

**Movement Screening Workshop on the Hip & Ankle****Thursday 21<sup>st</sup> January 2016****Venue – St Mary's Stadium, Southampton Football Club****NOTES (22<sup>nd</sup> Feb 2016)**

1. **Welcome and Introduction** (Maria Stokes) – slide set n<sup>o</sup>1 (slides will be available in a drop box). Purpose of the Group is to gain international consensus of movement screening tools and intervention programmes to develop a strong evidence based approach for future practice. Movement Screening Definitions were presented e.g. Physical Performance Tests and Movement Quality.

Purpose of the Day:

- Informing the group of studies in progress
- Identify commonalities between studies
- Discuss and agree possible modifications to protocols for future research
- Identify further tasks for any unresolved points

2. **Setting the scene: Musculoskeletal causes of hip pain and biomechanical analysis of human movement** (Cara Lewis) – slide set n<sup>o</sup>2

It is important to acknowledge the historical progression of our understanding of musculoskeletal causes of hip pain. Thus far, much of the focus has been on bone structure, partially due to the ability to quantify it. Movement quality, however, is more challenging to measure and even more difficult to communicate. Attempts at pooling movement quality data are hindered by differences in tasks assessed and methodology used for assessment. Establishing overlap of protocols between research groups (biomechanical and clinical) will allow data to be shared and multi-centre projects developed. This will advance our understanding of the interaction of movement and hip pain.

3. **Hip and groin pain in professional footballers – screening and prehab** (Mo Gimpel)

Overview of Southampton FC's procedures for dealing with hip and groin pain, use of functional movement screening and the Football Matrix.

4. **Adolescent Footballers Movement Screening: males and females** (Nadine Booyesen) – slide set n<sup>o</sup>3. Overview of the Hip and Lower Limb Movement Screening tool devised during Nadine Booyesen's MRes to identify hip movement patterns. Poor movement control in hip flexion and medial rotation with restricted hip internal range of motion was identified in footballers in a Premiership academy. PhD aims to examine the proof of concept for retraining movement control and assess the feasibility of conducting a future cluster randomised controlled trial (RCT). A pre-activation exercise programme has been devised which will be performed by young community based footballers for 12 weeks. Baseline measures used during the study was presented.

5. **Femoroacetabular Impingement (FAI\_ & Hip Labrum)** (Joanne Kemp – joined by Skype from Australia) – slide set n<sup>o</sup>4

Studies include: FORCE – longitudinal, no surgery  
HARP – longitudinal plus hip arthroscopy  
HIPARTi – international RCT  
FIRST – effective physio interventions

During these studies we are using a number of clinical tools (eg: video analysis and quantitative measures) and biomechanical lab tools (including kinematic models) to determine relationships between movement and outcomes, and the effectiveness of interventions in changing movement. Tools include clinical and lab based assessment of single leg dynamic tasks, hopping and jumping tasks, direction changing tasks.

6. **Adolescent Footballers Biomechanics** (Martin Warner) – slide set n<sup>o</sup>5

Overview of how biomechanics is currently being used to validate movement screening tests and elucidate on the mechanisms of poor movement control. Highlighted the issues and surrounding the use of biomechanics and the need to harmonise protocols/procedures to ensure data and results can be shared and compared. Some of the issues highlighted are; whether the visual observations made by clinicians directly correspond to kinematic/kinetic parameters? Do clinicians and biomechanics speak the same language? Is a threshold that defines poor/abnormal movement needed? A Biomechanics Task Group has been set up within the Movement Screening Group to harmonise protocols and approaches.

7. **Discussion - synthesis of hip studies & introduction to group work** (Chair: Cara Lewis)

Different versions of the same tests are used e.g. single leg squats with non-stance foot out in front or behind; single leg squats on decline boards. Needs discussion. Endurance may be important. Difficult to 'sell' movement screening to orthopaedic surgeons as a tool on its own. An easy, short test is needed.

8. Small group discussions

a. Clinical group

Reasons for using movement screening – prediction of injury and understanding movement. First line for exercise prescription. Quick assessment capacity. Screens used: Functional Movement Score (FMS), Football Matrix (Movement Performance Solutions). Recognise limitations e.g. test/retest, lack of endurance, lack of robust protocols. Test/retest capacity.

b. Research group

Development of screening tools (including reliability and validation). Used for injury prediction and prevention research. Definitions and terminology – being addressed by task group. Discrepancies in how performance of tests is interpreted. What do the numbers mean? How to make sure all are scoring the same? Questionnaires for hip HAGOS and iHot are very similar. Need to determine which one will be used consistently in different studies.

c. Biomechanics group

What is the role of biomechanics in movement screening? How best does 3D motion capture provide clinical data to clinicians? Need common movement tests in order to combine data. Modelling, including marker sets and models used, need to be

harmonized. Need to determine the influence of biomechanical methodologies on results. Need to determine how best to quantify and interpret variability of movement. Need for core set of tests to perform with additional tests for occupation/sport specific.

