the effectiveness of PT treatment with usual podiatry (uPOD) management (uPOD + PT, n = 41; mean age, 50.9 ± 10.1 years; 12 males, 29 females) compared to uPOD management alone (uPOD, n = 38; mean age, 51 ± 11 years; 8 males, 30 females) over a 6-week period. The uPOD group received treatment that was performed in accordance with usual practice patterns of the providers, which included education about the diagnosis, recommendations for supportive shoes, medication, and/or foot orthoses; provided a handout that emphasized calf and plantar foot stretches; and had the option to refer patients to a physical therapist or to order further imaging. The uPOD + PT group received the same treatment as the uPOD group with a combination of manual therapy, patient education, stretching, resistance training, and neurodynamic interventions delivered by a physical therapist. The primary outcome was the FAAM ADL subscale measured at 6 weeks. Secondary outcomes included the FAAM at 6 weeks and 1 year, the NPRS, and the global rating of change measured at 6 weeks, 6 months, and 1 year. There were small but insignificant between-group differences in the FAAM at the 6-week (5.1 [−0.7, 11.0]; $P = .084$) and 1-year (5.5 [0.1, 10.8]; $P = .045$) follow-up that favored the uPOD + PT group.

II A moderate-quality RCT investigated standard care (n = 35; mean age, 40.60 ± 10.64 years; 18 males, 17 females) versus a single, US-guided CSI to the plantar fascia (n = 35; mean age, 41.43 ± 9.66 years; 11 males, 24 females).[20] Standard care included a physiotherapist-led strengthening, stretching, and neuromuscular re-education program and a custom orthotic. The injection group consisted of a single methylprednisolone injection and a daily routine of calf stretches. Primary outcome measures included the FADI, the VAS, and plantar fascia thickness. Plantar fascia thickness was measured using US, in the prone position with the ankle positioned at 90 degrees. Between-group statistics were not reported, but the authors used a student t test to evaluate their findings. Results of the test were insignificant but the values were not reported. The authors found no differences between the groups at the 6-week follow-up.

Evidence Synthesis

The prior recommendation was based on expert opinion. Since the 2014 publication, multiple RCTs have been added to the body of literature. There is strong evidence that combined interventions of manual therapy, patient education, stretching, resistance training, and neurodynamic interventions improve pain at 6 weeks (short term) and 1 year (long term), and functioning at 6 months. There is weak evidence that isolated strengthening interventions such as isotonic, isometric, or self-paced walking during 3 sessions over 2 weeks provide clinically important pain reduction. There was insufficient evidence to identify a superior type of strength training or exercise.

Gaps in Knowledge

Additional research is needed to determine the dose and timing of exercise interventions. There appears to be an additive effect when exercise is combined with other interventions. Additional research is also needed to determine which combinations are best and at which dosages.

2023 Recommendation

B Clinicians should prescribe therapeutic exercise that includes resistance training for the foot and ankle musculature.

DRY NEEDLING

Operational Definitions

Dry needling is an intervention that uses a thin filiform needle to penetrate the skin and stimulate underlying MTrPs and muscular and connective tissues for the management of pain and movement impairments.

2014 Recommendation

F The use of trigger point DN cannot be recommended for individuals with heel pain/plantar fasciitis.

Evidence Update

I Llurda-Almuzara et al[49] performed a meta-analysis of 6 RCTs. The analysis included a total of 395 subjects with symptoms of pain for more than 1 month, 65% females, and ages ranging from 39 to 54 years. Trigger point DN was found to reduce pain in the short term with MD of −1.70 points (95% CI: −2.80, −0.60) and SMD of −1.28 (95% CI: −2.11, −0.44). In the long term (up to 6-months), trigger point DN was found to reduce pain with MD of −1.77 points (95% CI: −2.44, −1.11), SMD of −1.45 (95% CI: −2.19, −0.70), and related disability with SMD of −1.75 (95% CI: −2.22, −1.28). Four other SRs noted similar findings.[2,31,35,80] The SR by Sousa Filho et al directly compared CSI to DN and found that while CSI appeared to be superior to DN in the short term, DN appeared to be more effective in the long term. The most recent meta-analysis by Guimarães et al[31] specifically looked at pain reduction in 3 studies (n = 215) that compared DN to a control group. This analysis concluded DN was effective in decreasing pain in the short term (1 to ≤ 6 weeks) with a MD of −2.34 (95% CI: −4.64, −0.04).

I Moosaei Saein et al[55] compared DN (n = 10; mean age, 51.40 ± 5.46 years) to no treatment (n = 10; mean age, 49.40 ± 4.99 years) in 20 females, measuring pain VAS and active DF/PF ROM. There was a significant difference between the 2 groups ($P = .001$) at 4 weeks

for change in pain levels of (MD, −1.35; SD ± 0.286; P = .001). There were no differences with changes in dorsiflexion (MD, −2.1; SD ± 0.917; P = .103) or plantarflexion (MD, 1.55; SD ± 1.16; P = .59) ROM between both groups.

I Salehi et al[72] investigated the effects of DN and stretching exercise (n = 19; 20 feet; mean age, 40.20 ± 4.94 years; 6 males,13 females) versus stretching exercise only (n = 18; 20 feet; mean age, 41 ± 6.28 years; 6 males, 12 female) on first-step pain and the FAOS pain and ADL subscales. After 6 weeks of treatment, the combination of DN and stretching exercise group demonstrated significant improvements in pain during the first step in the morning (SMD, −1.7; 95% CI: −2.12, −1.3; Cohen's d = −2.67), on the FAOS pain subscale (SMD, 20.06; 95% CI: 15.87, 24.25; Cohen's d = −3) and FAOS ADL subscale (SMD, 14.22; 95% CI: 10.15, 18.30; Cohen's d = 2.24), with large effect sizes between the groups.

I Included in the meta-analysis by Guimarães et al,[31] a study by Dunning et al[22] compared function and disability in a group that received electrical DN with manual therapy, exercise, and US (n = 58; mean age, 39.1 ± 10.4 years; 21 males, 37 females) to a control group that received manual therapy, exercise, and US only (n = 53; mean age, 42.6 ± 11.6 years; 27 males, 26 females).[22] Those who received the addition of electrical DN experienced significantly greater improvements (P≤.004), with a small to medium effect size for SMD (0.32<SMD<0.55) at 4 weeks and medium effect size (0.53<SMD<0.66) at 3 months on the LEFS, FFI total, and all of the FFI subscales scores. The point estimates for between-group differences at 3 months were as follows: LEFS 9.26 points, FFI Pain 13.9%, FFI Disability 12.0%, and FFI Total 9.9%. All of these point estimates exceeded their respective MCID values.

