Balance and Fall Prevention in Older Adults

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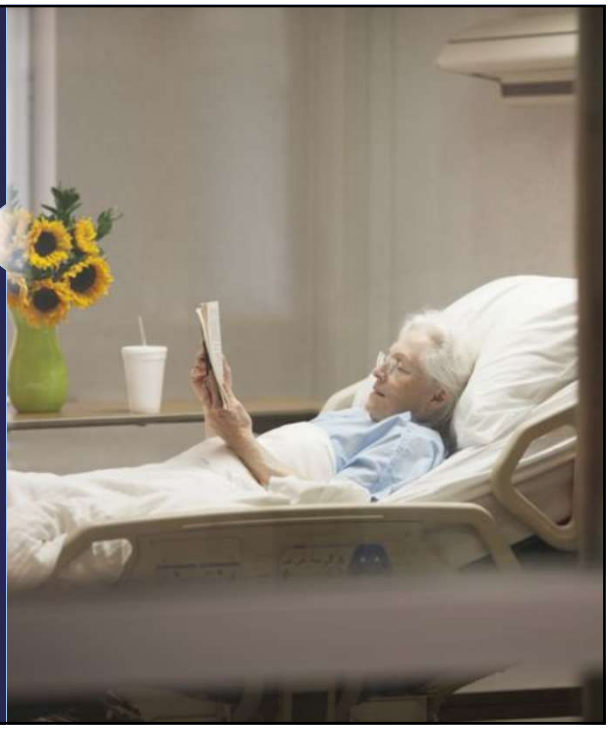
Things that increase fall risk:

- poor balance
- previous fall
- age (65+)
- weakness and/or inactivity
- medications
- vision or hearing problems
- foot problems

Falls can lead to…

- serious injury (10% of falls)
  - brain injury
  - broken hip
  - broken ribs, wrist, or shoulder
- fear of falling
- loss of independence



Outline

- General information about balance
- What physical therapy can offer
- Other ways to reduce fall risk

General Information About Balance

- visual input
- proprioceptive input
- vestibular input

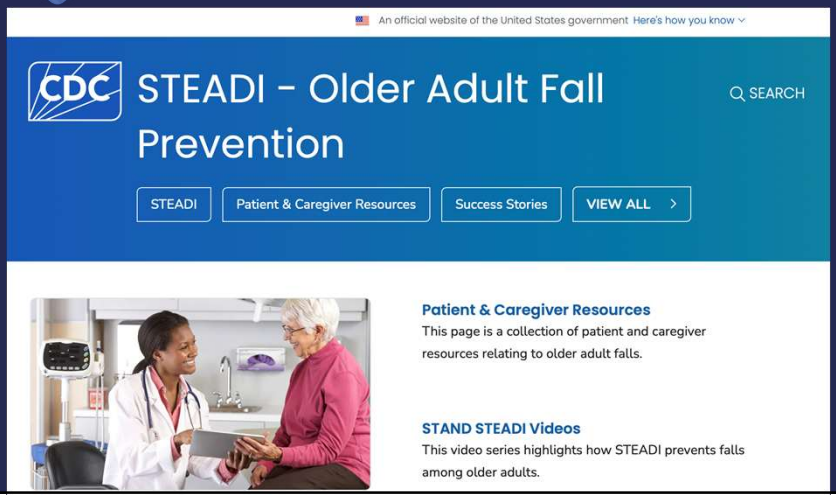
General Information About Balance

sensory inputs	integration	motor outputs
• visual • proprioceptive • vestibular	• brainstem, spinal cord • cerebellum • cerebral cortex	• body movements • coordinated head and eye movements

What Physical Therapy Can Offer

- Fall Risk Screen
- Balance Assessment
- Targeted Exercise

Fall Risk Screens: (1) STEADI



- 30-Second Sit to Stand
- 4-Stage Standing Balance Test
- TUG (Timed Up and Go)

Fall Risk Screens: (2) Lusardi et al. (2017)

