HOT TOPICS IN STROKE REHABILITATION
Turning Evidence-Based Practice 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 Observation Evaluation Investigation
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

RPE Scale

<table>
<thead>
<tr>
<th>RPE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Very, Very Light</td>
</tr>
<tr>
<td>7</td>
<td>Very Light</td>
</tr>
<tr>
<td>8</td>
<td>Fairly Light</td>
</tr>
<tr>
<td>11</td>
<td>Somewhat Hard</td>
</tr>
<tr>
<td>12</td>
<td>Hard</td>
</tr>
<tr>
<td>17</td>
<td>Very Hard</td>
</tr>
<tr>
<td>18</td>
<td>Very, Very Hard</td>
</tr>
<tr>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Fairly Light

Somewhat Hard

Hard
CASE #1

Jackson is a 27-year-old male who sustained an anoxic brain injury in 12/2014. Has history of concussions from falls and depression prior to injury.

Lives at home with mother in 2 story house with fully accessible basement. Uses power wheelchair with Roho or pushed in a manual wheelchair depending on transportation.

Primary goal of patient is to walk and for mom is to improve transfers. Interests in sports, physical fitness and weight lifting.

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?
Increase control in sitting, improve transfers, stand straighter, and walk.
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…
Breathing

FIST

Hip abduction

Hip extensors

Core

Occiput to wall sitting

Thomas test

DF range

Posture

Strength

Balance

Aerobic Capacity

Breathing

FIST

Hip abduction

Hip extensors

Core

Occiput to wall sitting

Thomas test

DF range

Posture

Strength

Balance

Aerobic Capacity

<table>
<thead>
<tr>
<th>Impairment/Body Structure Function</th>
<th>Outcome Measure</th>
<th>Jackson's Eval Scores</th>
<th>Norms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posture</td>
<td>Occiput to Wall Distance in chair</td>
<td>0 cm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ankle Passive DF</td>
<td>-15° Right, -7° Left</td>
<td>Neutral</td>
</tr>
<tr>
<td></td>
<td>Thomas Test</td>
<td>Neutral</td>
<td>Neutral</td>
</tr>
<tr>
<td>Muscle Performance: Strength</td>
<td>Hip abduction</td>
<td>1.5 bilateral</td>
<td>5/5</td>
</tr>
<tr>
<td></td>
<td>Supine Hip Extensor</td>
<td>Unable to isolate with knee/hip extended</td>
<td>5/5</td>
</tr>
<tr>
<td>Cardiovascular Endurance</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balance</td>
<td>FIST</td>
<td>1/4/6</td>
<td>N/A</td>
</tr>
</tbody>
</table>

FUNCTION IN SITTING TEST (FIST) RESULTS

<table>
<thead>
<tr>
<th>FIST Test Item</th>
<th>Date 1</th>
<th>Date 2</th>
<th>Date 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobic endurance</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Pelvic tilt</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Sitting, right arm</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Sitting, left arm</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Standing, right arm, left arm</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Standing, both arms</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Sitting, right arm, left arm, both</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Standing, both arms, both arms</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balancing, eyes closed</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balancing, eyes open</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balancing, left arm</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balancing, right arm</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>Balancing, both arms</td>
<td>N/T</td>
<td>N/T</td>
<td>N/T</td>
</tr>
<tr>
<td>FIST Total</td>
<td>58/58</td>
<td>58/58</td>
<td>58/58</td>
</tr>
</tbody>
</table>

Scoring Key:
1 = Independent (completes task independently & successfully)
3 = Verbal cues/increased time (completes task independently & successfully and only needs more time/pace)
5 = Upper extremity support (must use UE for support in addition to complete/successful)
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.

Function in Sitting Test  - http://www.samuelmerritt.edu/fist

INVESTIGATION

KNOWLEDGE TRANSLATION
Reflection References


Investigation Highlights

Posture


Strengthening

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

INTERVENTIONS

Breathing Exercises
- Inspiratory muscle trainer
- Breathing exercises – breath in for 2, hold for 2, blow out for 4.

