

POWER

SANFORD HEALTH



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Athletes involved in sports that require jumping, cutting, and pivoting have an increased risk of serious knee injuries, specifically non-contact anterior cruciate ligament (ACL) tears.[1]

- 7,000,000 High School students participate in team sports in the United States
- 3-11% of those student athletes advance to the collegiate level
- 10-25% of all sports related injuries occur at the knee
- An estimated 250,000 ACL-related injuries occur annually in the United States
- Female athletes are 2-8 times more likely to injure their ACL

The **Sanford Knee Injury Prevention Program** was developed to help reduce an athlete's risk of knee injury and improve overall athletic performance by using a multifaceted approach of neuromuscular and proprioceptive training. The known risk factors of knee injury include modifiable movement patterns: dynamic knee valgus (diving in at the knees), stiff landings, quadriceps dominance, leg dominance and lack of core control.

Correct



Incorrect







The **Sanford Knee Injury Prevention Program** specifically focuses on modifying those risk factors by emphasizing proper biomechanical movement patterns through:

- dynamic stretching
- lower extremity strengthening
- plyometric training
- hip and core activation
- agility training
- movement re-education

Many injury prevention programs for the knee are already in use and there is evidence that several of these programs have succeeded in reducing knee injuries by 27% and ACL injuries by 51%.[1] Although these programs have illustrated a reduction in overall knee and ACL injury rates, often times they are not being implemented in the high school and collegiate settings and do not specifically address activation of the hip musculature in preparation for proper movement patterns.

The **Sanford Knee Injury Prevention Program** has a unique component (activation of the hip muscles) that other injury prevention programs have not specifically addressed. Several studies have demonstrated that hip stability is an integral part of decreasing dynamic knee valgus (diving in at the knees) during athletic movements.[2,3] Dynamic knee valgus is one of the most common biomechanical factors associated with ACL tears.[2,3] By activating the hip muscles, athletes are more likely to use them during physical activity, therefore, reducing the amount of dynamic valgus and inherently reducing the risk of ACL injury. Not only does this program focus on decreasing dynamic valgus but it also promotes awareness of high-risk positions, enhances sport-specific agility, and improves technique.

The **Sanford Knee Injury Prevention Program** should be:

- implemented in middle school, high school, collegiate, and professional athletics
- incorporated into pre-activity routines such as before team strength and conditioning sessions or team practice sessions
- completed in 15-20 minutes as athletes become familiar with the program
- performed 2-3 times per week for a minimum of 8-12 weeks for best results

Sanford Knee Injury Prevention Program

Dynamic Warm-up

A. Single-leg RDL Stretch
B. Quad Stretch
C. Knee Hugs
D. Leg Cradle
E. High Knees
F. Butt Kicks
G. Carioca
H. Normal Skip
I. Skip for Height
J. Backpedal
K. 75% Run

Activation

A. Clamshell (30 sec. hold; each side)
B. Quadruped fire hydrant (30 sec. hold; each side)
C. Plank + side plank (30 sec. plank; 15 sec. side plank; each side)
D. Standing fire hydrant (30 sec. hold; each side)

Strengthening

A. Bodyweight squats with band (10 x)
B. Lateral band walks (20 steps; each side)
C. Walking lunges – forward (10 steps; each direction)
D. Walking lunges – backward (10 steps; each direction)
E. Walking lunges – lateral (10 steps; each direction)

Plyometrics

(15 – 30 sec. REST between each exercise)
A. Lateral squat jumps over line (6 x)
B. Forward/backward squat jumps over line (6 x)
C. Squat jumps + 90 degree turn (3 x; each direction)
D. Lunge jumps (4 x; each side DO NOT ALTERNATE
E. 2 to 1 hop (4 x; each side)
F. Single-leg side-to-side hop (4 x; each side)

Agilities

(15 – 30 sec. REST between each exercise)
A. Forward run with three step deceleration (2 x; 5 yd. or 15 ft.; each side)
B. Three-step shuffle (2 x)
C. Zig-zag cutting (3 x; 5 yd. or 15ft.; each side)

Dynamic Warm-up

A. Single-leg RDL Stretch
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H. Normal Skip
I. Skip for Height
J. Backpedal
K. 75% Run

First, pull a resistance band around and just above your knees.

