

## **Title: Reinterpreting the role of strength in improving movement in individuals with hip pain**

### **Session Description:**

The objective of this Science Meets Practice session is to educate attendees on the current evidence for treating muscle dysfunction and abnormal movement in individuals with chronic hip joint pain. Selected platform presenters will deliver short talks on current research projects in these topic areas, and then discuss the clinical implications through a moderator-led case presentation. Expert clinicians and researchers will present the evidence on strength impairments and movement dysfunction in this patient population and then consider the role of strengthening in modifying movement. A question and answer session between audience and panel members will highlight translation of the current evidence to clinical practice.

### **Course Objectives:**

At the conclusion of the course, each attendee will:

1. Identify common movement patterns in individuals with chronic hip joint pain.
2. Discuss the current evidence for the influence of muscle weakness on abnormal movement in individuals with chronic hip joint pain.
3. Observe a proposed model for using posture and movement as a primary means to reduce pain and improve function in individuals with chronic hip joint pain.

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### **Timed Outline:**

#### Timed Outline:

- 00:00-00:05 Introduction
- Speaker introductions, orientation to topic, brief description of target patient population (Griffin 2016)
- 00:05-00:29 Presentation of 3-4 research abstracts related to physical therapy management of chronic hip joint pain followed by Q&A to the presenters.
- 00:30-00:40 Moderator-led Q&A/summary of session (moderator: Di Stasi)
- 00:41-01:00 Case study presentation (Di Stasi) with application of current research from abstract presenters
- I. Summary of evaluation findings
    - a. History of current condition
      - i. 31 year old active female with L hip pain > 2 years
      - ii. Evaluation and treatment by multiple providers, including several imaging assessments, injections, and physical therapy. (Clohisy 2013)
      - iii. Diagnostic findings: cam lesion, 'mild' dysplasia, labral tear

- b. Patient goals: avoid hip surgery, perform daily/work activities without pain, full return to activities (ie. yoga, then hiking, cycling)
  - c. **Panel question:** *What are your first thoughts about how to approach the eval of a patient like this (ie. long duration pain, seen multiple providers with limited success, etc)*
  - d. Physical exam findings
    - i. Pain, ROM; strength; special tests (Harris-Hayes 2014, Kemp 2014, Kierkegaard 2017)
    - ii. Posture; gait; transfers; yoga-specific maneuvers
    - iii. PROs: Hip Outcome Score subscales, modified Oswestry Disability Index; Lower Extremity Functional Scale
  - e. **Panel question:** *How would these exam findings direct your initial intervention and/or HEP prescription? What might the next few weeks of the POC look like?*
    - i. Description of initial intervention and HEP: Patient education on condition and contribution of poor mechanics, posture/body mechanics education, muscle re-education/strengthening (Griffin 2016, Harris-Hayes 2016, Hunt 2012, Lewis 2007, Lewis 2009, Lewis 2010, Lewis and Sahrman 2015)
    - ii. Description of program progression over 1<sup>st</sup> 6 weeks of physical therapy.
- II. 6 week re-evaluation (8<sup>th</sup> visit)
- a. ~75% reduction in severity and frequency of pain with ADLs; climbing 3 flights of stairs without hip pain
    - i. Anterior hip pain with > 1 hour sitting, walking in winter boots
  - b. Excellent HEP compliance
    - i. Independent with standing posture; ADL transfer mechanics
    - ii. 12-15% improvement in hip abductor, adductor, and extensor and knee extensor strength; LSIs ~80-92% (Davis 2016, Harris-Hayes 2014, Kemp 2014, Kierkegaard 2017)
    - iii. PROs: MCID improvement in HOS-ADL. (Kemp 2013, Martin and Philippon 2007)
  - c. Activity level: resumed 'light' hiking; no yoga, no cycling
  - d. **Panel question:** *Given the patient's activity goals, what would be your approach to progression her current program? How would you discuss expectations for the timeline of recovery?*
    - i. Description of updates to goals/POC; treatment to address residual weakness, posture/body mechanics, and education for exercise progressions, activity modifications, and strategy for restoring fitness
- III. Discharge visit: 11 months since initial evaluation
- a. 22<sup>nd</sup> visit (9 weeks since last visit)
  - b. Patient returned after 'flare-up' of L hip/gluteal pain s/p 3.5 hours of exercise 3 days earlier
  - c. 'Generally painfree' with ADLs and 1.5-2 hours of exercise, HOS-ADL 94%, HOS-Sports 78%.
  - d. Independent with HEP, posture, body mechanics

