



# **The Ultimate Guide to Soccer Safety**

*For Players, Parents and Coaches*

*Developed by Goal-Tek Innovations <sup>Ltd.</sup>  
Tested and Approved by Soccer Moms*

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**“An ounce of prevention is worth a pound of cure”**

## **Introduction**

As a physiotherapist, soccer player and coach, and as the Director of Goal-Tek Innovations, I have a long standing interest in soccer safety, especially when many injuries and illnesses can be prevented. I have done my best to make this book comprehensive yet I still consider it a work in progress. Only when we have received feedback and contributions from members of the soccer community will we achieve the goal of creating the world's best work on soccer safety.

This book is available to all, for the benefit of players, parents, coaches and trainers throughout the soccer world. As updates and new information become available, the Ultimate Guide to Soccer Safety will grow and change as well.

A little about my background - I trained in physiotherapy at the University of British Columbia. I am a registrant of the Canadian Physiotherapy Association and the Canadian Academy of Manipulative Therapists. I am certified with the National Strength and Conditioning Association as a strength and conditioning specialist and also with the Institute for the Study and Treatment of Pain using the treatment method called Intramuscular Stimulation.

I have served as Chief Therapist for a number of national and international games. I also worked as a physiotherapist for the Al-Ittihad Team of the Libyan professional soccer league. This team was owned by the well known Saadi Ghadaffi, professional soccer player in Africa and Italy, and the son of Libyan leader Moammar Ghadaffi. The coaches for Al-Ittihad included Giuseppe Dossena, former World Cup winner, and Gaetano Colucci, trainer for Italian giants AC Milan and Roma. Saadi was and is a true soccer fan and also part owner of the Italian clubs Lazio and Juventus. This wonderful soccer experience included opportunities to train and work in some of the top clubs in the world. From a medical point of view the greatest learning experiences came from Germany while working with the famous Dr. Muller-Wohlfahrt of Bayern Munich and the German National Football Team.

In this book you will learn some of the obvious and, the not so obvious, risks associated with the game of soccer. I hope, by the end of this book, that you find it both enjoyable and informative. Again, I invite the input, comments and ideas from players, parents, coaches, trainers, physicians and soccer administrators so that the next edition might be even better than the current one.

So please, read, learn, contribute, enjoy. Let's improve soccer safety together.

Yours in Sport,

JR Justesen

## Contents

	<b>Introduction</b>		
<b>1</b>	<b>Hydration for Health and Performance</b>	Once the athlete, parent, and coach determine the fluid needs of the individual, they have accomplished the single most performance-enhancing aspect of sport nutrition.	<b>4</b>
<b>2</b>	<b>Water Bottle Safety</b>	Water bottles are exposed to many potential contaminants. Serious illnesses can be transmitted by sharing water bottles and by leaving water bottles on the ground.	<b>9</b>
<b>3</b>	<b>Head Protection</b>	There are as many concussions in soccer as there are in American Football. Chapter includes concussion signs and when to refer to the doctor.	<b>11</b>
<b>4</b>	<b>Grass Field Hazards</b>	Bacteria, fertilizers, pesticides and lime field markings pose serious risks to players everywhere. Read the lab report on grass field samples.	<b>16</b>
<b>5</b>	<b>Turf Field Hazards</b>	Turf fields are faster than grass and have more grip on the soccer cleat. We also provide independent lab results from turf field samples.	<b>19</b>
<b>6</b>	<b>Shin Pads and Boot Selection</b>	At some point while playing soccer, someone will kick you in the shins and you will be glad to have shin pads.	<b>22</b>
<b>7</b>	<b>Hot Weather Conditions</b>	Signs and symptoms of heat exhaustion and heat stroke plus guidelines for preventing heat injuries.	<b>26</b>
<b>8</b>	<b>Cold Weather Conditions</b>	Identifies risk factors for cold weather as well as practical tips on keeping warm and preventing hypothermia.	<b>29</b>
<b>9</b>	<b>Soccer Goal Safety</b>	At least 120 deaths and over 100 treated in hospitals each year from falling soccer goals.	<b>32</b>
<b>10</b>	<b>Stretching: When, Why, How</b>	Stretching principles will vary for the warm-up, the cool down and when the goal is to lengthen tight or imbalanced muscle groups.	<b>37</b>
<b>11</b>	<b>Soccer Injuries</b>	The basics on what to watch out for, when to refer, early management and general return to play guidelines. Also a section on the risk of being a female soccer player.	<b>41</b>

12	Miscellaneous Soccer Safety Tips		47
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## 1. Hydration for Health and Performance

### “Water is the athlete’s most important nutrient”

The heading says it – Once the athlete, parent, and coach determine the fluid needs of the individual, they have accomplished the single most performance-enhancing aspect of sport nutrition.

Even a 1-2% fluid loss can cause significant performance deterioration by increasing core body temperature and causing early fatigue. A 3-5% fluid loss increases stress on the heart and decreases the ability to dissipate heat. By 7% collapse is likely, and the signs and symptoms of heat illness will be evident and the risk of heat stroke and catastrophic complications can follow. It is not uncommon for players to dehydrate 2-6% during practice in the heat.

While training in Libya the players observed the Muslim belief in abstinence during Ramadan. During this time, they neither eat nor drink during the day. Professional soccer training is intense and during some of our two a day practices I could see many of the players lose coordination, speed, ball touch and intensity. At times even their speech became somewhat slurred. When they broke the fast with water, milk and dates it was like lifting a veil of haze away from the players. Their eyes became clearer and their ability to focus improved noticeably within just a few minutes. I was amazed at the profound effects dehydration and lack of fuel during the day had on the body during soccer training.

Rehydration with water alone may not be enough for the soccer player. Electrolytes play a role in the distribution of water throughout the body and also with muscle contraction and nerve conduction. Electrolytes are essentially tissue salts such as sodium, potassium, chloride and magnesium. Carbohydrates are sugars that the body requires for fuel during activity. Research shows us that the amount of carbohydrate in the drink has an effect on how quickly it is absorbed by the body.

In the 1970’s, an English physiotherapist gave his team either water or a sport drink with a crazy amount of carbohydrate (46% concentrated glucose syrup). He found that when the team drank the supplement rather than just water, they scored more goals, gave up fewer goals, and had more ball touches and more shots on goal, especially in the last one third of the game.

Twenty players from the Sao Paulo Futebol Clube were divided into two groups – one group played a soccer game without ingesting any additional fluids (as was their normal practice) and the other half drank a sports drink with 6% carbohydrate-electrolyte mix every 15 minutes throughout the game. The group who drank lost less body weight and performed more sprints than the non-drinking group. The group who drank also had lower body temperatures and lower heart rates than the non-drinking group although these values were not statistically significant.

In a smaller study, 9 players drank either a sport drink (6.9% carbohydrate) or a placebo. The players drank 5 ml of fluid for every kg of body weight, and another 2ml/kg every 15 minutes afterwards. Players did performance tests 7 days apart: when they consumed the carbohydrate

beverage they ran 33% longer than when they drank the placebo. Another study showed a 37% improvement in time to fatigue during running, a faster 20 m. sprint during the last 15 minutes, improved motor skills near the end of exercise, and a lower perception of fatigue.

#### **Signs of Dehydration:**

- Reduced endurance
- Earlier onset of fatigue
- Less alert or difficulty with concentration
- Muscle cramps
- Heavy sweating
- Increased heart rate
- Decreased skin elasticity
- Player's urine darker than a pale yellow

Prevention is better than cure as the saying goes. A soccer player should ensure proper hydration of the body begins at least 24 hours before training or game day.

If your player does become dehydrated or starts getting muscle cramps then get them off the field and try to rehydrate them with a sodium containing fluid, plain water, or a very diluted sports drink. Usually, by the time muscle cramps begin, the player is pretty far gone and will often have recurring cramps until removed from the field and rehydrated.

After dehydration, and depending on conditions, heat exhaustion can occur. This is a more serious matter (details in Chapter 8).

#### **How Much Should the Athlete Drink?**

The simplest way to evaluate an athlete's hydration status is to monitor the color of his or her urine. A pale yellow color indicates adequate hydration while a darker color similar to apple juice indicates dehydration. This should be monitored well before the day of competition to determine one's individual hydration requirements. After a few weeks the athlete can note a pattern and approximate sweat rate per hour.

The preferred method of determining an athlete's hydration needs is to weigh the athlete before and after a practice or game. Sweaty clothes should be removed before weighing. The Sports Medicine Committee for US Soccer recommends that athletes should aim to drink enough fluid so that their body weight after the workout is within 1 kg (2.2 lb) of their starting weights.

To replace the water, drink one pint of fluid for every pound lost. (One pint = 16 ounces = 500 ml = 0.5 liters). It is critical to replace the water loss as quickly as possible. Before the next workout, bodyweight should be back up to the baseline level.

There is a formula for fluid ingestion although it is always better to determine individual needs. The general formula for daily water intake is as follows:

- **1/2 ounce of water per pound body weight (normal activity)**

**Or**

- **2/3 ounces of water per pound body weight (for athletic individuals)**

Remember that fluid requirements will go up further as the relative humidity and temperature go up, as exercise intensity increases, in windy conditions, at altitude, and if the athlete wears additional layers of clothing; relatively unfit individuals will require more fluids than fit individuals. It is also important to remember that most foods contain water and all drinks contain water (Sport

drinks are 94% water, milk is 90% water, juices are about 89% water). **Once again, water is the athlete's most important nutrient.**

### **The Young Athlete**

Proper hydration is essential for the safety of active children. A child's body surface area makes up a much greater proportion of his overall weight than an adult's. Children do not regulate body temperature as efficiently as do adults. Therefore, active children are more susceptible to heat stress and illness. Heat injury, usually complicated by dehydration, is one of the most common sports injuries among kids, but is the most preventable.

Children should be encouraged to drink fluids frequently during activity – even though they may not be thirsty. A general guideline is that kids under 90 pounds should drink 3-6 ounces of fluids 1 hour prior to activity and 3-5 ounces of fluids every 20 minutes during activity. Kids greater than 90 pounds should drink 6-12 ounces an hour before and 6-9 ounces every 20 minutes during the activity. After activity, the young athlete should drink 16 ounces (1 pint, or 0.5L) for every pound of body weight that is lost. Again the important message here is that pre- and post-workout body weights or urine observations should be considered early on so that individual fluid needs can be assessed.

### **Don't Rely on Thirst**

Athletes do not drink enough fluid when they rely solely on thirst. This phenomenon is called **voluntary dehydration** and although it is not totally understood why the thirst mechanism does not keep up with demand, it is clear that performance suffers if the athlete is allowed to dehydrate during activity

**A regular hydration schedule should be implemented for all teams so that athletes fall into the hydration habit.**

### **Is There Such Thing As Too Much Water?**

Hyponatremia means a low concentration of sodium in the blood. This is a relatively rare condition where sweat (water and salts) is replaced by water (no salts), causing an eventual decrease in salt concentration. This condition is probably most often seen in ultra endurance events such as triathlons and marathons. One estimate places 30% of Hawaii Ironman finishers as being both dehydrated and hyponatremic. This is one of the foundations for athletes taking sport drinks as their method of rehydration.

Symptoms of hyponatremia may include: muscle cramps, swelling of the hands and feet, nausea, disorientation, confusion and slurred speech. Progression can be life threatening. These symptoms are similar to heat stroke and simply drinking water can actually worsen the condition. The main difference between the two conditions is in core body temperature which will be elevated during heat stroke (> 40°C or 104°F) while is less than 40°C during hyponatremia.

