Promoting Functional Independence and Activity in Older Adults

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What is mobility?

Mobility is broadly defined as the ability to move oneself ... within community environments that expand from one’s home, to the neighborhood, and to regions beyond.

“Optimal mobility, defined simply as being able to safely and reliably go where you want to go, when you want to go, and how you want to get there, is a key component of healthy aging.”

Mobility Disability

The gap between an individual’s physical ability and environmental challenges.

- Ability, examples: strength, balance, sensation
- Environment, examples: uneven surface, hill, indoor vs. outdoor

How do we measure Mobility?

For health or physical reasons, do you have difficulty climbing up 10 steps or walking one-quarter of a mile?

Because of underlying health or physical reasons, have you modified the way you climb 10 steps or walk a quarter of a mile?

Measuring mobility

Neurologic exam
- Gait speed = 10 feet at a comfortable pace ≤3 sec
- Balance

Short Physical Performance Battery
- Chair stands
- Semitandem and tandem stand
- 8 ft. walk

Mobility Limitations are Common

Of adults ≥65 NOT in long term care, 27% have “difficulty walking or climbing stairs”
Risk factors for Mobility Impairment

- Older age
- Low physical activity
- Obesity
- Strength or balance impairment
- Chronic disease burden (example, diabetes, heart failure, arthritis)

Mobility Disability and Health

**Physical:**
- An early predictor of physical disability and mortality (2-3x risk)
- Linked to lower health status, quality of life

**Psychological and Social:**
- Linked to depression, isolation, loneliness
- Increase risk of nursing home placement.

Requirements to maintain mobility

- Sensation
  - Hearing, vision, feeling
- Balance
- Strength
- Flexibility

Early signs of mobility disability

- Report of difficulty with walking
  - First signs typically walking longer distances or running
- Early: changes in method, frequency, or time used in a mobility task

References:

Activity and Older Adults

Physical activity decrease with age
Decreasing physiologic capacity in many organ systems with age

Activity is Possible and Beneficial at Any Ability Level

Benefits of Activity in Older Adults

Improved disease management
Improved brain health
Prevention of disability and loss of independence
Improved quality of life
Lower mortality risk
Mobility and Activity are Linked

Low levels of physical activity are linked to mobility limitations

- In 12 years, about ½ of adults over 70 developed walking disability in one study.
- Lower physical activity was linked to ~40% increased chance of walking disability.

*walking disability= needing help walking ¼ mile

Recommendations: health.gov

Physical Activity Guidelines for ALL ADULTS
Avoid inactivity
At least 150 minutes of moderate-intensity/week OR 75 minutes of vigorous-intensity/week
Muscle-strengthening 2 days or more/week

Recommendations: health.gov

Physical Activity Guidelines for OLDER ADULTS
Do it as abilities and conditions allow
Exercises that maintain or improve balance if at risk of falling
Determine level of effort based on level of fitness
Understand how any chronic conditions might affect ability to do regular activity

https://health.gov/paguidelines/guidelines/chapter5.aspx
The defining feature of geriatric medicine is the intense focus on the preservation and restoration of function.

Gill TM, Assessment of Function and Disability in Longitudinal Studies. JAGS 2010;58(Suppl 2):S308-S312

Background: function

- Physiologic age incorporates many factors
  - Age
  - Genetics (family history)
  - Lifestyle factors (smoking, alcohol, diet, fitness)
  - Comorbidities
  - Functional loss
- Physiologic age is more important than chronologic age in determining health outcomes and prognosis

Gill TM, Assessment of Function and Disability in Longitudinal Studies. JAGS 2010;58(Suppl 2):S308-S312

Assessing Function

Activities of Daily Living
- Bathing
- Dressing
- Toileting
- Transferring
- Feeding

Instrumental Activities of Daily Living
- Driving/transportation
- Using phone
- Shopping for food
- Finances
- Cooking
- Housework
- Taking meds

Needs 24 hour care

Needs help intermittently


Risk Factors: Functional Decline

- Environment: Social, Financial, Living Supports
- Genes
- Medications: Appropriate, Inappropriate
- Hospitalizations, Medical Conditions, Falls
- Age-related changes

Functional Decline

Lower function associated with shorter life expectancy

<table>
<thead>
<tr>
<th>Age</th>
<th>Independent</th>
<th>Mobility disabled</th>
<th>ADL disabled</th>
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<tbody>
<tr>
<td>70</td>
<td>16.7</td>
<td>15.7</td>
<td>11.5</td>
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<td>85</td>
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<td>6.9</td>
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*Mobility disabled = inability to walk half a mile and/or walk up and down stairs to the second floor without help.


