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Balance Outcome Measures- Selection and Utilization

Jill Seale, PT, PhD, NCS

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Learning Outcomes

After this course, participants will be able to:

- Identify at least three components of balance and postural control.
- List at least two arguments for the necessity for, and barriers to, outcome measure use.
- Identify at least two best practice evidence components for selection and utilization of balance outcome measures.
- Identify at least three resources for obtaining valid and reliable balance outcome measures.
- Describe appropriate utilization of at least three common balance measures.
- Select at least four appropriate balance measures for provided patient cases based on the patient's level of function and practice setting.

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Why do we need OMs?

- Evaluate change
- Evaluate the effectiveness of intervention
- Guide clinical decision making and modification of plan of care
- Assist in communicating and motivating patients
- Assist in communication with health care team and payor source
- Assist in diagnosis
- Used as prognostic indicator
- Changing health care environment and shift to pay for outcome
 - Potter K, Fulk GD, Salem Y, Sullavan J, *JNPT*, 2011.

Balance Outcome Measures Specifically...

- Balance is critical skill for function and fall avoidance
- Balance impairment is common in many health conditions and with aging
- The consequences of poor balance can be catastrophic
- A comprehensive assessment of balance is necessary to ID specific postural control/balance impairments to OPTIMIZE intervention

Outcome Measure Utilization

- Out of 1000 PTs surveyed, less than half used standardized OMs
 - Jette DU, et al. *Phys Ther*, 2009
- Use of OMs lacking in research
 - Salter KL, et al. *Am J Phys Med Rehabil*, 2007.
- Lack of evidence based recommendations about which OMs should be used for patients post stroke

Why Use OMs

- Quality assurance
- Communication with other providers
- Determine progress/outcomes for patients
- Examining practice effectiveness
- Examining clinician effectiveness
- Research

Jette DU, Halbert J, Iverson C, Miceli E, Shah P, *Phys Ther*, 2009

Benefits

- Enhance communication with patient
- Help direct plan of care
- Enhance communication with payers
- Enhance thoroughness of examination
- Improve patient outcomes
- Focus the intervention
- Motivate the patient
- Enhance efficiency of exam
- Decrease insurance denials
- Enhance marketing

Jette DU, Halbert J, Iverson C, Miceli E, Shah P, Phys Ther, 2009

Perceived Problems

- Confusing to patients
- Difficult for patients to complete
- Takes too much time for patients AND for clinicians
- Often not completed by d/c
- Make patients/clients anxious
- Difficult to interpret

Jette DU, Halbert J, Iverson C, Miceli E, Shah P, Phys Ther, 2009

Barriers to OM Utilization

- Time constraints
- Difficult for patients to complete
- Lack of equipment
- Lack of therapist knowledge of OMs
- How to select and apply best measure
- Lack of relevance to patients
- Merging with EMR
- Access to tests and measures
- Ability to interpret

Jette DU, Halbert J, Iverson C, Miceli E, Shah P, Phys Ther, 2009

Interesting Relationships

- Relationship between **specialty certification, age of patients seen, and practice setting** and likelihood to use OMs
- Compared with acute care, those in OP were 7X more likely to use OM
- Those in HH settings 12X more likely... why
- Participants with clinical specialty nearly 2X more likely to use OMs than those without specialization

Jette DU, Halbert J, Iverson C, Miceli E, Shah P, Phys Ther, 2009

HOW DO WE IMPROVE OUTCOME MEASURE UTILIZATION?

OM Selection

- What to measure
- Purpose of measure
- Type of measure
- Patient and clinic factors
- Psychometric factors
- Feasibility

Potter K, Fulk GD, Salem Y, Sullivan J, JNPT, 2011

OM Decision Making

- We start creating our initial list of OMs at the referral
- We refine this list as we make our initial observations and take the history
- Further refine as we conduct the systems review
- Have a refined, focused list as we start exam

Potter K, Fulk GD, Salem Y, Sullivan J, JNPT, 2011

Type of Measure

- Generic or Disease-Specific
 - Generic: intended for use across all populations
 - More likely to have norms
 - Useful for programmatic evaluation
 - Disease-specific: designed for use with only 1 specific disease or diagnostic population
 - May have norms
 - Measure constructs more meaningful to this diagnosis/disease

Type of Measure

- Performance-based or Self-report
 - Performance-based: assess performance on some pre-determined activities in specific environment
 - Patient's actual capability
 - Clinic performance may not reflect real world performance
 - Self-report: patient's opinions/perceptions of impact of health condition
 - May provide more info about real world performance
 - May over or underestimate or report what they feel therapist wants them to say

- Potter K, Fulk GD, Salem Y, Sullivan J. *JNPT*, 2011

Strategies to Improve OM Use

- Professional organization mandate
 - Professional requirement to measure OMs
- Clinical practice guides or models that include use of standardized OM adopted by accrediting agencies (Clinical Justification Model)
- Requirement to submit OMs with treatment plans in documentation
- Support for these initiatives:
 - Education seminars
 - Providing the standardized measures
 - Peer contact by consultants

Abrams D, Davidson M, Harrick J, Harcourt P, Zylinski M, Clancy J, Man Ther. 2006

Results of Initiative

- Increase in use of OMs
- Reduction in perception of barriers, specifically familiarity with measures and access to measures.
- Attitude scores had small, but significant decline.