General Discussion:

- i. Endurance plays into variability issue. What is variability? Fatigability – spinal rehab used Biering Sorenson test (hold prone position over end of couch) to indicate function – a similar movement screening test for lower limbs would be useful.
  - ii. Interpretation: Is 10° of hip abduction OK? Is 11° bad? Where is the cut-off point within visual realm? It will take time to get to full understanding of what movement screening tells us.
  - iii. Need to be consistent in putting data together. Challenging with multi-centre studies and those with different protocols.
  - iv. a. Trunk and non-stance leg positions make a difference. If prescriptive the patient may not move naturally. Which is more informative, assessing a patient's typical movement pattern or assessing a patient's ability to perform the movement correctly? .  
b. Important to standardise. Develop core methods with add-ons.
  - v. Single leg squat or single leg knee bend – these are different manoeuvres but sometimes terms are used interchangeably. Terminology Group is looking into this.
  - vi. Very often not able to compare data in studies, either because the tasks are slightly different or because the tasks are not fully described.
  - vii. Regardless of what is agreed in the future, it has to be communicated in an easy to use and understandable way.
9. **Reducing the burden of injury in community Rugby Union** (Matt Attwood) – slide set n<sup>o</sup> 6  
Adult community rugby union accounts for the largest rugby union playing population worldwide. Established injury incidence for this population when compared to other popular English sports, is notable, largely due to its high intensity, collision based nature. Our aim is to reduce the burden of these injuries through a targeted, progressive exercise programme as part of a cluster randomised controlled trial.
10. **Military Hip Study (MILO)** (Russ Coppack) – slide set n<sup>o</sup> 7  
There is little understanding of hip pain in the military – don't know the size of the problem. Non-surgical treatment is poorly understood within the military. Looking at how the structure and process of rehab options change the outcome. Want to ensure personnel receive treatment in the right way.
11. **Movement screening in elite golfers** (Nadine Booysen) – slide set n<sup>o</sup> 8  
Little is known regarding the hip and pelvic movement patterns in elite golfers or its possible association with risk of injury and pain. This was a joint MRI and Movement Screening study with WMS Clinical Trials Unit, University of Warwick & PGA European Tour. The aim was to document

the observed movement patterns in elite golfers using the hip and lower limb movement screen under development which include the following manoeuvres:

- Small knee bend
- Small knee bend with trunk rotation
- Standing hip flexion
- Deep Squat
- Side-lying with hip abduction while the leg is externally rotated

**12. Synthesis and Discussion: conclusions from hip studies** (Chair: Cara Lewis)

Multiple studies are underway, each looking at slightly different things. These studies are different in terms of the tasks, in the approach, and in populations being studied. As these and other studies move forward, efforts to have some overlap in tasks and approach would provide additional information when combined.

**13. Ankle studies** (Sarah de la Motte) – slide set 19

CHAMP (USU Consortium for Health and Military Performance). Aiming to improve health protection and readiness, collaborating research initiative, consensus on best practice, influencing policy and changing culture and training based on research. Overview of:

- a. JUMP-ACL OCS study which examined the modifiable risk factors predicting ACL injury risk ,
- b. FMS at Marine Officer Candidate School examining movement patterns related to MSK that leads to washout – using the FMS. High specificity.
- c. Core (Combat Readiness Evaluation) Study examining which measures predict injury over deployment cycle (FMS, Y-balance test, Landing error scoring system). Outcome none predict injury, injury capture incomplete.
- d. Ongoing work MEPSTART: Screening- FMS, Single leg squat leg back, Double leg squat, LESS, Step test, Y-Balance

**14. Quantification of static and dynamic ankle function** (Tony Redmond)

To understand ankle function – struggling with modelling, tissue studies, clinical and MRI. Requires expensive technology and time.

**15. Discussion: Ankle and Hip** (Chair: Nadine Booyesen)

Is what is happening at the hip affecting the ankle? Should the ankle be looked at? Often see a chronic ankle event prior to a hip injury/instability.