II A group receiving DN and stretching (n = 51; mean age, 49.5 ± 8.9 years; 15 males, 36 females) was compared to a group receiving percutaneous needling electrolysis and stretching (n = 51; mean age, 48.1 ± 8.8 years; 15 males, 36 females) in a lower-level RCT.[2] While both interventions were found to be effective in reducing pain and improving function at 5 time points between 4 and 52 weeks on the 4 FHSG subscales and pain VAS, a significant difference was not found between groups (P<.061, effect size range: 0.001-0.035).

Evidence Synthesis

Five SRs that included a total of 7 RCTs and 3 additional RCTs (two of high quality) supported the use of DN to treat MTrPs associated with plantar fasciitis/heel pain, particularly in chronic heel pain (>1 month). Evidence supports DN as an effective treatment for short- and long-term pain reduction, as well as long-term improvements in function and disability. The number of DN sessions typically ranged from 1 to 6 sessions, with treatment being directed to a MTrP in the gastrocnemius, soles, and plantar muscles of the foot. Although 1 study found DN was effective as a stand-alone treatment in reducing pain, DN has typically been included with other treatments such as stretching and manual therapy. Reported harms have included postneedling soreness and subcutaneous bleeding; however, these have been considered mild and have resolved spontaneously.

Gaps in Knowledge

Further research is needed to determine if the addition of electrical stimulation and specific parameters of stimulation adds any additional benefit to DN. Currently, only 1 study has compared standard DN to percutaneous needling electrolysis with equivocal results.

2023 Recommendation

B Clinicians should use DN to MTrP in the gastrocnemius, soles, and plantar muscles of the foot for short- and long-term pain reduction, as well as long-term improvements in function and disability.

MULTIMODAL INTERVENTIONS

Operational Definition

A combination of interventions that may include education, manual therapy, neuromuscular re-education, therapeutic exercise, electrotherapeutic modalities, US, thermal agents, taping, orthotics, splinting, DN, or training for correction of posture and movement during functional activities can collectively be considered multimodal intervention. Education may include information about the health condition or activity modification.[24]

2014 Recommendation

None

Evidence Update

I A SR with network analysis, by Babatunde et al,[7] included 31 RCTs (total n = 2450 patients). Available evidence from the network analysis suggests that no single treatment for plantar heel pain is better than others; however CSIs, alone or in combination with exercise, and ESWT were ranked most likely to be effective for the management of short-term, medium-term, and long-term pain or function. Placebo or control conditions appeared least likely to be effective, and exercise appeared to only be beneficial for long-term pain or function. Of the direct comparisons of combined treatments, CSI combined with exercise showed a statistically significant larger reduction in pain compared with exercise alone (SMD, 1.20; 95% CI: 0.14, 2.26). General trends from the network analysis and direct

comparisons for medium-term pain indicated that ESWT combined with orthoses may be more effective than other treatments (highest SUCRA value of 80.3).

I Fraser et al[25] found in their SR that the inclusion of mobilization techniques in treatment yielded greater improvement in function (6 of 7 studies, CIs that did not cross zero in 14 of 25 variables, effect size = 0.5-21.5) and algometry (3 of 3 studies, CI that did not cross zero in 9 of 10 variables, effect size = 0.7–3.0) from 4 weeks to 6 months when compared to interventions such as stretching, strengthening, or modalities. It was recommended that clinicians consider use of both joint and soft tissue mobilization techniques in conjunction with stretching and strengthening when treating patients with plantar fasciitis.

I In subjects with chronic (>6 months) plantar fasciitis, Costantino et al[17] investigated the efficacy of cryoultrasound, where cryotherapy and US at 2.4 W/cm^2 were delivered from the same probe (n = 42; mean age, 54.7 ± 9.9 years; 24 males, 18 females) to cryotherapy from the probe alone (n = 42; mean age, 54.73 ± 9.9 years; 23 males, 16 females). Subjects received 10 daily treatments of 20 minutes in duration. Those that received the cryoultrasound had a greater change pain VAS scores with the MD in change in pain between groups at 3 months (3.00; 95% CI: 2.29, 3.70) 12 months (4.35; 95% CI: 3.75, 4.95) and 18 months (4.82; 95% CI: 4.11, 5.50).

II Grim et al[29] investigated the effectiveness of manual therapy, customized foot orthoses, and combined treatments of manual therapy and customized foot orthoses in 63 patients (48.4 ± 9.8 years; 19 males, 44 females) with plantar fasciitis. The interventions all reduced pain and improved function, with the greatest benefits shown by isolated manual therapy. However, conclusions about the MT group were limited as the groups were not equivalent at the start of the trial.

II In a RCT[28] with 64 patients, 36 patients (12 males, 24 females) received US-guided 2.5-ml autologous PRP injection and 28 participants (11 males, 17 females) received phonophoresis and kinesiology taping on alternate days. Fifty-four participants (33 in PRP intervention group and 21 in kinesiology taping group) were analyzed. Findings suggest early benefit (2 weeks) from use of phonophoresis with kinesiology taping on alternate days. However, when followed beyond 2 weeks (12 and 24 weeks), the benefit of PRP injections was greater than the other group, while both groups improved.

Evidence Synthesis

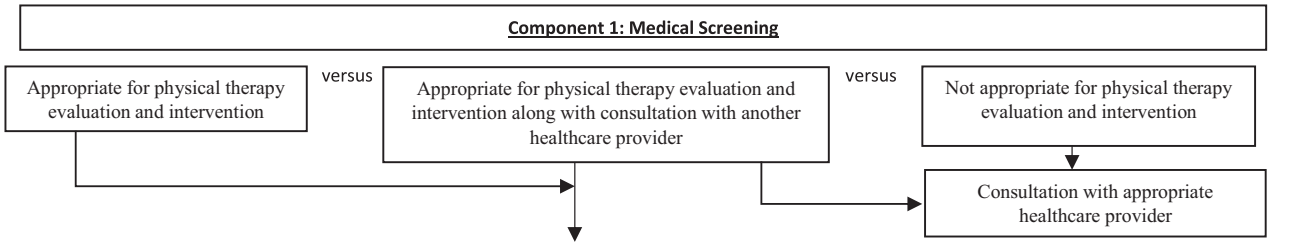
The evidence base for plantar fasciitis interventions is beginning to allow comparisons for combined treatments. The addition of electrical DN[9] or ESWT[22] to manual therapy, exercise, and US seems to result in small to moderate gains for short- and medium-term pain and function. Manual therapy[25,29] may be supplemented with the addition of stretching, strengthening, and modalities. However, there was not enough evidence to support a specific recommendation in this area. One study demonstrated benefits of combined US delivered daily at 2.4 W/cm^2 with cryotherapy in the same probe in those with chronic symptoms. The theoretical basis for the benefit of cryoultrasound treatment was that it allows for the potential positive mechanical effects of higher-intensity US without the associated thermal effects.