Hospitalization-Associated Disability

> 1/3 of older patients are discharged with worse functional status than baseline

1/2 of these patients acquire their deficits during their hospitalization

Covinsky KE et al. JAGS 2003;51:451-58

Slippery slope

Covinsky KE et al. JAGS 2003;51:451-58
Impact of functional disability

- Worse function with a hospitalization
- Longer hospital stays
- Higher rate of institutionalization
- Higher risk for readmission
- Higher mortality rate

Preventing Functional Decline

- Disease-specific health promotion
- Individualized home assessment and rehabilitation plan
- Preventing falls

Interventions during hospitalization
- 50% of new ADL disability is acquired during hospitalization
- Hospital at home, Acute Care for Elders units

Sensory Function

- Hearing impairment
  - 50% of 65+ have hearing impairment
  - Assoc with falls, social isolation, cognitive impairment
  - Whisper test

- Vision impairment
  - At least 1/5 of 60+ have some vision loss
  - Assoc with falls, social isolation, cognitive impairment, reduced QOL
  - Snellen chart

Take away: Ask about function

<table>
<thead>
<tr>
<th>ADL/IADLs</th>
<th>Can you get out of bed, dress, prepare meals, and shop on your own without help?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hearing</td>
<td>Do you have difficulty hearing? Do you stay at home rather than be with family or friends because of hearing difficulty? Do others comment to you about your hearing?</td>
</tr>
<tr>
<td>Vision</td>
<td>Any changes in your vision? Do you wear glasses? Do you need a new prescription? Any trouble driving due to vision?</td>
</tr>
<tr>
<td>Gait</td>
<td>Timed up and go (rise from seat, walk 10ft, turn around, return to seat)</td>
</tr>
<tr>
<td>Cognition</td>
<td>Mini-cog: 3 item re-call and Clock Draw Test</td>
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</tbody>
</table>
Definition of falls

Unintentionally ending up on the ground or other lower level

Not because of
- Fainting
- Sudden illness (e.g. stroke)
- Act of man (e.g. car crash)
- Act of nature (e.g. earthquake)

Falls are common

25-30% of adults over age 65 fall each year

Half of adults over age 80 fall each year

JAMA. 2010 Jan 20; 303(3): 258–266.
CDC Fall Injury Data, 2015.

• Every 11 seconds an older adult is in the ER because of a fall
• Every 19 minutes an older adult DIES because of a fall

NCOA: Fall Prevention, Get the Facts
Falls are a critical medical event

A top ten causes of death for adults 65+

10% of falls → major injury
- Fractures
- Brain trauma
- Hospitalization

JAMA. 2010 Jan 20; 303(3): 258–266.

Falls take away what matters most

Fallers experience decline in function (~35%)
Decrease in physical and social activity (~15%)
Fear of falling leads to social isolation, depression and further decline
3-10x increases risk of needing a nursing home not related to rehabilitation

NEJM 1997;337:1279-1284

Falls are Multifactorial

**Intrinsic Factors**
- Medical conditions
- Vision and hearing impairments
- Age, age-related changes
- Prior fall

**Extrinsic Factors**
- Medications
- Improper use of assistive devices
- Environment

FALLS

Fall Risk

People at highest risk for falls
- Have fallen before
- Older
- Have problems with strength, balance, mobility, vision
- Use certain medications (including alcohol/drugs) and 4+ medications

http://nihseniorhealth.gov/falls/causesandriskfactors/01.html
Medications and Fall Risk

Benzodiazepines – 60% incr risk
Non-benzodiazepine hypnotics
Tricyclic antidepressants
Anticholinergics
Anticonvulsants
Antihypertensives

More risk factors =
Greater chance of falling in 1 yr

What can we do?

Environmental modifications
Strength and balance exercises
Assess and correct vision and hearing impairments
Rule out low blood pressure or drops in blood pressure with standing
Minimize medications
Vitamin D- especially if “high risk”

Vitamin D

Vitamin D may reduce falls
Meta-analysis of double blind RCTs (2004) suggested Vitamin D decreases falls
More recent studies less convincing
Doses <800 IU do not appear to be effective
Low risk of harm of 800IU daily and possible benefit in falls and injury reduction in high risk, so Vitamin D is recommended by USPSTF

BMJ 2009;339:b3692
**Functional Assessment and Goal Setting**

**Function vs Fun**
- Get out of bed
- Get up from a chair
- Get up from the floor
- Get out and go shopping
- Get up and dance!
- Get to a cross court shot in tennis

**Motivation: Make it Personal**
- Travel goals
- Enjoy time with friends and family
- Be Independent
- Competition
- Health goals
- Be able to care for loved ones

**Mobility Research in the News**
- Health education vs physical activity
  - Activity: 150 min/week of walking, plus strength, flexibility & balance
  - Able to walk 400 m (~1/4 mile)
Assessing Gait Speed

- 5 meter walk
- Almost 5.5 yards
- 16.4 feet
- Comfortable pace
- Average time of 3 trials

