Functional Progression and Functional Testing in Rehabilitation

- Role of functional progression
- Benefits of functional progression
- Psychological considerations
- Components of functional progression
- Functional testing
- Examples of
  - Functional progression
  - Functional testing
- Chapter 16

Role of Functional Progression

1. Activities that simulate actual motor and sport skills, athlete to acquire/reacquire skills needed to perform sport skills safely and effectively
2. Requires breaking down sports into individual components
   - focus on parts in controlled environment
   - combine in an uncontrolled environment (competition)
3. Functional progression places stresses on the body in a well-planned positive and aggressive fashion
   - Major component of normal rehabilitation

Benefits of Functional Progression

**Physical**
1. Strength
2. Endurance
3. Mobility & flexibility
4. Relaxation
5. Coordination / skill & agility
6. Functional stability Assessment

**Psychological/Social**
1. 
2. 
3. 

Equals safe and effective return to sport

- Overload principle allows for ↑ in static and dynamic strength
  1. Work to fatigue: high or low resistance
  2. Functional progression = SAID principle
  3. Must strengthen muscles dynamically
- Stability is maintained by NM control mechanisms
  - Must be assessed through functional testing (objectively and subjectively). Allows for assessment of ability
- Tissues will shorten/tighten in response to immobilisation
  - Inhibits function
  - During progression tissues are stressed within a controlled range
  - Significant enough to elongate tissue, = return to proper lengths. Functional mobility critical
- Coordination, agility and motor skills
  - Allows for transformation of strength, flexibility and endurance into full-speed performance
  - Conscious to unconscious
  - NM facilitation critical
- Involves the concerted effort to reduce muscle tension
  1. Total body relaxation that ensues releases the injured area
  2. Relieves muscle guarding that can inhibit joint's full ROM
  3. Brugger Technique
- Endurance: necessary for long-duration activity
  - ADL or repeated motor function associate with sports
1. FP helps minimize loss of normal NM control
   - Practice variations used with functional progression
   - Allow athlete to re-learn various aspects of sport
2. Exercises must stress NM coordination
   - Without NM coordination improvements in strength, flexibility, endurance, and performance will not occur
3. Integral part of long term rehabilitation

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**Putting it All Together!**

- Without NM coordination improvements in strength, flexibility, endurance, and performance will not occur.

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**Psychological and Social Considerations**

- Caused by uncertainty about the future
- Experienced after losing direct contact with team for extended period of time
- Obstacle to performance that may serve as precursor to re-injury

Athlete gradually placed in more challenging situations

Functional progression allows athlete to exercise during regular team practice at the practice site

Progression allows athlete to adapt to imposed demands in a controlled environment

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**Components of Functional Progression**

- Restore joint ROM, muscular strength and endurance
- Incorporate proprioception and agility
- Sport-specific functional re-integration
- Full Return to Play

Factors that must be addressed:
1. Physician’s expectations for athlete/patient return to activity
2. Expectations for his or her return to activity
3. Total disability of the athlete/patient
4. Parameters of physical fitness for the athlete/patient
5. Must keep total well-being of athlete/patient in perspective

Full Return to Play
- Decision requires full evaluation of athlete’s condition
  - Objective observation and subjective evaluation
- Athlete should feel ready physically and mentally
- Controlled return
  - Added stress to injury can slow healing and result in long and painful recovery or re-injury
- Criteria
  - Physician’s release
  - Pain free, no swelling
  - Normal ROM, strength
  - Completion of functional testing minus adverse effects

**Designing Functional Progression**

- Guidelines
  1. Evaluate athlete’s current status
  2. Review expectations of the athlete and physician
     - Do they work together?
  3. Understand demands of sport and position played
     - Incorporation of athlete, coach, other athletic trainers
  4. Analyze demands that will be placed on athlete (rank order)
     - Set goals and means to assess levels of function and progress
     - Set parameters for return to play criteria

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**Functional Testing**

- Athlete performs tasks appropriate to stage in rehab process to isolate and address specific deficits
  - Determine current functional levels and set functional goals
- Used as an indirect measure of functional abilities
  - Strength and power
- Purpose for functional testing
  - Determine risk of injury due to limb asymmetry
  - Provide objective measures of progress
  - Measure ability of individual to tolerate forces

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- Good correlation to functional ability
- Look at both unilateral and bilateral function
  - Allows clinician to determine if athlete is compensating
  - Limb Symmetry Score: \((\text{ipsilateral limb / contralateral limb}) \times 100\)
    - Symmetry index of < 85% considered abnormal
  - Must consider stage of healing, appropriate rest and self-evaluation
- Limitations of functional testing
  - Lack of normative values or pre-injury baseline values for comparison - subjective decisions made based on test results
  - Should be easily understood by coach and athlete

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**Functional Progression:**

*Upper Extremity*

- Possible functional activities that can enhance upper extremity perf
  - PNF, swimming, pulley machines, rubber tubing

- Focus on proprioception and neuromuscular control
  - Awareness of proprioception (afferent pathway restoration)
  - Dynamic stabilization restoration (force-couples)
  - Preparatory and reactive muscle facilitation (unexpected forces)
  - Functional activities (mimic sport/activity pattern)

- Focus on core, scapulothoracic stabilizers and glenohumeral joint
  - Quadruped position: work muscles of trunk/core and upper extremity
  - While most activities are OKC oriented, CKC activities important for restoration of proper function

- Shoulder template for upper extremity rehabilitation and progression
  - Many activities for shoulder equally effective for elbow, wrist and hand

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**Functional Testing:**

*Upper Extremity*

- Use sports specific drill to assess perf and readiness,
  - critical to focus on sport demand for athlete

- Must focus on skill involved in sport
  - OKC vs. CKC (Gymnast vs. Tennis player)

- Timed performance simplest and most common used
  - Throwing velocity test (radar gun or stop watch)
  - CKC Upper Extremity Dynamic Stability Test

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Functional Progression: 
Lower Extremity

- Follows the same basic pattern as upper extremity
  - Activities should provide functional stress to injured limb

Functional Testing: 
Lower Extremity

- Can be tested in a number of ways:
  - Sprint times
  - Agility run times
  - Jumping or hopping heights/distances
  - Co-contraction tests
  - Carioca runs
  - Shuttle runs

- Carolina Functional Performance Index
  - Evaluates lower extremity functional performance
    - Co-contraction test (semicircular)
    - Carioca test (25 m)

Key Points

- When athlete safely and effectively perform tasks leading to sport-specific motor skills they can R2S
  - No program will benefit every athlete and every condition
  - Each athlete is an individual
- Using multiple options allows for athlete’s full return to pre-injury status
  - Not only allows for return to pre-injury status, but also ensure safer, more effective R2S