

A Medical Approach to Sports Performance Enhancement

Part I: The Evaluation

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In recent years, much has been made of special programs to reduce injury rates for soccer athletes, with good reason. Injuries such as ACL tears, ankle sprains, hamstring strains, and low back pain occur at an alarming rate for athletes of all ages and levels.

Typically, injury prevention programs are designed to be short “add-ons” to warm-up, lifting, conditioning, or practice sessions, with little concern for improved performance. Or, they are short 4-6 week programs, leaving coaches struggling to find the best times during the year to perform such training and worrying about the health of their team between their training cycles. Overall, most of these injury prevention programs have achieved some level of success, educated a number of people on the importance of injury prevention, and saved thousands of athletes from pain and suffering.

We know that sports medicine professionals are concerned with injuries, but strength and conditioning coaches are looking for performance. Oftentimes, performance coaches have little desire to worry about injuries and feel that the suggestions provided to them for injury prevention are remedial and tedious for their purposes. Conversely, sports medicine personnel traditionally see the performance personnel as “meat heads” looking for more speed or weight at all costs. Thus, there is a tendency to dedicate blocks of time to warmup, prevention, power, strength, flexibility, etc.

Separating blocks of time and priority levels only serves to confuse athletes and waste valuable training time. Everyone is trying to get more training into their limited amounts of time while also attempting to promote recovery. This is true of the professional, collegiate and youth levels. By bridging the gap between sports medicine and sports performance enhancement, we can prevent injury and improve performance while maximizing the efficiency of training.

What is a medical approach to sports performance enhancement?

Simply put, it’s a technique for integrating traditional physical medicine techniques into strength and conditioning models to prevent injuries and increase performance. This includes:

- Examining rehabilitation philosophies for clues as to how to prevent injuries
- Neuromuscular education and re-education by cluing in on motor learning and neuro feedback loops
- Adapting known exercises to improve biomechanics
- Integrating simple, quick exercises into workouts for a more well-rounded workout
- Choosing and following appropriate exercise progressions

Integrating sports medicine concepts into strength and conditioning is not a new concept for many people. But, unfortunately this concept has struggled to take hold with the masses, due to a lack of knowledge and communication between sports medicine and strength and conditioning staffs.

Historically, sports medicine has been very good at very basic, controlled movements with either injured athletes or those facing extreme difficulty with athleticism. Conversely, many strength



Figure 1: The Athletic Continuum

coaches prefer to work with those athletes who can only do rather advanced, complex movements and workout schemes. Consequently, many underdeveloped athletes and/or athletes who have minor injuries fall somewhere between the two areas and never realize their full

potential. As illustrated in Figure 1,

every athlete falls somewhere on the athletic continuum. By closing the knowledge gap between the two areas of expertise, we can find talent otherwise unseen and turn them into great players.

Evaluation

The athletic continuum illustrated above is a great tool for understanding the knowledge base and potential gap, but it only works if you understand where your athlete(s) falls on the continuum. Thus, your ability to assess your athletes is the key to program design. After all, if you don't know your athlete(s), how can you prescribe workouts for them?

The evaluation process used at Missouri State University includes:

- Foot Biomechanical Analysis
- Lumbopelvic Biomechanical Analysis
- Functional Movement Screen
- Hop, Stop, and Leap Test
- iMETT Metabolic Analysis
- Vertical Jump
- 20 yard Dash
- 5-10-5 Agility Run
- Back Squat
- Bench Press
- Military Press

It isn't overly important exactly what tools you use to evaluation your athletes, as long as it is fairly comprehensive in nature and it gives you a good understanding of your athlete's strengths, weaknesses, and potential. Make it work for you and your athletes.

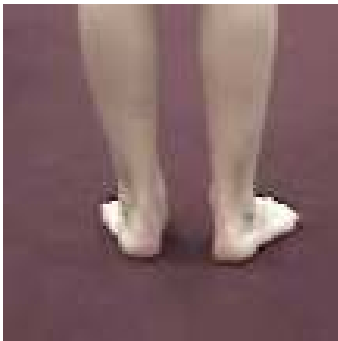


Figure 2: Pronation

Some areas of emphasis for our evaluation are:

Foot Biomechanical Analysis

During weightbearing and gait, you want to evaluate your athlete's pronation or supination. An athlete who pronates will have feet which flatten excessively (Figure 2). Another area to evaluate is their hip rotation while walking. An athlete who internally rotates at the hip will appear to have knees which face each other while walking.



