

# CONTINUING EDUCATION for Occupational Therapists

## EFFECTIVE HOME EXERCISE PROGRAM DESIGN FOR SENIOR PATIENTS: STRENGTHENING AND ENDURANCE PROGRAMS

PDH Academy Course #OT-1905 | 4 CE HOURS



This course is offered for 0.4 CEUs (Intermediate level; Category 2 – Occupational Therapy Process: Evaluation).

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### Course Abstract

Therapeutic exercise is an important part of the plan of care for many senior patients; as such, education in a home exercise program is key to both keeping gains made in therapy, and to continue to progress after discharge. This course considers the evidence for the importance of exercise and presents the elements of exercise program design, followed by an examination of evidence-based tests and assessments for aerobic endurance and strength. Exercise modifications for senior patients and considerations for individuals with comorbidities are also addressed.

Target audience: Occupational Therapists, Occupational Therapy Assistants, Physical Therapists, Physical Therapist Assistants (no prerequisites).

*NOTE: Links provided within the course material are for informational purposes only. No endorsement of processes or products is intended or implied.*

### Learning Objectives

By the end of this course, learners will be able to:

- Recall benefits related to exercise
- Recognize age-related physiological changes, with attention to how each impacts the plan of care in general and an exercise program specifically
- Identify elements of effective exercise program design
- Distinguish between assessments for aerobic endurance and strength, as well as other relevant assessments
- Recall exercise modifications and group programs relevant to senior patients
- Identify special considerations pertaining to senior patients with comorbidities

## Timed Topic Outline

- I. Why is Exercise so Important? (20 minutes) *Benefits of Exercise; Linking Exercise and Activity with Function*
- II. Seniors and the Aging of America (5 minutes) *Frail vs. Fit: Common Traits*
- III. Age-Related Physiological Changes (10 minutes)
- IV. Barriers, Precautions, and Contraindications to Exercise and Activity (5 minutes) *Barriers to Exercise; Precautions to Exercise; Contraindications to Exercise*
- V. Program Design Principles and Variables (15 minutes) *Principles of Program Design; Program Design Variables*
- VI. Keys to Effective Program Design (5 minutes)
- VII. Designing a Home Exercise Program (5 minutes) *Determine the Goal of the Program and Mode of Exercise; Establish a Baseline; Monitor Intensity*
- VIII. Assessments for Aerobic Endurance and Strength (70 minutes) *Assessments for Muscular Strength; Assessments for Aerobic Endurance; Other Functional Tests to Consider; Assessments for Lower Functional Levels*
- IX. Exercise Program Components (5 minutes)
- X. General Recommendations: Aerobic Endurance and Strengthening Exercises (5 minutes) *U.S. Department of Health and Human Services; American College of Sports Medicine; American Physical Therapy Association Geriatric Section*
- XI. Modifications to Traditional Exercises (5 minutes)
- XII. Evidence-Based Group Exercise Classes (15 minutes)
- XIII. Special Considerations for Individuals with Comorbidities (30 minutes) *Diabetes; Osteoporosis; Osteoarthritis; Cardiovascular Disease; Chronic Obstructive Pulmonary Disease; Auditory and Visual Impairments; Obesity; Cognitive Deficits; Multiple Sclerosis; Parkinson's Disease*
- XIV. Compliance and Discharge Planning (5 minutes)
- XV. Conclusion and Appendix (20 minutes)
- XVI. References and Exam (20 minutes)

## Delivery & Instructional Method

Distance Learning – Independent. Correspondence/internet text-based self-study, including a provider-graded multiple choice final exam. To earn continuing education credit for this course, you must achieve a passing score of 80% on the final exam.

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## Course Author Bio and Disclosure

Andrea Perrea, MPT, DHS, GCS, CSCS, is a licensed physical therapist with over 23 years of clinical experience, primarily in home care and outpatient therapy, and over 17 years teaching experience. She holds a doctorate degree in Health Science with emphasis in education and geriatrics. She is a Certified Geriatric Specialist through the American Physical Therapy Association, a Certified Strength and Conditioning Specialist through the National Strength and Conditioning Association, and a member of the American Physical Therapy Association, the APTA Geriatrics Section, and the National Strength and Conditioning Association.

Dr. Perrea has taught more than 300 continuing education courses since 2000. She taught as adjunct faculty for the Missouri Western University in the PTA program. In 2012 she instructed for the Missouri Alliance for Home Care and the Indiana Home Care Association. Dr. Perrea presented at the 2015 Rehab Summit in Orlando FL. She currently teaches courses on the following topics: Functional Testing and Skilled Documentation in Geriatric Therapy, Exercise Programs for Frail Elderly, Balance Assessments and Fall Prevention Programs, Strength Training for Function: Program Design for Frail to Fit Seniors, and Expand Your Functional Test Toolkit.

DISCLOSURE: Financial – Andrea Perrea received a stipend as an author of this course. Nonfinancial – No relevant nonfinancial relationship exists.

## Introduction

Physical Therapy and Occupational Therapy professionals often spend more time with patients than other health care professionals do. As such, we are in an excellent position to promote exercise and activity to them, and to help to incorporate both into their day to day lives. Therapeutic exercise is an important part of the plan of care for many patients, and education in a home exercise program is key to both keeping gains made in therapy, and to continue to progress after discharge.

## I. Why is Exercise so Important?

Exercise is crucial, in part, because the lack of it is detrimental to health. According to the National Institute on Aging (2019), lack of exercise together with poor diet is the second leading cause of death in the United States (smoking is #1).

It is also important because research shows people lose a significant amount of muscle with age – and that loss is increasingly related to other declines. Research suggests skeletal muscle mass and strength decline in a linear fashion, with up to 50% being lost by the 8th decade of life (Metter et al, 1997). Walston (2012) reports that sarcopenia, or the decline of muscle mass with age, is one of the most important causes of functional decline and loss of independence in older adults. Degenerative diseases with aging are also related to loss of muscle mass and strength (Evans & Rosenberg, 1992).

The U.S. Department of Health and Human Services stresses the importance of regular exercise and physical activity. In 2018, they released the second edition of the *Physical Activity Guidelines for Americans*. The Key Guidelines for adults (ages 18+) include:

- Adults should move more and sit less throughout the day. Some physical activity is better than none. Adults who sit less and do any amount of moderate-to-vigorous physical activity gain some health benefits.
- For substantial health benefits, adults should do at least 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of moderate-intensity, or 75 minutes (1 hour and 15 minutes) to 150 minutes (2 hours and 30 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic activity. Preferably, aerobic activity should be spread throughout the week.
- Additional health benefits are gained by engaging in physical activity beyond the equivalent of 300 minutes (5 hours) of moderate-intensity physical activity a week.

- Adults should also do muscle-strengthening activities of moderate or greater intensity and that involve all major muscle groups on 2 or more days a week, as these activities provide additional health benefits.

These guidelines also apply to older adults (ages 65+). Additional Key Guidelines for older adults include:

- As part of their weekly physical activity, older adults should do multicomponent physical activity that includes balance training as well as aerobic and muscle-strengthening activities.
- Older adults should determine their level of effort for physical activity relative to their level of fitness.
- Older adults with chronic conditions should understand whether and how their conditions affect their ability to do regular physical activity safely.
- When older adults cannot do 150 minutes of moderate-intensity aerobic activity a week because of chronic conditions, they should be as physically active as their abilities and conditions allow.

And, of course, exercise provides numerous benefits. I often feel we have to think like a marketing person: we need to “sell” each individual on participation in an exercise program, focusing on what is important to them in order to motivate good compliance and follow through.

## Benefits of Exercise

Research highly supports the benefits of both strengthening and aerobic endurance exercise, which are the two types we’ll be covering in this course. As you review the table below, keep in mind that one benefit might be really important to one person, while another benefit might be what helps to motivate another.

Exercise Benefit	Provided by Aerobic Exercises	Provided by Resistive Exercises
Increased strength		X
Increased muscle tissue		X
Increased metabolic rate	X	X
Improved body composition	X	X
Increased bone density		X
Improved gastrointestinal mobility	X	X
Decreased resting heart rate	X	X
Decreased resting blood pressure	X	X
Improvement in blood lipids	X	X
Improved post-coronary performance	X	X
Help regulate blood glucose	X	X
Increased strength of connective tissue		X
Decreased arthritis pain	X	X
Improved sleep	X	X
Decreased risk of disease	X	X
Increased gait speed	X	X
Increased gait distance	X	X
Decreased fall risk	X	X
Improved transfer ability		X
Improved aerobic endurance	X	

All of these factors can combine to assist in preventing the development of chronic diseases such as diabetes, heart disease, and osteoporosis (American College of Sports Medicine, 2010).

In addition, exercise also provides a number of mental health benefits (Long & Van Stavel, 1995):

- Increases self-confidence
- Provides distraction
- Enhances mood
- Induces physical relaxation
- Enhances self-esteem
- Provides positive body image

Finally, the physical and mental health benefits described above, taken together, can help improve overall function and independence: one of the main focuses of therapy

and rehabilitation, and important for patients' mobility skills, activities of daily living, and quality of life.

### Linking Exercise and Activity with Function

Muscles are used in everyday function, and research illustrates that we improve function when we improve strength. For example, the following three studies help to illustrate the connection between lower body strength and function: Beissner and colleagues (2000) found lower extremity muscle force to be a predictor of functional mobility in older adults living in senior housing communities; leg power was found to be a strong predictor of self-reported functional status in elderly women (Foldvari et al, 2000); and lower extremity strength gain was associated with improvements in chair rise, gait speed, stooping, and stair climbing (Chandler et al, 1998).

Connecting activities of daily living with your exercise program helps to show the importance of strengthening those muscles to your clients.

Common Upper-Body Tasks	Common Lower-Body Tasks
Lifting and carrying tasks	Walking
Bathing, toileting and dressing	Dancing
Cooking – meal preparation and clean up	Stair climbing
Grocery shopping	Going up and down curbs
Laundry	Transfers – sit to stand
Raking leaves and other yard work	Squatting activities
House cleaning tasks – vacuuming and sweeping	Getting up and down from the floor

Again, different patients will place more or less importance on different activities – it's up to you to determine which will motivate each.

## II. Seniors and the Aging of America

In the book *Senior Fitness Test Manual*, Rikli and Jones (2013) discuss a continuum of ability for people age 65 and older: from "frail" to "fit." They report that approximately 65% of this population fall into the middle of the continuum and can be described as independent, while at the ends of the continuum about 5% are elite or highly fit, and about 30% are dependent or frail.

### Frail vs. Fit: Common Traits

Therapists typically view all seniors in the independent and elite categories to be "fit" and individuals needing assist with mobility and activities of daily living to be "frail."

A frail individual typically demonstrates the loss of some

physical function, along with a possible chronic disorder and/or disability, and will usually need assistance with activities of daily living and/or mobility. Common causes of frailty include:

- Medical conditions
- Loss of senses
- Chronic disorders
- Sarcopenia
- Very old age
- Inactivity/Lifestyle factors

Conversely, when we talk about a “fit senior,” we are generally discussing community dwelling individuals – typically people who are independent in mobility, with or without an assistive device, and are independent in activities of daily living. Members of this category are at risk for physical decline with low activity levels.

An interesting study by Shumway-Cook and colleagues (2002) investigated the functional requirements for community dwelling seniors. Researchers followed 36 older adults (70 years of age or older) for three days with video cameras to see what they did during the course of a normal day. Based on their findings, the authors concluded that there were three main areas of function required for community-dwelling: gait distance, gait speed, and the ability to lift and carry.

- Gait Distance - Subjects had to walk over 1000 feet to complete their errands
- Gait Speed - Subjects walked at an average speed of 1.2 meters per second
- Lifting and Carrying - Subjects carried on average 6.7 pounds

These requirements should be kept in mind when designing an exercise program, so that the demands of the program will result in the gains needed to meet the functional requirements.

### III. Age-Related Physiological Changes

As the body ages, a number of physiological changes take place. Some changes are simply due to the passage of time and some can be greatly influenced through lifestyle choices.

The table below (Arking, 1998; Digionvanna, 2004) summarizes how various body systems are impacted by aging. The first column contains the body system; the second, physiological changes that occur with aging

within that system. The third column includes some items to consider when determining your plan of care in general, as well as some discussion of specifically how those changes might influence your exercise prescription or exercise modifications. (As you review the table, notice where and how we as therapists can influence these changes – for example, strength training may mitigate decreasing muscle strength, and aerobic conditioning can have positive effects on cardiovascular and respiratory functions.)

Body System	Physiological Changes with Aging	Impact on Plan of Care, Exercise Selection, and Exercise Program
Muscular	<p>Decreased ability of cells to be stimulated by neurons</p> <p>Decrease in number of muscle cells (Type II/fast twitch more than Type I/slow twitch)</p> <p>Decrease in number &amp; size of mitochondria</p>	<p>Individuals show decreased muscle strength and muscular endurance with age.</p> <p>There is earlier onset of fatigue and people may require additional rest breaks during treatment and exercises.</p> <p>Decreased ability to respond to rapid movements and decreased ability to generate power due to the decrease in fast twitch fibers. Speed of training is a variable that can be used to help train muscles to respond better.</p> <p>With age, individuals exhibit decreased function and impaired activities of daily living, especially gait, stair climbing, and sit-to-stand performance.</p> <p>Due to muscle weakness, substitution of muscle groups during exercise and function can occur – individuals may need additional cues and instruction for correct form on exercises.</p>

Skeletal	<p>Protein &amp; minerals in bone matrix change</p> <p>Bone more rigid and brittle</p> <p>Decrease in trabecular &amp; cortical bone</p> <p>Thinning of cartilage in joints</p> <p>Decrease in central region of vertebral body</p> <p>Collagen of intervertebral joints becomes stiffer</p>	<p>Older individuals are at increased risk of fracture; therefore, screening for fall risk and education on fall prevention is important.</p> <p>There is a decrease in height with age due to skeletal changes.</p> <p>There is a decrease in joint mobility – therapists may need to modify exercises or have people exercise only through available range of motion.</p> <p>Joint pain due to thinning of cartilage is very common – therapists can help educate on the benefits of exercise in reducing arthritic pain, and suggest possible modifications to exercises if pain is present.</p> <p>Increased rigidity of the spine and postural changes can limit visual field causing fall risk. They also might make use of exercise machines more difficult as the individual may not “fit” well in the machines.</p> <p>Skeletal changes in the hand may make modification of grip necessary for exercises.</p>
Cardiac	<p>Decrease in maximum heart rate</p> <p>Stiffer, dilated, thicker heart</p> <p>Accumulation of lipids in arteries</p> <p>Decreased ability of arteries to dilate</p>	<p>There is decreased efficiency and increased O<sub>2</sub> demand, and individuals may need additional rest breaks during exercise sessions.</p> <p>The decreased ability to respond to temperature changes makes environment a factor, as well as increasing the need for proper warm up and cool down. It is important to educate clients on these factors.</p> <p>Overhead work can increase blood pressure: exercises may need to be modified to no higher than shoulder height in some people with cardiac issues.</p> <p>In the presence of a history of cardiac issues, monitoring of vital signs and RPE scales might be indicated.</p>
Integumentary	<p>Thinning of epidermis</p> <p>Decreased number of collagen fibers</p> <p>Decreased number of sweat glands</p> <p>Decreased number of sensory neurons in the skin</p>	<p>Older individuals with thin skin have increased susceptibility to infection and a decreased rate of wound healing.</p> <p>Tissue is easier to damage – exercises may need to be modified to reduce shear or pressure on the skin.</p> <p>Along with changes in the cardiac system, changes in the skin also affect thermoregulation. Again, the importance of environment, warm up, and cool down with activity should be stressed.</p> <p>Individuals may present with decreased manual dexterity – modified grip may be needed for activities and ADLs.</p> <p>Consider including education on prevention of pressure sores, and pressure relief and positioning education, in the plan of care.</p>
Neurological	<p>Gradual decline in sensory functions</p> <p>Decrease in number of motor neurons</p> <p>Reflexes slowed</p>	<p>Delayed reaction times create an increased risk of falls or injury due to decreased ability to anticipate changes in the environment (decreased anticipatory postural control).</p> <p>Due to neurological changes individuals may be unable to register the aromas of foods, which can affect nutritional status and overall health.</p> <p>Slowing of voluntary movement occurs.</p> <p>Neuropathy may be present, affecting proprioceptive input from the foot and ankle. Some individuals with neuropathy cannot tolerate weights or bands around their feet and ankles so may need exercise modifications.</p>

