

## Supplementary File 2: Standardised treatment therapist handbook

### The physiotherapy for Femoroacetabular Impingement Rehabilitation Study (physioFIRST): A participant and assessor-blinded randomised controlled trial of physiotherapy for hip impingement.

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The Tiger group refers to the usual care, control group rehabilitation program for patients with femoroacetabular impingement (FAI).

The treatment program lasts for 6 months and has two phases. Phase 1 refers to months 0-3; Phase 2 refers to month 4-6 of treatment. Both phases target six key components of treatment. The four components of the rehabilitation program were selected to represent what could be “usual care” for hip pain, and has been tested in our pilot study

The four key components of the control program include:

1. ROM (flexion)
2. Standardised stretching
3. Standardised cardiovascular training/load management advice
4. Standardised Education

The two phases of treatment are outlines below.

#### Phase 1 month 0-3

This phase consists of

- i. Fortnightly one-on-one consultations with the treating physiotherapist;
- ii. Weekly physiotherapist-supervised gym sessions (these can be one-on-one or small groups, as long as there is no cross-contamination between the lion and tiger groups, where patients from each group attend the gym at the same time. This is critical for patient-blinding and the integrity of the study design).
- iii. Twice-weekly unsupervised exercise at home or in gym, patients' preference.

#### Phase 2 month 4-6

This phase consists of

- i. Monthly one-on-one consultations with the treating physiotherapist
- ii. Three times weekly unsupervised gym visits.

Details of one-on-one physiotherapy consultations (6 in phase 1, 3 in phase 2), physiotherapy supervised gym visits (12 in phase 1) and unsupervised gym visits (3 times week in phase 2) are detailed below.

#### One-on-one physiotherapy visits

These visits should last 30 minutes each. During these visits, the following should be completed

1. Flexion range of motion measured and recorded using inclinometer
2. Abduction and Adduction strength measured and recorded using hand-held dynamometer
3. Manual therapy as appropriate targeted to impairments in range of motion, and pain management. Details of therapy selection and progression outlined in Table 1 below.
4. Provision of standardised stretching program. See Table 2 for each weekly set of exercises
5. Provision of standardised cardiovascular fitness program. This should be handed out in first treatment and patient asked to progress self through program. See Table 3 for details below.
6. Standardised education Table 4.

**Note:** prior to the initial physiotherapy visit, the project investigator (Joanne Kemp) will contact the treating physiotherapist and provide them with details to access the exercise app, and ensure patient appointments are booked into the system.

**Please note, if patients complain of increasing pain during treatment that is concerning them or you, please contact Joanne Kemp to discuss. Do not allow the patient to continue to deteriorate without discussion.**

### **Physiotherapy-supervised gym visits**

These visits should last 30-60 minutes, depending on clinic and patient preference. These can be one-on-one or small group, as long as no cross-contamination occurs where patients from each of the two treatment groups attend at the same time. During these visits, the following should be completed

1. Completion of all current stretching exercises
2. Checking patient recording of exercises from that session (and unsupervised sessions) in exercise diary or exercise app

### **Unsupervised gym program**

Each patient will be given a gym membership for phase 2 of the program, and will be asked to

1. Attend the gym 3 times per week
2. Record each session in exercise diary or exercise app
3. Report any issues with program to the treating physiotherapist during one of the monthly one-on-one visits. Patients will also be able to contact the project investigator (Joanne Kemp) during this time with any questions about the program.

