APPENDIX A:

FULL
CLINICAL MEASURES

POSTURE SCORE SHEET	Name _____			SCORING DATES				
	GOOD — 10	FAIR — 5	POOR — 0					
HEAD LEFT RIGHT	HEAD ERECT GRAVITY LINE PASSES DIRECTLY THROUGH CENTER	HEAD TWISTED OR TURNED TO ONE SIDE SLIGHTLY	HEAD TWISTED OR TURNED TO ONE SIDE MARKEDLY					
SHOULDERS LEFT RIGHT	SHOULDERS LEVEL (HORIZONTALLY)	ONE SHOULDER SLIGHTLY HIGHER THAN OTHER	ONE SHOULDER MARKEDLY HIGHER THAN OTHER					
SPINE LEFT RIGHT	SPINE STRAIGHT	SPINE SLIGHTLY CURVED LATERALLY	SPINE MARKEDLY CURVED LATERALLY					
HIPS LEFT RIGHT	HIPS LEVEL (HORIZONTALLY)	ONE HIP SLIGHTLY HIGHER	ONE HIP MARKEDLY HIGHER					
ANKLES	FEET POINTED STRAIGHT AHEAD	FEET POINTED OUT	FEET POINTED OUT MARKEDLY ANKLES SAG IN (PRONATION)					
NECK	NECK ERECT, CHIN IN, HEAD IN BALANCE DIRECTLY ABOVE SHOULDERS	NECK SLIGHTLY FORWARD, CHIN SLIGHTLY OUT	NECK MARKEDLY FORWARD, CHIN MARKEDLY OUT					
UPPER BACK	UPPER BACK NORMALLY ROUNDED	UPPER BACK SLIGHTLY MORE ROUNDED	UPPER BACK MARKEDLY ROUNDED					
TRUNK	TRUNK ERECT	TRUNK INCLINED TO REAR SLIGHTLY	TRUNK INCLINED TO REAR MARKEDLY					
ABDOMEN	ABDOMEN FLAT	ABDOMEN PROTRUDING	ABDOMEN PROTRUDING AND SAGGING					
LOWER BACK	LOWER BACK NORMALLY CURVED	LOWER BACK SLIGHTLY HOLLOW	LOWER BACK MARKEDLY HOLLOW					
			TOTAL SCORES					

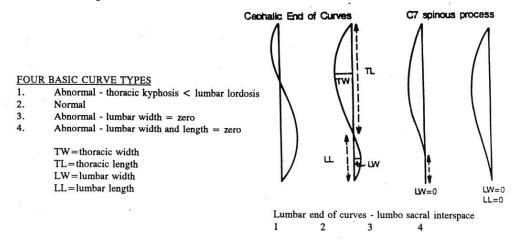| POSTURE SCORE SHEET	Name _____			SCORING DATES			
	GOOD — 10	FAIR — 5	POOR — 0				
HEAD LEFT RIGHT	HEAD ERECT GRAVITY LINE PASSES DIRECTLY THROUGH CENTER	HEAD TWISTED OR TURNED TO ONE SIDE SLIGHTLY	HEAD TWISTED OR TURNED TO ONE SIDE MARKEDLY				
SHOULDERS LEFT RIGHT	SHOULDERS LEVEL (HORIZONTALLY)	ONE SHOULDER SLIGHTLY HIGHER THAN OTHER	ONE SHOULDER MARKEDLY HIGHER THAN OTHER				
SPINE LEFT RIGHT	SPINE STRAIGHT	SPINE SLIGHTLY CURVED LATERALLY	SPINE MARKEDLY CURVED LATERALLY				
HIPS LEFT RIGHT	HIPS LEVEL (HORIZONTALLY)	ONE HIP SLIGHTLY HIGHER	ONE HIP MARKEDLY HIGHER				
ANKLES	FEET POINTED STRAIGHT AHEAD	FEET POINTED OUT	FEET POINTED OUT MARKEDLY ANKLES SAG IN (PRONATION)				
NECK	NECK ERECT, CHIN IN, HEAD IN BALANCE DIRECTLY ABOVE SHOULDERS	NECK SLIGHTLY FORWARD, CHIN SLIGHTLY OUT	NECK MARKEDLY FORWARD, CHIN MARKEDLY OUT				
UPPER BACK	UPPER BACK NORMALLY ROUNDED	UPPER BACK SLIGHTLY MORE ROUNDED	UPPER BACK MARKEDLY ROUNDED				
TRUNK	TRUNK ERECT	TRUNK INCLINED TO REAR SLIGHTLY	TRUNK INCLINED TO REAR MARKEDLY				
ABDOMEN	ABDOMEN FLAT	ABDOMEN PROTRUDING	ABDOMEN PROTRUDING AND SAGGING				
LOWER BACK	LOWER BACK NORMALLY CURVED	LOWER BACK SLIGHTLY HOLLOW	LOWER BACK MARKEDLY HOLLOW				
			TOTAL SCORES				