### **Sport Drinks**

Depletion of the body's carbohydrate stores and dehydration are the two main factors that will limit prolonged exercise. The higher the carbohydrate levels in a drink the slower the rate of stomach emptying. Isotonic drinks with a carbohydrate level of between 6 and 8% are emptied from the stomach at a rate similar to water. Electrolytes, especially sodium and potassium, in a drink will reduce urine output, enable the fluid to empty quickly from the stomach, promote absorption from the intestine and encourage fluid retention.

According to Carol Rodgers of University of Toronto's Faculty of Physical Education and Health, these people may have the right idea. "Sports drinks do help to delay fatigue symptoms." Sports

drinks were originally formulated to enable people to rapidly replenish the fluids and electrolytes lost through sweating during activity, she says. "So, the most common sports drinks on today's market contain a combination of electrolytes such as sodium, chloride, potassium and magnesium, various forms of sugars at a five to eight per cent concentration, and flavoring."

For energy replacement, it is the sugar, or glucose component of the drink, that is the most important. "Glucose is the primary source of energy for the brain, red blood cells and parts of the central nervous system," she says. "If glucose is low, it can cause dizziness, fatigue and mood changes." But in exercise, she notes, glucose is taken up from the blood plasma into the working muscles, forcing the liver to then break down its stored glucose (glycogen) and release it into the plasma.

Eventually, as the liver's glycogen stores become depleted, fatigue sets in and there is a decrease in the ability of the individual to continue exercising. "Glucose from sports drinks raises the blood glucose level of the body, in turn helping to maintain liver glycogen stores and preventing fatigue."

Rodgers also notes that while sports drinks were originally thought to benefit only those involved in activities of a long duration (where there would be sufficient decreases in liver and muscle glycogen), recent research suggests that the drinks may also help to maintain exercise intensity during short-term and "stop-and-go" activities. "Consuming a sport beverage during team activities such as basketball, hockey and soccer may help athletes to perform at a higher intensity after breaks as well as possibly result in a greater overall level of performance.

However, Rodgers warns, sports drinks are not a good replacement for plain water when athletes are overheated and dehydrated. "During activity in hot environments - when fluid replacement is essential to ensure that dehydration does not occur - consuming water or a diluted sports drink is your best choice."

Rodgers offers some tips for first-time sports drink consumers. "First-time users of sports drinks often find them too sweet, so it's good to dilute them by 30 or 50 per cent. A diluted drink still provides some of the energy benefits as well as more flavor than water alone."

### **Homemade Isotonic Sports Drink Recipes**

#### **Drink one: No Frills**

- 5 tablespoons of table sugar
- 1/3 teaspoon of salt
- 1 liter of water

#### **Drink two: Fruit Academy**

- 200ml ordinary concentrated fruit juice
- 800ml water
- A pinch of salt

#### **Drink three: Sport Academy Thirst Burst**

- 500ml unsweetened fruit juice (orange, apple, pineapple)
- 500ml water

Mix them all together in a jug and cool down in fridge.

**Conclusions and Recommendations:**

- Once the athlete and coach determine the fluid needs of the individual athlete, they have accomplished the single most performance-enhancing aspect of sport nutrition.
- Begin prehydrating the body at least 24 hours before the activity begins. Continue prehydration by drinking 5 ml. per kg body weight 1-2 hours before the game.
- Establish a hydration schedule for regular fluid replacement during games and practices. If possible 5-6 sips (or 2 ml/kg) every 15 minutes is ideal.
- After the game replenish lost fluids, electrolytes, and carbohydrates as quickly as possible.
- Weigh athletes before and after activity to determine individual fluid replacement needs.
- For every pound lost during activity, drink 1 pint or 500 ml. of fluids.
- Keep water bottles and/or sport drinks close by so athletes can easily hydrate during activity or competition.
- Educate athletes and coaches regarding the prevention, recognition and treatment of dehydration and heat related illnesses.



## 2. Water Bottle Safety

**“Hey look at that dog peeing on the sideline over there!”**

Well we have just established how important it is to maintain proper hydration. Now how do we prevent contamination or illness through the water bottles themselves?

### Sharing Water Bottles

Everyone knows that this practice is a no-no yet there are still teams who use a 6 or 8 pack of water bottles for all the players to share. Sharing water bottles can lead to transmission of a number of dangerous viruses, as well as relatively benign cases of colds and flu. One soccer mom just told us how her daughter caught “mono” from sharing her water bottle with another player (Mononucleosis is a virus that causes fever, fatigue, headache, lymph node enlargement, liver and/or spleen enlargement. Mono stays with a person for life).

### Reusing Water Bottles

Germs from your saliva thrive in room temperature water where they can multiply rapidly and cause disease. You may think that you are doing an environmental service by reusing your player's water bottle but consider that a study of water bottles at a Calgary elementary school found bacteria in kids' bottles that would prompt health officials to issue boil-water advisories, had the samples come from a tap. Researchers discovered bacterial contamination in about one-third of the samples collected from kids' water bottles at the school. Some samples even showed evidence of fecal coliforms (microorganisms found in human and animal excrement).

If your water bottle is intended for reuse then wash it well after each use in warm sudsy water then rinse it very well afterwards.

### Travel and Water Bottle Safety

Nothing ruins a good trip like getting sick. The more common bacteria found in water include the infamous E-Coli and Salmonella, but bugs can also include protozoa, viruses, and chemical pollutants. The best way to protect players is to drink bottled water over tap water. Bruce Wilson, University of Victoria Men's Soccer Coach says **“When traveling, if you don't open it, you don't drink it. It's not worth the risk.”** If bottled water is not available then boiling water for 5 minutes usually kills most the micro-organisms.

When we trained in Africa and whenever we traveled to train or play, the team always kept an enormous supply of bottled water. They never took the chance that the tap water was clean and drinkable. Each player received a bottle whenever he wanted, though many times they took a drink then threw the bottle down on the grass – lots of water was wasted this way but many water borne illnesses were probably prevented as a result of the practice.

### Keep Water Bottles Clean

I cringe every time I see players throw their water bottles on the ground as the field itself may be a serious source of contamination and disease. I will allow my bias to show here and suggest that players keep their drink bottles in the Hydration Station system by Goal-Tek Innovations [www.goal-tek.com](http://www.goal-tek.com). These Stations hold the players' water bottles so that they stay safe, clean, organized, and nearby. Coaches can keep the Station in the technical area as a meeting place during water breaks and can also move the Station around so that water is close to the players at all times.

An independent lab looked at levels of micro-organisms in both grass and turf soccer fields. We present the results of this study to you in the chapters on Grass Field Hazards and Turf Field Hazards.

**Players should not ever leave their water bottles** in the grass, dirt, or turf. These findings really shocked us – we liken a drink bottle left on the soccer pitch to leaving it on the bathroom floor, or worse. Goaltenders often leave their water bottles right near one of the goal posts. Our experience has shown that the soccer goal area is the most likely area to find contaminants varying from dog droppings to cigarette butts. I invite other clubs to test random samples from the technical areas of their grass or turf fields – send me the results and I will add them to the database for the next edition of this book. We took the field samples from the technical area and the goal area of each park as these are the areas where most players leave their bottles and gear on the ground. For the sake of consistency we ask that others test their fields in a similar manner.

### **Are Plastic Bottles Safe?**

Makers of Lexan water bottles received a bad reputation and have been embroiled in a controversy for the past two years, ever since a researcher at Case Western Reserve University said they may pose health risks. The researcher found that Lexan bottles leached a chemical called bisphenol A (BPA) into the water of lab rats. This chemical is a nasty one and has been associated with breast cancer and birth defects. On closer reading, the lab workers washed the bottles with harsh detergent and hot water (perhaps not unlike the average dishwasher). Like any material, plastic does degrade over time; you can see this in polycarbonate bottles when they become cloudy or faded in appearance. If you notice any change to the material, or if a bottle gives off a distinct plastic taste, it should no longer be used.

To minimize the threat of the material breaking down, some companies recommend washing bottles only with warm, soapy water and never subjecting them to a dishwasher. Microwaves are another no-no. And if any chips or cracks appear in the material, it's time to throw them out in favor of a new plastic, aluminum or stainless steel drinking container.

### 3. Head Protection

**“There are over 50 concussion management guidelines produced. The one common theme agreed upon by all is that no player who demonstrates any signs of concussion should be allowed to return to the field of play”**

Head injuries occur in soccer and are reported to comprise anywhere from 4% to 22% of soccer injuries. Most of them occur from head to player contact, followed by head to ground contact, head to ball contact, and head to goal post contact. Most head injuries are not noted to occur due to purposeful heading of the soccer ball although players can certainly receive head injuries if accidentally struck by the ball.

Some studies suggest that of adult players who frequently head the ball, up to 81% of them may suffer from some type of neurologic complaint such as decreased memory, attention, and concentration. Forwards and defenders tend to head the ball more often than midfielders and goalkeepers. Researchers cannot agree, however, that correct heading of the soccer ball causes any damage to players heads or brains. Many of the previous findings may have been caused by concussion rather than repeated heading of the ball.

A study in the Journal of the American Medical Association (JAMA) has raised new concerns about the practice of "heading" a soccer ball. A group of 33 young adult amateur soccer players in the Netherlands submitted to more than a dozen tests designed to measure various brain functions. The results were compared to those of a control group of runners and swimmers. The findings:

- 39% of the soccer players had an impaired performance on tests measuring planning abilities, compared with 13% of the control athletes.
- 27% of the soccer players, compared with 7% of the control athletes, had an impaired performance on memory tests.
- Concussions were frequent; 27% had one concussion due to soccer play; 23% had two to five concussions over the course of their years playing the sport.





The conclusions:

"Participation in amateur soccer is associated with decreased performance on tests of memory and planning. Although cognitive impairment appears to be mild, it presents a medical and public health concern... Methods for surveillance and prevention should be developed and adopted to maximize safety."

This was a small study with only a few soccer players but the findings should raise some eyebrows and instigate further studies in the area. I hope that at the very least all coaches will take training progressions for young players very seriously when it comes to learning to head the ball.

Heading a soccer ball is a difficult task for which most coaching books have players at least 12 years old before beginning the training progression. The importance of preparing the head for contact cannot be overstated. This preparation requires in part neck and torso strength and in part precision timing which depends on skillful coaching. The discussion of heading progression drills is beyond the scope of this book but the following neck exercises can help strengthen a player's neck muscles to protect the head and neck from concussions or other injury.

### Neck Exercises

Exercise	Instructions	Picture
<b>Lateral neck resistance</b>	Hold one hand against the side of your head. Use your hand to resist the movement as you try to touch your shoulder with your ear. Hold this posture for a count of 5.	
<b>Front of neck resistance</b>	Hold one or both hands against your forehead. Try to move head forward, but resist the movement with your hands. Keep the chin tucked throughout. Hold this posture for a count of 5.	
<b>Back of neck resistance</b>	Place both hands behind your head. Try to move head backwards, but resist the movement with your hands. Don't tip the chin upwards. Hold this posture for a count of 5.	
<b>Rotational neck resistance</b>	Hold one hand against the side of your head. Use your hand to resist the movement as you try to rotate your head to one side until your chin is lined on top of your shoulder. Hold this posture for a count of 5.	

### Soccer Balls

Soccer balls should be kept in good condition and allowed to dry if they get wet. We suggest teams use soccer balls made of waterproof or water resistant materials rather than leather due to the increased weight and safety risk of a heavy, water logged soccer ball. Water logged soccer balls can be 20% heavier than a dry ball.

The panels of the ball should be firmly stitched. If one of the panels comes loose and the ball is kicked with a spin on it, the loose flap can catch someone in the face or eye.

