THE Geriatric Rehab Tool Box of Tomorrow

Translating the Latest Evidence into Everyday Practice

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Learning Objectives

- Identify standardized tests appropriate for specific patient presentations
- Contrast differing areas of the scientific literature in a case based format
- Differentiate options for individualization of interventions for common patient case scenarios for a variety of settings.
What Will I Do in 2 Hours?

- I will review three case studies focused on different aspects of problems to discuss a variety of treatments

- This will be simplified therefore I will not...
  - Go into depth regarding outcome measure testing
  - Review the specifics of evaluation testing
  - Review specific research articles

Visions

- APTA 2020
  - Transforming society by optimizing movement to improve the human experience.

- AOTA 2025
  - Occupational therapy maximizes health, well-being, and quality of life for all people, populations, and communities through effective solutions that facilitate participation in everyday living.

INTERVENTION DESIGN
Motivation

What will improve quality of life?

LISTEN

Observation

Functional Activities

All Movement

Evaluation

Posture

Strength

Aerobic Capacity

Balance

Investigation

Review the Literature

Translate the Knowledge

These...

...lead you to your INTERVENTION

Reminder - MONITOR

- Make sure to monitor during all activities
- Always get baseline measurements
- Blood Pressure
- Heart Rate
- Rate of Perceived Exertion

<table>
<thead>
<tr>
<th>RPE Scale</th>
<th>Fairly Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
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<td>7</td>
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<td></td>
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<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Fairly Light</td>
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<tr>
<td>12</td>
<td>Somewhat Hard</td>
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<td>13</td>
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<td>16</td>
<td>Hard</td>
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<td>17</td>
<td>Very Hard</td>
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<tr>
<td>18</td>
<td>Very, Very Hard</td>
</tr>
<tr>
<td>19</td>
<td></td>
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<tr>
<td>20</td>
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</tr>
</tbody>
</table>
CASE #1

Bill is an 87 year-old male. PMHx of triple bypass with resultant mild CVA 2005, TIAs in 2011, mild heart attack 2013, COPD, emphysema, and pacemaker placed.

Recent attendance to PT is secondary to a fall resulting in a broken nose and concussion.

Lives with wife and two small dogs in ranch house with 1 step to enter and 1 step inside.

Using a rollator walker since the fall.

Use to bowl 3x/week.

MOTIVATION

- What are the top five things you want to work on during therapy?
- What do you wish you could get back to doing?
- How would you like things to be different?
Increasing strength, stand straighter, and improve balance to prevent falls.
Case #1 Video Observation

Reflection on Current Practice
Based on your observation take 30 seconds and write down what measures you would perform.

What Will Make The Biggest Impact?
If you could wave a magic wand…
**EVALUATION**

- Occiput to wall difference
- Thomas test
- Sit to stand
- Plantar flexors
- Hip extensors

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<table>
<thead>
<tr>
<th>Impairment/Body Structure Function</th>
<th>Outcome Measure</th>
<th>Bill’s Eval Scores</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Posture</strong></td>
<td>Occiput to Wall Distance</td>
<td>10 cm</td>
<td>0 cm</td>
</tr>
<tr>
<td></td>
<td>Thomas Test</td>
<td></td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Muscle Performance: Strength</strong></td>
<td>30 Second Sit to Stand</td>
<td>6 with UE support</td>
<td>11 reps</td>
</tr>
<tr>
<td></td>
<td>Heel Rise Test</td>
<td>Unable to complete full heel rise</td>
<td>25 reps</td>
</tr>
<tr>
<td></td>
<td>Supine Hip Extensor</td>
<td>5/5</td>
<td></td>
</tr>
<tr>
<td><strong>Cardiovascular Endurance</strong></td>
<td>6MWT</td>
<td>280 feet with SOB</td>
<td>1368 feet</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td>Four Square Step Test</td>
<td>23 seconds – catching backwards</td>
<td>15 secs</td>
</tr>
<tr>
<td></td>
<td>ABC Scale</td>
<td>50%</td>
<td>&gt;87%</td>
</tr>
</tbody>
</table>

**Gait Speed**

- I didn’t put gait speed in these charts because I always measure gait speed if the person is ambulatory because of correlation with safety.
  - Not always used as a goal (ie. Ataxia)

- This information gives me ammunition for patient feedback (knowledge of results) as well as insurance companies.
Case #1 Video Evaluation

Outcome Measures

Most reference Norms were taken from Rehabmeasures.org comparing community dwelling and the associated age range.