FLEXICURVE SPINAL MEASUREMENT

Administration:

- Mark centers of C7 spinous process and L-S joint space with a grease pencil while the patient is instructed to "STAND IN YOUR USUAL **BEST** POSTURE, RESTING YOUR HANDS ON THE CHAIR OR TABLE IN FRONT OF YOU. LOOK STRAIGHT AHEAD."
- Mark each landmark (C7 process and LS space) with a **single horizontal grease pencil line.** Make sure the patient is standing in their usual best posture so that the marks are in the correct place during measurement. Do NOT put tension on the skin while drawing, as this will change the location of the mark.
- Make sure that there are no bumps in the flexicurve and that it is in a smooth "S" shape.
- Mold flexicurve to exact shape of external kypholordosis between C7 and LS interspace.
- **Start by getting the "macro curve" generally "right". Hold at the top and the bottom, and gently adjust it to match the curve of the patient**.
- Fine-tune each area where there is "air" showing between f-curve and skin. Bring it about 1 millimeter away from the skin, and grasp at the top and bottom of the problem area. Lightly adjust this area only, **AVOIDING PUSHING THE FLEXICURVE INTO THE PATIENT'S BACK.**
- Ask the patient to **remove hands from the support**; and to stand in "your usual best posture". Check to see that there is still "no air" between flexicurve and skin.
- When satisfied that the f-curve is accurate in shape, mark the LS interspace on the side of the f-curve with a single straight grease pencil line as if you were continuing the mark from the skin directly onto the side of the f-curve. Mark C7 similarly only if it does not line up with the top end of the f-curve.
- Carefully remove f-curve from patient. Immediately place it on 10 x 10 grid paper (inches are divided into 1/10). **Carefully align C7 with a bold line intersection and place L-S directly underneath, intersecting the same vertical line.**
- Use a pen (not the grease pencil) to trace the curve onto the paper, being certain that your pen is following the surface that was contacting the patient directly.
- Use a ruler with 1/10th cm markings to measure the length and width of each segment. **Draw in the TW and LW lines as you measure.** Compute TW/LW and TL/LL ratios.

References:

- Chow, R.K., Harrison, J.E. (1987). Relationship of kyphosis to physical fitness and bone mass on postmenopausal women. *Am J Phys Med Rehaibil*, 66, 219-227.
- Crawford, H.J., Jull, G.A. (1993). The influence of thoracic posture and movement on range of arm elevation. *Physiotherapy Theory and Practice*, 9, 143-148.
- Cutler, W.B., Friedmann, E., Genovese-Stone, E. (1993). Prevalence of kyphosis in a healthy sample of pre- and post- menopausal women. *Am J Phys Med Rehaibil*, 72, 219-225.
- Ensrud, K.E., Black, D.M., Harris, F. (1997). Correlates of kyphosis in older women. *JAGS*, 45, 682-687.
- Lindsey, C., Reisine, S., Fertig, J. (1995). Evaluation for the effects of exercise on posture, back strength, pain & mood in postmenopausal women with osteoporosis & back pain. Paper presented at the WCPT, Washington, DC.
- Lindsey, C., Rizzo, A. (1998). Posture and balance issues for the patient with osteoporosis. Orthopedic Physical Therapy Clinics of North America Osteoporosis. (Avers D Ed), (7), 211-234.
- Lundon, K.M., Li, A.M., Bibershtein, S. (1988). Inter-rater and intra-rater reliability in the measurement of kyphosis in postmenopausal women with osteoporosis. *Spine*, 23(18), 1978-1985.
- Milne. J.S., Williamson, J. (1983). A longitudinal study of kyphosis in older people. *Age Ageing*, 12, 225-233.
- Ryan SD, Fried LP. (1997). The impact of kyphosis on daily functioning. *JAGS*, 45, 1479-1486.

According to Carleen Lindsay, PT (2004), four basic kypholordotic postural curves can be revealed using the flexicurve:

Research by Lundon et al., (1998) determined that the flexicurve ruler permits qualitative evaluation of postural deviation. It permits design of a specific physical therapy management strategy for the purpose of postural retraining and for longitudinal study of kyphotic curve change induced by disease progression or therapeutic intervention. They concluded that the flexicurve is a worthwhile alternative to an x-ray evaluation of spinal kyphosis.

Index of Kyphosis[1] = (TW/TL) x 100

Age	Female (inches)	Male (inches)
30-34	7.0 + 1.0	8.0 + 2.5
35-39	7.5 + 2.0	8.2 + 1.5
40-44	7.0 + 1.5	8.5 + 2.5
45-49	7.0 + 2.0	8.5 + 2.5
50-54	9.0 + 3.0	7.5 + 2.0
55-59	9.5 + 2.5	8.5 + 3.0
60-64	11.0 + 2.0	10.0 + 3.0
65-69	12.0 + 2.5	11.0 + 3.0
70-74	12.5 + 3.0	11.5 + 2.5
75-79	13.5 + 4.0	12.0 + 4.0
80 +	15.0 + 6.0	12.0 + 4.0

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[1] Milne, J.S, Lauder, I.J. (1974). Age Effects in Kyphosis and Lordosis. *Annals of Human Biology,* 1:327-337.

