Integrating New Evidence into Plantar Heel Pain Clinical Practice Guidelines

Combined Sections Meeting, 2018
New Orleans, LA, February 21-24, 2018

Speakers
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DISCLOSURE: The Speakers have nothing to disclose.

LEARNING OBJECTIVES.
Upon completion of this session you will be able to:
1. Integrate plantar heel pain clinical practice guidelines with new evidence including: foot biomechanics, patient education including pain science, resistance training, manual therapy, neurodynamics, and foot support.
2. Apply the role of the foot muscles and plantar fascia in foot structure and function to patients with plantar heel pain.
3. Differentiate between plantar heel pain presentations with and without nerve-tissue involvement.
4. Develop a multimodal plan of care for individuals with plantar heel pain that integrates clinical practice guidelines and recent evidence.

Timed Outline of Content:

0:00 to 0:05	Introduction: Integrating clinical practice guidelines, recent foot biomechanics, and new clinical evidence for plantar heel pain (S. Reischl)
0:05 to 0:30	Role of foot muscles and plantar fascia in foot function and plantar heel pain (S. Ridge)
0:30 to 1:00	Evaluation and management of plantar heel pain informed by clinical practice guidelines (S. Reischl)
1:00 to 1:45	Outcomes of a new clinical trial of multimodal physical therapy (S. McClinton)
1:45 to 2:00	Question and answer session (Stephen Reischl, Sarah Ridge, Shane McClinton)

REFERENCES ARE LISTED AT THE END OF THIS HANDOUT.

Content Outline

1. 0:00 to 0:05 Introduction
    a. Incidence of Plantar Heel Pain (PHP)
        i. Common in Athletic population[43]
        ii. Common seen by multiple practitioners[16, 38]
        iii. Referral to physical therapists is small percentage when seen by other health care provider are seen by PT[16]
    b. Clinical Practice Guidelines (CPG) Developed by the Orthopaedic Section of the APTA
        i. Introduction and Methods Presented in each guideline
        ii. The **FIRST** CPG published was Plantar Heel Pain Clinical Practice Guidelines in 2008[30] with revision published 2014[25]
        iii. Revision Publications have updated evidence and research grade
    c. The 2014 Revision presents updated evidence from Literature prior to January 2013.
        i. Impairment/Function-Based Diagnosis
        ii. Examination
        iii. Intervention
    d. Impairment/Function-Based Diagnosis
        i. Prevalence
        ii. Pathoanatomical Features
        iii. Clinical Course
        iv. Risk Factors
        v. Diagnosis/Classification
        vi. Differential Diagnosis
        vii. Imaging Studies
    e. Examination
        i. Outcome Measures
        ii. Activity Limitation Measures
        iii. Physical Impairment Measures.
    f. Intervention: 2014 Revision
        i. Manual Therapy
        ii. Stretching
        iii. Taping
        iv. Foot Orthoses
        v. Night splint
        vi. Physical Agents-Electrotherapy
        vii. Physical Agents-low level laser
        viii. Physical Agents-phonophoresis
        ix. Physical Agents-ultrasound
        x. Footwear
        xi. Education and counseling for weight loss
        xii. Therapeutic Exercise and Neuromuscular Reeducation
        xiii. Dry Needling
    g. Individuals with PHP demonstrate diversity using the ICF model
        i. Health Condition
            1. Many structures that may be source of symptoms
        ii. Participation issues
            1. Difficulty or unable to do their societal role: work, be on a team

iii. Activity Restrictions
1. Difficulty or unable to do activity: deliver mail, train for 2-mile event
iv. Body Structure and Function
1. Include Differential diagnosis
2. Movement based structure and function loss: pain with walking
v. Contextual Factors
1. "My job requires…"
2. "I have tried to lose weight but…"

h. With the increasing ability of PT to see patients with direct access, skills must be improved:
i. Differential Diagnosis: combining critical thinking in the examination process.
1. Examination of local structures and proximal structures
a. Nerve entrapments
b. Proximal muscle weakness, motor control
c. Other orthopaedic conditions contributing to PHP.
2. Questions to assess peripheral[2] and central[9, 14] neuropathology

i. Our Goal today is three-fold by the 3 presenters:
i. Sarah Ridge: Overview of what we know about foot structure and function and evidence to inform treatment.
ii. Steve Reischl: Presentation of Examination and Treatment using the CPG, evidence based physical therapy, and the author's perspective of 30+ years of foot and ankle physical therapy.
iii. Shane McClinton: Clinical applications of PHP management including outcomes of a recent pragmatic RCT that included a clinical-decision framework that integrated CPG and recent evidence.
iv. At the end, bring your questions, comments and discussion to the microphone.

