

FALLS PREVENTION & MANAGEMENT

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OBJECTIVES

- To define what a fall is
- To identify different age-related changes, chronic conditions that may increase fall risk
- To be familiar with different fall screening tools
- To be able to recommend different fall prevention strategies to patients and caregivers

DEFINITION

What is a fall?

An event that results in a person coming to rest inadvertently on the ground, floor, or other lower level without known loss of consciousness

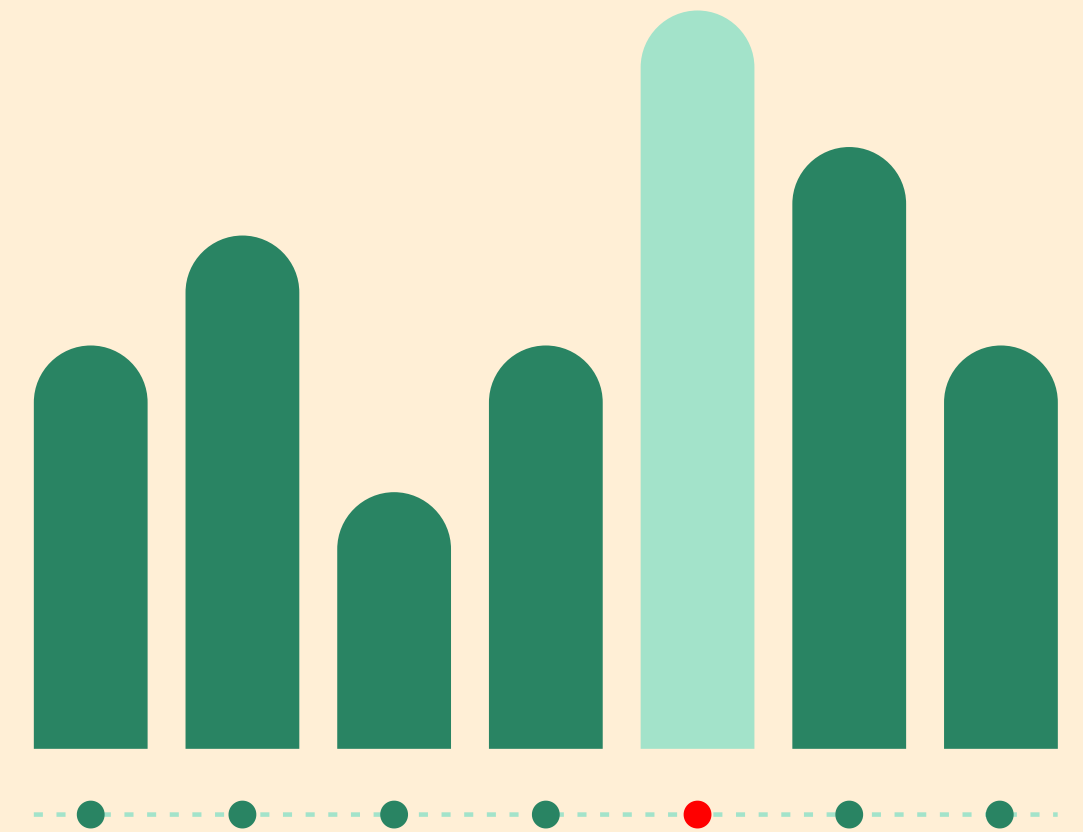


STATISTICS

Every second of every day, an older adult in the US will fall.

Per one CDC report, one of three adults ≥ 65 falls each year

Complications resulting from falls are the leading cause of death from injury in adults ≥ 65