Is movement screening being incorporated as an outcome measure in ankle studies?

Are we looking for a movement screening tool for the hip or for the whole lower extremity?

If just looking at hip movement screening then the ankle becomes less relevant.

Landing Error Scoring System – (early, unpublished) – finding landing is important for stress fracture occurrence.

Too many risk factors for injury that cannot be logged – so many confounders. Need to keep track of confounding factors. A risk factor does not mean it is going to cause the problem.

Elite sportspeople's exposure if tracked on a phone app.

**16. Harmonising hip & ankle studies** (Chair: Sarah de la Motte)

Nadine Booyesen's hip and lower limb test is not diagnostic but identifies the movement quality –the hip and lower limb movement screen under development examines the efficiency of movement control in which a person is asked to cognitively control movement at a specific joint whilst challenging the ability to maintain this control with movement at an adjacent joint. Movement faults are observed by answering a set of questions e.g Small Knee Bend Test:

- a. Does the knee move inward from the 2nd toe?
- b. Does the pelvis hitch?
- c. Does the knee fail to move 2 cm past the toes?
- d. Does the trunk lean forwards?

Core stability – modifiable risk factor. Some tests look at trunk control. Useful to have clinician and biomechanist feedback.

**17. Future topics** (Chair: Cara Lewis)

Need to look at the fact that the hip is not in isolation. Don't forget about everything else that is connected. A lower limb screen for hip and groin pathology needs to be clear and distinct. What tests are going to help us understand/predict hip pathology?

Important to have end-user groups involved at the early stages. All need to think about the tool being useable to clinicians. Compliance to the intervention is the key to success.

How are we educating patients and clinicians on importance of movement and moving well? Education component needs to be added.

- a. Struggles with terminology – squat/small knee bend; pelvic positions (drop/hitch)
- b. Sensitivity and specificity – What is the time goal? How can parameters be balanced?
- c. Standardisation – Standardised squat plus typical movement pattern? There is a difference between those who can and those who can't.
- d. Consistency – Needed when applying tests e.g. trunk and non-stance foot positions
- e. Biomechanics – Group agenda will be formulated for the first meeting (tbc)
- f. Questionnaires – Choose one mandatory plus others of their own choice.
- g. Endurance – Test over and over again *or* test, treadmill run, test? More challenging to implement in a clinic.

**18. Closing / Outcome and next steps** (Cara Lewis)

- a. Determine effect of trunk position on small knee bend movement pattern (Cara Lewis, in progress)
- b. Determine differences in assessed movement faults during small knee bend with the non-stance foot anterior vs. posterior – Which non-stance leg position is better for assessment? (Nadine Booyesen, in progress)
- c. Continue to work with Terminology task force to establish explanations of movement tasks and faults.
- d. Discuss questionnaires currently in use by research and clinical groups, and recommend a common questionnaire.

## Appendix

### List of delegates

Name	Affiliation
Cara Lewis	Boston University, USA
Cathy Bowen	University of Southampton
Elizabeth Heron	University of Southampton
Eric Bando	University of Nottingham
Helen French	Royal College of Surgeons in Ireland
Jackie Whittaker ★	University of Alberta, Canada
Jo Bartram	ARUK Centre for Sport, Exercise and Osteoarthritis Administrator <a href="mailto:Joanne.Bartram@nottingham.ac.uk">Joanne.Bartram@nottingham.ac.uk</a>
Joanne Kemp ★	Federation University Australia
Katie Flatters	University of Nottingham
Keith Stokes	University of Bath
Laura Partridge	DMRC Headley Court
Laura Wyatt	University of Nottingham
Lindsay Thomson	University of Edinburgh / sportscotland
Lucy Gates	University of Southampton
Maria Stokes	University of Southampton
Mark Williams	RAF Cosford
Martin Warner	University of Southampton
Matt Attwood	University of Bath
Mo Gimpel	Southampton Football Club
Moira McCormack	The Royal Ballet
Nadine Booysen (previously Botha)	University of Southampton
Nick Allen	Birmingham Royal Ballet
Patrick Carden	University of Exeter
Paul Muckelt	University of Southampton
Richard Jones	University of Salford
Richard Leech	University of Nottingham
Robert Barker-Davies	DMRC Headley Court
Russ Coppack	DMRC Headley Court
Sarah de la Motte	Uniformed Services University of the Health Sciences, USA
Tony Redmond	University of Leeds

via Skype ★