EXAMPLE of a QUESTIONNAIRE:

THE ACTIVITIES-SPECIFIC BALANCE CONFIDENCE (ABC) SCALE
Administration:
The ABC can be self-administered or administered via personal or telephone interview. Larger typeset should be used for self-administration, while an enlarged version of the rating scale on an index card will facilitate in-person interviews. Regardless of method of administration, each respondent should be queried concerning their understanding of instructions, and probed regarding difficulty answering specific items.

Instructions to Participants:
For each of the following, please indicate your level of confidence in doing the activity without losing your balance or becoming unsteady from choosing one of the percentage points on the scale form 0% to 100%. If you do not currently do the activity in question, try and imagine how confident you would be if you had to do the activity. If you normally use a walking aid to do the activity or hold onto someone, rate your confidence as it you were using these supports.

Instructions for Scoring:
The ABC is an 11-point scale and ratings should consist of whole numbers (0-100) for each item. Total the ratings (possible range = 0 – 1600) and divide by 16 to get each subject's ABC score. If a subject qualifies his/her response to items #2, #9, #11, #14 or #15 (different ratings for "up" vs. "down" or "onto" vs. "off"), solicit separate ratings and use the lowest confidence of the two (as this will limit the entire activity, for instance the likelihood of using the stairs).

Score Interpretation:
- 80% = high level of physical functioning
- 50-80% = moderate level of physical functioning[2]
- < 50% = low level of physical functioning[3]
- < 67% = older adults at risk for falling; predictive of future fall[4]

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[2] Powell, LE & Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol Med Sci* 1995; 50(1): M28-34.

[3] Myers, A.M, Fletcher, P.C, Myers, A.N, Sherk, W. (1998). Discriminative and evaluative properties of the ABC Scale. *J Gerontology A Biol Sci Med Sci*, 53, M287-M294.

[4] Lajoie, Y. Gallagher, SP. (2004). Predicting falls within the elderly community: comparison of postural sway, reaction time, the Berg balance scale and ABC scale for comparing fallers and non-fallers. *Arch Gerontol Geriatr*, 38, 11-26.

The Activities-specific Balance Confidence (ABC) Scale

For <u>each</u> of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

<div align="center">

0%   10   20   30   40   50   60   70   80   90   100%

<u>no confidence</u>   <u>completely confident</u>

</div>

"How confident are you that you will <u>not</u> lose your balance or become unsteady when you…

1. …walk around the house? ____%

2. …walk up or down stairs? ____%

3. …bend over and pick up a slipper from the front of a closet floor ____%

4. …reach for a small can off a shelf at eye level? ____%

5. …stand on your tiptoes and reach for something above your head? ____%

6. …stand on a chair and reach for something? ____%

7. …sweep the floor? ____%

8. …walk outside the house to a car parked in the driveway? ____%

9. …get into or out of a car? ____%

10. …walk across a parking lot to the mall? ____%

11. …walk up or down a ramp? ____%

12. …walk in a crowded mall where people rapidly walk past you? ____%

13. …are bumped into by people as you walk through the mall?____%

14. … step onto or off an escalator while you are holding onto a railing? ____%

15. … step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing? ____%

16. …walk outside on icy sidewalks? ____%

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

TINETTI PERFORMANCE ORIENTED MOBILITY ASSESSMENT[5]
Description:
The Tinetti assessment tool is an easily administered task-oriented test that measures an older adult's gait and balance abilities.

Equipment needed: Hard armless chair
Stopwatch or wristwatch
15 ft. walkway

Completion time: 10-15 minutes

Scoring: A three-point ordinal scale, ranging from 0-2.
"0" indicates the highest level of impairment and
"2" the individual's independence.
Total Balance Score = 16; Total Gait Score = 12; Total Test Score = 28
Interpretation:[6]   25-28 = low fall risk; 19-24 = medium fall risk; < 19 = high fall risk

[5] Tinetti, M.E. (1986). Performance-oriented assessment of mobility problems in elderly patients. *JAGS*, 34, 119-126. (Scoring description: PT Bulletin Feb. 10, 1993)
[6] Briggs, C.R., Gossman, M.R., Birch, R., Drews, J.E, Shaddea, S.A. (1989). Balance Performance Among Noninstitutionalized Adult Women. *Physical Therapy*, 69(9), 748-756.

Tinetti Performance Oriented Mobility Assessment (POMA) – Balance Tests

Initial instructions: Subject is seated in hard, armless chair. The following maneuvers are tested.

