Balancing Act: Functional Tests and Assessments for Balance and Fall Risk

PDH Academy Course #PT-1904
4 CE Hours

Course Abstract

Census data tells us that elderly populations are growing at an unprecedented rate – and we know as therapists that the elderly have the greatest risk of fall-related injury or death. This course presents a discussion of risk factors for falls, followed by an examination of evidence-based tests and assessments for balance and fall risk, including screening tools for cognitive impairment, functional tests pertaining to balance and fall risk, and questionnaires that assess confidence with mobility and concern for falling. It concludes with an overview of fall-related resources.

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Approvals

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Target Audience & Prerequisites

PT, PTA, OT, OTA – no prerequisites

Learning Objectives

By the end of this course, learners will:

- Identify statistics pertaining to falls and fall-related injuries
- Recognize age related physiological changes, with attention to how each contributes to fall risk
- Distinguish between screening tools for cognition
- Distinguish between screening tools for balance and fall risk
- Recall fall-related resources available to patients, caregivers, and health care workers

Timed Topic Outline

I. Statistics: Falls and Fall-Related Injuries (20 minutes)
II. Risk Factors for Falls (40 minutes)
    Age-Related Physiological Changes that Contribute to Fall Risk, Relevant Research, Modifiable Risk Factors for Falls, Alignment and Posture
III. Importance of Testing, When to Test, and Which Tests to Choose (10 minutes)
    Importance of Testing, When to Test, Which Tests to Choose
IV. Screening Tools: Cognition (10 minutes)
    Test and Assessment Overview
V. Screening and Assessment Tools: Balance and Fall Risk (90 minutes)
    Databases on Functional Testing, Test and Assessment Overview, American Physical Therapy Association Section Recommendations

VI. Resources for Patients, Caregivers and Health Care Workers (20 minutes)
Professional Resources, Evidence-Based Community Fall Prevention Programs
VII. Conclusion and Appendix (30 minutes)
VIII. References and Exam (20 minutes)

Delivery Method
Correspondence/internet self-study, with 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

As therapists, we see many individuals who have suffered a fall, and often, an injury as a result of the fall. While anyone, at any age, can fall, it's a particular risk in older populations: per the World Health Organization (WHO), not only do older people have the greatest risk fall-related risk of serious injury or death, this risk increases as they age (WHO, 2018). Nor is a fall likely to be a one-time occurrence: among those 65 years of age and older, falling once doubles a person's chances of falling again (CDC, 2017).

As the so-called "baby boomers" (those born between 1946-1964) age, we're seeing demographics unique in the history of the United States. By 2030, 1 in every 5 residents will be older than age 65. By 2035, for the first time ever, older adults (65+ years) are expected to outnumber children (less than 18 years), 78.0 million to 76.7 million (US Census Bureau, 2018). By 2060, the 65+ age group is projected to make up nearly 24% of the total population (Population Reference Bureau, 2016).

The well-documented projected growth of aging populations makes it even more incumbent upon therapists to adequately assess balance and fall risk, make allowances for both in plans of care, and educate their clients while doing so.

I. Statistics: Falls and Fall-Related Injuries

To further illuminate the scope of the problem, let's spend some time with the statistics.
The World Health Organization (WHO) addresses falls worldwide on their website, including the following facts (WHO, 2018):

- Falls are the second leading cause of accidental or unintentional injury deaths worldwide.
- Each year an estimated 646,000 individuals die from falls globally, of which over 80% are in low- and middle-income countries.
- Adults older than 65 years of age suffer the greatest number of fatal falls.
- 37.3 million falls that are severe enough to require medical attention occur each year.

They further discuss prevention strategies, emphasizing the importance of "…education, training, creating safer environments, prioritizing fall-related research and establishing effective policies to reduce risk."

Within the United States, the Centers for Disease Control and Prevention (CDC) has many fall-related resources on their website, some of which will be addressed later in the course. In addition, they supply these figures (CDC, 2017):

- One out of five falls causes a serious injury such as a broken bone or head injury.
- Each year, 3 million older people are treated in emergency departments for fall injuries.
- Over 800,000 patients a year are hospitalized because of a fall injury, most often because of a head injury or hip fracture.

- Each year at least 300,000 older people are hospitalized for hip fractures.
- More than 95% of hip fractures are caused by falling, usually falling sideways.
- Falls are the most common cause of traumatic brain injuries (TBI).
- In 2015, the total medical costs for falls totaled more than $50 billion.

The National Council on Aging (NCOA) also addresses falls in aging populations on their website, stating (NCOA, 2018):

- 1/4 of Americans aged 65+ falls each year.
- Every 11 seconds, an older adult is treated in the emergency room for a fall; every 19 minutes, an older adult dies from a fall.
- Adjusted for inflation, the annual direct medical costs for fall injuries are $31 billion. Hospital costs account for 2/3 of the total.
- By 2020, the annual direct and indirect cost of fall injuries is expected to reach $67.7 billion.

II. Risk Factors for Falls

There are a number of risk factors for falls, which can be divided into two categories: intrinsic and extrinsic.

Intrinsic risk factors are those that are within the body and/or acting upon the body; they may or may not be modifiable.

- Advanced age
- History of falls
- Muscle weakness
- Gait and balance problems
- Poor vision
- Postural hypotension
- Chronic conditions (arthritis, diabetes, stroke, dementia, incontinence, Parkinson's)
- Fear of falling
- Multiple medications / Psychoactive medications
- Cognitive decline

Extrinsic risk factors are those that are within the environment. They can often be modified or avoided.

- Lack of handrails on steps
- Poor stair design
- Lack of grab bar in bathroom
- Obstacles and trip hazards
- Slippery and uneven surfaces
- Improper use of assistive device

Falls are commonly caused by a combination of multiple risk factors, both intrinsic and extrinsic (CDC: Fact Sheet, 2017).

Age-Related Physiological Changes that Contribute to Fall Risk
As the body ages, a number of physiological changes take place: while all naturally occur due to the passage of time and aging processes, some can be influenced through lifestyle choices.

The table below (Arking, 1998; Digionvanna, 2004) summarizes how various body systems are impacted by aging, considering both how those physiological changes influence therapy programs in general, and how they affect fall risk. (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.)

Body System	**Physiological Changes with Aging**	**Impact on Fall Risk and Therapy Programs**
Muscular	Decreased ability of cell to be stimulated by neuron Decrease in number of muscle cells (Type II/fast twitch more than Type I/slow twitch) Decrease in number & size of mitochondria	Decreased muscle strength and muscular endurance Earlier onset of fatigue Decreased ability to respond to rapid movements Decreased ability for power Decreased function and impaired Activities of Daily Living, especially gait, stair climbing, and sit-to-stand performance Substitution of muscle groups with exercise and function
Skeletal	Protein & minerals in bone matrix change Bone more rigid and brittle Decrease in trabecular & cortical bone Thinning of cartilage in joints Decrease in central region of	Increased risk of fracture Decreased height Decreased joint mobility Joint pain due to thinning of cartilage Increased rigidity of spine Postural changes which can limit

	vertebral body Collagen of intervertebral joints becomes stiffer	visual field causing fall risk
Cardiac	Decrease in maximum heart rate Stiffer, dilated, thicker heart Accumulation of lipids in arteries Decreased ability of arteries to dilate	Decreased efficiency and increased O_2 demand Decreased ability to respond to temperature changes, making environment a factor, as well as increased need for proper warm up and cool down May need additional rest breaks Overhead work can increase blood pressure Modifications might be needed for exercises May be quick to fatigue, affecting balance
Integumentary	Thinning of epidermis Decreased number of collagen fibers Decreased number of sweat glands Decreased number of sensory neurons in the skin	Increased susceptibility to infection Decreased rate of wound healing Tissue easier to damage Decreased thermoregulation (importance of environment, warm up and cool down with activity) Decreased manual dexterity Modified grip may be needed for activities and ADLs Education on prevention of pressure sores Pressure relief and positioning education
Neurological	Gradual decline in sensory functions	Delayed reaction times – increased

	Decrease in number of motor neurons Reflexes slowed	risk of falls or injury due to decreased ability to anticipate changes in the environment (decreased anticipatory postural control) Inability to enjoy aromas of foods, which can effect nutritional status and overall health Slowing of voluntary movement Neuropathy may be present, affecting proprioceptive input from the foot and ankle
Vestibular	Decrease in number of nerve cells Decrease in density of hair cells Decrease in blood flow to the inner ear Reduction in vestibulocular reflex (VOR)	Issues of dizziness Vestibular-related disorders (BPPV, Meniere's disease, Vertigo) Reduction in VOR affects ability to stabilize vision when the head turns quickly
Vision	Decreased transparency of cornea Cornea becomes flattened Decreased fluid production Decreased number and length of cones Reduced acuity Decrease in depth perception Decrease contrast sensitivity Increase in eye diseases: cataracts, glaucoma, and macular degeneration	Difficulty seeing close objects – need for bifocals Medication mistakes due to not being able to read dosage and instructions Decreased adaptation to changing light Altered perception of body position in space Narrowing of visual field Difficulty with visualizing and perceiving surface conditions/environmental hazards Loss of independence when the person can no longer drive

		Larger print needed for handouts Potential social isolation, depression, decreased activity
Hearing	Increased ear wax Decrease in number of several types of cells Eardrum becomes stiffer	Decreased ability to hear all frequency of sound (especially high frequency) Decreased ability to localize sound Increased risk of falls / decreased balance reactions Potential social isolation, depression, decreased activity
Respiratory	Weakening of muscles of respiration Decrease in minute volume due to stiffness of thorax Decreased vital capacity Decreased rate of diffusion Decrease in Forced Expiratory Volume (FEV) Decrease in max breathing	Increased risk of aspiration and pneumonia Decreased efficiency of activities Increased risk of sedentary lifestyle Decreased maximal VO2 Need for additional monitoring of vitals, rest breaks, breathing techniques

Relevant Research

Rubenstein et al (2000) analyzed sixteen fall risk factor studies, identifying three top factors: lower extremity weakness, history of falls, and gait or balance deficit. They also emphasized the relevance of advanced age (over 80), cognitive impairment, depression, arthritis, and visual deficits.

