Considerations for Healthy Aging

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USC Division of Biokinesiology and Physical Therapy

University of Southern California

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

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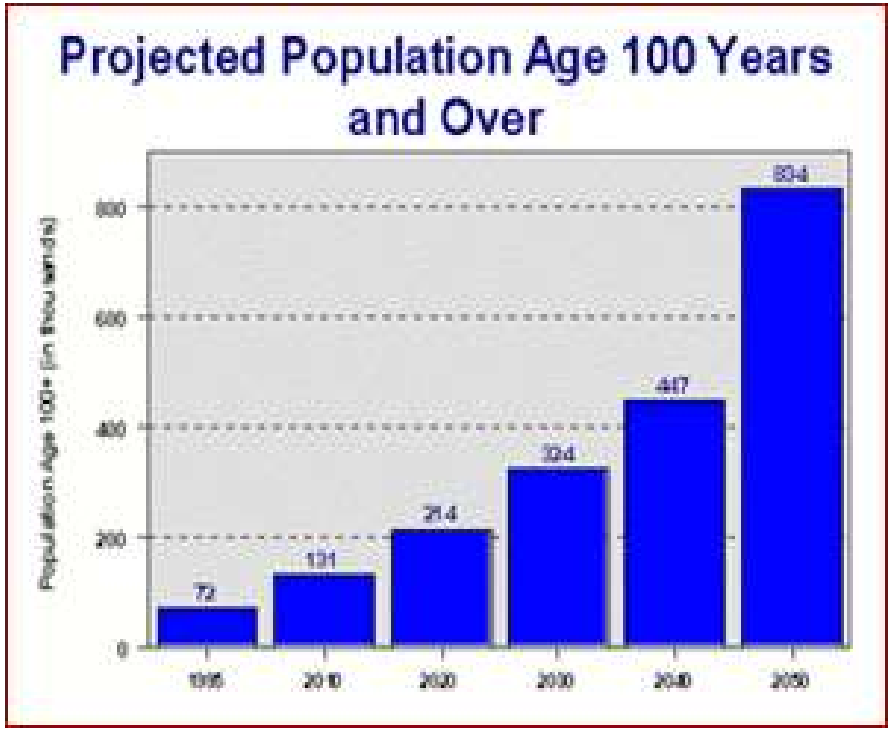
Aging Demography
Projections from the NECS