Vestibular	<p>Decrease in number of nerve cells</p> <p>Decrease in density of hair cells</p> <p>Decrease in blood flow to the inner ear</p> <p>Reduction in vestibuloocular reflex (VOR)</p>	<p>Dizziness may be present, requiring education on safety when transitioning from supine to sit and sit to stand.</p> <p>Check for a history of vestibular-related disorders (BPPV, Meniere’s disease, vertigo).</p> <p>Reduction in VOR affects ability to stabilize vision when the head turns quickly.</p> <p>May need to do testing to see if there is a vestibular deficit.</p>
Vision	<p>Decreased transparency of cornea</p> <p>Cornea becomes flattened</p> <p>Decreased fluid production</p> <p>Decreased number and length of cones</p> <p>Reduced acuity</p> <p>Decrease in depth perception</p> <p>Decreased contrast sensitivity</p> <p>Increase in eye diseases: cataracts, glaucoma, and macular degeneration</p>	<p>Difficulty seeing close objects could suggest a need for bifocals. May need to use larger print for home exercise program instructions and other educational materials.</p> <p>Inability to read dosage and instructions may cause medication mistakes.</p> <p>Due to decreased adaptation to changing light, education on good lighting in the home, hallways, by the bed, etc. may be required.</p> <p>Some individuals can have an altered perception of body position in space.</p> <p>A narrowing visual field can lead to difficulty with visualizing and perceiving surface conditions and environmental hazards.</p> <p>A loss of independence occurs when the person can no longer drive, which can lead to social isolation, depression, and decreased activity.</p>
Hearing	<p>Increased ear wax</p> <p>Decrease in number of several types of cells</p> <p>Eardrum becomes stiffer</p>	<p>Decreased ability to hear all frequencies of sound (especially high frequencies) and decreased ability to localize sound can both play a role in fall risk.</p> <p>There is potential social isolation, depression, and decreased activity if a person is not able to socialize due to hearing loss.</p> <p>Check to see if hearing aids are present and properly used. Hearing loss can be mistaken for cognitive deficits, so screening might be indicated.</p> <p>Exercise demonstration might work better than verbal instruction.</p>
Respiratory	<p>Weakening of muscles of respiration</p> <p>Decrease in minute volume due to stiffness of thorax</p> <p>Decreased vital capacity</p> <p>Decreased rate of diffusion</p> <p>Decrease in Forced Expiratory Volume (FEV)</p> <p>Decrease in max breathing</p>	<p>There is an increased risk of aspiration and pneumonia in people with respiratory diseases.</p> <p>Decreased efficiency of activities and increased risk of a sedentary lifestyle are common.</p> <p>There is a decrease in maximal VO<sub>2</sub> as a measure of aerobic fitness.</p> <p>Often during therapy and exercise there is a need for additional monitoring of vitals and rest breaks, as well as breathing techniques.</p>

## IV. Barriers, Precautions, and Contraindications to Exercise and Activity

### Barriers to Exercise

So what are the barriers in place, and what can we do about them?

Patients may not want to participate in therapy, often because they don't see its potential impact on their lives. Family members and other caregivers may also balk at therapy, preferring to do everything for their loved ones. And both patients and caregivers may feel that the risk of pain or injury due to exercise outweighs its benefits. In all of these cases, education is the key. Taking the time with patients and caregivers to make the connection between participation in therapy and staying independent can be a big motivator. And, although there are certainly risks to exercise, it is important to remind individuals that there are more risks to inactivity. The *Physical Activity Guidelines for Americans* (USDHHS, 2018) states that the more time spent in sedentary behavior, the more the risk of the following increases:

- All-cause mortality
- Cardiovascular disease and cardiovascular disease mortality
- Type II Diabetes
- Cancer (colon, endometrium, and lung)

It further states that the health benefits of physical activity far outweigh the risks of adverse events for almost everyone.

Likewise, physicians may not refer patients to therapy services at all, or fail to update their referrals to the next level of therapy when needed. We can use some of the tests presented in this course to help show need for therapy services, thereby facilitating physician orders.

### Precautions to Exercise

Barriers aside, precautions to exercise to exist, and we need to be aware of them. The following list was compiled by the American College of Sports Medicine (1998):

- Acute illness
- Unstable chest pain
- Uncontrolled diabetes
- Asthma
- Congestive heart failure
- Musculoskeletal pain
- Weight loss
- Falling episodes

Check with the patient's physician if any precautions are present to make sure they are safe to exercise.

### Contraindications to Exercise

Some physicians will provide parameters beyond which they want to be notified; likewise, some health care companies have specific guidelines. In the absence of this sort of input, the table below provides some guidelines for when it may be necessary to hold exercise. Particularly if a patient usually falls within the norms for these values, readings outside of them can be "red flags" that may indicate an issue. (Some people naturally fall outside of norms with readings; if that is the case, just be sure you have physician clearance to exercise.)

Vital Signs	Readings
Resting Heart Rate	If above 100 exercise should be held. If below 50 exercise should be held.
Resting Systolic Blood Pressure	If greater than 200 exercise should be held. If less than 90 exercise should be held.
Resting Diastolic Blood Pressure	If greater than 110 exercise should be held.
Oxygen Saturation	If less than 90% exercise should be held.

## V. Program Design Principles and Variables

### Principles of Program Design

There are four principles of program design: overload, progression, specificity, and rest/recovery.

#### Overload Principle

Simply put, you have to overload the body with more activity than it is used to in order to have an effect. True for both the strength or anaerobic system and the endurance or aerobic system, this is a key principle of program design and is critical to implement correctly to get lasting and meaningful results.

#### Overload for Strengthening

Muscle requires an adequate stimulus to get stronger. If your goal with an exercise is to gain strength, then you have to overload the targeted muscle or muscle groups to an appropriate degree.

Skeletal muscle requires approximately 60% of maximum strength overload to increase strength (ACSM, 2010). Activities of lower overload (< 60% of max strength) may result in 5-10% improvement on strength tests, but the change is likely related to motor learning rather than a biological increase in contractile proteins in the muscle (Sale 1988). In the white paper titled "Strength Training for the Older Adult," authors Avers & Brown state, "Motor learning alone does not achieve a reversal of muscle atrophy. Without overload, a further decline in function is likely once intervention ceases (2009)."

As therapists we see this in many individuals who make gains with participation in therapy but then start to

decline once therapy is concluded. This illustrates both the importance of proper overload for true strength gains, and the importance of the home exercise program to keep gains made during therapy.

We'll discuss options for determining the correct overload in the section on assessments. I highly recommend using a 15 repetition maximum test to determine the starting point for resistive exercises for most individuals.

### **Overload for Aerobic Endurance**

If your goal is aerobic endurance, you again have to overload that system with a continuous exercise and get the heart rate up to a level where you will see results. Often we think of overload in terms of intensity. The most common way to identify the proper intensity for aerobic training is using the heart rate method, via the following formula:

Age-predicted maximum heart rate =  $220 - \text{age}$

Training zone for proper overload = 60-80% of the age-predicted maximum heart rate

For example, a 70 year old man would have an age-predicted maximum heart rate of 150 beats per minute. 60% of 150 is 90; 80% of 150 is 120. His training heart rate would be 90-120 beats per minute.

### **Specificity Principle**

The American College of Sports Medicine (2010) states that this principle refers to distinct adaptations that take place as a result of the training program. This principle grew out of strength and conditioning programs for athletes: if athletes' programs were specific to their sport and their position in that sport, better results were obtained. For example, on a baseball team the catcher has a very different job functionally compared to the outfielders, and the exercise program should address that reality.

It may help, when we talk about specificity for therapy programs, to think "functional." Train specifically to address the functional limitations an individual may have. For example, if you have a patient that has difficulty getting up from a low couch or toilet stool due to leg weakness, you would want to train and strengthen the muscles involved in that movement with appropriate overload. Similarly, if an individual needs to work on improving aerobic endurance, you need to do an activity that is continuous in nature and gets the heart rate up to an appropriate overload.

### **Progression Principle**

This principle is simply to continue to overload over time. If we do not progress a patient, they will reach a plateau – this is why designing a good home program is essential. (Note: it is also very important in Medicare documentation to show progression in the plan of care.)

Once an individual has been taught some initial

exercises, and has demonstrated the ability to do them independently, they can do them on their own for their home program. On later visits you can teach them more advanced exercises for progression of the program. This both introduces new skill in your documentation and makes sure the individual does not reach a plateau in training.

### **Progression for Strengthening**

The 5% rule is considered a safe way to progress a strengthening program. It states that when a person can complete the target number of repetitions in two successive workouts with good form, they should be ready to progress. The safe progression amount is to increase the resistance by 5%.

### **Progression for Aerobic Endurance**

Progression of endurance training typically includes increasing minutes of aerobic activity and/or frequency of activity, or working at the higher end of the heart rate training zone.

### **Principle of Rest and Recovery**

Rest and recovery are important to avoid overtraining in individuals. The amount of time needed varies depending on the type of exercise and the individual. This will be discussed in more detail later in the course.

### **Program Design Variables**

The program design variables are: mode of exercise or exercise selection, frequency, duration, order of exercise, number of sets and repetitions, intensity, and rest periods.

### **Mode of Exercise (Exercise Selection)**

This refers to what types of equipment you are going to use and which specific exercises you will include in the program.

### **Aerobic Endurance**

Walking programs in the home or in the community are a great option for most individuals at varying levels of fitness. In addition, you and your clients may have access to equipment such as bikes, treadmills, elliptical trainers, rowing machines, NuSteps, and upper body ergometers for endurance activities. Continuous active range of motion exercises can also be used in sitting or standing for endurance work, as long as the target heart rate is achieved.

### **Strengthening**

The key with exercise selection for strengthening programs is to select ones that satisfy overload. There are multiple options, including machines, free weights, resistive cords and bands, kettle bells, medicine balls, and other types of resistive equipment. Especially when equipment or access to equipment is limited, body weight exercises are also often a good choice.

For beginner strength training programs, choose one exercise for each main muscle group: chest, back, shoulders, biceps, triceps, legs (quadriceps and hamstrings or combination exercise), and core (abdominals and low back). Optionally, you can add in smaller muscle groups such as the muscles of the wrist and forearm or calf. This will be discussed in more detail later in the course.

**Frequency**

This refers to both how often a person may participate in therapy and the frequency of exercise for the home program prescription.

**Aerobic Endurance**

Aerobic exercises are typically 3-7 days per week.

**Strengthening**

Strength training exercises are typically 2-3 days per week on non-consecutive days.

**Duration**

This can refer to either how long a person will exercise or how long the entire exercise program will last. Duration will vary based on the initial fitness level of the individual and the goals of the program.

**Exercise Order**

In general, place exercises that are more challenging early in the program, while the individual is not fatigued. When determining whether to do resistive exercises before or after aerobic endurance exercises, again consider fatigue, and schedule the one that is most important to each individual first. For safety reasons, it is also recommended that more complex exercises (multi-planar, plyometric, high-level balance) be scheduled early in the program, while the individual is fresh.

Considering strengthening exercises specifically, recommendations include working larger muscle groups before smaller groups, and doing core exercises at the end of the program. The rationale? Exercises for large muscle groups like the chest and back also work some of the smaller muscle groups at the same time. For example, you do not want to do triceps extensions before a bench press, as the triceps work to aid the chest muscles for that exercise. There is a similar rationale for why you want to train isolated core work at the end: you want people to engage the core muscles throughout all of the exercises, so you do not want to tire out those muscles by doing them first.

**Number of Sets and Repetitions**

This variable applies to strength training programs. For beginners, start with 1 set of an exercise for each major muscle group. Increase to 2-3 sets as you progress the program.

**Intensity of Training**

This is an extremely important variable, and one that is often under-dosed in programs for seniors (as mentioned above in the section on the overload principle). Often overload and training intensity are used interchangeably, which makes sense: intensity/overload is key to getting the physiological changes and improvements we are aiming for. It is important to find the initial starting level and then monitor intensity throughout the program. Section 7 will include additional information on monitoring intensity during exercise.

**Aerobic Endurance**

As discussed under the principle of overload, you need to achieve a heart rate of at least 60% of the age-predicted maximum heart rate for improvements in aerobic endurance.

**Strengthening**

As discussed under the principle of overload, you need to work a muscle or muscle groups at 60% of maximum available strength to get lasting improvements.

**Rest Periods**

**Aerobic Endurance**

Rest periods will depend on the individual and their intensity and duration of training.

**Strengthening**

There are rest period parameters to use when performing strengthening exercises to ensure adequate rest. The parameters depend on the intensity of training: if you work a muscle or muscle group harder, you need a longer rest period.

The rest periods below apply if you are going to do a second set of the same muscle group. You can eliminate rest periods if you do your strengthening exercises in a circuit format, alternating muscle groups. Also, keep in mind you can add or lengthen rest periods, which might be necessary when working with frail individuals or people with co-morbidities.

	<b>Light Resistance Training</b>	<b>Moderate Resistance Training</b>	<b>Heavy Resistance Training</b>
<b># repetitions that can be completed</b>	12-15 repetitions	8-12 repetitions	6-8 repetitions
<b>% 1 RM</b>	60-70%	70-80%	80-85%
<b>Rest period needed</b>	30-60 seconds	60-90 seconds	3 minutes

## VI. Keys to Effective Program Design

At a continuing education class I went to about fifteen years ago, the instructor asked this question: “What is the best exercise you can do?” The answer then was whatever exercise you *will* do. The answer today is the same. It comes down to compliance.

Remember, we have to “sell” the idea of participation in an exercise program, so work those motivators. Gather information about each individual: what are they willing to do? what do they enjoy? Make participation fun and convenient: find out what a person is already doing for exercise, and what if any equipment is available to them, and tailor their program to meet their specific situation (I like to include exercises they can do on their own, if possible, to eliminate the need for a second person to assist with the program). Explain the goals of the program, and relate each to their specific functional areas of interest. Use functional and objective tests to determine a baseline and then to track progress: numbers can be very motivating in explaining why a program is needed, and then showing that it is successful.

## VII. Designing a Home Exercise Program

### Determine the Goal of the Program and Mode of Exercise

The first thing to decide is what the physiological goal or goals of the program are – while goals such as improving range of motion or balance are often included in the exercise prescription, we will focus on aerobic endurance and strength for the purposes this course. If the goal is aerobic endurance, we need to choose an exercise or exercises that are continuous in nature and are of adequate overload to get the heart rate response we want. If the goal is strength, we need to choose exercises that have sufficient overload for the muscle or muscle groups being worked.

### Establish a Baseline

An evaluation of an individual’s current level of strength, endurance, and function is one of the first steps to designing an effective home program.

There are a number of assessments that can be used to both establish a baseline and show progress over time. These tools can help identify the need for therapy intervention, specifically address what should be included in the program, and aid in motivation of the client. Several options will be covered in the next section of this course.

### Monitor Intensity

#### Rated Perceived Exertion Scales (RPE)

These scales can be used to monitor exercise intensity by getting feedback from the individual on how hard they feel they are working.

The original RPE scale, created by Dr Gunnar Borg and known as the Borg Scale, is from 6-20 (multiplying the score by 10 gives a rough estimate of heart rate). The target rate of exertion for both aerobic endurance exercise and for strengthening exercises is 12-14 or “somewhat hard.”

#### Borg Scale (Gunnar Borg 1970, 1985, 1994, 1998)

6	No exertion at all
7- 8	Extremely light
9	Very light
10	
11	Light
12	
13	Somewhat hard
14	
15	Hard (heavy)
16	
17	Very hard
18	
19	Extremely hard
20	Maximal exertion

To use the Borg scale, present it to the person you’re working with. Explain that the target work level is between 12 and 14 (“somewhat hard”): if they are too low they will not get the best results and conversely if they work too high it may cause overtraining to occur. Ask them how hard they feel they are working, and educate them to let you know where they are at so you can keep the desired level of intensity.

The other option for a RPE scale is the 0-10 point scale or the Modified Borg Scale. The target level for intensity for aerobic endurance and strengthening exercises on this scale is a 4 or “a little intense.” I have also seen the level 4 as “somewhat hard,” similar to the original scale. Some therapists prefer this 0-10 scale, and some prefer to use the original or 6-20 scale.

#### Modified Borg Scale

0	None
0.5	Very, very light
1	Very light
2	Light
3	Moderate
4	A little intense
5	Intense
6	
7	Very intense
8	
9	Very, very intense
10	Maximum

I find RPE scales very helpful in getting good feedback from my clients; additionally, these scales give them a sense of control. They are used commonly with individuals with history of cardiac disease, as cardiac medications can blunt vital responses and RPE scales might be a better indicator of proper intensity in these individuals. I also really like using RPE scales with people with respiratory disease, as they can get anxious with exercise, and knowing that we do not want to work at the higher levels of exertion helps to alleviate that.