Quick Estimates
- 10 sec = 0.5 m/sec
- 7 sec = 0.7 m/sec
- 5 sec = 1.0 m/sec
- 4 sec = 1.25 m/sec
- 3 sec = 1.7 m/sec

Gait Speed Scoring
- Less than 0.4 m/sec: Household ambulator
- 0.4 - 0.8 m/sec: Limited community ambulator
- 0.8 - 1.2 m/sec: Community ambulator
- 1.2 m/sec and above: Able to safely cross streets

Walking speed Linked to Independence

<table>
<thead>
<tr>
<th>Walking Speed (meters per second)</th>
<th>Independent in ADLs</th>
<th>Less likely to be hospitalized</th>
<th>More likely to be hospitalized</th>
<th>Need intervention to reduce falls risk</th>
<th>Less likely to have adverse event</th>
<th>D/C to Home</th>
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Goals for Gait Speed

- If walking speed is not normal, a gain of 0.1 m/s predicts well-being.
  - Purser (2005), Hardy, Perera (2007)

- Increased speed
- Consistent trials
- Varied environments
Assessing Functional Mobility

Standard test with multiple actions

Timed Up & Go: TUG

Used to assess:
- Gait
- Memory
- Speed
- Accuracy
- Safety
- Fall Risk

TUG: Timed Up & Go

Start: seated comfortably
Stand up
Walk at a comfortable pace: 3 meters
Turn around and return to chair
Sit down

Ok to use assistive device
Score recorded in seconds

Other Assessments

Sit to Stand
- Time for 5x to complete movement
- Repetitions completed in 30 sec

Stand up from Cross-Legged position on floor
- Timed
- Without Hands

Strength: Lower Extremities

HIPS
- Squat
- Sit to stand
- Walk stairs
- Sideways walk
- Sideways kicks
- Bridges

ANKLES
- Calf raise
- Toe Tap
- Walk on balls of feet
- Walk on heels
- Sideways walk
Flexibility Goals

Hips
- Knee to chest (flexion)
- Standing extension stretch

Knees
- Prone knee bend with strap
- Knee to chest

Ankles:
- Dorsiflexion
- Calf stretch
- Squat with heel down
- Step down
- Plantarflexion
- Toe point

Fear of Falling

Independent risk factor for falls

Education
- Have a plan to prevent falls
- Recognize when situations deviate

Exercise for Confidence
- Physical training
- Practice, practice, practice

Assessing Fear of Falls

Activities-Specific Balance Confidence Scale (ABC)
Measures over and under confidence
Identifies
- Safety Risk
- Risk of Decreased Mobility

ABC Assessment

Sample Items:
- Walk around the house
- Walk down stairs
- Pick up item from the floor
- Reach for something on tip toes
- In & out of car
- Getting bumped while walking
- Escalator holding rail or holding parcels
Assessing Other Factors

<table>
<thead>
<tr>
<th>Factor</th>
<th>Note</th>
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<tbody>
<tr>
<td>Vision</td>
<td>Footwear</td>
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<td>Pain</td>
<td>Assistive Device</td>
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<td>Continence</td>
<td>Environment</td>
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<td>Hydration</td>
<td>Community</td>
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<td>Medications</td>
<td>Support</td>
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Making an Activity Plan

GETTING STARTED

What issues do you feel you need help with to your activity and mobility goals? (For example, vision improvement, pain control, etc)

What is 1 shortterm (1-2 weeks) goal around incorporating or increasing activity into your life? (For example, walk 30 more min/week, etc.)

What is 1 longterm (3-6 months) goal around incorporating or increasing activity into your life? (For example, be able to dance at my niece’s wedding in 4 months, etc)

Recommendations for Activity

- Health.gov
  [https://health.gov/paguidelines/](https://health.gov/paguidelines/)
- NIH Senior Health
  [https://nihseniorhealth.gov/exerciseforolderadults/healthbenefits/01.html](https://nihseniorhealth.gov/exerciseforolderadults/healthbenefits/01.html)
- NIA Go 4 Life
  [https://go4life.nia.nih.gov/](https://go4life.nia.nih.gov/)
Resources for Falls Prevention

**National Council on Aging:**
https://www.ncoa.org/healthy-aging/falls-prevention/

OPTIMIZE AGING COLLABORATIVE AT UCSF - GERIATRIC WORKFORCE ENHANCEMENT PROGRAM

For reference: Normal Gait Speeds
For Community Dwelling Adults from Lusardi 2003

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Group</th>
<th>Mean (m/s)</th>
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<tbody>
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<td>60-69</td>
<td>Male</td>
<td>1.26</td>
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Thank you
Lowen Cattolico, PT
Helen Kao, MD

For reference: Normal Gait Speeds
For Community Dwelling Adults from Lusardi 2003

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For reference: Timed Up & Go

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