IDENTIFYING FALL RISK FACTORS: SCREENING TOOLS & TECHNIQUES

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Objectives

- Following this course, attendees will be able to identify appropriate balance and fall risk screening tools.
- Following this course, attendees will be able to perform a medication review and identify those that are High-Risk Fall Risk Increasing Drugs (FRIDs).
- Following this course, attendees will be able to identify causes of dizziness.
- Following this course, attendees will be able to identify dizziness screening tools.

INTRODUCTION
A fall is defined as any event that leads to an unplanned, unexpected contact with a supporting surface, such as the floor or a piece of furniture, that is not the result of a push or shove or the result of a medical event, such as a heart attack or fainting.

A near-fall is a stumble or loss of balance that would result in a fall if you were unable to catch yourself.

Fall statistics

Older Adult Population (2018):
- 52 million people 65 years and older in the US (16% of the population)
- By 2050, 95 million or 23% of US population
- Over 1/4 of all older adults fall each year
- 1 out of 5 falls causes serious injury
- Less than ½ tell their doctor

References: CDC and PRB

Falling doubles a person's chance of falling again

Fall Statistics: Morbidity and Mortality

- Falls are the leading cause of non-fatal injuries including:
  - traumatic brain injuries (TBI)
  - fractures (hip, ankle, wrist)
- Falls are the leading cause of fatal injuries for older Americans
- Fall death rates increased by 30% from 2007 – 2016
- If rates continue to rise there could be 7 deaths every hour by 2030
- In 2015 the cost of fall injuries was $50 billion
  - 75% of the costs were covered by Medicare and Medicaid

Reference: CDC
Fall Risk Factors in Older Adults

- Chronic health conditions
- Physical and functional impairments*
- Medication* and alcohol use
- Environmental hazards

Falling is not a normal part of aging.

Falls Free
National Council on Aging

NATIONAL COUNCIL ON AGING (NOA)
FALL PREVENTION AWARENESS DAY (FPAD) 9/23/19

Fall Risk

Physical Exam

Medications
HFID
LFRID

Dizziness
Neuro
Ortho
Psychogenic
PHYSICAL EXAM & FALL RISK SCREENING

Identification of Fall Risk

- Questionnaires
- Medical history screening
- Physical Therapy Balance & Fall Risk Screening Tools
- CDC- STEADI (Stopping Elderly Accidents, Deaths, & Injuries)
  - Combination of the two

Fall Risk Questionnaires

- ABC: Activities-specific Balance Confidence Scale
  - < 67% = older adults at risk for falling; predictive of future fall
- MFES: Modified Falls Efficacy Scale
  - 14 item questionnaire that includes outdoor activities

Reference: Geriatric Toolkit
Medical History Screening: The 3 V’s

- **Visual**
  - Questions to ask:
    - Do you have: Cataracts, Diplopia, Blurriness, bifocals or progressive lenses
    - When was your last eye exam?
  - Things to look for: Nystagmus, tracking, convergence

- **Vascular**
  - Questions to ask:
    - Do you have: HTN, Heart disease, smoking, neuropathy (proprioception)
  - Things to look for: Drop Attacks, orthostatic hypotension

- **Vestibular**
  - Dizziness

Medical History Screening

- Diabetes (all 3 systems can be affected: visual, vascular (proprioceptive), vestibular)
- Central and Peripheral nervous system issues
- Chronic Pain
- Allergies

Physical Therapy Screening Tools

**References:**
- Geriatric Toolkit
- PTNOW: Falls: Tests and Measures

**Static:**
- FISBT 4: Frailty and Injuries: Cooperative Studies of Intervention Techniques
  - Tests of Static Balance: parallel, semi-tandem, tandem, and one-legged stance tests
- Functional Reach
  - 6-7 inches: limited functional balance
  - >10 inches: normal
Physical Therapy Screening Tools

Static & Dynamic:
- BERG Balance Scale
  - < 45/56 used as fall predictor
- Mini BEST
  - Cut off score dependent on patient population (stroke, Parkinsons, vestibular)
- Tinetti Performance Oriented Mobility Assessment (POMA)
  - < 19 = high fall risk

Dynamic:
- Timed Up and Go (TUG)
  - >13.5 sec is predictive of falls
- Dynamic Gait Index (DGI)
  - >10/24 is predictive of falls in the elderly
- Gait Speed
  - <1.8 ft/sec = risk for recurrent falls
- Four Square Step Test (4SST)
  - Sensitivity of 85%
  - Specificity of 88% to 100%
  - Positive predictive value of 86%