Looking specifically at cognitive impairment, Yaffe et al (2001) found that at least 10% of all people older than 65, and 50% of those older than 80, have some form of cognitive impairment. These changes can affect the older person's ability to anticipate and adapt to changes and hazards in the environment. For example, the incidence of falls in older people with cognitive impairment is more than two times that of cognitively intact people (Allan et al, 2009). And, along with dementia, a diagnosis of depression is linked to higher fall risk (Taylor et al, 2012).

On another note, older adults who take four or more prescription medications are at higher risk of falls (Campbell et al, 1989): many medications have side effects such as dizziness, fatigue, hypotension, and weakness that influence fall risk.

Finally, not only is fear of falling a risk factor for falling, but it can impact the lives of those who have not yet fallen. Events associated with developing fear of falling include a history of falls, dizziness, and self-related poor health; 35-56% of community-residing adults significantly curtail their activities due to fear of falling (Clemson et al, 2004).

Modifiable Risk Factors for Falls

As previously mentioned, both intrinsic and extrinsic risk factors for falls can be modifiable; further, we can play a role by addressing them in our therapy plan of care, as well as through patient and community education. The CDC (CDC Fact Sheet, 2017) references the following in particular:

- Difficulty with gait
- Foot (and/or shoe) problems
- Vestibular disorders/poor balance
- Postural hypotension
- Poor vision
- Medication-linked
- Home hazards

Before we look at balance specifically, let's briefly address both medication and home hazards.

Medication Management

The CDC stresses the importance of medication management – which it describes as eliminating medications if there is no active indication, reducing each dose to the lowest one effective, and avoiding medications where the risks outweigh the benefits – in the prevention of falls. It also mentions reducing or eliminating the following: any psychoactive drugs, drugs that have any anticholonergic side effects, and sedating over the counter medications, specifically Tylenol PM and Benadryl. In support of medication management, the CDC further recommends a "brown bag day," where people gather all their medications in a bag and review them with their pharmacist or physician.

Home Safety Assessments

Therapists are often in a position to improve safety and function in the home, whether through a discussion about home safety for the purposes of fall prevention or the use of a home safety assessment. There are a number of home safety assessments that are free to use. For example, the CDC's Stopping Elderly Accidents, Deaths & Injuries initiative (STEADI) has nice checklists available (https://www.cdc.gov/steadi/patient.html); likewise, the AARP website (https://www.aarp.org/) has good checklist options, ranging from room overviews to home overviews. If you're looking for a really extensive checklist, check out the AARP HomeFit Guide (https://assets.aarp.org/www.aarp.org_/articles/families/HousingOptions/200590_HomeFit_re

v011108.pdf), which provides a very detailed home safety assessment. For your convenience, I've also attached a summary home safety checklist, based on my many years of work in home care, which compiles information from multiple lists: see Appendix.

Alignment and Posture

Alignment and posture can impact balance, so you'll want to keep both in mind throughout the assessment and intervention process.

Alignment incorporating a forward head and rounded shoulders is associated with decreased function in walking, stair climbing, lifting, reaching, dressing, and bathing. It is also linked to susceptibility for vertebral fractures. In contrast, the benefits of proper alignment include:

- Increased lung capacity
- Less stress & strain on spine, joints and muscles
- Improved digestion
- Increased energy

Anticipatory vs. Reactive Postural Control

Anticipatory control is the control used when actions can be planned in advance: examples include recognizing a change in flooring and adjusting accordingly, or walking on a sidewalk, seeing sticks and obstacles like sticks in the way, and changing gait pattern to accommodate the situation.

Reactive control describes the more automatically generated actions that occur when our movements cannot be planned in advance. In other words, they occur in response to an event or events we did not expect. Examples include walking on a road and hitting a patch of black ice, or walking across the lawn and stepping in a hole.

Postural Control Strategies

There are at least three distinct postural control strategies that are used to maintain posture and our center of gravity: ankle strategy, hip strategy and step strategy.

Ankle strategy is affected by range of motion, strength at joint, the surface below, and sensation in the feet. We use this strategy if given a gentle nudge when standing to maintain balance.

Hip strategy is determined by the amount of strength and range of motion (ROM) of the hip. It is used in instances where there is more body sway: if you were given a nudge while standing on a narrow beam, you would "break" at the hip to accommodate for the disturbance of your center of gravity.

Step strategy is affected by lower extremity strength and power. If your center of gravity is moved beyond your maximum limit of stability the step strategy comes into play: you are standing on a piece of foam, someone pushes you to the side, and you step in order to maintain an upright position.

Analyzing alignment and posture should be a part of your assessment process; likewise, teaching proper alignment and postural strategies can be incorporated into your patient education and treatments.

III. Importance of Testing, When to Test, and Which Tests to Choose

Importance of Testing

Including functional tests and objective measures in documentation has become increasingly important over the last several years. Medicare and other insurance providers are looking for objective data to show need for skilled therapy and to show progress with interventions. As we move toward an era of pay for performance, this will become even more critical.

Functional testing helps to find the strengths and weaknesses your patient may have. In addition to helping to objectively demonstrate the need for skilled treatment, progress with the treatment plan, and need for continued services, it also guides your plan of care, ensuring that it is specific to the individual and their function. Let's consider an example: I might see in a therapy note that the patient is min assist for upper body dressing, but no documentation as to why they are min assist. It might be because they have limited shoulder range of motion, poor fine motor skills, decreased ability to reach and gather items for dressing, inadequate balance, cognitive deficits, etc. Terms like min, mod, and max assist are objective, but they are not patient specific, and don't address *why* the person is at a particular assist level. Functional testing helps us to investigate and pinpoint the "why" – the reason that an individual is having difficulty with basic functions.

The other important benefit of functional testing is motivation. I have found in my own practice that people love numbers, so it can be really helpful to show individuals their scores, explain what each one means, and break down how each will influence your goals. Objective data can also be used to educate patients and family members: to motivate them to participate in therapy, help to strengthen a recommendation, or demonstrate the need for continued treatment in the next phase of rehabilitation. Likewise, when people cannot see how much progress they have made, having objective data to show them this is very helpful. I have often used functional testing during home care, not only to show progress during my episode of care, but also to show why outpatient therapy is recommended.

Keep all of these factors in mind as you read through the functional tests presented in this course.

When to Test

Functional tests are commonly completed at the initial physical therapy and occupational therapy evaluations, both to establish a baseline, and to track progress over time.

Functional testing can also be done at any point in the plan of care, for any number of reasons. At a logistical level, time constraints may prevent you from completing all the tests you would like on the initial visit; doing them on subsequent visits is still an option. In another scenario, your patient may not be appropriate for a test on the initial visit due to their functional level, but might be able to participate later in the episode of care.

Which Tests to Choose

Choosing the right combination of tests takes practice and knowledge of the test options. Here are some things to keep in mind:

1. What do you want to test for? There is a wide range of tests available, valid for assessing functional strength, aerobic endurance, gait, and balance and fall risk, as well as screens for confidence/concern vis-à-vis falling, cognitive status, etc. Make sure the test is valid for what you want to test.

2. Do you know how to correctly perform the test, and is it an evidence-based test (by which I mean does it have good research behind it)?

   Prior to going over specific functional tests, we'll take a look at two excellent databases on functional testing, both of which cover the psychometric properties of each test included, as well as specific research pertaining to each. Similarly, practice sections of the American Physical Therapy Association (APTA) issued recommendations for tests, based on their psychometric properties and clinical usefulness; we'll consider those recommendations later in the course.

3. Do you have the time to perform the test, the equipment needed, adequate space, and any test scoring forms?

4. Do you understand the scoring, and how it relates to both function and your overall treatment plan?

5. Is the patient at a functional level and cognitive level to appropriately participate in the assessment?

   It's important to match the level of difficulty of a test to the functional ability of the patient. If you choose tests that are too easy for a higher-level individual, the results may fail to show why they need skilled therapy. Conversely, if you choose tests that are too difficult, you may not be able to show progress during your therapy plan of care.

   We'll take a closer look at assessing cognition in the next section.

IV. Screening Tools: Cognition

Since cognitive decline has been shown to play a role in fall risk, it is important to know tools to assess cognition. It is also important for your overall plan of care, as individuals with impaired cognition might take additional time or need caregiver training and involvement in order to meet therapy goals.

Sometimes another discipline, such as speech-language pathology, may have performed a cognitive screen; if that is the case you can refer to their findings. If, however, you suspect some issues with cognition but do not see anything documented in the medical record, you may wish to run a screen of your own. I have included the tools that therapists around the country tell me they use the most often.

