

THE PREVENTION OF INJURIES IN YOUTH SOCCER



MICHIGAN FITNESS FOUNDATION

**Michigan Governor's Council on
Physical Fitness, Health and Sports**

Michigan Fitness Foundation

In cooperation with

The Sports Injury Advisory Group

The Institute for the Study of Youth Sports at Michigan State University

and

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Position Paper: The Prevention of Injuries in Youth Soccer

EUGENE BROWN, PH.D.

SUMMARY OF RECOMMENDATIONS FOR INJURY PREVENTION

The Governor's Council on Physical Fitness, Health and Sports takes the position that the incidence and severity of injuries in amateur soccer can be reduced by the application of recognized injury-prevention practices. In order to maintain the current popularity of soccer, and concurrently, to reduce the number of associated injuries, a range of preventive measures is recommended. The first two sections of the document summarize the recommendations. Later sections present the research basis and rationale for the recommendations. Readers who desire the complete detail and explanations should read the corresponding later sections.

PREVENTIVE MEASURES FOR PREPARING THE ATHLETE

Pre-Participation Assessment

A comprehensive pre-participation assessment should be mandatory for participation in organized soccer for all middle and high school students in interscholastic competition and all youth over age 14 in agency-sponsored competition. For players 14 years and younger in agency-sponsored soccer, players should have a complete physical examination from their family physician every two years, with an interim history before each new season. The assessment should identify conditions that could threaten the athletes' safety. The pre-participation assessment should include both a self-reported medical history and physical examination, including a dental checkup.

- The physical examination should be performed by a physician, physician assistant, or nurse practitioner with the training and medical skills to recognize heart disease and orthopedic conditions of concern for soccer.
- In addition to cardiovascular screening, the examination for soccer should include (1) an orthopedic exam focusing on neck strength, joint range of motion, flexibility, anatomical malalignments and muscle-tendon imbalances and (2) documentation/re-examination of past neurological, bone and joint injuries.

- Conditions should be documented that have potential implications for an athlete's safety during practices or games (e.g., visual impairment, diabetes, hypertension, asthma, severe allergies, sickle cell disease, history of heat illness, history of concussion, use of medications, use of steroids, symptoms of eating disorders, etc.).
- The physician should also ensure that the athlete's immunizations are up to date, including hepatitis B.
- The pre-participation physical assessment should be administered at least six weeks prior to preseason practice to allow time for correction or rehabilitation of identified problems.

Exercise-Induced Asthma

- If exercise-induced asthma is suspected, the soccer player should be referred to a physician who is qualified to treat respiratory disorders.
- An athlete with asthma must have a written asthma management plan that is shared with the coach. If the athlete still has trouble breathing, the athlete's parents or guardian should be advised to talk to the physician who can then adjust the plan.
- Practices that reduce risk of asthma attacks include (1) beginning practices and games with a 15-minute warm-up, (2) ending the practice or contest with a 15-minute cool-down, (3) avoiding situations that could trigger exercise-induced asthma, (4) covering the mouth and nose to warm the air during cold weather, (5) playing with periodic breaks rather than continuous play, and (6) following physician's instructions about using medications before or during activity, which may include use of a quick-relief medicine or the use of an inhaler.

Physical Conditioning

In order to prevent injuries, the athlete should be provided the appropriate physical conditioning to prepare for the physical stresses that he or she will likely encounter.

- Conditioning programs for soccer should promote anaerobic capacity, cardiovascular endurance, flexibility, range of motion, muscle strength and power.

The Prevention of Injuries in Youth Soccer

- There should be a minimum of three weeks of preseason conditioning for recreational play, and six weeks for interscholastic play.
- For athletes 14 years and older involved in higher levels of competition, yearlong conditioning programs involving exercise and appropriate nutrition are essential to the athlete's safety. In addition, more intensive conditioning and strength training should be initiated a minimum of six weeks before the start of daily practice so that the athletes will be conditioned before the first day of practice.
- All training sessions for soccer involving vigorous physical activity should begin with a warm-up phase, followed by stretching, vigorous training activity (based upon the principle of progressively increasing exercise intensity from session to session), and ending with a cool-down period and stretching.