1. **Sitting Balance** Leans or slides in chair =0
    Steady, safe =1 _____

2. **Arises** Unable without help =0
    Able, uses arms to help =1
    Able without using arms =2 _____

3. **Attempts to Arise** Unable without help =0
    Able, requires > 1 attempt =1
    Able to rise, 1 attempt =2 _____

4. **Immediate Standing Balance** (first 5 seconds)
    Unsteady (swaggers, moves feet, trunk sway) =0
    Steady but uses walker or other support =1
    Steady without walker or other support =2 _____

5. **Standing Balance**
    Unsteady =0
    Steady but wide stance (medial heals > 4 inches
    apart) and uses cane or other support =1
    Narrow stance without support =2 _____

6. **Nudged** (subject at maximum position with feet as close together as possible, examiner pushes lightly on subject's sternum with palm of hand 3 times)
    Begins to fall =0
    Staggers, grabs, catches self =1
    Steady =2 _____

7. **Eyes Closed** (at maximum position of item 6)
    Unsteady =0
    Steady =1 _____

8. **Turing 360 Degrees** Discontinuous steps =0
    Continuous steps =1 _____
    Unsteady (grabs, staggers) =0
    Steady =1 _____

9. **Sitting Down**
    Unsafe (misjudged distance, falls into chair) =0
    Uses arms or not a smooth motion =1
    Safe, smooth motion =2 _____

    BALANCE SCORE: _____/16

Tinetti Performance Oriented Mobility Assessment (POMA) - Gait Tests –

Initial Instructions: Subject stands with examiner, walks down hallway or across room, first at "usual" pace, then back at "rapid, but safe" pace (using usual walking aids)

10. **Initiation of Gait** (immediately after told to "go")

Any hesitancy or multiple attempts to start	=0	
No hesitancy	=1	_____

11. **Step Length and Height**

Right swing foot:

Does not pass left stance foot with step	=0	
Passes left stance foot	=1	_____

Right foot does not clear floor completely:

With step	=0	
Right foot completely clears floor	=1	_____

Left swing foot:

Does not pass right stance foot with step	=0	
Passes right stance foot	=1	_____

Left foot does not clear floor completely:

With step	=0	
Left foot completely clears floor	=1	_____

12. **Step Symmetry**

Right and left step length not equal (estimate)	=0	
Right and left step length appear equal	=1	_____

13. **Step Continuity**

Stopping or discontinuity between steps	=0	
Steps appear continuous	=1	_____

14. **Path** (estimated in relation to floor tiles, 12-inch diameter; observe excursion of 1 foot over about 10 ft. of the course)

Marked deviation	=0	
Mild/moderate deviation or uses walking aid	=1	
Straight without walking aid	=2	_____

15. **Trunk**

Marked sway or uses walking aid	=0	
No sway but flexion of knees or back or spreads arms out while walking	=1	
No sway, no flexion, no use of arms, and no use of walking aid	=2	_____

16. **Walking Stance**

Heels apart	=0	
Heels almost touching while walking	=1	_____

GAIT SCORE = _____/12
BALANCE SCORE = _____/16
TOTAL SCORE (Gait + Balance) = _____/28

Tinetti Performance Oriented Mobility Assessment (POMA)	Date	Date	Date	Date
Balance Tests: Subject is seated on hard, armless chair				
SITTING BALANCE Leans or slides in chair =0, Steady, safe =1				
ARISES Unable without help =0; Able, uses arms =1, Able without using arms = 2				
ATTEMPTS TO RISE: Unable w/o help=0; Able, requires > 1 attempt =1; Able in 1 attempt =2				
IMMEDIATE STANDING BALANCE (first 5 seconds) Unsteady (sway/stagger/feet move)=0; Steady, w/ support =1;Steady w/o support =2				
STANDING BALANCE Unsteady =0; Steady, stance > 4 inch BOS & requires support =1; Narrow stance, w/o support =2				
STERNAL NUDGE (feet close together) Begins to fall =0; Staggers, grabs, catches self =1; Steady =2				
EYES CLOSED (feet close together) Unsteady =0; Steady =1				
TURNING 360 DEGREES Discontinuous steps =0; Continuous steps =1				
TURNING 360 DEGREES Unsteady (staggers, grabs) =0;Steady =1				
SITTING DOWN Unsafe (misjudges distance, falls) =0;Uses arms, or not a smooth motion =1; Safe, smooth motion =2				
BALANCE SCORE TOTAL	/16	/16	/16	/16
GAIT INITATION (immediate after told "go) Any hesitancy, multiple attempts to start =0; No hesitancy =1				
STEP LENGTH R swing foot passes L stance leg =1; L swing foot passes R =1				
FOOT CLEARANCE R foot completely clears floor =1; L foot completely clears floor =1				
STEP SYMMETRY R and L step length unequal =0; R and L step length equal=1				
STEP CONTINUITY Stop/discontinuity between steps =0; Steps appear continuous =1				
PATH (excursion) Marked deviation =0; Mild/moderate deviation or use of aid =1; Straight without device=2				
TRUNK Marked sway or uses device =0; No sway but knee or trunk flexion or spread arms while walking =1; None of the above deviations=2				
BASE OF SUPPORT Heels apart =0; Heels close while walking =1				

