



Considerations for Healthy Aging

Cheryl Resnik, PT, DPT, CEEAA
Professor of Clinical Physical Therapy



THE NEW ENGLAND CENTENARIAN STUDY

Harvard Medical School | Beth Israel Deaconess Medical Center

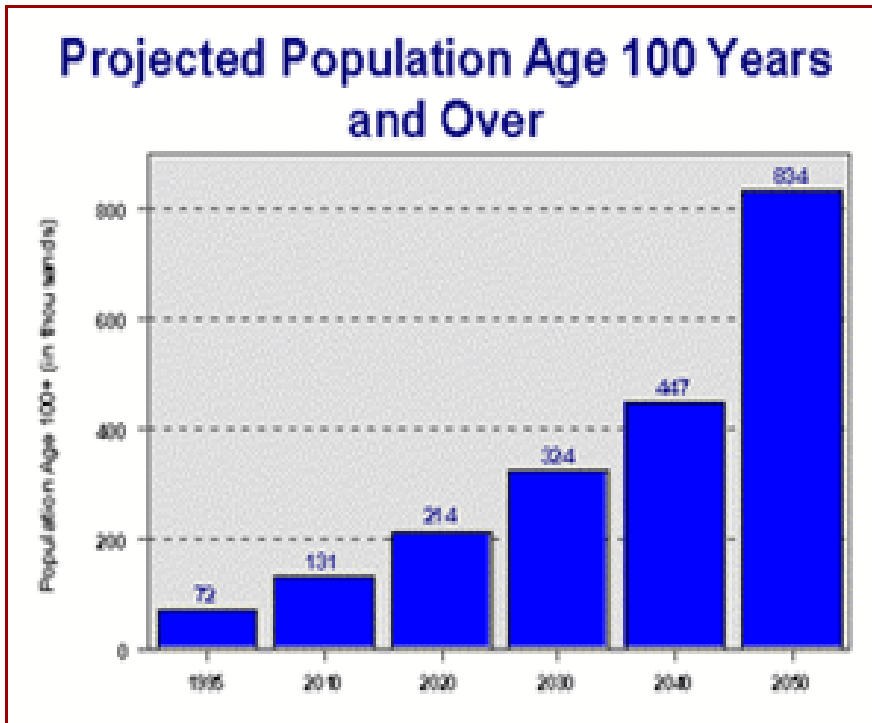


*Dr. Tom Perls, Director of the NECS,
Harvard Division on Aging, Beth Israel
Deaconess Medical Center*



**W. Whynot age 95 and
C. McGaig age 103 – sisters**

Aging Demography Projections from the NECS



- The first baby boomers recently turned 65.
- The number of Americans 65 and older will more than double by 2030
- By 2010, there were as many seniors as there were people under the age of 20.
- Approximately 3 million of these elder boomers can expect to become centenarians.