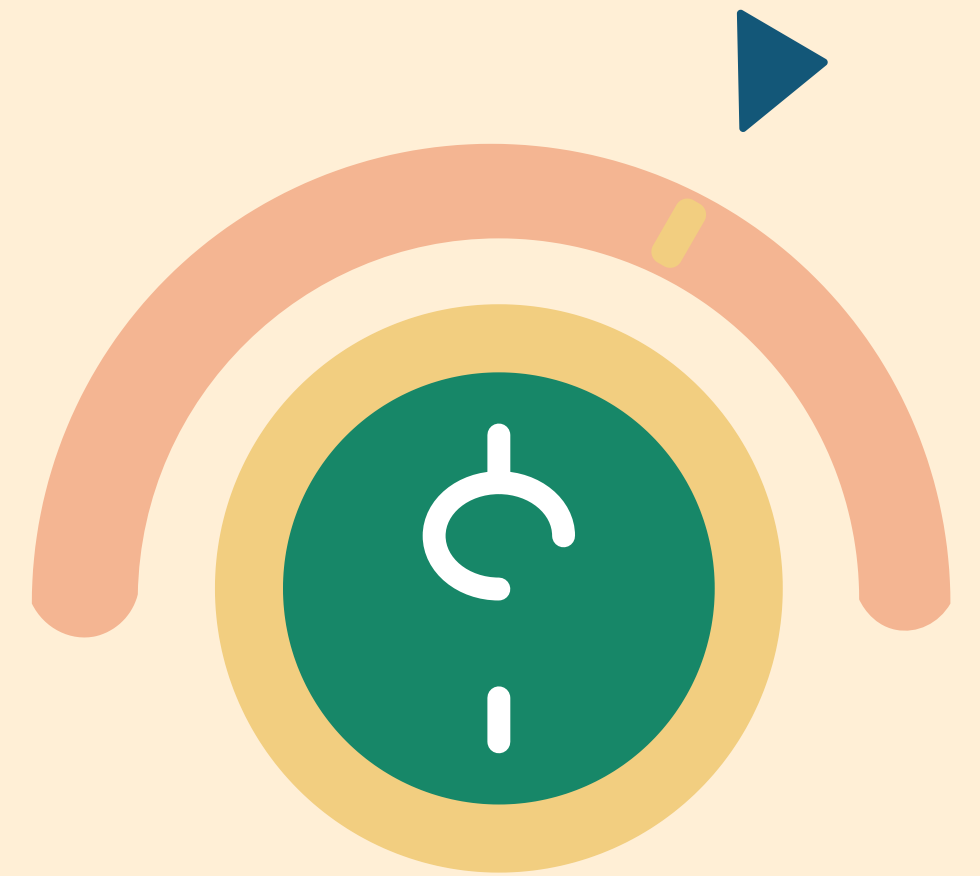


THE COST OF FALLS

Subsequent declines in functional status

Increased likelihood of nursing-home placement

Increased use of medical services and development of a fear of falling



THE COST OF FALLS

In 2015, the total medical costs for fall-related injuries totaled more than **\$50 billion**

Indirect costs from fall-related injuries



MAJOR RISK FACTORS

Several risk factors have been consistently associated with falls in multiple prospective cohort studies:

- older age
- cognitive impairment
- female gender
- past fall history
- arthritis
- foot disorders
- balance problems
- hypovitaminosis D
- use of psychotropic medication
- pain
- Parkinson disease
- stroke



Falls are multifactorial in nature

AGE RELATED CHANGES

Declines in:

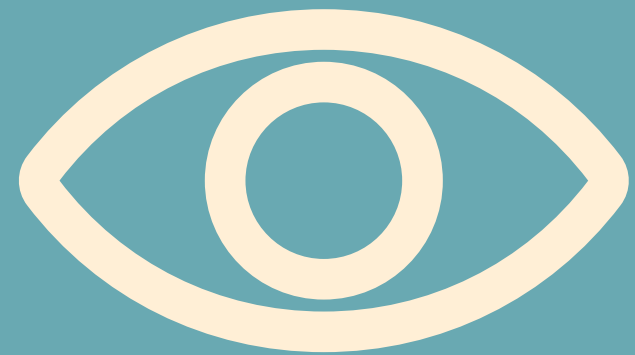
Visual

Proprioceptive

**Vestibular
Systems**

**Other CNS
Changes**

VISUAL SYSTEM



Decreases in:

- **Visual acuity**
- **Depth perception**
- **Contrast sensitivity**
- **Dark adaptation**

PROPRIOCEPTIVE SYSTEM



Loss of:

- **Sensitivity in legs**

VESTIBULAR SYSTEM



Loss of:

- **Labyrinthine hair cells**
- **Vestibular ganglion cells**
- **Nerve fibers**

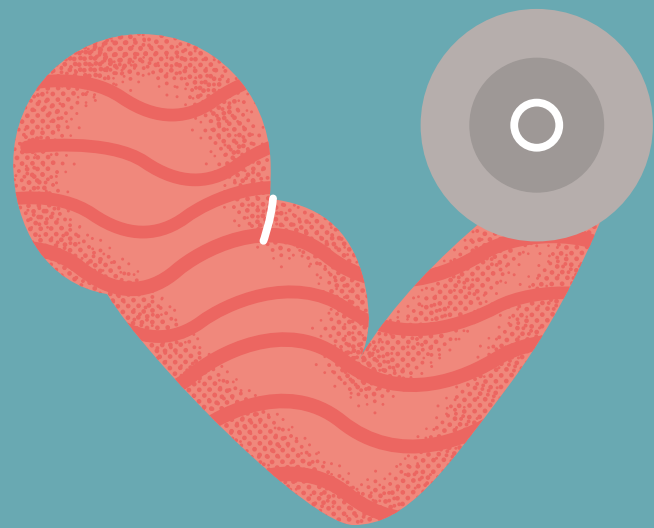
OTHER CNS CHANGES



Decrease in:

- **Neurons**
- **Dendrites**
- **Neurotransmitters**

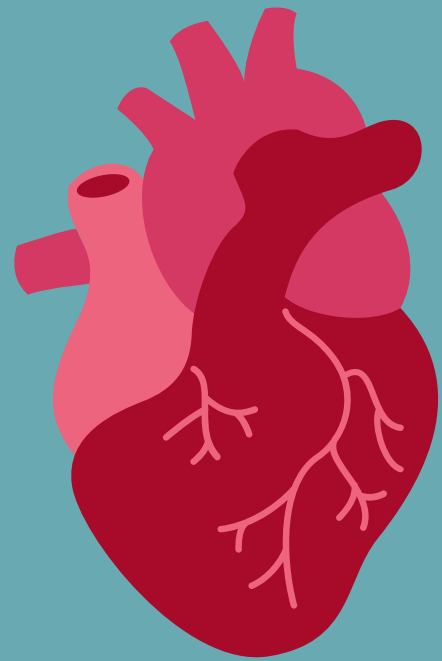
MSK SYSTEM



Changes in:

- **Distal vs proximal muscle activation order**
- **Onset of muscle activation**
- **Contraction of antagonistic muscles**