Gaps in Knowledge

Evidence is starting to include combined interventions, but controlled studies are needed to identify what particular combinations are needed.

INTERVENTIONS – OTHER

This CPG considered ESWT, CSI, and PRP to all be outside the scope of PT practice, despite ESWT being used by physical therapists in certain areas of the world. It should be noted that, unlike CSI and PRP, ESWT is a noninvasive treatment that attempts to use direct mechanical forces to promote tissue healing. A meta-analysis found that ESWT was effective in the medium and long term in decreasing pain when compared to control interventions.[31] Three SRs have investigated the effectiveness of CSI compared to other treatments on those with plantar heel pain with some conflicting conclusions.[20,13,56] A more recent comprehensive network meta-analysis found that while there is some evidence that CSIs alone or in combination with exercise and ESWT may be effective in improving short-, medium-, and long-term pain or function, the estimates of effect varied widely across trials.[7] There is also some evidence to suggest that PRP can be effective in short-term pain reduction compared to control interventions.[31] When looking at medium-term outcomes, ESWT was found to be effective in decreasing pain when compared to CSI. However, no difference was found among these 3 treatments in short- and long-term pain control.[31] A Cochrane review noted that the evidence support for CSI was of low quality, and although serious adverse events were rare, these were underreported and a higher risk cannot be ruled out.[19] Potential adverse effects after CSI included postinjection steroid-induced increase in pain, fat pad atrophy, nerve injury, and rupture of the plantar fascia.



Component 2: Classify condition

Evaluation of clinical findings suggestive of musculoskeletal impairments of body functioning (ICF) and the associated tissue pathology/disease (ICD)

Patient Examination

- Plantar medial heel pain: most noticeable with initial steps after a period of inactivity but also worse following prolonged weight bearing[B]
- Heel pain precipitated by a recent increase in weight-bearing activity[B]
- Reproduction of the reported heel pain with palpation/provocation of the proximal insertion of the plantar fascia[B]
- Positive windlass test[B]
- Negative tarsal tunnel tests [B]

Differential Diagnosis

Negative examination findings suggesting lumbopelvic region referred or radiating pain to include reports of low back pain, provocation of lumbar and pelvic girdle structures, lower limb nerve tension, and neurological status examination[F]

Specific testing: Pain not reproduced with palpation of body of the calcaneus, plantar surface of the calcaneus, posterior aspect of the calcaneus, or mid-substance of the plantar fascia[F]

Component 3: Outcome Measures

Patient Reported Outcome Measures:

FAAM, FHSQ, FFI, computer adaptive LEFS[A]
Visual Analog Scale to assess pain with initial steps after a period of inactivity

Physical Impairment Measures:

Supine ROM: Dorsiflexion knee extended, Dorsiflexion knee flexed, Plantar flexion, Supination/Inversion, Pronation/Eversion, Great toe extension. *Joint mobility assessment when deficits are identified
MMT: Anterior tibialis, posterior tibialis, fibularis longus and brevis
Standing: Heel raise (gastroc-soleus muscle strength), Dorsiflexion lunge test/ Tibio-pedal dorsiflexion range of motion, Foot Posture Index 6, Single leg squat, leg length
Body mass index in nonathletic individuals

Activity Limitations/Participation:

Patient relevant reproducible performance-based measures
Lower quarter musculoskeletal and biomechanical assessment, to include the following required elements of gait:

- 1st metatarsophalangeal joint range of motion and accessory mobility - to attain 65° of extension at pre-swing
- Rearfoot/Talocalcaneal range of motion and accessory mobility - to attain 4° to 6° of eversion at loading response
- Tibialis posterior strength and movement coordination to control mid-tarsal joint motion at loading response
- Fibularis longus strength and movement coordination to control mid-tarsal joint motion at terminal stance
- Talocrural dorsiflexion range of motion, accessory mobility, gastrocnemius/soleus muscle length and tissue mobility to attain 10° of dorsiflexion at terminal stance
- Gastrocnemius/soleus strength and movement coordination to control tibial advancement at mid stance and propulsion at terminal stance
- Knee joint and thigh muscle flexibility to attain 0° of extension at terminal stance and 60° of flexion at initial swing
- Quadriceps femoris strength and movement coordination to control knee flexion at loading response
- Hip joint mobility and muscle flexibility to attain 10° of extension at terminal stance
- Trunk, buttock, and thigh strength and movement coordination to control lower limb internal rotation at loading response and hip abduction at loading response and mid stance

Superscript letters indicate that the guidelines are based on (A) strong evidence, (B) moderate evidence, (C) weak evidence, (D) conflicting evidence, (E) theoretical/foundational evidence, or (F) expert opinion.

Component 4: Determination of Irritability

Component 5: Intervention Strategies

- Therapeutic Exercises[A]
  - Plantar fascia stretching
  - Gastrocnemius/Soleus stretching
- Manual Therapy[A]
  - Joint mobilization to improve identified restrictions in joint mobility of the lower extremity, with an emphasis on improving talocrural dorsiflexion
  - Soft tissue mobilization of the plantar fascia, gastrocnemius and soleus, specifically targeting trigger points and soft tissue restrictions
- Taping[A]
  - Rigid or elastic, in conjunction with other physical therapy treatments for short-term (one to ≤ six weeks)
- Night Splints[A]
  - Utilization of a night splints for a 1 to 3 month period for those consistently have pain with the first step in the morning
- LLLT[B]
  - Treat two to three points with a minimum dose of 2 J/point with a 904 nm wavelength laser or 4 J/point with 780–860 nm wavelength
- Dry Needling[B]
  - 1-6 sessions treating MTrP in the gastrocnemius, soles and plantar muscles
- Strengthening and Neuromuscular Re-education[B]
  - Resistance training for the musculature of the foot and ankle
- Foot Orthoses[C]
  - Combine with other treatments and not as a stand-alone intervention
  - Use of over-the-counter/pre-fabricated or a custom foot orthoses that support the medial arch and/or provide cushion to the heel region, especially in individuals who exhibit Foot Posture Index-6 scores indicating excessive pronation and/or positively respond to anti-pronation taping
  - A use of an over-the-counter heel cushion, footwear modification that provide heel cushioning, especially in individuals with decrease shock absorption capacity indicated by a Foot Posture Index-6 score that indicates excessive supination.
- Phonophoresis with ketoprofen gel[C]
  - For pain reduction
- Patient Education and Counseling[E]
  - Strategies to modify relevant weight bearing loads during occupational, recreational, or daily activities
  - Footwear options to mitigate commonly occurring weight loading stresses
  - Strategies to gain or maintain optimal lean body mass, especially in nonathletic individuals with a high body mass index