FIFA has set safety standards for size 4 and size 5 soccer balls. These standards include pressure (0.8 bar, or 11-12 pounds per sq inch). This said, when learning heading, either pressure should be released from the balls or a softer, lighter ball should be used to teach the skill.

In my experience, the moment when the ball strikes the player rather than the player striking the ball, accounts for most soccer ball related injuries. I was present at one particular match when a player seemingly lost track of the ball in the tussle with his opponent. The ball struck this player's head causing him to stop momentarily. He was substituted from the game but after a few minutes he lapsed into unconsciousness. Their trainer initiated the emergency action plan but by the time the specialists controlled the bleeding inside this young man's head, he suffered serious and permanent brain injury.

### **Goal Post Safety**

Collision with a soccer goal post can cause serious injury. In fact, fatalities in soccer are almost exclusively associated with traumatic contact with the goal posts. Some companies now make padding for the posts. Current designs have a fairly thin, high density padding to improve player safety while allowing the flight of the ball to continue uninterrupted. Although only a few teams use the goal post pads, there seems to be a definite trend towards improving player safety.

Anyone observing a corner kick will agree that the goal area can be a busy space. As players jockey for position and converge on a crossed ball, the risk of contact with one of the posts goes up dramatically.

Falling soccer goals have caused 31 deaths since 1979 and account for approximately 90 emergency room head injury visits per year. All movable goals should be anchored. No player should be allowed to climb on soccer goals. A full chapter is devoted to the area of soccer goal safety in Chapter 10.

### **Concussions**

Concussions represent one of the scariest injuries for player, parent and coach alike. Any potential head injury must be treated seriously as complications can be catastrophic. Concussions also represent the greatest number of head injuries. Return to play guidelines are numerous but their common thread of agreement is that all the signs and symptoms of a concussion should be cleared before the athlete is allowed to return to play.

Concussions are now more loosely defined as “a temporary disturbance of brain function due to a head injury.” Symptoms are quite diverse and the onset is not always immediate. Symptoms can last for hours, days, weeks, or even months.

#### **How to recognize signs:**

Confusion and memory loss are the two most common signs. Memory loss might be seen as a loss of memory of the events leading up to the injury or it may present as a loss of memory from the injury onwards. This list from the Mayo Clinic illustrates some of the additional signs to watch for:

- Headache;
- Dizziness;
- Ringing in the ears;
- Nausea or vomiting; and
- Slurred speech.

Some symptoms of concussions don't appear until hours or days later. They include:

- Mood and cognitive disturbances;
- Sensitivity to light and noise; and
- Sleep disturbances.

Head trauma is very common in young children. But concussions can be difficult to recognize in infants and toddlers because they can't readily communicate how they feel. Nonverbal clues of a concussion may include:

- Listlessness, tiring easily;
- Irritability, crankiness;
- Change in eating or sleeping patterns;
- Lack of interest in favorite toys; and
- Loss of balance, unsteady walking.

#### **When to refer to the doctor:**

This advice is also directly from the Mayo Clinic:

While most concussions get better on their own, some blows to the head can cause more serious injuries. You should seek medical advice if you have any of the following symptoms:

- Loss of consciousness requires medical advice while prolonged loss of consciousness requires immediate transport to the hospital;
- Prolonged headache or dizziness;
- Vision disturbances;
- Nausea or vomiting;
- Impaired balance;
- Prolonged memory loss;
- Ringing in the ears; and
- Loss of smell or taste.

**Any child who has lost consciousness after a blow to the head should be seen by a doctor.** Other warning signs of a potentially serious injury include persistent vomiting, seizures, or a large bruise on the scalp. In general, a bruise on the front of the head is less dangerous than one on the side or back of the head.

#### **When to return to play:**

There are over 50 concussion management guidelines produced. It is difficult enough for the clinician to decide, let alone the parent or player. **The one common theme agreed upon by all is that no player who demonstrates any signs of concussion should be allowed to return to the field of play.**

Healing and recovery take time! Players who suffer repeated concussions may also suffer cumulative brain damage.

#### **Prevention:**

Though rarely seen in the modern game of soccer, more players are wearing head protection. The company called Full90, [www.full90.com](http://www.full90.com) are the leaders in protective headgear – their site also features a monthly newsletter devoted to soccer head injuries. FIFA has approved the use of

headgear while playing. I can imagine a day when all players wear head gear as a normal part of the game.

## 4. Grass Field Hazards

**“Everyone loves a lush green soccer pitch but at what cost?”**

### Field Checks

One of the biggest hazards in outside field sports, yet often the most overlooked, is the field itself. One quarter of soccer injuries result from poor field conditions.

Take responsibility for checking the field even though the referee is the one who should do so before each and every game. Unfortunately, as can happen in minor and senior soccer, the referee barely arrives at the field in time for the game and only manages a quick check of the field for safety.

Coaches are too busy. The coaches are so busy getting their team ready to play and giving last minute instructions that they also don't have time to check the field for holes, puddles, broken glass, stones, or other debris. Most coaches are happy to leave this task to the referee, so they don't bother to check the field themselves.

We live in a beautiful city yet some of the items I have seen removed from soccer fields over the years are truly frightening. One year, while coaching, I was stuck with what turned out to be a blood testing needle. Six months and two HIV tests later I learned the value of performing a general field check before playing.

### Bacteria and Microorganisms

The following bacteria were found in field samples taken from local Victoria soccer pitches:

#### Grass Fields

Contaminant	Levels Detected		Comments
<ul style="list-style-type: none"> <li>Staphylococcus Aureus</li> </ul>	Field 1	<ul style="list-style-type: none"> <li>None detected</li> </ul>	<ul style="list-style-type: none"> <li>Staph A. is the most common cause of skin infections. These bacteria can cause a range of illnesses from mild skin irritation to abscesses, pneumonia, meningitis and even toxic shock. Staph A is also one of the more resistant bugs to treatment by antibiotics.</li> </ul>
	Field 2	<ul style="list-style-type: none"> <li>23,520</li> </ul>	
<ul style="list-style-type: none"> <li>Pseudomonas Aeruginosa</li> </ul>	Field 1	<ul style="list-style-type: none"> <li>684</li> </ul>	<ul style="list-style-type: none"> <li>P aeruginosa typically infects the respiratory tract, urinary tract and wounds that break the skin. Can lead to blood infections. P aeruginosa is naturally resistant to many antibiotics.</li> </ul>
	Field 2	<ul style="list-style-type: none"> <li>94,080</li> </ul>	
<ul style="list-style-type: none"> <li>Enterococci (fecal Strep)</li> </ul>	Field 1	<ul style="list-style-type: none"> <li>3420 to 14,994</li> </ul>	<ul style="list-style-type: none"> <li><b>684</b> times the suggested maximum exposure.</li> </ul>
			<ul style="list-style-type: none"> <li>Enterococci each year account for over 40,000 wound infections. They are also among the most</li> </ul>



	Field 2 • 14,994	• That's almost <b>3,000</b> times the suggested maximum exposure.	antibiotic resistant of all bacteria with some strains resistant to all known antibiotics.
• Fecal Coliform	Field 1 • 411 colony forming units/gram	• <b>20.5</b> times the suggested maximum exposure.	• Fecal coliform are passed through human and animal excrement.  • <u>Treated sewage</u> levels must not exceed 200 colonies per 100ml of water.
	Field 2 • 734 colony forming units/gram.	• <b>36.7</b> times the suggested maximum exposure.	

### Fertilizers

Many grass fertilizers contain nitrogen to help the root strength of the grass and to give it a greener color. These compounds can be deadly to pets and are also potentially dangerous for soccer players as well.

Some grass fertilizers also contain toxic heavy metals.

In 2005, Dr. Richard Ash, M.D., pleaded for an end to the needless exposure of athletes to sport field toxins. He cited numerous potentially serious health problems including “skin and eye irritations, digestive problems, asthma attacks, rashes and other allergic reactions, as well as the unknown.”

We wanted to have the grass field samples tested for fertilizers as well as microorganisms but our budget would not allow for this testing. Everyone loves a lush green soccer pitch but it may come at a cost to the health of the players.

### Lime

Burns experts are calling for a ban on lime-based markings on sports pitches. The move follows an incident during a soccer game in Wales in which a goalkeeper was seriously burnt by the corrosive alkali as he made a goal-line save—and fell directly onto fresh lime markings.

Although hydrated lime—calcium hydroxide—is only used rarely, owing to its known dangers, it is still used on some pitches, says Derek Walder, a consultant to Britain's Institute of Groundsmanship. “There are probably a lot of amateur clubs that still do it,” he says.

A team led by Viswanathan Narayanan at the Welsh Centre for Burns and Plastic Surgery at the Morriston Hospital in Swansea report in a recent edition of the journal Burns that the goalkeeper's lime burns covered 5 per cent of his body. He needed surgery to excise dead skin and to apply skin grafts.

### Pesticides

Pesticides are used for insect control on many grass fields. Pesticides and other harmful and non-organic growing agents affect our children and pets.

To reduce pesticide exposure to children, more than 30 states have moved to curb pesticide use at schools. Many of these schools follow a set of guidelines known as Integrated Pest Management (IPM), which calls for monitoring pest problems, addressing the cause, using non-chemical suppression techniques, and, if other methods fail, using the least-toxic type of pesticide.

One organization called the Northwest Coalition for Alternatives to Pesticides, <http://www.pesticide.org/pfpreport.pdf> offers a report that summarizes the hazards of pesticides and offers simple advice for communities to keep parks safer.

We are looking forward to an individual or group to do more research in this area. We can test local fields in various locations or else we could look at various types of fertilizers in known use on the soccer fields and then analyze those for toxicity.

### **Light Standards**

Interestingly, while the lighting is being provided to allow players to play and enjoy the game, this becomes a secondary concern to the safety aspects of providing appropriate lighting for the participants to safely run on a typically uneven surface and avoid collisions with fast moving people, the ball, or any objects such as goal posts, and training aids. Also if the standards are located too close to the playing surface, this creates a major hazard to the players and fans alike. Often players are running at full throttle near the sideline and one well placed nudge can send them flying into objects and or people placed near the sidelines. Last season, two players were tackled directly into light standards at one of our local soccer pitches. These standards are less than two feet from the field sideline. We approached the club but no action was taken.

I have also found that sports bags are a major hazard. Players often leave them close to the field so they can easily reach their water bottle. This can result in players tripping over them as they are tackled on the sidelines.

### **Soccer Goal Anchors**

Soccer goal anchors should always be used to prevent movable goals from tipping. Most of these anchors, however, are essentially long spikes that can come dislodged or remain forgotten in the grass for a player or lawnmower to come across. Players sliding into metal goal anchors can receive serious cuts. An industrial lawnmower can send a metal anchor flying. One park supervisor noted that the mower severed one of these spikes, causing the jagged metal piece to fly through the air: "Fortunately this piece of metal did not strike or impale anyone. The mower operator combed the area to find this piece along with retrieving the piece still in the mower. Both the detached piece and large piece were torn and each had a very sharp portion which if stepped or fallen upon would have injured someone."

More on soccer goal anchors and soccer goal safety is found in Chapter 9, Soccer Goal Safety.