Note: Cognitive tests come in multiple languages, so make sure you know the primary language of the individual being tested. A person may score as having a cognitive deficit on one of the tools when they actually just have a language barrier.

Test and Assessment Overview

The following tests and assessments will be covered:

- Mini-Mental State Examination
- Montreal Cognitive Assessment
- Saint Louis University Mental Status Exam
- Short Orientation-Memory Concentration Test of Cognitive Impairment

Mini-Mental State Examination

Purpose / Description:

Provides a quantitative assessment of cognitive impairment and tracks changes in cognition over time. The Mini-Mental State Examination includes 11 simple questions grouped into 7 cognitive domains:

- Orientation to time
- Orientation to place
- Registration of 3 words
- Attention and calculation
- Recall of 3 words
- Language
- Visual construction

Time to Complete:

< 10 minutes

Scoring and Score Interpretation:

The maximum score is 30. Levels of impairment are as follows (Tombaugh & McIntyre, 1992):

24-30	No impairment
18-24	Mild impairment
0-17	Severe impairment

Is the Test Free:
The current version of the test (MMSE-2) is not free to use; it is available for purchase at https://www.parinc.com/Products/Pkey/238.

Montreal Cognitive Assessment (MoCA)
Purpose / Description:
A brief 30 question cognitive screening tool for mild cognitive impairment. It assesses the following:

- Visuospatial/executive function
- Naming
- Memory
- Attention
- Language
- Abstraction
- Delayed recall
- Orientation

There are multiple versions of the MoCA, including one for people who are visually impaired.

Time to Complete:
10-12 minutes

Scoring and Score Interpretation:
Scores range from zero to 30: 26 and higher is usually considered normal.

In the initial data study, normal people scored an average of 27.4; people with mild cognitive impairment (MCI) scored an average of 22.1; people with Alzheimer's disease scored an average of 16.2 (Rosenzweig, 2018).

A short training program to better understand the test, as well as its scoring and interpretation, is available at https://www.mocatest.org/.

Is the Test Free:
Yes (Must be accessed at https://www.mocatest.org/)

Saint Louis University Mental Status Exam (SLUMS)
Purpose / Description:
Identifies persons who have dementia or mild neurocognitive impairment. It consists of 11 items testing orientation, memory, attention, and executive function.

Test website: https://www.slu.edu/medicine/internal-medicine/geriatric-medicine/aging-successfully/assessment-tools/mental-status-exam.php

Time to Complete:
< 10 minutes

Scoring and Score Interpretation:
The maximum score is 30 points. Cut-off scores for dementia or mild neurocognitive impairment are based on the education level of the patient being tested.

Is the Test Free:
Yes (See test form – Appendix)

Short Orientation-Memory Concentration Test of Cognitive Impairment (OMCT)
Purpose / Description:
A short assessment of cognitive ability, based on the Blessed Dementia Scale. The OMCT is made up of 6 items testing attention/working memory, reasoning/problem solving, cognition, and executive functioning.

Time to Complete:
5-10 minutes

Scoring and Score Interpretation:
The maximum score is 28 point; counterintuitively, the higher the score, the greater the impairment. A score within the 0-8 range is considered normal.

0-8: Normal - minimal impairment
9-19: Minimal to moderate impairment
20-28: Severe impairment

Is the Test Free:
Yes (See test form – Appendix)

V. Screening and Assessment Tools: Balance and Fall Risk

Now let's move on to examining several functional screening and assessment tools tied to balance and fall risk in the literature.

Databases on Functional Testing
As we address specific tests, should you wish to examine one or more in greater depth, you may wish to take advantage of the following options.

Rehabilitation Measures Database (Shirley Ryan AbilityLab)
https://www.sralab.org/rehabilitation-measures

Geriatric Assessment Tool Kit (University of Missouri)
http://geriatrictoolkit.missouri.edu/

Both of the above free databases contain a wealth of information on each test, including research, the psychometric properties of each, relevant research, and links to additional information. If the test is freely available, copies are usually available for download; if a fee or special permission is required for use, access information is provided instead.

PTNow (APTA)
https://www.ptnow.org/

Available free to members of the APTA, PTNow also provides an extensive database of tests and test information, including psychometric properties and clinical utility. Other resources include full-text access to research articles, access to Cochrane Reviews, and more.

Test and Assessment Overview
The following tests and assessments will be covered:

- Berg Balance Scale
- Timed Up and Go Test
- 30 Second Chair Stand Test
- 5 Times Sit to Stand Test
- 4-Stage Balance Test
- Single Leg Stance
- Walkie-Talkie Test
- Functional Reach Test
- Four Square Step Test
- Fullerton Advanced Balance Scale
- Dynamic Gait Index
- Gait Speed: Timed 10-Meter Walk
- Short Physical Performance Battery
- Clinical Test of Sensory Integration on Balance
- Mini Balance Evaluation Systems Test
- Function in Sitting Test
- Sitting Balance Scale

In addition, a summary table is included as a quick reference – see Appendix.

Berg Balance Scale (Berg)
Purpose / Description:
Measuring static and dynamic balance of older adults. This is a 14 item test that progressively gets more challenging as it goes along. The test should be performed in order. The individual being tested is not allowed to use an assistive device.

Time to Complete:
About 15 minutes.

If you are new to the test it can take a while to score due to the multiple levels of scoring per item on the test. I find as therapists get increasingly familiar with the scoring they can complete the test in < 15 minutes.

Special Equipment or Space Needed:
Score sheet, stop watch, ruler, footstool or step, 2 standard chairs (one with arms and one without), a shoe or a slipper. This test does not need much space, and can be done in a patient's room if you are in a facility.

Scoring and Score Interpretation:
A five-point ordinal scale ranging from 0-4: "0" indicates the lowest level of function and "4" the highest level. Maximum score for the test is 56.

Related Research:
Per Berg et al, scores of less than 45 indicate individual may be at greater risk of falling (1992). Thorbahn and Newton also found that a cutoff of 45/56 discriminated fallers from non-fallers (1996). Likewise, scores of less than 40 were associated with almost 100% fall risk (Shumway-Cook et al, 1997).

Functional Connection / Clinical Importance:
The Berg is an excellent assessment to evaluate static and dynamic balance for multiple diagnoses. It can help you to identify impairments or weakness your client has, so that you can use that information to direct the plan of care. The Berg is often used to help make the clinical decision whether a person needs to use an assistive device due to fall risk, and/or to help strengthen a recommendation to use an assistive device or other equipment such as a grab bar. In addition, it can be tied to safety with ambulation and safety with ADL's. Many components of the Berg are also used as treatment.

While therapists generally tell me they use this test with slightly higher-level individuals as it has some more challenging tasks, it can be used for a wide variety of functional levels – particularly if you feel an individual has the ability to improve with intervention. I have used this test frequently, in both outpatient and home care settings: I find it clearly shows clients their level of safety and ability.

Is the Test Free:
Yes (See test form – Appendix)

Timed Up and Go Test (TUG)
Purpose / Description:
Assessing mobility and fall risk. The TUG tests the ability to rise from a standard arm chair, walk 3 meters, turn, and return to the chair. An individual can use an assistive device for this test but

must be able to stand from the chair and walk without physical assist. You can supervise the individual for safety but not assist them.

Measure a point 3 meters from the front of the chair, and place a piece of tape or cone at that mark.

The person starts seated in the chair with their back against the back of the chair. They should be given the following instructions: "On 'Go' I want you to stand and walk at your normal pace around the cone (or piece of tape), return to the chair, and sit with your back against the back of the chair." Let them know you are timing them: the timer starts on the command "Go" and ends when the person sits back in the chair returning to the start position. They should be given a practice and 2 timed trials.

IMAGE 1

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

Dual Task TUGs: There are also versions of the TUG where an additional task is added. For example, in one test the individual carries a full cup of water while performing the TUG; in another the person is asked to count backwards from a number (given by the tester) while performing the TUG. Both of these scenarios test the ability to multi-task, and can highlight safety issues that crop up when a person needs to do more than one task at a time.

Time to Complete:
< 3 minutes; this varies depending on the functional level of the individual being tested.

Special Equipment or Space Needed:
Standard arm chair (18 inch height), 3+ meters of space, stopwatch, measuring device

Scoring and Score Interpretation:
The fastest score should be documented (I often find that the last timed trial is the quickest – there seems to be a practice effect). An older adult who takes12 seconds or more to complete the TUG is at risk for falling (CDC: TUG, 2017).

Related Research:
This test was developed by D. Podsiadlo and S. Richardson in 1991, since which it has undergone considerable research. Shumway-Cook et al (2000) found a cut off value of 14 sec for the TUG: older adults who took 13.5 sec or longer to perform the TUG were classified as fallers. Per Bischoff et al (2003), community-dwelling older adults should be able to complete the TUG in 12 sec or less, and it was a strong predictor of mobility status. 92% of community-dwelling women could complete test in < 12 seconds, while only 9% of institutionalized women had times < 12 seconds. Schaubert & Bohannon (2005) later found that the TUG significantly

correlated with knee extensor strength as measured with a dynamometer: the stronger the quadriceps, the faster the TUG score.

Functional Connection / Clinical Importance:
I find this test is the one most therapists know about and use in multiple practice settings; however, I also find that many therapists do not perform the test correctly. Pay special attention to the start position, the timing, and measuring 3 meters to keep the test valid.