STEADI
- Fall Screening tool
- Developed by the CDC, based on the 2011 AGS/BGS Guidelines for Fall Prevention
- STEADI is a combination of:
  - Performance tests: TUG, Static Balance, and 30 sec Sit to Stand
  - Fall History
  - Questionnaire results
- STEADI is also available as an app for mobile devices by Evidence in Motion
STEADI Screening

- Key questions asked:
  - Fall in the past year
  - Unsteady when standing or walking
  - Worry about falling

- Evaluate Gait, Strength, & Balance (TUG)
  - If no problem = Low Risk
  - If problem with gait, strength, & balance
    - 0-1 falls and no injury = Moderate risk
    - 2+ falls with injury = High Risk for Falls

Patient needs a multifactor fall risk assessment including physical exam
- medication assessment, postural hypotension, cognitive screening, DME
How medications can increase the risk of falls

- **Central Nervous System (CNS)**
  - Dizziness and/or vertigo
  - Floating sensation/light headedness
  - Sedation or drowsiness
  - Seizures
- **Eye, ear, nose, and throat (EENT)**
  - Blurred vision, diplopia, nystagmus
- **Neurological symptoms (Neuro)**
  - Ataxia/incoordination
- **Cardiovascular (CV)**
  - Orthostatic hypotension
  - Hypertension

How medications can increase the risk of falls

- **Polypharmacy**
  - Where a patient is prescribed 4 or more drugs
- Increases the risk factor for falls
- Sometimes medically necessary
High FRIDs

- High-Risk Fall Risk Increasing Drugs (High FRIDs)
- Older patients more likely to be taking multiple FRIDs

Common medication classes
- Pain medications (Opiate Agents and Muscle relaxers)
- Blood Pressure medications
- Sedative/hypnotics (including Benzodiazepines and Barbiturates)
- Antidepressants
- Antihistamines
- Antipsychotics
- Anticonvulsants

Older adults are more at risk of experiencing adverse drug effects due to changes in drug processing in the body.

Pain Medications & Muscle Relaxers

Possible Adverse Effects

CNS
- Dizziness/vertigo
- Sedation/drowsiness

(EENT)
- Blurred vision/diplopia

(CV)
- Orthostatic hypotension

Pain Medications & Muscle Relaxers

Examples

Opioids
- fentanyl (Duragesic)
- hydrocodone (Loritab/Vicodin)
- hydromorphone (Dilaudid)
- oxycodone (OxyContin)
- tramadol (Ultram)*
- meperidine (Pethidine)*
- tapentadol (Nucynta)*

Muscle Relaxers
- chlorozuxone (Paraflex/Parafon Forte)
- cyclobenzaprine (Flexeril)
- tiatridine (Zanaflex)
- baclofen (Lioresal)*
- methocarbamil (Robaxin)*

* (increased seizure risk)
**Blood Pressure Medications**

Possible Adverse Effects
- **CNS**
  - Dizziness/Vertigo
  - Sedation/Drowsiness
- **CV**
  - Orthostatic hypotension

**Examples**
- doxazosin (Candura)
- prazosin (Minipress)
- reserpine (Reserfia)
- clonidine (Catapres)
- dipyridamole (Dipirdacot, Persantine) - vasodilator
- Possible rebound hypertension with guanfacine (Tenex)

**Sedative/Hypnotics**
Including Benzodiazepines and Barbiturates

Possible Adverse Effects
- **CNS**
  - Dizziness/Vertigo
  - Sedation/Drowsiness
- **Neuro**
  - Ataxia
- **EENT**
  - Blurred vision
- **CV**
  - In some instances (orthostatic) hypotension
Sedative/Hypnotics
Including Benzodiazepines and Barbiturates
Examples

- Benzodiazepines
  - alprazolam (Xanax)
  - clonazepam (Klonopin)
  - lorazepam (Ativan)
- Barbiturates
  - amobarbital (Amytal)
  - primidone (Mysoline)
- Other
  - zolpidem (Ambien)

Antidepressants
Possible Adverse Effects
- Sedation/Drowsiness
- Minimal Dizziness/Vertigo
- Minimal visual disturbances
- There is a possibility of hypotension
- Increased risk of seizures (1)

Antidepressants
Examples
- amitriptyline (Elavil)
- escitalopram (Lexapro)
- fluoxetine (Prozac, Sarafem)
- trazodone (Trazadone)
- clomipramine (Anafranil) *(increased seizure risk)*
Antihistamines

Possible Adverse Effects
- Dizziness/Vertigo
- Sedation/Drowsiness
- Blurred Vision
- (Orthostatic) hypotension