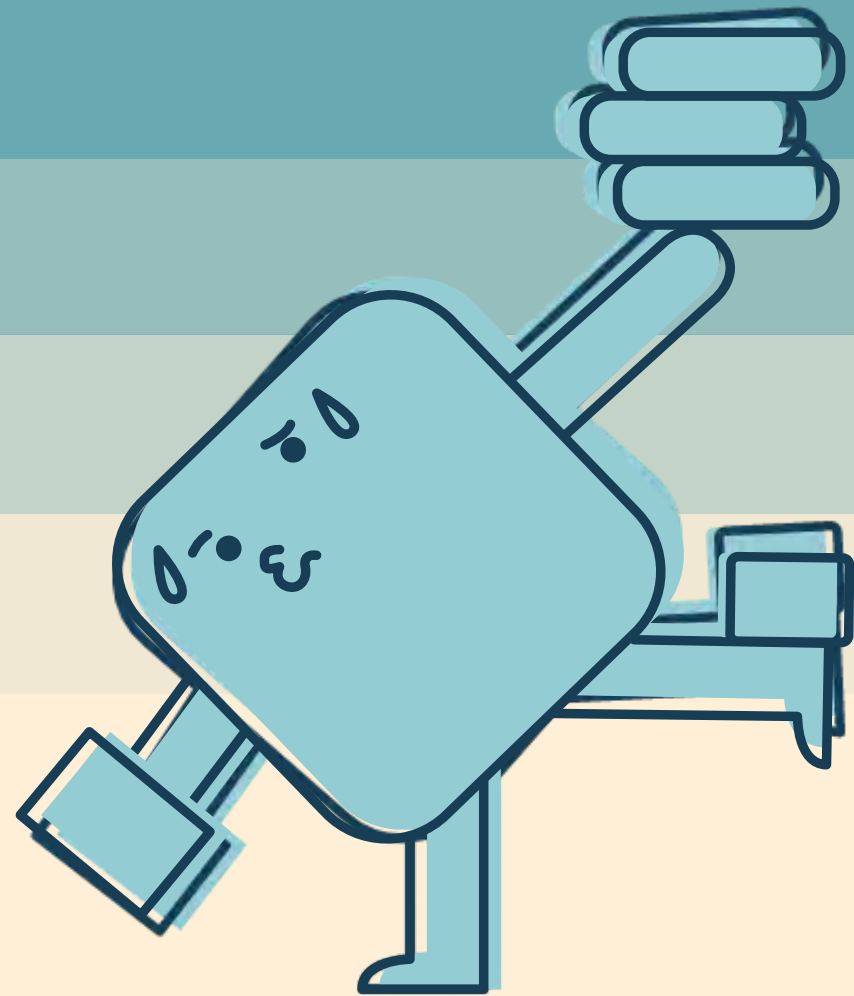
CARDIO- VASCULAR SYSTEM



Compromises in:

- **Baroreflex sensitivity**
- **Resting cerebral perfusion**
- **Total body water**

These age related changes...



affect postural control.

**AGE
RELATED
CHRONIC
CONDITIONS**

Parkinson's
Disease

Stroke

Osteoarthritis

Chronic pain

PARKINSON'S DISEASE

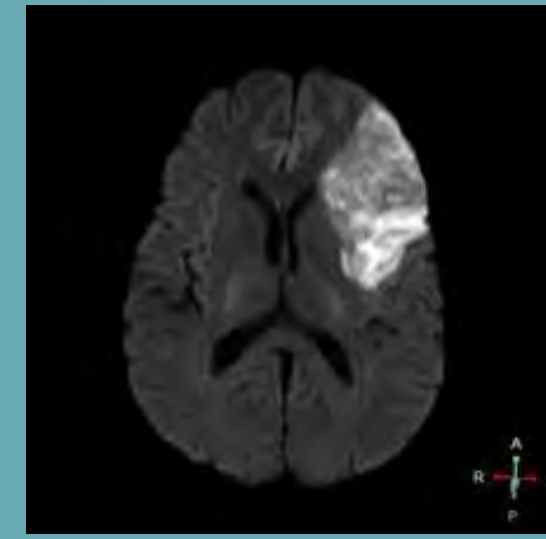
Leg Muscle Rigidity

Freezing Episodes and
Bradykinesia

Hypotension from
Medications

Cognitive Impairment

STROKE



Visuospatial Defects

Impaired peripheral
sensation

Muscle Weakness

Cerebellar dysfunction

Residual dizziness

OSTEOARTHRITIS



Affected mobility

Impaired ability to step
over objects and maneuver

Affected balance due to avoiding complete weight-bearing
on a painful joint

CHRONIC PAIN



Changes in gait

Changes in muscle strength

Pain acts as a cognitive
distractor

High risk medications

High Risk Medications

Alpha blockers and other anti-HTNs

Amiodarone

Antidepressants (SSRIs, TCAs, others)

1st-gen antihistamines

Anticholinergic drugs

Antimuscarinic incontinence agents

Antipsychotics (1st and 2nd gen)

Benzodiazepines

Acetylcholinesterase inhibitors (syncope)