Muscle Strengthening

- If resistance training to strengthen muscles is included in the training program, fitness professionals who have a thorough understanding of resistance training and safety procedures should supervise every exercise session.
- Equipment should be in good repair and properly adjusted to each individual.
- Resistance training should be individualized for each athlete and include warm-up exercises.
- Any individual muscle group should be trained only two to three times per week, to allow two to three days of rest between resistance training sessions.

Resistance Training Equipment for Immature Athletes

- If equipment is used as part of the strengthening regimen for players who have not completed puberty, the equipment should be selected so that it can be adjusted for size and load to accommodate immature users.
- Direct supervision should be provided by a qualified adult, with youth instructed in techniques and adjustment of equipment.

Neck Strengthening Exercises

- To reduce the risk of injuries from heading the soccer ball, players should be instructed and supervised in the correct technique in performing scientifically validated exercises to strengthen the neck muscles as part of their total conditioning program.
- If muscle-strengthening equipment is used, people trained in its use must supervise workouts.
- Especially for athletes under 14 years old, exercises involving muscle forces against self-provided resistance should be used. See Appendix A.

Nutrition

Athletes should eat a well-balanced diet consisting of the five food groups (grains, fruits, vegetables, dairy products

and meat, fish or poultry) and water. They should be encouraged to drink the equivalent of 8 to 16 ounces or more of water prior to exercise and during exercise. After exercise, athletes should replace fluids in amounts equivalent to their weight loss to prevent dehydration and to reduce the risks of heat illnesses.

Knowledge and Skill Development

Training programs should provide the athlete solid information on the rules of soccer and how the athlete can protect him/herself from injuries. A minimum ratio of one practice per game throughout the season has been recommended for youth play.

Soccer Skills

- Coaches must ensure that physical skills and the techniques of kicking, trapping, passing, tackling and heading are taught correctly and progressively, commensurate with the skill level and experience of the athletes. Appendix B contains guidelines for teaching selected skills. A complete progression for teaching soccer skills developmentally is provided in chapters 13 through 19 of ***Youth Soccer: A Complete Handbook*** by Eugene W. Brown, Ph.D.

Overuse Injuries

Young athletes are especially susceptible to injuries caused by undue repetitions of the same movement task.

- Coaches must distribute the frequency, intensity and duration of conditioning drills to prevent overuse injuries.
- Practice drills for individual skills should be short; the majority of practice time should be devoted to the integration of these skills into game-like situations during which the young athletes have opportunities to practice a variety of skills.

Promoting Safety

Athletes should be taught skills related to safety so that they are less likely to be injured. These skills include how to safely perform the skills, how to avoid violations of rules, how to avoid structural hazards in the soccer setting, knowing standard evasive maneuvers and methods of falling, and how to use training equipment.

Reducing Risk for Osteoarthritis

The following interventions can minimize the risk of developing osteoarthritis later in life due to soccer injuries.

- Athletes should be given strengthening regimens for the muscles surrounding the knee and ankle joints.
- Athletes should be taught how to perform drills, exercises and soccer skills correctly.
- Proper treatment should be provided after an acute injury, especially if the injury caused bleeding and swelling in the joint.

- Comprehensive rehabilitation after an injury should restore the joint as nearly as possible to its previous function.
- Equipment and surfaces should be used that reduce the impact of the player's own weight and contacts with the playing surface and other players.

Psychological Considerations

Prevention

Coaches should get to know their athletes and be in a position to recognize each athlete's traits or characteristics that may lead to injuries, to modify the athlete's behavior and, perhaps, to place the athlete in positions where injuries are less likely to occur.

Post-Injury

Coaches are in an excellent position to assist with the psychological reactions to injury by the athlete and assist in the athlete's recovery. Coaches should:

- Maintain close contact with the injured athlete.
- Have team members visit the athlete and keep him or her informed about team activities.
- Ensure that the athlete understands the nature of the injury, the recovery process, and the timeline for return to play.
- If developmentally appropriate, be sure that the athlete has coping skills for positive recovery, e.g., goal setting, self-talk strategies and mental imagery.
- Establish a close rapport with the athlete's parents to ensure that the athlete has social support within the family.