- 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

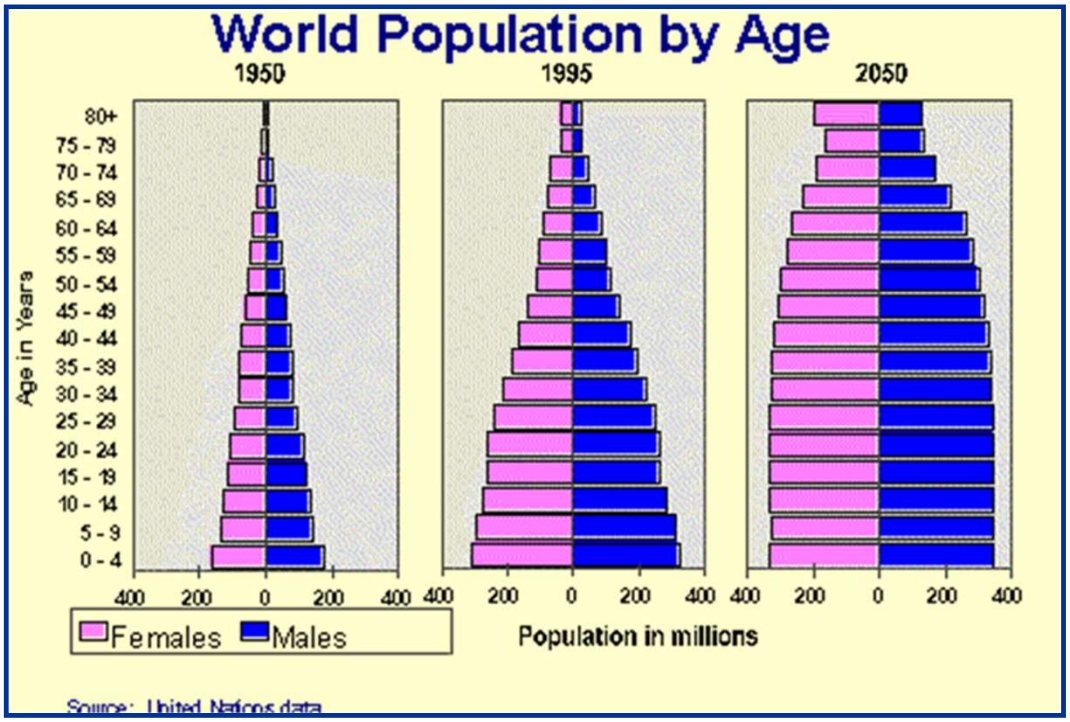
   Ruth, 100

10. Continued Work

    Filmina Rotundo, 100

www.huffingtonpost.com

Aging Demography



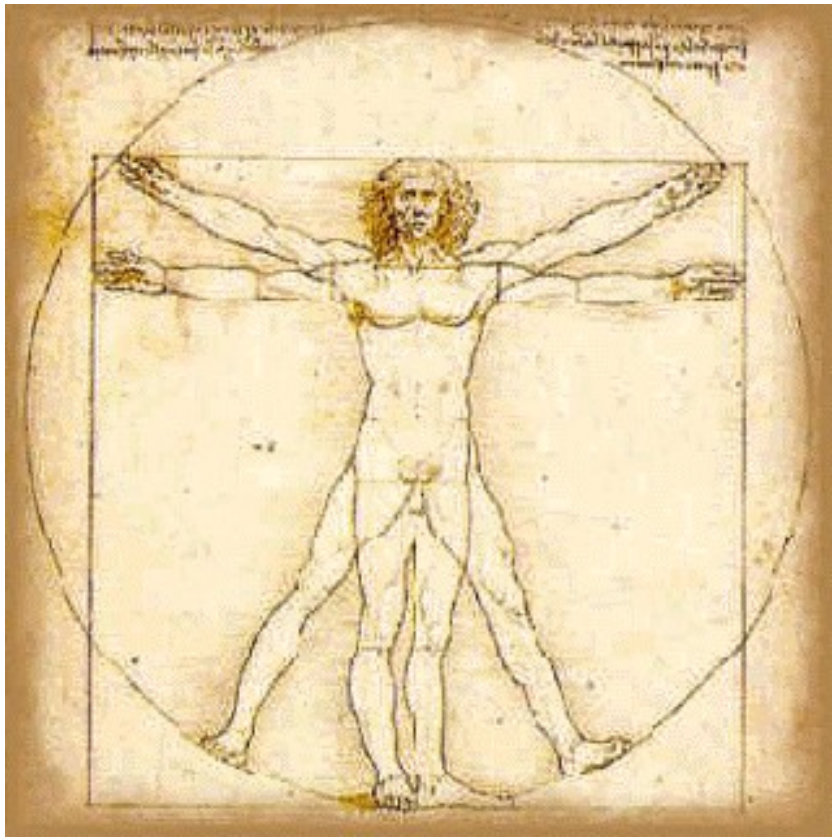
- In 2019, 54.1 million people were ≥ 65 years old acl.gov
- 6.6 million were ≥ 85 years old acl.gov
- Currently, there are about 97,000 centenarians in the U.S. US census
- Median income of older people $27,398