- e. Provided guidance on strength training progressions, training loads, return to activity expectations (Joseph 2016, Levy 2016, Naal 2014, Tjissen 2016)

01:00-01:22 Dialogue #1: Strength matters: The complicating effect of weakness on movement (Harris-Hayes)

- I. Evidence specific to rehabilitation is limited (Wall 2013 (review); Enseki 2014; Emara 2011; Griffin 2016, Hunt 2012; Yazbek 2011)
  - a. Controversy – is rehabilitation contraindicated? (Hickman 2001)
  - b. Clear need for research related to rehabilitation
- II. Recommendations from the Clinical Practice Guidelines published in JOSPT (non-arthritic and OA) (Enseki 2014)
- III. Update on evidence related to
  - a. Relationships among strength, movement impairments, pathology and patient-reported outcomes  
(Casartelli, 2012, Casartelli, 2104, Casartelli, 2011, Davis 2016, Diamond 2016, Diamond 2016, Harris-Hayes 2014, Harris-Hayes 2017, Freke 2016, Kivlan 2016, Nepple, 2015,
  - b. Strengthening interventions for hip joint pain  
(Emara 2011, Harris-Hayes 2016, Harris-Hayes *in press*)
- IV. Movement pattern training – Baseline findings and Treatment trial (Harris-Hayes, PI K23HD67343)
  - a. Report findings from preliminary work in young adults with chronic hip joint pain (Harris-Hayes 2016, Harris-Hayes *in press*).
    - i. Muscle strength and volume compared to controls, involved and uninvolved hips (Harris-Hayes 2016, Mastenbrook 2017)
    - ii. Rehabilitation approach – Movement Pattern Training
      - 1. Components of treatment
        - a. Task-specific instruction to modify abnormal movement pattern during daily and fitness activities
          - i. Reduce stresses to tissues
          - ii. Reduce pain and improve function
        - b. Strengthen hip musculature
- V. Current study
  - a. Comparing movement pattern training (task-specific) to strengthening

01:22-01:44 Dialogue #2: Movement matters: better function follows better movement (Lewis)

- I. Altered movement in individuals with FAIS compared to individuals without hip pain: what does the research say?
  - A. Gait: varies from no changes (Kumar et al. 2014) to reductions in hip excursion in the sagittal (Kennedy et al. 2009, Diamond et al. 2016, Rylander et al. 2013) and frontal (Kennedy et al. 2009, Rylander et al. 2013) planes
  - B. Stairs: varies from no change in hip motion (Hammond et al. 2017) to reduced sagittal plane motion (Rylander et al. 2013);
  - C. Stepdown: increased anterior pelvic tilt (Lewis et al. 2017a)
  - D. Bilateral squat: decreased pelvic tilt excursion (Lamontagne et al. 2009); decreased posterior pelvic tilt motion (Bagwell et al. 2016)
  - E. Alterations in movement do not necessarily follow the alterations in strength
  - F. Some of the alterations in movement would, in theory, produce earlier / more impingement (Ross et al. 2014)
  
- II. Altered movement in individuals with other types of hip pain compared to individuals without hip pain
  - A. Gait (Romano et al. 1996, Nunley et al. 2011, Lewis et al. 2015b, Skalshøi et al. 2015, Jacobsen et al. 2013)
  - B. Single leg task (Hatton et al. 2014, Charlton et al. 2016, Hatton et al. 2015)
  
- III. Movement patterns can change faster than muscle can be strengthened
  - A. Within a single session / few sessions (Lewis et al. 2015b, Marinko and Lewis 2016)
  