GAIT SCORE TOTAL	/12	/12	/12	/12
ASSISTIVE DEVICE				
TOTAL SCORE (BALANCE + GAIT) **FALL RISK** **(minimal >23, Mod. 19-23, High < 19)**	/28	/28	/28	/28
Therapist initials				

DYNAMIC GAIT INDEX[7]

Description:
Developed to assess the likelihood of falling in older adults. This scale was designed to test eight facets of gait.

Equipment needed: Box (Shoebox), Cones (2), Stairs
Completion Time: 15 minutes
Scoring: A four-point ordinal scale, ranging from 0-3.
            "0" indicates the lowest level of function and
            "3" the highest level of function.
        Total Score = 24

   Interpretation: < 19 = predictive of falls in the elderly > 22 = safe ambulators

DYNAMIC GAIT INDEX
1. Gait level surface _____
Instructions: Walk at your normal speed from here to the next mark (20')
Grading: Mark the lowest category that applies.
(3)   Normal: Walks 20', no assistive devices, good speed, no evidence for imbalance, normal gait pattern.
(2)   Mild Impairment: Walks 20', uses assistive devices, slower speed, mild gait deviations.
(1)   Moderate Impairment: Walks 20', slow speed, abnormal gait pattern, evidence for imbalance.
(0)   Severe Impairment: Cannot walk 20' without assistance, severe gait deviations or imbalance.

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[7] Shumway-Cook, A., Woollacott, M. (1995). *Motor Control Theory and Applications*, Williams and Wilkins Baltimore, 323-324.

2. Change in gait speed _____

Instructions: Begin walking at your normal pace (for 5'), when I say "go," walk as fast as you can (for 5'). When I say "slow," walk as slowly as you can (for 5').

Grading: Mark the lowest category that applies.

(3)   Normal: Able to smoothly change walking speed without loss of balance or gait deviation. Shows a significant difference in walking speeds between normal, fast and slow speeds.

(2)   Mild Impairment: Is able to change speed but demonstrates mild gait deviations, or not gait deviations but unable to achieve a significant change in velocity, or uses an assistive device.

(1)   Moderate Impairment: Makes only minor adjustments to walking speed, or accomplishes a change in speed with significant gait deviations, or changes speed but has significant gait deviation, or changes speed but loses balance but is able to recover and continue walking.

(0)   Severe Impairment: Cannot change speeds, or loses balance and has to reach for wall or be caught.

3. Gait with horizontal head turns _____

Instructions: Begin walking at your normal pace. When I tell you to "look right," keep walking straight, but turn your head to the right. Keep looking to the right until I tell you, "look left," then keep walking straight and turn your head to the left. Keep your head to the left until I tell you "look straight," then keep walking straight, but return your head to the center.

Grading: Mark the lowest category that applies.

(3)   Normal: Performs head turns smoothly with no change in gait.

(2)   Mild Impairment: Performs head turns smoothly with slight change in gait velocity, i.e., minor disruption to smooth gait path or uses walking aid.

(1)   Moderate Impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0)   Severe Impairment: Performs task with severe disruption of gait, i.e., staggers outside 15" path, loses balance, stops, and reaches for wall.

4. Gait with vertical head turns _____

Instructions: Begin walking at your normal pace. When I say to "look up," keep walking straight, but tip your head up. Keep looking up until I say, "look down," then keep walking straight and tip your head down. Keep your head down until I say "look straight," then keep walking straight, but return your head to the center.

Grading: Mark the lowest category that applies.

(3)   Normal: Performs head turns smoothly with no change in gait.

(2)   Mild Impairment: Performs head turns smoothly with slight change in gait velocity, i.e., minor disruption to smooth gait path or uses walking aid.

(1)   Moderate Impairment: Performs head turns with moderate change in gait velocity, slows down, staggers but recovers, can continue to walk.

(0)   Severe Impairment: Performs task with severe disruption of gait, i.e., staggers outside 15" path, loses balance, stops, reaches for wall.

5. Gait and pivot turn _____

Instructions: Begin walking at your normal pace. When I say, "turn and stop," turn as quickly as you can to face the opposite direction and stop.

Grading: Mark the lowest category that applies.

(3)   Normal: Pivot turns safely within 3 seconds and stops quickly with no loss of balance.

(2)   Mild Impairment: Pivot turns safely in > 3 seconds and stops with no loss of balance.

