APPENDIX:

FULL
SCREENING MEASURES

ONE LEGGED STANCE TEST (OLST)

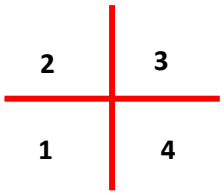
Description:
The OLST measures an older adult's balance abilities (non-institutionalized population). Stand, arms across the chest, eyes open. Lift one foot off the floor and time how long they can maintain balance. Stop the test at 30 seconds.

Equipment needed: Stopwatch or wristwatch
Completion time: 30 seconds
Scoring: Can do an average of 3 trials of how many seconds the subject can stand on one leg.
Normative Values:

Age Group	Dominant Leg	Non-Dominant Leg
60-64	38	34
65-69	24	24
70-74	18	20
75-79	11	12
80-86	11	10

FOUR SQUARE STEP TEST (FSST)[1]

Description:
The FSST measures an older adult's (65+) balance, incorporating quick change of directions which is predictive for risk of multiple falls.



Equipment needed: Stopwatch & 4 canes
Completion time: 5 minutes
Instructions: Start in square 1, face square 2 –step as fast as possible into each square following the sequence: 1,2,3,4,1,4,3,2,1
(will step forward, side, back, side, side, front, side & back)

Start the stopwatch as soon as the first foot contacts the floor in square 2 and finishes as the last foot touches the square 1. Both feet must contact in each square.
Scoring: One practice can be done – complete 2 tests and take best time.
If subject is unable to complete sequence, loses balance or touches canes, they can repeat the trial.
Interpretation: >15 seconds considered a multiple faller

[1] Dite, W.,Temple, V. A. (2002) Clinical Test of Stepping and Change of Direction to Identify Multiple Falling Older Adults. *Arch Phys Med Rehabil,* 83.

GAIT SPEED (PREFERRED AND MAXIMAL)

GAIT SPEED & Clinical Importance:

Slow gait speed predicts:

- *Future health status*
- *Functional decline*
- *Hospitalization*
- *Potential for rehabilitation*
- *Falls and fear of falling*
- *Mortality*
- *It has been reported to be the single best predictor of functional decline & disability*

Administration:

Measure a standard distance (e.g., 20 meters) and place markers at the start and finish. Start the patient 5 meters in front of the mark and have the patient walk 5 meters past the finish mark. Begin the stopwatch as soon as the person's foot crosses the start line and stop recording when the person's second foot crosses the finish line. Have the person perform 3 repetitions of each condition and calculate the average time.

Gait Speed = distance / time e.g. 20m/__minutes OR 20m / __ sec.

Instructions for the Patient:

1. Ask the patient to walk at his/her **preferred** walking speed.
2. Instruct the patient to continue walking 5 meters beyond the finish line.
3. Ask the patient to walk as **quickly** as possible, but safely.
4. Instruct the patient to continue walking 5 meters beyond the finish line.

Gait Speed Research Values:

- A difference of 0.1m/s is considered a meaningful change in gait speed in hip fracture patients. (Palombaro, K.M., 2006)

- <0.58 m/sec = would benefit from PT Ax and possible treatment
  Sens. 80%, Spec.89% (*Harada, N., 1995 – NOTE: testing used 6.1 m or 20 feet as test distance)*

- <1.8 ft./sec (0.55m/sec)= risk for recurrent falls: Sensitivity 72%, Specificity 74% *(Van Swearingon, J.M., 1998)*

Gait Speed Research Values:[2]

Table 2. Comfortable Gait Speed: Means, Standard Deviations, and Confidence Intervals by Age, Gender, and Use of Assistive Device (in Meters per Second)

Age (y)	Group	N	Mean	SD	CI
60-69	Male	1	1.26	—-	0.84 – 1.67
	Female	5	1.24	0.12	1.05 – 1.42
	Overall	6	1.24	0.10	1.13 – 1.35
70-79	Male	9	1.25	0.23	1.11 – 1.39
	Female	10	1.25	0.18	1.11 – 1.38
	Overall	19	1.25	0.20	1.15 – 1.34
80-89	Male	10	0.88	0.24	0.75 – 1.01
	Female	24	0.80	0.20	0.72 – 0.89
	No Device	24	0.91	0.16	0.84 – 0.98
	Device	10	0.63	0.17	0.52 – 0.74
	Overall	34	0.82	0.21	0.75 – 0.90
90-101	Male	2	0.72	0.14	0.43 – 1.02
	Female	15	0.71	0.23	0.60 – 0.82
	No Device	7	0.88	0.23	0.76 –1.01
	Device	10	0.59	0.10	0.48 – 0.70
	Overall	17	0.71	0.22	0.60 – 0.82

Table 3. Fast Gait Speed: Means, Standard Deviations, and Confidence Intervals by Age, Gender, and Use of Assistive Device (in Meters per Second)