Lay on your side with your knees bent (approximately 90°, and hips flexed approximately 60-70°).

With your feet together and hips stacked on top of each other, raise your top knee up like a clamshell.

Start



End





DO NOT



** Make sure your top hip does not roll backward and your back does not arch as these are compensatory movement strategies. **

Pull a resistance band around and just above both knees.

Starting on your hands and knees (all fours), raise one leg at a diagonal while keeping your hips parallel to the ground.

Maintain a flat back and tight core.

Start



Hold





DO NOT



** Do not let your hips over rotate and your back arch **

Place a resistance band around and just above both knees.

Get in a plank position on your forearms.

Keep your abdominals and gluteals tight, while maintaining tension on the band.

The band will remain loose during the side plank.

Perform the plank and side plank combination on each side.

Front Plank



Side Plank



DO NOT

** Do not let your back or hips drop. **





Place a resistance band around and just above both knees.

Stand on one leg with your stance knee slightly bent.

Lift the opposite leg back at a diagonal (similar to the quadruped fire hydrant).

Hold







DO NOT

** Do not let your stance knee cave inward and keep your trunk forward. If you are unable to hold proper form with the band, do not use it. **







First, place a resistance band around and just above your knees.

Squat down so your thighs are parallel with the ground, while pushing your knees out against the band.

Keep your hips back, trunk forward, and weight through your heels.

Once you reach parallel, rise back to a standing position by pushing through your heels and squeezing your glutes.





DO NOT





** Do not allow your knees to go in front of your toes. **

Place a resistance band around and just above both knees.

Get into a semi-squat position by bending slightly at the knees.

Keep your hips back, trunk forward, and weight through your heels.

Push your knees outward against the band and step sideways for twenty steps.

Repeat this in the opposite direction, keeping your hips and core tight.

Start, During & End



DO NOT

** Do not allow knees to cave inward on either leg while sidestepping. **





Take a step and lunge forward, creating a 90° angle with your thigh and lower leg.

Keep your trunk forward and allow your back leg to drop straight down.





DO NOT





** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not allowing it cave inward. **

Take a step backward into a lunge position.

Keep your trunk forward. Push up through the heel of your forward leg and return to a standing position.





DO NOT





** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not allowing it cave inward. **

Take a step and keep your opposite leg straight.

Push your hips back and keep your trunk forward.

After you reach the lunge position, push through the heel of your lead leg and return to a standing position.





DO NOT





** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. Do not go lower than parallel. **

Start in a squat position.

Jump up and sideways over a line, landing in a squat position.

Make sure to land soft and quiet. Keep your trunk forward, knees bent, and hips back, just above parallel.

Jump side-to-side, landing on each side three times.

Start, Jump & End



DO NOT

** Do not allow your knees to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **





Start in a squat position.

Jump up and forward over a line, landing in a squat position.

Make sure to land soft and quiet, keeping your trunk forward, knees bent, and hips back, just above parallel.

Jump backward over the same line, again landing in a squat position.

** Do not allow your knees to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **



Start





Jump





End





Start in a squat position.

Jump up and turn 90° to one side while in the air.

Land in a squat position and immediately jump up and return to the starting position.

This counts as one repetition.

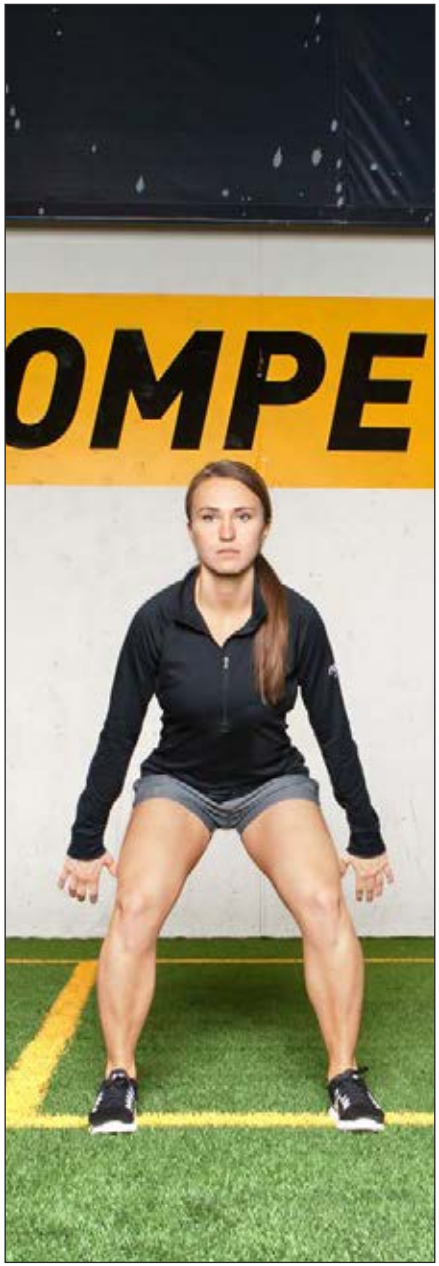
Perform three consecutive repetitions to each side.