Diuretics

Insulin

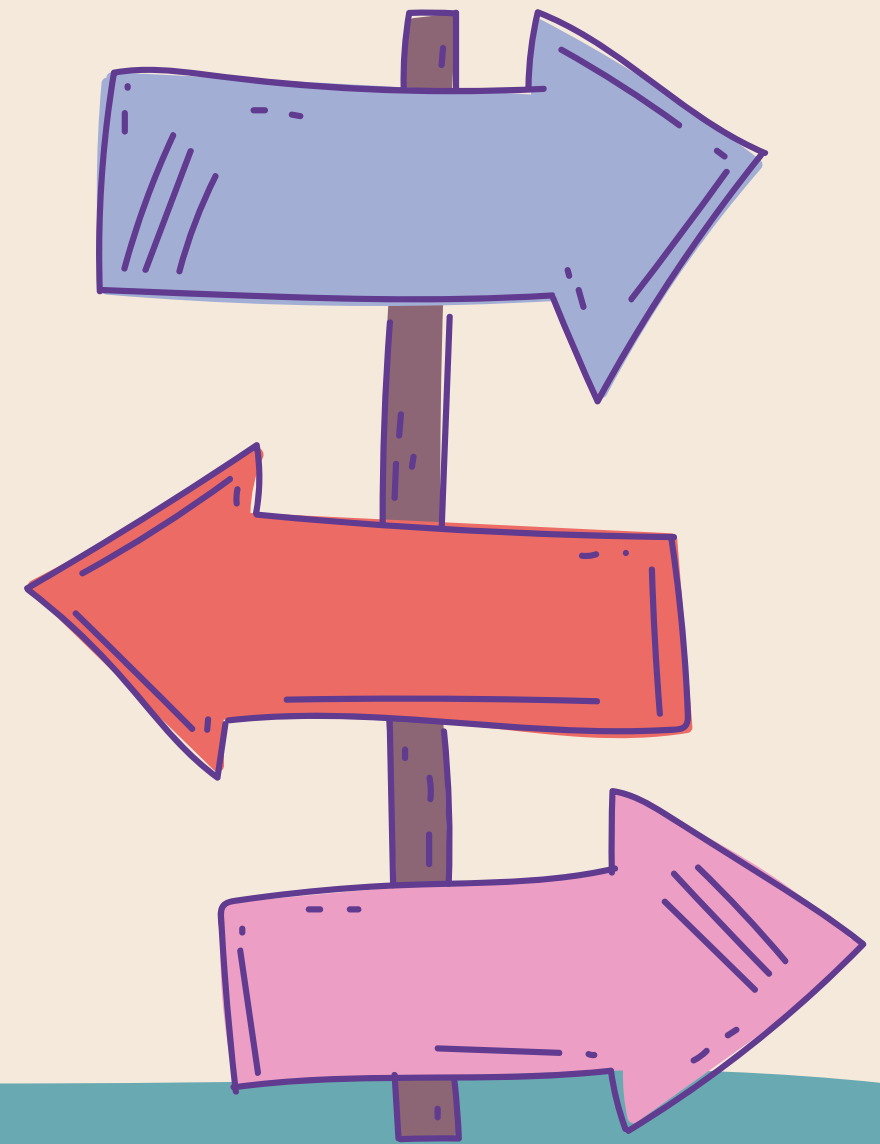
Muscle Relaxants

Nonbenzodiazepine hypnotics

Opioids

Parkinson's drugs

What are the clinical guidelines?





CDC'S ALGORITHM FOR FALLS RISK ASSESSMENT AND INTERVENTIONS

Validated in the National Health and Aging Trends Study (2017):

Participants classified as having moderate and high fall risk had ~2.6 and 4.8 times greater odds of falling than those classified as low risk, respectively, controlling for other risk factors

Four Things You Can Do to Prevent Falls:

① **Speak up.**

Talk openly with your healthcare provider about fall risks and prevention. Ask your doctor or pharmacist to review your medicines.

② **Keep moving.**

Begin an exercise program to improve your leg strength and balance.

③ **Get an annual eye exam.**

Replace eyeglasses as needed.

④ **Make your home safer.**

Remove clutter and tripping hazards.

Learn More

Contact your local community or senior center for information on exercise, fall prevention programs, and options for improving home safety, or visit:

- go.usa.gov/xN9XA
- www.stopfalls.org



1 in 4 people 65 and older falls each year.

Stay Independent

Learn more about fall prevention.



For more information, visit www.cdc.gov/steady

This brochure was produced in collaboration with the following organizations: VA Greater Los Angeles Healthcare System, Geriatric Research Education & Clinical Center (GRECC), and the Fall Prevention Center of Excellence



Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

STEADY

Check Your Risk for Falling

Circle "Yes" or "No" for each statement below			Why it matters
Yes (2)	No (0)	I have fallen in the past year.	People who have fallen once are likely to fall again.
Yes (2)	No (0)	I use or have been advised to use a cane or walker to get around safely.	People who have been advised to use a cane or walker may already be more likely to fall.
Yes (1)	No (0)	Sometimes I feel unsteady when I am walking.	Unsteadiness or needing support while walking are signs of poor balance.
Yes (1)	No (0)	I steady myself by holding onto furniture when walking at home.	This is also a sign of poor balance.
Yes (1)	No (0)	I am worried about falling.	People who are worried about falling are more likely to fall.
Yes (1)	No (0)	I need to push with my hands to stand up from a chair.	This is a sign of weak leg muscles, a major reason for falling.
Yes (1)	No (0)	I have some trouble stepping up onto a curb.	This is also a sign of weak leg muscles.
Yes (1)	No (0)	I often have to rush to the toilet.	Rushing to the bathroom, especially at night, increases your chance of falling.
Yes (1)	No (0)	I have lost some feeling in my feet.	Numbness in your feet can cause stumbles and lead to falls.
Yes (1)	No (0)	I take medicine that sometimes makes me feel light-headed or more tired than usual.	Side effects from medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I take medicine to help me sleep or improve my mood.	These medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I often feel sad or depressed.	Symptoms of depression, such as not feeling well or feeling slowed down, are linked to falls.
Total		Add up the number of points for each "yes" answer. If you scored 4 points or more, you may be at risk for falling.	

STEADI Algorithm for Fall Risk Screening, Assessment, and Intervention among Community-Dwelling Adults 65 and older



1 SCREEN for fall risk yearly, or any time patient presents with an acute fall.

Available Fall Risk Screening Tools:

- **Stay Independent: a 12-question tool** [at risk if score ≥ 4]
 - **Important:** If score < 4 , ask if patient fell in the past year (If **YES** \rightarrow patient is at risk)

- **Three key questions** for patients [at risk if **YES** to any question]
 - Feels unsteady when standing or walking?
 - Worries about falling?
 - Has fallen in past year?
 - » If **YES** ask, "How many times?" "Were you injured?"