2. 0:05 to 0:30 Foot structure/function
a. Structures that may be involved with causes of plantar heel pain
i. Previous understanding
ii. "New" knowledge about foot function related to PHP

b. Role of muscles in "proper" foot function
i. Support MLA during loading[5, 24]
1. Muscle strengthening increases arch stiffness[17]
2. Less muscle activation increases navicular drop[15]
ii. Control pronation during standing and walking[19, 20, 24]
1. Weak IFM have been associatied with impaired balance and increased risk of falls in the elderly[31, 33]
2. Similar function to deep core stabilizers of the spine[29, 34]
iii. Stabilize foot during propulsion of walking[5]
iv. Shock attenuation/energy dissipation?

c. Effects of IFM weakness
i. Control of midfoot?
1. Discussion of midfoot movement during landings, including groups of people with "strong" IFM and people with "weak" IFM
a. Static arch height correlates to mid-foot range of motion during drop landing
ii. Effect on other structures of the foot – bone, plantar fascia
1. Muscle weakness is a factor for stress fracture

b. Mechanical properties and function of the plantar fascia

i. PF helps maintain MLA, contributes to magnitude and timing of pronation and supination during gait[6]
    1. Windlass mechanism
ii. MLA helps with shock absorption during loading[39]
    1. Walking, running, landings
    2. Role of plantar fascia?
iii. Thickness changes in people with plantar fasciitis
iv. Stiffness of plantar fascia in people with and without plantar fasciitis
    1. Effect of stretching on the plantar fascia

c. Evidence of muscle weakness in PHP[1, 4, 7, 22, 27, 42]
    i. Runners with chronic PF have lower rearfoot IFM volume than healthy runners[8]
    ii. Atrophy of forefoot plantar intrinsic foot muscles may contribute to plantar fasciitis[7]
    iii. Toe flexor strength of feet with PF is lower than healthy feet[1, 27, 42]
    iv. Ankle plantar flexor weakness in PF compared to controls[22, 27]

3. 0:30 to 1:00 Management of Patients with Plantar Fasciitis and Plantar Heel Pain
    a. EVALUATION AND EXAMINATION
        i. Subjective Interview
            1. S.I.N.S. to determine level of objective assessment
            2. Planning the order of the assessment
        ii. Outcome Measures: These are valid and reliable measures
            1. FAAM
            2. LEFS
            3. FHSQ
            4. FFI
        iii. Psychosocial factors (Contextual Factors)
            1. Fear avoidance Belief Questions[18]
        iv. Activity Limitation Measures
            1. How the contextual factors alter Activity Limitations of each individual
            2. Activity Limitation measure linked to symptoms (pain, location, Agg/Allev)
        v. Physical Impairment Measures.
            1. Use of Visual Analog Scale of Pain
                a. Best, worse current
                b. Consider pain with provocative activity
            2. Inspection and Postural Assessment
                a. Foot Posture Index
                b. Full posture screen
                c. Screen of footwear, orthoses, pads, etc.
            3. Movement Assessment
                a. Sit to stand and return
                b. Observational Gait Analysis
                    i. Temporal/Spatial measures
                    ii. By phase of gait
                    iii. Expected movement in each phase and actual movement.
                c. Selected movement observation which are symptomatic
                    i. Squat, lunge, hop, etc.

ii. Star Excursion Balance Test
iii. Running Analysis
iv. Symptoms with the movement

4. Joint ROM measurements with functional testing
    a. Joints of ankle and foot
    b. AROM willingness to move
    c. PROM with end feel
        i. Leads to accessory motion testing
        ii. Leads to flexibility tests
5. Strength measurement of foot and ankle and proximal muscle groups
    a. Selective Tissue Tension tests
    b. Manual Muscle Testing
    c. Functional tests
6. Neurological Examination testing
    a. What level of examination (back to SINS)
    b. Nerve entrapment sites
    c. Assessment of Neural Mobility[3, 32, 35, 41]
7. Special Tests
    a. Windlass test
    b. Knee to wall
8. Palpation

b. INTERVENTION
    i. Goals, Prognosis, Plan of Care, Frequency, Duration
    ii. Evidence/Guideline-based clinical decision-making framework used in a recent RCT[28]

