

The Santa Monica Orthopaedic and Sports Medicine Research Foundation with adaptations from Core™ Performance

The PEP Program: Prevent Injury and Enhance Performance

Performed by: Proaxis Therapy, ORFC, & Steadman Hawkins Clinic of the Carolinas

This prevention program consists of a warm-up, stretching, strengthening, plyometrics, and sport specific agilities to address potential deficits in the strength and coordination of the stabilizing muscles around the knee joint. It is important to use proper technique during all of the exercises. The coaches and trainers need to emphasize correct posture, straight up and down jumps without excessive side-to-side movement, and reinforce soft landings. This program should be completed 2-3 times a week.

The field should be set up 10 minutes prior to the warm-up. This will allow for a smooth transition between the activities. A sample field set-up has been included in your packet.

This program should take approximately 12 to 15 minutes to complete. Alongside each exercise you will notice a box with the approximate amount of time that should be spent on each activity. This will serve as a guideline to you in order to conduct your warm-up in a time efficient manner.

1. Warm-up: Warming up and cooling down are crucial parts of a training program.

The purpose of the warm-up section is to allow the athlete to prepare for activity. By warming up your muscles first, you *greatly reduce* the risk of injury.

A. **Jog line to line** (cone to cone):

Elapsed Time: 0 - 0.5 minute

Purpose: Allows the athletes to slowly prepare themselves for the training session while minimizing the risk for injury. Educate athletes on good running technique; keep the hip/knee/ankle in straight alignment without the knee caving in or the feet whipping out to the side.

Instruction: Complete a slow jog from near to far sideline

B. **Shuttle Run** (side to side)

Elapsed Time: 0.5 to 1 minute

Purpose: engage hip muscles (inner and outer thigh). This exercise will promote increased speed. Discourage inward caving of the knee joint.

Instruction: Start in an athletic stance with a slight bend at the knee. Leading with the right foot, sidestep pushing off with the left foot (back leg). When you drive off with the back leg, be sure the hip/knee/ankle are in a straight line. Switch sides at half field.

C. **Backward Running**

Elapsed Time: 1 – 1.5 minutes

Purpose: continued warm-up; engage hip extensors/hamstrings. Make sure the athlete lands on her toes. Be sure to watch for locking of the knee joint. As the athlete brings her foot back, make sure she maintains a slight bend to the knee.

Instruction: Run backwards from sideline to sideline. Land on your toes without snapping the knee back. Stay on your toes and keep the knees slightly bent at all times.

2. Dynamic Stretching: It is important to incorporate a short warm-up prior to stretching. Never stretch a “cold muscle”. By doing the exercises outlined here, you can improve and maintain your range of motion, reduce stiffness in your joints, reduce post-exercise soreness, reduce the risk of injury and improve your overall mobility and performance.

- Don't bounce or jerk when you stretch. Gently stretch to a point of tension and hold.
- Hold the stretch for 2 to 3 seconds each as you are moving from one position to another. Concentrate on lengthening the muscles as you are stretching.
- Breathe normally. Don't hold your breath.

A. Inverted Hamstring Stretch (2 to 3 seconds x 15 reps) Elapsed Time: 1.5 to 2.5 minutes

Purpose: Stretch in hamstrings

Instruction: Bend over at waist (keeping back straight) and kick opposite heel to sky. When stretch is felt, stand and step forward with other foot and repeat.

B. Knee Hug (2 to 3 seconds x 15 reps) Elapsed Time: 2.5 to 3.5 minutes

Purpose: Stretch glutes/hamstring of front leg. Hip flexor stretch in back leg.

Instruction: Lift right knee to chest and grab below knee with hands. Pull right knee to chest while contracting left glute. Step forward with right foot and repeat stretch on other side.

C. Leg Cradle (2 to 3 sec x 15 reps) Elapsed Time: 3.5 – 4.5 min

Purpose: Stretch in outside of hip in front leg. Hip flexor stretch in back leg.

Instruction: Lift right leg to chest and place the right hand under the knee and left hand under ankle. Pull right leg to chest while contracting left glute. Step forward with right foot and repeat stretch on other side.

D. Walking Quad Stretch (2 to 3 sec x 15 reps) Elapsed Time: 4.5 – 5.5 min

Purpose: Quadriceps stretch

Instruction: Grasp right foot and pull toward back with right hand. A stretch should be felt on top of the thigh.

E. Forward Lunge with a Twist – (2 to 3 sec x 15 reps) Elapsed Time: 5.5- 6.5 min

Purpose: Elongate the hip flexors on the front of the thigh.

Instruction: Lunge forward leading with your right leg. Drop your left knee down to just above the ground while rotating your torso to the same side as your leading leg.

3. Strengthening: This portion of the program focuses on increasing hip and leg strength. This will lead to increased hip and leg strength and a more stable knee joint. *Technique is everything;* close attention must be paid to the performance of these exercises in order to avoid injury.

