

# Maximizing Acute Care Functional Outcome Measures in Hospitalized Aging Adults

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## Objectives

- Recognize the problem of hospital-acquired/exacerbated functional decline in older adults.
- Distinguish between normal aging changes and pathological aging changes.
- Determine hospital and therapy protocols and habits that may contribute to hospital-acquired/exacerbated functional decline during hospitalization of older adults.
- Use functional measures and other healthcare provider-driven screening tools as effective instruments for an improved culture of hospital mobility, accurate discharge prognostication, and overall improved care for older hospitalized adults.



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## Introductions



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# Building the Case: What is the Problem Anyway?



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## Functional Decline and Hospitalization



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## What Contributes to Functional Decline During Hospitalization?

- From the video?
- From your experience?
- Why is this a problem?



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### Exactly WHO are we talking about?

#### When Does Aging Begin?

- You may think about chronological age
  - The government does--- Medicare & Social Security
  - But that is actually an arbitrary designation



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### When Does Aging Begin?

But actually . . .

- Aging takes place over time
  - Grow older developmentally, not chronologically
  - Chronological age is not biologically uniform
- Old age is a new concept
- Aging is different from disease
  - Functional decline not necessarily due to aging
  - **Aging changes are distinguished from changes attributable to disease**



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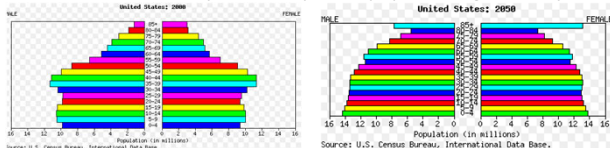
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### The Statistics

We can't close our eyes and hope this population goes away!



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### Demographics and Life Expectancy

- In 2021, life expectancy at birth: 76.4 (73.5 M, 79.3 F)
- In 2021, those who reached 65 could expect to live an additional average of 18.4 years
- Between present time and 2030, the 65+ population is expected to make up close to 20% of the total U.S. population
- Factors
  - Current declining birth rate
  - Decreased mortality rates
  - Increased life expectancy/better overall health
  - Large numbers in the “baby boomer” generation

**Life expectancy in the US (1900-2020)**  
Source: [https://www.cdc.gov/nchs/nhanes/healthdata/04\\_01\\_04](https://www.cdc.gov/nchs/nhanes/healthdata/04_01_04)

Year	Percentage
1900	2.1
1920	4.9
1940	9
1960	16.6
1980	25.9
1990	31.2
2000	35
2010	40.2
2020	54.8
2030	72.1

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### What Are the Statistics in Older Adult Hospitalization?

- Older adults account for 36-50% of hospital admissions
- 20% of Medicare patients are readmitted within 30 days, 75% of which are preventable
- Up to 35% of older patients experience functional decline s/p hospitalization resulting in
  - Dependence
  - Readmission
  - Nursing home placement
  - Mortality

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### What Does the Research Say?

- Predictors of functional decline after hospitalization:
  - Preadmission need for IADL on a regular basis
  - Use of a walking device
  - Need for assistance in traveling
  - No education after the age of 14
- Loss of mobility is critical in the “cascade” to dependency
  - But it is not a widely recognized outcome of hospital care
- Newer research—cognitive decline occurring w/hospitalization!

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### Hidden Dangers of Hospitalization

- Delirium
  - Affects 25-60% of older hospitalized adults
  - Processes contributing: hypoxia, infection, electrolyte imbalance, constipation, pain
  - Preventable in 40% of cases
- Reduced mobility and falls
  - Road to frailty!
  - BEDREST is BAD!
    - Orthostatic hypotension, atelectasis, decreased muscle strength, increased bone loss, constipation, incontinence, pressure ulcers, confusion



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### Hidden Dangers of Hospitalization

- Malnutrition and dehydration
- Almost 1/2 of older adults admitted already have these issues
  - Both are independent risk factors for
    - Falls
    - Confusion
    - Pressure ulcers
    - Impaired immunity
    - Longer hospital stays
    - Death



Infections– UTIs, pneumonia

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### How Can Therapy Professionals Help?

- Patients are adequately nourished and hydrated
- Call bells are within reach
- Pain is managed
- Incidental activity and independence is promoted during their stay
- Care is tailored to the person's goals and needs



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Orders We "Love to Hate"



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What Attitudes Might We Have?



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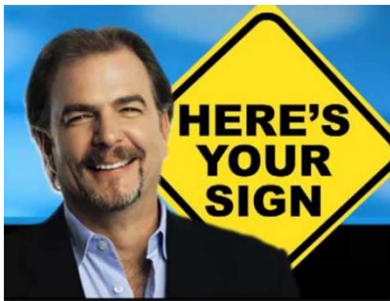
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### Optimal Aging



This is our goal for our older adult patients!

- Achieving life satisfaction in physical, psychological, functional, cognitive, emotional, spiritual, and social domains despite the presence of disabling medical conditions.
- We can help reduce these disabling effects and stop the cycle of "disease > disability > new incident disease" in order to facilitate maintenance of quality of life.



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### So, the challenge is . . .

- Are we as therapists really making a difference to do our best to prevent further functional decline in older adults?
- Are we using evidence-based practice to effectively and objectively evaluate patients and initiate interventions that can affect positive change for whatever the referring condition is?
- Can we advocate for mobility programs for patients who do not fall within our criteria for formal therapy (i.e., let's not overload our already overloaded schedules!)?
- Can we design interventions during hospitalization of older adults that not only adequately challenge them, but provide for improved functional outcomes and accurate discharge disposition recommendations?



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## Review of Physical Consequences with Aging

Those seemingly unnoticeable changes that can spell DISASTER!!



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### Aging is Inevitable...