## 5. Turf Field Hazards

**“There may be more to turf field installation than meets the eye”**

### Injuries

In 2006 the British Medical Journal looked at the incidence of injury with third generation turf fields (the new ones or third generation fields) versus grass fields. They studied 290 players under 1000 hours of training and 1000 hours of match time. They found no evidence of a greater risk of injury playing on turf fields over grass fields although the risk of ankle sprains was higher during match play (4.83 vs. 2.66 ankle sprains/1000 hours match time). Turf fields are faster and have more grip on the soccer cleat. This increases the amount of force required for the foot to “twist out” of the turf and may account for some of the ankle sprains seen in the clinic. The FA (Football Association) has set strict standards for turf fields and has created a Guide to Artificial Grass Pitches, found on their website [www.thefa.com](http://www.thefa.com)

The University of Missouri tested the twist out on their newest generation of turf field and compared it to three grass fields. They found that the average force required for a planted foot to twist out was between 81-85 foot pounds (110 – 115 newton meters). The force for a fully planted foot on the turf field was 110 foot pounds (149 newton meters). Note that foot pounds are simply units of force used when the force is applied as a twist as opposed to a straight line.

One of my physiotherapy colleagues, Rick Celebrini, also a former Canadian national and professional soccer player, has some advice regarding training on turf fields:

- Risk of injury is greater when the blades and rubber pack down and the field is wet. Players use cleats for grip but the increased grip into the packed turf can cause sprains. Rick recommends using multi studs on turf and feels that blade style cleats are the worst as it is better to slip than to stick.
- During training and warm-up use a three step deceleration when stopping versus a sudden stop. This will train quick feet and prevent injury.
- Defibrillation of a field reverses the packing effect – monitor how often your field is defibrillated.

At the clubs we played and trained at in Europe, turf was sometimes used as a playing surface but mostly was utilized in heavy wear areas in the team warm-up areas, the tunnel leading onto the field and even around the sidelines and technical areas. The fields though were mostly natural grass. Many teams had a turf field as well for foul weather training.

Manchester United, of the English Premier League, banned blades for turf fields because of player injuries.

### Bacteria

We were shocked to discover the levels of contaminants found in turf fields. The recycled rubber pellets contain several dangerous chemicals, absorb huge amounts of heat, and were also home to levels of bacteria found near sewage outfalls.

### Turf Fields

Contaminant	Levels Detected		Comments
<ul style="list-style-type: none"> <li>• Enterococci (fecal Strep)</li> </ul>	Field 1 • None detected		<ul style="list-style-type: none"> <li>• All samples taken from technical area (sideline) and goal area (near one of the goal posts).</li> </ul>
	Field 2 • 320	• <b>64</b> times the suggested maximum	
	Field 3 • 19,640	• That's almost <b>4,000</b> times higher than suggested maximum exposure.	
<ul style="list-style-type: none"> <li>• Fecal Coliform</li> </ul>	Field 1 • None detected		<ul style="list-style-type: none"> <li>• Field 1 fared the best and is also the newest field (Oct. 2005). Field 2 is a year older (Oct. 2004). Field 3 is the oldest field (Nov. 2002).</li> <li>• <b>Any wound that breaks the skin should be thoroughly cleansed to avoid infection.</b></li> </ul>
	Field 2 • None detected		
	Field 3 • 74,632	• This figure is <b>3,731</b> times greater than the suggested maximum exposure.	

### Chemicals – a look at the rubber pellets in turf fields

A small study in New York looked at the rubber pellets used in turf fields. They looked specifically for substances called polycyclic aromatic hydrocarbons (PAH's) and toxic heavy metals. This report is summarized below. Please note that all 6 of the PAH's mentioned below are considered to have a high likelihood of being carcinogenic (cancer causing) to humans. The Department of Conservation (DEC) has given specific limits to these chemicals so that anything found above these limits would be considered hazardous to health and require removal. The results are given below:

#### Concentrations of PAH's (in parts per million)

	Sample 1 A-Turf Rubber Pellets	Sample 2 A-Turf Rubber Pellets	DEC Soil Contamination Limits
Benzo (a) anthracene	1.23	1.26	1.0
Chrysene	1.32	7.55	1.0
Benzo (b) flouranthene	3.39	2.19	1.0
Benzo (a) pyrene	8.58	3.56	1.0
Benzo (k) fluoranthene	7.29	1.78	0.8
Dibenzo (a,h) anthracene	3.52	1.55	0.33

The researchers also found evidence of zinc, lead and arsenic above tolerable levels. This study prompted another study released in April of 2007 that looked at other types of turf fields. These results are given below:

#### Concentrations of PAH's (in parts per million)

	Sample 1 Field Turf	Sample 2 Field Turf	Sample 3 Field Turf	DEC Soil Contamination Limits
Chrysene	1.96	1.34	0.06	1.0
Dibenzo (a,h) anthracene	0.71	0.52	1.43	0.33
Benzo (b) fluoranthene	1.08	0.58	0.20	1.0

The chemical that exceeded the Soil Contamination Limits on all three samples was dibenzo (a,h) anthracene. The International Agency for Research on Cancer reports this chemical to be one of the worst PAH's and a probable human carcinogen.

Ask any player who spends time on turf fields and that player will tell you that they find these little rubber pellets in their soccer shoes, their socks, kit bags etc. The researchers want the next study to look at the likelihood that these chemicals are absorbed into the bodies of children. Until then we cannot read too much into these findings. For example, the Turf manufacturers state that they are aware of these reports but that the material used in the infill is extremely stable and does not break down.

My own conclusion is that there may be more to turf field installation than meets the eye. I will wait to see what conclusions are drawn from further research. In the meantime stay aware of potential health risks, especially preventable ones.

### **Temperature of Turf Fields**

A university of Missouri turfgrass expert took temperature readings on a third generation FieldTurf field on a 98 degree day. He found the surface temperature to be 173 degrees and the head level height temperature to be 138 degrees. On very hot days athletes are practically playing in an oven. Chapter 1 dealt with the importance of hydration. Chapter 7 deals with specifics of hot weather conditions. Please reread these chapters if playing or training on these surfaces on hot days.

### **Conclusions**

Players and coaches should be aware of potential dangers associated with turf fields and take the following actions:

- Turf fields have increased grip on the soccer cleat, especially when the blades and pellets are packed. Use boots with many small cleats rather than long cleats or blade style cleats.
- Disinfect all wounds and scrapes received on turf (and grass) fields to prevent infections.
- Do not leave water or drink bottles lying on the turf.
- Be aware of significant temperature increases on turf fields when it is hot out. Hydrate and train accordingly.
- Be aware that contact with the rubber pellets in turf fields may pose a risk to players. Limit the exposure by cleaning the player's equipment and removing pellets that accumulate in kit bags and soccer boots.

## 6. Shin Pads and Boot Selection

**“If you play soccer then sooner or later someone is going to kick you in the shins and you’ll be glad you had shin pads on”**

### Shin Pads

Shin pads protect players by spreading impacts over a larger area and by absorbing some of the force of direct impacts. Today’s shin pads often include plastic ankle or malleolus protectors. The malleoli are the parts of the ankle bone that stick out on either side and as such they are often injured by direct contact. Protection of this area is recommended but some players find that ankle, or malleoli pads result in decrease “touch” on the ball. By all soccer association rules, including FIFA, all players must wear shin pads, covered by the socks during games. We recommend wearing shin pads during all practice sessions as well.

A lighter shin pad allows the player to run and kick more easily whereas a heavier shin pad typically offers more protection from direct contact to the shin and ankle bones. Some of the professional players I trained would use shin pads with vertical plastic ribs – they would then cut out every other rib to lighten the shin pad to improve their touch. Players with light shin pads also had to deal with more bruises, and in one case, a broken leg that may have been prevented with heavier shin pads. Some players wear their shin pads very high and essentially give their ankles no protection whatsoever.

A balance may be required between weight and protection. Results from the following study may help players decide which pads offer the right combination and feel.

The Institute for Preventative Medicine in Ann Arbor Michigan studied 22 different shin guards (1995) for their weight and ability to attenuate force from a direct blow. The following table gives the weight and usefulness of each shin pad. Note that hotter conditions decreased the shock absorption of every shin pad tested. Also, even the worst shin pads tested still reduced force on the shin by 39.3%. The best shin pads with the lightest weight seem to be the Shin Pal from Ohio Cellular. Unfortunately this study is pretty old so it is hard to imagine that the pads in this study are the same ones made by these manufacturers today.

### Results of Preventative Medicine Study

Shin Pads	Manufacturer	Weight (oz)	Total Percent Reduction of Force from Direct Impact		
			0°C (%)	20°C (%)	38°C (%)
Body Pro	Albion	2.0	59.1	58.6	57.2
Shin Pal	Ohio Cellular	2.0	66.3	68.3	64.1
Protector	Ohio Cellular	2.5	68.3	66.0	64.2
Kevlar	Adidas	3.0	57.9	51.6	48.4
Rick Patrick	Patrick	3.75	49.0	50.2	47.2
Mitre	Mitre	4.0	56.0	61.6	53.8
Brine	Brine	4.5	76.0	75.7	66.4
Prostyle	Brine	3.0	49.4	45.5	46.5
Dunlop	Dunlop	4.5	49.3	47.7	45.3
Pro-Pad	Quassar	3.0	73.8	71.5	68.0
Real Seville	Real	4.5	69.8	63.4	56.1
Trisafe	Uhlsport	3.25	41.8	41.5	39.3

Air Shield	Uhlsport	4.75	72.8	71.2	67.5
Pro	Uhlsport	3.5	64.6	62.3	56.6
Italia Air	Lotto	4.75	77.1	75.5	70.2
Flex Guard	Lotto	2.5	43.8	46.3	40.7
Italia II	Lotto	5.25	72.3	73.0	64.7
Italia III	Lotto	3.25	51.2	55.0	45.7
Air Silicone	Lotto	5.0	72.9	66.5	70.4
Umbro	Umbro	3.75	68.5	72.2	64.1
Diadora	Diadora	3.75	59.2	57.5	51.3
Sondico	Seton	6.5	71.4	68.9	63.1
	<b>Average</b>	<b>3.77 oz</b>	<b>62.3 %</b>	<b>61.36 %</b>	<b>56.85 %</b>

Shin pads should fit well so that they are not so loose that they turn inside the player's socks, yet not so tight as to be uncomfortable. Many players tape their shin pads to prevent them from slipping inside the sock – this is a useful technique if shin pad slippage is an issue.

The bottom line is this: Even the greatest shin pad will not prevent injury if it is not worn or if it is worn incorrectly. A player should try on a couple different pairs while wearing their soccer boots. If possible let the player run around and perhaps even touch a ball while wearing the shin pads. This will allow the player to find a balance between comfort, fit, touch and protection.

#### **Boot Care:**

##### **From Peter Dheensaw, Player/Coach.**

Often the first thing I do to a new pair of boots is unlace the boots. When I have the laces out I apply a nice even layer of Vaseline to condition the laces. Conditioned laces will take the abuse of the cold and wet weather seasons.

Now that the boots are open and have no laces, I apply a good leather conditioning to the boots such as Dubbin or other soft leather conditioner. Work the conditioner in well, applying thin even coats; several coats are better than heavily coating them once. You can also rub Vaseline on the boots as a thin coat will provide a great moisture barrier.

After you have sealed the laces and boots, check to see if you have replaceable studs it's a good idea to apply some type of moisture barrier to the threads of the studs. This will allow you to removed or tighten the studs after a few matches, or later in the season.

This next tip is crucial for the lasting comfort of your boots. I try to fill the boot with several sheets of newspaper until the boot is filled. Then, slightly moisten the forms with water just enough to dampen the newspaper. After the paper dries, it will expand and keep your boots comfortable for the next use. Newspaper will also absorb any unwanted smells.