Examples
- diphenhydramine (Allergy medications, Benadryl, Sleep-Eze, Unisom, Midol PM)
- promethazine (Phenergan, Promacot)

Antipsychotics

Possible Adverse Effects
- Dizziness/Vertigo
- Sedation/Drowsiness
- (Orthostatic) hypotension
Antipsychotics
Examples
- aripiprazole (Abilify)
- haloperidol (Haldol, Peridol)
- lurasidone (Latuda)
- olanzapine (Zyprexa)
- risperidone (Risperdal)

Anticonvulsants
Possible Adverse Effects
- Dizziness/Vertigo
- Increased risk of seizures (see examples)
- Ataxia
- Visual issues (blurriness, diplopia, nystagmus)
- Some blood pressure effects (both hypo and hypertension)

Anticonvulsants
Examples
- gabapentin (Neurontin)
- levetiracetam (Keppra)
- phenytoin (Dilantin)
- pregabalin (Lyrica)*
- ethosuximide (Zarontin)*
- ethotoin (Peganone)*
- topiramate (Topomax)*

*increased seizure risk
Low FRIDS

- Low-Risk fall risk increasing drugs (low FRIDs)
- Common categories of medications include:
  - Blood Pressure Medications
  - Diuretics
  - Antiarrhythmic drugs
  - Vasodilating agents
  - Antidepressants (not classified as High FRIDs)
- While the effects may not be as severe, fall risk increases with the use of multiple FRIDs.

American Geriatric Society (AGS) Beers Criteria (2019)

- Guideline that identifies potentially inappropriate medication (PIM) use in older adults aged 65+
- 5 criteria:
  - medications that are potentially inappropriate in most older adults
  - those that should typically be avoided in older adults with certain conditions
  - drugs to use with caution
  - drug-drug interactions
  - drug dose adjustment based on kidney function

AGS Beers Criteria (2019)

- Each category contains the following information:
  - Drug name
  - Rationale for inclusion (adverse drug response – ADR)
  - Recommendation
    - Avoid
    - Use with caution
  - Quality of the evidence
  - Strength of recommendation
10 Medications that Older Adults Should Avoid or Use with Caution

- Often experience chronic health conditions that require treatment with multiple medications
- Can also be more sensitive to certain medications
- Greater likelihood of unwanted drug side effects which can lead to falls
- Of the 10 medications listed, these 5 increase the risk of falls:
  - Muscle Relaxants - giddiness & confusion
  - Anti-anxiety or insomnia medications - ↑ time to clear from system
  - Anticholinergics - confusion
  - Demerol - confusion & seizures
  - OTC medications - read the label (i.e. antihistamines)

HOW TO READ AN OTC DRUG LABEL

SCREENING FOR DIZZINESS
Some Definitions...

- **Dizziness**: internal and/or chronic sensation or feeling inside of the head.
- **Vertigo**: the hallucination that the outside world is moving or spinning.
- **Imbalance**: sensation of unsteadiness or lack of stability and may include a history of falls.

Dizziness related falls throughout the lifespan

- **Birth to 5 yrs**
  - Syndrome and mitochondrial disorders
  - Congenital hearing loss
  - Delayed motor milestones
  - BPV of infancy

- **8-30 yrs**
  - Sports related head trauma
  - Cortical or labyrinthine concussion

- **12-50 yrs**
  - Migraine related dizziness/vertigo;
  - Puberty to menopause

- **50+ yrs**
  - Benign Paroxysmal Positional Vertigo (BPPV)
  - Shingles
  - Post menopausal migraine

Equilibrium

- **Vestibular System**
  - Internal reference contributing 2/3 of information needed

- **Visual System**
  - External reference telling brain about the outside world,
  - information about motion

- **Somatosensory System**
  - Muscle receptors providing external reference from tactile contact with surfaces.

- **Central Nervous System**
  - Integrates sensory input and produces motor control response
Questions to ask in Subjective Interview

- When did it start?
- What provokes symptoms?
- What alleviates symptoms?
- How long do symptoms last?
- Symptom quality
- What other symptoms are associated?

Is it true BPPV?

- 15% of dizzy patients have true BPPV
- #1 otolithic cause of dizzy symptoms
- Questions to ask:
  - When do they experience symptoms?
  - How long do symptoms last?
  - Quality of symptoms?
- Screening tests
  - Epley Maneuver, Roll Test
- You want to treat this first

True BPPV

- Seconds to minutes in duration
- Most describe symptoms as spinning sensation
- Symptoms are provoked by actions such as rolling in bed, looking up, bending over and rapid head movements
- Can be insidious onset or following trauma to the head
Now what???