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APPENDIX A

SEARCH STRATEGIES AND RESULTS FOR ALL DATABASES SEARCHED

MEDLINE

((“foot”[mesh] AND “pain”[mesh] AND arch[tiab]) OR “abductor hallucis”[tiab] OR (arch[tiab] AND (shoe[tiab] OR midfoot[tiab] OR foot[tiab] OR plantar[tiab] OR heel[tiab]) AND pain[tiab])) OR (“heel spur”[mesh] OR “fasciitis, plantar”[mesh] OR ((“heel”[mesh] OR “calcaneus”[mesh]) AND “pain”[mesh]) OR “heel pain”[tiab] OR “painful heel”[tiab] OR “painful heels”[tiab] OR (heel[tiab] AND pain[tiab]) OR “calcaneal spur”[tiab] OR “calcaneal spurs”[tiab] OR (calcaneus[tiab] AND spur[tiab]) OR (calcaneus[tiab] AND spurs[tiab]) OR “plantar fasciitis”[tiab] OR “plantar fascitis”[tiab] OR “plantar foot pain”[tiab] OR “plantar pain”[tiab] OR (heel[tiab] AND spur[tiab]) OR (heel[tiab] AND spurs[tiab])) OR ((“questionnaires”[Mesh] OR “disability evaluation”[mesh:noexp]) AND (“Fasciitis, plantar”[mesh] OR foot[mesh] OR heel[mesh] OR “lower extremity”[mesh] OR “heel spur”[mesh] OR “calcaneus”[mesh] OR “ankle injuries” [mesh] OR “foot injuries”[mesh] OR “foot diseases”[mesh] OR foot[tiab] OR feet[tiab] OR heel[tiab] OR heels[tiab] OR “lower limb”[tiab] OR “lower limbs”[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND (Pain [mesh] OR “recovery of function”[mesh] OR pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) OR (((questionnaire[tiab] OR questionnaires[tiab] OR instrument[tiab] OR instruments[tiab] OR scale[tiab] OR scales[tiab] OR measurement[tiab] OR measurements[tiab] OR index[tiab] OR indices[tiab] OR score[tiab] OR scores[tiab]) AND (Foot[tiab] OR Feet[tiab] OR Heel[tiab] OR heels[tiab] OR “lower limb”[tiab] OR “lower limbs”[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND (Pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) NOT medline[sb])

Cochrane Library

((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR “lower limb” OR plantar OR calcaneal OR calcaneus OR midfoot)):ti,ab,kw OR (“abductor hallucis” OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)):ti,ab,kw OR (“heel pain” OR “painful heel” OR “painful heels” OR (heel and pain) OR “calcaneal spur” OR “calcaneal spurs” OR (calcaneus and spur) OR (calcaneus and spurs) OR “plantar fasciitis” OR “plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel and spur) OR (heel and spurs)):ti,ab,kw (Word variations have been searched)

Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts and Humanities Citation Index)

TS=((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) NEAR/8 (pain OR function OR functional OR dysfunction OR impaired OR impairment OR impairments OR disability) NEAR/8 (foot OR feet OR heel OR heels OR “lower limb” OR plantar OR calcaneal OR calcaneus OR midfoot)) OR TS=(“abductor halluces” OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)) OR TS=(“heel pain” OR “painful heel” OR “painful heels” OR (heel AND pain) OR “calcaneal spur” OR “calcaneal spurs” OR (calcaneus AND spurs) OR “plantar fasciitis” OR “plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel AND spurs))

ProQuest Nursing and Allied Health Source

ab(“Heel pain” OR “painful heel” OR “painful heels” OR (heel AND pain) OR “Calcaneal spur” OR “calcaneal spurs” OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR “Plantar fasciitis” OR “Plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel AND spur) OR (heel AND spurs) OR “Abductor hallucis” OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR “lower limb” OR plantar OR calcaneal OR calcaneus OR midfoot))) OR ti(“heel pain” OR “painful heel” OR “painful heels” OR (heel AND pain) OR “calcaneal spur” OR “calcaneal spurs” OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR “plantar fasciitis” OR “plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel AND spur) OR (heel AND spurs) OR “abductor hallucis” OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR “lower limb” OR plantar OR calcaneal OR calcaneus OR midfoot)))

CINAHL

(MH “Heel Spur” OR MH “Heel Pain” OR MH “Plantar Fasciitis”) OR ((MH “Heel” OR MH “Calcaneus”) AND MH “Pain”) OR TI ((“Heel pain” OR “painful heel” OR “painful heels” OR (heel AND pain) OR “calcaneal spur*” OR (calcaneus AND spur*) OR “plantar fasciitis” OR “plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel AND spur*))) OR AB ((“Heel pain” OR “painful heel” OR “painful heels” OR (heel AND pain) OR “calcaneal spur*” OR (calcaneus AND spur*) OR “plantar fasciitis” OR “plantar fascitis” OR “plantar foot pain” OR “plantar pain” OR (heel AND spur*))) OR MH “Foot” AND MH “Pain” AND (TI arch OR AB arch) OR TI “Abductor hallucis” OR AB “Abductor hallucis” OR AB ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel))) OR TI ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel)))

APPENDIX A (CONTINUED)

ProQuest Dissertations & Theses Global

ab("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))) OR ti("heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)))

PEDro (Physiotherapy Evidence Database)

"heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur" OR "calcaneal spurs" OR (calcaneus AND spur) OR (calcaneus AND spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))

SEARCH RESULTS

Methods

Briefly, the following databases were searched from 2012 to between December 14 and 15, 2020: MEDLINE (PubMed) (2007 to date), Cochrane Library (2007 to date), Web of Science (2007 to date), CINAHL (2007 to date), ProQuest Dissertations & Theses Global (2007 to date), PEDro (2007 to date), and ProQuest Nursing and Allied Health Source (2007 to date). See APPENDIX A (available online) for full search strategies and APPENDIX B (available online) for search dates and results.