How to Live to 100



1. Ice Cream

Virginia Davis, 108

2. Booze

Pauline Spagnola, 100

3. Greasy Breakfast

Susannah Jones, 116

4. Avoid Men

Jessie Gallan, 109

5. An Egg a Day – Raw!

Emma Morano, 115

6. Oatmeal

Duranord Veillard, 108

7. Push-ups

Fred Winter, 100

8. Dr. Pepper

Elizabeth Sullivan, 104

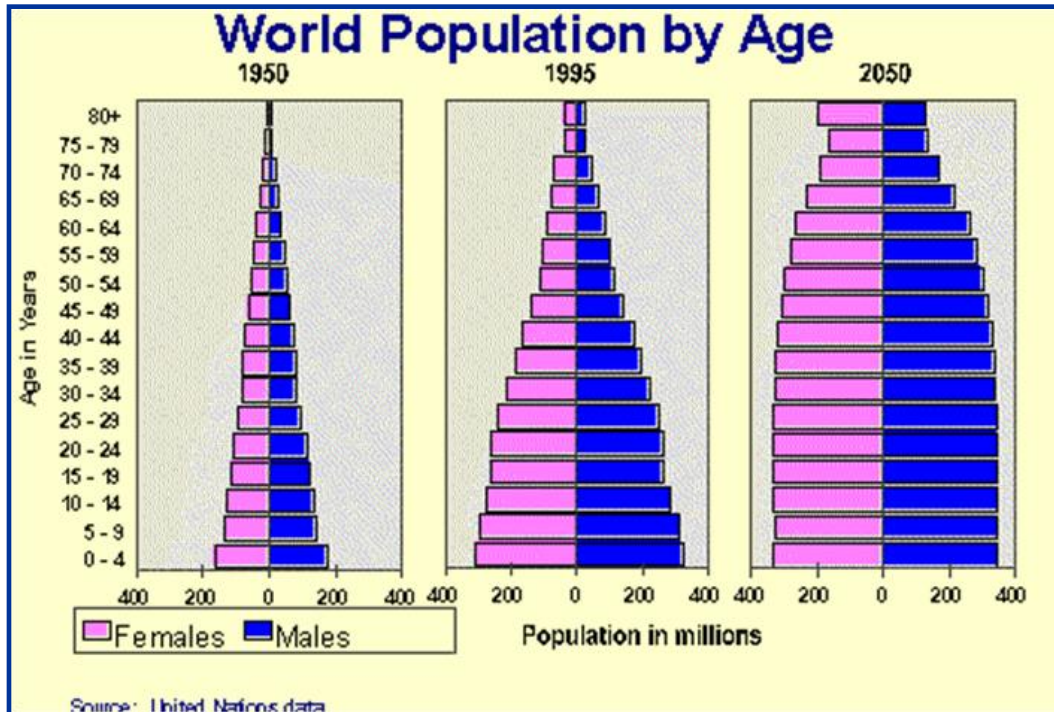
9. Lots of Movement

Ruth, 100

10. Continued Work

Felimina Rotundo, 100

Aging Demography



- In 2019, 54.1 million people were ≥ 65 years old acl.gov
- 6.6 million were ≥ 85 years old acl.gov
- Currently, there are about 97,000 centenarians in the U.S. [US census](http://US.census)
- Median income of older people \$27,398

Functional Requirements for Community-dwelling Aging Adults

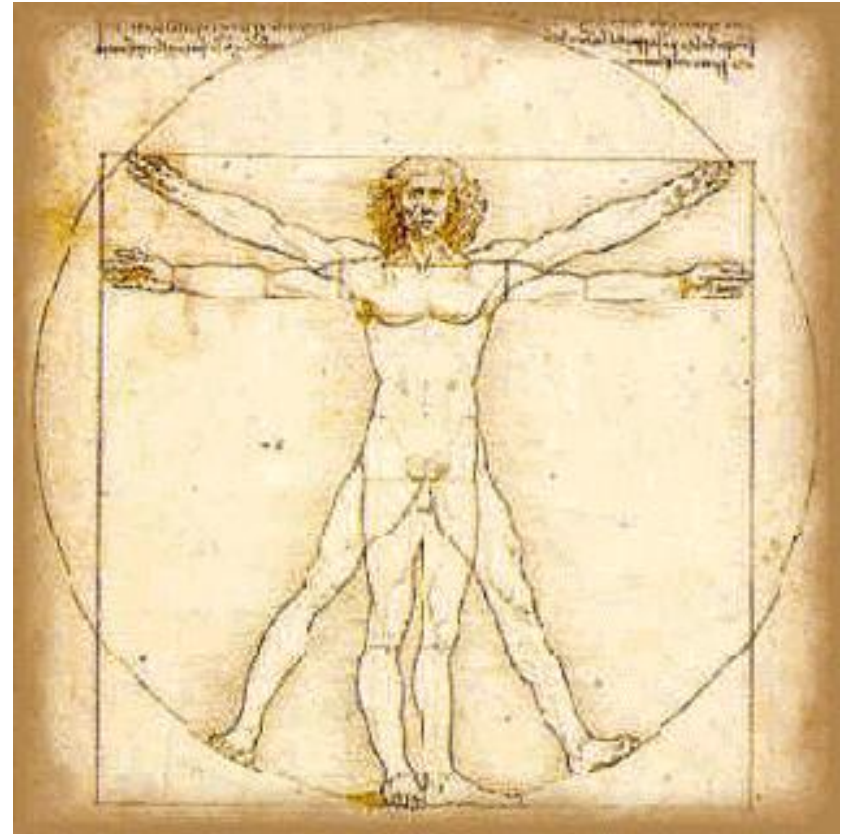


- Walk 1203 (366 m) feet to complete an errand
- Gait speed of 1.2 m/s (~4 ft/sec)
- Able to carry ave. 6.7 lb package
- Challenges of walking – stairs, curbs, slopes
- Able to perform postural transitions

What's Most Important?