Figure 4: Pronation & Hip Rotation while standing

This is important because the most common mechanism of injury for an ACL tear is foot pronation, hip internal rotation, and valgus at the knee (knock kneed position) (Figure 3). This is not to say that you need to stay awake at night worrying about an athlete that has any one of these biomechanical disadvantages. However, if an athlete presents to you with foot pronation and hip internal rotation (Figure 4), you may want to consider having them fitted for orthotic inserts in their shoes to block the pronation and eventual hip rotation and valgus.



Figure 3: Pronation, Hip Rotation, & Valgus while landing

This can be a very detailed process that may be best left to medial personnel for the decision on who and when an athlete should be fitted for such a device. However, a basic understanding of some risk factors will help you decide who gets referred for a further workup.

Lumbopelvic Evaluation

Another biomechanical evaluation is analyzing and recognizing possible deficiencies due to a leg length discrepancy and/or an unnatural positioning of the pelvis. Once again, a full understanding of the biomechanics of the pelvis is likely best left to medical personnel, but possessing the ability to perform a simple leg length evaluation will pay valuable dividends when trying to decrease the rate of lower extremity injury.

The evaluation begins with an athlete lying on their back on a table (Figure 5). Grasp both ankles and passively bend their knees, taking their knees to their chest (Figure 6). At that point, you will bring their feet flat with their knees bent at a rate greater than 45 degrees. Have the athlete raise their hips, bridging them as high off the table as possible (Figure 7). Have them relax and straighten their legs passively. With their legs completely relaxed, distract their legs and compare the leg length by looking at ankle bones on the inside of their legs (Figure 8).



Figure 5: Start Position



Figure 6: Knees to Chest



Figure 7: Hip Bridge



Figure 8: Distraction & Assess Leg Length



Figure 9: Leg Length Discrepancy

If at this point, the bones on the insides of the ankles don't line up (Figure 9), it is advisable to refer that athlete to your medical staff to assess the athlete further. This leg length discrepancy may be due to an anatomical leg length issue (one leg is actually longer than the other) or the athlete may have a condition with the alignment of their hips, causing a functional leg length discrepancy. Either way, an athlete with some sort of leg length problem is at a greater risk of injury, and/or will have the potential to have a decrease in performance due to an asymmetry in the body's neurological feedback loop.

Realistically speaking, it should not be expected that a coach will understand and possess the ability to correct all of these issues. However, it is important that you recognize those who are at risk for these issues and know when to refer to proper medical personnel.

Basic Movement Skills

It is highly recommended that an athlete's movement patterns be assessed in several ways to look at their ability to use their biomechanics in advantageous patterns for athletic movement. An excellent tool for assessing movement patterns in a controlled environment is the Functional Movement Screen™. This tool quickly and efficiently evaluates each athlete in seven distinct areas. It does a great job of helping each coach assess core stability, mobility, flexibility, and balance in a controlled environment. For detailed information on the Functional Movement Screen™, visit www.functionalmovement.com.

Another great tool for assessing movement is the Hop, Stop and Leap test. Made popular in recent years by Jeremy Boone, the Hop, Stop and Leap test assesses an athlete's ability to produce power and decelerate under control. Research shows that both power and deceleration have a large impact on both performance in soccer and ACL injuries. We utilize this test to aid in evaluating an athlete's ability to move functionally in a more uncontrolled environment which tends to be more sport specific. For more information on this test, visit www.athletebydesign.com.

Keep in mind that it is not pertinent that you perform these specific tests. However, it is very important that you perform some sort of evaluation process to address biomechanics, controlled functional movement, power development, and deceleration in addition to the traditional in-the-field tests that virtually every coach has performed for years. The evaluation process is very crucial and its importance cannot be minimized. Remember, the more that you know about your athletes and their abilities, the better equipped you are to prescribe workouts.

Part II of the "Medical Approach to Sports Performance Enhancement" will discuss programming to correct deficiencies based on the evaluation and proper exercise programming to improve functional performance and decrease injury.