**Table 1: Manual therapy overview**

Target for treatment	Assessment method	Technique	Aim	Description	Dosage
Overactive secondary stabilisers	Palpation, pain, reduced ROM	Soft tissue massage and trigger point release of iliopsoas, adductor group, gluteus minimus, gluteus medius, piriformis, tensor fascia latae, erector spinae	Address soft tissue restrictions with the aim of reducing pain and increasing hip joint range of movement	Sustained digital pressure to each trigger point with the muscle positioned on stretch  Massage longitudinally along the muscle belly	30-60 seconds digital pressure per trigger point  2-5 minutes of massage per muscle
Lumbar dysfunction	Pain, palpation, ROM	Mobilisation of lumbar spine	To improve lumbar spine mobility and restore normal lumbo-pelvic movement	Unilateral postero-anterior accessory glides, Grade III or IV	3-5 sets of 30-60 seconds
Capsular tightness	Palpation of femoral head glide in squat	Manual traction if ligamentum teres is intact or ligated and patient is >3 months post labral repair	Increase hip flexion and/or IR/ER range of motion	Seatbelt around patient's proximal femur and therapist's hips. Gentle inferior and/or lateral traction force applied. May include patient actively moving hip into flexion as traction is applied	3 sets of 10 seconds. If tolerated increase by 1 set per treatment session to a maximum of 6 sets in total
Bony limitations	Hard end feel in ROM tests	None	Treat with respect	None	N/A
Hip muscle weakness	Hand held dynamometry	See section 2	See section 2	See section 2	See section 2

**Table 2: Weekly stretching program**

Week 1						
Hip			Lower leg		Trunk	
	Description	Dosage	Description	Dosage	Description	Dosage
	a) Hip Flexor stretch off plinth.	Symptomatic leg 30 sec hold, repeat x3.	a) Gastroc wall stretch	Symptomatic leg 30 sec hold, repeat x3.	a) Thoracic rotation in supine	5 x 5sec holds to each side
	b) Short adductor stretch	30 sec hold, repeat x3,			b) Trunk rotation in Supine	5 x 5sec holds to each side.
	c) Hamstring stretch	Symptomatic leg 30 sec hold, repeat x3.				
	d) ITB stretch	Symptomatic leg 30 sec hold, repeat x3.				

Week 2						
Hip			Lower leg		Trunk	
	Description	Dosage	Description	Dosage	Description	Dosage
	a) Trunk rotation in Supine	5 x 5sec holds to each side.	a) Gastroc wall stretch	Symptomatic leg 40 sec hold, repeat x3.	a) Trunk rotation in Supine	5 x 5sec holds to each side.
	b) Single leg trunk rotation in supine	Alternate sides 30 sec hold, repeat x3 to each side.	b) Soleus stretch	Symptomatic leg 30 sec hold, repeat x3.	b) Single leg trunk rotation in supine	Alternate sides 30 sec hold, repeat x3 to each side.
	c) Hamstring stretch	Symptomatic leg 40 sec hold, repeat x3.				
	d) ITB stretch	Symptomatic leg 30 sec hold, repeat x3.				

Week 3						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Hip flexor stretch in kneel	Symptomatic leg 30 sec hold, repeat x3.		a) Gastroc wall stretch	Symptomatic leg 40 sec hold, repeat x3.	a) Trunk rotation in standing  5 x 5sec holds to each side.
	b) Short adductor stretch	60 sec hold, repeat x2.		b) Soleus stretch	Symptomatic leg 30 sec hold, repeat x3.	b) Single leg trunk rotation in supine  Alternate sides 40 sec hold, repeat x3 to each side.
	c) Hamstring stretch	Symptomatic leg 60 sec hold, repeat x2.				
	d) ITB stretch	Symptomatic leg 60 sec hold, repeat x2.				

Week 4						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Hip flexor stretch in kneel	Symptomatic leg 40 sec hold, repeat x3.		a) Gastroc wall stretch	Symptomatic leg 60 sec hold, repeat x2.	a) Trunk rotation in standing  5 x 5sec holds to each side.
	b) Hold/relax short adductor stretch	At movement barrier, 20% contraction x 3.		c) Tib Ant stretch	Symptomatic leg 30 sec hold, repeat x3.	b) Single leg trunk rotation in supine  Alternate sides 40 sec hold, repeat x3 to each side.
	c) Hold/relax Hamstring stretch (Therapist assisted)	At movement barrier, 20% contraction x 3.				
	d) Gluteal stretch	Symptomatic leg 30 sec hold, repeat x3.				