- Strength
- Flexibility
- Cardiovascular fitness
- Body composition
 - ↓ fat
 - ↑ muscle



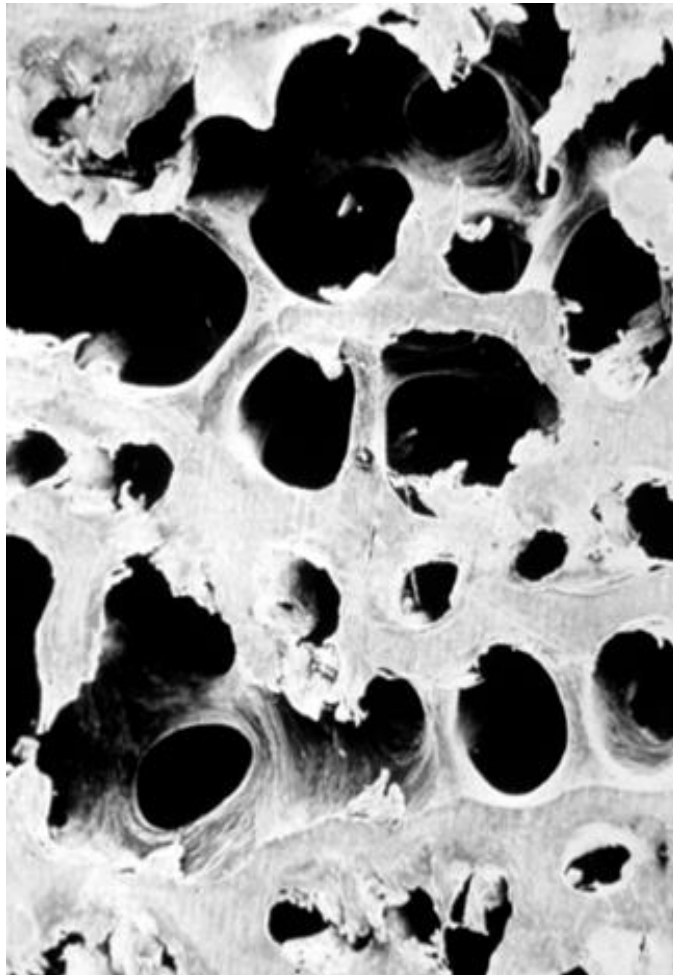
Osteoporosis



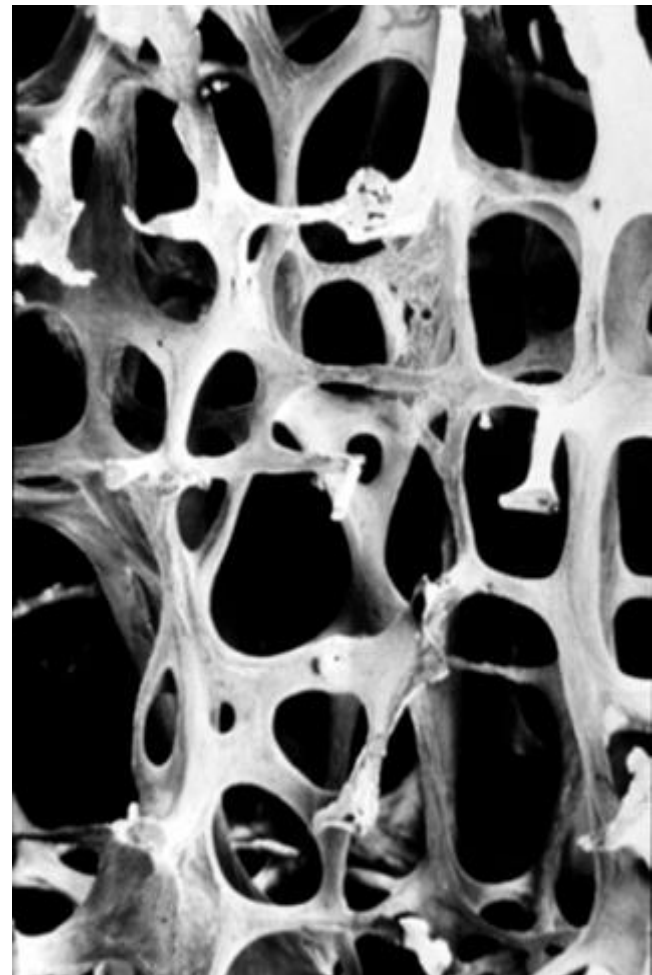
- A silent disease
- Often asymptomatic until fractures occur
- Early diagnosis and treatment are essential