(1)   Moderate Impairment: Turns slowly, requires verbal cueing, requires several small steps to catch balance following turn and stop.

(0)   Severe Impairment: Cannot turn safely, requires assistance to turn and stop.

6. Step over obstacle _____

Instructions: Begin walking at your normal speed. When you come to the shoebox, step over it, not around it, and keep walking.

Grading: Mark the lowest category that applies.

(3)   Normal: Is able to step over the box without changing gait speed, no evidence of imbalance.

(2)   Mild Impairment: Is able to step over box, but must slow down and adjust steps to clear box safely.

(1)   Moderate Impairment: Is able to step over box but must stop, then step over. May require verbal cueing.

(0)   Severe Impairment: Cannot perform without assistance.

7. Step around obstacles _____

Instructions: Begin walking at normal speed. When you come to the first cone (about 6' away), walk around the right side of it. When you come to the second cone (6' past first cone), walk around it to the left.

Grading: Mark the lowest category that applies.

(3)   Normal: Is able to walk around cones safely without changing gait speed; no evidence of imbalance.

(2)   Mild Impairment: Is able to step around both cones, but must slow down and adjust steps to clear cones.

(1)   Moderate Impairment: Is able to clear cones but must significantly slow, speed to accomplish task, or requires verbal cueing.

(0)   Severe Impairment: Unable to clear cones, walks into one or both cones, or requires physical assistance.

8. Steps _____

Instructions: Walk up these stairs as you would at home, i.e., use the railing if necessary. At the top, turn around and walk down.

Grading: Mark the lowest category that applies.

(3)   Normal: Alternating feet, no rail.

(2)   Mild Impairment: Alternating feet, must use rail.

(1)   Moderate Impairment: Two feet to a stair, must use rail.

(0)   Severe Impairment: Cannot do safely.   TOTAL SCORE: ___ / 24

FOUR SQUARE STEP TEST (FSST)[8]

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

```
       |
  2    |   3
-------+-------
  1    |   4
       |
```

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

BESTest[1] and Mini-BESTest[2]

Description: Balance test to differentiate balance in six systems that may influence balance: biomechanical, stability limits, postural responses, anticipatory postural adjustments, sensory orientation, and dynamic balance during gait and cognitive effects. [1]
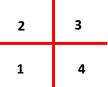
Equipment needed:

Stop watch, Measuring tape, Block of 4-inch, medium density, Tempur® foam
10-degree incline ramp, Stair step – 15cm, 2 stacked shoe boxes
2.5 kg (5lb) free weight, Firm chair with arms, Masking tape

Completion time:
BESTest: 30 minutes
Mini-BESTest 10-15 minutes

Scoring:
BESTest has 36 items (scored 0-3) ___/108 points
Mini-BESTest has 14 items (score 0-2) ___/28 points

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[8] 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.

Interpretation:
<19 on Mini-BESTest predicts future falls for people with Parkinson's Disease[3]
<16 on Mini- BESTest identifies history of falls[4]
<82 on BESTest identifies history of falls[5]

Reliability: Both BESTest and Mini-BESTest demonstrate good to excellent reliability
(BESTest inter-rater reliability: 0.91[6], Mini-BESTest inter-rater reliability 0.72-0.99[6]).

Norms:[7]

Test	Age group			
	50-59	60-69	70-79	80-89
BESTest	95.7	91.4	85.4	79.4
Mini-BESTest	26.3	24.7	21.0	19.6

Website Reference: http://www.bestest.us/

TIMED "UP AND GO"
Description of the Instrument

Patients are timed (in seconds) when performing the TUG - 3 conditions
1. TUG alone-from sitting in a chair, stand up, walk 3 meters, turn around, walk back, and sit down.
2. TUG Cognitive-complete the task while counting backwards from a randomly selected number between 20 and 100.
3. TUG Manual-complete the task while carrying a full cup of water.[9]

The time taken to complete the task is strongly correlated to level of functional mobility, (i.e. the more time taken, the more dependent in activities of daily living).[10]

The cutoff levels for TUG is 13.5 seconds or longer with an overall correct prediction rate of 90%; for TUG Manual (while carrying a glass of water) is **14.5 seconds** or longer with a 90% correct prediction rate; and Tug Cognitive (while counting backwards) is **15.0 seconds** or longer with an overall correct prediction rate of 87%.[11]

Statistical Interpretation:[12]
Inter-rater reliability was very high, with *r* =.98, .99, and .99 for the TUG, TUG manual, and TUG cognitive respectively

The TUG alone correctly classified 13/15 fallers (87% sensitivity) and 13/15 non-fallers (87% specificity).

