Essentia Health
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CONCUSSION PROGRAM: GUIDELINES FOR POST-CONCUSSION REHAB

Stage of Rehabilitation	Physical Therapy Program	Recommended Exercises
Stage 1 Target Heart Rate : **30-40% of maximum exertion** *(Max HR- Rest. HR X .30)+Rest. 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.	-Very light aerobic conditioning -Sub-max isometric strengthening and gentle isotonic -ROM/ Stretching - low level balance activities	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- Rest. HR X .40)+Rest. 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)	-Light to Moderate aerobic conditioning -Light weight PRE's -stretching (active stretching initiated) -Moderate Balance activities; initiate activities with head position changes	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 up/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- Rest. HR X .65)+ Rest HR Recommendations: any environment ok for exercise (indoor, outdoor); integrate strength, conditioning, and balance/proprioceptive exercise; can incorporate concentration challenges (counting exercises, MRS equipment/ visual games) (stage 1&2 exercises included, as appropriate)	-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.	Treadmill (jogging); Stationary Bike; Elliptical (upright or seated); UBE (25-30min) 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/blocks. Higher level balance activities: ball toss on plyo floor, balance discs, trampoline; squats and lunges on BOSU ball
Stage 4 (Sport Performance Training) Target Heart Rate: **80% of maximum exertion** *(Max HR- Rest. HR X .80)+ Rest HR Recommendations: continue to avoid contact activity, but resume aggressive training in all environments	-Non-contact physical training -Aggressive strength exercise -Impact activities/ plyometrics -Sport Specific Performance Training	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	-Resume full physical training activities with contact -Continue Aggressive strength/ conditioning exercise -Sport specific Activities	Program to be designed by Sport Performance Trainers Practice and game intensity training Sport specific activities

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