Consensus Development Statement. *Osteoporos Int* 1997; 7:1-5 *WHO Technical Report Series*. 1994;843:1-129

Normal Trabecular Bone



Osteoporotic Bone



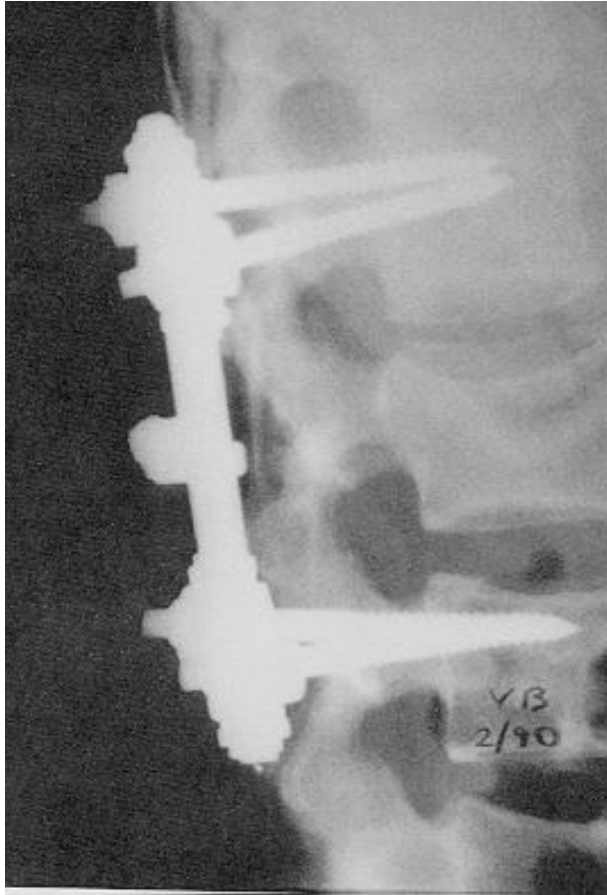
Osteoporotic Fractures



HIP

- 90% = fall
- 1SD decline in BMD = 2.6X risk increase
- 1 year mortality = 20%-25%

Osteoporotic Fractures



SPINE

- 40% = falls
- 40% = spontaneous
- 2SD decline in BMD = 4-6X risk increase
- T8, T12, L1
- Only 1/3 diagnosed

Osteoporotic Fractures



DISTAL FOREARM

- 96% = moderate trauma (fall)
- 1SD decline in BMD = 1.8X risk increase
- Most = forward fall and “catch”

Recommendations for Prevention of Osteoporosis



- Weight-bearing exercise
- Adequate intake of calcium and vitamin D
- Discourage smoking and excessive alcohol intake
- Other antiresorptive therapy

Falls



Definition:

- Unintentional change in position, coming to rest at a lower position
- Not due to an overwhelming intrinsic or environmental cause
- No loss of consciousness

Epidemiology of Falls



- 1/3 of ambulatory and 1/2 institutionalized elderly fall each year
- 1/2 falls result in injury (10-15 % in fx)
- 1/4 of all fallers limit their activities and lifestyle due to fear of falling

www.cdc.gov/homeandrecreationalafety/Falls/adultfalls



[Home](#) > [Publications](#) > [Search Publications](#) > [detail](#)

[Latest Publications](#)

[Search Publications](#)

[Browse Publications](#)

[Topic Center](#)

Join our Newsletter

A monthly e-mail of breaking news, data, and publications from the Center.

JOIN

[See our latest newsletter](#)



More than Half a Million Older Californians Fell Repeatedly in the Past Year

November 20, 2014

 Policy Brief

Author: [Steven P. Wallace, PhD](#)

Falls are the leading injury-related cause of death and of medical care use among Californians ages 65 and over. In 2012, there were 1,819 deaths due to falls among older Californians. More than 72,000 hospitalizations were caused by fall injuries among older adults during that year, along with more than 185,000 emergency department (ED) visits. The medical costs alone of falls in the state have been estimated to be over \$2 billion annually.

 print  share

 **Related Content**

How Big is the Problem



- 1 in 4 adults 65+ falls each year
- < half tell their healthcare provider
- q 20 minutes older adult dies 2° falls
- 3 million nonfatal fall injuries were treated in ERs in 2020
- Totals \$50 billion/year in 2015

www.cdc.gov

Theory of Why People Fall



Falls occur when:

- Older adults who are **predisposed** because of accumulated effect of diseases / impairments (intrinsic)
- Are **exposed to precipitating challenges** (extrinsic)



Fall risk factors are categorized as intrinsic or extrinsic.

