Learning Objectives

Upon completion of this course, the participant will be able to:
- Explain the value of an FCE to case management
- Identify the components of an FCE
- Discuss the concepts of maximal effort and consistency
- Interpret an FCE report
- Apply concepts learned to day to day case and claim management activities.

Definition

- Functional Capacity Evaluation (FCE) is an objective and comprehensive assessment of an individual’s physical and functional abilities.

Select Medical FCE Hierarchy of Functional Testing

- Select Medical follows the empirical order for constructing an FCE as follows:
  - Safety
  - Reliability
  - Validity
  - Practicality
  - Utility

FCE Components

- Intake Interview
- Musculoskeletal Exam
- Predictive Aerobic Capacity Assessment
- Static/Consistency (Isometric) Testing
- Dynamic Lifting/Material Handling
- Non-Lifting/Positional Tolerance Testing
- Exit Testing

Intake Interview

- Patient Demographics
- Medical History
- Treatment History
- Subjective Pain Report
- Subjective Capabilities/Limitations
- Vocational History
- Sitting Tolerance
- Baseline HR, BP, Respiratory Rate
**Key Information in Intake Process**

- Entrance into facility including gait, distance, ability to open/close doors
- Sitting Tolerance Assessment: While distracted, client’s sitting tolerance is assessed with recorded observations related to position changes, posture and physiologic responses.
- Perceived abilities: Is perception consistent with observed abilities?
- Pain rating: Consistent with pain behaviors?
- ADL/Current activity level: Does it match observed abilities?
- Mode and distance of transportation to FCE.
- Baseline HR, BP and respiratory rate
- Medical history

---

**FCE Musculoskeletal Screen**

- Assessment with objective measurements compared to functional abilities throughout functional testing
  - Gait
  - Posture
  - Flexibility
  - Range of Motion
  - Muscle Strength
  - Neurological
  - Special Tests
  - Waddell’s

---

**Gait Analysis**

- **Assistive Device:** Was it used consistently throughout the FCE and upon entrance and exit of the facility?
- **Gait Deviations:** Is gait pattern during MSE consistent with what is observed throughout the evaluation and exiting the facility?
- **Speed of Movement:** Does speed or quality of movement change throughout testing? Is it consistent with complaints of pain and/or fatigue?
- **Physiologic Responses:** Are they appropriate?

---

**Strength**

- Is strength grade consistent with what is observed throughout the functional testing?
  - Example: Client has Normal ROM and 5/5 lower extremity strength but is unable to perform at functional strength
- Is cog-wheeling present?
- Give-way weakness?
- Are compensatory patterns consistent with strength assessment?

---

**Range of Motion (ROM) Interpretation of Results**

- Are ROM measurements consistent with what is observed throughout the testing?
  - Example: Shoulder Active Range of Motion (AROM) measured at 90° flexion during MSE when client is aware of measurement with greater AROM observed during lifting and overhead reaching.
- Is ROM consistent while conning and doffing shoes and clothing and while changing positions on the examination table?
- Quality of motion: Smooth and fluid vs. compensatory patterns
- Pain behaviors: Are they consistent both aware and unaware of observation?

---

**Waddell’s Testing**

- **Non-Organic Physical Signs**
  - Tenderness
  - Simulation
  - Distraction
  - Regional Disturbance
  - Over-Reaction
- Waddell signs “appear to be completely independent of the conventional symptoms and signs of pathologic conditions of the spine.”
- **SCORING:** If three or more of the categories are positive, then the findings are clinically significant for non-organic low back pain.
### Lumbar ROM

- **Flexion**: The individual is asked to bend forward as far as possible. The reading from the inclinometer at S1 is subtracted from the ready of the inclinometer at T12.
- **Extension**: The individual is asked to extend backward from the waist as far as possible. The inclinometers are read from the inclinometer at S1 is subtracted from the reading of the inclinometer at T12.
- **Side bending**: The inclinometers are read from the inclinometer at S1 subtracted from the reading of the inclinometer at T12.

