Functional Movement Screen: The Basic Principles and Science, How to Use it as a Pre-Season Screening Tool to Prevent Injury and Identify Potential Issues, and How to Integrate it into Clinical Practice

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Conflict of Interest
No Conflict of Interest
Overview

History

Concept of Functional Movement Screening

Administering the FMS Assessments
  - Evaluating Dysfunctional Movement Patterns

Implementing into Your Clinical Practice

Questions

History: Breaking the Mold (AAOM, 2015; Walters, et al. 2015)

James Cyriax (1938)

- “Father of orthopedic medicine” coined the term orthopaedic medicine
- 3 principles of orthopedic medicine
  - Every pain has a source
  - Treatment must reach the source
  - Treatment must benefit the source
- Created non-surgical department
- Importance of communication
- Challenged the quality of patient care
History: Taking a Deeper Look  (The Janda Approach, 2010)

Vladimir Janda
- 1952; global vs. local
- 1960s; chronic ankle instability and chronic low back pain link
  - Proprioception
  - training neuromuscular systems; Rarely recommending strengthening
- 1968- muscle imbalance systematic, predictable, and involved the entire body
- Cross Syndrome, 1979
- Assessment of movement pattern as a whole (low back)
- 16 books and over 200 papers on muscle function

History: Putting it All Together.  (Wainner RS, Flynn TW, Whitman JM, 2001)

Robert Wainner
- Coined the term Regional Interdependence
  - Stated that there was a need within the clinical practice to look at possible relationships within the body in regards to musculoskeletal disorders.
  - Regional interdependence refers to the concept that seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the patient’s primary complaint.
History: Putting it All Together

Derrick Sueki

- “The concept that a patient’s primary musculoskeletal symptom(s) may be directly or indirectly related or influenced by impairments from various body regions and systems regardless of proximity to the primary symptom(s).” (Seuki, Cleland & Wainner, 2013)

Concept of Functional Movement Screening
A Whole Body Approach (Cook, 2010 & Janda, 1968)

Functional screening
- Anatomical approach
  - Basic principles of kinesiology
  - Complicated by “Isolation”
  - Entry level thought process, not the best way to go about assessment
- Functional approach
  - Movement is complex
  - Basic kinesiology fails to identify the problem
  - Everything moves as a unit

“It has also been recognized that the dysfunctions of muscles and joints are so closely related, the two should be considered a single, inseparable functional unit.” - Janda

The Functional Movement System (Cook, 2010)

Screen vs Test vs Assessment
- What is the difference?
  - Screen (FMS)
    - Selects suitable people
    - Protects people from risk, danger, injury
  - Test (Y-Balance)
    - Questions, problems or tasks to gauge knowledge
    - Measures a person’s ability
  - Assessment (SFMA)
    - Examines in order to evaluate
    - Judges inability
What is the FMS (Cook, 2010)

Functional Movement Screen (FMS)
• 7 Fundamental movement patterns
• Motor control within movement patterns
• Competence of basic movements
• Uncomplicated by specific skill

Purpose of the FMS (Cook, 2010)
• Pain-Free assessment
• Greatest areas of movement deficiency
• Limitations or asymmetries
• Correlate with outcomes
Administering the FMS Assessments

FMS Assessment (Cook, 2010)

7 Fundamental movement patterns
• Deep Squat
• Hurdle Step
• Incline Lunge
• Shoulder Mobility *
• Active Straight Leg Raise
• Trunk Stability Pushup *
• Rotary Stability *
• * Clearing Test Associated with Screening
### FMS Assessment (Cook, 2010)

Deep Squat: 3  
- Torso parallel with tibia  
- Femur is below horizontal  
- Knees do not track inside of feet  
- Dowel aligned over feet

Deep Squat: 2  
- Heels are elevated  
- Same as Grade 3

Deep Squat: 1  
- Heels are elevated  
- Dysfunction with ANY point

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### FMS Assessment (Cook, 2010)

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| 3 | 2 | 1 |
FMS Assessment (Cook, 2010)