Database	Date Conducted	Results, n
MEDLINE	12/14/2020	7743
Cochrane Library		
Cochrane reviews	12/14/2020	74
Protocols	12/14/2020	3
Trials	12/14/2020	8554
Clinical Answers	12/14/2020	1
Web of Science	12/14/2020	3910
ProQuest Nursing and Allied Health Source		
CINAHL	12/14/2020	1748
ProQuest Dissertations & Theses Global	12/14/2020	452
PEDro	12/15/2020	324
Total	12/15/2020	22809
Total with (**5930**) duplicates removed	12/15/2020	16879

Searches from 2014 Guidelines were rerun as reported with these changes:

- In MEDLINE, the MeSH "questionnaires" was retired. It was replaced with "Surveys and Questionnaires"[mesh] in the search strategy.
- Results were filtered by date (2012 or December 2012, as noted).
- Web of Science indexed a new database: Emerging Sources Citation Index (ESCI) – 2015-present. This was included in the new search.
- No access to ProQuest Nursing and Allied Health Source at the University of Pittsburgh.
- Search interface and export capabilities of PEDro changed significantly so the search was not replicable.

MEDLINE (PubMed)

(("foot"[mesh] AND "pain"[mesh] AND arch[tiab]) OR "abductor hallucis"[tiab] OR (arch[tiab] AND (shoe[tiab] OR midfoot[tiab] OR foot[tiab] OR plantar[tiab] OR heel[tiab]) AND pain[tiab])) OR ("heel spur"[mesh] OR "fasciitis, plantar"[mesh] OR (("heel"[mesh] OR "calcaneus"[mesh]) AND "pain"[mesh]) OR "heel pain"[tiab] OR "painful heel"[tiab] OR "painful heels"[tiab] OR (heel[tiab] AND pain[tiab]) OR "calcaneal spur"[tiab] OR "calcaneal spurs"[tiab] OR (calcaneus[tiab] AND spur[tiab]) OR (calcaneus[tiab] AND spurs[tiab]) OR "plantar fasciitis"[tiab] OR "plantar fascitis"[tiab] OR "plantar foot pain"[tiab] OR "plantar pain"[tiab] OR (heel[tiab] AND spur[tiab]) OR (heel[tiab] AND spurs[tiab])) OR (("Surveys and Questionnaires"[Mesh] OR "disability evaluation"[mesh:noexp]) AND ("Fasciitis, plantar"[mesh] OR "Foot"[mesh] OR "Heel"[mesh] OR "lower extremity"[mesh] OR "heel spur"[mesh] OR "calcaneus"[mesh] OR "ankle injuries"[mesh] OR "foot injuries"[mesh] OR "foot diseases"[mesh] OR foot[tiab] OR feet[tiab] OR heel[tiab] OR heels[tiab] OR "lower limb"[tiab] OR "lower limbs"[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND ("Pain"[mesh] OR "recovery of function"[mesh] OR pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) OR (((questionnaire[tiab]

APPENDIX A (CONTINUED)

OR questionnaires[tiab] OR instrument[tiab] OR instruments[tiab] OR scale[tiab] OR scales[tiab] OR measurement[tiab] OR measurements[tiab] OR index[tiab] OR indices[tiab] OR score[tiab] OR scores[tiab]) AND (Foot[tiab] OR Feet[tiab] OR Heel[tiab] OR heels[tiab] OR "lower limb"[tiab] OR "lower limbs"[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND (Pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) NOT medline[sb]) AND ("2012/12/01"[Date - Entry] : "3000"[Date - Entry])

Cochrane Library (Wiley)

((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)):ti,ab,kw OR ("abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)):ti,ab,kw OR ("heel pain" OR "painful heel" OR "painful heels" OR (heel and pain) OR "calcaneal spur" OR "calcaneal spurs" OR (calcaneus and spur) OR (calcaneus and spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel and spur) OR (heel and spurs)):ti,ab,kw

Date Filter: 01/12/2020 to 31/12/2020

Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts and Humanities Citation Index, Emerging Sources Citation Index [ESCI] – 2015-present)

TS=((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) NEAR/8 (pain OR function OR functional OR dysfunction OR impaired OR impairment OR impairments OR disability) NEAR/8 (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)) OR TS=("abductor halluces" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)) OR TS=("heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur" OR "calcaneal spurs" OR (calcaneus AND spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spurs))

Timespan: 2012-2020. Indexes: SCI-EXPANDED, SSCI, A&HCI, ESCI.

ProQuest Nursing and Allied Health Source

ab("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))) OR ti("heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)))

CINAHL

(MH "Heel Spur" OR MH "Heel Pain" OR MH "Plantar Fasciitis") OR ((MH "Heel" OR MH "Calcaneus") AND MH "Pain") OR TI (("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur*" OR (calcaneus AND spur*) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur*))) OR AB (("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur*" OR (calcaneus AND spur*) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur*))) OR MH "Foot" AND MH "Pain" AND (TI arch OR AB arch) OR TI "Abductor hallucis" OR AB "Abductor hallucis" OR AB ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel))) OR TI ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel)))

Published Date Dec 2012- Dec 2020

ProQuest Dissertations & Theses Global

ab(("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))))

APPENDIX A (CONTINUED)

OR ti(("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))))

Applied filters: 2012-12-01 – 2021-12-31
New search:
Title/Abstract: "plantar fasciitis" – 155 results
Title/Abstract: "heel" Problem: Pain – 169 results

Methods

The following databases were searched from 2020 to March 22, 2023: MEDLINE (PubMed), Cochrane Library, Web of Science, CINAHL, PEDro, and ProQuest Dissertations & Theses Global.