- Hundreds of theories of why we age, but no unifying theory
- Accumulation of genetic damage
- Genetically pre-programmed
- "Free radical" accumulation causing biochemical damage
- To name a few
- ALL tissues and systems undergo age-related change
- In general, agreed that aging has contributions from:
  - General whole body inflammatory response (Woods, et al)
  - Genetics
  - Consequences of lifestyle, primarily decline in physical activity\*\*\*\*

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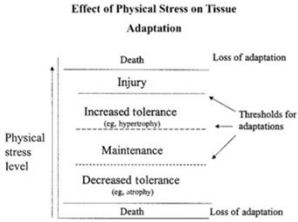

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### Aging Changes

- Changes appear slowly & over long period of time
- Results in loss of reserve:
  - Body stressors then cause an extra workload
    - illness
    - Medicines
    - Significant life changes
    - Sudden increased physical demands on the body
  - Decreased ability to maintain/restore equilibrium
  - Therefore, recovery from illness seldom 100%, which can lead to more and more disability

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### Important Question, Though . . .

- Does aging necessarily equal disease and disability??
- Do physiologic changes associated with the typical aging processes increase the susceptibility to disease process??



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### Normal vs Pathological Aging

<b>Normal Aging</b> <ul style="list-style-type: none"><li>• Changes that occur as a normal process of life that can be partially augmented by lifestyle changes, genetics, and medical interventions as appropriate.</li></ul>	<b>Pathological Aging</b> <ul style="list-style-type: none"><li>• Disease processes that begin as a result of lifestyle choices, genetics, or other factors that either are accelerated by normal aging effects or actually cause earlier physiological aging and decline; process can be augmented by lifestyle changes and medical intervention.</li></ul>
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### Pathological Aging

- Remember, what we often see of older adults in acute care is NOT reflective of a “good age”
- Pathological aging is either:
  - Lifestyle or genetic influences that have accelerated aging changes
  - Aging changes that complicate homeostasis or adaptability to disease or disability
  - Aging changes that contribute to worsening of disease or disability
- Normal aging **DOES NOT EQUAL** disease and disability!!



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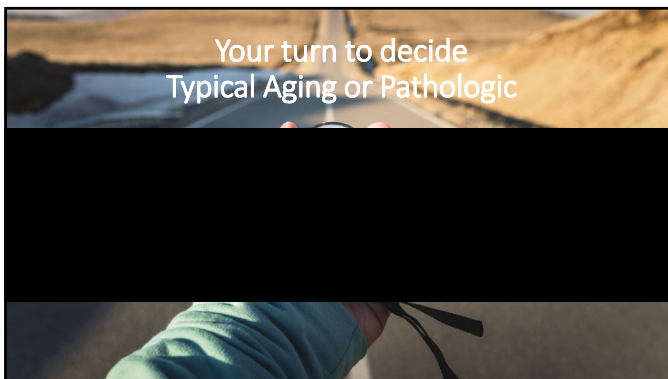
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Your turn to decide  
Typical Aging or Pathologic

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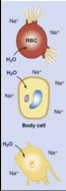

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### Typical Aging or Pathologic?

- Impaired regulation of fluids/electrolytes with orthostatic hypotension
  - **↓aldosterone (Na<sup>+</sup> reabsorption)**
    - Hyponatremia = plasma hypoosmolality
      - Lethargy, headache, confusion, etc.
  - **Impaired hormone concentration and/or response**
    - Glucose intolerance due to impaired ability to return to typical level
- Inability to lower and maintain/regulate blood glucose levels after eating meals.
  - **Type II diabetes**
  - **Associated with increased incidences:**
    - Heart disease, skin breakdown, and other complications

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### Typical Aging or Pathologic?

- Impaired unilateral sensation & muscle weakness of extremities.
  - **Cerebral vascular accident (CVA)**
    - Most common vessel obstructed with ischemic stroke?
    - Damage to these structures result in what?
      - Middle cerebral artery
      - Middle meningeal artery
      - Superficial temporal artery
- Decreased distal proprioception and discriminative touch.
- Impaired blood pressure regulation & bladder control.
  - **Decreased autonomic nervous system adaptability**
    - Sympathetic (increase HR & force of contractility)
    - Parasympathetic (decrease HR)
  - **Decreased axonal conduction velocity**



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### Typical Aging or Pathologic?

- Distal extremity pitting edema. Decreased albumin levels. Decreased physical activity tolerance. Significant increased shortness of breath with activity. Elevated heart rate coupled with elevated systolic pressure.
  - **Congestive heart failure & Chronic kidney disease**
    - Why are these two commonly linked?
- Increased arterial thickness and elevated blood pressure above 140/80.
  - **Hypertension risk**
    - Related to congestive heart failure
  - **What opens and closes heart valves?**
    - Pressure changes
  - **Hypertension requires ventricles to do what?**
    - Left ventricular hypertrophy
    - Why isn't increased muscle mass a good thing with the heart?



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Typical Aging or Pathologic?

- Thoracic kyphosis with decreased rib cage circumference. Impaired elasticity in airways and alveoli.
- Impaired detection and/or response of changes in arterial blood gases.
  - **How does inhalation vs exhalation occur?**
    - Pressure changes inside the lungs
- Alveoli filled with fluid causing cough with phlegm, fevers, chills, and difficulty breathing.
  - **Pneumonia**
    - How does thoracic kyphosis potentially increase susceptibility to pneumonia?



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Typical Aging or Pathologic?