### Dyspnea Scale

The dyspnea scale is used to describe the shortness of breath that a person experiences with exercise. It is similar to the PRE scale in that you are getting feedback from the individual on how they feel they are doing.

Dyspnea Scale		
0	Nothing at all	
5	Very, very slight	Just noticeable
1	Very slight	
2	Slight	Light
3	Moderate	
4	Somewhat severe	
5	Severe	Heavy
6		
7	Very severe	
8		
9		
10	Very, very severe	Almost Maximum/Maximum

### Talk Test

The talk test is an informal method to monitor intensity or overload during aerobic activity. The idea is that during aerobic exercise you should be able to talk, but not necessarily want to (I have also heard the talk test described as being able to talk but not sing). In other words, the intensity should be high enough that a person could not sing a song or carry on a long conversation. Conversely, if the individual has difficulty responding to questions due to shortness of breath, the intensity is too high.

### Vital Signs

Vital signs can be used to help monitor intensity while doing aerobic endurance work: the individual should be in the proper training zone as a percentage of maximum heart rate as discussed under establishing intensity. In some instances you may be teaching individuals to monitor their own vitals, and also educating them as to parameters of when to hold exercise.

## VIII. Assessments for Aerobic Endurance and Strength

The following table shows a number of objective assessments that can be used to establish baseline levels of aerobic fitness, upper body strength, and lower body strength. Each test's purpose, description, and normative data will be presented below.

Remember, if you are performing multiple tests, do the less fatiguing tests first.

Assessments for Muscular Strength	Assessments for Aerobic Endurance
30 Second Chair Stand Test	6 Minute Walk Test
5 Times Sit to Stand Test	2 Minute Walk Test
Arm Curl Test	2 Minute Step Test
Grip Dynamometry	
Push Up Test	
Trunk Curl Test	
YMCA Leg Extension Test	
1 Repetition Max (1 RM) Test	
15 Repetition Max (15 RM) Test	

### Assessments for Muscular Strength

#### 30 Second Chair Stand Test

##### Purpose / Description:

Testing functional lower extremity strength and detecting normal age-related strength decline.

Place a 17" chair against the wall for safety; the individual you are testing should be seated in the middle of the chair with their arms folded across their chest and feet flat on the floor. Instruct the individual to fully extend hips and knees and come to a full stand (I often demonstrate this). Give the following instructions: "On go, stand up and sit down as many times as you can in 30 seconds." The timer starts on go and the person stops at 30 seconds or when they can no longer do additional repetitions.

A video of a senior performing this test can be found at <https://www.cdc.gov/steady/materials.html> or <https://progressivetherapyedu.com/physical-occupational-therapy-resources/>.

##### Time to Complete:

< 5 minutes. You only do one trial due to fatigue.

##### Special Equipment or Space Needed:

17" chair and stopwatch. Very little space is needed.

##### Scoring and Score Interpretation:

An individual's score is the number of full stands they can do in 30 seconds (if they are more than halfway

up at the end of 30 seconds they get credit for the last repetition).

Below are the middle 50% of test scores (the top 25% and the bottom 25% are taken off).

### Test Norms (Rikli & Jones, 2013)

Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Men	14-19	12-18	12-17	11-17	10-15	8-14	7-12
Women	12-17	11-16	10-15	10-15	9-14	8-13	4-11

Along with the with the test score, you should also document items related to performance and safety: although you will not cue individuals on form prior to testing, you can make note of any variations and incorporate that information into your plan of care. For example, some individuals may have difficulty controlling the lowering or eccentric portion of the sit-to-stand movement. Others may have difficulty keeping centered on the chair, or have difficulty with balance upon standing. I have seen some individuals put their feet very far apart to perform the movement, and others put their feet together. These are all things to note in your documentation, as they highlight some safety issues and will direct your transfer training.

If a person cannot get up from the 17" chair with their arms crossed, their standardized test score is "0." Rikli and Jones (2013) mention in their textbook, *Senior Fitness Test Manual*, that there are some adaptations that can be used in the context of a score of "0" – be sure to document both the original score and how you adapted the test. It is particularly important to document the adaptation used so you can retest in the same way.

*Use arms* – You can allow the individual to use their arms and test how many repetitions they can do in 30 seconds. Some individuals will need to push up from the chair; with others, allowing them to push up from their thighs is adaptation enough.

*Increase surface height* – You can increase the surface to higher than 17", documenting the height used, and again test the number of repetitions they can do in 30 seconds. In a clinic, you might use a high low mat or place an Airex pad on the chair; in home care simply move to a higher chair or surface to perform the test.

### Related Research:

The norms listed above are from research conducted by Rikli and Jones (2013) in a nationwide study of over 7,000 older Americans aged 60-94 years. The research was conducted across 21 states and included 267 test sites.

I find that many therapists are surprised by the norms for this test. Keep in mind that as therapists we often work with the frail, or with individuals going through a bout of frailty or injury, whereas most seniors (per Rikli and Jones, 70%) are independent.

I remember working with an 85 year old man who'd had a fall while walking with his cane going to get lunch. He scored a 5 on the 30 second chair stand test (no modifications). His daughter, who was there during the evaluation, asked if that was a good score. I looked at the norms and let them both know that at his age he should score between 8-14. His score told me I needed to include functional strengthening in his plan of care, and it helped to show the patient and his daughter the reason why (I find I get better compliance with strengthening exercises when I use this test and explain the normative data).

Before I knew about this test, I suspect that if I had seen an 85 year old man get up from a chair with arms crossed, I would have thought he did really well! Again, because we often see more of the frail, we can have an improper perception of the norm, and rely on the power of tests with good data to help us self-correct.

### Functional Connection / Clinical Importance:

The ability to rise from a standard chair is such an important function. This test ties transfer ability and lower body strength together, providing an easy and quick way to evaluate lower extremity functional strength. I find this test gets me better clinical information than the traditional measure of manual muscle testing (MMT): even the frail will often have a MMT of the quadriceps of 4/5 or even 4+/5, but this does not tell me if/how they are able to get up from a chair.

I have used this test in multiple settings on most of my patients: if they are able to sit in a chair, and have full weight bearing and no contraindications, I perform the test. I find it gives me a great baseline, often showing functional weakness, and I see really good improvement with the scores (those individuals that score a "0" on the initial test may show progress with lower extremity strength in an adapted test position). I caution my orthopedic patients about the possibility of pain, and make sure they know they can stop if pain is present; if an individual has pain during the test I document it, as it is an important activity-limiting factor and should be addressed in the plan of care.

This test is also clinically important in that it is one of three functional tests the CDC's STEADI program uses in screening for fall risk: based on Rikli and Jones' research (2013), they consider a person a fall risk when their results are below the lowest number of the normal range (see table below). Rubenstein et al (2000) analyzed 16 fall risk factor studies and identified lower extremity weakness as the highest risk factor, which is why the 30 Second Chair Stand test ties into fall risk – and it is one of the quickest tests you can do to check fall risk as well as lower extremity functional strength.

### 30 Second Chair Stand Test: Below Average Scores (CDC: 30SCS, 2017)

Age	Men	Women
60-64	<14	<12
65-69	<12	<11
70-74	<12	<10
75-79	<11	<10
80-84	<10	<9
85-89	<8	<8
90-94	<7	<4

#### Is the Test Free:

Yes. No special test form needed.

#### 5 Times Sit to Stand Test

##### Purpose / Description:

Assessing lower extremity strength in a functional task.

The individual starts seated in the middle of a 16" chair with arms folded. Give the following instructions: "I want you to stand up and sit down 5 times as quickly as you can when I say go." The timer starts on go and stops after the fifth full stand.

The individual must come to a full stand for the repetitions to count.

##### Time to Complete:

< 5 minutes

##### Special Equipment or Space Needed:

16" chair & stopwatch. Very little space is needed.

##### Scoring and Score Interpretation; Related Research:

The lower the time, the better the score. Individuals with scores exceeding the following were considered to have worse than average performance (Bohannon et al. 2006):

- 60-69 yrs 11.4 sec
- 70-79 yrs 12.6 sec
- 80-89 yrs 14.8 sec

Lusardi et al (2004) provided the following reference values:

- 60-69 yrs 12 sec
- 70-79 yrs 12.3 sec
- 80-89 yrs 17.1 sec
- 90-101 yrs 22.5 sec

##### Functional Connection / Clinical Importance:

Overall, the functional connection and clinical importance of the 5 Times Sit to Stand test is similar to that of the 30 Second Chair Stand test. Due to fatigue, as a clinician you would choose to do either one or

the other, not both. The main consideration is that an individual would need to be able to do 5 repetitions in a row in order to participate in the 5 Times Sit to Stand test. Another consideration is the height of the chair: the 5 Times Sit to Stand Test uses a lower chair height, making it more difficult.

#### Is the Test Free:

Yes. No special test form needed.

#### Arm Curl Test

##### Purpose / Description:

Testing upper extremity strength, which is required for household and other activities involving lifting and carrying.

The individual performs seated bicep curls with the dominant arm, using good form, with their back resting against the back of the chair.

Demonstrate how to perform a bicep curl, then instruct the patient to sit in a chair, with arm in extension at their side, and back against the chair's back. Have them practice the motion without weight to make sure they understand the test – they should go through their full range of motion. Give the individual the weight (for women use a 5# weight; for men use an 8# weight) and ask them to do as many bicep curls as they can in 30 seconds. The timer starts on the command "go."

A video of a senior performing this test can be found at <https://progressivetherapyedu.com/physical-occupational-therapy-resources/>.

##### Time to Complete:

< 5 minutes. You only do one trial due to fatigue.

##### Special Equipment or Space Needed:

Armless chair, stopwatch, 5# dumbbell, 8# dumbbell. Very little space is needed.

##### Scoring and Score Interpretation:

An individual's score is the number of bicep curls they can do in 30 seconds (if they are more than halfway up at the end of 30 seconds they get credit for the last repetition).

Below are the middle 50% of test scores. You can do the test bilaterally, but the norms are for the dominant arm.

#### Test Norms (Rikli & Jones, 2013)

Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Men	16-22	15-21	14-21	13-19	13-19	11-17	10-14
Women	13-19	12-18	12-17	11-17	10-16	10-15	8-13

##### Functional Connection / Clinical Importance:

Lifting and carrying is a very important functional task for daily living, and this test ties into the assessment of lifting and carrying ability.

We discussed Shumway-Cook and colleagues' 2002 study earlier in the course. The result that interests us here is the ability lift and carry: community-dwelling subjects were able to carry, on average, 6.7 pounds.

To illustrate the upper extremity strength needed for daily activities, a list of common household items and their weights is below – the list was originally used in educating patients on lift restrictions, but it can also be used to show strength needed (Chatellier & LaPier, 2015). Specifics like these are important to keep in mind when designing strength training programs: we need to adjust the intensity of the exercises to produce strength gains strength that meet the demands of daily living.

12 pack of soda	10.5 pounds
Gallon of milk	8.6 pounds
Full casserole dish	8.44 pounds
Upright vacuum	12.42 pounds
Blender - full	7.60 pounds
Laundry basket - 4 dry towels	6.52 pounds
Laundry basket - 4 wet towels	9.14 pounds
Case of water bottles	27.36 pounds
3 quart casserole dish - empty	14.20 pounds
Golf clubs - women's 12 piece set	14.72 pounds

**Is the Test Free:**

Yes. No special test form needed.

**Grip Dynamometry**

**Purpose / Description:**

Assessing grip strength.

Test bilaterally. The person's elbow is flexed to 90 degrees. The forearm is neutral. The wrist is between 0 and 30 degrees of extension. The second position on the dynamometer is standard.

Instruct the individual: "Squeeze as hard as you can, but don't hurt yourself."

**Time to Complete:**

< 5 minutes

**Special Equipment or Space Needed:**

Grip dynamometer. Very little space is needed.

**Scoring and Score Interpretation:**

See norms on next column.

**Grip Dynamometry Norms (Roberts et al, 2011)**

Rating	Men (in lbs)	Women (in lbs)
<b>Excellent</b>	>141	>84
<b>Very Good</b>	123-141	75-84
<b>Above Average</b>	114-122	66-74
<b>Average</b>	105-113	57-65
<b>Below Average</b>	96-104	49-56
<b>Poor</b>	88-95	44-48
<b>Very Poor</b>	<88	<44

**Functional Connection / Clinical Importance:**

A systematic review by Bohannon (2008) concluded that grip strength was a significant predictor of mortality, disability, and time spent in the hospital.

NOTE: The next 3 tests – Push Up Test, Trunk Curl Test, and YMCA Leg Extension Test – are included in the book *Strength Training Past 50* (Baechle & Westcott, 2015). Each test assigns an index score, which eventually is used to create an overall strength score and determine which strength training program is recommended. However, the tests can also be used to determine a baseline, to determine a training load, and to show progress over time with training.

**Push Up Test**

**Purpose / Description:**

Assessing upper body strength. This test works the muscles of the chest (pectoralis major) and back of the arms (triceps).

Instructions: "Perform as many push-ups as possible without straining yourself." Record the number of consecutive push-ups completed with correct technique: men are tested using the standard push up position; women are tested using the modified position on the knees.

**Special Equipment or Space Needed:**

No equipment needed. Minimal space is required.

**Scoring and Score Interpretation**

# Completed Push-ups: Men	# Completed Push-ups: Women	Upper-body Strength Index Score
0-9	0-9	5
10-19	10-19	6
20 or more	20 or more	7

## Trunk Curl Test

### Purpose / Description:

Testing abdominal strength.

The individual lies on the floor or large mat. Their head, upper back, arms, and hips are on the floor, hands next to the hips, and knees bent approximately at 90 degrees with feet flat on the floor.

Instructions: "Contract your abdominal muscles to lift your upper back and head off the floor as far as possible. Your lower back should remain in contact with the floor as your hands slide forward. Lower to the resting position and do as many trunk curls as possible." The individual should also be instructed to exhale on the upward phase and inhale on the downward phase of the motion, and to control their speed (about 1 sec up and 1 sec down). Watch to make sure shoulder blades come up off the floor or mat.

### Special Equipment or Space Needed:

No equipment needed. Minimal space is required.

### Scoring and Score Interpretation

# Completed Trunk Curls: Men	# Completed Trunk Curls: Women	Midsection Strength Index Score
0-24	0-19	5
25-49	20-39	6
50 or more	40 or more	7

## YMCA Leg Extension Test

### Purpose / Description:

Assessing leg strength.

Start with a load that is approximately 25% of the individual's body weight and have the person perform 10 repetitions, then rest two minutes. Increase the load to approximately 35% of body weight and again perform 10 repetitions followed by two minutes rest. Increase the load to about 45% of body weight and perform 10 repetitions again followed by two minutes rest. Continue testing, adding additional weight, until you find the heaviest load the person can lift 10 times with good technique.

### Special Equipment or Space Needed:

Leg extension machine

### Scoring and Score Interpretation

Score for Lower Body Strength: Men	Score for Lower Body Strength: Women	Lower Body Strength Index
0-49%	0-39%	5
50-69%	40-59%	6
70% or higher	60% or higher	7

## 1 Repetition Maximum (1 RM) Test

### Purpose / Description:

Determining the amount of weight or resistance a person can lift just 1 time.

Have the individual warm up, and then demonstrate the exercise you want them to perform. Have them try the exercise without any resistance to make sure they understand the proper form. Make an educated guess as to the amount of weight/resistance under which the person will be able to do 2-3 repetitions, then have them try the exercise and see how many repetitions they can do. Add or subtract weight based on their performance and form until you find the resistance level at which they can do one repetition and no more.

### Special Equipment or Space Needed:

You will need equipment – typically resistance machines or free weights – that relates to the muscle/muscle groups you are testing. Elastic bands or tubing or body weight exercises can also be used.

### Scoring and Score Interpretation:

The score is simply the amount of weight the person could lift one and no more for a particular exercise.

### Functional Connection / Clinical Importance:

The 1 RM is used to determine the appropriate training weight to use for an exercise based on the phase of training. For example, beginners usually start at training weights of 60% of the 1 RM. If a person's 1 RM on the bench press was 100 pounds, the initial training weight would be set at 60 pounds.

You can use the table below to see the percent of 1 RM equivalent based on the number of repetitions a person can complete. For example if a person completed 10 repetitions of an exercise with good form and could not do more, that weight would be equivalent to 75% of their 1 RM.

### Number of Repetitions to % 1 RM (Westcott, 2002)

1	100
2	95
4	90
6	85
8	80
10	75
12	70
14	65
16	60
18	55
20	50

## 15 Repetition Maximum (15 RM) Test

### **Purpose / Description:**

Determining the amount of weight or resistance a person can lift 15 times and no more.

