AQUATIC/LAND CLINICAL PROTOCOL FOR
PATELLOFEMORAL DYSFUNCTION
(For Patellar Dislocation, Please refer to Addendum at end of Protocol)

FREQUENCY: 2-3 times per week.

DURATION: 4-6 weeks based on Physical Therapy evaluation findings. Continued formal treatment beyond meeting Self-Management Criteria will be allowed when:
1. Patient out of work or to hasten return to work full duty.
2. Athlete needs to return to organized athletic program.

DOCUMENTATION: Progress Note to physician at each follow-up appointment. Follow treatment calendar for daily requirements. Discharge Summary within two weeks of discharge.

INITIAL EVALUATION (WEEK ONE)

GOALS:
1. Evaluation to assess: Gait pattern, active/passive range of motion, quadriceps recruitment, patellar mobility, pain/inflammation, postural/biomechanical abnormalities.
2. Orient patient to pool program and give information packet.

- When patient meets the following SELF-MANAGEMENT CRITERIA:
  - Trace to 1+ effusion.
  - Good voluntary contraction of quadriceps complex particularly that of the vastus medialis oblique.
  - Symmetrical active extension to 125° active flexion.
  - Normal gait pattern.
  - No significantly abnormal foot, knee, or hip mechanics.
  - Minimal to no limitations in patellar mobility.
  - At least 4/5 hip, knee, and ankle strength.
  - Independent with use of dynamic patellar stabilizing brace or McConnell tape if indicated.
  - Squat to 90 degrees pain-free.
  - Minimal to no pain.

then patient can be instructed in either home exercise program or program to be performed at a local health club with follow-up appointments every 1-2 weeks until discharge criteria has been met.

- If patient does not meet above criteria, then a course of formal rehabilitation will be initiated 2-3 times per week until criteria has been met which will be augmented by a home exercise program as appropriate. Frequency of weekly appointments will depend on severity of the problem as well as the patient's availability, working status, choice/interest, and return to athletic competition.
**DISCHARGE CRITERIA**

- Symmetrical hip, knee, and ankle active range of motion or within 90% of uninvolved active flexion.
- Minimal to no patellar mobility limitations; additionally, central tracking of the patella within the trochlear groove is noted with active knee extension.
- No effusion following aggressive activity.
- Good size and normal synchronous recruitment of the vastus medialis oblique.
- Normal gait pattern.
- 4+/5 strength of ankle and hip musculature with hip adductors and ankle dorsiflexors being the exception at 5/5 strength, 5/5 strength of quadriceps, and 4+/5 hamstring strength.
- Full squat/kneel pain-free.
- Jog/Run pain-free.
- Good understanding and performance of home exercise program.
- Met, or consistently progressing toward, established functional/objective outcomes.
- Failure to progress.
- Failure to comply.

**--TREATMENT GUIDELINES--**

**WEEKS 1 TO 3**

**GOALS:**
1. Minimal to no pain with ambulation.
2. Eliminate effusion.
3. 0 to 120 degrees active range of motion.
4. Compliant with home exercise program.
5. Independent with use of dynamic patellar stabilizing brace or McConnell tape, if indicated.

**LAND COMPONENT:**
- Edema reduction techniques as indicated.
- Gait training as indicated.
- NMS/EMG for muscle re-education of the quadriceps complex emphasizing the vastus medialis oblique when inhibition or VMO dysplasia/insufficiency is noted. Initiate in supine in conjunction with quad setting and progress to multi-angle isometrics. NMS may also be used with closed chain activities (i.e. partial squats, step-ups, single limb balance) as appropriate with use of a patellar stabilizing brace or McConnell tape.
- Manual stretching of lower extremity musculature if indicated. For other major muscle groups of lower extremity musculature, the patient should be performing self-stretching. For specifics, please see Lower Extremity Flexibility Protocol.
- Manual patellar mobilization emphasizing medial glide and tilt.
- McConnell taping techniques may be used to augment a patellar stabilizing brace.
- The patient performing a strengthening program at home.
WEEKS 1 TO 3 (continued)