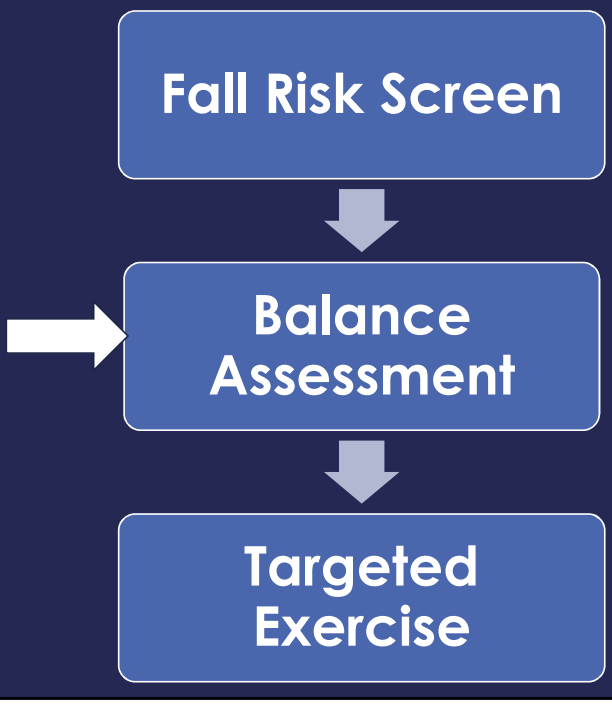
- Start with 30%
- Adjust this based on factors specific to you:
  - depression screen
  - fear of falling questionnaire
  - Timed Up and Go (TUG) score
  - leg strength
  - **how well you can balance on one leg**
  - **how fast you walk**

Table 5. Summary of Clinically Useful Indicators of Risk of 1 or More Future Falls Based on a PrTP of 30%[a]

Category	Measure	Cut Point	+LR	−LR	PoTP, % If +Test	PoTP, % If −Test
Medical history questions	Any previous falls	Yes/no	1.8	0.8	44	26
	Psychoactive medication	Yes/no	1.4	0.8	38	26
	Requiring any ADL assistance	Yes/no	1.4	0.8	38	26
	Self-report fear of falling	Yes/no	1.4	0.9	38	28
	Ambulatory assistive device use	Yes/no	1.3	0.9	36	26
Self-report measures	Geriatric Depression Scale-15	<6 points	1.9	0.9	45	28
	Falls Efficacy Scale International	>24 points	1.7	0.6	42	20
Performance-based functional measures	Berg Balance Scale	<50 points	3.4	0.7	59	23
	Timed Up and Go Test	>11 s	2.1	0.8	47	25
	Single-limb stance eyes open	<6.5 s	1.9	0.9	45	28
	Five Times Sit-to-Stand Test	>12 s	1.6	0.7	41	20
	Self-selected walking speed	<1.0 m/s	1.5	0.6	39	20

Abbreviations: +LR, positive likelihood ratio; −LR, negative likelihood ratio; PoTP, posttest probability; PrTP, pretest probability; +, test positive test result; −, test negative test result.
[a]To the extent that tests are independent (unrelated) the PoTP of 1 positive test can be used as a new PrTP for the next positive test, etc., to develop a cumulative individualized risk estimate. Because the degree of relationship among tests is not clearly understood at this time, this strategy may inflate the cumulative risk estimate. Online resources such as www.easycalculation.com/statistics/post-test-probability.php can assist clinicians in quickly determining cumulative PoTP risk values.

What Physical Therapy Can Offer



Balance Assessment

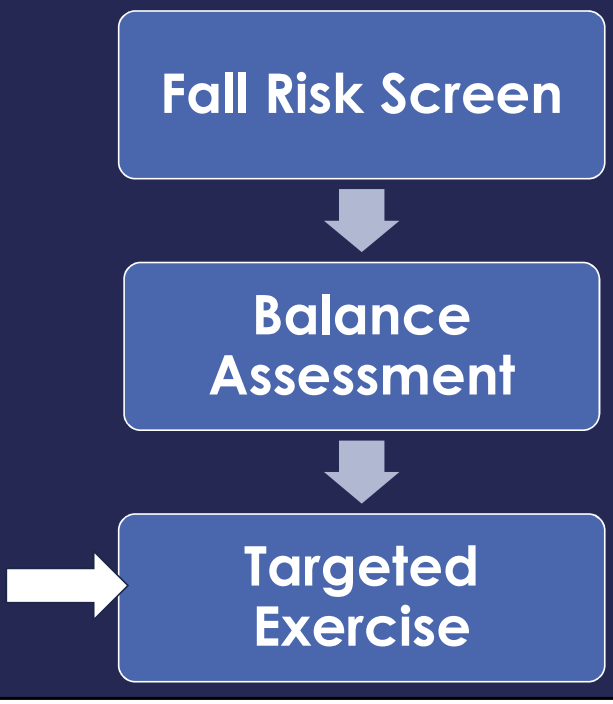
- **Gold Standard: Balance Evaluation Systems Test** (BESTest)
- → some combination of **balance**, **strength**, and **walking (gait)**