Have the individual warm up, and then demonstrate the exercise you want them to perform. Have them try the exercise without any resistance to make sure they understand the proper form. Make an educated guess as to the amount of weight/resistance under which the person will be able to do 15 repetitions, then have them try the exercise and see how many repetitions they can do, followed by a rest period. Without telling them that 15 is the goal, add or subtract weight based on their performance and form until you find the resistance level at which they can do 15 repetitions and no more.

### **Special Equipment or Space Needed:**

You will need equipment – typically resistance machines or free weights – that relates to the muscle/muscle groups you are testing. Elastic bands or tubing or body weight exercises can also be used.

### **Scoring and Score Interpretation:**

The 15 RM is the training weight for most beginners. You are both identifying the training weight and getting one set of an exercise completed with this test.

### **Functional Connection / Clinical Importance:**

The 15 RM is used to determine the appropriate training weight to use for an exercise based on the phase of training. You are doing a 1 RM calculation in reverse.

This is a safer option than a 1 RM test: in rehabilitation programs we often have reasons, such as healing concerns, why we do not want to test someone at their maximum. Most beginners and patients will start at a resistance that can be lifted 15 times and no more, so this test finds the training weight right away and the person gets a set of the exercise completed at the same time.

## Assessments for Aerobic Endurance

The appendix contains a Walking Endurance Program sheet, which can be used for a walking/aerobic exercise prescription. It includes areas to record aerobic endurance test scores.

### 6 Minute Walk Test

#### **Purpose / Description:**

Assessing aerobic endurance, and determining the distance an individual can walk in 6 minutes.

The individual should wear comfortable clothes and shoes. They can use any type of assistive device, but cannot need a physical assist (must be supervised, contact guard, or independent).

Instruct the individual to walk at their own pace, covering as much ground as possible in 6 minutes. Let them know they can stop and rest (standing rest) if needed, but timing continues. Do not overcoach: give encouragement every minute and let them know the time. Document total distance walked.

The individual is not required to walk the full 6 minutes. If they need to sit before 6 minutes, the test is done at that point and you would document the distance covered and when they had to sit.

Take vital signs at rest and at the end of the test for your clinical information (some protocols of this test used in cardiac rehabilitation and with individuals with respiratory conditions take vital signs every minute). Some therapists also like to gather rates of perceived exertion with this test.

#### **Time to Complete:**

< 10 minutes. You only do one trial due to fatigue.

#### **Special Equipment or Space Needed:**

Measuring device, equipment to check vital signs, stopwatch. Level walking space.

#### **Scoring and Score Interpretation:**

See norms below.

### **Test Norms (Rikli & Jones, 2013) – distances are in yards**

Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Men	610-735	560-700	545-680	470-640	445-605	380-570	305-500
Women	545-660	500-635	480-615	435-585	385-540	340-510	275-440

#### **Functional Connection / Clinical Importance:**

This test matches an individual's ability with their functional needs: for example, you may have a patient that has to walk over 1500 feet to get to their dining hall. The other things to note are if the individual needs rest breaks, has any difficulty with balance, or any gait disturbances during the test.

This test is also used with respiratory therapy to determine need for supplemental oxygen.

#### **Is the Test Free:**

Yes. No special test form is needed.

### 2 Minute Walk Test

#### **Purpose / Description:**

Assessing aerobic endurance, and determining the distance an individual can walk in 2 minutes.

The individual should wear comfortable clothes and shoes. They can use any type of assistive device, but cannot need a physical assist (must be supervised, contact guard, or independent).

Instruct the individual to walk at their own pace, covering as much ground as possible in 2 minutes. Let them know they can stop and rest (standing rest) if needed, but timing continues. Document total distance walked.

Take vital signs at rest and at the end of the test for your clinical information. Some therapists also like to gather rates of perceived exertion with this test.

**Time to Complete:**

< 5 minutes. You only do one trial due to fatigue.

**Special Equipment or Space Needed:**

Measuring device, equipment to check vital signs, stopwatch. Level walking space.

**Scoring and Score Interpretation:**

See norms below.

**Test Norms (Bohannon et al, 2015):**

Age	Women (Meters)	Men (Meters)
18-54	183	200.9
55-59	176.4	191.0
60-64	166.4	179.1
65-69	155.2	184.2
70-74	145.9	172.4
75-79	140.9	156.6
80-85	134.3	144.1

**Functional Connection / Clinical Importance:**

This test matches an individual's ability with their functional needs: for example, you may have a patient that has to walk over 1500 feet to get to their dining hall. The other things to note are if the individual needs rest breaks, has any difficulty with balance, or any gait disturbances during the test.

**Is the Test Free:**

Yes. No special test form is needed.

**2 Minute Step Test**

**Purpose / Description:**

Assessing aerobic endurance.

This test is a march in place test: it counts the number of full steps completed in 2 minutes with the person raising each knee to a point midway between the patella and iliac crest. To participate, a person needs to be able to march in place with or without holding on to a chair or counter. If a person has any limitations in weight-bearing status, or a recent cardiac event or surgery, this test is contraindicated. Vital signs are collected pre- and post-test.

Collect the pre-test vitals with the individual seated in a chair. Have them stand, measure a point midway between the patella and the iliac crest, and mark that spot with a piece of masking tape. Have the individual come over to a wall and transfer the masking tape to the wall at the same height.

Instruct the individual to do as many marches in place as they can within the 2 minutes. Cue them to make sure both knees are getting to the proper height. Both knees have to reach the masking tape, but only count the number of times the right side reaches the required height.

Monitor for signs of overexertion. If the person needs to take a rest break during the 2 minutes that is allowed as long as they remain standing. If they resume and do more marches before the 2 minutes are up, the additional ones are added to their score. If they need to sit down before the 2 minutes are up, their score is what they have up to that point. Collect the post-test vitals with the individual seated in the chair. Some therapists also like to gather rates of perceived exertion with this test.

Modifications and safety precautions: keep the chair nearby in case the person needs to hold onto it for safety: occasionally someone will start out looking good without holding on, but as they fatigue they may need to use the chair for balance. You can also have them stand near the wall. Holding on at any point during the test is considered a modification, so document that if it occurs. You may also need to lower the height for the march for individuals with any kind of flexibility limitation. Document if a shorter height was used so you can test it in the same manner when you retest.

**Time to Complete:**

< 5 minutes. You only do one trial due to fatigue.

**Special Equipment or Space Needed:**

Chair, equipment to check vital signs, tape measure, masking tape, stopwatch. Very little space needed.

**Scoring and Score Interpretation:**

See norms below.

**Test Norms (Rikli & Jones, 2013)**

Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Men	87-115	86-116	80-110	73-109	71-103	59-91	52-86
Women	75-107	73-107	68-101	68-100	60-90	55-85	44-72

Scores of less than 65 are associated with lower levels of functional ability (Rikli & Jones, 2013).

**Functional Connection / Clinical Importance:**

This test establishes a baseline for aerobic endurance, which is tied to walking tolerance and tolerance for activities of daily living. Some individuals have difficulty with basic tasks simply because they get too tired. This

test helps to capture that limitation. I have found this test is also helpful to help demonstrate to the individual the importance of participation in an aerobic exercise program.

### **Is the Test Free:**

Yes. No special test form is needed.

### **Other Functional Tests to Consider**

Because of their connection to function, I recommend considering two additional tests.

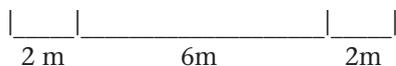
- Gait Speed: Timed 10-Meter Walk
- Short Physical Performance Battery

### **Gait Speed: Timed 10-Meter Walk**

#### **Purpose / Description:**

Assessing speed of walking in 2 conditions: preferred speed and maximal speed. The individual must walk without physical assistance, but can use any assistive device. You are allowed to walk by an individual if they need supervision for safety, but make sure you do not influence their speed.

Set up: Mark the start (0 meters) and finish line (10 meters) with tape. Now mark a line 2 meters from the starting line and 2 meters before the finish line to account for acceleration and deceleration zones.



The timer starts when toes of the leading foot cross the 2-meter line and the timer stops when the leading foot crosses the 8-meter line.

Preferred Speed: Ask the individual to walk at their preferred or normal speed from the starting line to the finish line. Collect 3 scores and average the trials.

Maximal Speed: Now ask the patient to “Walk as quickly and safely as possible” from the starting line to the finish line. Collect 3 scores and average the trials.

A video of a senior performing this test can be found at <https://progressivetherapyedu.com/physical-occupational-therapy-resources/>.

You can also perform a 5 meter gait speed test or even a 3 meter gait speed test. You would still mark an acceleration and deceleration zone for each (allow for at least 1 step of acceleration and 1 step of deceleration for the each version). The 3 meter test in particular works well for home care or if you have really limited space. It is not as accurate as a 5 or 10 meter test but it is still considered a valid test (Bohannon 2009).

#### **Time to Complete:**

About 10 minutes

#### **Special Equipment or Space Needed:**

Stopwatch, measuring device, tape to mark the floor and space for testing.

### **Scoring and Score Interpretation / Related Research:**

To calculate the score for a 10 meter test, divide 6 (the actual number of meters timed) by the average time to get your gait speed. For example, if a person took 5.8 seconds on average for the preferred speed portion, you would calculate  $6/5.8 = 1.03$  meters per second.

When scoring one of the variations, you would divide that distance traveled by the average time.

There is a helpful app (the Gait Speed app) that you can download – it does the math for you, and includes a timer.

This test has a wealth of research behind it: gait speed has been called a “Functional Vital Sign” and “The Sixth Vital Sign.” A white paper by Fritz and Lusardi (2009) highlighted the connections found in the literature between gait speed and other indicators of health:

#### **Categories of Ambulation**

- < .4 meters/sec = Household ambulatory
- .4 - .8 meters/sec = Limited community ambulatory
- .8 – 1.2 meters/sec = Community ambulatory
- 1.2 meters/sec and above = Able to safely cross streets

#### **Other Indicators**

- < .6 meters/sec = Dependent in ADL’s and IADL’s
- > 1.0 meters/sec = Independent in ADL’s
- < .6 meters/sec = More likely to be hospitalized
- > 1.0 meters/sec = Less likely to be hospitalized
- <1.0 meters/sec = Need intervention to reduce risk of falls
- > 1.0 meters/sec = Less likely to have adverse event

### **Functional Connection / Clinical Importance:**

This test is great to see if people who ambulate in the community are able to safely cross a street: speed and efficiency of gait are important, and this test captures those aspects; in addition, as you are getting an objective gait speed measure, you can also assess gait mechanics. From the research, we know that a person needs to walk at least 1.2 m/sec for safe crossing. If you have an individual that may not get back to 1.2 m/sec, you can tie improvements at lower levels to safely crossing a parking lot, exiting a building in case of an emergency, getting to the bathroom, and – for those with very slow gait – getting through an automatic doorway in time.

Another connection to function was brought up during one of my courses when I was teaching in New York City. A therapist mentioned that getting on and off the subway in time was a very important task for many of her senior clients.

A study by Studenski and colleagues published in the

*Journal of the American Medical Association* in 2011 pooled analysis from 9 cohort studies using data from over 34,000 community-dwelling older adults 65 and older and tied gait speed to longevity. They reported people that walked faster lived longer than people who walked slower. This further emphasizes gait speed as a functional vital sign.

**Is the Test Free:**

Yes. No special test form needed.

**Short Physical Performance Battery (SPPB)**

**Purpose / Description:**

Evaluating lower extremity functioning in older persons. The SPPB combines balance, chair rise, and gait tasks.

There are 3 sections to the test. The first looks at balance tests: feet side by side, semi-tandem stance, and tandem stance. The second addresses gait speed. The third consists of chair stand tests: single chair stand and 5 times chair stand.

Instructions should be delivered exactly as printed on the test form.

**Time to Complete:**

About 10 minutes

**Special Equipment or Space Needed:**

Scoring sheet, stopwatch, level space for walk test, standard chair.

**Scoring and Score Interpretation:**

There is a maximum score of 12. For community-dwelling older adults, a score of less than or equal to 10 indicates mobility disability (Vasunilashorn et al, 2009).

**Functional Connection / Clinical Importance:**

This test combines aspects of multiple other tests. It is a good choice if you want to have one objective measure to use to show progress.

**Is the Test Free:**

Yes (See test form – Appendix)

**Assessments for Lower Functional Levels**

Therapists may have patients who cannot participate in some assessments because of their level of disability, such as frail individuals with limited functional ability. The following tests can help establish a baseline and show progress with exercise programs with these individuals.

- Elderly Mobility Scale
- Barthel Index
- Sitting Balance Scale

**Elderly Mobility Scale**

**Purpose / Description:**

Assessing frail elderly subjects via a 20 point validated tool.

Subject performs 7 activities. The maximum score for the assessment is 20.

**Special Equipment or Space Needed:**

Scoring sheet, ruler, stopwatch, wall, access to bed and a chair, space for 6 meter walk.

**Time to Complete:**

About 15 minutes

**Scoring and Score Interpretation:**

Scores under 10: Generally patients are dependent in mobility and require assist with basic ADLs. Scores between 10-13: Generally these individuals are borderline for safe mobility and independence with ADLs. Scores over 14: generally these patients are able to perform mobility maneuvers alone and safely and are independent with ADLs.

**Functional Connection / Clinical Importance:**

This assessment is used most often in hospital settings, skilled nursing facilities, and home care. The score gives insight into overall mobility and ADL ability. It can also be used to educate individuals and their caregivers as to assist needed, and to aid in discharge planning.

**Is the Test Free:**

Yes (See test form – Appendix)

**Barthel Index**

**Purpose / Description:**

Assessing the ability of an individual with neuromuscular or musculoskeletal disorder to care for him/herself.

The Barthel Index consists of 10 ADL/mobility activities. Activities are rated based on the amount of assistance needed to complete each.

Additional notes to the clinician are listed on the test form.

**Special Equipment or Space Needed:**

Scoring sheet, hospital or facility room or bedroom in person's home, stairs.

**Scoring and Score Interpretation:**

None

**Functional Connection / Clinical Importance:**

This index is used to assess what a patient can do and the need for any assistance. It establishes a baseline of ability and helps guide the plan of care. It can also be used

to educate individuals and their caregivers as to assist needed, and to aid in discharge planning.

**Is the Test Free:**

Yes (See test form – Appendix)

**Sitting Balance Scale**

**Purpose / Description:**

Assessing balance in a seated position. (The items tested are quite similar to those included in the Berg Balance Scale, adapted to the sitting participant.)

This test assesses 11 items; each item is scored from 0-4, with “4” representing the highest level of function. The maximum score is 44.

Specific item-by-item instructions to the participant, with additional notes to the clinician, are listed on the test form.

**Time to Complete:**

About 15 minutes

**Special Equipment or Space Needed:**

Score sheet, 12” ruler, pen, slipper, stopwatch, 2 pound cuff weight, clip board, 15x15x5” piece of foam, 3-3 ½” large book.

**Scoring and Score Interpretation:**

There currently is not any research that has established norms for this test. However, scores can be used to show an individual’s progress, both numerically and as related to the improved functions you are seeing clinically.

**Functional Connection / Clinical Importance:**

The Sitting Balance Scale is most likely to be used with a patient that is non-ambulatory. In my experience, this test effectively demonstrates the need for items like positioning devices or special cushions. It can also be used to show improvements in sitting balance, which can translate into improved ADL ability at a seated level.

**Is the Test Free:**

Yes (See test form – Appendix)

**IX. Exercise Program Components**

The table below lists exercises for machines, free weights, and resistive bands. A beginner program should consist of one exercise for each main muscle group. You can mix and match from the three columns, depending on what equipment you and your patient have available.

Additional reminders:

- Start with a 2-4 exercises, and have the person

complete 1 set of 15 reps, then add additional exercises to get a complete program. When they can complete a full program 2 workouts in a row with good form, then you can add a second set.

- Use proper progression (5% Rule) to advance resistance amounts.
- Remember any special considerations or modifications that may be needed when selecting exercises.

Main Muscle Groups	Machine Workout	Free Weight Workout	Resistive Band Workout
Chest	Chest Press	Supine Dumbbell Chest Press	Seated Band Chest Press
Back	Seated Row	Bent Over Dumbbell Row	Seated or Standing Band Row
Legs	Leg Press or Knee Extensions & Hamstring Curls	Sit to Stands, Lunges or Step Ups with Dumbbells	Band Leg Press, Hip Abduction and Hamstring Curls
Shoulders	Shoulder Press	Dumbbell Military Press or Front Raise	Band Front Raise, Band Military Press
Biceps	Bicep Curls	Dumbbell Bicep Curls	Seated or Standing Band Bicep Curls
Triceps	Triceps Extension	Overhead Dumbbell Triceps Extension or Kick Backs	Triceps Band Push Downs
Abdominals	Abdominal Curl	Supine Curl Ups with Dumbbell	Seated Band Abdominal Curls
Low Back	Back Extension	Bridges with Dumbbell on Torso	Seated Band Back Extension

For ease of access, this table also appears in the Appendix.