Week 5								
Hip			Lower leg			Trunk		
Exercise	Description	Dosage	Exercise	Description	Dosage	Exercise	Description	Dosage
	a) Hip flexor stretch in kneel	Symptomatic leg 60 sec hold, repeat x2.		a) Calf roller stretch	Symptomatic leg 40 sec x 2.		a) Trunk rotation in standing	5 x 5sec holds to each side
	b) Adductor stretch in standing	Symptomatic leg 30 sec hold, repeat x3.		c) Tib Ant stretch in kneeling	Symptomatic leg 30 sec hold, repeat x3.		b) Lat dorsi and trunk stretch in prone kneel	40 sec hold x 2
	c) Hamstring stretch	Symptomatic leg 60 sec hold, repeat x2.						
	d) Gluteal stretch	Symptomatic leg 40 sec hold, repeat x3.						



Week 6							
Hip			Lower leg		Trunk		
	Description	Dosage		Description	Dosage	Description	Dosage
	a) Quad stretch in side lying	Symptomatic leg 30 sec hold, repeat x3.		a) Calf roller stretch	Symptomatic leg 60-120 sec.	a) Trunk rotation in standing	5 x 5sec holds to each side.
	b) Adductor stretch in standing	Symptomatic leg 40 sec hold, repeat x3.		b) Gastroc stretch 4 pt kneel	Symptomatic leg 30 sec hold, repeat x3.	b) Lat dorsi and trunk stretch in prone kneel	60 sec hold x 2
	c) Hamstring foam roller in sitting	Bilateral, 40 sec x 2.				c) Elbow prop lumbar extension in prone	
	d) Gluteal stretch on wall	Symptomatic leg 30 sec hold, repeat x3.					

Week 7						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Quad stretch in side lying	Symptomatic leg 40 sec hold, repeat x3.		a) Calf roller stretch	Symptomatic leg 60-120 sec.	a) Trunk rotation in 4 point kneel 3 x 5sec holds to each side.
	b) Adductor stretch in standing	Symptomatic leg 60 sec hold, repeat x2.		b) Gastroc stretch 4 pt kneel	Symptomatic leg 30 sec hold, repeat x3.	b) General trunk stretch in standing 3 x 5sec holds.
	c) Gluteal stretch on wall	Symptomatic leg 40 sec hold, repeat x3.				c) Elbow prop lumbar extension in prone 5 x 5sec holds.
	d) Gluteal foam roller	Symptomatic leg 40 sec x 2.				

Week 8						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Quad stretch in prone	Symptomatic leg 60 sec hold, repeat x2.		a) LL calf stretch	Symptomatic leg 30 sec hold, repeat x3.	a) Trunk rotation + hip flexion in standing  5 second holds, repeat x 3 to each side.
	b) Hamstring- stretch standing	Symptomatic leg 30 sec hold, repeat x3.		b) Gastroc stretch 4 pt kneel	Symptomatic leg 30 sec hold, repeat x3.	b) Thoracic extension and pec stretch with towel  3 x 30 sec holds
	c) ITB stretch with roller	Symptomatic leg 60-240 sec ,				c) Salute to the sun  3 x 5sec holds at end of range extension and flexion
	d) ITB standing with side trunk flexion	Symptomatic leg 30 sec x 3.				

Week 9						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Quad stretch in prone	Symptomatic leg 60 sec hold, repeat x2.		a) calf stretch in standing	Symptomatic leg 30 sec hold, repeat x3.	a) Trunk rotation in 4 point kneel  3 x 5sec holds to each side.
	b) Hamstring- hold/relax (therapist assisted)	At movement barrier, 20% contraction x 3.		b) Gastroc stretch 4 pt kneel	Symptomatic leg 30 sec hold, repeat x3.	b) General trunk stretch in standing  3 x 5sec holds.
	c) ITB stretch with roller	Symptomatic leg 60-240 sec ,				c) Extension in lying  5 x 5 second holds
	d) ITB standing	Symptomatic leg 30 sec x 3.				