- Loss of strength and loss of muscle mass over gradual time with loss in muscle power.
  - **Sarcopenia**
    - Estimated 8% loss per decade until 70, then increases to 15% per decade!
    - Loss of strength > loss of mass
    - Related to:
      - Extended hospital stays
      - Infectious and non-infectious complications
      - Overall mortality
      - Falls, fractures, gait disorders
- Gradual onset of knee pain that is worse with prolonged activity and stairs. Symptoms worse with long periods of inactivity and seems to be getting worse over time. Knee feels stiff and ambulation capacity is impaired.
  - **Primary knee osteoarthritis**
    - Articular degeneration without underlying reason (like rheumatoid arthritis)



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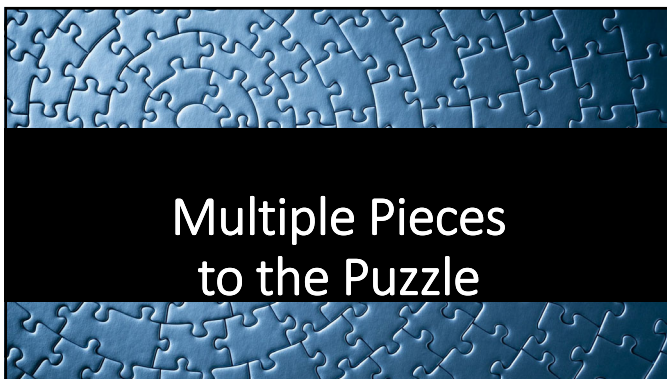
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Multiple Pieces to the Puzzle

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### Geriatric Syndromes

- Definition: a collection of symptoms and signs common in older adults not necessarily related to a specific disease such as
  - Delirium
  - Falls
  - Frailty
- Highly prevalent, multifactorial, and associated with morbidity and poor outcomes

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### Frailty

- **Criteria** (presence of 3 or more predictive over 3 years of falls, worsening mobility or ADL disability, hospitalization, and death):
  - Unintentional weight loss (10 lbs in past year)
  - Self-reported exhaustion
  - Weakness (as measured by grip strength/chair stands)
  - Slow walking speed
  - Low physical activity

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### What We See in Acute Care

- A few patients incidentally in the hospital who are pictures of “normal aging”
- Even more patients who have been generally aging well; hospitalization is the “tipping point”
- Even more patients who are already functionally-impaired, but compensated; hospitalization moves them to next lower level
- And even more who are functionally-impaired, barely compensated; hospitalization changes them profoundly

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# What Can We Do About the Problem?

Kicking Old Habits & Attitudes, Developing Screening & Mobility Programs, and Integrating Functional Measures



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## The "Fall Risk" Patient- Facility contributing to immobility?

1. **Restrictive Safety Measures**
  1. **Overprotection** by staff can lead to excessive use of bed rails, restraints, or limited mobilization schedules.
  2. **Overuse of Safety Protocols:**
    - **Bed Alarms:** While they alert staff of a patient's movement, they can discourage patients from attempting to move.
    - **Restraints:** Intended to prevent falls but can severely limit the patient's ability to move freely.
2. **Infrastructure Challenges:**
  1. **Narrow Corridors:** Lack of space can make it challenging for patients to walk with assistance or with devices like walkers.
  2. **Insufficient Handrails:** Without enough support structures in place, mobility is naturally discouraged.
3. **Staffing Issues:**
  1. **Insufficient Training:** Staff who aren't trained adequately may overly rely on restrictive measures out of fear of patient falls.
  2. **Staff-to-Patient Ratio:** Overburdened staff might limit patient mobility due to concerns they can't adequately supervise mobilization efforts.



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## The "Fall Risk" Patient- Facility contributing to immobility?

4. **Communication Gaps:**
  1. **Between Shifts:** Inconsistencies in patient care or mobility instructions between shifts can hinder regular mobilization.
  2. **Between Disciplines:** Lack of communication between doctors, nurses, therapists, etc., can result in missed opportunities for mobilization.
5. **Lack of Mobility Equipment:**
  1. Delay in providing or unavailability of aids like wheelchairs, walkers, or hoists can cause patients to remain bed-bound.
6. **Environmental Concerns:**
  1. **Slippery Floors or Uneven Surfaces:** If facilities aren't well-maintained, the physical environment can be a hazard, discouraging mobility.
  2. **Cluttered Rooms:** Excess equipment or furniture can obstruct movement and increase fall risks.
7. **Overemphasis on Liability:**
  1. **Fear of Lawsuits:** A facility's fear of legal action after falls might lead to excessive immobilization measures.
  2. **Inadequate Insurance:** Without proper insurance coverage, facilities might choose the safest route (immobilization) to minimize financial risks.



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### PT Strategies to Expedite Removal of Fall Precautions

- Comprehensive Assessment
- Individualized Exercise Program
- Functional Mobility Training
- Balance Training
- Education and Feedback
- Safe Environment
- Encourage Self Practice
- Collaborative Team Approach




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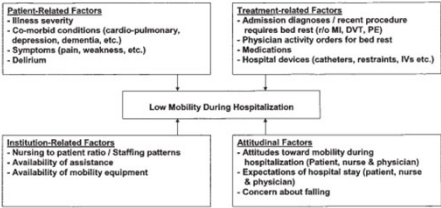
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### Other Factors Contributing to Immobility During Hospitalization:



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    graph TD
      PRF[Patient-Related Factors] --> LM[Low Mobility During Hospitalization]
      TRF[Treatment-related Factors] --> LM
      IRF[Institution-Related Factors] --> LM
      ATF[Attitudinal Factors] --> LM
  
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- Patient-Related Factors**
  - Illness severity
  - Co-morbid conditions (cardio-pulmonary, depression, dementia, etc.)
  - Symptoms (pain, weakness, etc.)
  - Delirium
- Treatment-related Factors**
  - Admission diagnoses / recent procedure requires bed rest (r/o ML DVT, PE)
  - Physician activity orders for bed rest
  - Medications
  - Hospital devices (catheters, restraints, IVs etc.)
- Institution-Related Factors**
  - Nursing to patient ratio / Staffing patterns
  - Availability of assistance
  - Availability of mobility equipment
- Attitudinal Factors**
  - Attitudes toward mobility during hospitalization (Patient, nurse & physician)
  - Expectations of hospital stay (patient, nurse & physician)
  - Concerns about falling