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



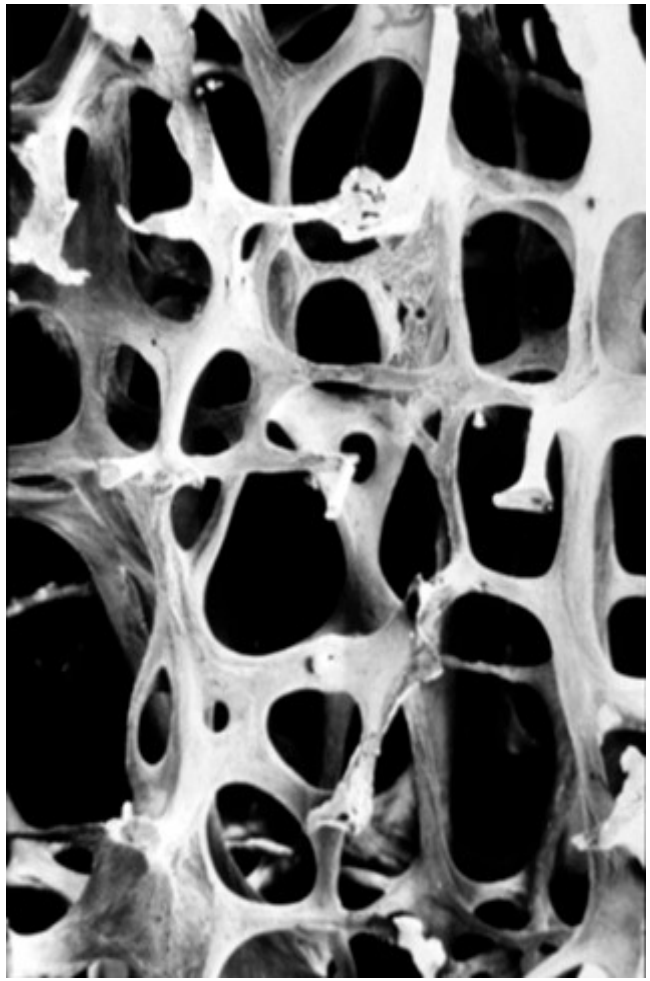
Osteoporosis

- 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

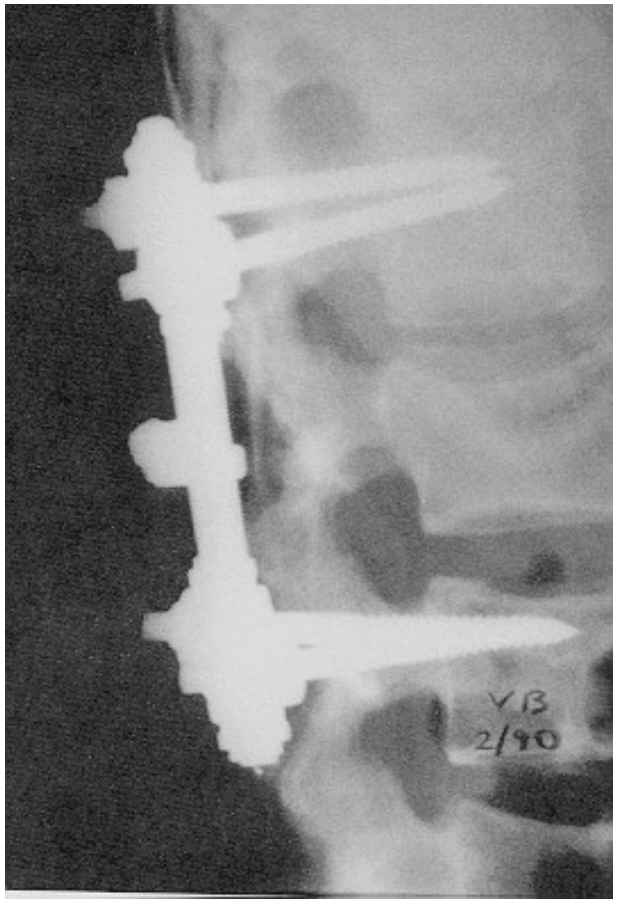


Osteoporotic Fractures

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/homeandrecreationalsafety/Falls/adultfalls

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How Big is the Problem

- 1 in 3 adults 65+ falls each year
- < half tell their healthcare provider
- q 20 minutes older adult dies 2^{o} falls
- 2.4 million nonfatal fall injuries were treated in ERs in 2012
- Totals $30 billion/year in 2012

www.cdc.gov

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

Patient: Date: Time: AM/PM

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/steadi/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.

For each stage, say "**Ready, begin**" and begin timing.
After 10 seconds, say "**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**

An older adult who cannot hold the tandem stance for at least 10 seconds is at increased risk of falling.