### Waddell’s Physical Objective Signs

- A non-organic sign presented is a positive finding.
- One non-organic sign in isolation may be present with some organic conditions and should be discounted.
- Three or more non-organic signs is the criterion for a Positive Waddell’s Non-Organic Signs Test.
- A positive non-organic sign should alert the clinician to the need for more comprehensive testing.

### Tenderness

- **Superficial Tenderness**
  - Ender to light touch over a wide area of lumbar skin.

- **Non-Anatomic Tenderness**
  - Deep tenderness is felt over a wide area, is not localized to one structure, and often extends to the thoracic spine, sacrum or pelvis.

### Simulation

- **Axial Loading**
  - Vertical pressure (1-2 lbs) over the skull while the patient is standing reproduces low back pain.

- **Rotation**
  - Back pain is reported when the shoulders and pelvis are passively rotated in the same plane.
  - In the presence of root irritation, leg pain may be a normal response.

### Distraction

- **Straight Leg Raising**
  - **Supine**
    - There should be a difference of 30 degrees between the supine and sitting straight leg raise for a positive test.
  - **Sitting**
    - There is marked improvement when straight leg raising is done in the sitting position.

### Regional Disturbance

- **Weakness**
  - Formal strength testing reveals a partial cogwheel effect of “giving way.”

- **Sensory**
  - Sensory testing reveals a diminished sensation in a stocking rather than a dermatomal distribution. Use caution when testing patients with a spinal stenosis of s/p root multiple spinal surgeries. Multiple nerve root involvement can mimic a regional disturbance.
Over-Reaction

- Over-Reaction may take the form of disproportionate verbalization, facial expression, muscle tension, tremor, collapsing, or sweating
- Use caution against observer bias
- Recognize that there are considerable cultural variations

Aerobic Capacity/Endurance Test

PURPOSE:
- Determine patients cardiovascular response to stressful activity
- Predict Max VO2 for classification of aerobic capacity for age and gender
- Determine Functional MET level

Isometric Consistency Testing

- Statistical consistency
  - Coefficient of Variation (CV)
  - The coefficient of variation represents the ratio of the standard deviation to the mean and is a useful statistic for comparing the degree of variation from one data series to another.
  - Strain gauge – push, pull
  - Grip
  - Pinch

Maximal Voluntary Effort (MVE) Testing

- Five position testing
- When 5 test positions are plotted, the means should fall into a "bell shaped" curve even in those with impairment
  - Matheson, L., Carlton, K., Nemeyer L., Grip strength in standard weights: normative standards. Ind. Rehab Q1 (3) 9, 17-23.

Interpreting Grip Strength Testing MVE

- Five position testing
- When 5 test positions are plotted, the means should fall into a "bell shaped" curve even in those with impairment

Pinch Strength Testing

- Pinch Strength
- Force Measure
- Consistency
- Tip Pinch
- Palmar Pinch
- Key Pinch
Interpreting Isometric Testing

- Rapid Exchange Grip (REG)
  - REG compares peak average force at the strongest setting from the Maximum (MVE) strength protocol to the peak average force at the same setting for a brief contraction.
  - Since the claimant has 5 seconds in the MVE protocol compared to about 1 second when doing REG, the amount of muscle recruitment and strength output should be greater in the MVE.

Consistency Between Test Batteries

- Cross Testing Analysis
  - Consistency between subjective, objective and functional data
  - Consistency between presentation when client aware and unaware of observation
  - Repeating similar movements in different contexts to see if they create the same difficulty or symptoms
  - Physiological response to activity
  - Biomechanical response to activity

Material Handling Tasks

- Lifting
  - Lifting is described by research as a whole body activity that is a synthesis of biomechanical, cardiovascular, metabolic and psychophysical aspects
  - Occasional
  - Frequent
  - Pushing
  - Pulling
  - Carrying
    - Occasional
    - Frequent

Lifting

- Lifting: Upward displacement of an object with a mass that is accelerated vertically through the application of force along the direction of the lift.
- Lowering: Downward displacement of an object with a mass that is decelerated vertically through the application of force against the direction of the lower.
- Lift testing at levels described previously
- Progressive loading format in 3 ranges

Lifting Assessment

- Progressive lift capacity testing is terminated for the primary reasons:
- Physiologic limitation – exceeds safe HR limit or has abnormal HR or BP response; has difficulty breathing or hyperventilates
- Biomechanical limitation – inability to maintain safe body mechanics. Kinesiophysical changes consistent with safe limit.
- Psychophysical limitation
  - Self-perceived as being too heavy to lift safely
  - Symptom limitation – pain, numbness, pins and needles, nausea, dizziness.