TUG Scoring Interpretation: Older adults who take longer than 13.5 seconds to complete the TUG have a high risk for falls.[13]

Table 5. Timed Up and Go Scores: Means, Standard Deviations, and Confidence Intervals by Age, Gender, and Use of Assistive Device (in Seconds)

Age (y)	Group	N	Mean	SD	CI
60-69	Male	1	7.3	—	-2.4 – 17.0
	Female	5	8.1	0.9	3.7 – 12.4
	Overall	6	7.9	0.9	7.0 – 8.9
70-79	Male	9	6.8	1.1	3.6 – 10.1
	Female	10	8.5	2.8	5.4 – 11.6
	Overall	19	7.7	2.3	6.6 – 8.8
80-89	Male	10	13.5	6.3	10.4 – 16.5
	Female	24	13.6	5.5	11.7 – 15.6
	No Device	24	11.0	2.2	9.4 – 12.5
	Device	10	19.9	6.4	17.5 – 22.3
	Overall	34	13.6	5.6	11.6 – 15.5
90-101	Male	2	23.4	9.2	16.6 – 30.3
	Female	15	17.0	5.3	14.5 – 19.5
	No Device	7	14.7	7.9	11.8 – 17.5
	Device	10	19.9	2.5	17.5 – 22.3
	Overall	17	17.7	5.8	14.7 – 20.7

[9] Lundlin-Olsson, L., Nyberg, L., Gustafson, Y. (1998). Attention, frailty, and falls: the effect of a manual task on basic mobility. *Journal of the American Geriatrics Society*, 46, 758-761.

[10] Podsiadlo, D., Richardson, S. (1991). The timed "up & go": A test of basic functional mobility for frail elderly persons. *Journal of the American Geriatrics Society*, 39, 142-148.

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[12] Lusardi, M.M. (2004). Functional Performance in Community Living Older Adults. *Journal of Geriatric Physical Therapy*, 26(3), 14-22.

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Timed "Up and Go"

Directions:
- The timed "Up and Go" test measures, in seconds, the time taken by an individual to stand up from a standard arm chair (approximate seat height of 46 cm [18in], arm height 65 cm [25.6 in]), walk a distance of 3 meters (118 inches, approximately 10 feet), turn, walk back to the chair, and sit down.
- The subject wears their regular footwear and <u>uses their customary walking aid</u> (none, cane, walker).
- No physical assistance is given.
- They start with their back against the chair, their <u>arms resting on the armrests</u>, and their walking aid at hand.
- They are instructed that, on the word "go" they are to get up and <u>walk at a comfortable and safe pace</u> to a line on the floor 3 meters away, turn, return to the chair and sit down again.
- The subject walks through the test once before being timed in order to become familiar with the test.
- Either a stopwatch or a wristwatch with a second hand can be used to time the trial.

Instructions to the patient:
"When I say 'go' I want you to stand up and walk to the line, turn and then walk back to the chair and sit down again. Walk at your normal pace."

Variations:
You may have the patient walk at a fast pace to see how quickly they can ambulate. Also you could have them turn to the left and to the right to test any differences.

Scoring:
Time for 'Up and Go' test _____sec.

☐ Unstable on turning?

☐ Walking aid used?   Type of aid: _____

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:[14]

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

[14] 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].

GRIP STRENGTH

Research has shown that increased grip strength is positively correlated with decreased risk of falling[15], has been demonstrated to have a 69% prediction accuracy for motor functioning 6 months post hip fracture in combination with upper limb functioning and age[16] and has even been noted as a marker for overall fragility in elderly women.[17] [18]

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.[19]

[15] Rossat, A., et al., (2010). Risk factors for falling in community-dwelling older adults: which of them are associated with the recurrence of falls? *J Nutr Health Aging*, 14(9), 787-91.

[16] Beloosesky, Y., Weiss, A., Manasian, M., Salai, M. (2010) Handgrip strength of the elderly after hip fracture repair correlates with functional outcome. *Disabil Rehabil*, 32(5), 367-73.

[17] Kritz-Silverstein, D., et al., (1994). Grip strength and bone mineral density in older women. *JBMR*, 9(1), 45-51.

[18] Dixon, W.G., et al. (2005). Low grip strength is associated with bone mineral density and vertebral fracture in women. *Rheumatology*, 44:642-646.

[19] 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.

TIMED SIT-TO-STAND

Description:
The 30 second sit to stand was initially developed as an assessment tool to assess lower body strength in community-dwelling elderly.[20]

Equipment/set-up:
Straight backed chair without arms (seat height approximately 17"). Chair is placed against wall or heavy object (plinth) to prevent it from moving during test. A stopwatch is also required.

Instructions:
After demonstrating the tester will have the participant cross their arms across their chest and after hearing the word "go" they will stand up and sit down as many times as possible in 30 seconds. If the participant is more than half way up when the 30 seconds are up it counts as a full stand.

Scoring:
The score is the total number of stands executed correctly within 30 seconds. If the patient is more than half way up at the end of 30 seconds it is counted as a full stand.