Balance Evaluation Systems Test

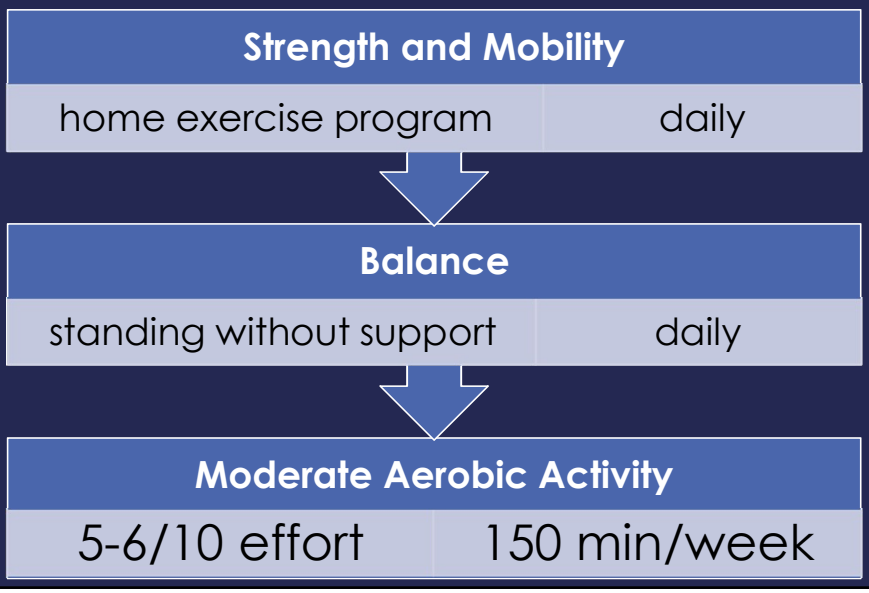
Balance Assessment

- **Gold Standard: Balance Evaluation Systems Test** (BESTest)
- → some combination of **balance**, **strength**, and **walking** (**gait**)
  - Berg Balance Test
  - Dynamic Gait Index (DGI)
  - Functional Gait Assessment (FGA)
  - 10 Meter Walk Test (walking speed)
  - 6 Minute Walk Test (walking endurance)

What Physical Therapy Can Offer



Targeted Exercise: 52 hrs



Example of balance training:

Other things you can do to decrease your fall risk:

- home modifications
- walking aids
- safe footwear
- vision and foot checks
- regular medication review
- **stay active**

Stay Active: Evidence-Based Fall Prevention Programs

Enhance Fitness

Tai Chi for Arthritis and Fall Prevention

Otago Exercise Programme

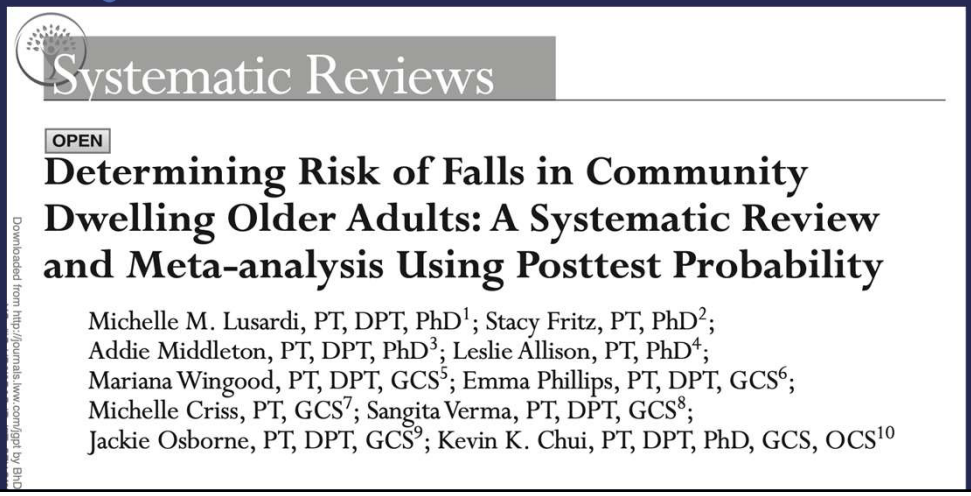
Medications that can increase fall risk:

- Sleep medications
- Depression and anxiety medications
- Mood and psychosis medications
- Seizure disorder medications
- Allergy medications
- Muscle relaxers
- Blood pressure medications
- Opioids

Fall risk is complex

- co-morbidities (≧ 4)
- medications: type, total number (>4)
- decreased Lower Extremity sensation
- decreased strength/power
- decreased range of movement (eg, ankle dorsiflexion)
- cognition
- incontinence
- orthostatic hypotension
- depression
- delirium
- fear of falling (FES-I > 24)
- poor vision
- footwear
- leg pain
- frailty, low physical activity levels
- home safety
- drug/alcohol abuse
- vestibular deficits

