

## Sports Rehabilitation & Performance Center Rehabilitation Guidelines for Non-operative Treatment of Patellofemoral Instability© \*

The following guidelines were developed by the Sports Rehabilitation and Performance Center team at Hospital for Special Surgery. Progression is based on healing constraints, and unctonal progression specific to the patient. Phases and time frames are designed to give the clinician a general sense of progression. Acute versus chronic, as well as, concomitant injury will alter the guideline.

### Follow physician's modifications as prescribed

#### PHASE I: PROTECTION PHASE (WEEKS 0-3)

**GOALS:**

- Independence in home therapeutic exercise (HEP) program
- Promote healing
- Control pain / swelling
- Minimize quadriceps inhibition: fair to good quadriceps contraction
- Straight leg raise (SLR) without lag, pain-free
- ROM: 0° KE to ≥ 90° KF
- Independent ambulation WBAT with brace locked in extension, and appropriate assistive device on level surfaces and stairs

**Emphasize**

- Normalize gait with appropriate assistive device
- Improving quadriceps contraction
- Controlling pain/effusion
- Compliance with home instructions: cold therapy, activity modification, quadriceps re-education with estim unit

**PRECAUTIONS:**

- Ambulation without brace or without crutches
- Lateralization of patella
- Symptom provocation: quadriceps shut down, joint effusion, active inflammation

**TREATMENT RECOMMENDATIONS:**

- ✓ Emphasize patient compliance to HEP and ambulation
- ✓ Ambulation: WBAT with assistive device to normalize gait pattern.
- ✓ Brace: MD directed; until able to perform pain-free SLR without a lag
- ✓ Cryotherapy: home cold therapy unit
- ✓ Electrical stimulation for quadriceps re-education: quadriceps sets with towel roll under knee
- Sitting knee ROM exercise: AAROM KF, PROM KE, stationary bike (short crank 90-115°KF)
- Quadriceps strengthening: progress as tolerated in a pain-free arc of motion, close chain preferred
  - Estim, biofeedback
  - Quad set with towel roll under knee; submaximal multi angle isometrics, as needed
  - Leg press: initiate with improvement of quadriceps contraction monitor arc of motion (bilateral)
- Hip progressive resisted exercises: all planes, pain-free SLR with brace if lag is present
- Distal strengthening (PF)
- Flexibility exercises (hamstrings, gastrocnemius)
- Initiate balance and proprioceptive training: double limb support for weight shifting with soft knee
- Gait training

**MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE:**

- Fair to good quadriceps contraction
- Good patellar mobility in medial direction
- ROM: 0° knee extension to ≥90° knee flexion
- 0/10 pain at rest

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- Able to SLR pain-free without quadriceps lag

### PHASE II: GAIT PHASE (WEEKS 4-6)

#### GOALS:

- Independence in HEP, as instructed
- Control pain, inflammation, effusion
- Promote healing
- ROM 0° KE-125° KF to full ROM
- Good patella mobility
- Good quad contraction
- Normalize gait with brace and assistive device, prn
- Postural stability, alignment and N-M control in single limb stance
- 0/10 pain with ADLs, therapeutic exercise: Recognize pain-free arc of motion

#### Emphasize

- Symptom control with ADLs, therex
- Minimizing knee effusion
- Normal gait pattern
- Postural stability, alignment, neuro-muscular (N-M) control during stance

#### PRECAUTIONS:

- Sign and symptom provocation: pain, inflammation, quadriceps shut down, joint effusion
- Concomitant injuries
- Lateralization of the patella
- Pathological gait pattern (quadriceps avoidance; bent knee)
- Arc of motion during exercise

#### TREATMENT RECOMMENDATIONS:

- HEP: advance as tolerated. Continue phase I exercises, as appropriate
- Patient education: Activity modification, progression of gait training, cryotherapy
- Patellar mobilization, MD directed
- ROM exercises:
  - Short sitting progressing to stair ROM, supine wall ROM as tolerated (~125°KF in sitting, quad control)
- Gait training: heel toe gait pattern with brace and assistive device, prn
- Quadriceps strengthening: progress as tolerated in a pain-free arc of motion, close chain preferred
  - Continue with Estim, biofeedback, quad sets, submaximal multi angle isometrics, as needed
  - Leg press: monitor arc of motion (bilateral, eccentric)
  - Initiate forward step up (FSU) progression, 6" step with adequate strength
- Bicycle: progressing to standard crank as ROM allows (115° KF in sitting), 80 RPMs
- Flexibility exercises - evaluation-based: AROM KF with hip extension in standing
- Advance proximal strength and core training: (i.e. hip extension with knee flexion, side planks, bridge)
- Hydrotherapy for gait, single limb alignment and stability, proximal strengthening
- Balance and proprioceptive training: double limb support on progressively challenging surfaces to single limb support on level surface only with demonstration of good alignment, stability and N-M control

#### MINIMUM CRITERIA FOR ADVANCEMENT:

- ROM 0° KE→ 125°+ KF
- Normal gait pattern
- Good patella mobility
- Postural stability, alignment and N-M control in single limb stance
- 0/10 pain with ADLs and therapeutic exercise
- Independent HEP

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### PHASE III: STRENGTHENING (WEEKS 7-16)

#### GOALS:

- Independent HEP
- Control pain, effusion and inflammation
- 0/10 pain with ADLs, therapeutic exercise
- ROM: WNLs
- Normalize gait on level surfaces and stairs
- Address imbalances
- Core stability: Single leg bridge = 30 s, Sahrmann  $\geq$  level 3
- Good single limb dynamic balance
- Eccentric quadriceps and pelvic control with 6"/ 8" FSD
- Initiate running program, plyometrics (bilateral)
- Symmetry, quality, alignment during selected movement patterns: squat, jump in place, side to side