Make sure to land softly during each jump.

** Do not allow your knees to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **



Start



Jump



Land



Start in lunge position.

Jump straight up into the air, pushing mostly through your front leg.

Land softly in the lunge position.

Perform this jump four consecutive times and then switch so your other leg is in front.

Start



Jump



Land



DO NOT

** Do not alternate legs. Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **





Start in a squat position.

Propel yourself forward
jumping off both feet.

Land on one leg, keeping your knee
bent, hips back, and trunk forward.

Hold this position for two sec. and
then go back to a squat position.

Perform eight jumps, landing
on each leg four times.

Start, Jump & End



Start



Jump



End



DO NOT

** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **







Standing on one leg, keep your knee bent, hips back, and trunk forward.

Hop up and sideways over a line, landing softly in the starting position.

Perform this hop four times on each leg.

Start, Jump & End



DO NOT



** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **

Run forward about five yd., or 15 ft., and use a three-step deceleration approach to stop.

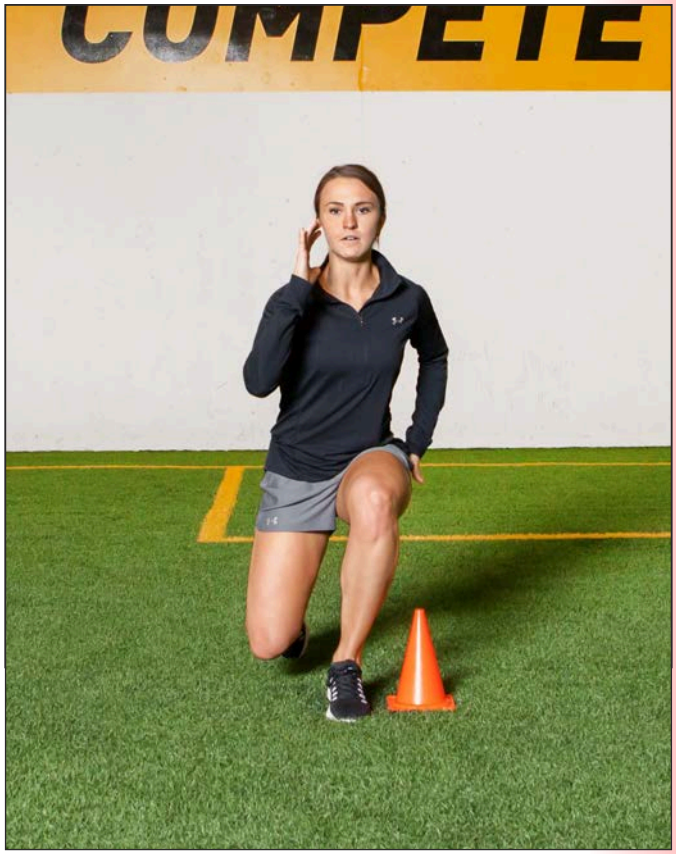
The three steps should be short and choppy.