Adaptations if hand use is required:
If the participant is unable to perform the task without use of hands during the practice trial, check "YES" for the "Use of hands required"question on the assessment form. The test continues with the patient using the chair or their thighs to push off. If the participant uses their hands, their score **can not** be compared with age-related normative values.

Reliability:
The tool has been shown to have test-retest reliability (ICC=.84 for men and .92 for women) while assessing lower body strength in community-dwelling elderly and people who have had a CVA.[21]

Normative Values:

Sex	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Normal* Range of Scores for Men	14-19	12-18	12-17	11-17	10-15	8-14	7-12
Normal * Range of Scores for Women	12-17	11-16	10-15	10-15	9-14	8-13	4-11

[20] Jones, C.J., Rikli, R.E., Beam, W.C. (1999). A 30-s chair-stand test as a measure of lower body strength in community-residing older adults. *Research Quarterly for Exercise and Sport*, 70, 113-119.
[21] Rikli , R.E., Jones, C.J. (1999). Development and validation of a functional fitness tests for community-dwelling older adults. *J Aging and Physical Activity*, 7, 129-161.

5 SIT-TO-STAND TEST [22] [23]

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.)[24]

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

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[22] Csuka, M., McCarty, D. (1985). Simple method for measurement of lower extremity muscle strength. *Am J Med*, 78(1), 77-81.

[23] 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.

[24] 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.

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.

Interpretation

Normal range of scratch test scores		
Age	Distance between fingertips – Women (cm)	Distance between fingertips – Men (cm)
60 - 64	-7.6 - 3.8	-16.5 - 0.0
65 - 69	-8.9 - 3.8	-19.1 - -2.5
70 - 74	-10.2 - 2.5	-20.3 - -2.5
75 - 79	-12.7 - 1.3	-22.9 - -5.1
80 - 84	-12.7 - 0.0	-22.9 - -5.1
85 - 90	-14.0 - -2.5	-24.1 - -7.6
90 - 95	-20.3 - -2.5	-26.7 - -10.2

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

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.

6-MINUTE WALK TEST
Description: The 6-Minute Walk test is a measure of endurance.

Equipment: Stopwatch, tape measure, track/loop walkway, portable chair,
        Borg RPE and Dyspnea scales.

Instructions to participant:
    When I say 'go', I want you to walk as far as you can in 6 minutes, up and down this walkway, doing laps. I will walk with you. If you get tired, short of breath, have chest pain, leg pain, or any other symptom, we will stop and have you rest until you feel ready to go again. While you rest, we let the stopwatch run, and then when you are through resting you can continue to walk for what is left of the remaining 6 minutes. We measure the total distance that you are able to walk in 6 minutes. We will avoid having a conversation so that you can save your wind for walking. You can begin when I say 'go'.
Guidelines:
  - Walk slightly BEHIND the participant so you are not unintentionally coaxing them to go faster than they would choose otherwise.
  - Attempt to take radial pulse during each lap of the 6MW, being careful not to slow down the patient's pace.
  - Inform the patient of the time elapsed at the end of each minute.

At the end of the 6 minutes:
  - Have participant sit down (portable chair)
  - Immediately take vital signs, <u>starting with HR</u>
  - Have patient rate their RPE, and also dyspnea using the Borg VAS
  - Calculate and record the distance walked.

STUDY: Lusardi M. (2003). Functional Performance in Community Living Older Adults. Journal of Geriatric Physical Therapy 26;3;14-22 Participants: 76 (22 men, 54 women); mean age: 83 ± 8

6 minute walk distances:

Age	Gender (N)	Mean		SD
60-69	Male (1)	498 m	1634 ft.	-
	Female (5)	405 m	1329 ft.	110 m
70-79	Male (9)	475 m	1558 ft.	93 m
	Female (10)	406 m	1332 ft.	95 m
80-89	Male (9)	320 m	1050 ft.	80 m
	Female (24)	282 m	922 ft.	123 m
	No Assist Device (24)	328 m	1076 ft.	102 m
	Assist Device (9)	197 m	646 ft.	82 m
90-101	Male (2)	296 m	971 ft.	15 m
	Female (15)	261 m	856 ft.	81 m
	No Assist Device (7)	324 m	1063 ft.	70 m
	Assist Device (10)	224 m	735 ft.	51 m

*STUDY: Steffen T.M. (2002). Age and Gender Related Test Performance in Community-Dwelling Elderly People: **6MW Test**, BBS, TUG, and Gait Speed. Physical Therapy, Vol.82, No.2, Feb, 2002*

6 minute walk distances:

Age	Gender (N)	Mean	SD	Normal Range (2SD)
60-69	Male (15)	572m	92 m	388-756 m
	Female (22)	538 m	92 m	354-722 m
70-79	Male (14)	527 m	85 m	357-697 m
	Female (22)	471 m	75 m	321-621 m
80-89	Male (8)	417 m	73 m	271-563 m
	Female (15)	392 m	85 m	222-562 m

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.[25]

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)

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