This test is a great way to get an initial look at transfer ability and gait, which are two very important functional tasks. I perform this test on any individual that qualifies to assess fall risk and get an idea of safety with transfers and gait. Depending on their performance, I can also see if a more detailed gait analysis or balance assessment is needed.

In addition to looking at risk for falls, this test also is measuring efficiency of movement. Efficiency is important in its own right, and can be linked to safety in situations like answering the door, answering the phone, and exiting in case of emergency: people have a sense of urgency when doing those tasks. To take a specific case, I was working with a woman who lived in a senior high rise apartment. She would walk with her walker to the elevator, push the button, and then sit in a chair and wait for the doors to open (it often took some time). When the elevator door opened, she only had so much time to get up from the chair and get herself and her walker into the elevator. She initially had a lot of difficulty with this and it caused her concern that the doors would close on her. I was able to use her TUG score to objectively show her that her efficiency or speed was improving, making getting on and off the elevator safer.

The TUG is also a good test to compare an individual's ability to walk with different devices, or with a leg brace or ankle foot orthoses (AFO). You can compare and contrast gait with multiple devices or AFO to look at speed and efficiency of movement and safety.

Another important clinical connection: a slow TUG time may be partially responsible for those episodes of incontinence that occur when an individual is unable to get to the bathroom in time. If that is the case, you can discuss the importance of improving TUG time to decrease those episodes.

This test is also clinically important in that it is one of three functional tests the CDC's STEADI program, which will be discussed in more detail later in this course, uses in screening for fall risk.

Is the Test Free:
Yes. No special test form is needed.

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/steadi/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.

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.

The following three studies help to illustrate the connection between lower body strength and function. Lower extremity muscle force was a predictor of functional mobility in older adults living in senior housing communities (Beissner et al, 2000); lower extremity strength gain is associated with improvements in chair rise, gait speed, stooping and stair climbing (Chandler et al, 1998); and leg power was found to be a strong predictor of self-reported functional status in elderly women (Foldvari et al, 2000).

Functional Connection / Clinical Importance:

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.

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).

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 12s
- 70-79 yrs 12.3s
- 80-89 yrs 17.1s
- 90-101 yrs 22.5s

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.

Is the Test Free:
Yes. No special test form needed.

4-Stage Balance Test
Purpose / Description:

Assessing static balance.

You will evaluate 4 standing positions: feet side by side, semi-tandem stance, tandem stance, and single leg stance. You should describe and demonstrate each position to the individual you are testing.

While patients are not allowed to use an assistive during the test, you are able to stand next to them, help them get into the position, and when they are steady let go and start the timer. Remain close to the individual to guard them for safety.

If the individual can hold the first position for 10 seconds without moving their feet or needing support, then go on to the next position. If they cannot, stop the test at that point.

A video of a senior performing this test can be found at https://www.cdc.gov/steadi/materials.html. It is interesting to note how her arm position changes with the different foot positions to meet the increasing demands as the test progresses.

Time to Complete:
About 5 minutes.

Special Equipment or Space Needed:
Stopwatch. Very little space is needed.

Scoring and Score Interpretation:
According to the CDC, a person who cannot hold the tandem stance for at least 10 seconds is at increased risk of falling (CDC: 4SBT, 2017).

Functional Connection / Clinical Importance:
In my experience this test ties very well with any type of standing activities, especially ADLs while standing. 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.

Is the Test Free:
Yes. No special test form needed.

Single Leg Stance (SLS)
Purpose / Description:
Testing ability to balance on one limb.

The test should be done barefoot, as the type of shoe can influence performance on the test. Document where the testing was conducted (carpet, tile, wood floor, etc.) so you can retest in the same manner.

Give the following instructions: “Stand on one leg, place your arms across your chest, and do not let your legs touch each other.”

Start the timer when the leg lifts off the ground. Stop the timer if any of the following happens:

- The suspended leg touches the ground
- The suspended leg touches the stabilizing leg
- The arms become uncrossed
- The stabilizing leg is displaced

Give a practice and 2 timed trials on each leg, and document the best score for each leg.

Time to Complete:
About 5 minutes

Special Equipment or Space Needed:
Stopwatch. Very little space is needed.

Scoring and Score Interpretation / Related Research:
Per the GeriNotes Community Screening form (2013), 20 seconds is normal for a senior; < 5 seconds indicates and increased risk of falls. More recently, Lusardi et al (2016) reported that <6.5 seconds indicated fall risk.

Springer et al (2007) tested single leg stance with eyes open and with eyes closed (the “eyes closed” condition shows up in a number of functional tests due to the importance of the visual system). They took a mean of 3 trials, and summarized their findings as follows:

Age	**Eyes Open (seconds)**	**Eyes Closed (seconds)**
18-39	43.3	9.4
40-49	40.3	7.3
50-59	37.0	4.8
60-69	26.9	2.8
70-79	15.0	2.0
80-89	6.2	1.3

Look at the youngest age group above (18-39 years old). They go from an average of 43.3 seconds with eyes open all the way down to 9.4 seconds with eyes closed. Now look at the age group 70-79 years old. They have an average of 15 seconds eyes open all the way down to 2 seconds for eyes closed.

This research highlights the importance of vision in balance. As therapists we are all aware of this connection, but your patients likely do not know how much impact vision has on balance, and thus on safety with mobility. This is why all the home safety checklists mention vision

(nightlight in the bathroom, light by the bed, good lighting in hallways and on steps). Remember this if you need to help convince someone to get additional lighting in their home.

Functional Connection / Clinical Importance:
This is a quick test that can be used to show fall risk, help justify your treatment approaches and equipment recommendations, and highlight issues of safety.

This test has multiple connections to everyday function. For example, the table below lists functional tasks commonly addressed by PT and OT professionals that tie in with single limb performance:

Physical Therapy	Occupational Therapy
Navigating a curb	Stepping in and out of a tub
Going up and down steps without a railing	Stepping in and out of the shower
Walking without an assistive device	Lower body dressing in standing
Improving from a step to gait pattern to a step through gait pattern	Washing feet in the shower
Car transfers	

In my experience, the SLS is one of the best examples of PT and OT professionals both using the same functional test to create discipline-specific plans of care and goals. For occupational therapists, poor performance on this test may lead to the recommendations like adding a grab bar to improve safety getting in and out of the tub or shower, or teaching an individual to do lower body dressing seated versus standing. For physical therapists, this test may help guide the decision on when to progress gait, whether to recommend the addition of a stair rail, or whether to teach a person to back up and sit first for increased safety when performing a car transfer.

In addition, when I was working in home care, I would occasionally use this test to request cross-discipline collaboration. For example, if an individual who scored low on this test had a bathroom with no grab bars, I would use the score to show that a more detailed OT assessment was needed to address safety in the bathroom.

I also find this test to be a good one to show progress in patients who have undergone total joint replacements. Initially these patients have difficulty stabilizing on the operated limb due to pain, swelling, and weakness; they also likely had a limp for many years before surgery. However, they tend to progress rather quickly on this test, and the improving scores both reflect and reinforce improved gait mechanics.

Is the Test Free:
Yes. No special test form needed.

Walkie-Talkie Test

Purpose / Description:

Measuring an older adult's ability to divide attention between tasks.

This is a quick test performed while walking with a patient. You initiate a conversation with the individual while they are walking, and ask them open-ended questions that require more than a yes or no answer. There are no standard questions used.

Time to Complete:

< 5 minutes

Special Equipment or Space Needed:

No equipment needed. Space is needed to walk about 30 feet.

Scoring and Score Interpretation:

The test is positive if the participant slows down or stops walking to respond to your question. A positive score suggests they have difficulty dividing attention between the tasks of walking and talking.

Functional Connection / Clinical Importance:

This test has been criticized due to lack of sensitivity needed to discriminate between fallers and non-fallers, but may be a nice quick clinical tool to see if there are issues when dividing attention between tasks. If a person tests positive that might influence your choice of treatment setting (quiet room vs. noisy gym area) or highlight some safety issues that might arise when the individual needs to multi-task.

Is the Test Free:

Yes. No special test form needed.

Functional Reach Test

Purpose / Description:

Assessing functional balance. The Functional Reach Test is item number 8 on the Berg Balance Scale, but it is also a test on its own.

The individual being tested stands near a wall with their dominant arm outstretched (90 degrees shoulder flexion). The hand is open and the palm is facing the floor. A ruler or yardstick is mounted horizontally, at shoulder height, on the same wall.

The individual being tested is not allowed to use an assistive device during the test, and they are not allowed to touch the wall.

Give the following instructions: "Reach as far forward as you can without taking a step, keeping your feet flat on the floor, and keeping your hand at the level of the ruler."

The tester measures from the end of the third digit at the start position to the end of the third digit at the end of the reach. If the participant takes a step or loses their balance you do not get a measurement.

Participants are given 2 practice trials and 3 measured trials. Take the average of the 3 measured trials.

People will use different reaching strategies: some get a lot of trunk flexion, others get more trunk rotation or protraction of the scapula. Whichever strategy they use is fine as long as they maintain balance.

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

Some versions of this test have the hand in a fisted position instead of the hand open – this should not affect outcome, as reach will be the same whether the hand is open or closed. When using the fisted position, the tester measures from the end of the third metacarpal at the start position to the end of the third metacarpal at the end of the reach.

