OUTCOMES TOOLBOX: MDC & MCID
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OBJECTIVES
1. Discuss elements of standardized outcome assessment for application to practice
2. Using patient cases:
   a. Select appropriate outcome measures taking into account properties of the tool, the patient’s abilities, and intended goal
   b. Discuss coordination of chosen outcome measures and intervention
   c. Create realistic goals and discharge plans based on chosen outcome measures
   d. Effectively document patient functional status

OUTCOME MEASURES
Using outcome measures:
1. Documents change over the episode of care
2. Guides selection of intervention
3. Guides goal writing
4. Provides evidence that intervention is effective
5. Enables comparison across patients
6. Facilitates communication among professionals and across disciplines

Questions to Ask
1. Is it reliable?
2. Is it valid?
3. Is it sensitive and specific?
4. Is it responsive?
5. Are changes in scores meaningful?

• Is it reliable?
  – Can you expect the same results no matter who rates/scores (inter-rater)?
  – Can you expect that any changes between start of care and discharge are the result of patient improvement (intra-rater, test-retest)?
  – Research reliability vs. reliability IRL for your facility, as used by your therapists?

• Is it valid?
  – Will the tool measure what you want it to measure?
  1. What are you trying to measure?
     • General mobility, transfers, lifting/carrying and self-care
     • Specific limitations in those aspects of function
  2. What tools are designed to measure that?
     • Ex: 5 x sit to stand vs. 1 min sit to stand
     • Ex: Berg Balance Scale vs. Timed up and Go

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OUTCOME MEASURES

• Is it valid?
  – Will the tool measure what you want it to measure in your patient (external validity)?
    • Ex: Timed Up and Go vs. Physical Performance Test
    • Ex: Berg Balance Scale vs. Fullerton Advanced Balance Scale
  – No tool will measure everything
  – No tool will measure an aspect of function perfectly in all people

• Is it predictive validity?
  – Will the tool measure predict an outcome relevant to the patient (predictive validity)?
    • Examples
      – 6 minute walk test and mortality
      – Barthel Index and discharge status
      – Berg Balance Scale and fall risk

• Is it sensitive and specific?
  – Sensitivity – True Positive
    • Value that defines a test’s ability to correctly identify a positive result
      – 90% sensitivity vs. 50% sensitivity
  – Specificity – True Negative
    • Value that defines a test’s ability to correctly identify a negative result
      – 90% specificity vs. 50% specificity

• Is it responsive?
  – Will the tool detect change over time?
    • Proportional to reliability
    • Must allow room for change
      – Ceiling Effect

• Are changes meaningful?
  – Responsiveness increases
    • When tool includes multiple items to address aspects of function that are likely to change
    • When what is being measured matches the patient’s limitations
      – May be beneficial to conduct PT exam first to clarify/elucidate patient’s limitations before choosing outcome measure
  – Responsiveness decreases
    • When the tool uses few, and/or broad categories

  – Standard Error of Measurement (SEM)
    • Estimate of the standard error inherent to a tool when repeated
      – Example – Dynamic Gait Index
        » SEM 1.04 pts for community dwelling older adults (Romero et al. 2011)
      – Example – Functional Reach Test
        » SEM 2.64cm for patients with Parkinson’s Disease (Schenkman et al. 1997)
OUTCOME MEASURES

• Are changes meaningful?
  - Minimal Detectable Change (MDC)
    • Smallest amount of change that reflects true change
    • Used with confidence interval (typically 95%)
      - Ex: Performance Oriented Mobility Assessment
        » MDC (at 95% confidence interval) = 5 pts for inpatient older adults (Faber et al. 2006)
      - Ex: 6 minute walk test
        » MDC (95%) = 33.47m for patients with Alzheimer’s Disease (Ries et al. 2009)