Update 1 (June 2022)

Database	Date Conducted	Results, n	Results After Duplicates Removed
MEDLINE (PubMed)	6/1/2022	1820	1818
Cochrane Library (Wiley) Cochrane reviews (12) Cochrane Trials (1675)	6/1/2022	1687	1473
Web of Science (Clarivate)	6/1/2022	1062	551
CINAHL (EBSCO)	6/1/2022	292	94
ProQuest Dissertations & Theses Global (ProQuest)	6/1/2022	63	63
PEDro (PEDro Partnership)	6/1/2022	68	27
Total	6/1/2022	4492	4026

Update 2 (March 2023)

Database	Date Conducted	Results, n	Results After Duplicates Removed
MEDLINE (PubMed)	3/22/2023	1010	1010
Cochrane Library (Wiley) Cochrane reviews (6) Cochrane Trials (1327)	3/22/2023	1333	1228
Web of Science (Clarivate)	3/22/2023	497	284
CINAHL (EBSCO)	3/22/2023	136	64
ProQuest Dissertations & Theses Global (ProQuest)	3/22/2023	3	3
PEDro (PEDro Partnership)	3/22/2023	23	16
Total	3/22/2023	3002	2605

Searches from 2014 Guidelines were rerun as reported with these changes:

- In MEDLINE, the MeSH "questionnaires" was retired. It was replaced with "Surveys and Questionnaires"[mesh] in the search strategy.
- Results were filtered by date (2020 or December 2020, as noted). For 2023, update results were filtered by date (June 2022-December 2023).
- Web of Science indexed a new database: Emerging Sources Citation Index (ESCI) – 2015-present. This was included in the new search.
- No access to ProQuest Nursing and Allied Health Source at the University of Pittsburgh.
- Search interface and export capabilities of PEDro changed significantly so the search was not replicable.

MEDLINE (PubMed)

(("foot"[mesh] AND "pain"[mesh] AND arch[tiab]) OR "abductor hallucis"[tiab] OR (arch[tiab] AND (shoe[tiab] OR midfoot[tiab] OR foot[tiab] OR plantar[tiab] OR heel[tiab]) AND pain[tiab])) OR ("heel spur"[mesh] OR "fasciitis, plantar"[mesh] OR (("heel"[mesh] OR "calcaneus"[mesh]) AND "pain"[mesh]) OR "heel pain"[tiab] OR "painful heel"[tiab] OR "painful heels"[tiab] OR (heel[tiab] AND pain[tiab]) OR "calcaneal spur"[tiab] OR "calcaneal spurs"[tiab] OR (calcaneus[tiab] AND spur[tiab]) OR (calcaneus[tiab] AND spurs[tiab]) OR "plantar fasciitis"[tiab] OR "plantar fascitis"[tiab] OR "plantar foot pain"[tiab] OR "plantar pain"[tiab] OR (heel[tiab] AND spur[tiab]) OR (heel[tiab] AND spurs[tiab])) OR (("Surveys and Questionnaires"[Mesh] OR "disability evaluation"[mesh:noexp]) AND ("Fasciitis, plantar"[mesh] OR "Foot"[mesh] OR "Heel"[mesh] OR "lower extremity"[mesh] OR "heel spur"[mesh] OR "calcaneus"[mesh] OR "ankle injuries"[mesh] OR "foot injuries"[mesh] OR "foot diseases"[mesh] OR foot[tiab] OR feet[tiab] OR heel[tiab] OR heels[tiab] OR "lower limb"[tiab] OR "lower limbs"[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND ("Pain"[mesh] OR "recovery of function"[mesh] OR pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) OR (((questionnaire[tiab] OR questionnaires[tiab] OR instrument[tiab] OR instruments[tiab] OR scale[tiab] OR scales[tiab] OR measurement[tiab] OR measurements[tiab] OR index[tiab] OR indices[tiab] OR score[tiab] OR scores[tiab]) AND (Foot[tiab] OR Feet[tiab] OR Heel[tiab] OR heels[tiab] OR "lower limb"[tiab] OR "lower limbs"[tiab] OR plantar[tiab] OR calcaneal[tiab] OR calcaneus[tiab] OR midfoot[tiab]) AND (Pain[tiab] OR function[tiab] OR functional[tiab] OR dysfunction[tiab] OR dysfunctional[tiab] OR impaired[tiab] OR impairment[tiab] OR impairments[tiab] OR disability[tiab])) NOT medline[sb])

("2020/12/01"[Date - Entry] : "3000"[Date - Entry]) AND ("2022/05/30"[Date - Entry] : "3000"[Date - Entry])

APPENDIX A (CONTINUED)

Cochrane Library (Wiley)

((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)):ti,ab,kw OR ("abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)):ti,ab,kw OR ("heel pain" OR "painful heel" OR "painful heels" OR (heel and pain) OR "calcaneal spur" OR "calcaneal spurs" OR (calcaneus and spur) OR (calcaneus and spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel and spur) OR (heel and spurs)):ti,ab,kw

with Cochrane Library publication date from Dec 2020 to Dec 2022
with Cochrane Library publication date from June 2022 to Dec 2023

Web of Science (Science Citation Index Expanded, Social Sciences Citation Index, Arts and Humanities Citation Index, Emerging Sources Citation Index (ESCI) – 2015-present)

TS=((questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) NEAR/8 (pain OR function OR functional OR dysfunction OR impaired OR impairment OR impairments OR disability) NEAR/8 (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)) OR TS=("abductor halluces" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain)) OR TS=("heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur" OR "calcaneal spurs" OR (calcaneus AND spurs) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spurs))

Timespan: 2020-12-01 to 2022-12-31 (Index Date)
Timespan: 2022-06-01 to 2023-12-31 (Index Date)
Editions = A&HCI , ESCI , SCI-EXPANDED , SSCI

CINAHL

(MH "Heel Spur" OR MH "Heel Pain" OR MH "Plantar Fasciitis") OR ((MH "Heel" OR MH "Calcaneus") AND MH "Pain") OR TI (("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur*" OR (calcaneus AND spur*) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur*))) OR AB (("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "calcaneal spur*" OR (calcaneus AND spur*) OR "plantar fasciitis" OR "plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur*))) OR MH "Foot" AND MH "Pain" AND (TI arch OR AB arch) OR TI "Abductor hallucis" OR AB "Abductor hallucis" OR AB ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel))) OR TI ((arch AND pain AND (shoe OR midfoot OR foot OR plantar OR heel)))