Whenever soccer boots get wet you should keep them separate from the other soccer gear, then stuff with paper and allow the boots to dry slowly in a well ventilated area. Player kit bags or boot bags should also be ventilated to prevent mold infestation.

#### **Boot Selection:**

**Molded Cleats:** Molded cleats are the basic choice for most soccer boots. The cleats are built into the sole of the boot as one piece. When these cleats wear out the boots must be replaced.

The shape of the cleats can vary dramatically. Some of the newer designs include "blades" which do seem to grip better in normal conditions. However, experience shows that these boots may increase the amount of force required for the foot to "twist out" of the turf or grass. Consequently there may be some increased risk of twisting or torque injuries while wearing blades or one of the more radical cleat placement designs. Manchester United has banned the use of blades due to

an increase in the number of metatarsal foot injuries. There are five metatarsal bones in each foot and the blade style of cleat may increase the pressure on the foot due to the shape of the cleat, plus the extra twist out forces place additional pressure on the bones of the foot.

**Orthotics and Other Inserts:** Soccer shoes often provide precious little support for the foot of the young soccer player. One can buy any number of inserts and custom orthotics to use in the boot but please keep in mind the following.

1. Foot orthotics are used to correct body mechanics. Consult a qualified professional for advice on whether or not to use these products inside a soccer boot or any other shoe.
2. Some players feel that orthotics and inserts “slow them down”. Likely this is due to the fact that some of the force pushed through the athlete’s foot will be absorbed through the insert before being transmitted into the ground. This can result in a loss of energy and efficiency. If this loss of energy is necessary to prevent injury then it is well worth it.
3. Adidas now offers a boot with three exchangeable soles depending on foot type and requirements. Now that the first one is out, hopefully other manufacturers will follow suit so that eventually the price will come down and the technology will be available to all players.

**Exercises to Strengthen the Feet:** the orthotics and inserts mentioned above are essentially passive supports placed into the shoe or boot. There are also active supporters of the foot, namely the muscles and tendons that lift the arches and absorb forces from running, cutting and kicking. The following exercises are ones I use in the clinic, and while it will take awhile to improve, the result is a stronger foot that is less reliant on passive supports.

1. Towel scrunches: Place your foot on a towel that is in front of you on the ground. Scrunch (pull) the towel towards you by using your toes and balls of the feet. When the towel is scrunched up, try to flatten it out again using the foot. Once the towel is somewhat flat, repeat for 10-15 reps on each foot. If you add a weight to the towel it will make the scrunch more difficult.
2. Ankle inversion: Theraband or surgical tubing work well for this home or gym based exercise. To perform this exercise you will turn the foot inward against the resistance of the band or tubing. Keep the hip still and turn only the foot and ankle. Do 3 sets of 25 for each side.
3. Ankle eversion: This one is in the opposite direction of the above exercise. It is a particularly important exercise following an ankle sprain as it strengthens the outer aspect of the leg and ankle and prevents reinjury. To do this exercise you will need to turn your foot outward against the resistance. Do not allow the hip to rotate during this exercise – keep all the movement to the foot and ankle. 3 sets of 25 each side.
4. Sand walks. Try walking or jogging in the sand in a variety of directions to strengthen all the muscles of the legs from the hips down to the feet.

**Latest Boot Features:** It is virtually impossible to keep up with the innovation of soccer boot companies. Using advanced pressure sensors and computers, manufacturers have found optimum cleat placement to maximize balance and grip. Adidas has moved more of the weight of the boot towards the front so that power transfers to the ball more quickly. Injectable rubber is used on the top of the boot to increase the player’s ability to put spin on the soccer ball and to achieve more powerful and accurate strikes.

In summer conditions on grass or turf I prefer multi-studs for a soft feel and most multi or turf cleats are generally light boots so your feet will not sweat as much and cause blisters or athlete’s foot.



In winter conditions I prefer long six studs to give me some extra bite into turns and ball handling skills on grass fields. Also, longer studs do not seem to get as clogged with grass and debris during wet weather and long grass conditions.

Turf fields, as mentioned previously, have more grip on the soccer cleat, especially when the turf becomes packed and firm. Utilize multi stud or short cleats over the longer 6 or 8 stud style. Also avoid blade style cleats on this surface.

## 7. Hot Weather Conditions

**“Children do not regulate body heat as well as adults. Therefore active children are more susceptible to heat illness”**

As chairman of the Sports Injury Advisory Group to the Governor of Michigan, Dr. David Janda MD helped develop some guidelines on preventing heat stroke among football players, guidelines that are applicable to every sport and recreational activity.

His recommendations included:

- **Acclimatize to heat gradually.** Practices for the first week to 10 days should be shorter and less intense, as should practices on abnormally hot or humid days. In addition athletes should be encouraged to initiate their own conditioning program several months prior to the beginning of the season. During the hottest weather practice sessions should be scheduled in cooler parts of the day.
- **Account for heat and humidity.** Both the temperature and relative humidity should be taken into account in determining the length of practice sessions. It has been suggested that if the sum of the temperature and relative humidity are greater than or equal to 160, special precautions must be taken. If the sum is greater than 180, practice and or games should be cancelled.
- **Provide for frequent breaks.** Adjust the activity level and provide frequent rest periods during hot weather (at least 15 minutes per hour of practice). Athletes should rest in shaded areas; jerseys should be loosened or removed.
- **Rehydrate.** Cold water or sports drinks should be available in unlimited quantities to players. Scheduled water breaks should be strictly enforced. See Chapter 1 for more details.
- **No salt tablets.** Salt should be replaced through salting of food or beverage, not salt tablets.
- **Weigh athletes before and after practice.** Athletes should be weighed before and after each practice to monitor water loss. Weight loss greater than 3% indicates a substantial risk and 5% a significant danger to the student athlete.
- **No heavy or wet clothing.** During practice athletes should wear cooling clothing such as shorts and fish net jerseys. Sweat saturated t-shirts should be changed often because they retain heat.
- **Parent monitoring.** Parents should monitor all practices and games, with the responsibility shared on a rotating basis among all parents of student athletes. If a parent observes an unsafe situation developing, he or she should immediately bring it to the attention of the coach.
- **Identify athletes at greater risk.** Some athletes are more susceptible to heat illness than others. Identify and observe closely those at greatest risk of heat illness, including

those who are poorly conditioned, overweight, have an acute illness, or have cystic fibrosis, diabetes, or mental retardation. Student athletes with a previous history of heat illness should be watched closely during practices and hot weather.

• **Learn the warning signs.** It is imperative that all coaches, parents, and players are on the lookout for signs of dehydration or heat illness, such as fatigue, lethargy, inattention, stupor, and/or awkwardness. An athlete exhibiting any of these signs should be immediately removed from participation, cooled down and placed in a shaded environment.

I think Dr. Janda summed it all up nicely. Some of the temperatures during training in Libya reached 44 degrees C (111.2 degrees F) and all his recommendations are absolutely on the mark. We often had two or even three a day practice sessions so that sessions were intense yet brief, and performed during the cooler parts of the day.

In Chapter 1 we looked at signs of dehydration. In hot weather especially dehydration can progress to a more severe heat exhaustion.

If your player develops signs that the dehydration is worsening you may see the following:

#### Signs of Heat Exhaustion

- Weakness
- Dizziness
- Tunnel vision
- Ongoing muscle cramps
- Headache
- Pale sweaty skin
- Urge to go to the bathroom
- Body temperature 36 - 40° C (97 - 104° F)

This player should be removed from play and placed in a cool or shady area. Actively cool the player with fans, cool towels or even ice. Begin to rehydrate slowly and monitor the player. If recovery is not rapid and uneventful then seek medical attention.

If your player develops signs that heat exhaustion is worsening, heat stroke may be present. Heat stroke is a medical emergency. Hopefully no player will reach that stage because everyone will be monitoring and hydrating to prevent just such a condition. This said it is still useful to recognize the signs.

#### Signs of Heat Stroke

- High body temperature > 40° C
- The absence of sweating, with hot red or flushed dry skin
- Rapid pulse
- Difficulty breathing
- Strange behavior
- Hallucinations
- Confusion
- Agitation
- Disorientation
- Seizure
- Coma

A player with heat stroke requires immediate cooling to avoid organ damage. Call for an ambulance (911 if your area has the service) and begin cooling the athlete right away. Remove the player to a shady area, and cool with fans, water, ice packs under the armpits and in the groin

area or even an ice bath if such a situation can be constructed. Continue to monitor the player's temperature.

Please refer back to chapter 1 for special notes regarding hydration for the young athlete and hydration habits for the entire team.

## 8. Cold Weather Conditions

### “Human beings are better at dissipating heat than we are at retaining heat”

The American College of Sports Medicine (ACSM) has a number of guidelines when it comes to running activities in a cold environment. The key goal in participating in cold weather is to avoid exposure of skin to the elements and wearing of proper clothing. The following list is adapted from the ACSM guidelines.

- **Avoid dehydration** and make sure you pre-hydrate. See Chapter 1 again for details. Remember the body requires fluids to carry out most of its metabolic functions including the regulation of body temperature.
- **Drinking carbohydrate and electrolyte fluids** may be beneficial in maintaining your glycogen stores in the muscle. In cold weather training, glycogen is used up quicker by the body.
- **Wear appropriate clothing** that will cover as much of your body as possible using materials that will trap moisture and sweat away from your skin. Layers of clothing help retain heat better than a single thick layer. Cotton is bad because it absorbs moisture which then makes it even colder later on. Many new fabrics will optimize warmth and comfort – the primary quality is that the material will wick moisture away from the body. Remember that if thermal underwear is worn under the soccer shorts, they should be the same main colour as the shorts. This rule comes from FIFA and may not apply to many youth and recreational leagues.
- **Officials** should be very cautious in authorizing games and practices in conditions where the temperature is below 0 C and wind conditions are high. They should enquire of the participants to ensure pre-event hydration, medication use and susceptibility to cold injury (prior occurrence).
- **Vaseline** is an essential cold weather item. A layer of vaseline on the feet, ears, back of the hands, neck... will provide a layer of insulation from the cold, the wet and the wind.
- **Gloves** on cold days are great. Gloves help retain some heat and most of them offer finger tip padding for better grip. If you take throw-ins then you know how difficult it can be to throw the ball in when your hands are frozen.
- **Headgear.** Wear a hat or toque for as long as possible on cold days.
- **Soccer warm-up** is continuous right up to the start of the game. Do not allow players to get cold. Players who do get cold should warm up again before going onto the field of play. Players who sweat and then get cold will lose significantly more body heat than a cold and dry player.
- **Goalkeepers** generate less heat than other players so make sure the keeper is layered even more than the rest of the players.
- **Sports bras** for female soccer players can provide a little extra warmth.
- **Keep warm dry clothes** on hand in the kit bag, including a hat or toque, and a jacket.

Also consider cold weather risk factors which can predispose a soccer player to cold injury. These factors are somewhat cumulative so if several of these are present then the chance of a player developing a cold related problem will go up several times.

### **Risk factors**

- Windchill
- Moisture. Wet skin will freeze at a lower temperature than dry skin.
- Players unaccustomed to cold weather. An 8 - 10 day period of acclimatization, further aids in the reduction of the risk of cold injury.
- Unfit
- Dehydrated
- Use of a variety of medications
- Persons with persistent, disabling mental illness
- Various medical conditions, such as asthma
- Inappropriate clothing
- Infection, colds, flu

Identifying cold injury in your soccer player is the next area of concern. Hypothermia is generally classified as mild, moderate or severe. The difference at each level of hypothermia is based on the body's core temperature.