#### Emphasize

- Identifying and addressing muscle/ soft tissue imbalances
- Neuromuscular control
- Functional progression
- Quality of movement

#### PRECAUTIONS:

- Sign and symptom provocation: pain, and active inflammation/ effusion, quadriceps shutdown
- Gait deviations
- "Too much, too soon" progression
- Disregarding quality of movement

#### TREATMENT RECOMMENDATIONS:

- HEP, as instructed
- Educate patient: Activity modification, individualized, and cryotherapy
- Quadriceps strengthening: progress as tolerated, monitor arc of motion, closed chain preferred
  - FSU progression: 6" step progressing to 8" step (dependent on patient height)
  - Eccentric leg press progressing to:
    - Forward step down (FSD) progression: 6" step progressing to 8" step (dependent on patient height)
    - Squat progression: chair, ball if necessary with buttocks moving under ball, free squats to single leg
- ROM exercises: supine
- Gait training to emphasize heel-toe gait pattern with emphasis on loading response
- Advance proximal strength through functional activities (bridging progression, hip extension with KF, clock, RDL, windmill, lawn mower) and core training (planks, side planks, Sahrmann progression)
- Balance progression with postural alignment and N-M control: (static to dynamic, introduce different planes of motion, challenging surfaces middle phase)
- Address muscle imbalances – evaluation-based: (i.e. 2 joint hip flexor length)
- Cross training: elliptical trainer initiated with good strength/ quality during 6" FSU, bicycle (80 RPMs), swimming (crawl, back stroke)
- Initiate running program (late phase): with eccentric quadriceps control during 8" FSD and MD clearance
  - ✓ 30 second interval initially
- Initiate plyometric program with MD clearance and evidence of good eccentric quadriceps control
  - ✓ Vertical jumping progression: Jump up to jump in place

#### CRITERIA FOR ADVANCEMENT:

- ROM WNLs
- No pain or swelling
- Normalize gait on level surfaces and stairs
- Ability to demonstrate alignment, control, stability in single limb stance during dynamic activities
- Core stability: Single leg bridge = 30 s, Sahrmann  $\geq$  level 3
- Symmetry, quality, alignment during selected movement patterns
- Isokinetic test at 180°/ sec and 300°/ sec: 85% limb symmetry index (LSI)

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**PHASE IV: ADVANCED STRENGTHENING AND FUNCTION (~ 4 WEEKS)**

**GOALS:**

- Lack of pain, apprehension with sport specific movements
- Maximize strength and flexibility as to meet demands of individual's sport activity
- Ability to demonstrate strategy, symmetry, quality, control and alignment during selected movement patterns: squat, jump (vertical and horizontal: broad jump, hop to opposite, single leg hop), single leg squat,
- Isokinetic test: 180° / sec and 300° / sec 85% limb symmetry index (LSI)
- Cardiovascular fitness to meet demands of sport

**PRECAUTIONS:**

- Pain with therapeutic exercise & functional activities
- Inadequate strength, functional strength, ROM, flexibility, fitness when returning to sport

**TREATMENT RECOMMENDATIONS:**

- Continue to advance LE strengthening, flexibility, dynamic single limb stability & agility programs
- Continue to address muscle imbalances – evaluation-based
- Advance core stability
- Cross training
- Advance plyometric program with MD clearance and evidence of good eccentric quadriceps control
  - ✓ Vertical jumping progression: Jump down
  - ✓ Horizontal jumping progression: Broad jump, single leg landings
  - ✓ Progress running program
  - ✓ Cutting, deceleration, change of direction with MD clearance and dynamic single limb stability

**CRITERIA FOR ADVANCEMENT:**

- Demonstrate symmetry, quality, alignment during selected movement patterns
- Medical clearance by surgeon for return to play progression
- Lack of apprehension with sport specific movements
- Flexibility to meet demands of sport

**Emphasize**

- Quality of movement
- Functional progression

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**PHASE V: RETURN TO PLAY (~ 4 WEEKS)**

**GOALS:**

- Lack of pain, apprehension with sport specific movements
- Maximize strength and flexibility as to meet demands of individual's sport activity
- Ability to decelerate with good control, and alignment on single limb
- Isokinetic test: 180° / sec and 300° / sec 85% limb symmetry index (LSI)
- Cardiovascular fitness to meet demands of sport
- Hop Test  $\geq$  85% limb symmetry

**PRECAUTIONS:**

- Pain with therapeutic exercise & functional activities
- Inadequate strength, functional strength, ROM, flexibility, fitness when returning to sport

**TREATMENT RECOMMENDATIONS:**

- Continue to advance LE strengthening, flexibility, dynamic single limb stability, core stability & agility
- Advance plyometric program: with MD clearance
  - ✓ Horizontal jumping progression: Broad jump to Hop to opposite to Single leg hop
- Advance cutting, deceleration training
- Progress cardiovascular fitness to meet demands of sport

**CRITERIA FOR DISCHARGE:**

- Isokinetic test: 180° / sec and 300° / sec 85% limb symmetry index (LSI)
- Ability to decelerate and change direction with good control, and alignment on single limb to meet demands of sport
- C-V fitness to meet demands of sport
- Medical clearance by surgeon for return to play
- Hop Test  $\geq$  85% limb symmetry
- Lack of apprehension with sport specific movements
- Flexibility to meet demands of sport
- Independence with gym program for maintenance and progression of therapeutic exercise program
- Demonstrate quality of movement with required sports specific activities