OUTCOME MEASURES

• Are changes meaningful?
  - Minimal Clinically Important Difference (MCID)
    • Smallest effect or change in score that a patient would deem beneficial or meaningful
      - NOT the same as statistical significance
    • Calculation of MCID is not uniform
      - ‘Meaningful’ can have many interpretations and perspectives
        » Patient vs. PT – Individual vs. group
        » Needs to exceed SEM/MDC threshold

OUTCOME MEASURES

• Are changes meaningful?
  - Minimal Clinically Important Difference (MCID)
    • Ex: 5 times sit to stand test
      - MCID ≥ 2.3 seconds for patients with vestibular disorders (Meretta et al. 2006)
      - Ex: 10m walk test (gait speed)
        » MCID = 14 - 16 m/s in adults post stroke (Perera et al. 2006; Tilson et al. 2010)
      - Ex: 6 minute walk test
        » MCID = 54m for patients with COPD (Rasekaba et al. 2009)

OUTCOME MEASURES

• Are changes meaningful?
  - 82 y/o patient with balance impairment is scored on Berg Balance Scale
    • SEM = 1.8 (Donoghue et al. 2009)
    • MDC = 4.9 (Donoghue et al. 2009)
  - 75 y/o patient post stroke (chronic) is scored on Dynamic Gait Index
    • SEM = .97 (Jonsdottir & Cattaneo, 2007)
    • MDC = 4 (Lin et al. 2010)

OUTCOME MEASURES

• Are changes meaningful?
  - 55 y/o patient with spinal stenosis is scored on Patient Specific Functional Scale
    • SEM = 1.03
    • MDC = 2.4
    • MCID = 1.34

OUTCOME MEASURES

• Where to find tools and their psychometric properties
  - Original journal articles – e.g. PubMed
  - Rehabmeasures.org
  - PT Now
  - Exercisepd.com
  - NeuroQOL
  - PROM bibliography
OUTCOME MEASURES

• G code and Severity Modifier reporting
  – Focused around one functional goal
  – Most critical to patient/success
  – Potential for significant change during episode of care
  – Use outcome measures to determine and support severity modifier choice
  – Okay and often preferable to use more than one tool to support modifier choice
  – Use other data (limiting and facilitating factors) too

SUGGESTIONS

• Have a number of outcome measures relevant to your patient population ready
• Create a ‘cheat sheet’ for your facility and/or provide easy access to database
• Choose goals that exceed SEM and/or MDC threshold – and consider MCID if available
• Combine tools for better outcomes
  – Creates more than one avenue to document change and support billing
  – Gives a broader view of the patient’s change over the episode of care

PATIENT CASE: Chester

• 68 year old farmer
• R TKA, POD 6 with CHF and A Fib new dx
• R knee 15-90; L knee 10-85
• PMH: CABG x 4, 6 months ago, BMI:36.7
• WBAT with FWW
• Admitted to SNF for rehab
• Goal: walk 1 mile w/o SOB; return to farming

TESTS TO CONSIDER

• Five Times Sit to Stand (5xSTS)
• Timed Up and Go (TUG)
• Trail making test A and B
• Functional Reach test (FRT)
• Physical Performance Test (PPT)
• Berg Balance Scale (BBS)
• Dynamic Gait Index (DGI)
• Patient Specific Functional Scale (FSPS)

TEST RESULTS

• 5xSTS – not able at 16” chair height, 25s at 30” height (bar stool)
• TUG – 20s w/ FWW
• Trail A, B – 25s, 62s respectively
• FRT – Forward 14”
• PPT – 25/36
• BBS – 32/56
• DGI – 14/24

FUNCTIONAL REPORTING

G code Mobility
• 5xSTS – 0% normative value; CN =100% impaired
• TUG – 48% normative value; CK =40<60
• FRT – 93% normative value; CI =1<20%
• BBS – 57% completion; CK =40<60%
• DGI – 58% completion; CK =40<60%