### **Mild hypothermia**

- Shivering
- Feels intensely cold
- Goose bumps
- Numb hands

These players will have a core body temperature of 32 – 35 C and will have the ability to rewarm themselves.

### **Moderate hypothermia** (body temperature 28 – 31 C)

- Intense shivering
- Uncoordinated, or slow and labored movements
- Difficulty breathing
- Headache or dizziness
- Mild confusion or agitation
- Difficulty speaking
- Signs of depression (it is absolutely miserable to be that cold)

### **Severe Hypothermia**

- Shivering stops
- Exposed skin is bluish and puffy
- Unable to walk or severe incoordination
- Muscle rigidity
- Decreased breathing rate and heart rate
- May become unconscious

Those with severe hypothermia (core body temperature of less than 28 C) require active rewarming and immediate medical attention. Wrap the player in a thermal blanket if available and get prompt medical help. Hopefully you will recognize earlier symptoms and will not allow any player to reach this level of illness.

### Frostbite

Frostbite can occur to areas of exposed skin and to feet and toes. Though there are varying degrees of frostbite, the skin will almost always appear white and waxy or possibly purplish. The sufferer may have pain and/or numbness and the skin may appear hard or wooden.

Children lose heat faster than adults therefore they are more susceptible to the cold (remember they are more susceptible to the hot weather as well). People with circulatory problems are at greater risk of hypothermia – for young players this may be someone with diabetes. Anyone who has suffered a previous cold injury will always be more susceptible to another cold injury.

### Frostbite Do's and Don'ts

<b>Do</b>	<b>Do Not</b>
Remove player from the cold as soon as possible	Do not rub the area with anything.
Remove any wet or restrictive clothing	Do not rewarm with dry heat such as heating pads and
Rest the injured area and elevate it slightly	Do not rewarm the injury if there is a chance that the part will not stay warm. Frostbitten tissue is frozen so thawing and refreezing can cause serious and permanent damage.
Gently rewarm the part by blowing warm air onto it or by immersing in warm water (38-41 C) for 30-45 minutes.	
Check for hypothermia as well. Core warming may be required	

As with most areas of soccer safety, prevention is far better than needing treatment. By following the suggestions made in the first part of this chapter, which includes the cancellation of practice or game if the conditions are too severe, the chance of a serious cold injury occurring will be rare.

## 9. Soccer Goal Safety

**“The simplest solution is to anchor all movable soccer goals and to educate the public that climbing on these goals can cause serious injuries”**

There are six areas pertaining to Soccer Goal Safety that we would like to address:

- Falling Soccer Goals
- Soccer Goal Anchors
- Goal Posts
- The Soccer Net
- Safely Putting Up and Taking Down the Soccer Net
- Safely Storing Soccer Goals

### Falling Soccer Goals

Anchored for Safety ([www.anchoredforsafety.org](http://www.anchoredforsafety.org)) is a soccer goal awareness organization that was created in memory of Zachary Tran who was killed when an unanchored goal fell on him. They report on and keep track of soccer goal injuries from 1979 to 2007. During this period there were 31 deaths and 51 injuries related directly to falling soccer goals. Other estimates place the number of emergency room visits at 90 per year.

Movable soccer goals come in a variety of materials and weights. In some cases a 22 pound force can bring down a 400 pound soccer goal. Then add in wind conditions, slope of the field and human contact, and the risks begin to add up.

The simplest solution is to **anchor all movable soccer goals** and to educate the public that climbing on these goals can cause serious injuries. Under the “Field of Play” rules, FIFA says that all goals must be anchored securely to the ground. Portable goals may only be used if they meet this requirement.

The latest in safer soccer goal design has the front posts and crossbar made of a lighter material than the heavier rear ground bar. This helps to counterbalance the goal and prevent tipping forward.

Another design involves making the soccer goal deeper. This helps prevent the goal from tipping but many nets will not fit on such a design.

A third type of goal again uses a heavier rear ground bar with and folds up after use.

Regardless the style of soccer goal, it is still imperative to anchor the goal properly.

The FA (Football Association of England) and others disapprove of any homemade soccer goal that does not meet safety standards. Many of the injuries noted above involved homemade soccer goals. The FA includes in their recommendations the following guides to soccer goal inspection:

- Every Week:



A visual check of the whole goal for: missing nuts bolts, clips or other fittings; securely anchored; net fixings; any broken cords in the net; or any damage to the frame of the goal.

- Each Time the Goal is Moved

Check that the goal has not been damaged during the move and check that the anchors are securely repositioned to hold down the soccer goal.

- At the Start of the Season and Every Three Months

The FA goes so far as to say that the club should test the goal for strength and stability.

- In the case of a socketed goal, every time it is reinstalled.

In the United States, the Coalition to Promote Soccer Goal Safety will send your Soccer Club free warning labels to attach to the goals. Most goal manufacturers will provide their customers with safety labels as well.

Coaches often want to move the soccer goals to create a certain game or drill situation. Goals are probably most vulnerable to tipping when being moved. Check if your goal manufacturer has instructions on moving the goal. Also, use adequate numbers both for safety, and to avoid distorting the goal in any way. Use at least 4 adults and do not drag the goal across the ground. Goals with wheels should only be pushed backwards as they tend to tip very easily to the front.

### **Soccer Goal Anchors**

A properly anchored or counterweighted goal is less likely to tip over and cause injury. An excellent anchor should be efficient at preventing the goal from tipping, and should not create additional dangers to the players. Most anchors are best placed near the back corners of the goal. Single anchoring points are typically never adequate.

Types of Soccer Goal Anchors include:

- Auger

This style of anchor is essentially a length of coiled metal that screws into the ground with a flange over the ground bar to keep it down. Usually two are required but soft ground or poorly weighted nets may require more. In softer and under certain brittle soil conditions, the auger is a very poor anchor. If a chain or coil is used to hold the rear ground post, then the post must not be allowed to lift more than 50 mm (2 inches).

- Peg or Stake

This style requires that the ground bar at the back of the net have holes pre-drilled so that the peg or stake can be driven through. If conditions prevent the peg from being pounded all the way flush with the ground bar, the remaining piece sticking up can become a dangerous item to slide or fall into. These anchors are driven straight down which limits their effectiveness (ideally the anchor should angle forward to give better counterbalance to a forward tipping goal).

- J-Hooks

The “J” or “U” style of anchor uses a long, usually at least 10 inches, metal spike(s) with the top portion hammering down onto the ground post to anchor it. These hooks never end up flush with the shape of the ground bars, and the J-Hook in particular, can cause additional injury for the player who falls or slides into the back of the net. We were personally involved in a game whereby one of the players was knocked into the back of the net. As the player fell he caught his head on the edge of the J-Hook - the cut was severe, requiring many stitches.

- **Semi-Permanent**

These anchors have one component permanently in the ground. The permanent part then has a tether that can attach to the rear ground bar. This is a great system except that goals cannot be moved for training purposes and during the off-season, the anchor must be stored well to avoid the blades of the lawnmower. The length of the tether must ensure that the rear ground post cannot lift more than 50mm (2 inches).

- **Sandbags**

These and other counterweights can be used on hard surfaces such as turf. The only problem is determining how much weight is required to keep the goal from tipping. As much as 150 kg (330 pounds) may be required to keep a full size net anchored. (If you want to get technical, the formula takes the goal height, divided by the length of the goal's side bars times 112).

- **Net Pegs**

Net pegs are used to attach the net directly to the ground. They are not and should not be used as Goal Anchors.

Finally, as mentioned briefly above, storage of anchors after use is very important. We received word in September 2006 that one of the civic work crews went over an anchor with his lawnmower. The resultant shards flew through the air but fortunately did not injure anyone. A memo was immediately sent out to all the local soccer fields.

### **Goalposts**

Most soccer injuries happen in the open field. However there are also injuries that occur due to contact with the goal posts. These injuries include concussions, neck and spine injuries, broken teeth, broken bones, cuts and bruises.

Soccer is the most played sport that does not require padding around equipment that may come into contact with the players. Over the past few years, there has been a slow but steadily growing movement to use upright padding over the goalposts as extra protection. One company has now started making their soccer goals with the ability to compensate for the extra width of upright padding.

### **The Soccer Net**

A soccer net can trap body parts or cause cuts if the mesh is too wide or the cords too thin. Check the net periodically to see if cords are coming loose. If enough cords come loose that a player's head can fit through then there is an additional risk of becoming strangled in the net itself.

Soccer nets with smaller mesh prevent entrapment and also discourage climbing. There is also more overall netting so these nets often last a little longer than the large mesh nets.

Note that bird enthusiasts request that we take down our soccer nets when not in use. The nets can pose a hazard to birds who can get caught up in them.

### **Safely Putting Up and Taking Down the Soccer Net**

The first issue to consider here is how the net attaches to the frame of the goal. Some systems use a hook. This presents incredible danger if a player or coach attempts to attach the net to the crossbar by jumping up. Players and coaches have received terrible cuts and even amputations as a result.

When attaching the soccer net to the goal frame, we recommend either carefully tipping the goal, using at least 4 adults, or using a system that extends one's reach. The Goal-Tek Innovations

Quick-Pic (GTI Soccer net Kit [www.goal-tek.com](http://www.goal-tek.com)) is one such option, but one can use a sturdy ladder just as well. This concept applies when putting up and taking down the net.

### **Storing Soccer Goals**

Never leave a soccer goal accessible while upright and unanchored. If you can't lock them securely while upright then leave them flat on the ground. Two upright goals can be locked together face to face for stability. Some clubs and parks may have storage areas for the goals. If no reasonable option is found then it may be best to leave the goal anchored in its place.

The U.S. Consumer Product Safety Commission agrees. The following guidelines were set by them in 1995 in recognition of the dangers:

- Securely anchor or counterweight movable soccer goals at ALL times.
- Anchor or chain one goal to another, to itself in a folded down position, or to nearby fence posts, dugouts, or any other similar sturdy fixture when not in use. If this is not practical, store movable soccer goals in a place where children cannot have access to them.
- Remove nets when goals are not in use.
- Check for structural integrity and proper connecting hardware before every use. Replace damaged or missing parts or fasteners immediately.
- NEVER allow anyone to climb on the net or goal framework.
- Ensure safety/warning labels are clearly visible (placed under the crossbar and on the sides of the down-posts at eye level).
- Fully disassemble goals for seasonal storage.
- Always exercise extreme caution when moving goals and allow adequate manpower to move goals of varied sizes and weights. Movable soccer goals should only be moved by authorized and trained personnel.
- Always instruct players on the safe handling of and potential dangers associated with movable soccer goals.
- Movable soccer goals should only be used on LEVEL (flat) fields.

### **Additional Soccer Goal Safety Resources**

U.S Consumer Product Safety Commission: [www.cpsc.gov](http://www.cpsc.gov)  
326 Guidelines for Soccer Goal Safety  
5118 Movable Soccer Goals Can Fall Over On Children

American Society For Testing And Materials: [www.astm.org](http://www.astm.org)  
F1938-98 Guide For Safe Use of Movable Soccer Goal  
F2056-00 Safety and Performance Specification for Soccer Goals

The Football Association (The FA): [www.thefa.com](http://www.thefa.com)  
Goals for Football Technical Details  
Goals for Football Guidance Notes

Anchored for Safety, Zachary Tran Memorial: [www.anchoredforsafety.org](http://www.anchoredforsafety.org)

For further information on soccer goal anchors and/or to obtain free soccer goal warning labels, safety alerts and bulletins, contact:

The Coalition to Promote Soccer Goal Safety  
c/o Soccer Industry Council of America  
200 Castlewood Dr.  
North Palm Beach, FL 33408

## 10. Stretching: When, Why, How

**“Stretching for warm-up is dynamic. Stretches for cool-down are static and held for 20-30 seconds. Stretches for muscle lengthening can be held longer (60 -90 seconds and more) but should not be performed before sport participation.”**

The term “stretching” is used to generally mean anything that takes a muscle to its end range.

