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

DR. MARY PLACZKOWSKI, DAT, LAT, ATC, COLORADO STATE UNIVERSITY PUEBLO

1

Conflict of Interest

No Conflict of Interest

2

Overview

History

Concept of Functional Movement Screening

Administering the FMS Assessments
- Evaluating Dysfunctional Movement Patterns

Implementing into Your Clinical Practice

Questions

3

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

4

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

5

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

Robert Wainner

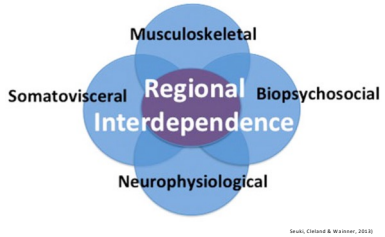
- Coined the term Regional Interdependence
- Stated that there was a need within the clinical practice to look at possible relationships within the body in regards to musculoskeletal disorders.
- Regional interdependence refers to the concept that seemingly unrelated impairments in a remote anatomical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

6

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)



7

Concept of Functional Movement Screening

8

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

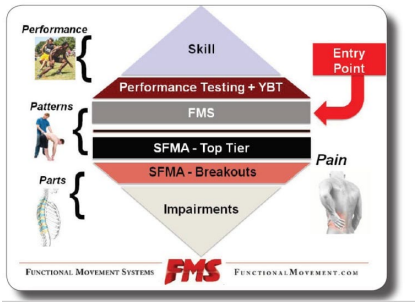
" It has also been recognized that the dysfunctions of muscles and joints are so closely related, the two should be considered a single, inseparable functional unit." - Janda

9

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



10

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

11

What is the FMS (Cook, 2010)

Purpose of the FMS

- Pain-Free assessment
- Greatest areas of movement deficiency
- Limitations or asymmetries
- Correlate with outcomes

12

Administering the FMS Assessments

13

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

14

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

15

FMS Assessment (Cook, 2010)

3 2 1

16

FMS Assessment (Cook, 2010)

Hurdle Step: 3
- Hips, knees and ankles remain aligned in the sagittal plane
- Minimal to no movement is noted in lumbar spine
- Dowel and hurdle remain parallel

Hurdle Step: 2
- Dysfunction in grade 3 movements
- Maintain balance

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

17

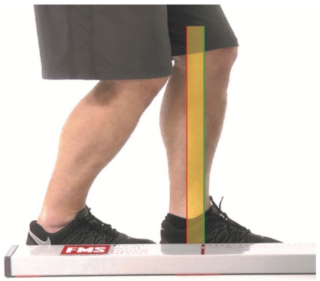
FMS Assessment (Cook, 2010)

3 2 1

18

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





Green | Yellow | Red

19

FMS Assessment (Cook, 2010)

20

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

21

FMS Assessment (Cook, 2010)

Clearing Test: Shoulder
- Palm on opposite shoulder
- Lifts elbow as high as possible
  - Maintaining shoulder contact

22

FMS Assessment (Cook, 2010)

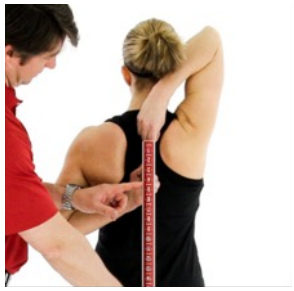
Shoulder Mobility: 3
- Fists are within one hand length

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

23

FMS Assessment (Cook, 2010)



3

2

1

24

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**

25

FMS Assessment (Cook, 2010)

3 2 1

26

FMS Assessment (Cook, 2010)

Clearing Test: Spinal Extension

- Spinal extension is cleared by performing a press- up in the pushup position.

27

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.

28

FMS Assessment (Cook, 2010)

3 2 1

29

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.

30

FMS Assessment (Cook, 2010)

Rotary Stability: 3
- Performs a correct unilateral repetition

Rotary Stability: 2
- Does not perform a correct unilateral repetition
- Doesn't fall or lose balance

Rotary Stability: 1
- Does not perform unilateral repetition
- Falls or loss of balance

31

FMS Assessment (Cook, 2010)

3 2 1

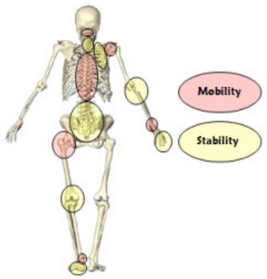
32

Implementing into Your Clinical Practice

33

Key Concepts: Stability vs Mobility

Joint by Joint Approach



(Cook, 2010)

"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)

34

Composite Scores (Asgari, et al. 2021; Knapik et al 2015;Letafatkar, et al 2014; Liu, et al. 2023; Trinidad-Fernandez, et al. 2019)

Composite Scores
- 14 is the "magic" number

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

35

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

36

References

AAOM,. (2015). Cyriax System of Orthopaedic Medicine. Retrieved 9 July 2015, from http://www.aaomed.org/Cyriax-System-of-Orthopaedic-Medicine

Asgari, M., Alizadeh, S., Sendt, A., & Jaitner, T. (2021). Evaluation of the Functional Movement Screen (FMS) in Identifying Active Females Who are Prone to Injury. A Systematic Review. *Sports medicine - open*, *7*(1), 85. https://doi.org/10.1186/s40798-021-00380-0

Cook, G. Movement: functional movement systems: screening, assessment, and corrective strategies 2010.

Cyriax.eu,. (2015). Dr. J.H. Cyriax, M.D., M.R.C.P. | cyriax.eu. Retrieved 9 July 2015, from http://cyriax.eu/content/dr-jh-cyriax-md-mrcp

Knapik, J. J., Cosio-Lima, L. M., Reynolds, K. L., & Shumway, R. S. (2015). Efficacy of functional movement screening for predicting injuries in coast guard cadets. Journal of strength and conditioning research, 29(5), 1157–1162. https://doi.org/10.1519/JSC.0000000000000704

Letafatkar, A., Hadadnezhad, M., Shojaedin, S., & Mohamadi, E. (2014). Relationship between functional movement screening score and history of injury. International journal of sports physical therapy, 9(1), 21–27.

Liu, H., Ding, H., Xuan, J., Gao, X., & Huang, X. (2023). The functional movement screen predicts sports injuries in Chinese college students at different levels of physical activity and sports performance. Heliyon, 9(6), e16454. https://doi.org/10.1016/j.heliyon.2023.e16454

Sueki, D. G., Cleland, J. A., & Wainner, R. S. (2013). A regional interdependence model of musculoskeletal dysfunction: research, mechanisms, and clinical implications. The Journal Of Manual & Manipulative Therapy, 21(2), 90-102.

37

References

The Janda Approach,. (2010). About Dr. Janda. Retrieved 9 July 2015, from http://www.jandaapproach.com/about/

Trinidad-Fernandez, M., Gonzalez-Sanchez, M., & Cuesta-Vargas, A. I. (2019). Is a low Functional Movement Screen score (≤14/21) associated with injuries in sport? A systematic review and meta-analysis. BMJ open sport & exercise medicine, 5(1), e000501. https://doi.org/10.1136/bmjsem-2018-000501

Wainner RS, Flynn TW, Whitman JM. Spinal and Extremity Manipulation: The Basic Skill Set for Physical Therapists. San Antonio, TX: Manipulations, Inc; 2001

Walters, N., & Walters, N. (2015). James Cyriax, Father of Orthopaedic Medicine. Wellcome Library. Retrieved 9 July 2015, from http://blog.wellcomelibrary.org/2013/06/james-cyriax-father-of-orthopaedic-medicine/

38