Additional references are below.


INVESTIGATION
KNOWLEDGE TRANSLATION

Reflection References

Investigation Highlights
Posture
Investigation Highlights

Strengthening


Reflection

Based on the motivations, observations, and evaluations take 30 seconds and write down what interventions you would perform.
RANGE AND STRENGTH FIRST

- Improve alignment and stability before being able to progress to optimal balance challenges.
  - Chin tucks, upper trap/scale stretches, pectoral stretches, hip flexor stretch, trunk rotation
- Integrate breathing activities consistently throughout all positions: 2 second in/2 second hold/4 second out
- Gluteal muscle composition discriminates between fallers versus nonfallers
  - Hip Abductor-Adductor Control is the Predominant Neuromechanical Contributor to Lateral Balance Stability.

<table>
<thead>
<tr>
<th>Supine</th>
<th>Sitting</th>
<th>Standing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease pillows under head and lay flat</td>
<td>Activate transverse abdominals</td>
<td>Squats against wall – in stride</td>
</tr>
<tr>
<td>Shoulder and head press</td>
<td>Hip flexor stretch – in sitting laying back</td>
<td>Stand up against wall, breath, before walking</td>
</tr>
<tr>
<td>Supine extensor activation – heels/hands</td>
<td>Reverse sitting</td>
<td>Sit to stand with added up on toes</td>
</tr>
<tr>
<td>Unilateral bridging</td>
<td>Pelvic motion – breathing cue, kinesio</td>
<td>Resisted sit to stand – activate hip extensors</td>
</tr>
</tbody>
</table>

Case #1 Video Intervention
How Do You Adjust Your Intervention?

Time for Change

Intervention Adjustment

Reflect Adjust

Observe

Knowledge of Results
Feedback
Self Efficacy
Intensity
External Cues

Motor Learning
**Progression/Challenges**

- Eyes closed
- Speed Changes (Slow/fast)
- Visual distracters
- Dual task training with challenges – cognitive, visual, manual, auditory (singing, words start with K, reading, dialing a phone, etc).
- Challenges – carrying heavy objects, pushing heavy objects

**Knowledge of Results**

- Make a chart to show improvement. Choose outcome measures based on key impairments.
  - Heel rise
  - Need increased PF strength to increase gait speed
  - Number of sit to stands in 30 seconds
  - Addressing LE strength and decreased reaction time
  - Gait Speed

<table>
<thead>
<tr>
<th>DATE</th>
<th>Heel Rise</th>
<th>Sit to Stands in 30 seconds</th>
<th>Gait Speed in m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/24</td>
<td>3 with assist of UEs</td>
<td>.2m/s with RW</td>
<td></td>
</tr>
<tr>
<td>9/30</td>
<td>3 but with use of 1 hand</td>
<td>.2m/s with RW</td>
<td></td>
</tr>
<tr>
<td>D/C to SNF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10/5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Home Exercise Program**

- Don’t under estimate the power of a focused home activity – emphasize this to them
- Whenever possible have them focus on the passive range FIRST
- In this case I would work on supine activities:
  - Morning and night no pillow under the head

CASE #2

John is an 84-year-old male who has a PMHx for prostate blockage and hospitalization and rehab from 3/2015-5/2015. After a TURP procedure was rehospitalized due to cellulitis of arm. Lives alone in a 2 bedroom apartment, 2 steps to enter the house with railing. He rarely uses the basement. He ambulates with a straight cane with a recent fall requiring bathroom modifications. He enjoys playing card games, watching sports, and going out with girlfriend. Wants to independently get off of couch and walk faster to keep up with girlfriend and go dancing.