People generally assume that the flexibility and extensibility of a muscle, or lack thereof, is associated with muscular injury. In fact, most muscle and tendon pulls do not occur at the end or range of motion, but within the normal range of motion while the muscle is lengthening under tension.

While working in Germany, we used MRI (magnetic resonance imaging) to assess players' injuries. With few exceptions we found that lower body muscular injuries correlated with MRI findings of low back pathologies. The well known Dr. Muller Wohlfahrt uses muscle and joint injections (non-medicinal) directed to the injured muscle and also to the muscles and joints of the low back. His theory, simplistically stated, was that irritation to the spinal nerves caused a tightening and a weakening of the muscles supplied by that nerve. The analogy used was that the affected muscles were like 100 Watt light bulbs receiving only 80 Watts of power. When the bulb is asked to produce the full 100 Watts it is unable to do so and injury results.

Working with Dr. Wohlfahrt led me to study with Dr. Chan Gunn, the creator of the IMS (Intramuscular Stimulation) model. Dr. Gunn's model uses nerve and muscle research to explain the processes behind chronic pain. His theories though, also apply to the athlete because the athlete needs the nervous system even more so than the average individual in order to recruit muscle and to recruit it quickly. Over the past few years I have found excellent results using IMS as an adjunct in the treatment of athletic injuries. If we apply this line of thinking to the role of stretching then one conclusion that might be reached is that the state of the nervous system is more important than the relative flexibility of the muscle (not that flexibility is unimportant, only that nervous system preparation is more important). Observations of soccer players doing pre-game static stretches only to pull a muscle during competition did little to bolster my confidence in stretching as a warm-up technique. On the other hand I also observed many players perform their own dynamic type stretches and continue without injury.

I use the terms static and dynamic stretches quite a bit so I think it is worthwhile to define these different types of stretches:

**Static Stretching:** A static stretch is one where sustained pressure is applied to a muscle or group of muscles in a lengthened position. One example of this is the hamstring stretch. These positions are held for varying lengths of time with the typical advice being 20-30 seconds because research has told us that static stretches held for 20 seconds will improve muscle flexibility and muscle resistance through a range of motion.

**Dynamic Stretching:** Repeated movements are made either through the range of motion or at the end range of motion. If the player were to swing his leg up and down to stretch his hamstring then this would be an example of dynamic stretching. The term ballistic stretching is where a bouncing movement is applied at the end range which stimulates a stretch reflex.

**PNF Stretches:** PNF stands for proprioceptive neuromuscular stimulation. Essentially these stretches involve taking the muscle to the end of its range and then contracting the muscle

without movement at the joint. After the contraction is held for a period of usually 10 seconds, the muscle is taken to its new range of motion.

I think that at the end of the day we really use stretches as a tool to achieve one of the following goals:

- As part of a warm-up and injury prevention routine
- To enhance performance by stimulating the nervous system
- As a part of the rehabilitation process of an injured muscle or joint
- To reduce muscle stiffness
- To make increases in muscle length
- To relax the nervous system

### **Warm-Up**

A warm muscle will have greater extensibility than a cold muscle. The warm-up phase requires stimulation of the nervous system to recruit muscle quickly and to allow the muscle to act with force and power. Warm-up activities should increase muscle and joint temperatures, increase nerve firing rates, recruit movement patterns required for soccer, and optimize the body's readiness for action. A relaxed nervous system will not accomplish this task, therefore the use of static stretching during warm-up is of questionable value.

We should use instead a series of movements that progress from simple to complex and will involve sport specific movements seen in the game. A dynamic warm-up such as this will not only increase heart rate and warm the muscle tissues but it will also prime the nervous system to recruit muscles that will be required for sprinting, jumping, tackling and so on.

We use the term dynamic stretches quite often now – the term is different than the ballistic stretches used in days gone by. Dynamic stretches are controlled movements that take a joint through an entire range of motion. I will give some examples of dynamic stretches that can be used as a part of a soccer warm-up. I will not include other warm-up drills as these will be under the supervision of the team coach.

### **Example of a Soccer Warm-Up**

- Start with 10 minutes or so of easy jogging. The jogging should include forward and backward movements and also sideways motions (Carioccas).
- Walk on the toes for 20 m. straight, 20 m. in toe-out (external rotation) and 20 m. in-toed (internal rotation).
- Walk on the heels for 20 m. straight ahead, 20 m. turned out and 20 m. turned in.
- Lunge walks for 20 m.
- Skipping with high knees for 20 m.
- Kick your hands. Place hands behind the back and then, while jogging, kick each heel to tap the hand behind the seat.
- Swing one hip around to the front, skip or shuffle step and then repeat with the other hip going across the front as well. Go for at least 10 in each direction with a nice full yet controlled range of motion.

- As above but swing the hips from the inside to the outside instead. Shuffle step to get in position for the next hip swivel. These routines should be coordinated and when they are done in unison as a whole team it helps develop tempo and rhythm to the warm-up.
- While jogging forward, reach down and touch the grass with the left hand. Keep the body upright as you do so then repeat with the right hand. You can also touch down with both hands to alternate. Get in at least 10 touches on each side.
- While standing, swing the leg up and down with a bent knee to warm-up the hip flexors; swing the leg in the same way with a straight leg to warm-up the hamstrings; swing the leg inside and out to warm-up the adductor or inner thigh muscles. Point the toe to the grass and make large circles in each direction to warm-up the ankles. These movements may be performed at increasing speed but control is the important thing – they are not bouncing or uncontrolled movements – the nervous system is controlling the muscle movement through each degree of the particular range of motion. 10-20 of each movement pattern with a slow increase in speed.
- Shadow drills with or without the ball. Now players are starting to move faster. One player dribbles the ball in various directions while the partner attempts to contain or defend the dribbler. Switch off every 40 m or so.
- Move into progressively sport specific movements and drills.

### Cool-Down

After a hard game or intense training, the muscles will be fatigued and may even have levels of damage to the tissue. As a part of cooling down, or what is now often called “warm-down”, continued movement of the body and gentle static stretches are used. Since there may be microscopic muscle damage, the player should not stretch aggressively and the holds should be in the range of 20-30 seconds. All the major muscle groups of the legs should be addressed as well as the muscles of the torso.

### Stretching for Range of Motion

I see many soccer players each week and some of them seem to be tight at every joint. I often refer to these players as “hard wired” as I believe that the muscles of these players are the result of the state of the nervous system. These players often have fantastic speed and reaction time but they are also at risk of injuries related to inflexibility and therefore require a separate stretching regime to maintain muscle balance and range of motion.

There are two primary types of stretching to gain range of motion at a joint

- Prolonged Static Stretches
- PNF Stretches

Muscles contain collagen and therefore if it is to achieve a greater length then the load on it must be held into the “plastic zone” which is at least 20-30 seconds. PNF stretches are also effective as they will hold a muscle under tension for a period greater than 20 seconds.

If the stretches for range of motion are done at night I like to prescribe prolonged static stretches of 60-90 seconds. these stretches are held at a gentle intensity (for example if 10/10 was an unbearably painful stretch and 0/10 was no stretch whatsoever then the ideal stretch intensity

would fall under a 2 or 3/10). Holding a gentle stretch like this will improve muscle extensibility and will calm and relax the nervous system. Anecdotally many people sleep better after performing a series of stretches like this. Note that your posture must be in good form through all stretches but especially with the prolonged ones. Sometimes I have the player resting on the floor so that they do not have to worry about posture as much and rather just relax into the stretch.



## 11. Soccer Injuries

**“When returning to play from a soccer injury, it is better to come back a week late than a day too early.”**

### An Ounce of Prevention...

Just before Kaka, now of AC Milan, went to Italy, he played for Sao Paulo in Brazil. Training there one day the team doctor took me aside and we watched Kaka in training. As he pointed out the special talent before us he also pointed out how disciplined they were to develop this young man over the years and how AC Milan were interested in taking him to Italy. This doctor also showed me the fitness and medical data they kept for this player from the time they picked him as a potential star in their youth system. The club tracked his speed, fitness, body fat, body weight, injuries, you name it. They kept records of all this data over all those years because it was important that when Milan bought the contract for Kaka, that they knew his history and development too. The point I am trying to make here is that we have the knowledge and the tools to track the development of young players and to identify both strong and weak areas as well as injury patterns over time. Sao Paulo even spent the final year, before sending Kaka to Italy, training with an emphasis on increasing his body weight to prevent injury and improve his performance. Even if your son or daughter is not going to the professional level in this beautiful game, we can still train professionally to identify weak spots or imbalances in a player's overall fitness. The end result will be improved fitness, improved performance, and decreased incidence of soccer injuries.

### Pre-Season Medical

Although not a requirement, a pre-season medical is a great idea for any player. A thorough pre-season medical will ensure that players are not entering the season with an injury or with an injury that is not fully rehabilitated. The pre-season medical will also determine the general health of the player and should identify areas or factors that may predispose the player to risk of injury, or factors requiring rehabilitation or specific fitness training.

There are various professionals who might play a role in this process. Your family or sports medicine physician for example can do a comprehensive physical that covers all the body systems. A physiotherapist (physical therapist) can perform a detailed biomechanical assessment and may assess sport specific movements. An athletic trainer might look at fitness testing, flexibility, speed testing, anaerobic power, agility testing and program design. This information is combined to prevent player injury, and to set a baseline for fitness and sport specific testing measures.

Ideally the pre-season medical check will occur three months before the start of the season. If your doctor does not do the medical assessment then a letter should be sent to the doctor so that there is greater continuity of care for player and professional alike.

### Player Medical Cards

There is a saying in sports medicine that “to be forewarned is to be forearmed”. In other words, be prepared for potential medical emergencies. Should anything happen, the coach or trainer should have a medical card for each player so that pertinent facts of the medical history are known on the spot.

The following is an example of a player medical card that can be used but most Sport Associations have their own form that parents and players receive at the beginning of the year or

even better, before the season begins. Note that many Soccer Association medical cards include a waiver of risk related to the game itself.

### Player Medical Form (Youth)

*This form must accompany the team to all games and practices*

Last name: \_\_\_\_\_ Given name(s): \_\_\_\_\_

Date of Birth: \_\_\_\_\_ Medical Card # \_\_\_\_\_

Person to call in the case of an emergency: \_\_\_\_\_

Day Phone: \_\_\_\_\_ Evening Phone: \_\_\_\_\_

Person we can call if nobody is at the above numbers: \_\_\_\_\_

Day Phone: \_\_\_\_\_ Evening Phone: \_\_\_\_\_

Family Doctor: \_\_\_\_\_ Phone: \_\_\_\_\_

Address: \_\_\_\_\_

Please give relevant information on:

• Medications: \_\_\_\_\_  
Are they carried by the player? \_\_\_\_\_ Are they administered by the player? \_\_\_\_\_

• Allergies: \_\_\_\_\_

• Previous Injuries: \_\_\_\_\_

Is there anything else we should know about? \_\_\_\_\_

\_\_\_\_\_

In the event my child requires immediate medical attention, I hereby give permission to the team officials to seek such treatment.

\_\_\_\_\_  
Signature of Parent/Guardian

\_\_\_\_\_  
Date

#### Emergency Action Plan

Every team should have an Emergency Action Plan (EAP) that leads to the prompt arrival of help should an emergency arise.

