Just Right: Medicine That Works

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Physical therapists are experts in movement systems and exercise prescription, particularly among adults who are older and/or need modifications of an exercise prescription secondary to comorbidities, impairments, mobility limitations, or activity restrictions. Appropriately dosed exercise prescription can make significant changes in any older adults' function, activity participation, and quality of life.

In fact, when exercise is appropriately prescribed, sedentary and frail older adult's maximal strength (defined by 1 repetition max -RM) increases by 6.6 - 37%, muscle mass increases from 3.4 - 7.5%, muscle power increases by 8.2%, and functional capacity improves by 4.7 - 58.1% in as little as 12 weeks.[1] These gains require therapists to be fully current in research advances for best exercise prescription. APTA Geriatrics assembled a working group to assimilate all the latest literature into the Table on the next page.

The table headers are based on the ACSM's FITT (Frequency, Intensity, Time, and Type) principles. The use of the FITT principles can ensure that the exercise domain is appropriately dosed. Exercise domains: aerobic capacity, strengthening, flexibility, and balance are located in the table's rows. The intensity column provides clinicians with guidance on start ing and progressing deconditioned individuals.

The following cases provide examples on how to implement the FITT principles into your daily practice:

1. Patient with COPD

A 72-year-old former smoker has a BMI of 37 and a history of sedentary activity involving television watching and socializing from a chair. He has stable COPD with a forced expiratory volume (FEV) of 45%. He has been on disability since the age of 57. He uses oxygen at 1L/min prn. Other medical history includes medication-controlled hypertension (Propranolol), hyperlipidemia, diabetes (Metformin), prostatitis, and bilateral knee arthritis (pain with transitions and weight-bearing of more than five minutes at an intensity of 3-6/10). He uses a cane for ambulation outside his home. He desires to be able to walk comfortably up to one mile to visit his friends and family and to not feel so tired. He is accepting of pool exercise, which may be more comfortable for his knees.

Exercise Test/Outcome Measure: Six-Minute Walk: 235 feet (76.5 meters) with two standing rest breaks of 25 seconds each with an increase in heart rate of 12 beats/minute (78 to 90) and blood pressure from 148/90 to 160/92. Self-reported dyspnea was 3 and perceived exertion was 4.

Exercise Prescription (FITT): aquatic exercise in waist

Table 1: Compiled Exercise Prescription for Older Adults[1-7]

	Intensity	Volume	Frequency	Type
Aerobic Capacity	Moderate Intensity: May need to start at 30-50% for severely deconditioned individuals. Progress towards: • 40-60% HRR* • 5-6/10 RPE	• 30 up to 60 min/day in bouts of at least 10 minutes (longer time for greater benefit) • Total 150-300 min/week	5/week	• Walking • Dancing • Swimming • Water aerobics • Speed walking or jogging • Aerobic exercise classes • Bicycle riding (non-recumbent stationary or on a path) • Elliptical type machines • Some gardening activities such as raking and pushing a lawnmower, tennis, and golf (without a cart) • General: any exercise type that does not impose excessive orthopedic stress.
	Vigorous Intensity: • 60-90% HRR • 7-8/10 RPE	• 20-30 min/day of more vigorous exercise • Total 75-100 min/week.		
Strengthening	Moderate intensity: 60%-70% 1-RM	Initially focus on form and comfort with exercise before increasing resistance • 8-10 exercises involving the major muscle groups • 1 set of 10-15 reps each (if done to failure, equates to 60-70% 1RM)	• 2/week	Progressive resistance training such as lifting weights, using machines, working with resistance bands, using body weight for resistance (such as push-ups, pull-ups, and sit-ups), climbing stairs, carrying heavy loads, and heavy gardening.
	Power** incorporating power when patient can perform full set with no pain or compensations	• 1-6 sets of 4-20 reps at 20-80% 1 RM • 1-11 exercises	1-3/week	Any of the above exercises with the addition of a speed component.
Flexibility	Stretch to the point of feeling tightness or slight discomfort.	Shoulders, hips, back, wrists, hamstrings, ankles Hold the stretch for 30-60 seconds.	2/week-preferably performed on days aerobic activity is performed.	Slow movements into sustained positions that result in a stretch.
Balance	• Rated moderate intensity. • Progressively challenging postures that reduce the base of support and challenge sensory input. • Start static if necessary and quickly progress to dynamic.	90 minutes/week	2-3 days/week	Any activity that promotes agility during movement such as multi-planar walking, stepping over and around obstacles, moving the head while walking, transitioning to different height surfaces, moving in different environments, stooping, crawling, bending, etc.

Abbreviations: HHR-Heart Rate Reserve; RM: one repetition max

* Recommend bookmarking a Heart Rate Reserve Website or downloading an app calculator such as: Karvonen Formula Calculator (HIOX Softwares Pvt Ltd)

**A lot of variability in the literature

high water[9] 2x/week for up to 45 minutes/session, monitoring blood pressure because of hydrostatic pressure. Land-based resistance exercise[10] 1x/week progressing to 3x/week over an eight-week period.