MOTIVATION

Sitting on couch with girlfriend and independently getting off. Walk faster to keep up with wife and go dancing.
VIDEO OBSERVATION

Case #2 Video Observation

Reflection on Current Practice
Based on your observation take 30 seconds and write down what measures you would perform.
What Will Make The Biggest Impact?

If you could wave a magic wand…

- 2 Min Step Test
- 6MWT

- Posture
- Strength
- Balance
- Aerobic Capacity

- Occiput to wall difference
- Thomas test
- Four Square Step Test
- ABC Scale
- Sit to stand
- Hip abduction
- Hip ext
- Strength
- Heel rise
- 2 Min Step Test
- 6MWT

A

B

C

D

### Impairment/Body Structure Function

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>John's Eval Scores</th>
<th>Norms</th>
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<tbody>
<tr>
<td><strong>Posture</strong></td>
<td></td>
<td></td>
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<tr>
<td>Occiput to Wall Distance</td>
<td>0 cm</td>
<td></td>
</tr>
<tr>
<td>30 Second Sit to Stand</td>
<td>3 with UE support</td>
<td>15 reps</td>
</tr>
<tr>
<td>Hip Abduction</td>
<td>5/5</td>
<td></td>
</tr>
<tr>
<td>Hip Extension Strength</td>
<td>5/5</td>
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<tr>
<td>Heel Rise Test</td>
<td>Unable to complete full heel rise even with bilateral UE support</td>
<td>25 reps</td>
</tr>
<tr>
<td><strong>Muscle Performance: Strength/Flexibility</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Min Step Test</td>
<td>71-103</td>
<td></td>
</tr>
<tr>
<td>6MWT</td>
<td>1368 feet</td>
<td></td>
</tr>
<tr>
<td><strong>Cardiovascular Endurance</strong></td>
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</tr>
<tr>
<td>Four Square Step Test</td>
<td>20 seconds</td>
<td>15 secs</td>
</tr>
<tr>
<td>ABC Scale</td>
<td>75%</td>
<td>&gt;67%</td>
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</table>
## Investigation Highlights

### Strengthening


### Aerobic Conditioning

Reflection
Based on the motivations, observations, and evaluations take 30 seconds and write down what interventions you would perform.

INTERVENTIONS

Power Training
- Low strength and power are particularly powerful risk factors to indicate declined mobility in men
- Power training is directly related to diminished ability to perform ADLs, increase risk for falling and predictor of functional dependency – so more relevant than strengthening. BUT you need to strengthen first.
- Perform functional movements as fast as possible while maintaining quality
  - Sit to stand as fast as possible and stand to sit slowly for eccentric control
Power = force x velocity
Fast Concentric and slow eccentric
Sit to stand, On stairs, PF
Standing hip hike

• Circuit Training
• High Intensity Interval Training

Evidence for the efficacy of a task-related circuit class at improving locomotor function in chronic stroke.
The use of task-oriented circuit class training to improve gait and gait-related activities in patients with chronic stroke.

- High Intensity Interval Training (HIIT)
- Repeated bouts of high intensity followed by recovery periods (no single formula)
- Allows greater stress to system
- Improved muscle metabolic function
- Trains aerobic and anaerobic system
- Build base first

Case #2 Video Intervention

Circuit Training
High Intensity Interval Training
How Do You Adjust Your Intervention?