Intrinsic	Extrinsic
Advanced age	Lack of stair handrails
Previous falls	Poor stair design
Muscle weakness	Lack of bathroom grab bars
Gait & balance problems	Dim lighting or glare
Poor vision	Obstacles & tripping hazards
Postural hypotension	Slippery or uneven surfaces
Chronic conditions including arthritis, diabetes, stroke, Parkinson's, incontinence, dementia	Psychoactive medications
Fear of falling	Improper use of assistive device

CDC.org

Modifiable Predisposing Factors (Intrinsic)



1. Decreased strength
2. Impaired balance, gait
3. Visual
 - Depth perception
 - Contrast sensitivity

Modifiable Predisposing Factors (Intrinsic)



4. Disease management

- Stroke
- Parkinsonism
- Orthostasis
- Cognitive impairment
- Depressive symptoms
- Foot problems + Arthritis

Modifiable Precipitators of Falls (extrinsic)



1. Medications

- 4+ Medications
- High risk medications:

Psychotropics (e.g. sedatives,
antidepressants-SSRI & TCA)

Antihypertensives

Digoxin

Anticholinergics

Modifiable Precipitators of Falls (extrinsic)



2. Acute illness
3. Multi-focal lens
4. Footwear
5. Environment: Stairs; tripping hazards
6. Unsafe behaviors

Fall Prevention in Practice



- Identify Patients At Risk - 65+
 - Have you fallen in the past year?
 - Do you feel unsteady when standing or walking?
 - Do you worry about falling?
- Assess & manage the health problems that increase fall risk

Therapeutic Approach



- Identify & treat immediate underlying causes & predisposing risk factors
- Review & reduce meds
- Manage postural hypotension
- PT evaluation for strength, balance, & gait training
- OT evaluation for environmental modification and low vision strategies

Postural Hypotension



- Frequently unrecognized
- Adequate hydration
 - ½ c. water every ½ hr for first 8 hrs of day
- Liberalize salt in diet
- Reduce meds that contribute
- Teach patients to change position slowly