Frequency: 3x/week of supervised exercising, progressing to daily walking

Intensity: 60% of VO2 peak or 1 RM (3-4 on m-Borg scale) for two weeks; then increase to a target intensity of 80-85% VO2 peak or 1RM. One-set to failure of each exercise, progressing to two sets. High-intensity interval training in bouts that are feasible, but challenging.[11]

Time: minimum of eight weeks, transition to physical activity program that includes aerobic walking and strengthening for a minimum of 150 minutes/week.

Type: aquatics (aerobic) and land-based therapy (strengthening). Start with aquatics to increase exercise tolerance in weight-bearing with one session/week of land-based therapy for strengthening legs (e.g. leg press, sit-to-stands, mini-squats, lateral walking, shallow lunges off BOSU). Progress to 3x/week of land-based therapy with a gradual decrease in aquatic therapy sessions.

2. Patient who is identified as being frail

An 87-year-old female with a BMI of 23 who lives in a retirement home with meals provided, complains of being tired and having no energy. Active medical history of osteoporosis (BMD of hip of -3.0), two old compression fractures at L3 and L4, kyphosis, stress and urinary incontinence and two falls in the past year without fracture. Walks with a wheeled walker. Wants to have better balance and protect herself from falling and "breaking."

Exercise Test/Outcome Measures and Results: Floor-to-stand transfer (unable without personal assistance), Six-Minute Walk Test (completed four minutes with 6x 4 standing rest breaks due to fatigue, distance of 84 meters with an increase in heart rate of 10 beats/min, no change in blood pressure (128/86mm/Hg), timed 30-second sit-to-stand (0 - unable to stand without using arms), four Square Step Test (22 seconds using 2 canes), Functional Gait Assessment (8/30).

Exercise Prescription (FITT): Purpose is to improve balance and agility and strength to facilitate transfers with control and less effort and long-distance walking.[5]

Frequency: 5x/week of supervised balance/agility training and strengthening

Intensity: Perceived effort of 3-5/10 and balance and agility till deterioration in performance indicating fatigue. One-set to failure of each strengthening exercise, progressing to two sets. Progress to power activities.

Time: A total of two hours balance/agility training/week for a minimum of 12 weeks spread out over five days/week. Strengthening of 20-30 minutes/session each day alternating lower extremity/total body/ trunk/core for a minimum of 12 weeks transitioning to physical activity program. Goal is active engagement in an exercise program without rest breaks unless requested.

Type: Multi-planar stepping and walking, minimizing hand holds using Clock-me App; reactive balance control (starting and stopping, stepping over obstacles, turning, figure 8, resisted walking, incorporating head movements, rapid movements using Blaze-Pods, etc); strengthening of lower extremities and trunk (e.g. partial lunges, wall sits, sit to stands, leg press, mini-squats, sumo-squats, kettlebell swings, bent-over rows, deadlifts, overhead press, log rolls with arms overhead, resisted PNF trunk patterns, functional tasks).

3. Patient with arthritis and chronic pain

A 72-year-old female with chronic history of disabling knee, hip and back pain has limited mobility and promoted excessive sedentary activity. BMI of 42. Ambulates in her apartment using a rolling walker. Rarely leaves the home which requires three stairs to the outside. Medical history includes s/p R and L total knee replacements five and seven years ago, spinal stenosis with symptoms brought on with standing, diabetes (insulin controlled), controlled hypertension, ASCD (controlled with beta-blockers which can cause dizziness upon standing), and occasional gout in feet. Patient desires to "feel better" which translated to walking around her apartment without fear of falling, going outside to meet her driver without using a wheelchair, and being able to socialize (go out to lunch) with her brother and friend.

Exercise Test/Outcome Measures: Six-Minute Walk Test (using 20-foot walkway in home 140 feet in two minutes without rest break with self-perceived dyspnea of 5/10 and mBorg of 6/20 and knee and back pain of 8/10 requiring patient to sit down); usual walking speed (0.35m/s); Timed Up and Go (14 seconds with walker), 30-s Sit to Stand (unable), Functional Gait Assessment (12/30).

Exercise Prescription: Home-based therapy[12] to improve strength, balance and agility, and tolerance to activity within pain tolerance of 2 points higher than at rest.[7]

Frequency: Work up to 150 minutes/week starting with 10-minute "exercise snacks" multiple times/day to break up sitting episodes.

Intensity: Start at 30-50% of 1 RM (3-4 m-Borg) increasing to 60-80% 1 RM and 5-7 m-Borg. One set to failure of each strengthening exercise, progressing to two sets. Balance/agility exercises to failure. Pain may be limiting factor initially, until tolerance increases.

Time: Minimum of 16 weeks transitioning to physical activity program in the community.

Type: Sit-to-stands using arms, lower self slowly (eccentric); heel rises, mini-squats, back extensions as tolerated. Multi-planar stepping with a walker, then transitioning to two canes as tolerated. Incorporate head turns during stepping. Sit-backs, bent over rows, deadlifts, standing marches for trunk strength (keeping trunk erect as tolerated).

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