Age (y)	Group	N	Mean	SD	CI
60-69	Male	1	1.96	—	1.37 – 2.56
	Female	5	1.81	0.17	1.55 – 2.08
	Overall	6	1.84	0.17	1.67 – 2.02
70-79	Male	9	1.94	0.26	1.74 – 2.14
	Female	10	1.80	0.26	1.61 – 1.99
	Overall	19	1.86	0.27	1.73 – 1.99
80-89	Male	10	1.29	0.38	1.10 – 1.48
	Female	24	1.20	0.29	1.08 – 1.33
	No Device	24	1.38	0.22	1.28 – 1.47
	Device	10	0.88	0.23	0.73 – 1.03
	Overall	34	1.23	0.32	1.12 – 1.34
90-101	Male	2	1.27	0.13	0.85 – 1.69
	Female	15	1.05	0.32	0.90 – 1.21
	No Device	7	1.29	0.33	1.11 – 1.47
	Device	10	0.93	0.20	0.78 – 1.08
	Overall	17	1.08	0.31	0.92 – 1.24

[2] Lusardi, M.M. (2003). Functional Performance in Community Living Older Adults. *Journal of Geriatric Physical Therapy,* 26(3), 14-22.

FLOOR TRANSFER TEST

Description: Assesses the person's ability to transfer themselves from standing to lying supine on the floor without assistance.

Step 1: Demonstrate first then ask the person to transfer themselves from standing to a supine position on the floor, then back to an erect position without any kind of support, unaided, and without time restriction. Success = able to do transfer without any assistance or support and without stumbling (unintentional change in participant's transitional position resulting in the previous position).[9,10]

If unable to do step 1, then: Demonstrate first then ask the person to do the same as above but with a standard chair without arm rests. Success = able to do transfer without assistance from another person.[9,10]

Equipment needed:
Clear floor space, Standard chair without arms

Completion time: 5-10 minutes

Scoring:
Successful: able to complete entire test by getting down and up from the floor.
Unsuccessful: unsuccessful rise, inability to get down, or stumbling while attempting to get up, grabbing or reaching for tester, requiring physical assistance, test is stopped because of fear of injury or fall.[10]

Interpretation: The inability to get up from the floor could be an indication of failing health and predicts serious fall-related injuries: 30% of women who could not get off the floor would experience a serious fall-related injury in the next year.[10] Knowing if your client/patient cannot get up from the floor will also help inform your treatment plan, as this may be a goal to work towards.

Reliability: Demonstrates excellent interrater reliability (ICC 0.98 and 0.99)[9].

Validity: Has been correlated with ability to climb stairs (r=0.79)[10], TUG (r=0.72)[10], difficulty with outdoor walking (r=0.67)[10], ADLs (r=0.62)[11], perceived health (r=0.36)[11], number of diseases (r=0.28)[11], sit to stand time (r=0.64)[12], single leg stance time (r=-0.36 right, -0.42 left)[12], five time sit to stand time (r=0.65)[13], Berg Balance Scale (r=-0.69)[13], Timed up and go (r=0.71)[13], 5 step test (-0.57)[9], functional reach test (r=0.49)[9], 50 ft walk (r=-0.52)[9], and Tinetti POMA (r=0.44)[9].

BICEP CURL TEST

Description: The biceps or arm curl indicates arm strength & is associated with the ability of a person to perform lifestyle tasks such as carrying heavy objects in ADLs.

Equipment needed: Armless chair, stopwatch, 5 lb. wrist weight or dumbbell for women, 8 lb. for men

Instructions: Sit on the chair with your feet flat on the floor, keeping your back straight. Using your dominant hand, hold the weight straight down by your side. On the signal to begin, lift weight to above your elbow, rotating your wrist so the palm faces upwards and return to your side. Repeat as many times in 30 seconds as possible.

Interpretation:

Normal range of scores		
Age	**Number of curls – Women**	**Number of curls – Men**
60 - 64	13 – 19	16 - 22
65 - 69	12 – 18	15 - 21
70 - 74	12 – 17	14 - 21
75 - 79	11 – 17	13 - 19
80 - 84	10 - 16	13 - 19
85 - 90	10 - 15	11 - 17

TIMED LOADED STANCE TEST

Description:

Tested in women 75-80 years old, one asymptomatic group and one with vertebral fractures. For this test, the patient stands holding a 2 lb. weight at chest height with elbows extended, neutral pronation/supination. The patient was timed for how long they could hold this position. Timing stopped if they couldn't maintain the test position or voluntarily set down the weights. Maximum time for test is 2 minutes.