Environmental Modification



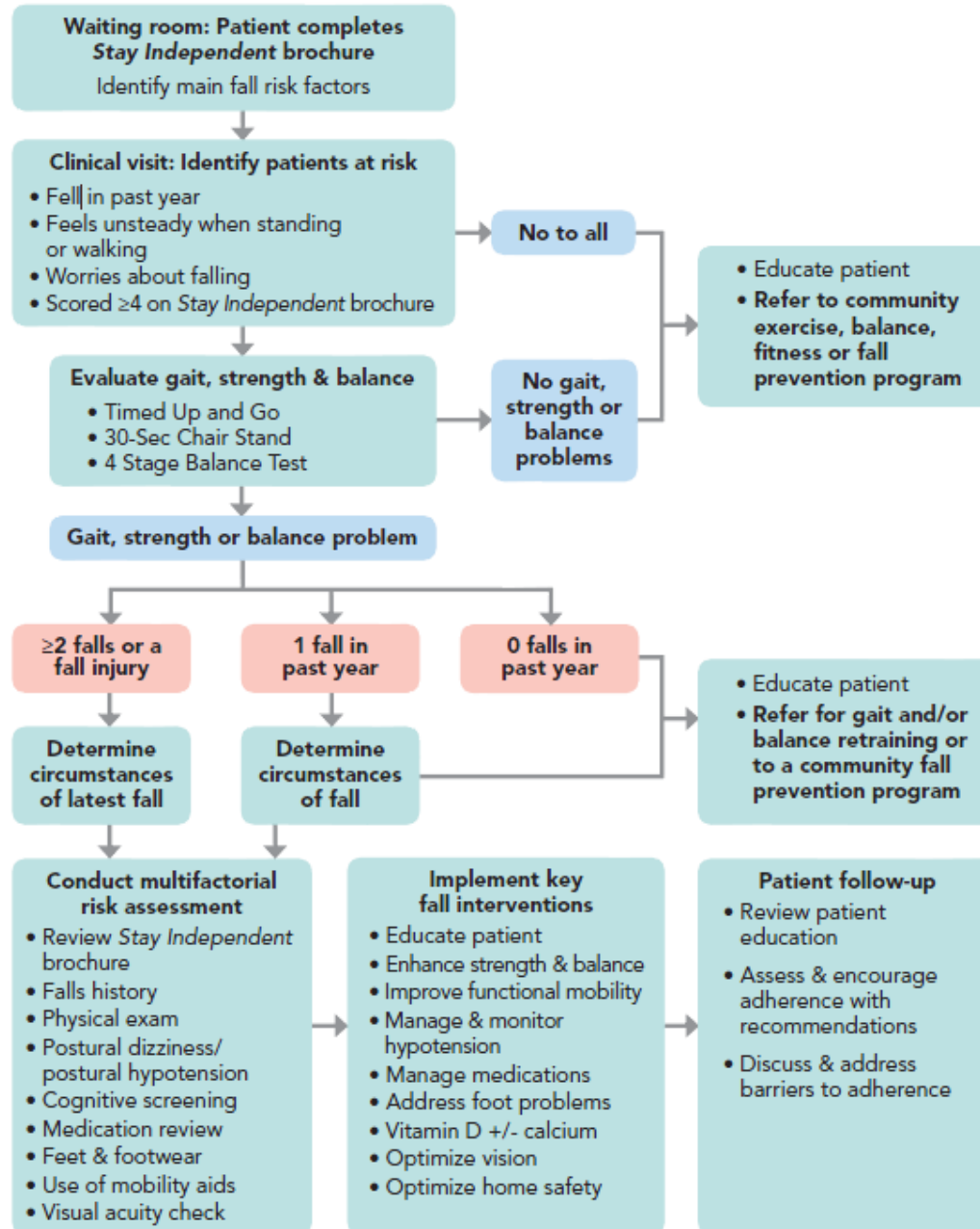
- Home safety assessment
 - By pt or caregiver using checklist, home visit, or home health nurse, OT, PT
- Hazards include:
 - Clutter
 - Electric cords
 - Slippery throw rugs & loose carpet
 - Poor lighting
 - Pets

Clinical Pearls



- Screen all pts >65 yo for falls
- Evaluate the circumstances of the fall
- Systematically evaluate for modifiable predisposing factors and precipitants
 - Motor/balance/gait
 - Environment
 - Medications
 - Vision
 - Disease management, including cognition

Algorithm for Fall Risk Assessment & Interventions



CDC.org



Fall Risk Factor Identified	Factor Present?	Notes
Falls History		
Any falls in past year?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Worries about falling or feels unsteady when standing or walking?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Medical Conditions		
Problems with heart rate and/or rhythm	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Cognitive impairment	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Incontinence	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Depression	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Foot problems	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other medical conditions (Specify)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Medications		
Any psychoactive medications, medications with anticholinergic side effects, and/or sedating OTCs? (e.g., Benadryl, Tylenol PM)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Gait, Strength & Balance		
Timed Up and Go (TUG) Test ≥12 seconds	<input type="checkbox"/> Yes <input type="checkbox"/> No	
30-Second Chair Stand Test Below average score (See table on back)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
4-Stage Balance Test Full tandem stance <10 seconds	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Vision		
Acuity <20/40 OR no eye exam in >1 year	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Postural Hypotension		
A decrease in systolic BP ≥20 mm Hg or a diastolic bp of ≥10 mm Hg or lightheadedness or dizziness from lying to standing?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other Risk Factors (Specify)		
	<input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	



The 30-Second Chair Stand Test

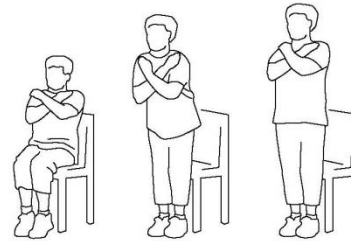
Purpose: To test leg strength and endurance

Equipment:

- A chair with a straight back without arm rests (seat 17" high)
- A stopwatch

Instructions to the patient:

1. Sit in the middle of the chair.
2. Place your hands on the opposite shoulder crossed at the wrists.
3. Keep your feet flat on the floor.
4. Keep your back straight and keep your arms against your chest.
5. On **"Go,"** rise to a full standing position and then sit back down again.
6. Repeat this for 30 seconds.



