What is the Science and Clinical Reasoning for Return to Sport Testing following an Upper Extremity Injury?

Return to Sport Based on Objective Criteria

Course/session: There are numerous articles describing return to sport (RTS) for lower extremity injuries. However, there is limited published literature that provide specific objective criteria, tests, or guidelines as to how to return an athlete back into sports with an upper extremity injury. The physician has cleared the athlete from a medical perspective and the athlete is standing in front of you with the question: “When can I go back to play?” Admitting we do not have great science to make the decisions, we still have to make a decision now! So what do we base that decision on in order to get the athlete back to activity? The foundation of the this presentation is formed acknowledging that there are few high level evidence studies available and minimal tests with good psychometric properties. As we transition to evidence based practice (EBP), we need to recognize that one of the critical components, when there is minimal high levels of evidence, is clinical experience and expertise. Therefore, the presenters will share the science and a quantitative and qualitative criterion-based functional testing algorithm (FTA) that provides the rationale for clinical decision making to return an athlete back to sports. Some of the unique contributions of this course will be upper extremity functional tests to facilitate the clinical reasoning for safely returning the athlete back to sports at their pre-morbid level.

Course session learning objectives: The course participants will:

1. Learn one method of a quantitative and qualitative battery of tests being used clinically for decision making
2. Analyze the various tests described for psychometric properties and clinical application
3. Develop a FTA that is applicable to your own clinical setting using the information provided during this presentation
4. Synthesize the results of your FTA to assist with clinical decision making to return the athlete back to sports participation

Conflict of interest disclosure:

1. George J. Davies. Associate Editor-Sports Health
2. Kevin E Wilk – None
3. Todd Ellenbecker – None
4. Marisa Pontillo- None
A Quantitative and Qualitative Functional Testing Algorithm for Clinical Decision Making for Return to Sports Following a Shoulder Injury

George J. Davies,
PT,DPT,MEd,SCS,ATC,LAT,CSCS,PES,FAPTA
Professor-Georgia Southern University
Savannah, GA.

I. Introduction (Davies)
II. Mini-review of literature on upper extremity performance based tests
III. Need for criterion-based decision making
   A. Baseline pre-participation screening
   B. Litigation concerns
   C. Task analysis of specific activities
   D. Importance of fatigue testing
IV. Functional Testing Algorithm (FTA)
   A. Basic Information/testing: Subjective information, Biopsychosocial tests, PROs, basic measurements, proprioceptive/kinesthetic testing, strength/power tests
   B. UE Functional performance tests: CKC tests, OKC tests
   C. Functional performance tests: Overhead throwing tests, specificity functional tests
V. Stratify Patients to activity levels
   A. General Orthopaedic patients
   B. Recreational athletes
   C. Competitive overhead athletes
VI. Specific tests with psychometric properties
   A. Subjective information
   B. PROs
   C. Objective impairment tests
   D. Functional performance tests
VII. Criteria to progress to next higher level of testing performance
VIII. Specific information about these areas will be the focus of the following presentations:
   A. Basic Measurements (Ellenbecker)
   B. Strength & Power Tests (Ellenbecker)
   C. Closed Kinetic Chain UE Functional Performance Tests (Pontillo)
   D. Open Kinetic Chain UE Functional Performance Tests (Wilk)
   E. Functional UE Functional Performance Tests (Wilk)

IX. Q&A (Moderator-Davies - All)
Basic Measurements, Strength and Power Assessments for Upper Extremity return to Play

Todd S. Ellenbecker, DPT, MS, SCS, OCS, CSCS
Clinic Director, Select Physical Therapy Scottsdale Sports Clinic
Vice President, Medical Services, ATP World Tour

I. Basic Measurements:
   A. Range of Motion (Glenohumeral Joint IR / ER @ 90 ABD)
      1) Importance of Scapular Stabilization
      2) Descriptive Values for Rotational ROM in the Overhead Athlete
         i) Shanley et al,
         ii) Wilk et al
         iii) Ellenbecker et al
   B. Upper Extremity Outcome Scores
      1) SANE, SST, ASES, (General Shoulder Scales)
      2) KJOC (Specific for Overhead Athlete)

II. Strength & Power Measures
   A. Muscular Strength
      1) HHD (Reimann et al.)
      2) Isokinetic IR / ER Strength Testing
         i) Ellenbecker et al
         ii) Wilk et al
   B. Muscular Balance
      1) ER/IR ratio 66% or > (Byram et al.)