Reliability: Inter-test and test-retest reliability was good (ranging from 0.81-0.89)

Validity: Functional reach distance, gait velocity, MOS-36 Physical Function Subscale, shoulder flexion strength, and six minute walk distance were most strongly associated with TLS time. Acceptable concurrent validity was established. Notes: the task is well-tolerated and safe for the frail and oldest-old as this test is self-limiting.[3]

[3] Shipp, K.M., Purse, J.L., Gold, D.T., Peiper, C.F., Schenkman, M.S., Lyles, K.W. (2000). Timed loaded standing: a measure of trunk and upper extremity endurance suitable for people with osteoporosis. *Osteoporosis Int.*, 11:914-922.

5 SIT-TO-STAND TEST [4] [5]

Description:
The 5 sit to stand test originally has been used as a surrogate measure for lower extremity strength. Subsequent research has suggested that it is not entirely inferring strength but may predict recurrent falls.

Equipment needed: Armless chair and stopwatch
Instructions: Subjects were asked to rise from a chair five times as fast as possible with their arms folded across their chests

Interpretation: Exceeding the following scores indicates a worse than average performance: 11.4 sec (60-9 yrs.); 12.6 sec (70-9 yrs.); 14.8 sec (80-9 yrs.)[6]

SCRATCH REACH TEST

Description: The back scratch test provides an indication of the participant's upper body and shoulder flexibility. It is associated with lifestyle activities such as getting dressed, reaching for objects and putting on a car seat belt.

Equipment needed: measuring tape or ruler

Instructions: Place one hand over the same shoulder with the palm touching the back and reach down the back. Place the other hand up the back from the waist with the palm facing outwards. Reach up the back. Point the middle fingers of each of hand towards each other and try to touch fingers. Don't bounce arms but do grasp fingers to pull hands together. Do two warm ups with the arms in opposite positions to determine the preferred side for reaching over the shoulder.

Measurements: Use the tape measure or ruler to measure the distance between the middle fingers. If the fingers do not overlap the score has a negative value. If the fingers overlap the score has a positive value.

The risk zone is -10.2 cm for men and -5.1 cm for women using the correct form

---

[4] Csuka, M., McCarty, D. (1985). Simple method for measurement of lower extremity muscle strength. *Am J Med*, 78(1), 77-81.
[5] Lord, S.R., Murray, S.M., Chapman, K., et al. (2002). Sit-to-Stand Performance Depends on Sensation, Speed, Balance, and Psychological Status in Addition to Strength in Older People. *J Gerontol A Biol Sci Med Sci*, 57 (8), M539-M543.
[6] Bohannon, R.W. (2006). Reference values for the five-repetition sit-to-stand test: A descriptive meta-analysis of data from elders. *Perceptual and Motor Skills*, (103), 215-222.

SOLEUS STRETCH TEST

Description: The soleus stretch test provides an indication of the participant's flexibility in the ankle. It also can be used as an exercise (stretch) to increase flexibility into dorsiflexion. Many seniors have reduced dorsiflexion while walking which can lead to trips and falls. If the cause is reduced range of motion rather than strength, the soleus should be a focus for lengthening.

Facing a wall, place one foot approximately 2-3" away from the wall to start (measured from toe to wall). Bend the knee until the front of the patella touches the wall. If the heel stays on the floor the participant can incrementally move the foot further away from the wall. The test is stopped when the participant is the maximum distance away from the wall and still able to touch the knee without lifting the heel. Progress is self-limiting (i.e., there will be a maximum that is achieved – compare both sides) but it is easy to track using tape on the floor or paper record.

2-MINUTE STEP TEST

Description: The 2-Minute Step test indicates the level of aerobic endurance of the participant. It is associated with the ability to perform lifestyle tasks such as walking and stair climbing.

Equipment: stopwatch, tape measure, masking tape or whiteboard.

Guidelines:
Locate the participant's patella and iliac crest (top of hip). Determine the mid-point of these two anatomical locations. Measure this distance from the floor. Place a mark on the wall with masking tape/whiteboard marker of this distance.

Participants are instructed to step up and down on the spot, facing the wall. They should lift each knee to the level of the mark on the wall. They should continue to step as fast as they can for 2 minutes. They are permitted to slow down/rest as needed.

On the instruction to begin, start the stopwatch.
Count one cycle per every two steps (i.e. count each time the right leg is lifted).

Only count the cycle if the knees reach the correct height – encourage them to keep meeting that point.[7]

[7] Rikli, R., Jones, C.(2001) *Senior Fitness Test Manual*. (1st ed).Champaign (IL): Human Kinetics.

Normal range of scores		
Age	**Number of steps Women**	**Number of steps Men**
60 - 64	75 - 107	87 – 115
65 - 69	73 -107	86 – 116
70 - 74	68 - 101	80 – 110
75 - 79	68 - 100	73 – 109
80 - 84	60 - 90	71 – 103
85 - 90	55 - 85	59 – 91
90 - 95	44 - 72	52 – 86

***the risk zone is 65 steps for either men or women (using correct form)**