Walking Speed: the 6th Vital Sign

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

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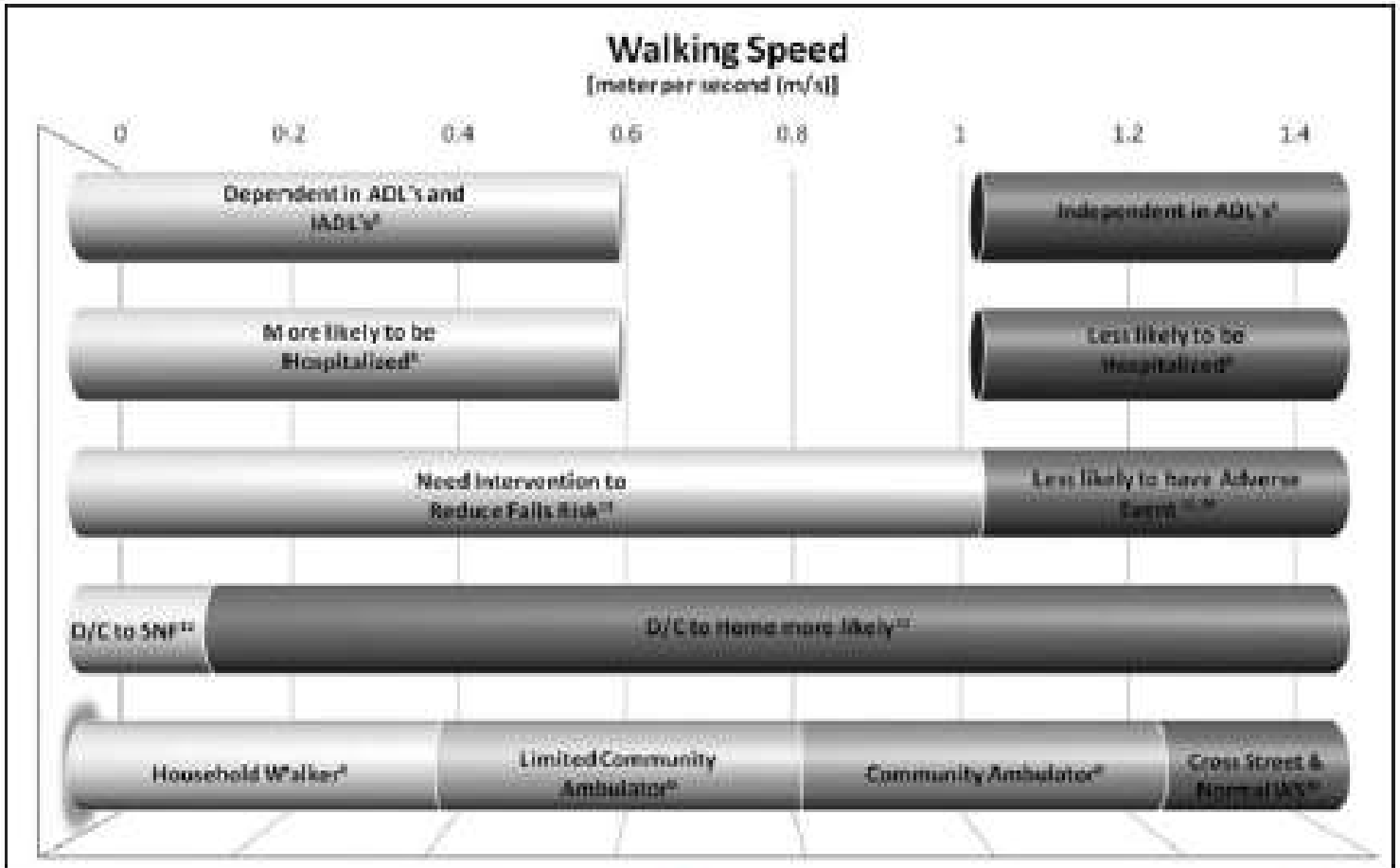


0 mph	0.4 mph	0.9 mph	1.3 mph	1.8 mph	2.2 mph	2.7 mph	3.1 mph
10 meter walk time	50 sec	25 sec	16.7 sec	12.5 sec	10 sec	8.3 sec	7.1 sec
10 foot walk time	15.2 sec	7.6 sec	5 sec	3.8 sec	3 sec	2.5 sec	2.2 sec

ADL: activities of daily living; IADL: instrumental ADLs; D/C: discharged; WS: walking speed; mph: miles per hour; sec: seconds