- Medications
  - meclizine (Antivert), scopolamine (for motion sickness)
- Musculoskeletal
- Neurological
- Vascular
- Psychological

Musculoskeletal implications

- Deconditioning
  - Hospitalization, immobilization, decreased postural control, muscle atrophy
- Ocular
- Cervicogenic

Musculoskeletal Testing

- Postural Screen
- Sensory
- Manual Muscle Testing
- Gait
- Cervical screening
- Vertebral Artery Screening
- Balance testing
Ocular screening

- Gaze evoked nystagmus
- Visual tracking
- Convergence/divergence
- Saccades
- Head Thrust Test/Head Impulse Test
- Dynamic Visual Acuity Test
- VOR

Cervicogenic Dizziness (CGD)

- “Non-specific sensation of altered orientation in space and disequilibrium originating from abnormal afferent activity from the neck.”
- Estimated rate of CGD at 7.5% for those patients complaining of dizziness
- Whiplash Associated Disorder (WAD)
- Incidence of symptoms of vertigo was approximately 50-65% in patients with cervical spondylosis
Common complaints and abnormalities with CGD

- Neck pain and limited cervical ROM
- Impaired postural control and sensorimotor dysfunction
- Oculomotor dysfunction
- Spontaneous and/or positional nystagmus
- History of falls
- Feeling uneasy/unsteady

Subjective Examination

- Described as “unsteady” or “lightheaded”
- Episodic in nature and lasts minutes to hours
- Aggravated by neck and head movements and relieved by positional change
- May also experience blurred vision, neck pain and nausea

Cervical Dizziness Special Tests

- Head-Neck Differentiation Test
- Smooth Pursuit Neck Torsion Test
- Joint position Sense
Vestibulo-Collic Reflex

Neurologic implications

- Peripheral
  - BPPV
  - Vestibular pathologies
- Central
  - Migraine
  - CVA, TBI, MS, etc.
  - concussion

Migraine

- #1 non-otologic cause of vertigo
- 28 million Americans suffer from migraine
- Predominately female (1:4) and strong genetic correlation
- Many different variants
- Can have many triggers
- Vestibulopathy in 44% of migrainuers
- May appear as Meniere's Disease, but does not have residual effects
Vascular Implications

■ Vertebral Artery Compromise (5 D's and 3 N's)
  - Dizziness
  - Dysphasia
  - Dysarthria
  - Drop Attacks
  - Diplopia
  - Nystagmus
  - Numbness
  - Nausea

Vascular Screen

■ Vertebral Artery Screening Test
  - Patient in sitting with head turned in hyper extension

American Academy of Neurology Recommends VAST prior to Dix-Hallpike or BPPV treatment

Psychologic Implications

■ Psychological disorders
  - Personality disorders
  - Anxiety/depression
  - PTSD, BPS, etc.
■ Motor conversion disorder
■ Fear avoidance behaviors
■ Phobic postural vertigo (Persistent Postural Perceptual Dizziness)

■ Health care team
  - Neuropsych, psychologist, psychiatrist, pain management
Persistent Postural Perceptual Dizziness (PPPD or 3PD)

- "Chronic functional disorder of the nervous system, characterized by non-spinning vertigo and perceived unsteadiness"
- Symptoms can last for hours but can wax and wane in severity
- Not always continuously present throughout the day
- May be exacerbated by upright posture, active or passive motion without regard to direction or position, exposure to moving visual stimuli or complex visual patterns
- Triggered by events that can cause vertigo, unsteadiness and dizziness
- Cause significant stress or functional impairment
- Not better accounted for by another disease

SUMMARY

What have we learned?

- Medical screening
- Balance & fall risk screening tools
- Medication review and identification of those that are High-Risk Fall Risk Increasing Drugs (FRIIDs)
- Identification of some of the causes and screening tools for dizziness


Popirlé, Stupak, Staab, Jeffrey P Stone, Jon. Persistent Postural-Perceptual Dizziness (PPPD): A Common, Characteristic and Treatable Cause of Chronic Dizziness (2018), The BMJ.

References

- Medications That Older Adults Should Avoid Or Use With Caution Print Facebook Tweet Email The 2019 American Geriatrics Society Updated Beers Criteria for Evaluating Adverse Effects of Medications in Older Adults. In AGS Health in Aging Foundation. Retrieved from https://www.healthinaging.org/medications-older-adults/medications-older-adults-should-avoid