Considerations for Healthy Aging

Cheryl Resnik, PT, DPT, CEEAA
Associate Professor of Clinical Physical Therapy
IPGC 2015
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
   Filmina Rotundo, 100

www.huffingtonpost.com
Aging Demography

- In 2010, 40 million people were $\geq 65$ years old.  
  \[\text{CDC}\]

- 6.1 million were $\geq 85$ years old.  
  \[\text{CDC}\]

- Currently, there are about 70,000 centenarians in the U.S.  
  \[\text{Alliance for Aging}\]

- One centenarian per 4,400

- 90% are women
Functional Requirements for Community-dwelling Aging Adults

- Walk 1203 (366 m) feet to complete an errand
- Gait speed of 1.2 m/s
- 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

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/homeandrecreationalallsafety/Falls/adultfalls
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.
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° falls
• 2.4 million nonfatal fall injuries were treated in ERs in 2012
• Totals $30 billion/year in 2012

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.

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

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
Multifactorial Assessment
With Targeted Intervention

CDC Compendium

• Single Interventions
  – 15 exercise
  – 4 home modification
  – 10 clinical interventions

• Multifaceted Interventions
  – 12 interventions addressing multiple risk factors
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

USC Division of Biokinesiology and Physical Therapy
Algorithm for Fall Risk Assessment & Interventions

Waiting room: Patient completes Stay Independent brochure
Identify main fall risk factors

Clinical visit: Identify patients at risk
- Fell in past year
- Feels unsteady when standing or walking
- Worries about falling
- Scored ≥4 on Stay Independent brochure

Evaluate gait, strength & balance
- Timed Up and Go
- 30-Sec Chair Stand
- 4 Stage Balance Test

Gait, strength or balance problem

≥2 falls or a fall injury
Determine circumstances of latest fall
Conduct multifactorial risk assessment
- Review Stay Independent brochure
- Falls history
- Physical exam
- Postural dizziness/postural hypotension
- Cognitive screening
- Medication review
- Feet & footwear
- Use of mobility aids
- Visual acuity check

Implement key fall interventions
- Educate patient
- Enhance strength & balance
- Improve functional mobility
- Manage & monitor hypotension
- Manage medications
- Address foot problems
- Vitamin D +/- calcium
- Optimize vision
- Optimize home safety

1 fall in past year
Determine circumstances of fall

0 falls in past year

No gait, strength or balance problems

No to all

- Educate patient
- Refer to community exercise, balance, fitness or fall prevention program

Patient follow-up
- Review patient education
- Assess & encourage adherence with recommendations
- Discuss & address barriers to adherence
<table>
<thead>
<tr>
<th>Fall Risk Factor Identified</th>
<th>Factor Present?</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Falls History</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any falls in past year?</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Worries about falling or feels unsteady when standing or walking?</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Medical Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Problems with heart rate and/or rhythm</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Incontinence</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Foot problems</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Other medical conditions (Specify)</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Medications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any psychoactive medications, medications with anticholinergic side effects, and/or sedating OTCs? (e.g., Benadryl, Tylenol PM)</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Gait, Strength &amp; Balance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Timed Up and Go (TUG) Test</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>≥12 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-Second Chair Stand Test</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Below average score (See table on back)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-Stage Balance Test</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Full tandem stance &lt;10 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acuity &lt;20/40 OR no eye exam in &gt;1 year</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Postural Hypotension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A decrease in systolic BP ≥20 mm Hg or a diastolic bp of ≥10 mm Hg or lightheadedness or dizziness from lying to standing?</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td>Other Risk Factors (Specify)</td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
<tr>
<td></td>
<td>○ Yes ○ No</td>
<td></td>
</tr>
</tbody>
</table>
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](http://www.cdc.gov/injury/STEADI)
## Lower Extremity Strength Test

### Chair Stand—Below Average Scores

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-64</td>
<td>&lt;14</td>
<td>&lt;12</td>
</tr>
<tr>
<td>65-69</td>
<td>&lt;12</td>
<td>&lt;11</td>
</tr>
<tr>
<td>70-74</td>
<td>&lt;12</td>
<td>&lt;10</td>
</tr>
<tr>
<td>75-79</td>
<td>&lt;11</td>
<td>&lt;10</td>
</tr>
<tr>
<td>80-84</td>
<td>&lt;10</td>
<td>&lt;9</td>
</tr>
<tr>
<td>85-89</td>
<td>&lt;8</td>
<td>&lt;8</td>
</tr>
<tr>
<td>90-94</td>
<td>&lt;7</td>
<td>&lt;4</td>
</tr>
</tbody>
</table>

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
Walking Speed
[meter per second [m/s]]

- 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
- 2.2 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

<table>
<thead>
<tr>
<th>Population</th>
<th>Cut-Off score</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community dwelling adults</td>
<td>&gt; 13.5*</td>
<td>Shumway-Cook et al, 2000</td>
</tr>
<tr>
<td>Older stroke patients</td>
<td>&gt; 14*</td>
<td>Andersson et al, 2006</td>
</tr>
<tr>
<td>Older adults already attending a falls clinic</td>
<td>&gt; 15*</td>
<td>Whitney et al, 2005</td>
</tr>
<tr>
<td>Frail elderly</td>
<td>&gt; 32.6*</td>
<td>Thomas et al, 2005</td>
</tr>
</tbody>
</table>

* 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

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

Scores < 67% indicates a risk for falling; can accurately classify people who fall 84% of the time.
STEADI - Older Adult Fall Prevention

STEADI Stopping Elderly Accidents, Deaths & Injuries

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.

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