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

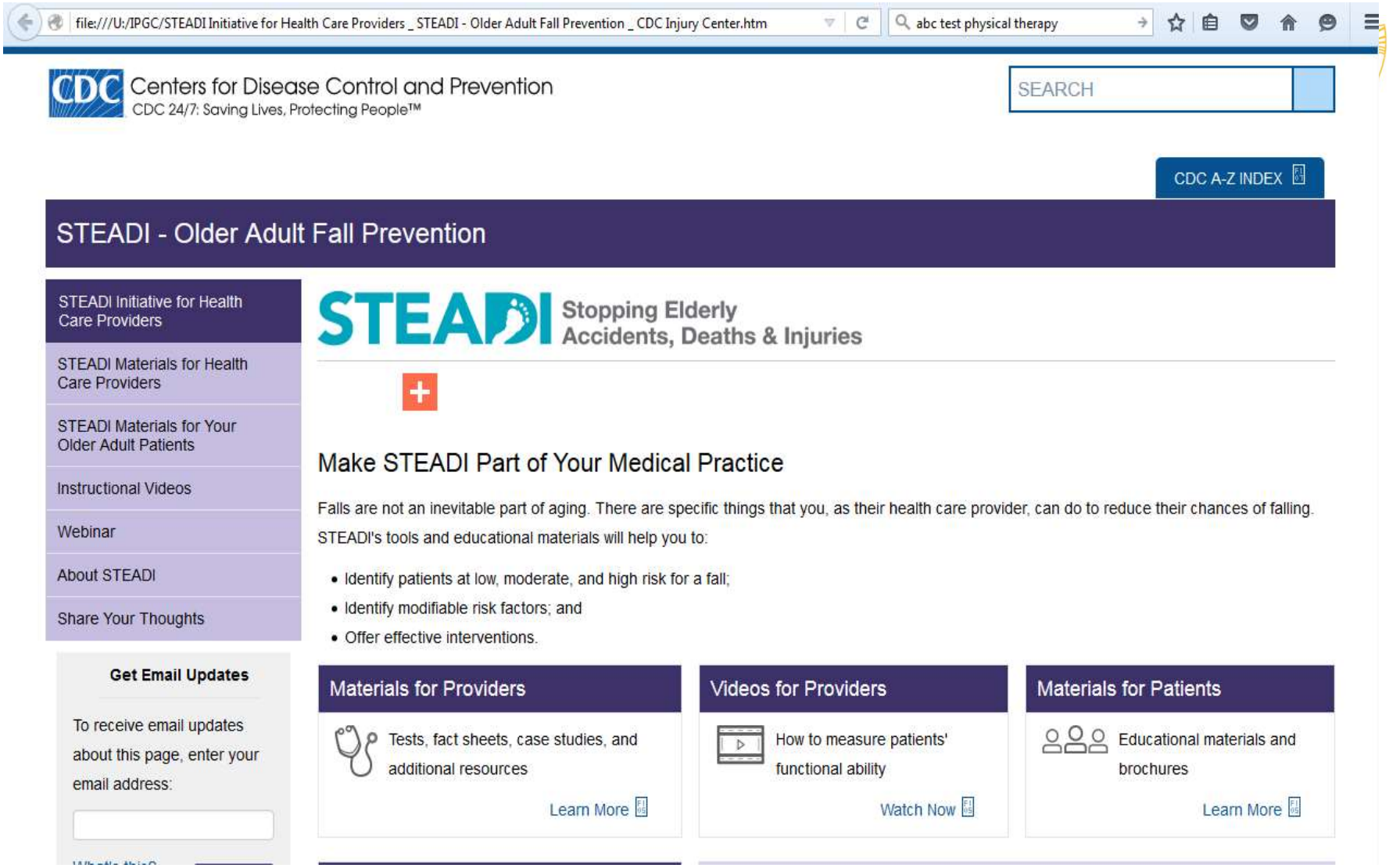
TUG Norms

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



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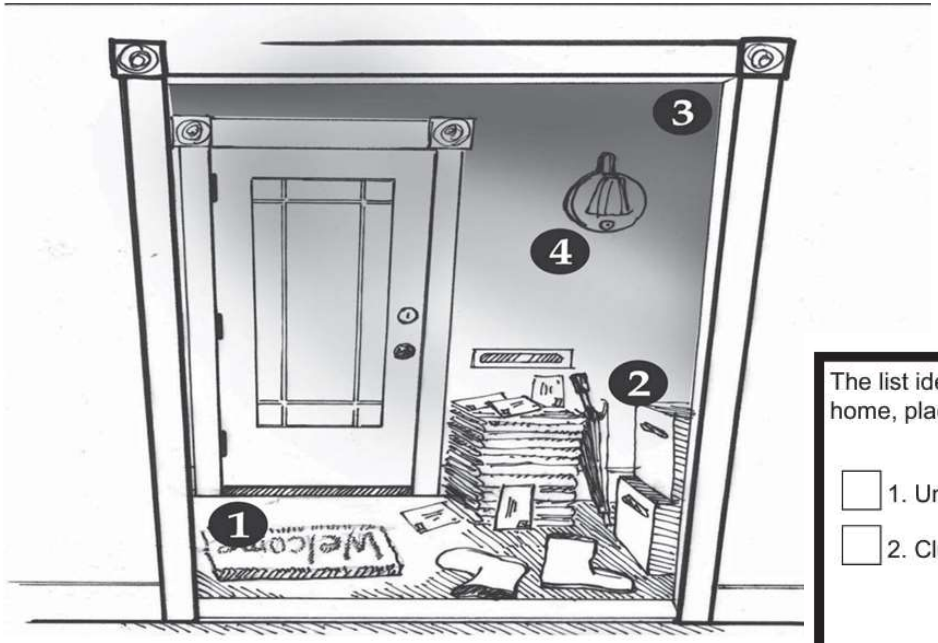
HOME SAFETY

Screening in the Home Environment

Areas: bathroom(s), bedroom(s), kitchen, living room, dining room, stairs, entrances/hallways, laundry, garage, yard

Other factors: flooring, walkways, thresholds, lighting, children, pets, BEHAVIOR

Hallway or Foyer



The list identifies all of the potential home hazards that may cause a fall. If the item applies to your home, place a check in the box. Then add the total number of checks and enter it in the box below.

- ☐ 1. Uneven or slippery flooring
- ☐ 2. Cluttered area
- ☐ 3. Dark or poor lighting
- ☐ 4. Lack of access to ceiling light

Other_____

Total number of problems ☐

* The numbers correspond to the hazard in the picture and solutions on the following page

Living Room