Time to Complete:
About 5 minutes

Special Equipment or Space Needed:
Ruler or yardstick mounted at shoulder height on a wall. Very little space is needed.

Scoring and Score Interpretation / Related Research:
Most healthy individuals with adequate balance can reach 10 inches or more (this result gets the highest score on this item on the Berg). Scores less than 6 or 7 inches indicate limited functional balance (Duncan et al, 1990).

Functional Connection / Clinical Importance:
This is a fairly quick and easy test to perform on individuals with varying levels of ability: to participate, an individual simply needs to be able to stand in their regular two foot stance and reach the dominant arm to 90 degrees. If they need supervision, that is allowed as long as you don't assist them.

I like to tie performance on this test to safety with retrieval of items for dressing, for self-care, and for kitchen tasks. If an individual's score is initially low, I suggest bringing everyday items into closer reach for safety until their score improves.

Even though a person cannot use their assistive device while performing the test, I have found this is a great test to do with people who use walkers. They often must let go of the walker to reach and do daily tasks; they also must reach to open and close doors while entering and

exiting rooms. People who use a walker often have difficulty both navigating the device and reaching, which needs to be addressed.

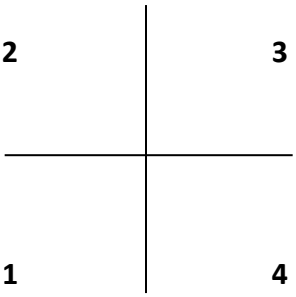
Is the Test Free:
Yes. No special test form needed.

Four Square Step Test (FSST or 4SST)
Purpose / Description:
Assessing dynamic balance via stepping and change of direction to identify fall risk in older adults. The FSST was developed by W. Dite and V.A. Temple in 2002.

A cane is the only assistive device that can be used during the test; it is not an appropriate test for a person who walks with a walker. (The therapist may use a gait belt to guard the patient for safety.)

The FSST uses 4 canes set up in a plus sign (+) pattern. If you do not have 4 canes you can make a similar device using PVC: you'll need 4 pieces (30-36 inches long) and a 4-way connector. Use PVC that is ¾" or 1" in diameter, to mimic the size of the canes and keep the test valid (Staples 2011).

Place the 4 canes (or PVC grid) on the floor, making a large +) sign with 4 quadrants. The individual will start standing in the lower left quadrant (box 1), and will step around the grid in first a forward/clockwise, then a counterclockwise pattern. In other words, the subject moves through the following sequence: 1 to 2, 2 to 3, 3 to 4, 4 to 1, 1 to 4, 4 to 3, 3 to 2 and 2 to 1. (You do not number the floor – the numbers are just to illustrate the sequence.) You are allowed to demonstrate the sequence for the participant.



Instruct the individual to take 2 steps per quadrant, no more and no less, and to complete the sequence as quickly as possible without touching the canes (PVC) on the floor. Both feet must make contact with each quadrant; the individual may just tap the foot or land flat footed.

Following a demonstration by the clinician, if needed, the participant has a practice trial and then 2 timed trials. The clinician may cue the participant during the practice trial only. Timing starts when the first foot hits the second quadrant (box 2) and stops when the last foot comes back to the start position (box 1).

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

Time to Complete:
10-15 minutes

Special Equipment or Space Needed:
Stopwatch, gait belt, 4 canes or equivalent.

Scoring and Score Interpretation / Related Research:
The score is the time (in seconds) it takes to complete the sequence. Per Dite & Temple (2002), < 15 seconds is normal; Whitney et al (2007) found that a cutoff score of > 12 seconds discriminates fallers from non-fallers, and concluded "The FSST is a reliable and valid tool for measuring the ability to perform multidirectional movements in people with balance deficits secondary to vestibular disorders."

It is important not to just document the score, but also your assessment of the participant's performance. For example, a person might be fearful or hesitant to do the test, or may have visual deficits that influence their performance and safety. One individual may have the most difficulty with foot clearance, while another has difficulty maintaining balance during the test. Remembering the proper sequence may be yet another consideration.

Similarly, I have had instances where I am not able to document a score: if an individual does not complete the sequence correctly, loses their balance to the extent that the therapist needs to aid them with the gait belt, or makes contact with the PVC or canes on the floor, the test cannot be scored. However, you should still document why the test stopped, as this will highlight a safety issue. Here are some examples of possible documentation:

- Attempted 4SST but unable to score as patient lost balance during testing
- Attempted 4SST but unable to score as patient did not have adequate foot clearance

Functional Connection / Clinical Importance:
I have used this test both to help show the need for an assistive device, and to demonstrate that an individual is ready to progress to gait without a device. I also really like this test for people who you hear walking because they shuffle their feet due to poor foot clearance: it is a great way to highlight safety issues, both in your documentation and also to the individual being tested.

In the courses I teach on functional testing, therapists say that the FSST mimics some of the tasks involved in navigating small spaces and in meal prep in the kitchen (moving side to side, stepping back to open refrigerator door, etc.).

Another functional connection is the ability to ambulate over transitions in the environment: going from wood to tile flooring, in and out of a front door, or over the transition to the shower

are all times an individual needs to change direction and step over an item. Likewise, Staples (2011) mentions the connection of performance on this test to safely walking on a sidewalk: sidewalks are uneven, and people must make adjustments for this.

There is also the cognitive piece: being aware of hazards in the environment without relying on cuing.

Is the Test Free:
Yes. No special test form needed.

Fullerton Advanced Balance Scale (FAB)
Purpose / Description:
Assessing static and dynamic balance under varying sensory conditions. The FAB, from the Center for Successful Aging from the California State University, is designed to measure balance in higher-functioning active older adults.

It consists of 10 test items scored on an ordinal scale ranging from 0 to 4 points ("4" indicating the highest level of function). The maximum score is 40 points.

The tester describes and demonstrate items 1-9 (the tester does not demonstrate item 10 as it is testing an unexpected perturbation).

Time to Complete:
10-12 minutes

Special Equipment or Space Needed:
Scoring sheet, stopwatch, pencil and 12-inch ruler, masking tape, 6" bench, 2 Airex pads, yard stick, metronome (or metronome app) set at 100 beats per minute. This test requires about 20-30 feet of level space for the walking tests.

Scoring and Score Interpretation:
Hernandez and Rose (2008) found that a score of 25 or lower produced the highest sensitivity and specificity in predicting fall risk in older adults 65 years old and older: "A practitioner can be confident in more than 7 out of 10 cases that an older adult who scores 25 or lower on the FAB scale is at high risk for falls and in need of immediate intervention."
Functional Connection / Clinical Importance:
This test is for more active community-dwelling seniors, and is a nice choice if you want to test multiple components of balance. It connects functionally to ambulation in crowded or busy environments and walking on uneven surfaces.

I find that outpatient therapists are using this test the most often due to the high skill level needed to complete the tasks on this assessment.

Is the Test Free:

Yes (See test form – Appendix)

Dynamic Gait Index (DGI)

Purpose / Description:

Developed to assess the likelihood of falling in older adults, the DGI tests 8 facets of gait.

It uses a four-point ordinal scale ranging from 0-3, "0" indicating the lowest level of function and "3" the highest level. The maximum score is 24 points.

This test is easy to administer: you just read the instructions printed on the test form.

Time to Complete:

10-15 minutes

Special Equipment or Space Needed:

Score sheet, shoebox, 2 cones, stairs, 20 foot level walkway.

Scoring and Score Interpretation:

A score of <19 is predictive of fall risk in the elderly.

Functional Connection / Clinical Importance:

This test is a good choice for a more comprehensive gait assessment: I like that it incorporates multiple aspects and can highlight safety concerns in a higher level individual.

A traditional gait assessment (testing ambulation on a level surface going one direction) gets us good information but does not tell the whole story. We do not always walk in a straight line on a level surface. When I speak to therapists that use the DGI test clinically, they tell me that their patients have the most difficulty with items 3, 4 (head turns), and 6 (stepping over shoebox). In my experience, this would relate to ambulation in the community, grocery shopping where you have to reach and look at varying levels and move around others in the store, and walking in crowded environments. People have to account for varying surfaces, conditions, and demands for daily gait, and the DGI helps to address these variations.

Is the Test Free:

Yes (See test form – Appendix)

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.

```
I_____I_____________________I_____I
  2 m              6m                2m
```

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 ADLs
- < .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)

Clinical Test of Sensory Integration on Balance (CTSIB)
Purpose / Description:
Quantifying postural control under various sensory conditions. Developed by Shumway-Cook and Horak in 1986, the CTSIB looks at the contributions of the visual, vestibular, and proprioceptive systems.

It consists of 6 conditions, each of which should be held for 30 seconds. Participants should not wear shoes.

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

Time to Complete:
About 20 minutes

Special Equipment or Space Needed:
Score sheet, 3” high density foam cushion, stopwatch.

Scoring and Score Interpretation:

The score for each condition is a maximum of 30, achieved when the participant is able to hold the position for the full 30 seconds. Horak suggests that each test be performed 3 times, and the scores averaged.

Sway may also be quantified per the test form.

Functional Connection / Clinical Importance:
This test helps the clinician to determine which system or combination of systems contributing to balance is involved. This then will assist in developing an appropriate treatment plan.