Week 10						
Hip			Lower leg		Trunk	
	Description	Dosage		Description	Dosage	
	a) Quad stretch in standing	Symptomatic leg 30 sec hold, repeat x3.		a) Calf roller stretch	Symptomatic leg 60-120 sec.	a) Trunk rotation + hip flexion in standing
	b) ITB standing	Symptomatic leg 40 sec hold, repeat x3.		b) calf stretch in standing	Symptomatic leg 40 sec hold, repeat x3.	b) Thoracic extension and pec stretch with towel
	c) Gluteal foam roller	Symptomatic leg 60-120 sec.				c) Salute to the sun
	d) Hamstring stretch standing	Symptomatic leg 40 sec hold, repeat x3.				

<b>Week 11</b>								
<b>Hip</b>			<b>Lower leg</b>			<b>Trunk</b>		
	<b>Description</b>	<b>Dosage</b>		<b>Description</b>	<b>Dosage</b>		<b>Description</b>	<b>Dosage</b>
	a) Quad stretch in standing	Symptomatic leg 30 sec hold, repeat x3.		a) Calf roller stretch	Symptomatic leg 60-120 sec.		a) Thoracic extension and pec stretch with towel	3 x 40 sec holds
	b) ITB standing	Symptomatic leg 40 sec hold, repeat x3.		b) LL calf stretch	Symptomatic leg 40 sec hold, repeat x3.		b) ITB + trunk lateral flexion	Symptomatic leg 40 sec hold, repeat x3,
	c) Piriformis stretch in prone	Symptomatic leg 40 sec hold, repeat x3.					c) Salute to the sun	5 x 5sec holds at end ext and flexion
	d) Hamstring stretch standing	Symptomatic leg 40 sec hold, repeat x3.						

Week 12							
Hip			Lower leg		Trunk		
	Description	Dosage		Description	Dosage	Description	Dosage
	a) Quad stretch in standing	Symptomatic leg 30 sec hold, repeat x3.		a) LL calf stretch	Symptomatic leg 40 sec hold, repeat x3.	a) Thoracic extension and pec stretch with towel	3 x 40 sec holds
	b) Hold/relax short adductor stretch	At movement barrier, 20% contraction x 3.		b) Gastroc stretch 4 pt kneel	Symptomatic leg 60 sec hold, repeat x2.	b) ITB + trunk lateral flexion	Symptomatic leg 40 sec hold, repeat x3,
	c) Piriformis stretch in prone	Symptomatic leg 40 sec hold, repeat x3.				c) Salute to the sun	5 x 5sec holds at end ext and flexion
	d) Hamstring stretch standing	Symptomatic leg 40 sec hold, repeat x3.					

**Table 3: Cardiovascular fitness standardised program**

Cardiovascular training			
Phase	Exercise	Description	Dosage
1	Level 1 patient choice	Cycling (stationary or road bike, no MTB); swimming (no breaststroke); other aquatic activity (water aerobics, water jogging no egg beater kick); walking (on flat terrain, no beach or bush walking); kayaking; rowing (if flexion ROM >100); elliptical cross trainer.	As much as hip pain will allow. Progress to Level 2 when patient feels ready
2	Level 2 patient choice	Dance, running, MTB, athletics, bush walking, netball, football (all codes), hockey, racquet sports	As much as hip pain will allow

**Table 4. Key education components**

1. Weight maintenance with recommended weight loss if BMI  $\geq$  25. Patients are encouraged to seek their own guidance for weight loss. Specific patient questions can be answered.
2. Patients' expectations of treatment and activity. Patients are encouraged to do as much activity as their hip pain allows. No specific guidance is offered around activity modification, but patient-specific questions can be answered.