The list identifies all of the potential home hazards that may cause a fall. If the item applies to your home, place a check in the box. Then add the total number of checks and enter it in the box below.

- ☐ 1. Presence of throw or scatter rug
- ☐ 2. Presence of clutter
- ☐ 3. Presence of electric cords across the floor
- ☐ 4. Poor lighting
- ☐ 5. Presence of unstable furniture
- ☐ 6. Presence of unstable chair
- ☐ 7. Difficult to access light switches
- ☐ 8. Not enough space to move around

Other_____

Total number of problems ☐

* The numbers correspond to the hazard in the picture and solutions on the following page.

Kitchen

The list identifies all of the potential home hazards that may cause a fall. If the item applies to your home, place a check in the box. Then add the total number of checks and enter it in the box below.

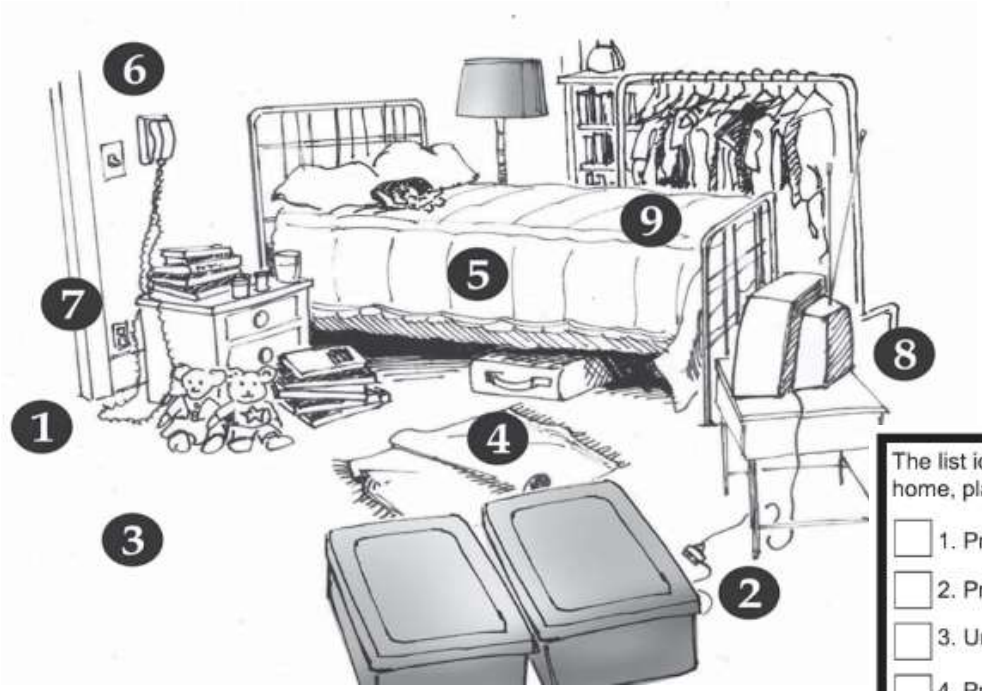
- ☐ 1. Cabinet too high or low
- ☐ 2. Not enough counter space
- ☐ 3. Using a stool or a chair to reach things
- ☐ 4. Not enough room to maneuver
- ☐ 5. Presence of throw/ scatter rug
- ☐ 6. Slippery floor
- ☐ 7. Poor lighting
- ☐ 8. Presence of a pet underfoot when preparing meals