G code Other
• Trail A, B – 100% 90th percentile by age; CH = 0%

G code Carrying Objects
• PPT – 69% completion; CJ =20<40%
INTERVENTION

- Gait training with walker, progressing to cane
- Stair training
- Closed chain LE exercises
- Strengthening Ex
- Muscle Stimulation, R quad, gluteus medius

GOALS

DISCHARGE PLANNING

- Walk community distances with cane or no AD at speed >/= 0.3 mps
- Demonstrate R knee flexion 0-125
- Will demonstrate functional RLE strength by STST < 12 seconds
- Will demonstrate functional improvement in balance by single limb stance of >15 seconds on either leg

PATIENT CASE: Marlene

- 72 year old female, active volunteer
- Widow, lives alone, accessible condo
- Ruptured appendix, sepsis, wound vac with delayed closure; HOD 8
- PMH: anemia; asthma; BMI 24
- Developed acute kidney injury and PE (chest tube)
- 2L NC with SpO2 90% with activity

TESTS TO CONSIDER

- Performance Oriented Mobility Assessment (POMA; Tinetti)
- 6 minute walk test (6MW)
- Fullerton Balance Assessment (FAB)
- Mini-mental state exam (MMSE)
- Romberg
- Rating of Perceived Exertion (RPE)
- 5xSTS
- FRT

TEST RESULTS

- Tinetti – 20/26
- 6MW – 180 ft
- FAB – 8/40
- MMSE – 28/30
- Romberg – EO 45s, EC 42s, Tandem 0-3s
- RPE – 5/10
- 5xSTS – not able at 18” chair height
- FRT – Forward 8”

FUNCTIONAL REPORTING

G Code Mobility
- Tinetti – 77% completion; CL =60<80% impaired
- 6MW – 12% normative value; CM =80<100%
- FAB – 20%; CM =80<100%
- 5xSTS – 0% normative value; CN = 100%
- FRT – 72% normative value; CL =60<80%

G code Body Positions
- Romberg – 25% normative value; CI =20<40%
- MMSE – 100% norm; CH 0%
INTERVENTION

• Breathing exercises
• Manual facilitation of respirations and intercostals
• Gait training
  – Start with 4WW? Progress to no AD/treadmill
• Muscle stimulation of intercostals and diaphragm
• Standing exercises

GOALS

DISCHARGE PLANNING

• Bed mobility with minimal assist (assist with wound vac)
• Will tolerate walking/standing for 5 minutes continuously with respiratory rate of \( \leq 18 \) bpm

PATIENT CASE: Cathy

• 84 year old caregiver for sister with recent THA
• Trip/fall 3 days ago with ED admission today for AMD, inability to walk/pain
• Non-displaced pubic ramus fx and R parietal SDH, no mass effect on imaging
• PMH: macular degeneration; HTN; 1 additional fall in past 6 months
• Admitted for observation on stroke protocol

TESTS TO CONSIDER

• Barthel Index (BI)
• Modified Rankin Scale
• Motor Assessment Scale (MAS)
• Outpatient Physical Therapy Improvement in Movement Assessment Log (OPTIMAL)
• Functional Gait Assessment (FGA)
• BBS
• 5xSTS

TEST RESULTS

• BI – 35/100
• Rankin – 4
• MAS – 29/48
• OPTIMAL – 79/110 difficulty, 91/110 confidence
• FGA – 11/30
• BBS – 26/56
• 5xSTS – 1 in 15s @18” chair height

FUNCTIONAL REPORTING

Mobility G Code
• BI – 35% completion; CL =60<80% impaired
• Rankin – 57% impairment; CK =40<60%
• MAS – 60% CL =60<80%
• OPTIMAL – 65% difficulty, 78% confidence; CL =60<80%
• FGA – 37% completion; CL =60<80%
• BBS – 46% completion; CK =40<60%
• 5xSTS – 80% impairment; CM =80<100%
INTERVENTION

- Gait training with walker
- TENS
- Transfer and mobility training to decrease pubic ramus stress
- Muscle stimulation (if muscle paresis/paralysis noted post-CVA)
- Balance and coordination exercises