SCREENED NOT AT RISK

PREVENT future risk by recommending effective prevention strategies.

- Educate patient on fall prevention
- Assess vitamin D intake
 - If deficient, recommend daily vitamin D supplement
- Refer to community exercise or fall prevention program
- Reassess yearly, or any time patient presents with an acute fall

1 SCREEN for fall risk yearly, or any time patient presents with an acute fall.

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SCREENED AT RISK

2 ASSESS patient's modifiable risk factors and fall history.

Common ways to assess fall risk factors are listed below:

Evaluate gait, strength, & balance
 Common assessments:

- Timed Up & Go
- 30-Second Chair Stand
- 4-Stage Balance Test

Identify medications that increase fall risk (e.g., Beers Criteria)

Ask about potential home hazards (e.g., throw rugs, slippery tub floor)

Measure orthostatic blood pressure (Lying and standing positions)

Check visual acuity
 Common assessment tool:

- Snellen eye test

Assess feet/footwear

Assess vitamin D intake

Identify comorbidities (e.g., depression, osteoporosis)

Reduce identified fall risk

- Discuss patient and provider health goals
- Develop an individualized patient care plan (see below)

Below are common interventions used to reduce fall risk:

Poor gait, strength, & balance observed

- Refer for physical therapy
- Refer to evidence-based exercise or fall prevention program (e.g., Tai Chi)

Medication(s) likely to increase fall risk

- Optimize medications by stopping, switching, or reducing dosage of medications that increase fall risk

Home hazards likely

- Refer to occupational therapist to evaluate home safety

Orthostatic hypotension observed

- Stop, switch, or reduce the dose of medications that increase fall risk
- Educate about importance of exercises (e.g., foot pumps)
- Establish appropriate blood pressure goal
- Encourage adequate hydration
- Consider compression stockings

Visual impairment observed

- Refer to ophthalmologist/optometrist
- Stop, switch, or reduce the dose of medication affecting vision (e.g., anticholinergics)
- Consider benefits of cataract surgery
- Provide education on depth perception and single vs. multifocal lenses

Feet/footwear issues identified

- Provide education on shoe fit, traction, insoles, and heel height
- Refer to podiatrist

Vitamin D deficiency observed or likely

- Recommend daily vitamin D supplement

Comorbidities documented

- Optimize treatment of conditions identified
- Be mindful of medications that increase fall risk

3 INTERVENE to reduce identified risk factors using effective strategies.

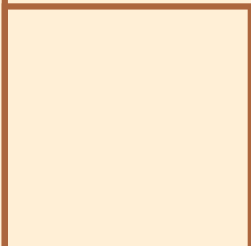
FOLLOW UP with patient in 30-90 days.

Discuss ways to improve patient receptiveness to the care plan and address barrier(s)

NOW FOR THE....



HISTORY AND m PHYSICAL m



FOR THOSE AT THE OFFICE NOT SEEN SPECIFICALLY FOR A FALL..

Has there been a previous fall?
(strong risk factor for future falls)

What were the circumstances?

Evaluate for gait and balance problems



FOR THOSE PRESENTING BECAUSE OF A FALL...



Activity at the time of the fall?

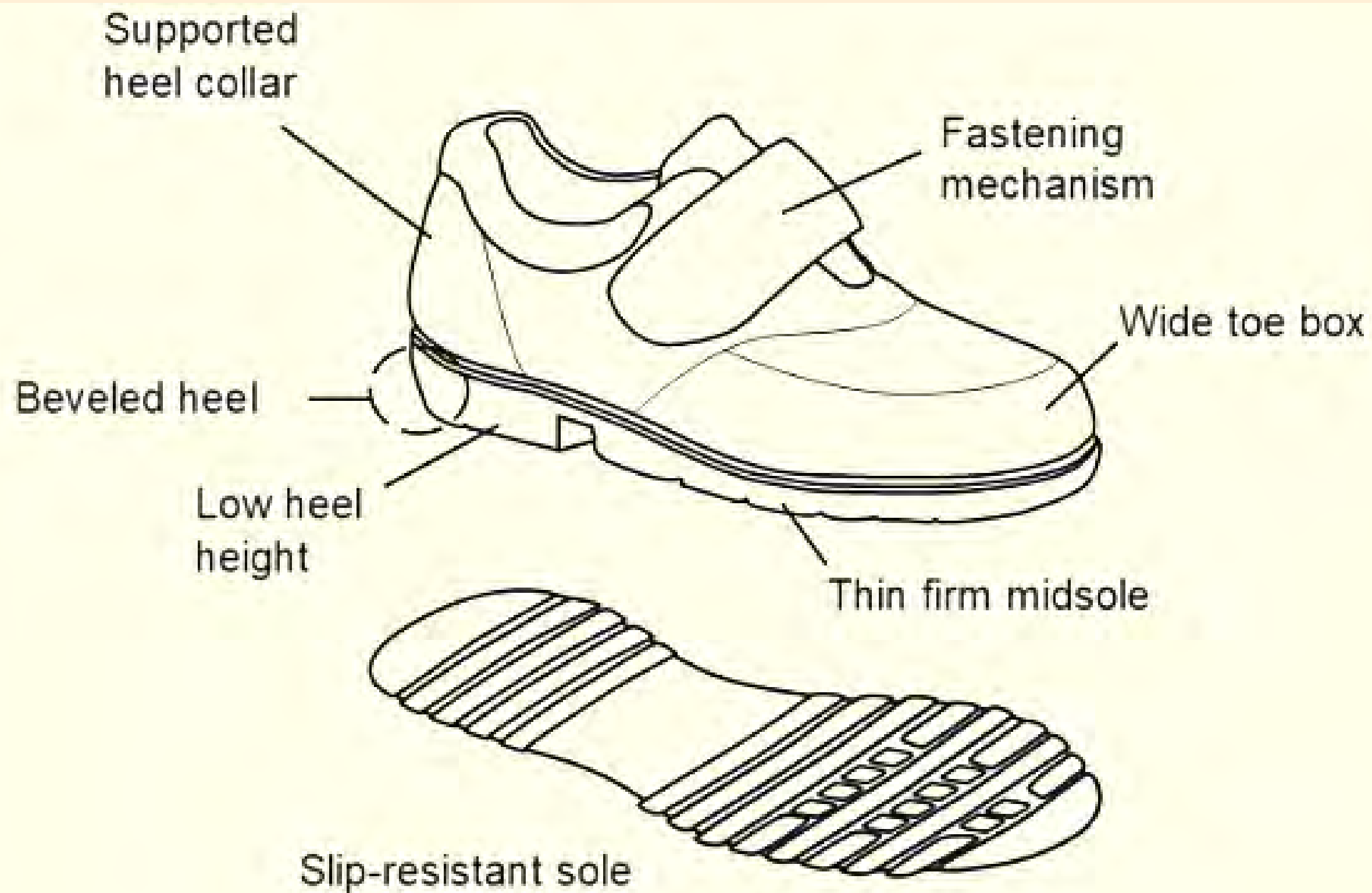
Prodromal symptoms?