## X. General Recommendations: Aerobic Endurance and Strengthening Exercises

Below you'll find the activity recommendations for older adults issued by the U.S. Department of Health and Human Services, the American College of Sports Medicine (ACSM), and the American Physical Therapy Association (APTA) Geriatric Section. These can be used to help educate individuals on the amount of activity that is recommended for good health.

### **U.S. Department of Health and Human Services: Physical Activity Guidelines for Americans (2 ed.)** (USDHHS, 2018)

Updated in 2018, the *Physical Activity Guidelines for Americans* provides evidence-based guidance to help Americans maintain or improve their health through activity. The premise is that regular physical activity over months and years can produce long-term health benefits. We discussed the key guidelines for both adults and older adults in Section I.

<https://health.gov/paguidelines/second-edition/>

### **American College of Sports Medicine (ACSM): Recommendations for Older Adults** (ACSM, 2009)

Strengthening Exercises:

- Progressive resistance training of all major muscle groups
  - 2-3 days per week
  - 2-3 sets
- Higher intensities are deemed more beneficial than, and just as safe as, lower intensities

Aerobic Exercises:

- 30-60 minutes per day of moderate-intensity OR 75-150 minutes per week of more vigorous aerobic activity

### **American Physical Therapy Association (APTA) Geriatric Section: Recommendations for Healthy Aging** (2019)

Strengthening Exercises:

- Progressive resistance training of all major muscle groups
  - 8-15 repetitions
  - 2-3 times per week
  - 1-3 sets

Aerobic Exercises:

- 20-60 minutes per day
- 3-5 days per week

<https://geriatricspt.org>

## XI. Modifications to Traditional Exercises

In order to educate your patients on proper technique and keep them safe, it is important to know and teach modifications for some common exercises and types of machines. Even if you are not using them in your therapy environment, your patients may be using them after discharge – another good reason to discuss what types of equipment they will have access to, and what they like to use, ahead of time.

**Front Raise** – Keep the thumb up position on this exercise in order to prevent impingement. If using a bar, hold the bar at the ends to keep the thumb up position.

**Lateral Raise** – This exercise should also be done with the thumb up position to prevent impingement.

**Chest Press / Bench Press** – Keep the elbow in line with or slightly in front of the shoulder in order to decrease stress on the anterior shoulder joint. If using a seated machine, adjust the back pad to achieve this. When the bench press is performed on a bench, avoid bringing weights or the bar to the chest and again keep the elbow in line with or slightly in front of the shoulder.

**Lat Pulldown** – There are usually pictures on these machines showing two ways to do this exercise: bringing the bar behind the back, or pulling it down to the collar bone region in the front. To reduce stress on the anterior shoulder, pull the bar to the front on this exercise. (When the bar is pulled to the back, we often see a forward head position with hyperextension in the neck; the shoulder is near end range of horizontal abduction and external rotation, increasing stress on it.)

**Pec Deck** – This is another machine that can cause stress on the anterior shoulder: often when people sit at the machine they are at the end ranges of horizontal abduction and external rotation. Adjust the arms to keep the elbow in line with or slightly in front of the shoulder for improved safety.

**Squat / Calf Raise Machine** – This is specifically the machine where the load is translated through the pads that rest above the shoulders: educate people with increased kyphosis and lordosis, or history of disc problems, to avoid this machine due to the compressive forces. Instead, use free weights held at the sides to avoid the compression force.

**Military Press** – To improve safety on this exercise, bring free weights a little in front of the body and not directly overhead. This helps reduce stress on the shoulder and improves ability to see the weight during the lift for safety. If a military press machine is used, adjust the back pad so the elbow can stay in front of the shoulder.

## XII. Evidence Based Group Exercise Classes

Incorporating community fitness and wellness opportunities can be a good addition to your home program: recommending good group exercise classes can be particularly motivating for those individuals who like to participate in group activities. Evidence-based programs are those that have been rigorously tested in controlled settings, proven effective, and translated into models that are available to community-based organizations. They are shown to have positive benefits for participants, have high retention rates, and are delivered by certified instructors.

The Administration on Aging (AoA) and the National Council on Aging (NCOA) are involved in administration and support initiatives on the efficient utilization of resources for low-cost but effective programs. NCOA's goal is to help older adults live longer and healthier lives, and NCOA supports the expansion and sustainability of evidence-based health promotion and disease prevention community programs. AoA's Regional Area Agencies on Aging (AAA) receive funding to support evidence-based programs: you can check with your local AAA to find out which programs are available in your community and if there is a need for a specific program. Look for programs at: <https://eldercare.acl.gov/Public/Index.aspx>

The Centers for Disease Control and Prevention (CDC) includes recommendations for evidence-based fitness classes on their site, including:

- Active Living Every Day (ALED)
- EnhanceFitness (EF)
- Fit & Strong!
- Walk with Ease (group)

They also mention other promising programs which have some evidence in support of their benefits but are still building infrastructure to support widespread use, including:

- Arthritis Foundation Aquatic Program (AFAP)
- Arthritis Foundation Exercise Program (AFEP)
- Walk with Ease (self-directed).

The APTA Academy of Geriatrics also mentions the above programs as a way to maintain gains made in therapy.

We will briefly discuss each below.

### **Active Living Every Day (ALED)**

(<https://us.humankinetics.com/blogs/active-living>)

Developed by behavioral scientists at the Cooper Institute in Dallas, TX, and offered through a partnership with Human Kinetics, Active Living Every Day is designed to teach ways to, as the name suggests, be more active every day: overcome barriers to physical activity, set realistic goals, build confidence, and stay motivated.

The ALED program can be offered in conjunction with existing community-based physical activity programs – participants meet once a week for one hour for 12 weeks – or independently. It utilizes the Active Living Every Day book and offers optional online support resources for participants and facilitators.

A randomized, clinical trial with 235 participants compared the 24-month intervention effects of a lifestyle physical activity program with traditional structured exercise on improving physical activity, cardio respiratory fitness, and cardiovascular disease risk factors (Dunn et al, 1999). Both the lifestyle and structured activity groups had significant and comparable improvements in physical activity and cardio respiratory fitness from baseline to 24 months.

### **EnhanceFitness (EF)**

(<https://projectenhance.org/enhancefitness/>)

EnhanceFitness is an evidence-based one hour group exercise class that includes cardiovascular exercise, strength training, and balance and flexibility exercises for frail to fit adults. The target audience is older adults living in the community. There is no expensive equipment required: only chairs and cuff weights. Each class can include up to 25 participants guided by a certified instructor; if the group size is larger than 25 a second instructor is added. Attendance is recorded, and three functional fitness tests are performed when individuals join the class and a four month intervals: an 8' Timed Up and Go Test, G, the Arm Curl Test, and the 30 Second Chair Stand Test. Data is collected and reported to track outcomes.

Per the EnhanceFitness website, the program has been shown to:

- Improve physical function
- Decrease depression
- Protect against falls and injury
- Provide a social benefit
- Promote a physically active lifestyle
- Reduce medical care utilization costs
- Decrease unplanned hospitalization
- Decrease mortality rate

In addition, EnhanceFitness cites a pilot study that began in 1993 in Bothel, WA. It reported that participants realized the following: a 13% improvement in social function, a 52% improvement in depression, and a 35% improvement in physical functioning.

### **Fit & Strong!**

(<https://www.fitandstrong.org/>)

Fit & Strong! is an evidence-based group physical activity and behavior change intervention for sedentary older adults with lower extremity joint pain and stiffness

related to osteoarthritis, who have physician clearance to participate in a physical activity routine. Exercise program development is combined with group problem solving/education to facilitate arthritis symptom management, confidence in ability to exercise safely with arthritis, and commitment to lifestyle change. Led by a certified fitness instructor, the program is 3 times per week for 8 weeks. Each session lasts 90 minutes: the exercise portion, including warm up and stretching, aerobic exercises, strength training exercises, and a cool down, is 60 minutes; the education portion occupies the final 30 minutes. Before the end of the program participants meet with the instructor and develop individualized exercise plans.

Outcomes of the program are measured using demographic information, the Western Ontario and McMaster Universities Arthritis Index (WOMAC), the geriatric version of the Arthritis Impact Measurement Scales (Geri-AIMS), and the Rapid Assessment of Physical Activity (RAPA). The National Council on Aging's website lists the following outcomes from participation in Fit & Strong!:

- Increased adherence to physical activity
- Improved self-efficacy for exercise
- Reduced lower extremity joint stiffness
- Decreased lower extremity joint pain
- Improved aerobic capacity (6 Minute Walk Test)
- Reduced arthritis pain

### **Walk With Ease**

(<https://www.arthritis.org/living-with-arthritis/tools-resources/walk-with-ease/>)

This program is offered by the Arthritis Foundation as either a self-guided course or in a community setting. Individuals using the self-guided format can purchase a guidebook from the Arthritis Foundation Online Store for \$11.95, which includes tools to develop a walking program, stay motivated, manage pain, and learn to exercise safely. For those who prefer a community format, classes are taught by an Arthritis Foundation certified leader in cities across the country as a 6 week program that meets 3 times per week for 1 hour sessions.

Per the Arthritis Foundation's website, studies by the Thurston Arthritis Research Center and the Institute on Aging of the University of North Carolina indicate that the Walk With Ease program can do the following:

- Reduce the pain and discomfort of arthritis
- Increase balance, strength and walking pace
- Build confidence in your ability to be physically active
- Improve overall health

### **Arthritis Foundation Exercise Program (AFEP)**

Led by a trained instructor, this is a low-impact

community-based program designed for people with arthritis. The focus of the program is to reduce fatigue, pain, and stiffness, and improve functional ability, mobility, strength, coordination, and self-confidence. The program is for 8-12 weeks, with sessions 2-3 times per week for 60 minutes each session.

Note: the Arthritis Foundation no longer directly offers the AFEP. Training to lead the program is available through the Aquatic Exercise Association (<https://www.aeawave.com/Arthritis.aspx>); already-available classes can be found via the Arthritis Foundation's Resource Finder (<http://resourcefinder.arthritis.org/>).

### **Arthritis Foundation Aquatic Program (AFAP)**

This water-based program is led by a trained instructor and includes joint range of motion exercises, stretching, breathing exercises, and light aerobic activities. Classes typically meet 2-3 times per week for one hour.

Note: the Arthritis Foundation no longer directly offers the AFAP. Training to lead the program is available through the Aquatic Exercise Association (<https://www.aeawave.com/Arthritis.aspx>); already-available classes can be found via the Arthritis Foundation's Resource Finder (<http://resourcefinder.arthritis.org/>).

There are two additional programs that are specifically designed for seniors and have some research to back them.

### **Tai Chi for Arthritis**

(<https://taichiforhealthinstitute.org/>)

Developed by Dr. Paul Lam at the Tai Chi for Health Institute (TCHI), this program targets adults with or without arthritis, rheumatic diseases, or related musculoskeletal conditions, as well as individuals with mild, moderate, or severe joint involvement or back pain. Classes are led by a TCHI Board certified instructor, 45-60 minutes 2-3 times per week for 6-8 weeks, and consist of:

- Warm up and cool down exercises
- One or two movements per lesson progressing to the six basic core movements and six advanced extension techniques
- Breathing techniques
- Tai Chi principles including those relating to improved physical and mental balance

Per the website, Tai Chi for Arthritis has been shown to:

- Improve balance
- Increase muscular strength
- Improve mobility
- Increase flexibility
- Improve psychological health
- Decrease pain
- Prevent falls

## Geri-Fit

(<https://www.gerifit.com/>)

Geri-Fit is an evidence-based health promotion and chronic disease management support program designed specifically for older adults. It's a progressive resistance exercise program that aims to rebuild strength that has been lost through the aging process to help ensure higher levels of function. The equipment used in the class includes dumbbells, a sturdy chair, and a stretch band. An instructor demonstrates the exercises used in the class and then walks around the group to give one-on-one correction.

The program reports the following benefits:

- Improved strength
- Improved balance
- Improved activities of daily living such as carrying groceries, being able to get out of a car, picking up a pet, getting up from a chair, going up and down steps, and being able to walk freely

The Geri-Fit program offers 4 different license opportunities; delivery can be via a group fitness class or a virtual fitness class.

## XIII. Special Considerations for Individuals with Comorbidities

### Diabetes

According to a report by the Centers for Disease Control and Prevention, as of 2015, 30.3 million Americans (9.4% of the U.S. population) have diabetes. In addition, more than 100 million U.S. adults are now living with diabetes or prediabetes (CDC, 2017).

One of the main considerations when working with individuals with diabetes is blood sugar. Always confirm that they are managing their diagnosis by checking and keeping a log of their blood sugar levels. If nutritional counseling is indicated, it's helpful to know about opportunities in your community: for starters, many physicians' offices offer free nutritional counseling, and many grocery stores offer nutritional classes as well. You'll also want to provide education in the importance of proper footwear and daily foot checks (a caregiver may need to assist). When stretching, to avoid disruption of blood flow, don't use the cross-leg position.

Keep fruit juice or sugared foods handy to counter the possibility of acute low blood sugar resulting from exercise plus insulin supplementation: Type 1 diabetics on beta blockers are particularly at risk for hypoglycemia because the medication masks the symptoms of an episode. Also, be aware of blood sugar numbers that may indicate exercise should be held. If blood sugar is below 100, individuals should supplement with carbohydrates before exercise. If a person with Type 2 diabetes has high

blood sugar (over 250), they can still exercise if they are well hydrated. If a person with Type 1 diabetes has high blood sugar, you should check for ketones: if present exercise should be held, but if there are no ketones they can exercise (GeriNotes 2008).

Another consideration for the exercise program is whether an individual has neuropathy. Any balance deficits due to the neuropathy should be noted; in addition, the presence of neuropathy may impact tolerance for exercises in weight bearing and/or weights or bands on the feet.

In a study by Kitamura et al (2003), the combination of modes of exercise is shown to be important: the authors conclude that aerobic plus resistance training is more effective for improving insulin action in the elderly than resistance training alone. Likewise, a literature review by Davis & Green (2007) noted that combining resistance training and aerobic training can have positive effects on metabolic variables. The authors also report that circuit training has shown to produce positive effect on glycemic control in Type 2 diabetics, and that moderate resistive training (45-55% 1 RM) was shown to be safe and effective in improving glycemic control with no adverse events other than mild muscle soreness

In 2008, the section on Geriatrics of the American Physical Therapy Association published a patient education piece titled "Diabetes: Guide to Safe and Effective Physical Activity and Exercise for the Aging Adult." The following exercise prescription was recommended:

- Cardiovascular aerobic exercise: at least 150 minutes per week of moderate-intensity aerobic physical activity and/or at least 90 minutes per week of vigorous aerobic activity.
- Resistance/strengthening exercise: resistive exercises 3 times per week targeting all major muscle groups (8-10 exercises). Progress to 3 sets of 8-10 repetitions of a weight that cannot be lifted more than 8-10 times.

### Osteoporosis

Per the International Osteoporosis Foundation, it is estimated that over 200 million people worldwide suffer from osteoporosis; approximately 30% of all postmenopausal women in the United States and in Europe have osteoporosis (2019).

Two of the main considerations with exercise selection are to avoid twisting and spinal flexion exercises. In general, people should be instructed to avoid fast or jerky motions, and to be aware of any visual and respiratory limitations due to postural changes. Education in self-care modifications – especially lower body dressing and reaching tasks – may be needed to help avoid excessive trunk flexion and rotation. If an individual you are working with has access to exercise equipment, caution

that person to avoid the rotary torso and the abdominal curl machines to limit trunk flexion and rotation. Individuals with this diagnosis should also avoid hip adduction and abduction against resistance machines. Typically start with lower loads at 50-60% 1 RM, and progress to 70-80% 1 RM as tolerated.

Multiple studies have shown positive effect on bone density with strengthening exercises. Menkes et al (1993) reported an increase in regional bone mineral density in middle-aged and older men after participation in a 16-week strength training program. Villaereal et al (2003) reported relatively vigorous exercise training significantly improved lumbar spine bone mineral density. Nelson et al (1994) showed a high intensity resistive training program was an effective means to preserve bone density in postmenopausal women. Finally, a literature review conducted by Zehnacker et al (2007) looked at which specific exercise protocols using resistive training were effective in maintaining or increasing bone density in postmenopausal women. They found improvements in bone density in seven of the studies, then looked for commonalities, and concluded: high loading (70-90% 1 RM) was required, at a volume of 8-12 reps and 2-3 sets.