Published Date: 20201201-20221231
Published Date: 20220601-20231231

ProQuest Dissertations & Theses Global

ab(("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot)))) OR ti(("Heel pain" OR "painful heel" OR "painful heels" OR (heel AND pain) OR "Calcaneal spur" OR "calcaneal spurs" OR (Calcaneus AND spur) OR (calcaneus AND spurs) OR "Plantar fasciitis" OR "Plantar fascitis" OR "plantar foot pain" OR "plantar pain" OR (heel AND spur) OR (heel AND spurs) OR "Abductor hallucis" OR (arch AND (shoe OR midfoot OR foot OR plantar OR heel) AND pain) OR ((Questionnaire OR questionnaires OR instrument OR instruments OR scale OR scales OR measurement OR measurements OR index OR indices OR score OR scores) AND (pain OR function OR functional OR dysfunction OR dysfunctional OR impaired OR impairment OR impairments OR disability) AND (foot OR feet OR heel OR heels OR "lower limb" OR plantar OR calcaneal OR calcaneus OR midfoot))))

Applied filters: 2020-12-01 – 2022-12-31
Applied filters: 2022-06-01 – 2023-12-31
PEDro (Physiotherapy Evidence Database)
Title/Abstract: "plantar fasciitis"
Title/Abstract: "heel" Problem: Pain
New records added since 12/01/2020
New records added since 06/01/2022

APPENDIX B

ARTICLE INCLUSION AND EXCLUSION CRITERIA

Inclusion Criteria

Study Population
Primarily adults (16 years old or greater) with plantar heel pain due to plantar fasciitis –Studies reporting on persons less than 16 years old IF the proportion in the sample is small (less than 5%)

Study Designs
Articles providing evidence of the following types: systematic reviews or meta-analyses of randomized controlled trials, and experimental randomized controlled trials
Include all SRs with 1 or more RCTs

Interventions
Studies for which the research question is effectiveness of interventions within the scope of practice of physical therapists, to include modalities (including but not limited to iontophoresis, manual therapy, stretching exercises, taping, orthotic devices, dry needling, and splints) Joint mobilization, soft-tissue mobilization, massage, strengthening exercises, neuromuscular re-education, modalities-LASER, diathermy, phonophoresis, ultrasound, electrical stimulation, cryotherapy, thermotherapy (moist heat) whirlpool. For extracorporeal shockwave treatment compared to control or non–physical therapy (PT) treatment, categorize as potentially include and tag as extracorporeal shockwave.

Comparisons
Usual care, no intervention-placebo, or other PT interventions, non-PT interventions such as extracorporeal shockwave, injection, and surgery.

Outcomes
All outcomes will be included.

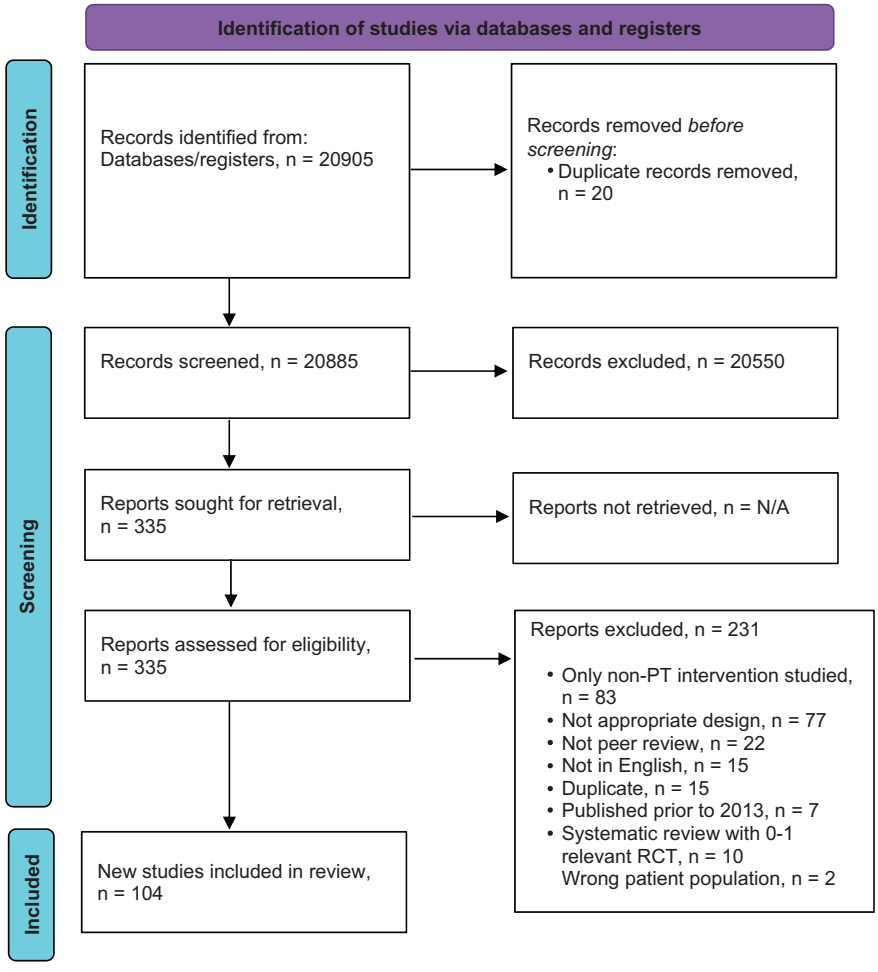
Exclusion Criteria
Studies published prior to 2013
Nonsystematic-narrative review articles and reports, cohort studies, case-control studies, cross-sectional studies, case-series, case studies/reports
Non-English, non–peer-reviewed published articles (eg, abstracts, dissertations) (systematic review with RCTs and non-RCTs should be included)

Articles reporting on the following:
1. Primarily infants and children (less than 16 years old)
2. Heel pain related primarily to conditions other than plantar fasciitis:
    1. Fractures (including stress fractures)
    2. Compartment syndrome
    3. Tumors
    4. Postoperative heel pain from foot surgery
    5. Posterior or lateral heel pain related to Achilles or peroneal tendinitis
    6. Nonmusculoskeletal heel pain:
        1. Diabetes
        2. Ulcers
        3. Primary peripheral nerve entrapment
3. Topics outside the scope of physical therapist practice:
    1. Decision to order radiologic tests (magnetic resonance imaging, etc)
    2. Extracorporeal shockwave therapy (unless it is compared to physical therapy intervention)
    3. Diagnostic ultrasound