A. Walking Lunges (3 sets x 10 reps)

Elapsed Time: 6.5 – 7.5 min

Purpose: Strengthen the thigh (quadriceps) muscle.

Instruction. Lunge forward leading with your right leg. Push off with your right leg and lunge forward with your left leg. Drop the back knee straight down. Make sure that you keep your front knee over your ankle. Control the motion and try to avoid your front knee from caving inward. *If you can't see your toes on your leading leg, you are doing the exercise incorrectly.*

B. Russian Hamstring (3 sets x 10 reps)

Elapsed Time: 7.5 –8.5 min

Purpose: Strengthen hamstrings muscles.

Instruction: Kneel on the ground with hands at your side. Have a partner hold firmly at your ankles. With a straight back, lean forward leading with your hips. Your knee, hip and shoulder should be in a straight line as you lean toward the ground. Do not bend at the waist. You should feel the hamstrings in the back of your thigh working. Repeat the exercise for 3 sets of 10, or a total of 30 reps.

C. Single Toe Raises (30 reps x 2 reps)

Elapsed Time: 8.5 – 9.5 min

Purpose: This exercise strengthens the calf muscle and increases balance.

Instruction: Stand up with your arms at your side. Bend the left knee up and maintain your balance. *Slowly* rise up on your right toes with good balance. You may hold your arms out ahead of you in order to help. Slowly repeat 30 times and switch to the other side. As you get stronger, you may need to add additional repetitions to this exercise to continue the strengthening effect of the exercise.

4. Plyometrics: These exercises are explosive and help to build power, strength and speed. The most important element when considering performance technique is the landing. *It must be soft!* When you land from a jump, you want to softly accept your weight on the balls of your feet slowly rolling back to the heel with a bent knee and a straight hip. These exercises are basic; however, it is critical to perform them correctly. Please take the time to ensure safe and correct completion of these exercises.

A. Lateral Hops over Cone (20 reps)

Elapsed Time: 9.5 – 10min

Purpose: Increase power/strength emphasizing neuromuscular control.

Instruction: Stand with a 6" cone to your left. Hop to the left over the cone softly landing on the balls of your feet land bending at the knee. Repeat this exercise hopping to the right.

- B. Forward/Backward Hops over cone** (20 reps) Elapsed Time: 10 – 10.5 min
Purpose: Increase power/strength emphasizing neuromuscular control
Instruction: Hop over the cone/ball softly landing on the balls of your feet and bending at the knee. Now, hop backwards over the ball using the same landing technique. Be careful not to snap your knee back to straighten it. You want to maintain a slight bend to the knee. Repeat for 20 reps.
- C. Single Leg hops over cone** (20 reps) Elapsed Time: 10.5 – 11 min
Purpose: Increase power/strength emphasizing neuromuscular control.
Instruction: Hop over the cone/ball landing on the ball of your foot bending at the knee. Now, hop backwards over the ball using the same landing technique. Be careful not to snap your knee back to straighten it. You want to maintain a slight bend to the knee. Repeat for 20 reps. Now, stand on the left leg and repeat the exercise. Increase the number of repetitions as needed.
- D. Vertical Jumps with headers** (20 reps) Elapsed Time: 11 – 11.5 min
Purpose: Increase height of vertical jump.
Instruction: Stand forward with hands at your side. Slightly bend the knees and push off jumping straight up. Remember the proper landing technique; accept the weight on the ball of your foot with a slight bend to the knee. Repeat 20 times.
- E. Scissors Jump** (20 reps) Elapsed Time: 11.5 – 12 min
Purpose: Increase power and strength of vertical jump.
Instruction: Lunge forward leading with your right leg. Keep your knee over your ankle. Now, push off with your right foot and propel your left leg forward into a lunge position. Be sure your knee does not cave in or out. It should be stable and directly over the ankle. Remember the proper landing technique; accept the weight on the ball of your foot with a slight bend to the knee. Repeat 20 times.

5. Agilities

- A. Shuttle run with forward/backward running** Elapsed Time 12 – 13 min
Purpose: Increase dynamic stability of the ankle/knee/hip complex
Instruction: Starting at the first cone, sprint forward to the second cone, run backward to the third cone, sprint forward to the fourth cone (etc...).
- B. Diagonal runs** (3 passes) Elapsed Time 13 – 14 min
Purpose: To encourage proper technique/stabilization of the outside planted foot to deter the position from occurring.
Instruction: Face forward and run to the first cone on the left. Pivot off the left foot and run to the second cone. Now pivot off the right leg and continue onto the third cone. Make sure that the outside leg does not cave in. Keep a slight bend to the knee and make sure the knee stays over the ankle joint.

C. Bounding run (44 yds)

Elapsed Time 14 – 15 min

Purpose: To increase hip flexion strength/increase power/speed

Instruction: Starting on the near sideline, run to the far side with knees up toward chest. Bring your knees up high. Land on the ball of your foot with a slight bend at the knee and a straight hip. Increase the distance as this exercise gets easier.