- IV. Evidence from other conditions
  - A. Improving strength does not necessarily improve movement patterns (Willy and Davis 2011, Ferber et al. 2011)
  - B. Movement retraining improves movement patterns (Wouters et al. 2012, Willy et al. 2012)

01:44 – 02:00 Moderator-led Q&A/summary of session (Di Stasi)

**Speaker Information:**

Stephanie Di Stasi, PT, PhD, OCS

APTA number: 332548

Assistant Professor, Division of Physical Therapy, The Ohio State University, Columbus, OH, USA

Research Scientist, Sports Medicine Research Institute, The Ohio State University Wexner Medical Center, Columbus, OH, USA

**Stephanie Di Stasi, PT, PhD, OCS**, is an Assistant Professor in the Division of Physical Therapy at The Ohio State University and a Research Scientist for OSU's Wexner Medical Center Sports Medicine Research Institute. She received her Master of Science in Physical Therapy from Springfield College and maintains part-time clinical work treating sports and orthopaedic populations. Dr. Di Stasi received her PhD in Biomechanics and Movement Science from the University of Delaware in 2011 and completed post-doctoral work in Sports Medicine at The Ohio State University. Dr. Di Stasi's current research focuses on the mechanisms of disability and joint disease in individuals with musculoskeletal conditions of the lower extremity in order to inform targeted treatment strategies. Her work on outcomes following hip arthroscopy has been funded by the National Center for Advancing Translational Sciences, the Foundation for Physical Therapy, the Sports Physical Therapy Section of the APTA, and OSU's Center for Clinical and Translational Science. Dr. Di Stasi is a member of the American Physical Therapy Association (Research, Sports and Orthopaedics sections), American Society of Biomechanics, and International Society for Hip Arthroscopy.

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No relevant financial relationship exists

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Marcie Harris-Hayes, PT, DPT, MSCI

APTA number: 189145

Associate Professor in the Program in Physical Therapy and Department of Orthopaedic Surgery within the Washington University School of Medicine

Director, Rehabilitation Research for Orthopaedic Conditions (RROC) laboratory

Marcie Harris-Hayes, PT, DPT, MSCI is an Associate Professor in the Program in Physical Therapy and Department of Orthopaedic Surgery within the Washington University School of Medicine. She is the director of the Rehabilitation Research for Orthopaedic Conditions (RROC) laboratory. Dr. Harris-Hayes received her Master of Science in Physical Therapy from Northwestern University, her clinical Doctorate in Physical Therapy and Master's of Science in Clinical Investigation from Washington University. She completed her post-doctoral experience at Washington University as a scholar in the Comprehensive Opportunities in Rehabilitation Research Training program (CORRT). Her research, funded by NIH, NICHD-NCMRR, is focused on the investigation of rehabilitation factors in hip disorders including femoroacetabular

impingement, acetabular labral tears and osteoarthritis. Currently, she is completing a feasibility, clinical trial comparing two treatment approaches, movement pattern training compared to strengthening, for young adults with chronic hip joint pain.

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### Cara L. Lewis, PT, PhD

APTA number: 181873

Associate Professor of Physical Therapy, Rehabilitation Sciences and Medicine

Director, Human Adaptation Laboratory

Cara L. Lewis, PT, PhD, is an Associate Professor in the Department of Physical Therapy and Athletic Training within Boston University's College of Health and Rehabilitation Sciences: Sargent College. She earned her Master of Science in Physical Therapy from Washington University in St. Louis. She practiced physical therapy for 4 years before returning to Washington University for her PhD in Movement Science. Dr. Lewis completed a post-doctoral fellowship focused on rehabilitation robotics with Dan Ferris, PhD, at the University of Michigan in Ann Arbor. Dr. Lewis has published several peer-reviewed journal articles on hip joint forces and gait. She has received research funding from multiple sources including the NIH and NSF. Dr. Lewis is currently funded by a K23 and R03 from NIAMS to investigate movement differences in young adults with and without hip pain.

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(Harris-Hayes section)

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