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### "At Risk" Hospital Protocols: Bedrest- Risks and Effects

**Bedrest**

- Common medical intervention- but when is it truly medically necessary?
  - In ICU, to maintain integrity of tubes and lines, esp. artificial airways
  - To minimize trauma with coagulopathies
  - To maintain spine or bone alignment
- Needs to be balanced with mobility activities in order to improve both short- and long- term outcomes for survivors of critical illness

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**"At Risk" Hospital Protocols: Bedrest- Risks and Effects**

**Bedrest**

- Cardiovascular effects
  - ↑ heart rate and ↓ heart rate variability
  - Orthostatic instability
  - ↑ risk for DVT/PE
  - ↓ red blood cells → direct affect on O2 uptake (evidence of ↓ O2 carrying capacity in healthy adults after bedrest x 14 days)
- Pulmonary effects
  - ↓ aerobic capacity by 1% with 10 days of bedrest in healthy adults
  - Atelectasis → decreased lung volume
  - Worsening of chronic conditions like obstructive sleep apnea

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**"At Risk" Hospital Protocols: Bedrest- Risks and Effects**

**Bedrest**

- Skin effects
  - Breakdown and delayed wound healing
- Cognition, sleep, & pain alteration
- Bone effects
  - ↓ mechanical compression → decreased bone strength (what about our older adults already with osteoporosis??)

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**"At Risk" Hospital Protocols: Bedrest- Risks and Effects**

**Bedrest**

- Muscle effects
  - Atrophy measurable within 3-5 days of bed rest in healthy and critically ill adults alike (stress in ICU accelerates this process)
  - Critically ill pts lose almost 1% of lean body mass daily
  - Postural muscles undergo earlier and more extensive atrophy
  - Reduction in tactile, positional, and vibratory sensation after prolonged bedrest, especially in sedentary women with low baseline muscle strength
  - Vicious cycle of inactivity leads to loss of sensation and reduced ability to recruit muscle, in turn leading to more inactivity

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### "At Risk" Hospital Protocols: Bedrest- Risks and Effects

**Bedrest**

- Functional effects
  - 8% ↓ in submaximal exercise tolerance after only 5 days in hospitalized older pts who were FREE TO AMBULATE (!)
- Kortebein et al (2008)
  - Study on healthy, community dwelling older adults 60-85 years-old
  - Voluntary bed rest x 10 days
  - Results:
    - » 13.2% ↓ in knee strength
    - » 14% ↓ in stair climbing
    - » 12% ↓ in maximal aerobic capacity
  - AND THESE ARE HEALTHY OLDER ADULTS!!!



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### "At Risk" Hospital Protocols: Falls Precautions- Risks and Effects

**Falls precautions**

- Emphasized by Joint Commission for "fall prevention"
  - Zero tolerance for falls in direct opposition to the need to get weak pts moving
- (Over)use of bed rest and mobility restrictions to minimize falls
- Yes ...
  - Fall rates ARE higher in older age population and are higher in geriatric hospitalized patients
  - A single fall may result in fear of falling that begins downward spiral of reduced mobility, leading to loss of function and further falls
- Culture shift needed
  - Overcome fear of falls
  - Realize that promotion of mobility may just prevent such falls!



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### "At Risk" Hospital Protocols: Not Prioritizing Mobility

**Failure to prioritize mobility**

- "Low mobility" defined as being limited to a bed or chair
  - Associated with functional decline and increased nursing home placement, even after controlling for severity of illness
- Barriers to mobility
  - Pt weakness & fatigue
  - Restraining devices (IV, Foley)
  - Fall prevention initiatives
  - Lack of staffing, processes, & equipment to encourage mobility
  - Many of the above reflect a hospital culture that does not value or prioritize mobility!

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**"At Risk" Hospital Protocols: Not Prioritizing Mobility**

**Failure to prioritize mobility**

- Data shows that in previously ambulatory older adults
  - Spend 13% of hospital stay sitting
  - 4% of time standing or walking
  - 83% of time in bed
  - <5% of these individuals had physician orders for bed rest!

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**"At Risk" Hospital Protocols: Not Prioritizing Mobility**

**Failure to prioritize mobility**

- Effects extend beyond hospitalization
  - >1/3 of adults 70+ years of age d/c from hospital w/a major **NEW disability** not present before admit
  - 1 year post d/c, <1/3 of older adults w/hospital-associated disability have recovered to pre-hospital status, and >1/3 **have DIED!**
  - Odds of LTC admit **3X higher** in this population than those w/stable functional status



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**"At Risk" Hospital Protocols: Failure to Identify at risk older patients**

**Failure to identify "at-risk" older patients**

- *Pre-existing functional impairments at hospital admission* associated w/higher readmission rates → "post-hospitalization syndrome" (Greysen et al 2015)
  - 48.3% of Medicare seniors have identified functional impairments
  - Those with 3 or more ADL dependencies 70% more likely to be readmitted than those w/o impairments
- *Functional status at hospital d/c* is a better predictor of 30-day post-d/c readmissions than medical co-morbidities (for older pts d/c from IPR)



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"At Risk" Hospital Protocols: Failure to Identify at risk older patients

Failure to identify "at-risk" older patients

- *Frailty* is a strong predictor of adverse outcomes in older hospitalized adults
  - Correlated with hospital mortality
  - Increased new nursing home placement
  - Increased hospital LOS



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"At-Risk" Hospital Protocols: Limits of the Evaluation

Therapy Evaluations

- Often the ONLY mobility assessment the pt may have
- Often overused for interventions that could be done by nursing
- Too late?
- Too soon?
- Not "appropriate"
- Examination not thorough enough
- Documentation not robust enough



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What Can We Do as a Hospital Institution?