On **"Go,"** begin timing.

If the patient must use his/her arms to stand, stop the test.
Record "0" for the number and score.

Count the number of times the patient comes to a full standing position in 30 seconds.

If the patient is over halfway to a standing position when 30 seconds have elapsed, count it as a stand.

Record the number of times the patient stands in 30 seconds.

Number: _____ **Score** _____ **See next page.**

A below average score indicates a high risk for falls.

Notes:

For relevant articles, go to: www.cdc.gov/injury/STEADI

Lower Extremity Strength Test



Chair Stand—Below Average Scores

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

http://www.cdc.gov/steady/pdf/30_second_chair_stand_test-a.pdf

The 4-Stage Balance Test



Purpose: To assess static balance

Equipment: A stopwatch

Directions: There are four progressively more challenging positions. Patients should not use an assistive device (cane or walker) and keep their eyes open.

Describe and demonstrate each position. Stand next to the patient, hold his/her arm and help them assume the correct foot position.

When the patient is steady, let go, but remain ready to catch the patient if he/she should lose their balance.

If the patient can hold a position for 10 seconds without moving his/her feet or needing support, go on to the next position.
If not, stop the test.

Instructions to the patient: I'm going to show you four positions.

Try to stand in each position for 10 seconds. You can hold your arms out or move your body to help keep your balance but don't move your feet. Hold this position until I tell you to stop.



Instructions to the patient:



1. Stand with your feet side by side.

Time: _____ seconds



2. Place the instep of one foot so it is touching the big toe of the other foot.

Time: _____ seconds



3. Place one foot in front of the other, heel touching toe.

Time: _____ seconds



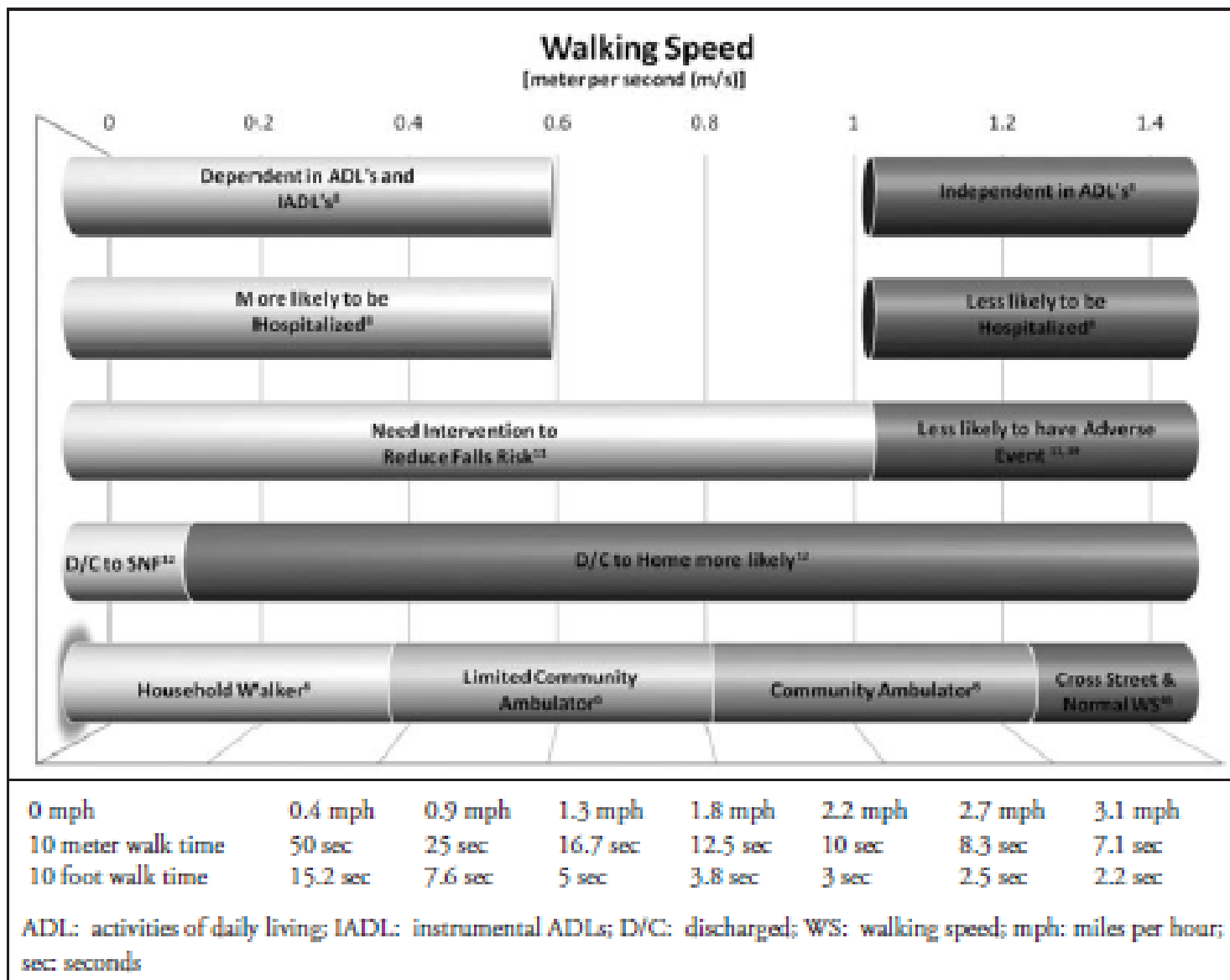
4. Stand on one foot.