Supine/Sidelying
- Supine extensor activation
- Initiation of rolling
- Clam shells – with resistance
- Bridging – push heels into the mat (glut focus)- slight ER

Sitting
- Kinesiotaping for cervical extension
- Resistance with theraband. Pushing
- Facilitate error with wedge
- Wheelchair tilted back for stretching, breathing and exc
**Tilt Table**

- Passive stretch of ankles, trunk alignment, hip stretch, extensor activation with legs straight, abdominals

- Pulling theraband quick with one arm to get opposite extensors

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**Case #1 Video Intervention**

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How Do You Adjust Your Intervention?

Intervention Adjustment:
- Reflect
- Adjust
- Observe

How Do You Adjust Your Intervention?

Motor Learning
- Knowledge of Results
- Self Efficacy
- Feedback
- Intensity
- External Cues

Adjustment Strategies:

Self-Efficacy
External Cues
Knowledge of Results

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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

Reference the Progression/Challenges slide for adjustment with ANY of the cases

Home Exercise Program

- Don’t under estimate the power of a focused home activity – emphasize this to them
- Supine Hip Extension activation in supine
- Tilt wheelchair stretching of pecs
- In this case I would focus on head and trunk position and stretching

TRY Part Task Training with lower level patient

CASE #2

Fred is a 66 year-old male with a subarachnoid hemorrhage in 2013. He had two seizures prior to hemorrhage and 3 seizures since. Has fallen three times in the last month.

Lives with wife was a special ed teacher. Buffalo Bills fan. Lives in a ranch style house with no stairs. He is Independent in bed mobility with rail, mod A without. Ambulates with quad cane throughout the house.

Scared of falling again. Enjoys visiting son who has two stairs to enter without a railing. Wants to get in and out of car and walking through doors that automatically close and open.

MOTIVATION

Increasing strength, stand straighter, and improve balance to prevent falls.
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…

- Occiput to wall difference
- Thomas test

- Sit to stand
- Hip extensors
- Hip abd/Knee flexors

- TUG
- ABC Scale

- 6MWT

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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>Posture</td>
<td>Occiput to Wall Distance</td>
<td>0 cm</td>
<td>0 cm</td>
</tr>
<tr>
<td></td>
<td>Thomas Test</td>
<td></td>
<td>Neutral</td>
</tr>
<tr>
<td>Muscle Performance: Strength</td>
<td>30 Second Sit to Stand</td>
<td>2 with UE support and rocking</td>
<td>16 reps</td>
</tr>
<tr>
<td></td>
<td>Hip abductors/Knee Flexors</td>
<td>1/5 “unable to isolate movement”</td>
<td>5/5</td>
</tr>
<tr>
<td></td>
<td>Supine Hip Extensor</td>
<td>1/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Cardiovascular Endurance</td>
<td>6MWT</td>
<td>221 feet</td>
<td>1876 feet</td>
</tr>
<tr>
<td>Balance</td>
<td>TUG</td>
<td>58 secs</td>
<td>14 secs</td>
</tr>
<tr>
<td></td>
<td>ABC Scale</td>
<td>24%</td>
<td>&gt;07%</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 #2 Video Evaluation
INVESTIGATION

KNOWLEDGE TRANSLATION

Investigation Highlights

Trunk Flexibility

Muscle Performance

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

INTERVENTIONS

Hip Abductor Strengthening
- Hip abductor muscles play an important role in mediolateral balance control. Accurate balance performance appears limited by lower hip abductor strength when explicit visual information on balance reduces the need for hip abductor proprioception.

Case #2 Video Interventions

Alternate Facilitation for Higher Level

External Cues

- Counting number of steps to improve step symmetry
  - Let’s start with a goal of increasing stride length. An internal cue would be to ask your patient to “take a bigger step”. To switch this to become more automatic and have an external focus, count how many steps they took in a certain distance (i.e. 25feet). If it took them 26 steps to complete that distance, have them do it again but with less steps.