Time and location?

Previous falls?

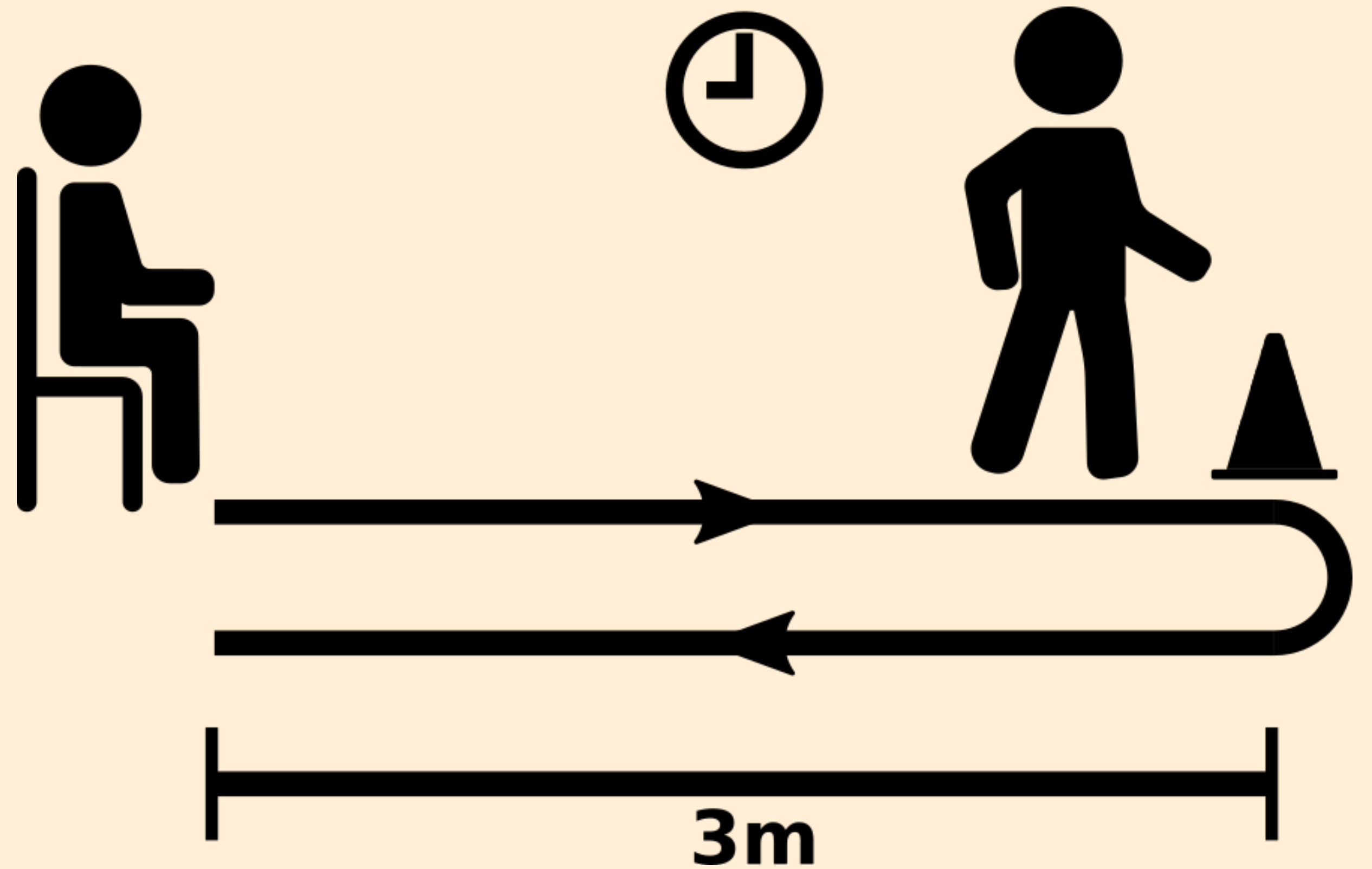
Medication history?

Environmental factors?



Characteristics of Shoes Recommended for Older Adults

The Get Up and Go Test



4-stage Balance Test



10 sec.



