



Centers for
Orthopaedics
Experience in Motion

33 Sewall Street
Portland, ME 04102
(207) 828-2100

www.orthoassociates.com

A FUNCTIONAL ACL INJURY PREVENTION PROGRAM

Preparing athletes to play sports is much more than placing a ball in their hands, performing a few warm up laps, a few static stretches, and then having them practice or play a scrimmage. It also goes beyond asking them to enter a weight room and perform 8-12 total body strengthening exercises. This is an example of thousands of prevention programs in every high school and colleges in Maine. Unfortunately it is a plan for failure, because it does not completely address the fundamental needs of the athlete. This is evident by the number of ACL injuries that come through our clinic.

Coaches spend hours every day refining throwing, hitting, and shooting techniques during practice, yet minimal time is spent on movement skills. Athletes no longer receive instruction on movement skills in school or in sports, which is one of the reasons injury rates are up. No one spends time teaching athletic movement stance, acceleration, deceleration, transition, crossover, drop step, back peddle, or jumping skills. These are the fundamental blocks of all athletic movement. There is a need to train movement skills, which will be the beginning of our functional strengthening program.

Functional strengthening is performing exercises that stimulate the neuromuscular system to perform dynamic concentric, eccentric, and isometric stabilization in response to movement, gravity, and external forces. Strength training should not be performed with just isolated movements working in a single plane. Training in this manner is a plan for failure because the nervous system is not programmed to function in terms of isolated movements. Instead it should include dynamic multi-directional strength development. Remember, most sports orientated movements are not performed in a stable body position instead they are performed offbalance and off one leg or another.

We must attempt to mimic these proprioceptive and neuromuscular actions in a safe, controlled manner that will decrease the likelihood of injury and contribute to the athlete's strength during sports specific movements. You must train your athletes to perform movements that address coordination, proprioception, neuromuscular motor unit recruitment, kinesthetic awareness, and fundamental movement techniques (running, jumping, agility). Additionally, athletes must be educated on technique skill, awareness of ACL injury mechanisms, and injury prevention skills. Finally, educating the athlete that preparing to play goes beyond warming up and actual competition it also involves proper nutrition, recovery, and the right equipment (shoes, cleats, prophylactic braces, etc).



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The following routine is something we at OAPT have come up to provide a strong prevention based program that can be instituted with any sport and at any competitive level. The program comes in the form of a warm-up that takes 10-15 minutes per day and can be done 3-5 times per week. Ideally this warm up will be performed everyday at the beginning of practice and prior to a game. Your imagination is the limiting factor in coming up with the warm-up.

ATHLETIC PREPARATION

There is no better time to accomplish fundamental movement skills than to institute a functional warm-up. A functional warm up by definition is a series of actions that mimic the specific movements or skills that are involved with each individual sport (running, jumping, turning, twisting, etc). This is an ideal time because the athletic trainer, therapist, or coach can control the speed of which the movement is performed. An ideal movement can be taught at a regulated speed with emphasis on technique. It is then possible to increase the speed, change the direction or conditions of the movement, and finally implement the movement with a sports specific skill. By following this plan it is possible to not only teach proper technique for jumping, running, and pivoting, it also gradually elevates an athlete's core temperature, making tissue more flexible, and increases the demand for proprioceptive skills.

The following is an example of an introductory progressive functional warm-up that incorporates all of the important elements in the injury prevention program:

- 2-3 minute jog with sport equipment (ball, stick, tennis racket)
- 20-30 yard run @ 50% focus on running mechanics repeat x2
- 20-30 yard run @ 75% focus on running mechanics repeat x2
- High knee 10-15 yards with remaining distance @75% run repeat x2
- Butt kickers 10-15 yards with remaining distance @75% run repeat x2
- Lateral shuffle 10-15 yards with 180 degree turn repeat x2
- Cariocca 10-15 yards with 180 degree turn repeat x2
- Spapiocca 10-15 yards with 180 degree turn repeat x2
- Skate jump 10-15 yards-180 degree turn-stride back
- Alternate hip dip with 180 degree alternate turn 10-15 yards with remaining distance @75% run repeat x2
- Lateral cone jump to left x8-180 degree turn-lateral cone jump to right x8 75% remaining distance
- Lateral high knee over cone to left x8-180 degree turn-lateral high knee over cone x8 pivot 75% run remaining distance
- Forward hops over cones x8 –90 degree pivot 3-5 yard run-90 degree pivot with 75% run remaining distance
- Functional Jump training exercises (2-3 exercises) or instruction (jump to



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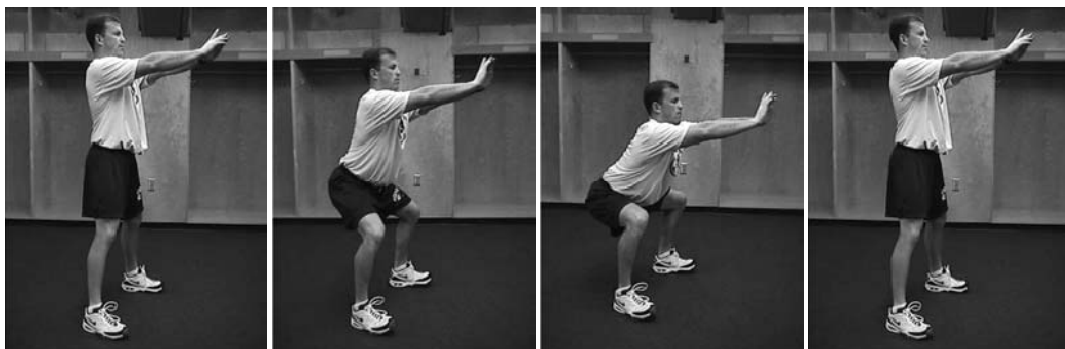
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- sprint, unilateral jump to sprint, lateral jump to sprint, etc)
- Core Work 75-100 core exercises

One of the most fundamental exercises that should be instructed to every athlete regardless of position is the squat. Very few athletes are taught how to squat properly. Squatting is a very important exercises for athletes to master because it is the starting point for a majority of lower body strengthening and closed chain exercises. Below are some guidelines and cueing ideas for teaching proper squatting technique:

- Learn to lower the center of gravity by flexing the knee and hips.
- Keep the knee over the ankle, not in front of the ankle. This means weight stays on the heels. Athletes with weak quads attempt to lower the center of gravity as simple as possible and this is usually done at the ankle 1st. This is not quality movement and is easier to perform, discourage this.
- Get the thigh parallel to the floor (90 degrees) by minimizing ankle movement and maximizing knee movement. The more ankle movement the more knee movement is required to get to parallel (sometimes 135 degrees, this kills athletes with PF problems).
- If an athlete cannot get to parallel while squatting they have a tight lower body. Do not allow them to stick plates under the heels to achieve 90 degrees. The larger issue at hand is flexibility and should be addressed before squatting! Quality movement cannot take place on poor structure.
- Keep the weight on the heels and lift the toes off the ground.
- Do not allow excessive trunk flexion. Again this is an issue of flexibility and you are only contributing to a plan of doom, address the underlying problem. You will be doing yourself and your athlete a favor in the long run.
- It is important to work on getting the athlete to perform this exercise on a single leg as soon as able to demonstrate good mechanics bilaterally.





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The squat is just the beginning of the movement skills that need to be properly trained and mastered. An athlete who can properly perform the basic movement skills required for sports will not only reduce their likelihood of injuries but also increase their performance. Get involved with a functional warm-up with your sports program and everyone will benefit from the rewards.