- More robust and sensitive screening at hospital admission
- Tiered criteria for mobility
- Enforce falls precautions responsibly
- Education about proper use of bedrest
- What triggers therapy evals vs general encouragement of mobility?
- Train non-therapy personnel
- Create basic mobility and ambulation protocols



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## What Are Other Institutions Doing?

### Johns Hopkins

- Johns Hopkins Highest Level of Mobility Scale (JH-HLM)
  - Recorded by nurses for each pt on every shift
- Activity Measure for Post-Acute Care (AM-PAC) 6-Clicks
  - Recorded at admit, TIW by nursing, and every visit by PT/OT

### Cleveland Clinic

- Interdisciplinary care pathway based on assessment of pt current and pre-hospital level of mobility based on AM-PAC

### Duke Univ. Hospital

- Banner Mobility Assessment Tool
  - Done every shift and generates an individualized mobility plan



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## Therapy Solutions

### 1. Early Mobility-

- Implementing structured protocols to determine when patients should begin movement post-surgery or illness.
- Monitoring pain levels to ensure mobilization doesn't cause unnecessary discomfort.
- Highlighting the physiological benefits such as improved blood circulation and reduced risk of deep vein thrombosis.

### 2. Individualized Assessment-

- More thorough examination for appropriate mobility recommendations and DC recommendations
- Utilizing standardized tools with more objective value
- Evidence-based measurements of endurance, function, balance, and gait with predictive values
- Regularly updating the assessment as the patient progresses.
- Use of assessments to identify those who can be adequately mobilized with nursing staff intervention

### 3. Functional Mobility Training-

- Setting up short term goals to be accomplished with support/nursing staff.
- Using techniques such as simulation of daily activities and situational training.



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## Continued: Therapy Solutions

### 4. Strength and Endurance Training-

- Incorporating resistance exercises using bands or weights.
- Ensuring aerobic exercises tailored to the individual's capabilities.
- Progressively increasing intensity and duration as tolerated by the patient.



### 5. Balance Training-

- Using equipment like balance boards or stability balls.
- Introducing static and dynamic balance exercises.
- Ensuring exercises are safe and appropriately challenging.

### 6. Respiratory Exercises-

- Teaching techniques such as diaphragmatic breathing and pursed-lip breathing.
- Using incentive spirometry to enhance lung expansion.
- Ensuring clearance techniques for patients with excessive mucus or secretions.



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### Continued: Therapy Solutions



- 7. Education (patient and Family)-**
  - Providing written materials or videos on the benefits of mobility.
  - Demonstrating safe techniques for moving in bed or getting out of it.
  - Highlighting potential complications of prolonged bed rest, such as bedsores or muscle atrophy.
- 8. Collaboration with Medical Team/Interdisc Team-**
  - Regular team meetings to discuss patient progress.
  - Integrating mobility goals into daily patient care plans.
  - Addressing any medical concerns that could impact mobilization.
- 9. Motivation and Confidence Building-**
  - Setting small, achievable goals for patients to aim for.
  - Celebrating milestones to encourage continued progress.
  - Addressing any fears or anxieties related to movement.



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### Continued: Therapy Solutions

- 10. Mobility Aids-**
  - Regular maintenance checks to ensure all aids are in good working condition.
  - Training sessions for patients on the correct usage of these aids.
  - Adapting aids as needed based on individual requirements.
- 11. Safe Environment-**
  - Regular safety audits to identify potential hazards.
  - Making sure the hospital layout supports mobility (e.g., wide corridors and ramps).
  - Having a rapid response team in case of emergencies.
- 12. Scheduled Mobility-**
  - Integrating mobility sessions into the patient's daily care plan.
  - Gradually increasing the frequency and duration of these sessions.
  - Ensuring rest periods in between to avoid fatigue.
- 13. Mobility Champions-**
  - Designating staff members who take the lead in promoting mobility.
  - Regularly updating training and resources available to these champions.
  - Encouraging peer-to-peer learning and motivation.





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### Continued: Therapy Solutions

- 14. Frequent Assessments-**
  - Using standardized scales to measure pain, fatigue, and other potential barriers.
  - Addressing any identified barriers promptly with medical interventions or changes in care plans.
- 15. Staff Training-**
  - Regular refresher courses on the latest mobility protocols.
  - Training on the correct use of equipment and safety protocols.
  - Ensuring a proper patient-to-staff ratio to ensure adequate supervision during mobility sessions.
- 16. Use of Technology-**
  - Integrating wearables that track movement, steps, and overall activity.
  - Using apps that can provide feedback and motivation to patients.
  - Ensuring technology integrates well with hospital systems for easy monitoring by medical staff.





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# Using Functional Measures As Clinical Predictors

And Produce Documentation That Means Even More



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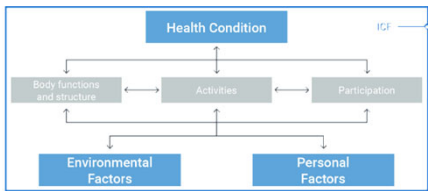
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## International Classification of Functioning, Health and Disability (ICF)



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## Using ICF in Evaluation and establishment of POC

### Objective testing

- Identify & administer tests that quantify the patient's body structure and function/impairments
  - strength, balance, endurance

### Use results to formulate the plan of care

- Patient-centered goals
- Interventions

Include the patient in planning



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### How to Choose Functional Tests

- Applicable to the patient
- Acceptability of test to the individual (tolerance for test, positioning)
- Appropriateness of test for application to the pathology or health condition, body function or status, activity, or participation
- Practical for use in acute care (time, cost, feasibility)
- Usefulness is obtaining necessary applicable information



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### Commonly Needed Information