**Feet
adjacent**



**Semi-tandem
stance**



**Tandem
stance**

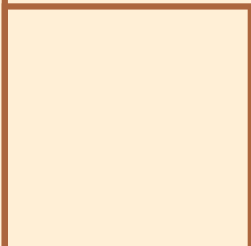
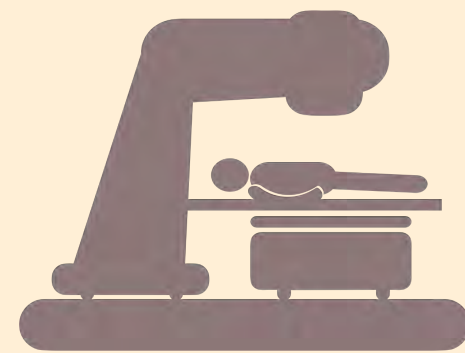
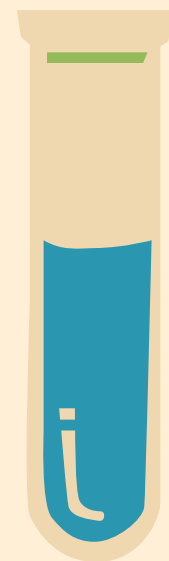


**One
foot**

AND NEXT....



LABORATORY AND m DIAGNOSTIC TESTS m



Hemoglobin

BUN/Creatinine

Glucose

HELPFUL LAB TESTS



Echocardiography

Brain imaging

Spine imaging

**ADDITIONAL
TESTING**



Preventing Falls: Selected Risk Factors and Suggested Interventions



GENERAL RISK

Exercise Programs with resistance, gait, balance and coordination training

Education and information, cognitive-behavioral intervention to decrease fear of falling and activity avoidance

Daily supplementation of Vit D3 (≥ 800 IU) for those with Vit D deficiency and possibly those in LTC facilities.



MEDICATION-RELATED FACTORS

Benzodiazepines, sedative-hypnotics, antidepressants, antipsychotics, antiHTN medications

Consider whether medication is really needed

Reduce dosage as possible



MEDICATION- RELATED FACTORS

Benzodiazepines, sedative-hypnotics, antidepressants, antipsychotics, antiHTN medications

Address sleep problems with nonpharmacologic interventions

Educate regarding appropriate use of meds and monitoring for adverse events



MEDICATION-RELATED FACTORS

Recent change in dosage or number of prescriptions, or use of ≥ 4 prescriptions, or use of other meds associated with fall risk

Review medication list and reduce number and dosage of all medications

Counsel patients at risk of falls because of a new prescription or dosage increase

Monitor response to medication changes



MOBILITY- RELATED FACTORS

Presence of environmental hazards

Improve lighting, especially at night

Remove floor hazards

Replace existing furniture with safer
furniture (correct height, more stable)



MOBILITY- RELATED FACTORS

Presence of environmental hazards

Install support structures, especially in bathroom (railings, grab bars, elevated toilet seats)

Use nonslip bath mats



Impaired strength, gait, balance, or transfer skills

Refer to PT for comprehensive evaluation, rehabilitation, and training in use of assistive devices

Provide gait training

Prescribe balance and strengthening exercises

If able to perform tandem stance, refer to Tai Chi, dance or yoga

MOBILITY-RELATED FACTORS



Impaired strength, gait, balance, or transfer skills

Provide training in transfer skills

Prescribe appropriate assistive devices

Recommend appropriate footwear

MOBILITY- RELATED FACTORS



MOBILITY-RELATED FACTORS

Impaired leg or arm strength or range of motion, or proprioception

Strengthening exercises

Resistance training 2-3 times/week, 3 sets of 10 repetitions with full ROM, then increase resistance

Tai Chi

Refer to Physical Therapy or Occupational Therapy



MEDICAL FACTORS



Parkinson's disease, osteoarthritis, depressive symptoms, impaired cognition, carotid sinus hypersensitivity, other conditions associated with increased falls

Optimize medical therapy

Monitor for disease progression and impact on mobility and impairments

Determine need for assistive devices

MEDICAL FACTORS

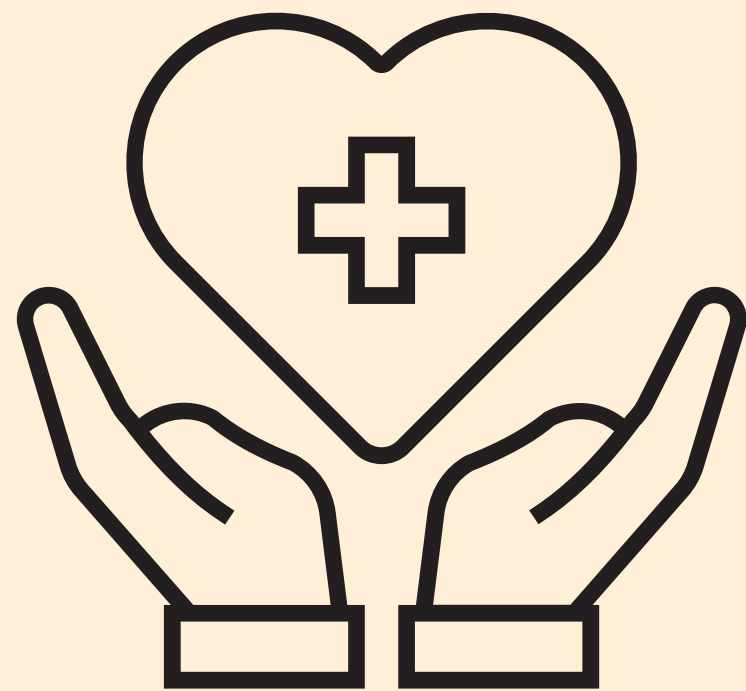


Parkinson's disease, osteoarthritis depressive symptoms, impaired cognition, carotid sinus hypersensitivity, other conditions associated with increased falls

