



**Biomechanics of Sports**

# **FMS Practice Test #2**

**April 13, 2020**



Lesson: April 13, 2020

**Objective/Learning Target:**

**Students will be able to show an understanding of the Deep Squat and Hurdle step.**



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## **Instructions**

**Read the following passage and take the quiz at the end.**



## Deep Squat

### DESCRIPTION

The client assumes the starting position by placing the inside edge of the foot in vertical alignment with the crease of the armpit to establish the shoulder-width stance. The feet should be in the sagittal plane with no lateral outturn of the toes. The client rests the dowel on top of the head to adjust the hand position, resulting in the elbows at a 90-degree angle. Do not manually manipulate set up positions, but absolutely spot for safety and be aware of possible balance issues that could put the person being screened at risk.

Next, the client presses the dowel overhead with the shoulders flexed and abducted and the elbows fully extended. Instruct the client to descend slowly into the deepest possible squat position with the heels on the floor, head and chest facing forward and the dowel maximally pressed overhead. The knees should align over the feet with no valgus collapse.

As many as three repetitions may be performed, but if the initial movement falls within the criteria for a score of three, there is no need to perform another test. If any of the criteria for the score of two are not achieved while using the FMS board, the client receives a score of one.



## **WHY THE DOUBLE TO SINGLE LEG PATTERN?**

The double to single leg pattern is fundamental to our ability to walk and is the base of our locomotive mechanics. It is a display of control of our center of mass with a changing base of support. Rolling, crawling and other developmental milestones set the stage for this pattern.

In daily living, the ability to use this double to single leg movement to simply walk up a flight of stairs, step over toys left on the ground, or hike up our favorite mountain trail affects our life choices. Later in life it is critical that aging adults maintain this movement ability for independence and quality of life.

In work tasks, we see people load one side to perform off-center tasks and reach from a narrow base over a single leg. Can you imagine climbing a ladder without the ability to efficiently perform the single leg stance? Fire fighters, painters, and construction workers of all types rely on this ability.

In sports if this pattern is challenged, we lose the ability to have first step quickness needed to beat our opponent on the football field. A pitcher in baseball needs this ability during windup, powerfully transferring force through double leg stance to follow through onto a single leg stance. This transfer from double leg to single leg is required in many sport performance skills.

Whether it's a high-level sprinter in the Olympics, a mother quickly returning upstairs to get a child's backpack, or a recreational golfer stepping uphill on the course, double to single leg mechanics show up in all levels of daily activity and sport. The double leg to single leg movement requires the ability to rely on the stance leg while performing the stepping motion with the opposite leg. When this movement ability is performed poorly we alter our locomotive mechanics and efficiency breaks down.



### **WHY THE HURDLE STEP SCREEN?**

The Hurdle Step Screen (HS) looks at single leg stance challenged by a dynamic stepping motion. The pattern demands a higher step than normal to express mobility and range of motion with the stepping leg, while requiring stability of the stance leg. The step over the string imposes a time demand.

The single leg stance must be maintained while the opposing leg is stepping, which creates a dynamic challenge. The HS uses tibial height as a body relative standard for the stepping motion.

The dowel across the shoulders provides a horizontal reference allowing the screener to easily see the subtle dips and shifts in shoulder position and upper body, indicating a compensation. We are asking for full lower body motion and control without having to "rob" from the upper body position.



## Hurdle Step

### DESCRIPTION

To begin the test, use the dowel to measure the height of the tibial tuberosity. Since it can be difficult to find the true joint line between the tibia and the femur, the top center of the tibial tuberosity serves as a reliable landmark.

To adjust the previously described hurdle to the correct height, have the client stand with feet together and use the dowel to measure from the floor to the height of the top and center of the tibial tuberosity. Slide the hurdle's marking cord to the tibial tuberosity height measured, and adjust the other side until the cord is level and displays accurate tibial tuberosity height on both indicators.

Have the client stand directly behind the center of the hurdle base, feet touching at both heels and toes and with the toes aligned and touching the base of the hurdle. Position the dowel across the shoulders, below the neck. Ask the client to step over the hurdle to touch the heel to the floor while maintaining a tall spine, and then return the moving leg to the starting position. The hurdle step is performed slowly and under control. Do not manually manipulate set up positions, but absolutely spot for safety and be aware of possible balance issues that could put the person being screened at risk.

If any of the criteria for a score of three are not achieved, the client receives a score of two. If any of the criteria for the score of two are not achieved, score this a one.



## Discussion Questions - Section 2

### Suggested Discussion and Lab Questions:

- Why is the screen considered species specific?
- Discuss what can affect your movement learning platform?
- In your own words, give 3 purposes for each of the seven tests.
- Provide an example of how each of these movement patterns transfer to a movement in sport or daily activity.
- Why are the tests performed in the order suggested?
- Explain why the clearing tests are performed after the movement pattern for a test.
- Explain why the Deep Squat Test is considered a functional pattern in the FMS?
- Describe where we see the attributes of the Hurdle Step in real life activity or sport?





Email your discussion questions to the following instructors:

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