In 2008, the section on Geriatrics of the American Physical Therapy Association published a patient education piece titled "Osteoporosis: Guide to Safe and Effective Physical Activity and Exercise for the Aging Adult." The following exercise prescription was recommended:

- Cardiovascular/aerobic exercise: impact activities (such as walking, dancing, and hiking) 3-5 days per week at a brisk pace for 20-30 minutes.
- Resistance/strengthening exercise: resistive exercises 2-3 times per week targeting all major muscle groups (8-10 exercises). Progress to 1-2 sets of 8-10 repetitions of a weight that cannot be lifted more than 8-10 times.
- Balance exercises: activities that challenge balance such as Tai Chi, challenging gait activities, and lower extremity exercises.
- Functional exercises: brisk walking, stair climbing, sit to stands.

### Osteoarthritis (OA)

Osteoarthritis is the most common joint disorder in the United States. Symptomatic knee OA occurs in 10% of men and 13% of women aged 60 years or older, and the number of people affected is likely to increase due to the aging of the population and the obesity epidemic (Yuqing Zhang et al, 2010).

General recommendations when working with individuals with osteoarthritis include avoiding exercises that may increase joint pain, using shorter sessions of exercise more frequently, and decreasing program

variables such as intensity and number of exercises during exacerbations. Education on proper neutral wrist position is often needed; overhead lifts with resistance should be avoided if there is shoulder or cervical arthritis. Proper shoe wear for shock absorption is another area that should be discussed. Since pain is a barrier for participation in an exercise program, it is important to educate individuals on the ability of exercise to help decrease pain and improve function. If weight bearing exercises are especially painful, pool programs may be considered.

Several research studies have shown exercise to be beneficial for individuals with osteoarthritis. A study that included 462 volunteers 65 and over found quadriceps weakness was common in individuals with positive radiographic findings of OA, whether or not pain was present. The authors suggest that quad weakness may precede the development of knee pain by changing the arthokinematics of the knee, eventually leading to pain (Slemenda et al 1997). Ettinger et al (1997) reported older disabled persons with knee OA had modest improvements in physical performance and pain with both aerobic and resistance exercise programs, and suggested that exercise should be prescribed as part of prescription for OA. Jan et al (2004) showed that participating three times per week in a home program of range of motion, strengthening, and walking improved muscle strength, walking speed, and function in patients after total hip arthroplasty. Mangione et al (2005) reported that a high-intensity exercise performed in the home is feasible for people after hip fracture. A home-based program of weight bearing exercises improved quadriceps strength, balance, and walking speed in individuals seven months post fall-related hip fracture in a study by Sherrington & Lord (1997). Galea et al (2008) reported a strengthening program was effective for both home and center based groups.

### Cardiovascular Disease

Cardiovascular disease or heart disease can refer to a number of conditions, including heart attack, stroke, heart failure, arrhythmia, and heart valve problems. According to the CDC (2017), heart disease is the leading cause of death for both men and women, with high blood pressure, high cholesterol, and smoking being key risk factors.

The main considerations when setting an exercise program for individuals with a history of heart disease are to avoid overhead exercises and isometrics that can induce the Valsalva maneuver, both of which can cause an increase in blood pressure.

After cardiac surgery, patients typically have a lift restriction, and resistive exercises are contraindicated until later in the rehab process. Post-op individuals start with active range of motion exercises for the upper and lower extremities, with all exercises performed below shoulder height. Their early rehabilitation also includes

a progressive walking program at a lower intensity. After the initial stages of cardiac rehabilitation, when post-op patients are able to begin strength training, they are advised to start at low intensity (estimated 40% 1 RM). They typically only do about 15 easy repetitions of an exercise. Proper breathing with all exercises should be emphasized. Monitoring of vital signs and use of RPE scales is important with individuals with heart disease. Educate your clients in how to self-monitor vital signs, as well as the signs and symptoms that they need to stop exercise.

The following exercise prescription was recommended for people with heart failure by the *Journal of Geriatric Physical Therapy* (Norman, 2012):

- Aerobic exercise 3-5 days per week, 60-80% max HR, RPE 12-14
- Resistive exercises 2-3 days per week, 40-80% 1 RM, RPE 12-14
- Respiratory muscle training 3-7 days per week, 15-30 min 1-2 times per day

### Chronic Obstructive Pulmonary Disease (COPD)

Chronic obstructive pulmonary disease is a progressive lung disease characterized by small airway inflammation with difficulty in breathing, wheezing, and chronic cough. The primary cause is smoking; other factors include environmental pollutants, allergies, asthma, and poor nutrition. By the year 2020, COPD is expected to be the third leading cause of death in the United States (CDC, 2018).

Individuals with this condition have increased work of breathing to overcome the increased airway resistance, and will typically need slower progression of their exercise program with more frequent rest breaks. In addition, since arm exercises cause shortness of breath sooner than leg exercises, you may need to alternate upper and lower body activities. The exercises that make up the home program can be divided up and spread throughout the day to make the program more manageable and to improve compliance. Oxygen saturation should be monitored; endurance testing may be necessary to assess the baseline in endurance and to see if supplemental oxygen is needed for exercise and activity. Likewise, monitor vital signs and look for indications of overexertion. To improve recovery from exercise and daily activities, education on breathing activities is helpful. Pinwheels, available at most dollar stores, are a good tool for breathing exercises: they add interest and give the person visual feedback.

In my experience, individuals with this diagnosis do really well with seated strengthening exercises. Since you are isolating muscle groups, the oxygen need is not as high as many standing exercises – I find the oxygen saturation number stays the same or increases slightly with seated strengthening exercise. I use RPE scales with

these individuals to get feedback from them on how hard they are working, both in order to be at the correct overload level, and to give them a sense of control over the intensity.

The ACSM recommends resistive exercises for individuals with COPD: 2-3 days per week with a low resistance and high repetitions (Durstine et al, 2016).

### Auditory and Visual Impairments

**Auditory impairments:** If your clients have hearing aids, check that they have them on and they are working properly. Face individuals so they can see you and speak slowly to assist in understanding. Avoid crowded and noisy environments for treatment and offer exercise demonstration along with verbal instruction.

**Visual impairments:** If your clients have glasses, check that they are clean and ask if they have had a vision check in the last year. Use large print for home exercise programs and other educational handouts. Be aware of spacing of the treatment environment so there are no trip hazards present, and make sure lighting conditions are good.

### Obesity

This diagnosis is strongly correlated with increased risk of coronary artery disease, hypertension, diabetes, hyperlipidemia, hormone dysfunction, and menstrual dysfunction. For exercise selection, begin with exercises that support body weight – such as seated exercises in lieu of standing – to reduce pressure on the joints. All exercise equipment and assistive devices have weight limits, so make sure they are safe to use before incorporating them. Nutritional counseling may be indicated, so an awareness of community resources can prove useful.

### Cognitive Deficits

When working with individuals with cognitive deficits, getting the caregivers involved and teaching them to assist will be necessary for the program to be beneficial. In addition, frequent demonstration and/or doing exercises along with the clients can be helpful. Keep exercises simple, and consider incorporating activities that are already familiar to each individual. Focus on postural muscles, quadriceps, hip extensors, and any other areas of weakness. Time of day is an important variable: since those with cognitive deficits often will do better earlier in the day, the exercise program should be scheduled then for better participation, and to avoid “sundowning” (the higher level of agitation associated with fatigue which is common at the end of the day). Music can also help to achieve better involvement.

An article in the *Journal of Geriatric Physical Therapy* looked at outcome measures used in the research on exercise interventions with people with Alzheimer's and related dementias, including the Timed Up and Go Test (TUG), repeated chair stand tests, short-distance gait

speed tests, the Berg Balance Scale, and isometric strength measures (McGough et al, 2019). Consider these tests when looking at outcome measures for your patients with similar diagnoses.

### Multiple Sclerosis (MS)

Multiple sclerosis is a disease of the central nervous system. Damage to the myelin coating around nerve fibers interferes with the transmission of nerve signals between the brain, spinal cord, and the rest of the body. Some of the common symptoms include fatigue, dizziness, balance and gait difficulties, weakness, vision problems, numbness and tingling, and spasticity.

The American College of Sports Medicine's *Exercise Management for Persons With Chronic Diseases and Disabilities* (2016) mentions that exercise training has no effect on the prognosis or progression of MS, but may improve short-term fitness and functional performance. Thus, the focus of the exercise program is maintenance of flexibility, strength, balance, and aerobic capacity. The main consideration is heat intolerance: you do not want to overwork or overheat individuals with this diagnosis. Make sure there is proper ventilation (such as fans) to avoid overheating, encourage adequate water intake, and realize they might have limited energy reserves.

### Parkinson's Disease

Parkinson's disease is a chronic, progressive disorder with symptoms including tremor, rigidity, bradykinesia, and postural instability. Exercise prescription typically focuses on using reciprocal movements, strengthening, flexibility, gait training, balance activities, and postural exercises. Treadmills should not be used for endurance exercises due to safety concerns, as individuals with Parkinson's disease can experience freezing episodes. Though outcomes vary because of the complexity and progressive nature of the condition, some more recent programs are showing some promise, including LSVT BIG.

LSVT BIG is an evidence-based treatment for people with Parkinson's disease, designed to help improve mobility and activities of daily living. The program helps people with Parkinson's disease recalibrate how they perceive their movements, which may have become smaller and slower due to disease progression. It consists of a 4-week training protocol incorporating both 1 hour sessions 4 days a week and daily practice via a home exercise program; after the 4 weeks, practice should continue for at least 10-15 minutes daily. Per the LSVT website, research on LSVT BIG began in 2001 and indicates improvement in the following after participation in the program: faster walking with bigger steps, improved balance, increased trunk rotation, and improvements in activities of daily living. Certification in the LSVT BIG program is available to physical and occupational therapists, and physical therapy assistants and occupational therapy assistants, and is required in order to use the program with patients.

A case study published in the Academy of Geriatric Physical Therapy's *GeriNotes* describes the impact of the LSVT BIG program on a patient with Parkinson's disease (Hampton et al, 2019). The baseline level of the individual in the case study was independent with basic activities of daily living, ambulation independent with a roller walker in the home and supervised with the walker outdoors, independent with steps using a handrail. The authors reported improvements in the individual's outcomes and indicated that participation in the LSVT BIG program allowed the patient to meet therapy goals. The outcomes, measured via functional test scores, are below:

Functional Tests	Initial Evaluation	Post-participation in LSVT BIG
Timed Up and Go Test (TUG)	23 sec with roller walker	10 sec no assistive device
Tinetti	23/28 sec with roller walker	28/28 sec no assistive device
Functional Reach	10 inches	20 inches
30 Second Sit to Stand Test	12 repetitions	15 repetitions
5 Times Sit to Stand Test	18 seconds	9 seconds
6 Minute Walk Test	480 feet with roller walker	600 feet no assistive device
10-Meter Walk Test	22 seconds or .45 meters per second with roller walker	6 seconds or 1.67 meters per second no assistive device

Anecdotally, I have spoken with a number of therapists over the years who are certified, or know a colleague certified, in LSVT BIG. They are always very positive about the treatment and report they have seen really good improvements in the patients that participate. If you have not seen the treatment, you can find out who is certified in your area on the website: <https://www.lsvtglobal.com/LSVTBig>.

In addition, Rock Steady Boxing and Pedaling for Parkinson's are community fitness classes designed for individuals with Parkinson's disease. You can check to see if these are offered in your area as referral options.

For information on Rock Steady Boxing, visit <https://rocksteadyboxing.org>. Pedaling for Parkinson's is offered through the YMCA – you can check with your local YMCA to see if it's available near you.

## XIII. Compliance and Discharge Planning

One of the keys to developing a solid exercise program is getting good participation, including after discharge. Since we do not get to follow patients for an extended period of time, the home exercise program is important to help individuals keep the gains made in therapy and to help them continue to improve. Talk with your patients. Find out what is reasonable for them, and what they are willing to do. Even the greatest, most comprehensive program will result in limited success if the individual it's designed for sees it as too much.

Some strategies for improving compliance include:

- Make the exercise fun and something they enjoy
- Give positive reinforcement
- Set a time of day to exercise to make it a routine
- Find an exercise buddy or individual to exercise with the person
- Incorporate socialization if the patient likes group classes
- Set goals based on the patient's needs and what is important for them
- Track participation using exercise grids or flow sheets
- Track progress with functional and objective testing
- Set up a reward (new walking shoes, workout clothes, massage, etc.)

## Conclusion

Some of your home exercise programs will be more comprehensive, while others might be very simple. Either way, effective exercise programs come down to proper design and good compliance.

Finding out which exercise activities each patient plans to return to allows you to fill in any gaps with the home program. Also keep in mind what the person is willing to do and what they like to do.

We have a wealth of research to guide us on proper exercise program design and the many benefits associated with strength and aerobic endurance programs. Using the principles of overload, progression, specificity, and rest/recovery, we can create safe and effective programs to help keep our senior clients independent and at the highest levels of function.

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## Appendix

### Test Forms

Short Physical Performance Battery

Elderly Mobility Scale

Barthel Index

Sitting Balance Scale

### Walking Endurance Program

### Exercise Program Components (Beginners)

## SHORT PHYSICAL PERFORMANCE BATTERY PROTOCOL AND SCORE SHEET

*All of the tests should be performed in the same order as they are presented in this protocol. Instructions to the participants are shown in bold italic and should be given exactly as they are written in this script.*

### 1. BALANCE TESTS

The participant must be able to stand unassisted without the use of a cane or walker. You may help the participant to get up.

***Now let's begin the evaluation. I would now like you to try to move your body in different movements. I will first describe and show each movement to you. Then I'd like you to try to do it. If you cannot do a particular movement, or if you feel it would be unsafe to try to do it, tell me and we'll move on to the next one. Let me emphasize that I do not want you to try to do any exercise that you feel might be unsafe.***

***Do you have any questions before we begin?***

#### A. Side-by-Side Stand

1. ***Now I will show you the first movement.***
2. (Demonstrate) ***I want you to try to stand with your feet together, side-by-side, for about 10 seconds.***
3. ***You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop.***
4. Stand next to the participant to help him/her into the side-by-side position.
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask ***"Are you ready?"***
7. Then let go and begin timing as you say, ***"Ready, begin."***
8. Stop the stopwatch and say ***"Stop"*** after 10 seconds or when the participant steps out of position or grabs your arm.
9. If participant is unable to hold the position for 10 seconds, record result and go to the gait speed test.

### **B. Semi-Tandem Stand**

1. ***Now I will show you the second movement.***
2. (Demonstrate) ***Now I want you to try to stand with the side of the heel of one foot touching the big toe of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you.***
3. ***You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop.***
4. Stand next to the participant to help him/her into the semi-tandem position
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask ***"Are you ready?"***
7. Then let go and begin timing as you say ***"Ready, begin."***
8. Stop the stopwatch and say ***"Stop"*** after 10 seconds or when the participant steps out of position or grabs your arm.
9. If participant is unable to hold the position for 10 seconds, record result and go to the gait speed test.

### **C. Tandem Stand**

1. ***Now I will show you the third movement.***
2. (Demonstrate) ***Now I want you to try to stand with the heel of one foot in front of and touching the toes of the other foot for about 10 seconds. You may put either foot in front, whichever is more comfortable for you.***
3. ***You may use your arms, bend your knees, or move your body to maintain your balance, but try not to move your feet. Try to hold this position until I tell you to stop.***
4. Stand next to the participant to help him/her into the tandem position.
5. Supply just enough support to the participant's arm to prevent loss of balance.
6. When the participant has his/her feet together, ask ***"Are you ready?"***
7. Then let go and begin timing as you say, ***"Ready, begin."***
8. Stop the stopwatch and say ***"Stop"*** after 10 seconds or when the participant steps out of position or grabs your arm.

