

## **PEP Program (Prevent injury and Enhance Performance Program)**

Adapted from: The Santa Monica Sports Medicine Research Foundation - The PEP Program.  
<http://smsmf.org/smsf-programs/pep-program>

Recent studies have documented that the incidence of ACL injury can be reduced by up to 70% with the implementation of a specific warm up program.

The PEP program has been shown to decrease both first time ACL injuries and further ACL injuries after reconstruction. This program is a highly specific session that replaces the traditional warm up.

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 jumping moves (jump straight up and down without excessive side-to-side movement), and aim for soft landings.

Optimally the program should be performed at least 2-3 times per week.

This program should take approximately 15 - 20 minutes to complete. However, when you first begin the program, it may take slightly longer due to the fact that you must first become well acquainted with the program and the transitions.

### **Basic Components of the PEP Program**

1. Warm-up (50 metres each):
  - A. Jog line to line of soccer field (cone to cone)
  - B. Shuttle run (side to side)
  - C. Backward running
2. Stretching (30 s × 2 reps each):
  - A. Calf stretch
  - B. Quadricep stretch
  - C. Figure 4 hamstring stretch
  - D. Inner thigh stretch
  - E. Hip flexor stretch
3. Strengthening:
  - A. Walking lunges (20 metres × 2 sets)
  - B. Russian hamstring (3 sets × 10 reps)
  - C. Single toe-raises (30 reps on each side)
4. Plyometrics (20 reps each):
  - A. Lateral hops over 2 to 6 inch cone
  - B. Forward/backward hops over 2 to 6 inch cone
  - C. Single leg hops over 2 to 6 inch cone
  - D. Vertical jumps with headers
  - E. Scissors jump
5. Agilities:
  - A. Shuttle run with forward/backward running (40 metres)
  - B. Diagonal runs (40 metres)
  - C. Bounding run (45–50 metres)

Online Videos:

- <http://smsmf.org/smsf-programs/pep-program>
- [https://www.youtube.com/watch?v=t\\_yz7yWLo5o](https://www.youtube.com/watch?v=t_yz7yWLo5o) - Search YouTube for **PEP Program NCAA**

## **Section 1: Warm-up**

Warming up and cooling down are a critical part 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)**

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)**

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**

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

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

## **Section 2: Stretching**

By performing these stretches, 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. Note: this portion of the program may be moved to the end of your training session. Gently stretch to a point of tension and hold. Hold the stretch for 30 seconds. Concentrate on lengthening the muscles you are stretching. Breathe normally.

### **A. Calf stretch**

Instruction: Stand leading with your right leg. Bend forward at the waist and place your hands on the ground (V formation). Keep your right knee slightly bent and your left leg straight. Make sure your left foot is flat on the ground. Do not bounce during the stretch. Hold for 30 seconds. Switch sides and repeat.

### **B. Quadriceps stretch**

Instruction: Place your left hand on your partner's left shoulder. Reach back with your right hand and grab the front of your right ankle. Bring your heel to buttock. Make sure your knee is pointed down toward the ground. Keep your right leg close to your left. Don't allow knee to wing out to the side and do not bend at the waist. Hold for 30 seconds and switch sides

### **C. Figure Four Hamstring stretch**

Instruction: Sit on the ground with your right leg extended out in front of you. Bend your left knee and rest the bottom of your foot on your right inner thigh. With a straight back, try to bring your chest toward your knee. Do not round your back. If you can, reach down toward your toes and pull them up toward your head. Do not bounce. Hold for 30 seconds and repeat with the other leg.

#### **D. Inner Thigh Stretch**

Instruction: Remain seated on the ground. Spread your legs evenly apart. Slowly lower yourself to the centre with a straight back. You want to feel a stretch in the inner thigh. Now reach toward the right with the right arm. Bring your left arm overhead the stretch over to the right. Hold the stretch and repeat on the opposite side.

#### **E. Hip Flexor Stretch**

Instruction: Lunge forward leading with your right leg. Drop your left knee down to the ground. Placing your hands on top of your right thigh, lean forward with your hips. The hips should be square with your shoulders. If possible, maintain your balance and lift back for the left ankle and pull your heel to your buttocks. Hold for 30 seconds and repeat on the other side.

### **Section 3: Strengthening**

This portion of the program focuses on increasing leg strength. This will lead to increased 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**

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 you 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**

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, lead 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.

#### **C. Single Toe Raises**

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.

### **Section 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 bent hip. These exercises are basic, however, it is critical to perform them correctly. Please begin these exercise using a flat cone (2 inches) or with a visual line on the field.

#### **A. Lateral Hops over Cone**

Purpose: Increase power/strength emphasizing neuromuscular control

Instruction: Stand with a 2 inch 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. Progress to Single leg hops

### **B. Forward/Backward Hops over cone**

Purpose: Increase power/strength emphasizing neuromuscular control

Instruction: Hop over the cone 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.

### **C. Single Leg hops over cone**

Purpose: Increase power/strength emphasizing neuromuscular control.

Instruction: Hop over the cone 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. Now, stand on the left leg and repeat the exercise. Increase the number of repetitions as needed.

### **D. Vertical Jumps with headers**

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.

### **E. Scissors Jump**

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.

## **Section 5: Agilities**

### **A. Forward run with 3 step deceleration**

Purpose: Increase dynamic stability of the ankle/knee/hip complex

Instruction: Starting at the first cone, sprint forward to the second cone. As you approach the cone, use a 3 step quick stop to decelerate. Continue on to cone 2 using the same strategy to deceleration. Do not let your knee extend over your toe. Do not let your knee cave inward. This exercise is used to teach the athlete how to properly accelerate and decelerate while moving forward and the hip, buttock and hamstring musculature.

### **B. Lateral Diagonal runs**

Purpose: To encourage proper technique/stabilisation of the hip and knee. This exercise will also deter a “knock knee” position from occurring, which is a dangerous position for the ACL.

Instruction: Face forward and laterally run to the first cone on the right. Pivot off the right foot and shuttle run to the second cone. Now pivot off the left 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 hip and make sure the knee stays over the ankle joint.

### **C. Bounding run**

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.