Abrams D, Davidson M, Harrick J, Harcourt P, Zylinski M, Clancy J, *Man Ther.* 2006

Components of Balance and Postural Control

- Balance is complex and multifactorial
- Need good understanding of what makes up “balance” to select appropriate measures

Systems Framework for Postural Control

- 6 components required for maintaining postural control
 - Constraints on biomechanical system
 - Movement strategies
 - Sensory strategies
 - Orientation in space
 - Dynamic control
 - Cognitive processing

Sibley KM et al, Arch Phys Med Rehabil, 2015

Systems Framework for Postural Control

- Biomechanical constraints: degrees of freedom, strength, limits of stability
- Orientation in space: perception of gravity, verticality
- Movement strategies: reactive, anticipatory, voluntary
- Control of dynamics: gait, proactive
- Sensory strategies: integration and reweighting
- Cognitive processing: attention, learning

Sibley KM et al, Arch Phys Med Rehabil, 2015

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Recommended OMs - Neuro

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Neurological Diagnoses

- Best resource is the Academy of Neurologic PT Outcome Measures Recommendations (EDGE)
 - <http://www.neuropt.org/practice-resources/neurology-section-outcome-measures-recommendations>

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Stroke

- Acute: Berg Balance Scale, Functional Gait Assessment (FGA), Activities-specific Balance Confidence Scale (ABC), Postural Assessment Scale for Stroke Patients (PASS)
- Inpatient and Outpatient: Berg, FGA, ABC, PASS

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The details

- Berg: 14 items, balance and functional mobility; static and dynamic; < 45 indicates greater fall risk
- FGA: 10 item test of postural stability in walking; multiple motor tasks while walking
- ABC: self-report or interview; balance confidence with various activities; 16 items; cut-off of 81% (stroke)
- PASS: 12 item; assessing and monitoring postural control; specific to stroke; cut-off of 12.5 pts

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Pusher Syndrome

- This is an issue with orientation in space – verticality
- Outcome Measures
 - Clinical Scale for Contraversive Pushing
 - Modified Scale for Contraversive Pushing
 - Burke Lateropulsion Scale*
- Baccini M, Paci M, Rinaldi L. *Neurorehabil Neural Rep*, 2006; D'Aquila MA et al, *Clin Rehabil*, 2004; Bergmann J et al, *Clin Rehabil*, 2014; Babyar SR et al, *Clin Rehabil*, 2009; Koter R et al, *JNTP*, 2017.

Multiple Sclerosis

- Acute: Berg, Timed Up and Go (with cognitive and manual), ABC, Dynamic Gait Index (DGI), Functional Reach, Trunk Impairment Scale
- Inpatient and Outpatient: Berg, Dizziness Handicap Inventory, TUG (with cognitive and manual), ABC, Four Square Step Test, Functional Reach, Trunk Impairment Scale
- Good resource with Case Examples
 - Cohen ET et al, *Int J MS Care*, 2015

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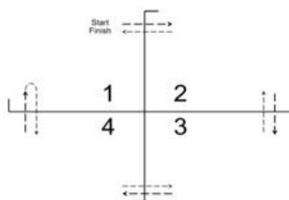
The details

- TUG: mobility, balance, walking ability and fall risk; >14 indicates fall risk
 - TUG cognitive: add cognitive task; counting backwards by 3
 - TUG manual; add physical task; walk while holding a cup filled with water
- DGI: ability to modify balance while walking with external demands; 8 items; < 19 indicates fall risk
- Functional Reach: maximum distance for forward reach from fixed position; 7" is cutoff
- Trunk Impairment Scale: specific to stroke; static and dynamic sitting balance, coordination of trunk movement

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The details

- Dizziness Handicap Inventory: 25 item self-assessment; perceived effects of dizziness; < 59 in MS
- Four Square Test: dynamic balance; ability to step over objects forward, sideways and backwards



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SCI

- Acute (0-3): TUG, Berg
- Sub acute (3-6): TUG, Berg
- Chronic (>6): Berg, TUG

- AIS A, B: no balance measure rec
- AIS C, D: TUG, Berg

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Traumatic Brain Injury

- Acute Care
 - None highly recommended related to balance
 - Balance Error Scoring System (BESS), Community Mobility and Balance Scale, and High Level Mobility Assessment Test (HiMAT) (mildly dependent to independent in ambulation)
- In- and Outpatient Rehab
 - HiMAT (OP only) highly recommended
 - Berg
 - Community Balance and Mobility Scale
 - BESS (OP only)
 - Dizziness Handicap Inventory (OP only)