**SCORING:**

**A. Side-by-side-stand**

- Held for 10 sec  1 point
- Not held for 10 sec  0 points
- Not attempted  0 points

**If 0 points, end Balance Tests**

Number of seconds held if  
less than 10 sec: \_\_\_\_ . \_\_\_\_ sec

**B. Semi-Tandem Stand**

- Held for 10 sec  1 point
- Not held for 10 sec  0 points
- Not attempted  0 points (*circle reason above*)

**If 0 points, end Balance Tests**

Number of seconds held if less than 10 sec: \_\_\_\_ . \_\_\_\_ sec

**C. Tandem Stand**

- Held for 10 sec  2 points
- Held for 3 to 9.99 sec  1 point
- Held for < than 3 sec  0 points
- Not attempted  0 points (*circle reason above*)

Number of seconds held if less than 10 sec: \_\_\_\_ . \_\_\_\_ sec

**D. Total Balance Tests score \_\_\_\_\_ (sum points)**

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

<i>If participant did not attempt test or failed, circle why:</i>	
Tried but unable	1
Participant could not hold position unassisted	2
Not attempted, you felt unsafe	3
Not attempted, participant felt unsafe	4
Participant unable to understand instructions	5
Other (specify) _____	6
Participant refused	7

## 2. GAIT SPEED TEST

*Now I am going to observe how you normally walk. If you use a cane or other walking aid and you feel you need it to walk a short distance, then you may use it.*

### A. First Gait Speed Test

1. *This is our walking course. I want you to walk to the other end of the course at your usual speed, just as if you were walking down the street to go to the store.*
2. Demonstrate the walk for the participant.
3. *Walk all the way past the other end of the tape before you stop. I will walk with you. Do you feel this would be safe?*
4. Have the participant stand with both feet touching the starting line.
5. *When I want you to start, I will say: "Ready, begin."* When the participant acknowledges this instruction say: *"Ready, begin."*
6. Press the start/stop button to start the stopwatch as the participant begins walking.
7. Walk behind and to the side of the participant.
8. Stop timing when one of the participant's feet is completely across the end line.

### B. Second Gait Speed Test

1. *Now I want you to repeat the walk. Remember to walk at your usual pace, and go all the way past the other end of the course.*
2. Have the participant stand with both feet touching the starting line.
3. *When I want you to start, I will say: "Ready, begin."* When the participant acknowledges this instruction say: *"Ready, begin."*
4. Press the start/stop button to start the stopwatch as the participant begins walking.
5. Walk behind and to the side of the participant.
6. Stop timing when one of the participant's feet is completely across the end line.

**GAIT SPEED TEST SCORING:**

Length of walk test course: Four meters  Three meters

**A. Time for First Gait Speed Test (sec)**

1. Time for 3 or 4 meters \_\_ \_\_. \_\_ \_\_ sec
2. If participant did not attempt test or failed, circle why:
  - Tried but unable 1
  - Participant could not walk unassisted 2
  - Not attempted, you felt unsafe 3
  - Not attempted, participant felt unsafe 4
  - Participant unable to understand instructions 5
  - Other (Specify) \_\_\_\_\_ 6
  - Participant refused 7
3. Aids for first walk.....None  Cane  Other

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**B. Time for Second Gait Speed Test (sec)**

1. Time for 3 or 4 meters \_\_ \_\_. \_\_ \_\_ sec
2. If participant did not attempt test or failed, circle why:
  - Tried but unable 1
  - Participant could not walk unassisted 2
  - Not attempted, you felt unsafe 3
  - Not attempted, participant felt unsafe 4
  - Participant unable to understand instructions 5
  - Other (Specify) \_\_\_\_\_ 6
  - Participant refused 7
3. Aids for second walk..... None  Cane  Other

What is the time for the faster of the two walks?  
Record the shorter of the two times \_\_ \_\_. \_\_ \_\_ sec  
[If only 1 walk done, record that time] \_\_ \_\_. \_\_ \_\_ sec

If the participant was unable to do the walk:  **0 points**

**For 4-Meter Walk:**

- If time is more than 8.70 sec:  **1 point**
- If time is 6.21 to 8.70 sec:  **2 points**
- If time is 4.82 to 6.20 sec:  **3 points**
- If time is less than 4.82 sec:  **4 points**

**For 3-Meter Walk:**

- If time is more than 6.52 sec:  **1 point**
- If time is 4.66 to 6.52 sec:  **2 points**
- If time is 3.62 to 4.65 sec:  **3 points**
- If time is less than 3.62 sec:  **4 points**

### 3. CHAIR STAND TEST

#### Single Chair Stand

1. **Let's do the last movement test. Do you think it would be safe for you to try to stand up from a chair without using your arms?**
2. **The next test measures the strength in your legs.**
3. (Demonstrate and explain the procedure.) **First, fold your arms across your chest and sit so that your feet are on the floor; then stand up keeping your arms folded across your chest.**
4. **Please stand up keeping your arms folded across your chest.** (Record result).
5. If participant cannot rise without using arms, say **"Okay, try to stand up using your arms."** This is the end of their test. Record result and go to the scoring page.

#### Repeated Chair Stands

1. **Do you think it would be safe for you to try to stand up from a chair five times without using your arms?**
2. (Demonstrate and explain the procedure): **Please stand up straight as QUICKLY as you can five times, without stopping in between. After standing up each time, sit down and then stand up again. Keep your arms folded across your chest. I'll be timing you with a stopwatch.**
3. When the participant is properly seated, say: **"Ready? Stand"** and begin timing.
4. Count out loud as the participant arises each time, up to five times.
5. Stop if participant becomes tired or short of breath during repeated chair stands.
6. Stop the stopwatch when he/she has straightened up completely for the fifth time.
7. Also stop:
  - If participant uses his/her arms
  - After 1 minute, if participant has not completed rises
  - At your discretion, if concerned for participant's safety
8. If the participant stops and appears to be fatigued before completing the five stands, confirm this by asking **"Can you continue?"**
9. If participant says "Yes," continue timing. If participant says "No," stop and reset the stopwatch.

**SCORING**

**Single Chair Stand Test**

- |   | <b>YES</b>               | <b>NO</b>                         |
|---|--------------------------|-----------------------------------|
| A. Safe to stand without help                                 | <input type="checkbox"/> | <input type="checkbox"/>          |
| B. Results:   |                          |                                   |
| Participant stood without using arms                          | <input type="checkbox"/> | → Go to Repeated Chair Stand Test |
| Participant used arms to stand                                | <input type="checkbox"/> | → End test; score as 0 points     |
| Test not completed  | <input type="checkbox"/> | → End test; score as 0 points     |
| C. If participant did not attempt test or failed, circle why: |                          |                                   |
| Tried but unable  | 1                        |                                   |
| Participant could not stand unassisted                        | 2                        |                                   |
| Not attempted, you felt unsafe                                | 3                        |                                   |
| Not attempted, participant felt unsafe                        | 4                        |                                   |
| Participant unable to understand instructions                 | 5                        |                                   |
| Other (Specify) _____   | 6                        |                                   |
| Participant refused   | 7                        |                                   |

**Repeated Chair Stand Test**

- |   | <b>YES</b>               | <b>NO</b>                |
|---|--------------------------|--------------------------|
| A. Safe to stand five times                                   | <input type="checkbox"/> | <input type="checkbox"/> |
| B. If five stands done successfully, record time in seconds.  |                          |                          |
| Time to complete five stands ____ . ____ sec                  |                          |                          |
| C. If participant did not attempt test or failed, circle why: |                          |                          |
| Tried but unable  | 1                        |                          |
| Participant could not stand unassisted                        | 2                        |                          |
| Not attempted, you felt unsafe                                | 3                        |                          |
| Not attempted, participant felt unsafe                        | 4                        |                          |
| Participant unable to understand instructions                 | 5                        |                          |
| Other (Specify)   | 6                        |                          |
| Participant refused   | 7                        |                          |

**Scoring the Repeated Chair Test**

- |   |                                   |
|---|-----------------------------------|
| Participant unable to complete 5 chair stands or completes stands in >60 sec: | <input type="checkbox"/> 0 points |
| If chair stand time is 16.70 sec or more:                                     | <input type="checkbox"/> 1 points |
| If chair stand time is 13.70 to 16.69 sec:                                    | <input type="checkbox"/> 2 points |
| If chair stand time is 11.20 to 13.69 sec:                                    | <input type="checkbox"/> 3 points |
| If chair stand time is 11.19 sec or less:                                     | <input type="checkbox"/> 4 points |

Study ID \_\_\_\_\_ Date \_\_\_\_\_ Tester Initials \_\_\_\_\_

**Scoring for Complete Short Physical Performance Battery**

**Test Scores**

**Total Balance Test score** \_\_\_\_\_ **points**

**Gait Speed Test score** \_\_\_\_\_ **points**

**Chair Stand Test score** \_\_\_\_\_ **points**

**Total Score** \_\_\_\_\_ **points (sum of points above)**

## Elderly Mobility Scale (EMS)

### Summary:

**Measures:** Scale of assessment of mobility.

**Description:** The EMS is a 20 point validated assessment tool for the assessment of frail elderly subjects (Smith 1994). The EMS is measured on an ordinal scale.

**Who's it for:** Older people in a hospital setting either on a ward or in a day hospital.

<b>Properties:</b> <u>Reliability:</u>	Inter-rater	YES
<u>Validity:</u>	Predictive	YES
	Concurrent	YES
<u>Responsive to change:</u>	Not established	
<u>Sensitivity:</u>	Not established	
<u>Specificity:</u>	Not established	

**Training:** Minimal

**Equipment:** Metre rule, stop watch, access to a bed and chair, and usual walking aid.

**Space needed:** Space for bed, chair, wall, space for 6m walk.

**Time to complete:** 15 minutes

**Good things about it:** Functional, clinically significant, minimal training needed, can be used as an assessment tool and an outcome measure.

**Limitations:** Difficult to use in community environments, ceiling effect for more able patients, not sensitive for patients with issues of poor confidence.

**Version 2**  
**Updated June 2012**

# ELDERLY MOBILITY SCALE SCORE

Patient details.....

TASK	Date			
<b>Lying to Sitting</b>	2 Independent 1 Needs help of 1 person 0 Needs help of 2+ people			
<b>Sitting to Lying</b>	2 Independent 1 Needs help of 1 person 0 Needs help of 2+ people			
<b>Sitting to Standing</b>	3 Independent in under 3 seconds 2 Independent in over 3 seconds 1 Needs help of 1 person 0 Needs help of 2+ people			
<b>Standing</b>	3 Stands without support and able to reach 2 Stands without support but needs support to reach 1 Stands but needs support 0 Stands only with physical support of another person			
<b>Gait</b>	3 Independent (+ / - stick) 2 Independent with frame 1 Mobile with walking aid but erratic / unsafe 0 Needs physical help to walk or constant supervision			
<b>Timed Walk (6 metres)</b>	3 Under 15 seconds 2 16 - 30 seconds 1 Over 30 seconds 0 Unable to cover 6 metres <i>Recorded time in seconds.</i>			
<b>Functional Reach</b>	4 Over 20 cm. 2 10 - 20 cm. 0 Under 10 cm.  <i>Actual reach</i>			
<b>SCORES</b>		<b>/ 20</b>	<b>/ 20</b>	<b>/ 20</b>
<b>Staff Initials</b>				

**Scores under 10** - generally these patients are dependent in mobility manoeuvres; require help with basic ADL, such as transfers, toileting and dressing.

**Scores between 10 - 13** - generally these patients are borderline in terms of safe mobility and independence in ADL i.e. they require some help with some mobility manoeuvres.

**Scores over 14** - Generally these patients are able to perform mobility manoeuvres alone and safely and are independent in basic ADL.

Version 2

# THE BARTHEL INDEX

Patient Name: \_\_\_\_\_

Rater Name: \_\_\_\_\_

Date: \_\_\_\_\_

---

Activity	Score
----------	-------

---

## FEEDING

0 = unable

5 = needs help cutting, spreading butter, etc., or requires modified diet

10 = independent

\_\_\_\_\_

## BATHING

0 = dependent

5 = independent (or in shower)

\_\_\_\_\_

## GROOMING

0 = needs to help with personal care

5 = independent face/hair/teeth/shaving (implements provided)

\_\_\_\_\_

## DRESSING

0 = dependent

5 = needs help but can do about half unaided

10 = independent (including buttons, zips, laces, etc.)

\_\_\_\_\_

## BOWELS

0 = incontinent (or needs to be given enemas)

5 = occasional accident

10 = continent

\_\_\_\_\_

## BLADDER

0 = incontinent, or catheterized and unable to manage alone

5 = occasional accident

10 = continent

\_\_\_\_\_

## TOILET USE

0 = dependent

5 = needs some help, but can do something alone

10 = independent (on and off, dressing, wiping)

\_\_\_\_\_

## TRANSFERS (BED TO CHAIR AND BACK)

0 = unable, no sitting balance

5 = major help (one or two people, physical), can sit

10 = minor help (verbal or physical)

15 = independent

\_\_\_\_\_

## MOBILITY (ON LEVEL SURFACES)

0 = immobile or < 50 yards

5 = wheelchair independent, including corners, > 50 yards

10 = walks with help of one person (verbal or physical) > 50 yards

15 = independent (but may use any aid; for example, stick) > 50 yards

\_\_\_\_\_

## STAIRS

0 = unable

5 = needs help (verbal, physical, carrying aid)

10 = independent

\_\_\_\_\_

**TOTAL (0-100):** \_\_\_\_\_

## The Barthel ADL Index: Guidelines

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1. The index should be used as a record of what a patient does, not as a record of what a patient could do.
2. The main aim is to establish degree of independence from any help, physical or verbal, however minor and for whatever reason.
3. The need for supervision renders the patient not independent.
4. A patient's performance should be established using the best available evidence. Asking the patient, friends/relatives and nurses are the usual sources, but direct observation and common sense are also important. However direct testing is not needed.
5. Usually the patient's performance over the preceding 24-48 hours is important, but occasionally longer periods will be relevant.
6. Middle categories imply that the patient supplies over 50 per cent of the effort.
7. Use of aids to be independent is allowed.

## References

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Mahoney FI, Barthel D. "Functional evaluation: the Barthel Index."  
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*Maryland State Med Journal* 1965;14:56-61. Used with permission.

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## SITTING BALANCE SCALE

Note: all sitting items are performed with the patient sitting unsupported on a surface with both feet in weight bearing unless otherwise indicated.

Equipment needed: Score sheet, 12-inch ruler, pen, slipper, PDR or other item 3-3.5 inches thick, stopwatch, 2 lb cuff weight, clipboard, 1'5 x 15" x 5" piece of foam

### **1. SITTING UNSUPPORTED (eyes open)**

INSTRUCTIONS: Please sit with your arms folded for 60 seconds. (Examiner must make sure the patient's feet are in weight bearing.)

- ( ) 4 able to sit safely and securely 60 seconds
- ( ) 3 able to sit 60 seconds under supervision
- ( ) 2 able to sit 30 seconds
- ( ) 1 able to sit 10 seconds
- ( ) 0 unable to sit without support 10 seconds

### **2. SITTING UNSUPPORTED (eyes closed)**

INSTRUCTIONS: Please sit with your eyes closed for 30 seconds. (Examiner must make sure the patient's feet are in weight bearing.)

- ( ) 4 able to sit safely and securely 30 seconds
- ( ) 3 able to sit 30 seconds under supervision
- ( ) 2 able to sit 10 seconds
- ( ) 1 able to sit 3 seconds
- ( ) 0 unable to sit without support 3 seconds

### **3. SITTING UNSUPPORTED WITH ARMS AS LEVERS**

INSTRUCTIONS: Please lift this cuff weight out in front of you with your arm straight. (Starting position for all scores is with patient's hands in their lap. Examiner must ensure that the arm moves to at least 90 degrees of shoulder flexion for a score of 4 or 3. If the patient has hemiplegia, test using the unaffected arm.)

- ( ) 4 able to sit while lifting a 2-lb cuff weight at 90 deg. shoulder flexion
- ( ) 3 able to sit while lifting one arm to 90 deg. flexion
- ( ) 2 able to sit with hands folded across chest
- ( ) 1 able to sit with hands in lap
- ( ) 0 able to sit with hands at side on the mat

### **4. REACHING FORWARD WITH OUTSTRETCHED ARM WHILE SITTING**

INSTRUCTIONS: Reach forward and touch this pen. (Ask the patient to make a fist and extend arm forward to shoulder height (approximately 90 degrees). Place a 12 inch ruler touching patient's fist in line with patient's arm. Hold up a pen 12 inches from patient's fist. Ask the patient to try to touch the pen with knuckles without losing balance. Note distance reached.)

- ( ) 4 can reach forward confidently > 10 inches
- ( ) 3 can reach forward > 5 inches
- ( ) 2 can reach forward > 2 inches
- ( ) 1 reaches forward but needs supervision
- ( ) 0 loses balance while trying/requires external support

## **5. PICK UP AN OBJECT FROM THE FLOOR WHILE SITTING UNSUPPORTED**

INSTRUCTIONS: Pick up the slipper. (Examiner should place the slipper on the floor 3 inches in front of the patient's toes.)