- Functional strength and endurance
- Functional mobility
- Assessment of fall risk
- Ability to return to prior environment/recommended d/c disposition (Current mobility vs needed mobility)



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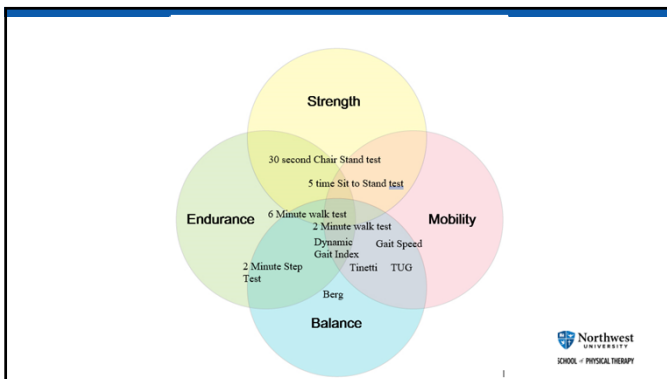
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### Strength testing

**Strength**  
 30 second Chair Stand test  
 5 time Sit to Stand test

**Endurance**  
 6 Minute walk test  
 2 Minute walk test  
 Dynamic Gait Index  
 2 Minute Step Test

**Mobility**  
 Gait Speed  
 Timed TUG  
 Berg

**Balance**

- Problems with traditional MMT?
- Older patients, REALLY need info on extensor muscle groups (back extensors, quads)

Some alternatives:

- Chair stand tests
  - 5 times Sit to Stand; 30 second Chair Stand

Reasoning

- Functional approach to lower body strength
- Ability to perform sit>stand from a standard height chair without the use of UEs can be equated to a 4/5 quad strength

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### Functional Strength Tests

**Strength**  
 30 second Chair Stand test  
 5 time Sit to Stand test

**Endurance**  
 6 Minute walk test  
 2 Minute walk test  
 Dynamic Gait Index  
 2 Minute Step Test

**Mobility**  
 Gait Speed  
 Timed TUG  
 Berg

**Balance**

Five Times Sit to Stand (5TSTS)

- Pt must be able to arise from sitting w/o using arms
- Upon command, pt stands and sits repeatedly as fast and safely as possible for 5 reps
- Record time required to complete all 5 reps and stop the time when the patient returns to sitting after last rep
- Equipment: armless free-standing chair, stopwatch
- Interpretation related to Geriatric populations
  - $\geq 12$  seconds, identifies need for further fall risk assessment
  - $>15$  sec- recurrent falls
  - $>17$  sec- high risk for persistent functional limitation, mortality and hospitalization

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### Functional Strength Tests

**Strength**  
 30 second Chair Stand test  
 5 time Sit to Stand test

**Endurance**  
 6 Minute walk test  
 2 Minute walk test  
 Dynamic Gait Index  
 2 Minute Step Test

**Mobility**  
 Gait Speed  
 Timed TUG  
 Berg

**Balance**

Thirty Second Chair Stand Test

- Pt must be able to arise from sitting w/o using arms
- Upon command, pt stands and sits repeatedly as fast and safely as possible for 30 seconds
- Record reps (final rep counts is greater than 1/2 way to standing)
- Equipment: armless chair against a wall, stopwatch
- Unable to perform one rep indicative of fall risk

Criterion fitness standards to maintain physical independence

Age	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Women	15	15	14	13	12	11	9
Men	17	16	15	14	13	11	9

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### Functional Strength + Let's Practice

- Get a partner and practice these functional strength measures.
  - 5 x sit to stand test
  - 30 second chair stand test

Think about uses for and barriers to these tests and how you would document your findings.



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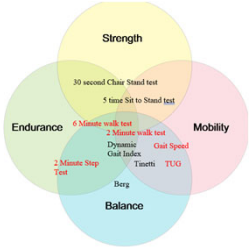
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### Functional Mobility




What information do we need other than basic bed mobility & transfers?

- Is functional mobility adequate for prior environment?
- What does pt's current status indicate for predicting d/c dispo?
- What mobility indicators can be warning signs for problems? Readmission risk? Impending functional decline?

What tools do we have?

- Cardiovascular endurance (6MWT, 2MWT, 2MST)
- Gait speed (10 meter walk test)
- Timed Up and Go (TUG)
- Functional tests (AMPAC 6-clicks)



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### Functional Mobility + 6 Minute Walk Test



- Most researched and validated walk test
- 6MWT strongly correlates with mortality and moderately with function
- 75% of average walking speed during 6MWT has been shown to be an effective method for dosing aerobic training in patients with cardiopulmonary diseases



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### 6 Minute Walk Test

- To enhance cross-center reproducibility  
Recommended course length = 100 ft  
Minimum course length = 50 ft
- Circular courses are acceptable if a low-traffic linear course is not available. But may overestimate the distance.
- Pt rests in a chair for 10-min after which baseline pulse, BP, and RPE are collected. Repeat measurements after test.



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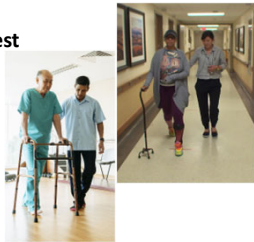
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### 6 Minute Walk Test

- Patients are allowed to stop and rest if needed.
- Encouragement should be given every minute alongside update on time.
- Distance is measured by counting the number of laps and measuring the distance of the final partial lap.
- A practice test is not needed but can be considered based on clinical judgement.