APPENDIX C

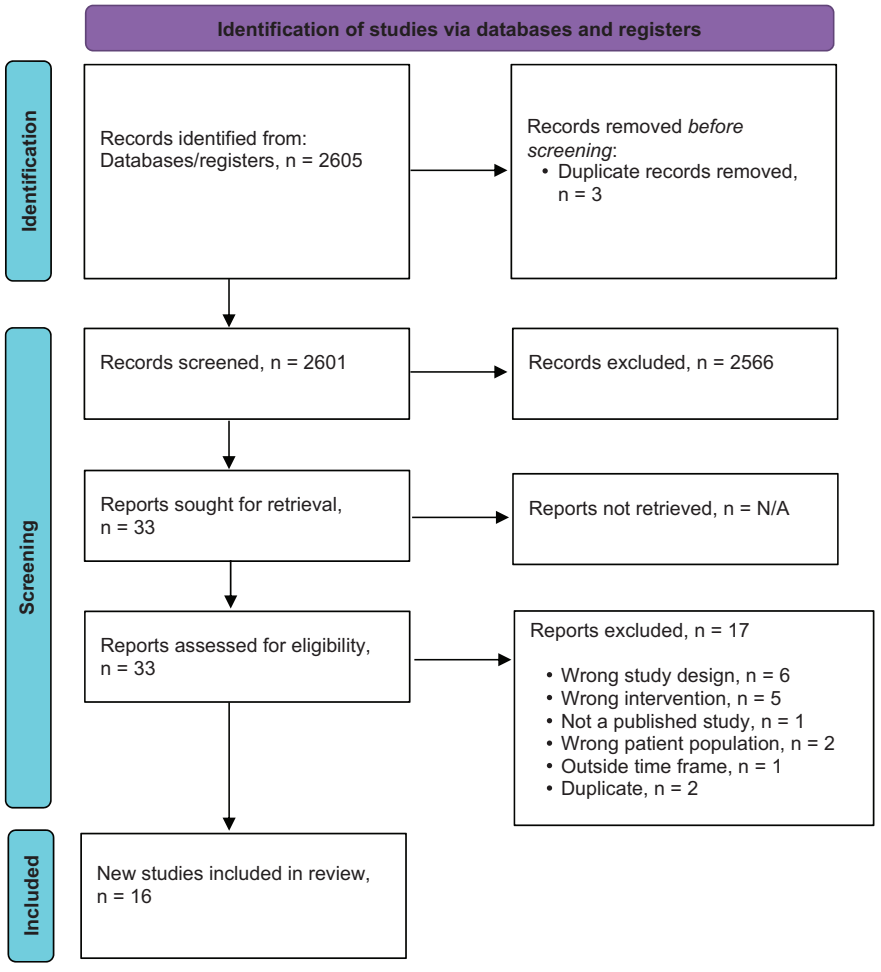
FLOWCHART OF ARTICLES

Heel Pain/Plantar Fasciitis CPG Interventions – December 2020 to December 2021 & June 2023



APPENDIX C (CONTINUED)

Heel Pain/Plantar Fasciitis CPG Interventions – March 2023 to March 2024



Abbreviations: CPG, clinical practice guideline; PT, physical therapy; RCT, randomized clinical trial.

APPENDIX D

LEVEL OF EVIDENCE TABLE[a]

Level	Intervention/Prevention	Pathoanatomic/Risk/Clinical Course/Prognosis/Differential Diagnosis	Diagnosis/Diagnostic Accuracy	Prevalence of Condition/ Disorder	Exam/Outcomes
I	Systematic review of high-quality RCTs High-quality RCT[b]	Systematic review of prospective cohort studies High-quality prospective cohort study[c]	Systematic review of high-quality diagnostic studies High-quality diagnostic study[d] with validation	Systematic review, high-quality cross-sectional studies High-quality cross-sectional study[e]	Systematic review of prospective cohort studies High-quality prospective cohort study
II	Systematic review of high-quality cohort studies High-quality cohort study[c] Outcomes study or ecological study Lower-quality RCT[f]	Systematic review of retrospective cohort study Lower-quality prospective cohort study High-quality retrospective cohort study Consecutive cohort Outcomes study or ecological study	Systematic review of exploratory diagnostic studies or consecutive cohort studies High-quality exploratory diagnostic studies Consecutive retrospective cohort	Systematic review of studies that allows relevant estimate Lower-quality cross-sectional study	Systematic review of lower-quality prospective cohort studies Lower-quality prospective cohort study
III	Systematic reviews of case-control studies High-quality case-control study Lower-quality cohort study	Lower-quality retrospective cohort study High-quality cross-sectional study Case-control study	Lower-quality exploratory diagnostic studies Nonconsecutive retrospective cohort	Local nonrandom study	High-quality cross-sectional study
IV	Case series	Case series	Case-control study		Lower-quality cross-sectional study
V	Expert opinion	Expert opinion	Expert opinion	Expert opinion	Expert opinion

Abbreviation: RCT, randomized clinical trial.

[a]*Adapted from the Center for Evidence-based Medicine 2009 levels of evidence.*[12] *See also* **APPENDIX E.**

[b]*High quality includes RCTs with greater than 80% follow-up, blinding, and appropriate randomization procedures.*

[c]*High-quality cohort study includes greater than 80% follow-up.*

[d]*High-quality diagnostic study includes consistently applied reference standard and blinding.*

[e]*High-quality prevalence study is a cross-sectional study that uses a local and current random sample or censuses*

[f]*Weaker diagnostic criteria and reference standards, improper randomization, no blinding, and less than 80% follow-up may add bias and threats to validity.*

APPENDIX E

PROCEDURES FOR ASSIGNING LEVELS OF EVIDENCE

- Level of evidence is assigned based on the study design using the Levels of Evidence table (**APPENDIX D**), assuming high quality (eg, for intervention, randomized clinical trial starts at level I)
- Study quality is assessed using the critical appraisal tool, and the study is assigned 1 of 4 overall quality ratings based on the critical appraisal results
- Level of evidence assignment is adjusted based on the overall quality rating:
  - High quality (high confidence in the estimate/results): study remains at assigned level of evidence (eg, if the randomized clinical trial is rated high quality, its final assignment is level I). High quality should include the following:
    - Randomized clinical trial with greater than 80% follow-up, blinding, and appropriate randomization procedures
    - Cohort study includes greater than 80% follow-up
    - Diagnostic study includes consistently applied reference standard and blinding
    - Prevalence study is a cross-sectional study that uses a local and current random sample or censuses
  - Acceptable quality (the study does not meet requirements for high quality and weaknesses limit the confidence in the accuracy of the estimate): downgrade 1 level
    - Based on critical appraisal results
  - Low quality: the study has significant limitations that substantially limit confidence in the estimate: downgrade 2 levels
    - Based on critical appraisal results
  - Unacceptable quality: serious limitations - exclude from consideration in the guideline
    - Based on critical appraisal results