- Practice getting in and out of car in the clinic
  - Use the environment to set up and mimic a car
  - Remember to facilitate a posterior pelvic tilt when lifting up leg over lip

- Don’t forget to focus on using a curb
Mimic Getting In and Out of Car

Aerobic Conditioning

- 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

How Do You Adjust Your Intervention?

Time for Change
Intervention Adjustment

- Reflect
- Adjust
- Observe

Motor Learning

- Knowledge of Results
- Self Efficacy
- External Cues
- Intensity
- Feedback

Enhance Error

- Add weights to legs during retraining
- Add weighted vest
- Add theraband resistance IN direction of error
Home Exercise Program

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

- In this case I would focus on visual tracking, rotations and/or proximal stability

CASE #3

Tim is a 66 year-old male diagnosed with a CVA 2/2015. PMHx includes right lumbar lami in 2013 requiring right AFO for foot drop and bilateral hip replacements (2009,2016).

Lives with significant other in a 2 story home with 3 steps to enter with bilateral railings. Right sided railing to access basement. Ambulates using straight cane.

Pt was a professor of toxicology and biology prior to stroke. Goals to improve walking speed and fluidity and balance
MOTIVATION

Improve walking speed and balance.

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.

If you could wave a magic wand…

What Will Make The Biggest Impact?

- 6MWT
- Four Square Step Test
- ABC Scale
- Sit to stand
- Hip abductors
- Hip extensors
- PF Strengthening

Posture

Strength

Balance

Aerobic Capacity

GMWT
### Impairment/Body Structure Function

<table>
<thead>
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</thead>
<tbody>
<tr>
<td><strong>Posture</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occiput to Wall Distance</td>
<td>2 cm</td>
<td>0 cm</td>
</tr>
<tr>
<td>Thomas Test</td>
<td>Right WNL/ Left stiff ilioseas and Pectus</td>
<td>Neutral</td>
</tr>
<tr>
<td><strong>Muscle Performance: Strength</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 Second Sit to Stand</td>
<td>6 with UE support</td>
<td>11 reps</td>
</tr>
<tr>
<td>Hip abductor</td>
<td>2/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Plantarflexion Strength</td>
<td>Bilateral 1/5</td>
<td>5/5</td>
</tr>
<tr>
<td>Supine Hip Extensor</td>
<td></td>
<td>5/5</td>
</tr>
<tr>
<td><strong>Cardiovascular Endurance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6MWT</td>
<td>363 feet</td>
<td>1368 feet</td>
</tr>
<tr>
<td><strong>Balance</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four Square Step Test</td>
<td>28 seconds – needs to look at floor</td>
<td>15 secs</td>
</tr>
<tr>
<td>ABC Scale</td>
<td>61%</td>
<td>&gt;67%</td>
</tr>
<tr>
<td>DGI</td>
<td>15/24 “Turns”</td>
<td>19/24</td>
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</tbody>
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Case #3 Video Evaluation

INVESTIGATION

KNOWLEDGE TRANSLATION
### Investigation Highlights

**Balance and Motor Learning**


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**Balance and Motor Learning**

Reflection

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

INTERVENTIONS

Strengthen

- Practice retraining ability to isolate movements but FOCUS on priority functional movements
  - Motivators

- Need to be able to turn on and turn off muscles
  - Can use theraband wrap to take away gravity to assist with isolation

- Estim plantarflexors for knee control
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

Reactive Balance

- Train stepping on the good side.
- Reactive stepping: Side stepping, backward stepping, forward stepping
- Start with just stepping out. Go in all directions.
- On ramp
- Resisted stepping
- Slip trainer

Reactive Balance - Fishing
Case #3 Video Intervention

How Do You Adjust Your Intervention?

Time for Change

Intervention Adjustment

Reflect  Adjust  Observe
External Cues

- Utilization of an external cue

- Adjustment of increasing awareness of surroundings through eyes closed or external cues

Home Exercise Program

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

- In this case I would focus on plantarflexor strengthening or increased lower extremity strengthening (stepping up and down)
Ataxia Intervention Video

Don’t get stuck in the mud

Facility Consultations Available