Estimating Fall Risk



Systematic Reviews

OPEN

Determining Risk of Falls in Community Dwelling Older Adults: A Systematic Review and Meta-analysis Using Posttest Probability

Michelle M. Lusardi, PT, DPT, PhD[1]; Stacy Fritz, PT, PhD[2]; Addie Middleton, PT, DPT, PhD[3]; Leslie Allison, PT, PhD[4]; Mariana Wingood, PT, DPT, GCS[5]; Emma Phillips, PT, DPT, GCS[6]; Michelle Criss, PT, GCS[7]; Sangita Verma, PT, DPT, GCS[8]; Jackie Osborne, PT, DPT, GCS[9]; Kevin K. Chui, PT, DPT, PhD, GCS, OCS[10]

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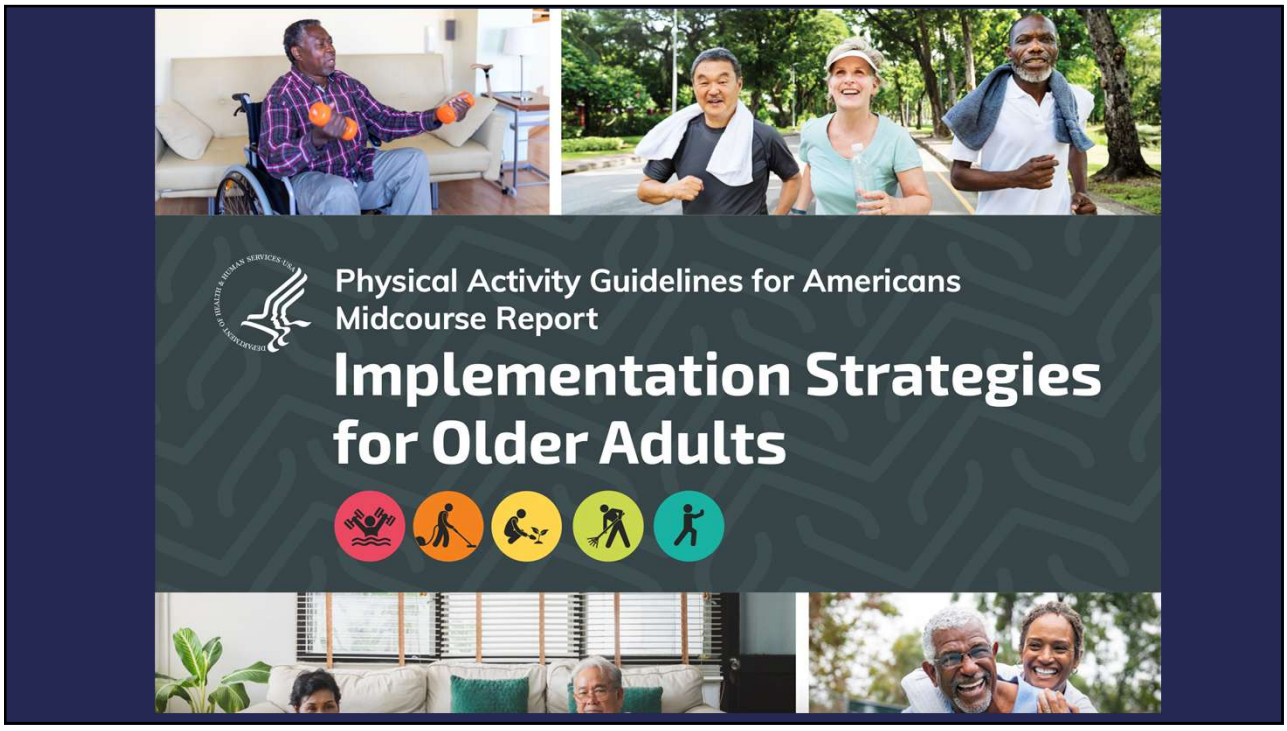

Figure 1. Older Adult *Physical Activity Guidelines* Dosage Recommendations

Older adults need a mix of physical activity to stay healthy.

Moderate-intensity aerobic activity

Anything that gets their heart beating faster counts.

at least **150** minutes a week

Muscle-strengthening activity

Activities that make their muscles work harder than usual count.

at least **2** days a week

As part of their weekly activity, older adults need multicomponent physical activity, which includes aerobic, muscle-strengthening, and balance activities.

Multicomponent activity — like dancing, water aerobics, or tai chi — helps keep older adults' bodies strong and lowers their risk of falling.