Performance Signs of Physiologic Effort

- Functional activities are terminated and these are correlated with objective physiologic signs to include
  - Change in body mechanics
  - Accessory muscle recruitment, substitution patterns
  - Fatigue pattern, trembling, shaking
  - Increased heart rate and blood pressure
  - Research shows a direct relationship between size of active muscle mass and the magnitude of HR increases.
  - (Seals et al)
Positional Tolerances

- Sustained or repetitive positioning with negligible force or weight involved
  - Try to use positions/actions required for daily job or living tasks
  - Test individually or in circuit
  - Test may involve generic (standard) or job-specific tasks

Positional Tolerance Tasks

- Sitting
- Standing
- Walking
- Bending
- Squatting/Crouching
- Kneeling
- Crawling
- Balancing
- Reaching Multiple levels
- Climbing (stairs, ladder)
- Grasping
- Fine Motor
- Handling

Upper Extremity Coordination, Speed and Strength

- Manual Dexterity
- Fine Finger Dexterity
- Hand Grip Strength
- Finger Pinch Strength

Physical Demands – Strength Rating

- Physical level of performance is based on the 5 physical demand ratings established by the US Department of Labor published in the Dictionary of Occupational Titles

Physical Demand Levels of Work

- Sedentary
- Light
- Medium
- Heavy
- Very Heavy

Physical Level of Performance

S – Sedentary

- 10 lbs of force occasionally and/or
- Negligible amount of force frequently or constantly
- Sitting most of the time
- Walking or standing occasionally may be required
**Light Work**

L – Light
- Up to 20 lbs of force occasionally and/or
- Up to 10 lbs of force frequently
- Walking and/or standing usually required for more extended periods of time

**Medium Work**

M – Medium
- Up to 50 lbs of force occasionally and/or
- Up to 20 lbs of force frequently and/or
- Up to 10 lbs of force constantly to move objects

**Heavy Work**

H – Heavy
- Up to 100 lbs of force occasionally and/or
- Up to 50 lbs of force frequently and/or
- Up to 20 lbs of force constantly to move objects

**Very Heavy Work**

VH – Very Heavy
- > 100 lbs of force occasionally and/or
- > 50 lbs of force frequently and/or
- > 20 lbs of force constantly to move objects

**Frequency of Work Demands**

- Occasional: 0 – 33% of workday
- Frequent: 34 – 66% of workday
- Constant: 67 – 100% of workday

**FCE Report: The Final Analysis**

- FCE conclusions are based on the comprehensive collection and interpretation of data gathered throughout the functional evaluation process
- Provides summary and detail of results per category of assessment
- Defines work performance level based on objective data
- Defines current functional capabilities
- Reports performance consistency
FCE Reports Contain

- Observations of physiologic responses and movement patterns including:
  - Body Mechanics
  - Accessory muscle recruitment (shrugging, leaning, shoulder abduction, etc.)
- Pain behaviors
- Postures
- Gait changes
- Modification of hand positions – types of gripping
- Physiologic responses
- Performance aware and unaware of observation

Performance Analysis

Conclusions made with respect to performance are not based on a single piece of data without looking at all factors including:

- Demonstrated performance:
  - CV consistency
  - Physiologic responses
  - The presence or lack of objective signs at termination
  - Evaluator’s observations
  - Cross validity testing
- Performance date is utilized to substantiate clinical decision

Performance Analysis

- Inconsistent performance: Lack of consistency in performance including observed behavior aware and unaware of observation, CV above 15% and cross testing validity profile
- Self limited: Voluntary termination of an activity without observed physiologic and biomechanical changes
- Consistent/full effort: test results are consistent and observed behaviors match physical findings.

Questions?

Thank You!