Is the Test Free:
Yes (See test form – Appendix)

Mini Balance Evaluation Systems Test (Mini BESTest)
Purpose / Description:
Targeting and identifing 4 underlying systems (anticipatory, reactive postural control, sensory orientation, and dynamic gait) so that specific treatments can be determined based on deficits. Developed in 2010 by Franchignoni et al, the Mini BESTest is a shortened version of the Balance Systems Test (BESTest).

There are a total of 14 items on the test, scored 0-2; "2" represents the highest level of function. The maximum score is 28. (The original BESTest contains 36 items. There is also a Brief-BESTest that contains 8 test items.)

Participants should be tested wearing flat-heeled shoes, or remove both shoes and socks. Assistive devices and/or physical assistance may be provided, but impact the score for each item they are used on.

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

Time to Complete:
10-15 minutes

Special Equipment or Space Needed:
Score sheet, stopwatch, medium density 4" foam pad, incline ramp (10 degree slope), box (height = 9"), standard armless chair, about 6 meters of space for walk tasks, masking tape.

Scoring and Score Interpretation:
The 14 items are divided into 4 sections, grouped by the system being tested. Lower scores on specific section(s) suggest deficits in the related system(s).

Functional Connection / Clinical Importance:
This test helps to isolate which balance systems are affected, directing the clinician's plan of care.

Is the Test Free:
Yes (Must be accessed at http://www.bestest.us/test_copies)

Function in Sitting Test (FIST)
Purpose / Description:
A bedside evaluation of sitting balance, assessing sensory, motor, proactive, reactive, and steady state balance factors.

The FIST assesses 14 items; each item is scored from 0-4 with "0" = dependent and "4" = Independent. The maximum score is 56.

The patient should be seated on a standard hospital bed, femurs halfway off, hips and knees at about 90° of flexion (a stool, step, etc. may be used for shorter patients). Hip rotation should be neutral. The clinician should guard throughout, and may assist if necessary; assistance impacts scoring.

Time to Complete:
< 15 minutes

Special Equipment or Space Needed:
Scoring sheet, standard hospital bed, stopwatch

Scoring and Score Interpretation:
There currently is not any research that has established norm for this test.

Functional Connection / Clinical Importance:
This test can be used to assess seated function, which is needed to perform self-care and ADL's. Results might also be used to focus interventions, like the need for a specialized positioning program or cushion.

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)

Questionnaires Related to Fall Risk
In addition to functional tests, let's also look at two questionnaires that assess confidence with mobility and concern for falling:

- Activities-Specific Balance Confidence Scale
- Falls Efficacy Scale - International

Both questionnaires have been recommended by sections of the APTA, based on clinical usefulness and the strength of the testing in the research: the ABC by the neurological section, and the FES-I by the geriatric section. You can find the recommendations on the APTA's PTNow.

You can use one or the other questionnaire (it's not necessary to use both).

Activities-Specific Balance Confidence Scale (ABC)
Purpose / Description:
Assessing an individual's confidence in their ability to perform 16 tasks without falling.

The ABC can be self-administered, or administered by the clinician either in person or via a phone interview (I personally prefer administering in person to make sure the participant understands the scoring and how to answer the items).

For each of the 16 items on the test, the participant should indicate their level of confidence, on an 11 point scale ranging from 0-100%, that they can do the activity without losing their

balance or becoming unsteady. “0%” means they have no confidence at all, and 100% means they are completely confident.

The initial 7 items are activities that might take place in the home environment, while the last 9 items take place outside the home.

Ideally, the participant will give an answer for all 16 of the items. If they do not do an activity on the list, prompt them to answer how confident they would be if they had to do that activity today. If they normally use a walking aid to do the activity, or hold on to someone, they should rate their confidence while using those supports.

Time to Complete:
10-15 minutes

Special Equipment or Space to Perform the Test:
Score sheet

Scoring and Score Interpretation / Related Research :
Add up all the numbers for the 16 items, and divide by 16: this gives you an average percent score, or “ABC score” – for example, you would document “ABC score is 65%.”

Interpretation data for this test is as follows (Meyers et al, 1998):

- 80% = high level of functioning
- 50-80% = moderate level of functioning
- < 50% = low level of physical functioning

In addition, a score of <67% indicates that an older adult is at risk for falling, and has been found to be predictive of future falls (LaJoie and Gallagher, 2004).

Functional Connection / Clinical Importance:
I like the combination of items on the ABC: in addition to overall confidence, it shows confidence in the home vs. in the community, and also gives you possible specific activities to focus on in your treatment. For example, when using this tool, I once discovered that an individual had a fall getting items out of her closet – this had not come up earlier in therapy. Given the new information, I was able to adjust her treatment.

Personally, I find I use this test the most when I suspect that a person’s lack of confidence is holding them back. I also have found that, as an individual progresses with therapy and I start to see improvements in functional ability, I also see their confidence score improve. Another individual, “Mary,” had a past fall going out her front door. Prior to the fall she spent part of her day on the front porch getting fresh air and interacting with neighbors; after the fall she would not go outside as she was fearful of the threshold, and had become isolated. She scored very low on activities 8-16 on the ABC. Since her fall, Mary’s family had been putting her in a wheelchair and pushing her over the threshold to exit the home; it took me four visits in home

care just to get her to try to walk outside (she was only contact guard assist). By discharge she was again able to enter and exit the front of the home on her own, and I saw her score on the ABC improve.

Is the Test Free:
Yes (See test form – Appendix)

Falls Efficacy Scale - International (FES-I)
Purpose / Description:
Assessing fear of falling, mainly in the community-dwelling older population.

This questionnaire can be self-administered or done in person.

Similarly to the ABC, the FES-I is a 16 item questionnaire, referencing both activities done in the home and outside the home. Instead of using a 0-100% scale, it measures levels of concern on a four point Likert scale, where "1"= not at all concerned and "4" = very concerned.

It is interesting to note that the FES-I specifically uses the word "concern." This is because it is considered a non-emotional term, whereas words like "anxious" or "fearful" are emotionally weighted, and people are less willing to admit to them.

A Short FES-I, using 7 items, is also available.

Time to Complete:
10-15 minutes

Special Equipment or Space to Perform the Test:
Score sheet

Scoring and Score Interpretation / Related Research:
When all items are completed, add the scores together to give a total, ranging from a possible 16 (no concern) to 64 (severe concern).

The FES-I has been found to be a reliable and valid tool for measuring an individual's concern for falling in a sample of people with vestibular disorders (Morgan et al, 2013).

Functional Connection / Clinical Importance:
The same as the previous questionnaire.

The largest difference between the two is phrasing: you may find that some individuals prefer the 0-100% scale, while others prefer the "concern" range.

Is the Test Free:
The FES-I is not free to use; it is available for download at https://sites.manchester.ac.uk/fes-i/.

APTA Section Recommendations

As mentioned previously, the various practice sections of the APTA have designated certain test and assessments as recommended, based on the clinical usefulness of each tool and the research supporting it. The recommendations for balance-related assessments follow; a complete list of recommendations can be found on the APTA website (https://www.apta.org).

Section Recommendations from the American Physical Therapy Association (APTA)

Geriatric and Home Care Section Recommendations

- Berg Balance Scale
- 30 Second Chair Stand Test / 5 Times Sit to Stand Test
- Timed Up and Go Test
- Falls Efficacy Scale - International
- Fullerton Advanced Balance Scale
- Sitting Balance Scale

Acute Care Section Recommendations

- Timed Up and Go Test
- Function in Sitting Test

Cardiovascular and Pulmonary Section Recommendations

- Timed Up and Go Test
- Berg Balance Scale

Neurology Section Recommendations

- Berg Balance Scale
- Dynamic Gait Index
- Four Square Step Test
- Functional Reach Test
- Timed Up and Go Test / Dual Task TUGs
- Gait Speed
- Fullerton Advanced Balance Scale
- Activities-Specific Balance Confidence Scale
- Balance Evaluation Systems Test
- Single Leg Stance

VI. Resources for Patients, Caregivers and Health Care Workers

While a full discussion of intervention strategies is beyond the scope of this course, we'll cover a few key resources.