GOALS

DISCHARGE PLANNING

D/C TO LTC or FAMILY
- Able to sit unsupported without use of UEs for 5 minutes safely
- Walk 30 feet with wheeled walker and minimal assist of 1
- Independence in rolling and bed positioning without use of railings

RTN TO PLOF
- Independent bed mobility and transfers with use of walker
- Walk 150 feet with walker
- Climb/descend 3 steps with single railing
Chester is a 68-year-old male, semi-retired farmer who lives with his spouse in an older 2-story home with main bedroom and bathroom on the 2nd floor and 3 steps to access the home. His history includes DJD in both knees, CAD s/p CABGx4 6 months ago. Now s/p R TKA 6 days ago with hospital stay extended by new diagnosis of CHF and A-Fib. Current medications: Lovenox®, Oxycodeone, Simvastatin, Niacin, Nitroglycerin, (prn/prior to exercise), Lisinopril, and Metoprolol.

Chester is WBAT as tolerated using a front wheeled walker. Knee mobility is 15-90 degrees R knee; 10-85 degrees L knee on hospital discharge. BMI is 36.7. He is admitted for rehabilitation stay at local SNF as he requires moderate assistance for bed and chair transfers. He resisted having recommended orthopedic surgery for years despite knee pain but finally acquiesced when unable to progress in outpatient cardiac rehabilitation. His family will not allow him to return to field work or milking cows until he is able to easily walk a mile without SOB.

Marlene is a 72-year-old female retired librarian who is active in community delivering Meals on Wheels, and as a hospital auxiliary volunteer. She is widowed and lives in 55+ condo with no steps. She drives, and ambulates independently but has a history of 1 fall on an icy driveway without serious injury in past year. Marlene is hospitalized with a ruptured appendix and sepsis, treated open abdomen x 6 days then closed with wound vac. PMH: significant for asthma and iron-deficiency anemia; BMI: 24. Developed both R pulmonary embolus (treated with chest tube and anticoagulant) and acute kidney injury (treated with 3 days of dialysis). She was in the ICU for 7 days, did not require intubation but was partially sedated and ventilated with continuous BIPAP prior to abdominal closure with wound vac. Current medications: TPN (tapering-2L/day-subclavicular central line), Prilosec®, Buspirone, Benadryl®, Metronidazole, Cefuroximine, Atenolol.

On the 8th hospital day/1st post-op day (HOD8/POD1), PT was consulted. On evaluation Marlene required 2L NC and SpO₂ was 90% with any activity. Diet has been advanced to clear liquids and NG tube was removed. She is visibly anxious and states a goal of discharge home with family assistance.

Cathy, an 84-year-old widow, lives in single story house with 3 steps to enter from the garage. She lives with takes care of 88-year-old sister who needs assistance for mobility and ADLS. Cathy presents to ED with extreme pain and inability to walk as well as acute mental status changes and forgetfulness after a witnessed trip/fall over a small stool moved by grandchildren 3 days ago. Radiographs are negative for hip fracture but reveal a non-displaced pubic ramus fracture. Head CT shows a small to medium R parietal/temporal subdural hematoma (SDH) with minimal mass effect. Cathy was admitted for overnight hospital observation and rehydration. PMH: 1 additional fall in past 6 months (non-injurious); HTN; good bone density on last DXA; recent diagnosis of wet macular degeneration (AMD). Current medications: Prinzide®, Avastin®, Tramadol. Current supplements: multivitamin, vitamin D, gingko.
References

1. Andrew MK, Rockwood K. A five-point change in Modified Mini-Mental State Examination was clinically meaningful in community-dwelling elderly people. *Journal of Clinical Epidemiology* 2008;61(8):827-831.


30. Tilson, JK, et al. Meaningful gait speed improvement during the first 60 days poststroke: minimal clinically important difference. 2010 *Phys Ther* 90(2): 196-208


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