### Stage 1

**Target Heart Rate**: 30-40% of maximum exertion

*(Max HR - Resting HR X .30)+ Resting HR

**Recommendations**: exercise in quiet area (treatment rooms recommended); no impact activities; balance and vestibular treatment by specialist (prn); limit head movement/position change; limit concentration activities; 10-15 minutes of light cardio exercise.

**Physical Therapy Program**

- Very light aerobic conditioning
- Sub-max isometric strengthening and gentle isotonic
- ROM/Stretching
- Low level balance activities

**Recommended Exercises**

- Stationary Bike; Seated Elliptical; UBE; Treadmill walking: (10-15 min)
- Quad sets; Ham sets; (UE) light hand weights; resistive band rowing; (LE) SLR’s; Resistive bands ankle strengthening
- Cervical ROM exercise, Trap/LS stretching, Pec stretching, Hamstring stretching, Quad stretching, Calf stretching
- Romberg exercises (feet together, tandem stance, eyes open-closed); single leg balance

### Stage 2

**Target Heart Rate**: 40-60% of maximum exertion

*(Max HR - Resting HR X .40)+ Resting HR

**Recommendations**: exercise in gym areas recommended; use various exercise equipment; allow some positional changes and head movement; low level concentration activities (counting repetitions); 20-30 minutes of cardio exercise. (stage 1 exercises included, as appropriate)

**Physical Therapy Program**

- Light to Moderate aerobic conditioning
- Light weight PRE’s
- Stretching (active stretching initiated)
- Moderate Balance activities; initiate activities with head position changes

**Recommended Exercises**

- Treadmill; Stationary Bike; Elliptical (upright or seated); UBE; (20-25 min)
- Light weight strength exercise (Nautilus style equipment); resistive band exercises (UE/LE); wall squats, lunges, step ups/downs
- Any stage 1 stretching, active stretching as tolerated (Lunge walks, side to side groin stretching, walking hamstring stretch)
- Romberg exercises, VOR exercise (walking with eyes focused with head turns); Swiss ball exercises: single leg balance exercises

### Stage 3

**Target Heart Rate**: 60-80% of maximum exertion

*(Max HR - Resting HR X .65)+ Resting HR

**Recommendations**: any environment ok for exercise (indoor, outdoor); integrate strength, conditioning, and balance/proprrioceptive exercise; can incorporate concentration challenges (counting exercises, MRS equipment/visual games)

(stage 1&2 exercises included, as appropriate)

**Physical Therapy Program**

- Moderately aggressive aerobic exercise
- All forms of strength exercise (80% max)
- Active stretching exercise
- Impact activities running, plyometrics (no contact)
- Challenging proprioceptive/dynamic balance (integrated with strength and conditioning); challenging positional changes.

**Recommended Exercises**

- Treadmill (jogging); Stationary Bike; Elliptical (upright or seated); UBE (25-30 min)
- Resistive weight training including free weights; MRS/ Functional Squat; Dynamic Strength activities
- Active stretching (Lunge walks, side to side groin stretching, walking hamstring stretch)
- Initiate agility drills (zig zag runs, side shuffle, ect…), Jumping on tramp/block.
- Higher level balance activities: ball toss on pryo floor, balance discs, trampoline; squats and lunges on BOSU ball

### Stage 4 (Sport Performance Training)

**Target Heart Rate**: 80% of maximum exertion

*(Max HR - Resting HR X .80)+ Resting HR

**Recommendations**: continue to avoid contact activity, but resume aggressive training in all environments

**Physical Therapy Program**

- Non-contact physical training
- Aggressive strength exercise
- Impact activities/plyometrics
- Sport Specific Performance Training

**Recommended Exercises**

- Program to be designed by Sport Performance Trainers
- Graded Treadmill testing
- Interval training
- Sport Specific drills/training

### Stage 5 (Sport Performance Training)

**Target Heart Rate**: Full exertion

**Recommendations**: Initiate contact activities as appropriate to sport activity; full exertion activities for sport activities

**Physical Therapy Program**

- Resume full physical training activities with contact
- Continue Aggressive strength/conditioning exercise
- Sport specific Activities

**Recommended Exercises**

- Program to be designed by Sport Performance Trainers
- Practice and game intensity training
- Sport specific activities

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* Target Heart Rates calculated by Karvonen’s equation: Max HR (220-Age) – Resting HR X Target Percentage + Resting HR