- ( ) 4 able to pick up slipper without losing balance
- ( ) 3 able to pick up slipper but needs supervision for balance
- ( ) 2 unable to pick up slipper but reaches 1-2 inches (2-5 cm) from slipper and keeps balance independently
- ( ) 1 unable to pick up and needs supervision while trying
- ( ) 0 unable to try/needs assist to keep from losing balance or falling

## **6. PLACE ALTERNATE FOOT ON LARGE BOOK (PDR) WHILE SITTING UNSUPPORTED**

INSTRUCTIONS: Place each foot alternately on this book four times. (Place a *Physician's Desk Reference* (PDR) or other item that is 3-3½ inches high, 6 inches in front of the toes. Have patient alternately touch feet to the top of the PDR. Patient should continue until each foot has touched the PDR four times. Patients with hemiplegia or unilateral amputation may perform the task with their uninvolved leg.)

- ( ) 4 able to sit independently and safely complete 8 steps in 20 seconds
- ( ) 3 able to sit independently and complete 8 steps in > 20 seconds
- ( ) 2 able to complete 4 steps without aid with supervision
- ( ) 1 able to complete > 2 steps needs minimal assist
- ( ) 0 needs assistance to keep from falling/unable to try

## **7. REACHING UNILATERALLY WITH OUTSTRETCHED ARM WHILE SITTING UNSUPPORTED**

INSTRUCTIONS: Reach to the side and touch this pen. (Ask patient to make a fist and extend arm out to the side, laterally, to shoulder height (approximately 90 degrees). Place a 12 inch ruler touching the patient's fist in line with patient's arm. Hold up a pen 12 inches from patient's fist. Ask patient to try to touch the pen with knuckles without losing balance. Note distance reached. If the patient is in a wheelchair, remove the arms of the chair.)

- ( ) 4 can reach laterally confidently > 10 inches
- ( ) 3 can reach laterally > 5 inches
- ( ) 2 can reach laterally > 2 inches
- ( ) 1 reaches laterally but needs supervision
- ( ) 0 loses balance while trying/requires external support

## **8. TURNING TO LOOK BEHIND OVER LEFT AND RIGHT SHOULDERS WHILE SITTING**

INSTRUCTIONS: Turn to look directly behind you over toward your left shoulder. Repeat to the right. (Patient is seated with hands in lap. Examiner may identify an object directly behind the patient to encourage a complete turn of the trunk.)

- ( ) 4 looks behind from both sides while shifting weight appropriately
- ( ) 3 looks behind one side only other side shows less weight shift
- ( ) 2 turns sideways only but maintains balance
- ( ) 1 needs supervision when turning
- ( ) 0 needs assist to keep from losing balance

## 9. LATERAL BEND TO ELBOW IN SITTING

INSTRUCTIONS: While facing forward, bend sideways to your left until your forearm touches the clipboard and return to an upright position. Repeat to the right. (Place a clipboard level with the sitting surface. Patients with hemiplegia should perform this task to both sides.)

- ( ) 4 able to smoothly perform the motion bilaterally and return to midline
- ( ) 3 able to perform 2/3 of the motion or difficulty returning to midline on one or both sides
- ( ) 2 able to perform 1/3 of the motion or only performs unilaterally
- ( ) 1 initiates motion, but requires assistance to go further
- ( ) 0 unable to complete motion

## 10. SIT TO STAND TRANSFERS

INSTRUCTIONS: Please stand up. Try not to use your hands for support.

- ( ) 4 able to transfer safely with the minor use of hands
- ( ) 3 able to transfer safely with verbal cuing and/or supervision
- ( ) 2 able to transfer with assistance x 1
- ( ) 1 able to transfer with assistance x 2
- ( ) 0 unable to transfer or needs a lift

Note: On the following item have the patient sit unsupported on a 15" x 15"x5" piece of foam to further evaluate sitting balance. Density should be such that when the patient sits on the foam, their balance is challenged but the foam should not be compressed all the way to the chair seat. The patient's feet should remain in weight bearing.

## 11. PICK UP AN OBJECT FROM THE FLOOR WHILE SITTING UNSUPPORTED ON FOAM

INSTRUCTIONS: Pick up the slipper that is placed 3 inches in front of your toes. (Examiner should place the slipper on the floor 3 inches in front of the patient's toes.)

- ( ) 4 able to pick up slipper safely and easily
- ( ) 3 able to pick up slipper but needs supervision
- ( ) 2 unable to pick up slipper but reaches 1-2 inches (2-5 cm) from slipper and keeps balance independently
- ( ) 1 unable to pick up and needs supervision while trying
- ( ) 0 unable to try/needs assist to keep from losing balance or falling

\_\_\_\_\_ **TOTAL SCORE (Maximum = 44)**



## Exercise Program Components – Beginners

The table below lists exercises for machines, free weights, and resistive bands. A beginner program should consist of one exercise for each main muscle group. You can mix and match from the three columns, depending on what equipment you and your patient have available.

Additional reminders:

- Start with a 2-4 exercises, and have the person complete 1 set of 15 reps, then add additional exercises to get a complete program. When they can complete a full program 2 workouts in a row with good form, then you can add a second set.
- Use proper progression (5% Rule) to advance resistance amounts.
- Remember any special considerations or modifications that may be needed when selecting exercises.

<b>Main Muscle Groups</b>	<b>Machine Workout</b>	<b>Free Weight Workout</b>	<b>Resistive Band Workout</b>
<b>Chest</b>	Chest Press	Supine Dumbbell Chest Press	Seated Band Chest Press
<b>Back</b>	Seated Row	Bent Over Dumbbell Row	Seated or Standing Band Row
<b>Legs</b>	Leg Press or Knee Extensions & Hamstring Curls	Sit to Stands, Lunges or Step Ups with Dumbbells	Band Leg Press, Hip Abduction and Hamstring Curls
<b>Shoulders</b>	Shoulder Press	Dumbbell Military Press or Front Raise	Band Front Raise, Band Military Press
<b>Biceps</b>	Bicep Curls	Dumbbell Bicep Curls	Seated or Standing Band Bicep Curls
<b>Triceps</b>	Triceps Extension	Overhead Dumbbell Triceps Extension or Kick Backs	Triceps Band Push Downs
<b>Abdominals</b>	Abdominal Curl	Supine Curl Ups with Dumbbell	Seated Band Abdominal Curls
<b>Low Back</b>	Back Extension	Bridges with Dumbbell on Torso	Seated Band Back Extension

# EFFECTIVE HOME EXERCISE PROGRAM DESIGN FOR SENIOR PATIENTS

## (4 CE HOURS) FINAL EXAM

- Per the National Institute on Aging (2019), lack of exercise together with poor diet is the \_\_\_\_\_ leading cause of death in the United States.
  - Leading
  - Second leading
  - Third leading
  - Fifth leading
- Per the U.S. Department of Health and Human Services, for substantial health benefits, adults should do at least \_\_\_\_\_ 150 minutes (2 hours and 30 minutes) to 300 minutes (5 hours) a week of \_\_\_\_\_.
  - Balance training
  - Moderate-intensity aerobic physical activity
  - Muscle-strengthening activities
  - Vigorous-intensity aerobic physical activity
- Increased metabolic rate, improvement in blood lipids, and decreased fall risk are among the benefits provided by \_\_\_\_\_.
  - Aerobic exercises only
  - Aerobic exercises and resistive exercises
  - Resistive exercises only
  - None of the above
- Which of the following is NOT among the mental health benefits provided by exercise, per Long & Van Stavel (1995)?
  - Enhances mood
  - Increases self-confidence
  - Provides positive body image
  - Reduces physical relaxation
- "The ability to lift and carry" is among the three main areas of function required for community-dwelling identified by Shumway-Cook and colleagues (2002). On average, how much did study participants carry?
  - 3.9 pounds
  - 5.2 pounds
  - 6.7 pounds
  - 8.3 pounds
- Age-related changes to the skeletal system can impact exercise programs in which of the following ways?
  - Increased rigidity of the spine and postural changes can make use of exercise machines more difficult as the individual may not "fit" well in the machines
  - Skeletal changes in the hand may make modification of grip necessary for exercises
  - There is a decrease in joint mobility – therapists may need to modify exercises or have people exercise through only available range of motion
  - All of the above
- Per the American College of Sports Medicine (1998), asthma, musculoskeletal pain, and uncontrolled diabetes are among the \_\_\_\_\_.
  - Barriers to exercise
  - Contraindications to exercise
  - Precautions to exercise
  - Risks of exercise
- When applying the principle of overload to aerobic endurance, using the heart rate method, what is the age-predicted training heart rate of an 80 year old man?
  - 84-112 beats per minute
  - 90-120 beats per minute
  - 96-128 beats per minute
  - 102-136 beats per minute
- When applying the principle of progression to strengthening, the 5% rule states that when a person can complete the target number of repetitions in \_\_\_\_\_ successive workouts with good form, they should be ready to progress. The safe progression amount is to increase the resistance by 5%.
  - 1
  - 2
  - 3
  - 4
- Given the program design variable of exercise order, recommendations include \_\_\_\_\_.
  - Doing core exercises at the end of the program
  - Scheduling more complex exercises later in the program
  - Working larger muscle groups before larger groups
  - All of the above
- Given the program design variable of rest periods, the target rest period between moderate resistance training sets of 8-12 repetitions at 70-80% RM, working the same muscle group, is \_\_\_\_\_.
  - 30-60 seconds
  - 60-90 seconds
  - 2 minutes
  - 3 minutes
- When using the Borg scale of rated perceived exertion, the target work level is between \_\_\_\_\_.
  - 10-12 (light)
  - 12-14 (somewhat hard)
  - 16-18 (very hard)
  - None of the above

13. The \_\_\_\_\_ tests functional lower extremity strength and detects normal age-related strength decline. Equipment needed includes a 17" chair and a stopwatch. Adaptations such as "allowing the individual to use their arms" "increasing the chair's surface height" are allowed in the context of an original score of "0."
- 30 Second Chair Stand Test
  - Push Up Test
  - Trunk Curl Test
  - YMCA Leg Extension Test
14. The \_\_\_\_\_ assesses upper body strength. Men should use the standard position; women may use a modified position.
- 1 Repetition Max (1 RM) Test
  - Arm Curl Test
  - Push Up Test
  - Trunk Curl Test
15. The norms for this test include age 70-74, men 545-680 yards, women 480-618 yards; age 75-79, men 470-640 yards, women 435-585 yards.
- 2 Minute Step Test
  - 2 Minute Walk Test
  - 6 Minute Walk Test
  - Gait Speed: Timed 10-Meter Walk
16. The \_\_\_\_\_ evaluates lower extremity functioning in older persons, combining balance, chair rise, and gait tasks. There is a maximum score of 12.
- 5 Times Sit to Stand Test
  - Barthel Index
  - Elderly Mobility Scale
  - Short Physical Performance Battery (SPPB)
17. The \_\_\_\_\_ assesses the ability of an individual with neuromuscular or musculoskeletal disorder to care for him/herself. It consists of 10 ADL/mobility activities. Activities are rated based on the amount of assistance needed to complete each.
- Barthel Index
  - Elderly Mobility Scale
  - Gait Speed: Timed 10-Meter Walk
  - Sitting Balance Scale
18. Considering exercise program components, band front raises, band military presses, and dumbbell military presses target which main muscle group?
- Abdominals
  - Back
  - Legs
  - Shoulders
19. Strengthening exercises: progressive resistance training of all major muscle groups, 8-15 repetitions, 2-3 times per week, 1-3 sets and aerobic exercises: 20-60 minutes per day, 3-5 days per week are activity recommendations issued by whom?
- American College of Sports Medicine
  - American Physical Therapy Association Geriatric Section
  - Senior Fitness Test Manual
  - U.S. Department of Health and Human Services
20. Both front raises and lateral raises should be done with the \_\_\_\_\_ position to prevent impingement.
- Palm down
  - Palm up
  - Thumb down
  - Thumb up
21. When the load is translated through the pads that rest above the shoulders, educate people with increased kyphosis and lordosis, or history of disc problems, to avoid this machine due to the compressive forces. Instead, use free weights held at the sides.
- Lat Pulldown
  - Military Press
  - Pec Deck
  - Squat / Calf Raise Machine
22. Developed by behavioral scientists at the Cooper Institute in Dallas, TX, and offered through a partnership with Human Kinetics, \_\_\_\_\_ is designed to teach ways to overcome barriers to physical activity, set realistic goals, build confidence, and stay motivated.
- Active Living Every Day (ALED)
  - EnhanceFitness (EF)
  - Fit & Strong!
  - Walk With Ease
23. \_\_\_\_\_ is an evidence-based health promotion and chronic disease management support program designed specifically for older adults. The equipment used in the class includes dumbbells, a sturdy chair, and a stretch band.
- Arthritis Foundation Exercise Program (AFEP)
  - EnhanceFitness (EF)
  - Geri-Fit
  - Tai Chi for Arthritis
24. When working with a client with osteoporosis, considerations include \_\_\_\_\_.
- Avoid fast or jerky motions
  - Emphasize twisting and spinal flexion exercises
  - Incorporate hip adduction and abduction against resistance machines
  - Incorporate rotary torso and abdominal curl machines
25. The following exercise prescription was recommended for people with \_\_\_\_\_ by the Journal of Geriatric Physical Therapy (Norman, 2012):
- Aerobic exercise 3-5 days per week, 60-80% max HR, RPE 12-14
  - Resistive exercises 2-3 days per week, 40-80% 1 RM, RPE 12-14
  - Respiratory muscle training 3-7 days per week, 15-30 min 1-2 times per day
- Chronic obstructive pulmonary disease
  - Heart failure
  - Multiple sclerosis
  - Parkinson's disease

## ANSWER SHEET

First Name: \_\_\_\_\_ Last Name: \_\_\_\_\_ Date: \_\_\_\_\_

Address: \_\_\_\_\_ City: \_\_\_\_\_

State: \_\_\_\_\_ ZIP: \_\_\_\_\_ Country: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

License/certification # and issuing state/organization \_\_\_\_\_

Clinical Fellow: Supervisor name and license/certification # \_\_\_\_\_

Graduate Student: University name and expected graduation date \_\_\_\_\_

\*\* See instructions on the cover page to submit your exams and pay for your course.

**By submitting this final exam for grading, I hereby certify that I have spent the required time to study this course material and that I have personally completed each module/session of instruction.**

### Effective Home Exercise Program Design for Senior Patients Final Exam

- |                    |                     |                     |                     |                     |
|--------------------|---------------------|---------------------|---------------------|---------------------|
| 1. (A) (B) (C) (D) | 6. (A) (B) (C) (D)  | 11. (A) (B) (C) (D) | 16. (A) (B) (C) (D) | 21. (A) (B) (C) (D) |
| 2. (A) (B) (C) (D) | 7. (A) (B) (C) (D)  | 12. (A) (B) (C) (D) | 17. (A) (B) (C) (D) | 22. (A) (B) (C) (D) |
| 3. (A) (B) (C) (D) | 8. (A) (B) (C) (D)  | 13. (A) (B) (C) (D) | 18. (A) (B) (C) (D) | 23. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D) | 9. (A) (B) (C) (D)  | 14. (A) (B) (C) (D) | 19. (A) (B) (C) (D) | 24. (A) (B) (C) (D) |
| 5. (A) (B) (C) (D) | 10. (A) (B) (C) (D) | 15. (A) (B) (C) (D) | 20. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |

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# EFFECTIVE HOME EXERCISE PROGRAM DESIGN FOR SENIOR PATIENTS

(4 CE HOURS)

## COURSE EVALUATION

Learner Name: \_\_\_\_\_ Completion Date: \_\_\_\_\_

PT  PTA  OT  OTA  SLP  SLPA Other: \_\_\_\_\_

	Disagree			Agree		
Orientation was thorough and clear	1	2	3	4	5	
Instructional personnel disclosures were readily available and clearly stated	1	2	3	4	5	
Learning objectives were clearly stated	1	2	3	4	5	
Completion requirements were clearly stated	1	2	3	4	5	
Content was well-organized	1	2	3	4	5	
Content was informative	1	2	3	4	5	
Content reflected stated learning objectives	1	2	3	4	5	
Exam assessed stated learning objectives	1	2	3	4	5	
Exam was graded promptly	1	2	3	4	5	
Satisfied with learning experience	1	2	3	4	5	
Satisfied with customer service (if applicable)	1	2	3	4	5	n/a

What suggestions do you have to improve this program, if any?

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What educational needs do you currently have?

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What other courses or topics are of interest to you?

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