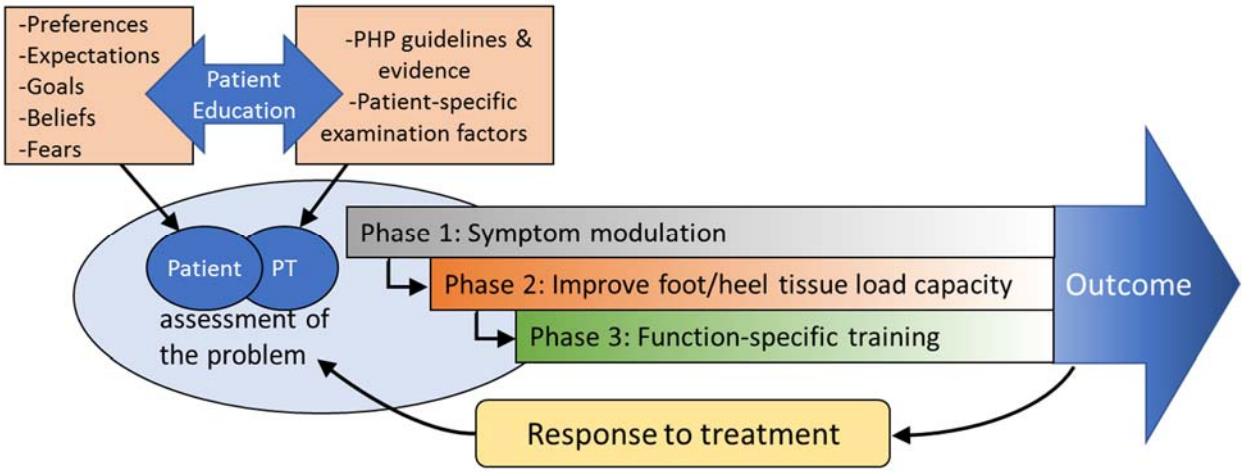

FIGURE 1. Clinical decision-making framework used to guide individualized PHP intervention. The 3 phases of rehabilitation are directed and modified throughout the episode of care based on the patient's response to treatment(s) and alliance of the PT and patient's ongoing assessment of the problem. The therapist's assessment is informed by PHP guidelines, current evidence, and the patient's examination findings. Biopsychosocial factors contributing to the patient's assessment of the problem are included in the assessment and educational strategies (including pain neuroscience) are used to bridge gaps between the PT and patient assessments of the problem. Interventions are directed at the most significant local and or proximal impairments based on the evaluation and response to treatment.

iii. Components of the Plan of Care
    1. Education
    2. Home Program
    3. In Physical Therapy Sessions
    4. Return to activity
    5. Response to selected treatment program
iv. PHASE 1: Symptom Modulation
    1. Morning symptoms
        a. Exercise prescription
            1. Focus on stretching, strength deficits
            2. Timing of exercise in the patient's day
        b. Night splint
    2. Symptoms from prolonged sitting time to standing walking
        a. Exercise prescription
            1. Focus on stretching
            2. Timing of the exercise in the patient's day
        b. Footwear
        c. Tape, Orthoses
    3. Symptoms with activity
        a. Activity modification
        b. Exercise prescription
            1. Focus on stretching
            2. Timing of the exercise in the patient's day
        c. Footwear
        d. Tape, orthoses
    4. Treatment of Impairments
        a. Education/Counseling/referral to other practitioners
        b. Manual Therapy
        c. Exercise prescription
            1. Focus on stretching
            2. Timing of the exercise in the patient's day
        d. Tape, Orthoses
        e. Physical Agents

4. 1:00 to 1:45 Clinical applications and outcomes - Treatment details and outcomes from a recent RCT[26, 28]
    a. Evidence/Guideline-based clinical decision-making framework used in the RCT (see FIGURE 1 above)
    b. Phases of treatment used to guide clinical decision-making in the RCT (see TABLE 1)

TABLE 1. Phases and progression of physical therapy treatment for PHP.[26]

Phase	Goals	Criteria to advance to next phase	Interventions
Phase 1	1. Decrease irritability 2. Education about condition and rehabilitation 3. Improve dorsiflexion	1. Mild to moderate pain 2. Dorsiflexion ≥ 10 degrees (measured in prone with knee extended),[37] or symmetrical dorsiflexion to uninvolved side	1. Patient education 2. Address contributing factors (footwear/inserts, posture, gait, neuro-dynamic or proximal impairments) 3. Exercise* - stretch/mobilization 4. Night splint (if symptoms > 6 months)[30] 5. Manual therapy 6. Taping 7. Modalities
Phase 2	1. Further reduction in pain 2. Restore muscle performance 3. Minimize gait deviations 4. Enhance basic function(s)	1. Minimal to no pain 2. Single leg heel raise ≥ 12 repetitions,[23] or symmetrical performance to the uninvolved side 3. Walking items on FAAM ≤ "slight difficulty"	1. Exercise*† - stretch and strength 2. Manual therapy† 3. Gait training
Phase 3	1. Enhance higher level function(s) including sport and recreational activities 2. Prevent recurrence	<u>Discharge when:</u> Understanding of condition management and prevention and a) Patient-specific goals met, b) GROC ≥ "quite a bit better," or c) plateau evident in GROC or FAAM scores	1. Progression of exercise 2. Sport/recreation specific training 2. Education on condition management and prevention

**Included a home program with less than 5 exercises;[24] †Manual therapy during Phase 2 will address residual impairments from Phase 1 but Phase 2 treatment will reflect greater volume of exercise interventions than manual therapy compared to Phase 1. Abbreviations: FAAM, Foot and Ankle Ability Measure; GROC, global rating of change scale*

c. Improvement of foot/heel tissue load capacity through resistance training
    i. Use of augmented low-Dye to support decision to train foot vs. just orthotic use
    ii. High-load resistance training in PHP[36]
    iii. Resistance training phase of PHP treatment[28]
        1. Foot-specific
            a. Short foot training and progression
            b. Toe training
        2. Proximal[21, 40]
            a. Core/hip/dynamic valgus considerations
    iv. Patient education
        1. Load management
        2. Pain neuroscience[13]

b. Neurodynamics[32]
a. Outcomes of multimodal PT intervention
    i. Effectiveness of PT in addition to usual podiatric care[26, 28]
        1. Study results and conclusions
        2. Considerations
            a. Completion of treatment
            b. Psychosocial factors[10-12]
            c. Concurrent musculoskeletal disorders

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