Time for Change

Intervention Adjustment

Reflect ➔ Adjust ➔ Observe

Motor Learning

- Feedback
- Self Efficacy
- Intensity
- Knowledge of Results
- External Cues
External Cues
- Large movement sit to stand
- Big arm movement
- Utilizing external cue of rolling walker with seat to reach over top
- Utilize a cue in front to bring head toward to facilitate pre-extension phase
- Add weighted vest and resistance

Home Exercise Program
- Don’t under estimate the power of a focused home activity—emphasize this to them
- Focus on short dances with wife
  - Help with aerobic, posture and breathing
- In this case I would find 1-2 songs they could 1-2 times a day
Ray is a 90-year-old male. PMHx includes a total knee replacement three years before.

Lives with wife in 1 story house with 5 steps to enter with railing. Uses a straight cane for community distances.

Wife is concerned that he continually loses his balance in the kitchen. Family is concerned about fall risk.

He felt he was fine. Wife wanted him to be safer in the kitchen. Granddaughter is worried about falls.

VIDEO OBSERVATION
Case #3 Video Observation

Reflection on Current Practice

Based on your observation take 30 seconds and write down what measures you would perform.

What Will Make The Biggest Impact?

If you could wave a magic wand…
Why didn’t I give him the ABC scale?
INVESTIGATION

KNOLEDGE TRANSLATION

*Investigation Highlight*

**Balance**

*Investigation Highlight*

**Balance**
Investigation Highlight

Balance
- GCadore EL, Rodríguez-Mañas L, Sinclair A, Izquierdo M. Effects of different exercise interventions on risk of falls, gait ability, and balance in physically frail older adults: a systematic review. Rejuvenation research. 2013 Apr 1;16(2):105-14.

Reflection
Based on the motivations, observations, and evaluations take 30 seconds and write down what interventions you would perform.

INTERVENTIONS
Visual System

- **Smooth Pursuits**
  - Follow moving target through all planes of motion

- **Saccades**
  - Tests the ability of the eye to change direction rapidly to maintain its focus on a moving target
  - Alternate from looking from one object to another

- **Vestibular Ocular Reflex**
  - Tests the eyes ability to maintain focus on an object while the head is in motion
  - Place head in 30° of flexion and maintain gaze on object while head is moving side to side
  - Test is positive if saccadic eye movement or if dizziness or nausea

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Strength and balance exercises reduce falls while walking training alone could increase them.

85% of balance comes from proximal strategies (hip abd, add, trunk) and 15% from the ankle

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**Reactive Balance**

- Can use a ramp or wedge (or tilt treadmill), leaning, theraband resistance, start/stop treadmill (or change speeds), unexpected waste pulls

**Turning**

- Start with eye tracking and movements
- Eyes dissociate head from body
- Retrain movement
Stepping Strategies

- Need to load leg and then do a quick and unexpected release
- Facilitate reactive balance

Turning

- Critical to practice because it is dangerous and results in falls. Also functional and done throughout the day.
  - Falls during turning are 8X more likely to result in hip fractures compared with straight-line walking.
- Turning more often than walking straight
  - People turned 100 times an hour and up to a 1,000 times a day. Almost every task requires some type of turning
  - 2 turns per 10 steps

Turning

- Eye movement is critical for the release of the steering synergy for turning control (Ambati 2013)
  - Start with eyes and head turning as well as when rolling in bed
- Future work should focus on improving saccade performance during functional tasks and testing the effects of therapeutic interventions on related outcomes (study with PD). (Lohnes 2011)
  - Recommend Training on saccades and practice turning eyes then head THEN trunk.
Retraining Reactive Balance

Enhance Error
- Add weights to legs during retraining
- Add weighted vest
- Add theraband resistance in direction of error

How Do You Adjust Your Intervention?

-Time for Change
Intervention Adjustment

Reflect Adjust

Observe

Home Exercise Program

- Don’t under estimate the power of a focused home activity – emphasize this to them

- When balance is an issue work on the primary impairments that could be adjusted

- In this case I would focus on visual tracking/smooth pursuits/VOR. Add a visual cue (reminder card on TV) and a knowledge of results chart to perform during commercials

OK
Don’t get stuck in the mud

Facility Consultations Available