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The details

- BESS: static postural stability; used in concussion/mild TBI; return to sport; 6 conditions
- Community Mobility and Balance Scale: high level balance and mobility; tasks common in community environments
- HiMAT: high-level motor performance; walking, running, jumping, stairs, hopping, skipping

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Parkinson's Disease

- BESTest and Mini BESTest
- DGI
- FGA
- TUG
- ABC scale
- 4 square step test
- Functional Reach
- Tinetti Mobility Test POMA
- Berg
- Walking While Talking Test
- 360 degree Turn Test

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The details

- BESTest and miniBEST: 36 item (full); anticipatory, reactive postural control, sensory orientation, dynamic gait
- Tinetti Mobility Test (POMA): gait and balance; fall risk; intended for elderly
- Walking While Talking Test: Dual task measure of divided attention; cognitive-motor interactions
- 360 Degree Turn Test: dynamic balance; complete circle while time to complete and number of steps are recorded; > 3.8 sec cut-off

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Vestibular Disorders

- Beyond scope of this course, but obviously very linked to this topic
- EDGE documents:
<http://www.neuropt.org/practice-resources/neurology-section-outcome-measures-recommendations/vestibular-disorders>

Most Recent Evidence - Neuro

- Berg Balance Scale – changes in static and dynamic sitting/standing balance
- Activities-specific Balance Confidence Scale – changes in balance confidence
- Functional Gait Assessment – dynamic balance while walking
- Recommendations from A Core Set of Outcome Measures for Adults with Neurologic Conditions Undergoing Rehabilitation – CPG
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6023606/>
 - Moore JL, et al, *J Neurol Phys Ther*, 2018

Others Not in EDGE

- Function in Sitting Test (FIST): bedside evaluation of sitting balance; sensory, motor, proactive, reactive, and steady state balance factors; 14 items
- L-Test: created for assessing persons with amputation; TUG plus a turn

Psychosocial Assessment

- Social support
- Behavioral and cognitive function
- Fear of falling
 - 1/3 of those who have fallen develop fear of falling
 - Significant consequences
 - More sedentary
 - Deconditioning
 - Frailty
 - Increased risk of future falls

Fear of Falling

- Found in those who have fallen, as well as those who have not
- **Balance confidence best predictor of falling**, followed by fear of falling avoidance behavior and TUG
- Psychological factors may be more valuable in predicting future falls
- ABC and FFABQ best at predicting future falls, independently and compared against other variables
 - Landers MR et al, *Phys Ther*, 2016

Ortho/Sports Balance Measures

- Y Balance Test
 - Commercially available, Move2Perform, Evansville, IL
- Star Excursion Balance Task: dynamic balance

Photo US
Air Force
by Robb
Lingley



Figure 1: Subject performing the posterior reach component of the Star Excursion Balance Test



Photo by
SportEX
Medicine
flickr

Common Mistakes

- Assisting or providing contact guard
- Not attending to details of the test
 - Use of arms for sit<->stand?
 - When to start time?
 - Measuring distances
- Being a distraction
- “Inflating” score/grade
- Choosing “less than best” measure
 - Ceiling or floor effects

Common Mistakes

- Lack of consistency within yourself and/or between members of your team
- Lack of good observation
- Not using outcome measures to inform and motivate the patient
- Lack of detail in reporting measures to 3rd party payers

Good Resources

- Rehabilitation Measures Database
 - <https://www.sralab.org/rehabilitation-measures>
- Core Set of Outcome Measures for Adults with Neurologic Conditions
 - <http://www.neuropt.org/practice-resources/anpt-clinical-practice-guidelines/core-outcome-measures-cpg>
- PT Now
 - <https://www.ptnow.org/tests-measures>
- Geriatric Examination Tool Kit
 - <https://geriatrictoolkit.missouri.edu/>
- Physiopedia
 - https://www.physio-pedia.com/Outcome_Measures

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Application

- 17-year-old female who experienced a concussion while “heading” a ball
 - Appropriate measures?
 - How to determine return to play?
- 75 y/o male who experienced a fall resulting in fractured wrist
 - Measures to determine/demonstrate fall risk?
 - What parts of balance to target?

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Application

- 25 y/o weekend athlete (hiking, kickball, touch football) with recurrent ankle sprains on R
 - What components of postural control need to be addressed?
 - What OM would be appropriate?
 - How could this guide your treatment?

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Application

- Rate the following from “easiest measure” to “most challenging”
 - HiMAT
 - DGI
 - Berg
 - FGA
 - PASS

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References

- Available on separate pdf document

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Questions?

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