Other_____

Total number of problems ☐

* The numbers correspond to the hazard in the picture and solutions on the following page

Bedroom



The list identifies all of the potential home hazards that may cause a fall. If the item applies to your home, place a check in the box. Then add the total number of checks and enter it in the box below.

- ☐ 1. Presence of clutter
- ☐ 2. Presence of electric cords across the floor
- ☐ 3. Unsafe carpet (uneven, torn, curled up)
- ☐ 4. Presence of throw/scatter rug
- ☐ 5. Height of bed (too low/high)
- ☐ 6. Lack of a telephone near the bed
- ☐ 7. Lack of nightlight
- ☐ 8. Arrangement that causes difficulty to reach items (TV remote, lamp)
- ☐ 9. Lack of device to get in/out of bed

Other _____

Total number of problems ☐

* The numbers correspond to the hazard in the picture and solutions on the following page

Bathroom

The list identifies all of the potential home hazards that may cause a fall. If the item applies to your home, place a check in the box. Then add the total number of checks and enter it in the box below

- ☐ 1. Presence of unsafe bath rugs
- ☐ 2. Lack of grab bars in the tub
- ☐ 3. Lack of grab bars in the shower area
- ☐ 4. Lack of grab bars near the toilet
- ☐ 5. Toilet is too high or low
- ☐ 6. Slippery tub (lack of bath mat, etc)
- ☐ 7. Claw foot/tub that is too high to get into
- ☐ 8. Lack of bath chair in the shower area
- ☐ 9. Clutter
- ☐ 10. Incorrect placement of grab bars

Other _____

Total number of problems ☐

* The numbers correspond to the hazard in the picture and solutions on the following page

8. Rug pad and double-sided carpet tape
Rug pads can prevent mats and rugs from sliding over the floor and provides cushioning underfoot. Various pads differ in their dimensions, color, and material. Carpet tapes can also be used alone or in combination with a rug pad. The key feature of this rug pad is that it is made from eco-friendly materials.
Price range: $7 - $149

9. Single-piece cable cover
Cable covers keep the wires and cords off the floor and eliminate the risk of falls by getting tangled in them. Cable covers such as shown in the picture are easy to install because of their single-piece design and self-adhesive backing. They can also be painted to match the color of the interior.
Price range: $12 - $34

10. Furniture risers

Risers elevate the height of the bed, chairs, or table if they are too low. They also create considerable space under the bed for storage. The key feature of this furniture leg riser is that it is made of durable polycarbonate with interlocking design for safe stacking, and it can fit most leg types, including castors. The usual weight carrying capacity of a single riser is 600 lb. per leg.

Price range: $7 - $49

11. Standing cane with tray feature

A standing cane provides safety and balance while getting in or out of a chair. There are several key features of this standing cane such as a fully adjustable height and length, and it features a handy multi-use swivel laptop/TV tray with cup holder and utensil compartment.

Price range: $130 - $180

Questions?

Thank you for your attention