Time: _____ seconds



Walking Speed: the 6th Vital Sign

Fritz S, Lusardi M, J Gero PT, Vol.
32;2:09



The Timed Up and Go (TUG) Test



Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters or 10 feet away on the floor.

Instructions to the patient:

When I say **"Go,"** I want you to:

1. Stand up from the chair
2. Walk to the line on the floor at your normal pace
3. Turn
4. Walk back to the chair at your normal pace
5. Sit down again

On the word **"Go"** begin timing.

Stop timing after patient has sat back down and record.

Time: _____ seconds

An older adult who takes ≥ 12 seconds to complete the TUG is at high risk for falling.

Observe the patient's postural stability, gait, stride length, and sway.

Circle all that apply: Slow tentative pace ■ Loss of balance ■
Short strides ■ Little or no arm swing ■ Steadying self on walls ■
Shuffling ■ En bloc turning ■ Not using assistive device properly

Notes:



Timed Up and Go TUG

TUG Norms



Cut-Off Scores indicating risk of falls by population		
Population	Cut-Off score	Author
Community dwelling adults	> 13.5*	Shumway-Cook et al, 2000
Older stroke patients	> 14*	Andersson et al, 2006
Older adults already attending a falls clinic	> 15*	Whitney et al, 2005
Frail elderly	> 32.6*	Thomas et al, 2005
* Time in seconds		

<http://www.rehabmeasures.org>

Functional Gait Assessment Tasks



- Level surfaces
- Change in gait speed
- Horizontal head turns
- Vertical head turns
- Pivot turn
- Step over obstacle
- Narrow base of support
- Eyes closed
- Walking backwards
- Steps

ABC - Activities-Specific Balance Confidence Scale



Activity
Walk around the house
Walk up and down stairs
Pick up a slipper from the floor
Reach at eye level
Reach while standing on your tiptoes
Stand on a chair to reach
Sweep the floor
Walk outside to nearby car
Get in and out of a car
Walk across a parking lot
Walk up and down a ramp
Walk in a crowded mall
Walk in a crowd or get bumped
Ride an escalator holding the rail
Ride an escalator not holding the rail
Walk on icy sidewalks
Total ABC score

Scores < 67% indicates a risk for falling; can accurately classify people who fall 84% of the time.

STEADI - Older Adult Fall Prevention

- STEADI Initiative for Health Care Providers
- STEADI Materials for Health Care Providers
- STEADI Materials for Your Older Adult Patients
- Instructional Videos
- Webinar
- About STEADI
- Share Your Thoughts



Make STEADI Part of Your Medical Practice


Falls are not an inevitable part of aging. There are specific things that you, as their health care provider, can do to reduce their chances of falling. STEADI's tools and educational materials will help you to:

- Identify patients at low, moderate, and high risk for a fall;
- Identify modifiable risk factors; and
- Offer effective interventions.

Get Email Updates


To receive email updates about this page, enter your email address:

Materials for Providers

 Tests, fact sheets, case studies, and additional resources


[Learn More](#)

Videos for Providers

 How to measure patients' functional ability

[Watch Now](#)

Materials for Patients

 Educational materials and brochures

[Learn More](#)



Thank you for your attention