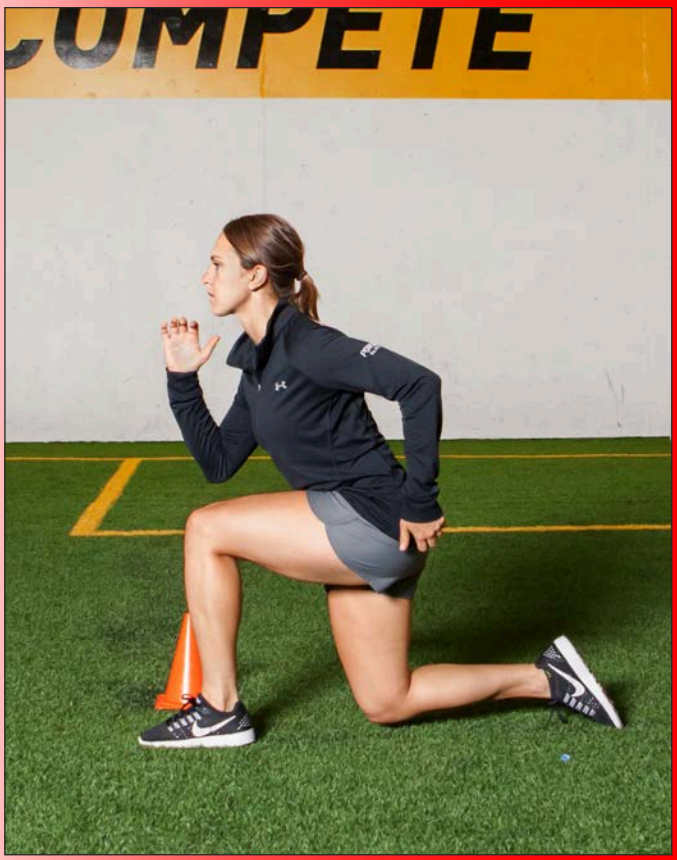
You will end with one leg in front of the other.

Your front knee should be bent, your hips should be back (just above parallel), and your trunk should be forward.

Backpedal to your starting location and repeat this movement.

After two repetitions, repeat the same movement with the opposite leg.





DO NOT





** Do not allow your knee to go in front of your toes and keep your knee pointed straight forward, not letting it cave inward. **

Start in an athletic position with feet positioned a little wider than shoulder-width apart.

Shuffle three times to one side, then change direction and shuffle three times the other way.

Make sure to stay low, keeping your knees bent, hips back, and trunk forward.





DO NOT





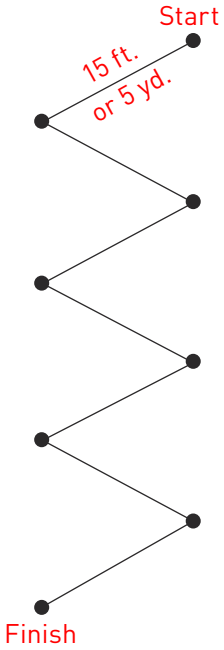
** Do not allow your knees to go in front of your toes and keep your knees pointed straight forward, not letting it cave inward. **

Run five yd., or 15 ft., in a diagonal direction toward the left or right.

Use the three-step deceleration technique to slow down.

Cut the opposite direction, pushing off your outside leg.

Run five yd., or 15 ft., in a diagonal direction to the opposite side and make another diagonal cut.







DO NOT





** Do not allow your knees to go in front of your toes and keep your knees pointed straight forward, not letting it cave inward. **

References:

1. Donnell-Fink LA, Klara K, Collins JE, et al. Effectiveness of Knee Injury and Anterior Cruciate Ligament Tear Prevention Programs: A Meta-Analysis. PLoS ONE. 2015; 10(12): e0144063.

2. Hewett TE, Myer GD, Ford KR, et al. Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: a prospective study. Am J Sports Med. 2005; 33:492-501.

3. Powers CM. The Influence of Abnormal Hip Mechanics on Knee Injury: A Biomechanical Perspective. J Orthop Sports Phys Ther. 2010; 40(2): 42-51

Disclaimer:

The information provided in this Sanford Knee Injury Prevention Program is for informational purposes only. This program should not to be used to determine whether any technique or exercise is appropriate for you and it is not a substitute for professional medical advice. Your provider may use different procedures, techniques, and exercises than those that are depicted or described in this program. Always contact your physician or other qualified health provider prior to starting any new treatment or with any questions you may have regarding a medical condition. The information provided is intended to be a general overview of the medical topic. This program does not constitute an attempt to practice medicine nor does it establish a doctor-patient or hospital patient relationship.

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014000-00428 4/16