Professional Resources

The following resources will be covered:

- AARP Livable Communities
- Administration for Community Living
- American Occupational Therapy Association (AOTA)
- American Physical Therapy Association (APTA)
- Centers for Disease Control and Prevention
- Fall Prevention Center of Excellence
- National Council on Aging
- Vestibular Disorders Association

AARP Livable Communities

AARP Livable Communities supports the efforts of communities to be great places for people of all ages. They define a livable community as follows: one that is safe and secure, has affordable and appropriate housing and transportation options, and offers supportive community features and services. They have extensive information on home safety; if you do home safety assessments, I highly recommend exploring their website. In particular, their HomeFit Guide is an extensive, excellent resource for home safety and modifications. They also offer a free newsletter (AARP Livable Communities e-Newsletter) that you can sign up to get continued information from the organization.
https://www.aarp.org/livable-communities

Administration for Community Living

This site has a number of resources for older adults and caregivers, including links on home safety, fall prevention, and information on evidence-based fall prevention programs. They also link to items from the National Council on Aging.
https://acl.gov/programs/health-wellness/falls-prevention

American Occupational Therapy Association (AOTA)

Professional organization for occupational therapy health professionals.
https://www.aota.org

American Physical Therapy Association (APTA)

Professional organization for physical therapy health professionals.
https://www.apta.org

Centers for Disease Control and Prevention STEADI Initiative

This is one of the best resources for healthcare providers, patients, and caregivers on fall prevention. STEADI, or "Stopping Elderly Accidents, Deaths and Injuries," consists of 3 core elements: screen patients for fall risk, assess modifiable risk factors, and intervene to reduce risk using effective clinical and community strategies. If you have not been to this website I highly recommend you take some time to check it out. You will find materials for patients and caregivers on risk factors, home safety, medications and staying independent; materials for healthcare providers including screening forms, medication review sheets, fact sheets, and

functional assessments; customizable brochures you can order with your name and company logo (or just print for free as handouts) and much more.
https://www.cdc.gov/steadi/

Fall Prevention Center of Excellence
This site is from the USC School of Gerontology. They have information for individuals, families, and service providers on the topics of balance and mobility, environment, medical management, and other resources, as well as data on falls in California.
http://stopfalls.org/

National Council on Aging
This organization has a number of resources for clinicians and for patients and caregivers, including the National Falls Prevention Resource Center (https://www.ncoa.org/center-for-healthy-aging/falls-resource-center/), funded by the Administration on Aging (AoA). The Center cites the following purposes:

- Increase public awareness and educate consumers and professionals about the risks of falls and how to prevent falls.
- Support and stimulate the implementation, dissemination, and sustainability of evidence-based falls prevention programs and strategies to reduce the incidence of falls among older adults and adults with disabilities
- Serve as the national clearinghouse of tools, best practices, and other information on falls and fall prevention.

Assets include information on sharing best practices, resources for professionals and advocates, and resources for older adults and caregivers – plus information about, and ideas for celebrating, National Fall Prevention Awareness Day.
https://www.ncoa.org/

Vestibular Disorders Association
This site has helpful information on specific vestibular disorders, including benign paroxysmal positional vertigo (BPPV), neuritis, vertigo, and Meniere's disease. You can find free patient materials under the tab "Resources for Professionals".
https://www.vestibular.org/

Evidence-Based Community Fall Prevention Programs
As therapists we only have a limited time to work with individuals, so it is helpful to know of additional resources in your community. Referral to evidence-based community programs that improve function and reduce fall risk can be very helpful to your clients.

The following programs will be covered:

- FallProof
- Stepping On
- Otago Exercise Program
- A Matter of Balance

- EnhanceFitness
- Fit and Strong
- YMCA Moving for Better Balance
- Tai Chi for Arthritis
- Walk With Ease

FallProof

FallProof is a balance and mobility program developed at the Center of Aging at California State University at Fullerton by Debra Rose, PhD. It includes balance and mobility assessments, and has six major components:

- Center-of-gravity control training
- Multisensory training
- Postural strategy training
- Gait pattern enhancement and variation training
- Strength and endurance training
- Flexibility training

The program is implemented in community-based and residential care settings. Instructors are certified, and lead FallProof group-based courses and one-to-one classes in multiple healthcare settings. In addition, an excellent textbook titled *FallProof! A Comprehensive Balance and Mobility Training Program* by Debra Rose is published by Human Kinetics.
http://hdcs.fullerton.edu/csa/FallProof/

Stepping On

Developed in Australia, this program is designed for people living at home who have experienced a fall or are concerned about falling. It is a community-based program for small groups, facilitated by an exercise leader. Participants come to 2 hour sessions once per week for 7 weeks.

- Week 1: Introduction, overview and risk appraisal
- Week 2: Exercises and moving about safely
- Week 3: Home hazards
- Week 4: Community safety and footwear
- Week 5: Vision and falls and vitamin D
- Week 6: Medication management and mobility mastery experiences
- Week 7: Review and plan ahead

The exercise leader is present for all 7 sessions, and invites volunteer guest experts to lead specific segments of the course: exercise, vision, medications and community safety. In a study by Clemson et al (2004), the Stepping On program demonstrated a 31% decrease in falls.
http://www.steppingon.com/

Otago Exercise Program

This home-based program was developed in 1995 in New Zealand to prevent falls in older adults. It includes a minimum of 7 home visits by a home care physical therapist over a 1-year period, for an average of 8-10 total hours with a therapist. These therapists assess each

individual, then teach a home exercise program which includes 17 balance and strengthening exercises. Participants are asked to keep a daily exercise log and journal, and purchase ankle weights for the strengthening part of the program.

The University of North Carolina at Chapel Hill reports on their website that the Otago Exercise Program is being promoted by the Centers for Disease Control, the Patient Centered Outcomes Research Project, and the Administration for Community Living in 16 states. In addition, research conducted at the UNC's School of Medicine and Center for Health Promotion and Disease Prevention showed statistically significant improvement in clinical scores after as little as 8 weeks (Shubert et al, 2016). Likewise, a case study published in the Home Health Section Quarterly Report in 2013 showed score improvements on the TUG and the 4-Stage Balance Test in an 84 year old homebound gentleman participating in the Otago Exercise Program (Artzerounian, 2013).
https://www.ac.co.nz/otagoexerciseprogramme

A Matter of Balance
Developed at the Roybal Center at Boston University, this program targets people who are 60 or older, ambulatory, and able to problem-solve, who demonstrate concern about falling and interest in improving flexibility, balance and strength. It includes eight 2-hour sessions for small groups (the maximum class size is 14). Over the course of the program, participants learn to:

- View falls as controllable
- Set goals for increasing activity
- Make changes to reduce fall risk at home
- Exercise to increase strength and balance

All sessions are led by volunteer lay leaders called coaches; a Master Trainer is responsible for teaching the curriculum to the coaches, providing them with guidance, making observation visit, and offering support as they lead the classes. Likewise, a guest healthcare professional visit to the class might be arranged by the Master Trainer.

Outcomes reported by the program include:

- 97% of participants are more comfortable talking about fear of falling
- 97% feel comfortable in increasing activity
- 99% plan to continue exercising
- 98% would recommend A Matter of Balance

https://mainehealth.org/healthy-communities/healthy-aging/matter-of-balance

EnhanceFitness
Part of Project Enhance, developed by Washington Senior Services in partnership with the University of Washington and Group Health Cooperative in the mid 1990's, this program is an evidence-based group exercise class for older adults at varying levels of fitness. The program has been implemented in a number of facilities around the country, including YMCAs, fitness centers, senior centers, and retirement communities. Per the website, as of the end of 2018, program participation is over 25,000.

Instructors go through a training program and are certified to teach the class, which consists of a 5 minute warm-up, 20 minutes of aerobic exercise, 5 minute cool-down, 20 minutes of strengthening exercises (using cuff weights and free weights) and 10 minutes of stretching. In addition, data is collected from participants to track outcomes. Class attendance is tracked, and 3 functional tests are performed at regular intervals: an 8' TUG, the Arm Curl Test and the 30 Second Chair Stand Test.

I recently attended and participated in this class at my local YMCA, and was very impressed. The class is well designed and instructed, and people of all different functional levels were in the class, including 2 individuals over the age of 80 and 2 people on oxygen. The instructor mentioned that a physical therapist was joining for the day, so participants knew why I was there; at least 5 people stopped and talked to me after the class, telling me how much they liked it.
www.projectenhance.org/enhancefitness.aspx

Fit and Strong
This program, an evidence-based 8 week physical activity/behavior change intervention, targets older adults with lower extremity joint pain and stiffness related to osteoarthritis. It has been successfully implemented in multiple community-based settings. It seeks to help participants:

- Maintain independent functioning
- Reduce and manage arthritis symptoms
- Learn a variety of stretching, balance and aerobic and strengthening exercises and how to progress a program
- Gain an understanding of what osteoarthritis is and how physical activity can help to manage symptoms
- Incorporate physical activity into lifestyle by exercising 3x/week for 1 hour
- Develop an individual multiple component physical activity program that is sustainable after the program ends.

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. Individual exercise program prescription is part of the program.
https://www.fitandstrong.org

YMCA Moving for Better Balance
This program targets individuals 65 and older who are physically mobile with impaired stability and/or mobility, or individuals 45 and older with a condition that may impact stability and/or mobility. Based on the principles of Tai Chi, using 8 movements modified for falls prevention, it is designed to improve strength, mobility, flexibility, and balance for overall health and better function. The 12 week instructor led group class includes 2 class sessions and 2+ hours of at home practice per week.

While participants do not need to be members of the YMCA to attend, instructors must successfully complete the Y-certified Moving for Better Balance instructor training.

More information is available at http://www.ymca.net/moving-better-balance; visit your local YMCA's website to see if it offers the program.

Tai Chi for Arthritis

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, 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

https://taichiforhealthinstitute.org

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. Interested parties can call 800 283-7800 to find classes near them.

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

https://www.arthritis.org/living-with-arthritis/tools-resources/walk-with-ease/

Conclusion

As the population ages, it becomes increasingly crucial that therapists have the know-how and the resources to adequately assess patients' balance and fall risk, and to address both in plans of care. And because as therapists we often have the opportunity to spend more time with our patients than other health care providers, we're in a great position to provide them with knowledge as well.

Functional and objective testing helps to identify the specific strengths and limitations of each patient and develop a patient-specific plan of care. In addition, it's important to incorporate education on risk factors for falls and fall prevention: for example, you might ask if an individual has had a vision check in the last year, refer them to a pharmacist or their physician if they have any difficulty with or questions about medication management, and/or discuss home layout and possible adaptations to ensure their environment is as safe as possible. Likewise, being aware of community resources and fall prevention programs, and referring your clients and their caregivers as appropriate, can give them access to additional information as well as helping to prevent falls.