Predicted norms:  
men 6MWD = (7.57 x height cm) - (5.02 x age) - (1.76 x weight kg) - 309 m  
women 6MWD = (2.11 x height cm) - (2.29 x weight kg) - (5.78 x age) + 667 m



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### 2 Minute Walk Test

- Comparable to 6MWT
- Same testing procedure, shorter duration
- Significant correlations with age, height, weight, and BMI

Reference equations of the 2MWT were as follows:  
o Women:  $2MWT_{predicted} = 257.177 - (0.723 \times age) - (1.688 \times BMI)$   
o Men:  $2MWT_{predicted} = 279.096 - (0.998 \times age) - (1.426 \times BMI)$



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## Functional Mobility+ 2 Minute Step Test

**Strength**  
30 second Chair Stand test  
5 time Sit to Stand test

**Endurance**  
6 Minute walk test  
2 Minute walk test

**Mobility**  
Dynamic Gait Index  
Gait Speed  
Timed TUG  
Berg

**Balance**  
2 Minute Step Test

Useful field test for geriatric patients, patients with limited mobility or for clinical situations where space is confined

\*Method - measuring a point that is halfway between the midpoint of the patient's patella and the top of their iliac crest and then measuring how many times the patient's right knee reaches this point while marching in place for 2 minutes.

\*A person with reduced balance may use a table, wall, or chair as a touch-hold for stability.

\*Higher scores indicate greater levels of aerobic capacity.

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## Functional Mobility+ 2 Minute Step Test

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## Functional Mobility+ 2 Minute Step Test

Normative data for females (n = 1025)

Age Range (years)	Participants (n)	Step Count (SD)
60-64	141	101 (24)
65-69	176	111 (28)
70-74	193	105 (32)
75-79	174	95 (27)
80-84	141	87 (24)
85-89	108	75 (24)
90-94	76	64 (20)

Normative data for females (n = 546)

Age Range (years)	Participants (n)	Step Count (SD)
60-64	69	91 (24)
65-69	106	90 (28)
70-74	108	84 (32)
75-79	107	84 (24)
80-84	54	75 (22)
85-89	34	70 (20)
90-94	18	58 (14)

Cut-off scores for predicting physical independence:

Age (Years)	Step count (Male participants)	Step count (Female participants)
60-64	100	97
65-69	101	93
70-74	95	89
75-79	88	84
80-84	80	78
85-89	71	70
90-94	60	60

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### Functional Mobility+ Gait Speed 10-meter walk test

- The 10MWT assesses walking speed in meters per second over a short duration.
- Two trials are administered at the patient's comfortable walking speed, followed by 2 trials at his/her fast walking speed. The 2 trials, for each speed, are averaged and the 2 gait speeds are documented in meters/second.
- Considerations - Assistive devices may be used but must be documented; if a patient requires assistance, only the minimum amount of assistance required for a patient to complete the task should be provided. The level of assistance documented

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### Gait Speed 10 Meter Walk Test

Interpretation:

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

A Gain of 0.1 m/s is a predictor for well-being in those without normal walking speed. (Purser 2005; Hardy, Perera 2007).

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### Functional Mobility+ Timed Up and Go (TUG)

Timed test of specific tasks:

- Stand from chair w/o using armrest
- Walk 10 ft (3m), turn around 180 deg, walk back to chair
- Sit to chair
- Can use AD
- Mean or best of 3 trials

Equipment: chair w/o arm rests, measuring tape, cone to mark distance, timer

Scores > 13.5 sec = increased fall risk

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### Functional Mobility+ Timed Up and Go (TUG)

Time to Complete Test	Mobility Impairment Category	Falls Risk
< 10 seconds	Independent	NO
10-20 seconds	Mostly Independent	YES, if > 14 seconds
20-30 seconds	Moderately Impaired	YES
> 30 seconds	Severely Impaired; probable ADL dysfunction	YES



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### Functional Mobility+ AM-PAC 6-Clicks



**Strength**

- 30 second Chair Stand test
- 1 foot lift to stand test

**Endurance**

- 4 Minute walk test
- 2 Minute walk test
- Openair walk band
- Get 30Sec
- 10min
- 10min
- 10min

**Mobility**


- 3-Step TUG
- Step
- Step
- Step

**PT – “Basic mobility”**

- Turning over in bed
- Supine to sit
- Bed to chair
- Sit to stand
- Walk in room
- 3-5 steps w/rail

**OT – “Daily activity function”**

- Feeding
- O/F hygiene
- Dressing uppers
- Dressing lowers
- Toilet (toilet, urinal, bedpan)
- Bathing (wash, rinse, dry)



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### Functional Mobility+ AM-PAC 6-Clicks

Data used for

- Discharge recommendations after first PT/OT visit
  - Home w/ no services 19.48
  - Home w/home care 17.81
  - SNF/IRF 13.95 – 14.0
  - LTAC – 11.25
- Improving patient mobility
  - Pts with a score of 18 or above on the mobility section ideal for nursing mobility (need no more than “a little” help)



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## Functional Mobility<sup>+</sup> AM-PAC 6-Clicks

Data used for

- Guiding therapist resource utilization
  - For d/c recs
    - Minimal detectable change in AM-PAC 6 clicks = 4.72
    - Average change in acute = 1.63 PT, (those going to SNF, 0.72 PT)
    - Research shows biggest AM-PAC 6 clicks change occurs when pt in a post-acute environment
    - Therefore, if PT/OT initial visit indicates SNF level, referral can be made immediately and decrease LOS in acute care
  - Patients scoring 24 may not be appropriate for continued PT/OT intervention



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## Functional Mobility<sup>+</sup> Let's Practice

Get a partner and practice these functional strength measures.

- 6- or 2-minute walk test
- 2 min step test
- gait speed 10 meter walk test
- TUG

Think about uses for and barriers to these tests and how you would document your findings.



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## Balance – It all starts with a screen

### 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.
<b>Total</b>		Add up the number of points for each "yes" answer. If you scored 8 points or more, you may be at risk for falling. Discuss this brochure with your doctor.	

This brochure was developed by the National Low Back Institute, Centers for Disease Control and Prevention, and a validated fall risk self-assessment tool (Chamberlain et al., 2010). See 2011 ADA/AAO-MSA Statement on the prevention of falls.



