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Patellofemoral Pain Rehabilitation Guidelines

Phases and time frames are designed to give the clinician a general sense of progression. Identification of phase and progression is evaluation based, allowing the practitioner to deem what treatment is most appropriate. The clinician should balance appropriate interventions for the optimization of functional activities, while considering symptom irritability and the resolution of impairments. Additionally, progression through the phases and the maximum achievable phase should be in alignment with patient goals. Note that pathology and/or structural deficits may affect the patient's ideal level of activity.

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PHASE I: Activity Modification

PRECAUTIONS	▪ Be mindful of yellow flags such as effusion and red flags such as multi-joint symptoms ▪ Avoid exercises and activities that are painful and/or exacerbate symptoms ▪ Significant gait deviations
TREATMENT RECOMMENDATIONS	▪ Identify functional deficits in the lower extremity kinetic chain ▪ Patient education o Understanding PF loads o Improved neuromuscular control/muscle activation o Standing posture o Deficits identified and plan of care including goals o Activity modification to decrease or eliminate pain o Movement strategies (importance of hip strategy versus knee strategy)

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- Management of pain and effusion
- Modalities
  - Pain, swelling: e.g. ice, compression, TENS
- Lower extremity (LE) soft tissue and joint mobility
- Early emphasis on gradual gluteus, core and hamstring strengthening
- Knee P/AA/AROM without increasing irritability
- Knee isometric strengthening as tolerated
- Core stabilization
- Proximal and distal strengthening
- Proximal and distal stretching as tolerated
- Cardiovascular exercise (see Appendix 1- Cardiovascular exercises)
- External supports, as needed (bracing or taping)
- Gait training with appropriate assistive device if needed

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EMPHASIZE	▪ Patient understanding of condition/PF loading ▪ Control pain and effusion/inflammation ▪ Pain-free exercise and activities ▪ Normalize gait with appropriate assistive device ▪ Active quadriceps contraction ▪ Early hip abduction and core strengthening
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Active quadriceps contraction ▪ No gross effusion at knee ▪ No or minimal pain at rest ▪ Pain controlled with ambulation on level surfaces with appropriate assistive device

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PHASE II: Addressing Impairments/Building Foundation of Strength

PRECAUTIONS	▪ Sign/symptom provocation: pain during or after activity, joint effusion, active inflammation, quadriceps shutdown ▪ Avoid activities that cause pain or inflammation
TREATMENT RECOMMENDATIONS	▪ Patient education o Progress to performance of modified function (0/10 pain with ADLs and non PT specific exercise e.g. cardiovascular) o Reinforce compliance with updated HEP o Movement strategy ▪ Continued external supports (bracing, taping, shoe inserts) ▪ Address flexibility and ROM deficits

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- Massage therapy
- Soft tissue mobilization
- Foam rolling
- Stretching
- Joint mobilization, as needed (patella, ankle, hip)

- Neuromuscular control, bilateral progressing to single limb balance
- Proximal muscle activation and limb alignment in single limb (see Appendix 3)
- Knee control and distal alignment in single limb
- Hip strategy during functional movements
- Strengthening (see Appendix 3)
  - Core
  - Hip and gluteal
  - Quadriceps
  - Ankle and foot
- Cardiovascular training (see Appendix 2)

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EMPHASIZE	▪ Progress home exercise program ▪ Compliance with activity modification ▪ Effusion, inflammation and pain control ▪ Good neuromuscular control/alignment with single limb support ▪ Monitor onset of new pain/symptoms ▪ Continue work on soft tissue self-mobilization
MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Pain free with modified activities and ADLs ▪ Able to stand on 1 leg with good alignment and control ▪ Able to demonstrate a hip strategy ▪ Able to perform pain free 6" step up ▪ Intermittent pain ▪ Normalized gait on level surfaces

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PHASE III: Restoration of Function

PRECAUTIONS	▪ Too much, too soon: monitor volume and load ▪ Avoid compensatory movement strategies ▪ Monitor movement strategies during fatigue situations ▪ Avoid inadequate rest and recovery ▪ Avoid inadequate strength to meet demands of activity level ▪ Ensure that underlying pathology is conducive to long term loading and will optimize joint preservation
TREATMENT RECOMMENDATIONS	▪ Patient education o Functional progression o Adequate rest and recovery ▪ Functional strength o Squat progression o Eccentric progression

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	▪ Progression of body weight exercise
	  o Double leg to single leg exercise
	  o Deadlift to single leg deadlift
	▪ Neuromuscular control
	▪ Cardiovascular training via low/non-impact activities such as elliptical, bike etc.
	▪ Hydrotherapy if available (see Appendices 2, 4 and 5- hydrotherapy)
	▪ Evaluation based strengthening progression
	  o Core
	  o Gluteals
	  o Quadriceps (closed chain in pain free arc)
	▪ Flexibility/mobility