Appendix

Home Safety Assessment

Balance Test Summary Table

Screening Tools: Cognition
- Saint Louis University Mental Status Exam
- Short Orientation-Memory Concentration Test of Cognitive Impairment

Screening and Assessment Tools: Balance and Fall Risk
- Berg Balance Scale
- Fullerton Advanced Balance Scale
- Dynamic Gait Index
- Short Physical Performance Battery
- Clinical Test of Sensory Integration on Balance
- Function in Sitting Test
- Sitting Balance Scale
- Activities-Specific Balance Confidence Scale

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Balancing Act: Functional Tests and Assessments for Balance and Fall Risk
(4 CE Hours)

FINAL EXAM

1. Per the World Health Organization, falls are the _____ cause of accidental or unintentional injury deaths worldwide.
    a. Leading
    b. Second leading
    c. Third leading
    d. Fifth leading

2. Within the United States, per the Centers for Disease Control and Prevention, _____ falls causes a serious injury such as a broken bone or head injury.
    a. One out of two
    b. One out of three
    c. One out of five
    d. One out of seven

3. Intrinsic risk factors for falls _____
    a. Are those that are within the environment
    b. Can often be avoided
    c. Include "Poor stair design" and "Improper use of assistive device"
    d. Include "Poor vision" and "Chronic conditions"

4. Which of the following is NOT an aging-related physiological change to the vestibular system?
    a. Decrease in blood flow to the inner ear
    b. Decrease in number of nerve cells
    c. Increase in density of hair cells
    d. Reduction in vestibulocular reflex (VOR)

5. Aging-related physiological changes to the integumentary system can impact fall risk and therapy programs by _____.
    a. Increasing susceptibility to infection
    b. Increasing the visual field
    c. Increasing thermoregulation
    d. All of the above

6. Rubenstein et al (2000) analyzed sixteen fall risk factor studies, identifying three top factors: _____.
    a. Arthritis, cognitive impairment, and lower extremity weakness
    b. History of falls, gait or balance deficit, and depression
    c. Lower extremity weakness, history of falls, and gait or balance deficit
    d. Visual deficits, depression, and cognitive impairment

7. "Affected by lower extremity strength and power; comes into play if your center of gravity is moved beyond your maximum limit of stability," describes which postural control strategy?

a. Ankle strategy
b. Hip strategy
c. Knee strategy
d. Step strategy

8. Which of the following is a FALSE statement about functional testing?

a. Data derived from functional testing can be used to educate patients and family members
b. Functional testing helps to find the strengths and weaknesses your patient may have
c. Functional testing should only take place at the initial physical therapy and occupational therapy evaluations
d. Including functional tests and objective measures in documentation has become increasingly important over the last several years

9. The _____ provides a quantitative assessment of cognitive impairment and tracks changes in cognition over time; it includes 11 simple questions grouped into 7 cognitive domains.

a. Mini-Mental State Examination
b. Montreal Cognitive Assessment (MoCA)
c. Saint Louis University Mental Status Exam (SLUMS)
d. Short Orientation-Memory Concentration Test of Cognitive Impairment (OMCT)

10. The _____ identifies persons who have dementia or mild neurocognitive impairment; it consists of 11 items testing orientation, memory, attention, and executive function.

a. Mini-Mental State Examination
b. Montreal Cognitive Assessment (MoCA)
c. Saint Louis University Mental Status Exam (SLUMS)
d. Short Orientation-Memory Concentration Test of Cognitive Impairment (OMCT)

11. The _____ is a brief 30 question cognitive screening tool for mild cognitive impairment. There are multiple versions, including one for people who are visually impaired.

a. Mini-Mental State Examination
b. Montreal Cognitive Assessment (MoCA)
c. Saint Louis University Mental Status Exam (SLUMS)
d. Short Orientation-Memory Concentration Test of Cognitive Impairment (OMCT)

12. The _____ assesses static balance: feet side by side, semi-tandem stance, tandem stance, and single leg stance. If the individual can hold the first position for 10 seconds without moving their feet or needing support, then go on to the next position. If they cannot, stop the test at that point.

a. 4-Stage Balance Test
b. Fullerton Advanced Balance Scale

c. Single Leg Stance
d. Timed Up and Go Test

13. The _____ measures the static and dynamic balance of older adults. This is a 14 item test that progressively gets more challenging as it goes along. The test should be performed in order. The individual being tested is not allowed to use an assistive device.

a. Berg Balance Scale
b. Clinical Test of Sensory Integration on Balance
c. Fullerton Advanced Balance Scale
d. Functional Reach Test

14. The _____ measures an older adult's ability to divide attention between tasks. No equipment is needed. Space is needed to walk about 30 feet.

a. Dynamic Gait Index
b. Gait Speed: Timed 10-Meter Walk
c. Short Physical Performance Battery
d. Walkie-Talkie Test

15. The _____ evaluates lower extremity functioning in older persons; it combines balance, chair rise, and gait tasks. 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).

a. Fullerton Advanced Balance Scale
b. Mini Balance Evaluation Systems Test
c. Short Physical Performance Battery
d. Timed Up and Go Test

16. The _____ is a bedside evaluation of sitting balance, assessing sensory, motor, proactive, reactive, and steady state balance factors. It assesses 14 items; each item is scored from 0-4 with "0" = dependent and "4" = Independent. The maximum score is 56.

a. Function in Sitting Test
b. Functional Reach Test
c. Mini Balance Evaluation Systems Test
d. Sitting Balance Scale

17. The _____ assesses dynamic balance via stepping and change of direction to identify fall risk in older adults. The score is the time (in seconds) it takes to complete the sequence. Per Dite & Temple (2002), < 15 seconds is normal; Whitney et al (2007) found that a cutoff score of > 12 seconds discriminates fallers from non-fallers.

a. 4-Stage Balance Test
b. Berg Balance Scale
c. Four Square Step Test
d. Mini Balance Evaluation Systems Test

18. The _____ was developed to assess the likelihood of falling in older adults. It tests 8 facets of gait. It uses a four-point ordinal scale ranging from 0-3, “0” indicating the lowest level of function and “3” the highest level. The maximum score is 24 points.

a. 30 Second Chair Stand Test
b. Dynamic Gait Index
c. Gait Speed: Timed 10-Meter Walk
d. Walkie-Talkie Test

19. Which three functional tests are used by the CDC’s “Stopping Elderly Accidents, Deaths and Injuries” (STEADI) program in screening for fall risk?

a. Berg Balance Scale, 5 Times Sit to Stand Test, Gait Speed: Timed 10-Meter Walk
b. Clinical Test of Sensory Integration on Balance, Single Leg Stance, Dynamic Gait Index
c. Timed Up and Go Test, 30 Second Chair Stand Test, 4-Stage Balance Test
d. Walkie-Talkie Test, Four Square Step Test, Sitting Balance Scale

20. A difference between the Activities-Specific Balance Confidence Scale (ABC) and the Falls Efficacy Scale - International (FES-I) is _____.

a. Only the ABC assesses confidence with mobility and concern for falling
b. Only the FES-I has been recommended by sections of the American Physical Therapy Association
c. The ABC contains 16 items; the FES-I contains 24
d. The ABC uses an 11 point confidence scale ranging from 0-100%; the FES-I measures levels of concern on a four point Likert scale

21. The _____ section of the American Physical Therapy Association recommends the following balance-related assessments: the Timed Up and Go Test and the Function in Sitting Test.

a. Acute Care
b. Cardiovascular and Pulmonary
c. Geriatric and Home Care
d. Neurology

22. Balance-related assessments recommended by the Geriatric and Home Care section of the American Physical Therapy Association include _____.

a. The 30 Second Chair Stand Test and the Functional Reach Test
b. The Berg Balance Scale and the Sitting Balance Scale
c. The Function in Sitting Test and the Dynamic Gait Index
d. The Single Leg Stance and the Activities-Specific Balance Confidence Scale

23. Assets of the _____ include information on sharing best practices, resources for professionals and advocates, and resources for older adults and caregivers – plus information about, and ideas for celebrating, National Fall Prevention Awareness Day.

a. AARP Livable Communities
b. Fall Prevention Center of Excellence
c. National Council on Aging

d. Vestibular Disorders Association

24. The _____ program was developed in Australia, designed for people living at home who have experienced a fall or are concerned about falling. In a study by Clemson et al (2004), this program demonstrated a 31% decrease in falls.

a. A Matter of Balance
b. EnhanceFitness
c. Fit and Strong
d. Stepping On

25. The _____ program is offered by the Arthritis Foundation as either a self-guided course or in a community setting. 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 program can reduce the pain and discomfort of arthritis; increase balance, strength and walking pace; build confidence in your ability to be physically active; and improve overall health.

a. A Matter of Balance
b. Tai Chi for Arthritis
c. Walk With Ease
d.YMCA Moving for Better Balance

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Balancing Act: Functional Tests and Assessments for Balance and Fall Risk

(4 CE HOURS)

Learner Name: _____

	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 at or above entry-level knowledge	1	2	3	4	5	
Content was substantiated through use of references, footnotes, etc.	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?

_____

_____

What educational needs do you currently have?

_____

_____

What other courses or topics are of interest to you?

_____

_____