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BALANCE TEST	DATE	ASSESSMENT GAIT:	DATE
Subject is seated on stool, unless stated.			
<b>1. SITTING BALANCE</b> Seated on stool, feet flat = 0 Steady state = 1		<b>10. GAIT INITIATION</b> (accelerated) after "start" = 0 Any hesitations, multiple attempts to start = 0 Steady state = 1	
<b>2. ANKLES</b> Heels without help = 0 Heels with help = 1 Able to lift using only = 0 Able to lift using only = 1		<b>11. STEP LENGTH</b> Heels and toes flat (stepped feet) with step = 0 Heels and toes flat (stepped feet) with step = 1 Heels and toes flat (stepped feet) with step = 2 Heels and toes flat (stepped feet) with step = 3	
<b>3. ATTEMPTS TO RISE</b> Heels without help = 0 Heels with help = 1 Able to rise on first attempt = 0 Able to rise on first attempt = 1		<b>12. GAIT SYMMETRY</b> Heels and toes flat (stepped feet) with step = 0 Heels and toes flat (stepped feet) with step = 1 Heels and toes flat (stepped feet) with step = 2 Heels and toes flat (stepped feet) with step = 3	
<b>4. IMMEDIATE TRANSITION BALANCE</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2		<b>13. STEP CONTINUITY</b> Heels and toes flat (stepped feet) with step = 0 Heels and toes flat (stepped feet) with step = 1 Heels and toes flat (stepped feet) with step = 2 Heels and toes flat (stepped feet) with step = 3	
<b>5. TRANSFER BALANCE</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2		<b>14. PAIN</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2	
<b>6. TRANSFER BALANCE</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2		<b>15. TURNING</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2	
<b>7. FEET POSITION</b> Heels without help = 0 Heels with help = 1 Able to rise on first attempt = 0 Able to rise on first attempt = 1		<b>16. STOPPING</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2	
<b>8. TURNING AND OBSTACLES</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2		<b>17. STOPPING</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2	
<b>9. STOPPING</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2		<b>18. STOPPING</b> Unobstructed, steady state = 0 Unobstructed, steady state = 1 Obstructed, steady state = 2	

10-18 = High risk for falls  
19-24 = Moderate risk of falls  
25 & up = negligible risk of falls

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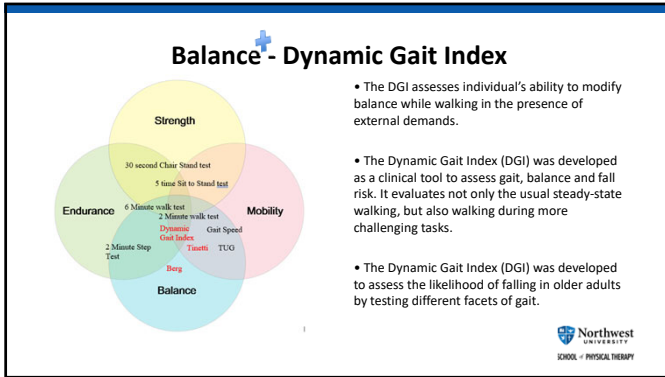
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### Dynamic Gait Index

The DGI can be performed with a marked distance of 20 feet, and it can be performed with or without an assistive device.

Scores are based on a 4-point scale:  
 3) No gait dysfunction  
 2) Minimal impairment  
 1) Moderate impairment  
 0) Severe impairment

Highest possible score is 24 points, and tasks include:  
 1) Steady state walking  
 2) Walking with changing speeds  
 3) Walking with head turns both horizontally and vertically  
 4) Walking while stepping over and around obstacles  
 5) Pivoting while walking  
 6) Stair climbing

**Community Dwelling Elderly**  
< 19 indicative of increased fall risks





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## Balance+ Berg

- The Berg Balance Scale (BBS) is a 14-item objective measure that assesses balance and fall risk in adults.
- Items include static and dynamic activities of varying difficulty (but no gait component)
- Item-level scores range from 0-4, determined by ability to perform the assessed activity
- Item scores are then summed – Max 56
  - < 45 indicates individuals may be at greater risk of falling
  - < 40 on BBS associated with almost 100% fall risk

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## Balance: Let's Practice

Get a partner and practice these functional strength measures.

- 4 Stage balance test
- Tinetti POMA
- Dynamic Gait Index
- Berg

Think about uses for and barriers to these tests and how you would document your findings.

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# Thank you!

Questions: [ann.pharr@northwestu.edu](mailto:ann.pharr@northwestu.edu), [tania.tablinsky@northwestu.edu](mailto:tania.tablinsky@northwestu.edu), [austin.alexander@northwestu.edu](mailto:austin.alexander@northwestu.edu), [annwkspt@yahoo.com](mailto:annwkspt@yahoo.com)

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### Functional Outcome Measure Appendix

Found in Google Drive (if trouble accessing, please email [ann.pharr@northwestu.edu](mailto:ann.pharr@northwestu.edu))

<https://drive.google.com/drive/folders/1Sg3Y9yKpimf5hXlwLvxxrvfLN5Z3bG3Q?usp=sharing>



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### Where to find the instruments in this seminar

American Physical Therapy Association (APTA)  
<http://www.ptnow.org/tests-measures>  
[www.ptnow.org](http://www.ptnow.org)

Rehab Institute of Chicago (Shirley Ryan Abilities Lab)  
[www.rehabmeasures.org](http://www.rehabmeasures.org)

National Institutes of Health (NIH) Toolbox  
[www.nihtoolbox.org](http://www.nihtoolbox.org)

A Compendium of Mobility Measures Focused on Community-Dwelling Older Adults  
<http://www.bu.edu/bostonroc/instruments/mobilitycompendium/>



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