EMPHASIZE	▪ Progression of pain free PF loading ▪ Eccentric quadriceps control ▪ Quality with functional activities ▪ Continued emphasis on proximal LE strength and core

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MINIMUM CRITERIA FOR ADVANCEMENT TO NEXT PHASE	▪ Independent control of symptoms ▪ Pain free with modified activities and ADLs ▪ Able to demonstrate bilateral body weight squat with proper alignment and control ▪ Able to descend a 6-8" step with good control and alignment (depending upon patient's height) ▪ Discharge to long term HEP and modified activity or progress to Phase 4 if ▪ patient wants to return to dynamic activities or sport

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PHASE IV: Return to Sport/Dynamic Activities

PRECAUTIONS	▪ Too much, too soon: monitor volume and load ▪ Avoid compensatory movement strategies ▪ Monitor movement strategies during fatigue situations ▪ Avoid inadequate rest and recovery ▪ Avoid inadequate strength to meet demands of activity level ▪ Ensure that underlying pathology is conducive to long term loading and will optimize joint preservation
TREATMENT RECOMMENDATIONS	▪ Increase volume and PF load to mimic load necessary for return to activity ▪ Introduce movement patterns specific to patient's desired sport or activity

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	▪ Introduction of light agility work (see Appendix 5) ▪ Increase cardiovascular load to match that of desired activity ▪ Consider collaboration with ATC, performance coach/strength and conditioning ▪ coach, skills coach and or personal trainer for complex sports specific movements if ▪ available
EMPHASIZE	▪ Progression of pain free PF loading ▪ Eccentric quadriceps control ▪ Quality with functional activities
MINIMUM CRITERIA FOR DISCHARGE	▪ Ensure that there is a plan in place for a graded return to full or modified activity based on patient's maximal therapeutic activity (e.g. ATC, skills coach, CSCS)

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Appendix 1: Phase 1

- Cardiovascular exercises
    - UBE
    - Airdyne® or stationary bike
    - Swimming (use of pool buoy and avoidance of breast stroke)

Appendix 2: Common Gait Deviations

- Lack of knee control resulting in knee hyperextension during stance
- Femoral internal rotation, valgus and/or increased pronation during stance
- Femoral internal rotation during swing
- Medial heel whip during swing
- Increased pelvic rotation with decreased hip extension

Appendix 3: Phase 2 Treatment Recommendations

- For proximal muscle activation in single limb
    - Weight shifting medial/lateral, anterior/posterior to single limb stance
    - Proprioceptive board/wobble board
    - Contralateral hip extension and/or abduction
    - Hip hiking
    - Retro walking on treadmill or over ground
    - Single leg isometric leg press with slight knee flexion at less than body weight

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- Emphasize hip strategy for movement
    - Initiate and continue to drive movement with the hips, e.g. hip hinging, butt taps
    - Core and Gluteal strengthening
    - Transverse abdominis activation in hook lying
    - Pallof press
    - Front planks
    - Side planks
    - Bridge progression
    - Side lying hip abduction with ankle weight
    - Prone hip extension with ankle weight
    - Clamshell
- Closed chain quadriceps strengthening
    - Double limb to single limb leg press at less than bodyweight
    - Progress body weight strengthening (start with double limb support).
    - Squat into chair
    - Romanian dead lifts
    - Band walks
    - Step ups
    - Step downs
- Ankle and foot
    - Heel raises
    - Intrinsic foot exercises
- Cardiovascular training
    - Increase volume before intensity (e.g. increase time before resistance)

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  - Bicycle 80 RPM
  - Swimming, progress from pool buoy
- Walking program
  - Hydrotherapy
- Address gait deviations (forward, retro ambulation)
- Strengthening: sidesteps, standing leg lifts with ankle weights, double limb squats, step ups,
- standing hip/knee extension with noodle under foot, calf raises (if applicable utilizing laminar flow to provide resistance)
- Balance: single limb stance activity with UE/LE movements
- Core stability: noodle push downs, med ball trunk rotation
- Flexibility: address patient flexibility needs

Appendix 4: Phase 3 Treatment Recommendations

- Hydrotherapy
- Progress step ups, step downs, prone hip kicking (flutter, hip abduction/adduction), single limb squats, lunges, progress intensity of single limb activity against laminar flow, initiate light aqua jogging

Appendix 5: Phase 4 Treatment Recommendations

- Light agility: ladder, jump rope, Alter G® if able at low intensity and low volume
- Hydrotherapy

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- Plyometrics: double and single leg jumps, jumping jacks, split stance hops, lateral push-offs, cariocas, sprinting to test patient tolerance for return to sports activity