The EAP should include:

- Who will provide emergency first aid, including the use of an automatic external defibrillator (AED).
- Who and how emergency medical services will be contacted.
- The address and location of the field of play.
- Location of telephone(s). If a telephone is not always available then ensure that a cell phone is available and that there is cell phone coverage in the area.
- Who will monitor non-injured team members during the emergency.
- Know where the player medical cards (and emergency contacts) are at all times.
- Know where the first-aid kit is at all times. Know the contents of the first-aid kit.
- Any emergency medical devices such as asthma inhalers, EpiPens, and AEDs

### Types of Soccer Injuries

1.6 million soccer injuries resulted in emergency room visits among players ages 2 to 18. Twice as many boys were admitted to hospital for their injuries as were girls. Boys had a greater amount of face, head, and neck injuries, while girls were more likely to have ankle and knee injuries.

Most soccer injuries occur in games when the players are tired, especially near the end of the first and second halves. Injury rates tend to increase as players get older and their level of play intensifies. Duke University studied soccer injuries and found that young players in defensive roles were injured more often than players in offensive roles. Other studies have found no relationship across player positions and sport injuries. There are a few different studies that list the type and location of soccer injuries. I will provide the statistics from Ekstrand:

Type		Area	
Sprain	29%	Knee	20%
Overuse	23%	Ankle	17%
Contusion	20%	Thigh	14%
Strain	18%	Groin	13%
Fracture	4%	Foot	12%
Dislocation	2%	Leg	12%
Others	4%	Back	5%
		Others, including head injury	7%

Elite soccer teams often have the luxury of having a team physician, physiotherapist or athletic trainer. For the teams who do not have these medical professionals to consult, the coach or parent might benefit from knowing a few basics, including when to refer a player for medical assessment.

### The Risk of being Female

Overall, female players are twice as likely as boys to suffer an injury while playing soccer.

One German study followed 143 elite female soccer players after noting factors such as injury history, body type and weight, and player position. After one full season they concluded the following:

1. Injury rate was the highest for defenders (9.4 injuries per 1,000 hours of play). Possibly this due to the fact that defenders perform the most backward and lateral movements.
2. Injury rates were second highest for attackers (8.4 injuries per 1,000 hours of play). Attackers generally spend much of their time sprinting, feinting, falling, diving and jumping.
3. Previous ACL (anterior cruciate ligament) injury significantly increases the risk of another such injury.
4. Taller players (greater than 175 cm.) are more likely to suffer an injury.
5. More injuries happened to the dominant leg.
6. Increased body weight during the off season may increase non-contact injury risk during the competitive season.
7. 10% of all players developed more than three injuries.
8. Injury risk should be assessed on an individual basis. Injury prone individuals should be identified, individual risk factors analyzed and acted upon to prevent further injury and loss of playing time.

### Immediate Assessment and Treatment of a Soccer Injury

Care for the injured player begins immediately. Appropriate care can mean the difference of days or weeks of rehabilitation, and minimizes the chances of long term disability.

Upon arriving to the injured player the care giver will first assess whether the player is breathing. If the player is breathing then there will be an airway and circulation. If the player is not breathing then assessment of the airway follows with assessment of circulation after that. In emergency medicine and first-aid the concept is remembered as ABC (Airway; Breathing; Circulation). Every soccer team should have at least one person who is trained in First-Aid.

Once emergent and life threatening worries are out of the way then we can ask "What happened?", "Where were you hit?", "Where does it hurt?". A scan is made of the injured area to observe for bleeding, the position of the injured part, signs of swelling or deformity and comparison with the opposite side. If the player cannot continue then an assessment should continue on the sideline to determine the nature and severity of the injury. At this point the only safe first-aid advice I can offer without assessing the athlete is the application of **RICE**. Please know that RICE alone is not sufficient to rehabilitate a serious injury, it is only the first line of defense to control the injury and hasten the healing process.

<b>Rest</b>	Rest the injured area, remove the player from the game.
<b>Ice</b>	Apply ice to the injured part for 20 minutes or until numb. Do not use heat during the acute phase of an injury.
<b>Compression</b>	Apply compression bandages to the area to limit swelling. Do not apply these too tightly as it can affect circulation. An easy test of circulation is the Capillary Refill test. After compression is applied, wait a few minutes then squeeze one of the toenail beds on the compressed side until it blanches or turns white. Release the pressure and the nail bed should return to a pink color within 1-2 seconds of the release.
<b>Elevation</b>	Elevate the injured area above the level of the heart.

### When to Refer to a Medical Professional

- Obvious deformities that indicate a broken bone.

- Player is unable to bear weight.
- Severe pain.
- Presence of numbness and/or tingling can indicate a nerve injury.
- Immediate swelling in a joint. When a joint swells within a few minutes it usually indicates blood in the joint. Bleeding indicates that something has torn or ruptured and this requires a medical diagnosis.
- Swelling that lasts more than 6 days. This sign may indicate ongoing inflammation to the injured area and requires diagnosis.

This is a book on Soccer Safety, not a book on how to rehabilitate an athlete. This said, I would like to address some of the basics to assist players, parents and coaches to understand the injury process and perhaps gain a better appreciation for the answer to their number one question:

### **“WHEN CAN I RETURN TO PLAY?”**

Of course the answer to this question varies depending on many factors. The following section on rehabilitation principles may help identify the stage of healing the athlete is in and this in turn may give a better indication of when rehabilitation will be complete.

#### **Rehabilitation Principles**

The ultimate goal following a sports injury of any kind is to achieve symptom free movement and function, allowing the player to return to sport in the shortest possible time. Rehabilitation begins immediately after an injury and continues through the phases of healing, including whether or not surgery is indicated. Rehabilitation culminates with a return to sport.

Though easier said than done, this process should begin with a thorough understanding of the diagnosis as well as contributing factors to the injury. The healing process will require continuous assessment because living tissues respond and adapt to the stresses imposed on them. As the athlete progresses, the plan of care and the rehabilitation goals must be revisited to ensure they are still appropriate to the individual.

The following table lists the stages of healing of soft tissues (muscles, tendon, ligaments):

<b>Phase of Injury</b>	<b>Time Frames</b>	<b>Comments</b>
Inflammation Phase	0 - 6 days	Signs of inflammation are: redness, heat swelling and pain.
Repair Phase	7 – 21 days	The body produces new connective tissue to fill the wound and new blood supplies to these tissues.
Remodelling Phase	22 days – 6 weeks	Scar tissues align and rehabilitation focuses on restoration of the athlete's strength, range of motion, stamina, speed, agility and sport specific skills. This phase can last for a year or more with fractures or more serious injuries.

## **Rehabilitation Goals**

These goals represent a continuum rather than a need to achieve one before moving to the next. For example I may move the athlete into stabilization exercises when full range of motion is not yet achieved. Also, I may begin with relatively easy agility exercises before moving to speed work, which is before more difficult agility tests and exercises.

- **Range of Motion**
- **Stability**
- **Strength**
- **Speed**
- **Agility**
- **Sport Specific Skills**

## **Resumption of Soccer Following Injury**

The player must not return to play in practice or game conditions until the following criteria have been met:

- The player can run straight without pain; run and turn in a figure eight without a sign of a limp.
- The player is able to hop and jump in all directions with control and speed and without pain.
- Should be able to support full weight with the injured part. The injured part must be able to support weight or stress through all planes of movement.
- The player should have practiced with the team prior to competition.
- There is no pain, swelling or disability following training.

## 12. Miscellaneous Soccer Safety Tips

### Individual Kit Bags

Think your gym bag is a good place to keep your water bottle? Sweat glands are used by the body to help excrete waste. Sweat is made up of urea, salts, fatty acids, 400 odoriferous compounds and can even include heavy metals (15 minutes in a sauna can excrete as much heavy metal as it would take all day for the kidneys to do).

Researchers have even found that sweat can transmit Hepatitis B and the SARS virus. Sweat does not transmit HIV, the AIDS virus.

Use a kit bag that has different compartments for clean versus dirty, sweaty clothing.

By the way coaches, the same applies the team pinnies used for training sessions. These items get soaked in sweat and are usually tossed back into a single bag. Since you can't tell the difference between pinnies, one player can end up wearing another player's sweat from the last practice.

### Injury Stoppages

Although it is considered good sportsmanship for players to kneel down during injury stoppage, this practice encourages blood to pool in the legs after running has brought blood into the leg muscles.

It is far better for players to remain standing and even better to keep moving gently during the game stoppage. This will allow blood to circulate more freely both to the legs and also back again to the heart.

### Player Safety – Jewelry

Jewelry can injure both the owner and the player who comes into contact with the piece. All referees have been instructed to ensure players remove all jewelry before a game.

### Allergic Reactions

Allergic reactions may include the need for the EpiPen. Anaphylaxis is a severe allergic reaction that may include swelling of the throat and airway. When it strikes it is a life threatening emergency in which every second counts. If this is a requirement for one of your players it is important that more than one person is aware of the EpiPen and aware of how it works. Essentially the EpiPen delivers a dose of epinephrine (also called adrenaline) to the body to counteract the anaphylaxis

### First Aid Kit

Every team needs a first aid kit that accompanies the team to games and practices. A basic sport first aid kit should contain:

Item	Number	Uses
Abdominal Pad	1	Covers large wounds and can be used to absorb large amounts of discharged fluids.
Green Soap Sponges	12	Clean wounds and scrapes to prevent infections. Used by many first response teams.
Ammonia Inhalant Pads	3	Can prevent fainting or rouse a fainted person.
Alcohol Pads	12	Disinfectants for intact skin.
1 ½" Trainers Tape	2-3	Taping ankles to taping socks. This stuff could rival duct tape for its many uses.
Non-Stick Sterile Bandages	1-2	As the name says – when you do not want the

		bandage to adhere to the wound.
Gauze Pads (5x5 cm)	4	Cover wounds, stop bleeding, pad an area.
Gauze Pads (7.5x7.5 cm)	4	Keep a couple of different sizes on hand.
Gauze Pads (10x10 cm)	4	
Conform Bandage	1	Flexible. Can be used for padding and protection. Also useful for a bleeding head wound that requires treatment for the player to continue.
Elastic Support Bandage (eg. tensor bandage)	1	Useful for holding an ice bag over the injured area and for applying compression during the acute stage of injury.
Band-Aids various sizes	12	
Safety Scissors	1	For tape or clothing removal, these scissors have a flat, rounded tip to prevent cutting skin.
Triangular bandage	1	For slings and also to help create a splint if required.
Safety Pins	6	
CPR Aid Device	1	This is a barrier used during the administration of CPR. Most if not all first responders now use these devices to prevent disease transmission.
Disposable Nitrile Gloves	4	Use when dealing with blood. Non-latex composition is less likely to cause irritation or allergic reaction.
Forceps	1	Used when fingers are too large to grasp or when many areas need to be held at once. I prefer the locking style so I can let go of the forceps and they maintain their grip.
Instant Cold Packs	2	Chances are you will need to buy more of these as the season progresses. twist and squeeze to activate, cold in 30 sec.
Eyewash Solution 30 ml	1	Dirt, fingers rubber pellets – anything in the eye can cause serious irritation.

Know what's in your team's first-aid kit and know where it is located at all times.

One of the great lessons I learned while working in professional soccer is that the pros do many of the same drills and exercises that we teach our players even from a young age. The difference is that they did these drills extremely well. The touch, the tempo, the intensity were just fantastic to watch. The results of the hours of training spoke for themselves on the field.

Soccer safety is like the game itself. There are many basic things that we can do to make the game safer. So lets do these things extremely well.