<table>
<thead>
<tr>
<th>Hurdle Step: 3</th>
<th>Hurdle Step: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Hips, knees and ankles remain aligned in the sagittal plane</td>
<td></td>
</tr>
<tr>
<td>• Minimal to no movement is noted in lumbar spine</td>
<td></td>
</tr>
<tr>
<td>• Dowel and hurdle remain parallel</td>
<td></td>
</tr>
<tr>
<td>• Dysfunction in grade 3 movements</td>
<td></td>
</tr>
<tr>
<td>• Maintain balance</td>
<td></td>
</tr>
</tbody>
</table>

Hurdle Step: 1
• Contact between foot and hurdle occurs
• Loss of balance is noted

FMS Assessment (Cook, 2010)
FMS Assessment: Clearing Test: Ankle (Cook, 2010)

Green  Yellow  Red

FMS Assessment  (Cook, 2010)
FMS Assessment (Cook, 2010)

Incline Lunge: 3
- Dowel contacts maintained
- Dowel remains vertical
- No torso movement noted
- Dowel and feet remain in sagittal plane
- Knee touches board behind heel of front foot

Incline Lunge: 2
- Dysfunction in grade 3 movements
- Maintain balance

Incline Lunge: 1
- Loss of balance is noted

FMS Assessment (Cook, 2010)

Clearing Test: Shoulder
- Palm on opposite shoulder
- Lifts elbow as high as possible
- Maintaining shoulder contact
FMS Assessment (Cook, 2010)

Shoulder Mobility: 3
• Fists are within one hand length

Shoulder Mobility: 2
• Fists are within one-and-a-half hand length

Shoulder Mobility: 1
• Fists are not within one-and-a-half hand length
FMS Assessment (Cook, 2010)

- The non-moving limb remains in neutral position for all three Active Straight Leg Raise: 3
  - Vertical line of the malleolus resides between mid-thigh & ASIS

Active Straight Leg Raise: 2
- Vertical line of the malleolus resides between mid-thigh and joint line

Active Straight Leg Raise: 1
- Vertical line of the malleolus resides below joint line
FMS Assessment (Cook, 2010)

Clearing Test: Spinal Extension
• Spinal extension is cleared by performing a press-up in the pushup position.

FMS Assessment (Cook, 2010)

Trunk Stability Pushup: 3
• The body lifts as a unit with no lag in the spine
• Men: thumbs aligned with the top of the head
• Women: thumbs aligned with the chin

Trunk Stability Pushup: 2
• Men: thumbs aligned with the chin
• Women: thumbs aligned with the clavicle

Trunk Stability Pushup: 1
• Unable to lift body as a unit with no lag in the spine from 2.
FMS Assessment (Cook, 2010)

Clearing Test: Spinal Flexion

• Assume a quadruped position
• Rocking back and touching the buttocks to the heels
• Then touch chest to the thighs.
• The hands should remain in front of the body
• reaching out as far as possible.
### FMS Assessment (Cook, 2010)

<table>
<thead>
<tr>
<th>Rotary Stability</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Performs a correct unilateral repetition</td>
</tr>
<tr>
<td>2</td>
<td>Does not perform a correct unilateral repetition</td>
</tr>
<tr>
<td></td>
<td>Doesn’t fall or lose balance</td>
</tr>
<tr>
<td>1</td>
<td>Does not perform unilateral repetition</td>
</tr>
<tr>
<td></td>
<td>Falls or loss of balance</td>
</tr>
</tbody>
</table>

![FMS Assessment images]

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![FMS Assessment images]

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Implementing into Your Clinical Practice

Key Concepts: Stability vs Mobility

“The body works in an alternated pattern of stable segments connected by mobile joints. If the pattern is altered - dysfunction and compensation will occur.”

(Cook 2010)

Composite Scores
• 14 is the “magic” number

Where is the magic?
• Data populations heterogeneity
• Sport specific
• Gender specific
• Different cut off scores

Clinical Implications

Clinical implication
• Initial screens
• Notice areas of imbalance or asymmetries
• Address asymmetries
• Strength training or prehabilitation

FMS Nasal breathing Study
• Before and after Functional Movement Screening
• Physical changes that occur with nasal breathing
• Implementation of nasal breathing in running routine/daily activity
References


https://doi.org/10.1519/JSC.0000000000000704


https://doi.org/10.1136/bmjsem-2018-000501
