Hurdle Step Movement Pattern Test

Purpose

The hurdle step movement pattern is an interregnal part of locomotion and acceleration. Although we do not step or stride to this level in most activities the hurdle step will help expose compensation and asymmetry in stepping or striding function. It is designed to challenge the body’s proper stepping and stride mechanics as well as stability and control in single leg stance. The movement requires proper coordination and stability between the hips, moving asymmetrically with one bearing the load of the body and the other moving freely through space. The pelvis and core must begin with, and maintain stability and alignment throughout the movement pattern. The arms are observed in static position as they hold a dowel across the shoulders. This gives the observer further representation of the static responsibility of the upper body and trunk in the stepping movement. Note that excessive upper body movement in simple stepping is viewed as compensation and not necessary when proper mobility, stability, posture and balance are available and functioning. The hurdle step challenges bilateral functional mobility and stability of the hips, knees and ankles. The test also challenges stability and control of the pelvis and core. This test offers an opportunity to observe functional symmetry.

Description

To begin this test, first get a height measurement of the individuals' tibia. Since it can be difficult for some to find the true joint line between the tibia and femur, the center of the tibial tuberosity (bony bump below the patellae) will serve a reliable landmark. To adjust the hurdle for correct height, have this individual stand with the outside of the right foot against the base of the hurdle, in line with one of the hurdle uprights. Slide the marking cord to the level to center of the tibial tuberosity and then adjust the other side until the cord is level and displays accurate tibial tuberosity height on both indicators. Start the test by having the individual place the feet together while standing directly behind the center of the hurdle base. Feet are together, touching at both the heels and toes, and aligning the toes touching the base of the hurdle. The dowel is positioned across the shoulders below the neck. The individual is then asked to step over the hurdle and touch their heel (not toe) to the floor while maintaining the stance hip in an extended position. All weight should be born on the stance leg. The knee and ankle can flex slightly on the stance leg. The moving leg is then returned to the starting position. The Hurdle Step should be performed slowly and under control. The individual will have 3 chances per stepping leg to perform the hurdle step. As soon as a hurdle step meets the criterion there is no need to repeat the test on the side. If at least one repetition is completed meeting the criteria below a III is given for the hurdle step pattern on that side. Score each side independently.
Implications of the Hurdle Step Movement Pattern Test

Performance of the hurdle step test requires optimal stepping patterns. The test also requires stance-leg stability. It involves the ankle, knee, and hip as well core stability and pelvic control. The hurdle step also requires the step-leg to perform open-kinetic chain dorsiflexion of the ankle and flexion of the knee and hip. In addition, the individual must also display overall balance because the test imposes a need for dynamic stability. The test demonstrates core stability in a single leg stance position.

Poor performance during this test can be the result of several factors. It may simply be due to poor stability of the stance leg or poor mobility of the step leg. The main thing to consider is that no single part is being tested. A pattern is being tested. Imposing maximal hip flexion of one leg while maintaining apparent hip extension of the opposite leg requires the individual to demonstrate relative bilateral, asymmetric hip mobility and dynamic stability.
- Score the leg that is stepping over the hurdle – this simply represents the pattern and does not imply the functional ability of a body part or side. Always remember you are screening patterns, not parts.
- Make sure the individual maintains a stable torso – no movement above the waist.
- Make sure the toes keep in contact with the hurdle during and after each repetition.
- Tell the individual be as tall as possible to start the test but to not lock knees during test.
- Maintain proper alignment with the string and the tibial tuberosity.
- When in doubt score low.
- Do not try to interpret the score when testing.
Hurdle Step Testing Procedure

I
- Contact between foot and hurdle
- Loss of balance is noted

II
- Alignment is lost between hips, knees and ankles
- Movement is noted above the waist
- Dowel and hurdle do not remain parallel

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

0 - The athlete will receive a score of zero if pain is associated with any portion of this test. A medical professional should perform a thorough evaluation of the painful area.
Hurdle Step

Score of 3

**Medicine Ball Progression**
- Standing Static Closed Chop/Lift
- Standing Static Open-Chop/Lift
- Standing Dynamic Open-Chop (Hip Ext)
- Chop/Lift Progressions
- Single-Leg Dead Lift
- Single-Leg Pull/Press

Score of 2

**Stretches**
Recommended not mandatory

**Self Stretches**
- Stride
- Stride w/ spinal rotation
- Stride w/ hip external rotation

**Corrective Exercises**
- Straight Leg Bridge
- Core Engagement-Single Leg Stance

Score of 1

**Stick or Foam Roll Work**

**Partner Stretch**
- Prone Hip Flexor
  (Perform Hamstring Curl)
Partner Stretch
Prone Hip Flexor Stretch

Starting Position- Lie prone with involved side on table and knee flexed to 90 degrees. The opposite foot is placed on the floor with the hip flexed to resemble maximal stride position. The partner places his/her hand under the involved side knee (between the table and knee). The other hand is placed on the sacrum of the athlete to stabilize the hips and lumbar spine.

Execution at a Glance- The athlete actively flexes the hip against a slight resistance of the partner's hand. This is repeated for 3-5 repetitions. The partner then extends the involved hip, passively holding it for a 5-10 second count. The athlete then actively holds the hip in extension and adduction for a 3-5 second count.

Safety Tips and Verbal Cues- Maintain alignment with the lower extremity and torso. Do not abduct hip during stretch and maintain neutral spine during stretch. Take special note of right and left asymmetries, focusing on the weakness.
Self Stretches
Stride with Hip External Rotation

Starting Position- Standing with involved hip flexed and externally rotated, knee is flexed and lower leg is placed on a table (height is approx. mid-thigh or higher). The opposite extremity remains extended with the foot flat on the floor. The torso and spine should be in a neutral and erect posture.

Execution at a Glance- The athlete then flexes the stance knee, enough to feel a stretch in hip. This position is held 5-10 seconds. The spine should stay erect throughout the stretch. This is repeated 3-5 times.

Safety Tips and Verbal Cueing- A pillow can be placed under the thigh and knee of the flexed hip to decrease pressure on knee and hip. Maintain proper alignment with flexed hip, spine and torso. The flexed hip and knee should be perpendicular to the pelvis. An increased stretch is noted with greatened adduction. Take special note of right and left asymmetries, focusing on the weakness.
**Stride with Spinal Rotation**

**Starting Position**- Standing with the involved hip and knee flexed with the foot placed on the table. Maximal stride position should be assumed. The opposite leg should be extended at the hip and knee. The torso and spine should be in a neutral and erect posture.

**Execution at a Glance**- Lean toward table maintaining an erect spine slightly bend knee, and rotate spine toward flexed hip. Hold stretch for 5-10 seconds and repeat 3-5 times.

**Safety Tips and Verbal Cueing**- Maintain proper posture with hip, knee, spine and torso. Take special note of right and left asymmetries, focusing on the weakness. **Self Stretch**