Use bedside commode if frequent nighttime urination

Cardiac pacing in patients with carotid sinus hypersensitivity who experiences falls due to syncope

MEDICAL FACTORS



Postural Hypotension

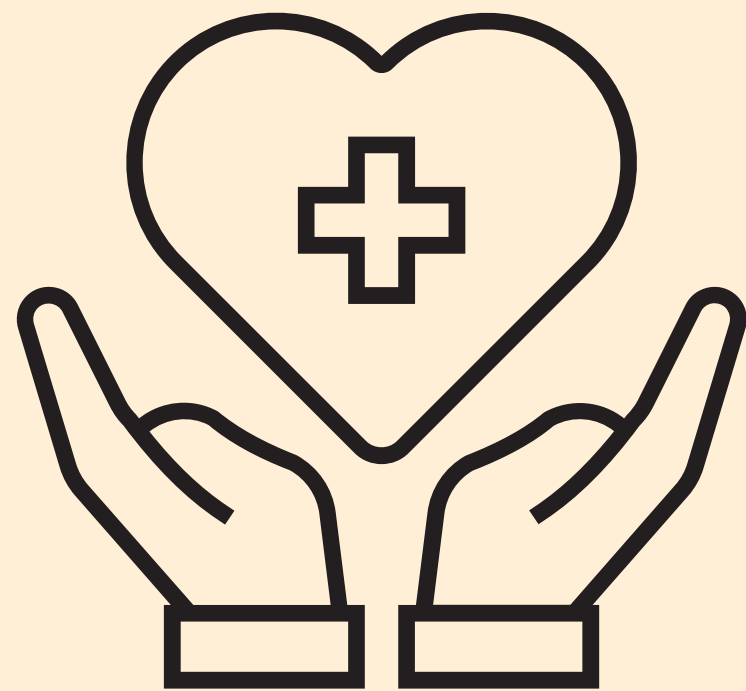
Review medications and adjust dosing or switch to less hypotensive agents; avoid vasodilators and diuretics if possible

With HTN, intensive BP-lowering treatment decreases the risk of orthostatic hypotension

Educate on activities to decrease effect (slow rising, ankle pumps, hand clenching, elevation of head of bed) and to slow rising from recumbent or seated position, grab bars by toilet and bath

Optimize hydration

MEDICAL FACTORS



Postural Hypotension

Pressure stockings

Liberalize salt intake if appropriate

Caffeinated coffee (1 c.) or caffeine (100mg) with meals for postprandial hypotension

Consider meds if HTN, HF, hypoK not serious

Each tablet contains:

Midodrine Hydrochloride, USP.. 5 mg

Usual Dosage:

See accompanying prescribing information.

Dispense in a tight, light-resistant container as defined in the USP, using a child-resistant closure.

Store at 20° to 25°C (68° to 77°F), excursions permitted between 15° to 30°C (59° to 86°F) [see USP Controlled Room Temperature].

KEEP THIS AND ALL MEDICATIONS OUT OF THE REACH OF CHILDREN.



NDC 72888-113-01

**Midodrine
Hydrochloride
Tablets, USP
5 mg**

Rx Only

100 Tablets



Midodrine

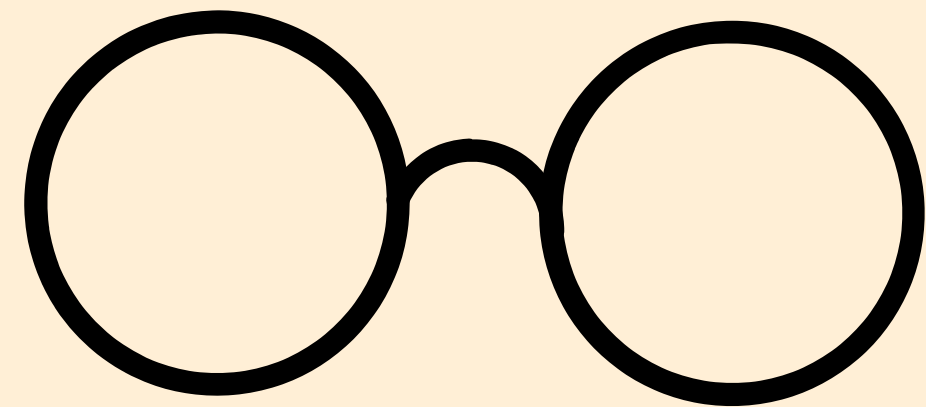
2.5-10mg given 3 times/day 4 hr apart



Fludrocortisone

0.1mg q8-24h

MEDICAL FACTORS



Visual Impairment

Cataract removal (1st but not 2nd cataract removal found to reduce falls, but 2nd cataract removal still useful for improvement in vision)

Increase awareness and vigilance when wearing multifocal lenses while walking, particularly up stairs (decreased depth perception and contrast sensitivity)

CONSIDERATIONS FOR RECURRENT FALLERS



There will be patients with non-modifiable risk factors...

...and may likely need increased supervision

For those wanting to remain independent: discussion of goals of care may be helpful

Home safety products may prevent long lies



KEY POINTS



- Falls are common events that also threaten the independence of older adults
- Falls are usually multifactorial in origin
- Older adults who have had even a single fall should have a gait and balance evaluation
- Effective interventions include med review, exercise programs with muscle strengthening and balance training, use of appropriate footwear, multifactorial interventions including home assessment, and vitamin D supplementation for those with Vit D deficiency (and possibly for those institutionalized)

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THANK YOU!



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