WATER COMPONENT

Shallow Water:
- **Warm-up:** Walking forward/backward/sideways with semi-squats with emphasis on quadriceps control and symmetry.
- **Gait training in water with emphasis on good quadriceps control.** May use underwater EMG or NMS with heel switch on vastus medialis oblique for increased control during gait without flexed knee.
- **Stretching of gastrocsoleus complex, iliotibial band, quadriceps, and hamstrings.**
- **Initiate closed chain lower extremity exercises:** Multi-plane exercises with emphasis on hip adduction (avoid hip abduction unless less than 4/5 strength is evident).
- **Initiate closed chain lower extremity quadriceps exercises initially in mid-range (-20° to 80°) so that patella remains seated in trochlear groove.** May use underwater NMS with trigger switch to increase vastus medialis oblique control. Partial squats, heel raises, 4-6” forward/lateral step-ups, modified lunges, kickboard knee flexion/extension.
- **Balance/Proprioception:** Clap unders, clap behinds, straight leg walk, braiding forward/backward/sideways, four-count kicks, one-legged balance (can hold barbell or pool side for assistance if needed), perform eyes open/eyes closed.

Deep Water: (May add cuffs/fins for increased resistance to tolerance.)
- **Deep water walking with wet vest/ski belt with emphasis on sideways walking to facilitate lower extremity adduction.**
- **Open chain with barbells:** Cross country skiing, jumping jacks moving out slow and in fast to facilitate VMO/adductor strengthening, bicycling, corkscrews with emphasis on iliotibial band, sideways running with affected side down to facilitate increased lower extremity adduction, flutter kicking.
- **Closed chain:** Squats on barbell/kickboard, can add 180’s/360’s, teeters.
- **Cardiovascular:** Swimming against jets with pool buoy between legs to increase lower extremity adduction.

WEEKS 3 TO 6

**GOALS:** Meet Self-Management Criteria.

LAND COMPONENT:
- **Continue with treatment as indicated in Weeks 1 to 3.**
- **Continue with manual patellar mobilization and McConnell taping techniques/dynamic patellar stabilizing brace as indicated.**
- **Continue with manual stretching program.**
- **Continue with comprehensive strengthening program at home.**

WATER COMPONENT

Shallow Water:
- **Continue with warm-up/walking/gait training,** increasing speed/resistance with increased turbulence and/or cuffs (NMS/EMG if needed).
- **Continue with stretching,** if indicated.
- **Continue with closed chain exercises (NMS/EMG if needed)**, increased depth of squats, heel ↔ toe walking, 6-8” forward/lateral step-ups, lunges with diagonal, increased size of kickboard with
knee flexion/extension.

WEEKS 3 TO 6 (continued)

Shallow Water (continued):
- Continue with balance/proprioception. May add plyometrics on and off step to tolerance. Perform with eyes open/eyes closed.
- Core training with 1-3 kg ball.
- Sports specific/functional activities in water, if appropriate.

Deep Water:
- Continue with deep water walking. Progress to running. May add tethers, if appropriate.
- Continue with open chain exercises, adding increased cuffs/turbulence/speed.
- Continue with closed chain exercises with multi-directional movement.
- Continue with cardiovascular exercises: With swimming, avoid swim strokes which facilitate abnormal knee mechanics.

WEEKS 6 TO DISCHARGE

GOALS:
1. Meet DISCHARGE CRITERIA.
2. The patient completely transitioned to land at Week 6.

- Continue with independent flexibility program.
- Continue with comprehensive strengthening program to include abdominals, multi-hip for flexion, abduction, adduction, and extension, leg press, sitting/standing heel raises, hamstring curls, and leg extensions 90 degrees to -30 degrees.
- May progress balance/proprioception/agility activities.
- May incorporate work/sport specific activities as indicated.
- Progress cardiovascular conditioning using the following: Stairmaster, cross country ski device, stationary bicycle, walking, and swimming.

For advanced exercises, please refer to Advanced Lower Extremity Aquatic Exercise Protocols.
ADDENDUM FOR PATELLAR DISLOCATION PROTOCOL

Protocol is the same for both diagnoses excluding the following:

- Additional DISCHARGE CRITERIA for patellar dislocation is that the patient will have a negative apprehension test for patellar dislocation.

TREATMENT GUIDELINES FOR PATELLAR DISLOCATION – WEEKS 1 TO 3

GOALS:
1. Minimal to no pain at rest.
2. 1+ effusion.
3. 0-90° active range of motion.
4. Full weight bearing gait with patellar stabilizing brace in place.
5. Compliant with home exercise program.

- Treatment on land and water is the same. However, with manual stretching, the therapist should only push to 90° of flexion. Additional flexion should only be encouraged if stretching procedures cause no pain.

- During all closed chain exercises Weeks 1-6 in water and on land, quadriceps strengthening should be done in mid-range (-30° to 90°) as opposed to patellofemoral pain syndrome (-20° to 80°).