III. Summary
References


UE CKC Functional Testing

Marisa Pontillo, PT, PhD, DPT, SCS
Sports Team Leader, GSPP Penn Therapy at Penn Sports Medicine Center
Scientific Consultant, Sports Performance and Injury Prevention Research, University of Pennsylvania
Chair, SPTS Shoulder SIG

- Bilateral tests: Compare to normative values
- Unilateral tests: > 90% limb symmetry

CKCUEST

- Technique:
  - 2 tape lines placed 36 inches apart
  - Patient in standard push-up position, one hand on each line
  - Patient is to touch one tape line with the opposite hand, and repeat
  - Score: Number of touches achieved in 15 seconds
- Test-retest reliability: ICC2,2 of 0.92 (Ellenbecker, 2000)
- Correlates with rotator cuff strength by HHD for both elevation ($r = 0.68$) and internal rotation ($r = 0.75$) (Pontillo, 2010)
- Correlates with isolated NMC of core ($r = 0.4$) (Pontillo, 2016)
- Normative Values: 476 collegiate athletes (Pontillo, 2011)
  - Female collegiate athletes scored an average of 22 touches
  - Male collegiate athletes averaged 26 touches
- Sport specificity?
- Clinical utility
- Injury prediction: Score < 21 touches: sensitivity: 0.83, specificity: 0.79, odds ratio: 18.75 in determining if collegiate FB player would sustain an in-season injury (Pontillo, 2013)

UQ Y-Balance Test

- Technique:
  - Patient is to maintain push-up position with feet 12 inches apart
  - One hand on platform
  - Performs maximal effort reaches with opposite hand in 3 directions
    - Medial, superolateral, and inferolateral
- Normalize to upper limb length
- Test-retest reliability: ICC > 0.90
• Moderate association with side plank and CKCUEST (Gorman 2012; Westrick 2012)
• Sport specificity?
• Clinical utility

References
Functional Testing for the Overhead Athlete

Kevin E Wilk, PT, DPT, FAPTA
Champion Sports Medicine
Birmingham, AL

I. Introduction:
   A. Overhead Throwers
      1. popular sport –
         a. youth baseball leagues
         b. scholastic teams
         c. recreational leagues
      2. injuries appear to be increasing
         a. shoulder joint
         b. elbow joint
   B. The Overhead Throwing Athlete
      1. why so many injuries
      2. tremendous forces (0.5-1.0 x BW)
      3. high angular velocities at the glenohumeral joint (6100-7200 0/s)
      4. significantly high numbers of shoulder & elbow injuries
      5. significant amount of re-injuries
   C. Criteria to Return to Play (RTP)
      1. Knee joint studies have demonstrated objective criteria RTP – reduce injuries
         Grindem et al: BJSM ‘16
      3. Numerous specific tests for LE
         a. FMS, Y balance, Isokinetics, Hop tests, shuttle runs, etc…
      4. Where are we regarding the shoulder functional testing
         a. Functional Throwing Performance Index
            Davies et al: JOSPT ‘93
      5. Single Arm Shot Put Test
         Mayhew et al: J Ped Ex Sci ‘92
         Negrete et al: JStrength Cond ‘10

II. Return to Play Criteria for Throwers
   A. Specific Criteria
      a. Satisfactory Clinical Exam
      b. PROM
         i. ER/IR at 90 deg abduction
         ii. ER at 45 90 deg abduction
         iii. Flexion
iv. Horizontal adduction at 90 deg abduction

c. Objective Muscle Testing
   i. ER/IR testing
   ii. Shoulder abd/adduction
      *Wilk et al: AJSM '93
      *Wilk et al: AJSM '95
      *Davies GJ: Compendium of Isokinetics
   iii. Scapular muscle testing:
       1. Retraction/protraction
       2. Elevation/depression
      *Wilk, Reinold, Hooks: JOSPT '97

d. Functional Testing:
   i. Ball drop test
   ii. Throws into wall 90/90 position
   iii. Step down test
   iv. Reaction Board Testing (Quick Board)

e. Appropriate Rehab Progression:
   i. Plyometrics (2 hand & 1 hand drills)
   ii. Dynamic stabilization (control)
      No Symptoms & No Pain

f. Patient’s Subjective Reported Outcome/Status:
   i. KJOC scoring
      *Alberta et al: AJSM ‘11

III. Summary & Key Points:
   A. Critical Aspect to Rehab Process – proven at knee joint
   B. Objective Criteria NOT Time Based Return to Play
   C. RTP criteria based on:
      a. Clinical exam
      b. Objective testing
      c. Subjective patients outcome
   D. Criteria to RTP
      *Youth Players ------------ Skeletal Mature
      *Baseball Players --------- Softball Players

      More Research Is Needed - Important Area

KEW: 11/17