PREVENTIVE MEASURES RELATED TO THE SOCCER ENVIRONMENT

Facilities

- Fields should be inspected prior to each practice or match and all potential hazards corrected or removed prior to activity.
- Out-of-bounds buffer zones should be clearly marked with adequate space between bleachers, spectators, other structures and the playing field to prevent injuries to players and spectators beyond the regulation playing field. A buffer zone of four meters (13 feet) is recommended. Where feasible, indoor soccer fields should also be designed with this buffer zone.
- In indoor play, the walls around the field must be smooth and continuous without any projections. Doors used for substitutes to enter the playing area must always open away from the field and should be kept closed during games.
- If present, locker rooms, weight rooms and shower rooms should be sanitary, well-lighted and free of hazardous debris. Ground fault circuit interrupters should be installed when water is near electrical outlets.
- Coaches and officials are responsible to avoid exposing players to hazards associated with facilities.

Goal Posts—Design, Padding, Anchoring

- Goals should be anchored for both games and practices on either a permanent or temporary basis.
- Soccer games should begin only if the goals are anchored. If the goals are not sufficiently anchored or counterweighted, the game must not be played.
- If permanent goals are used, the goals should be padded, at least in the field portion of the goal.
- Moveable goals that are not in use should be dismantled and chained or anchored to each other, a fence post or other sturdy source. If this is impractical, store soccer goals in a place inaccessible to children.
- For moveable goal posts: (1) remove nets when goals are not being used; (2) inspect the equipment before each use, immediately replacing damaged or missing parts; (3) prohibit climbing on the net and goal posts; (4) attach and ensure the visibility of safety labels; (5) disassemble goals when soccer season ends; (6) exercise caution when moving goals, using only authorized and trained personnel; (7) educate players about soccer goal safety.
- Corner flags for outdoor play should be flexible and must be a minimum of five feet in height with a blunt or rounded top.

Equipment, Supplies and Apparel

- A properly equipped and attired athlete is less likely to be injured. The essential equipment for all soccer players is a ball, shin guards, shoes, mouth guard, shirt and shorts.
- If eyeglasses are essential for vision, a type of glasses made for contact sports, with strong frames and unbreakable lenses, should be worn with a safety strap. For athletes with severely impaired vision, previous eye injuries or vision in one eye, safety goggles should be used.
- Jewelry (including rings, bracelets, necklaces, wristwatches, etc.) must not be worn for practices or matches. Only Medic Alert® bracelets or necklaces are allowed, if they are properly taped down with medical information showing.
- It is the responsibility of coaches and officials to make sure that all equipment and apparel are safe.
- Parents, guardians and players should be informed about appropriate safety equipment and apparel so that they can purchase essential items.
- Inspection of equipment should be a season-long process for parents, athletes and coaches. Officials must also conduct safety inspections of equipment worn by all players prior to each game.

The Soccer Ball

- The size of soccer ball used for organized play is dictated by the league or organization. In general, younger players (4-7 years old) should use a smaller and lighter ball (size 3), 8-11 year old players should use a size 4 ball and older players (12 years old and

up) should use a larger and heavier standard-sized ball (size 5).

- Soccer balls should be inspected to ensure that they do not have any loose panels that could cause injury.

Shin Guards

- All players should be required to wear properly fitting shin guards.
- Shin guard size should be matched to the length of the player's lower leg and constructed of materials that provide good force-absorbing qualities.
- Coaches are responsible for ensuring that players are wearing shin guards that are completely covered by their socks before participation in practices or games.
- Officials are responsible for ensuring that players are wearing properly fitting shin guards that do not project from beneath the socks, thus creating a potential hazard for opponents.

Shoes

- Shoes are the most important piece of personal equipment for a soccer player and should be purchased to fit.
- Gym shoes, multi-cleated molded shoes and shoes with screw-in cleats are all permissible apparel for soccer players. Gym shoes or "flats" are appropriate for indoor play or for outdoor play when the surface is not wet.
- The multi-cleated molded shoe is recommended as a versatile shoe for most outdoor play. Judgment must be used in deciding whether to use screw-in cleats.
- Because of the potential hazard of cleats to other players, officials are responsible for inspecting cleated shoes before matches and coaches before practices. The first level of inspection for all protective equipment rests with the parents and athletes.

Mouth Guards

All players should wear properly sized, molded mouth guards throughout all practices and games.

Clothing

The amount and style of clothing should be related to the temperature and humidity that are present and the intensity of activity.

Goalkeepers require specialized clothing: goalkeeper's gloves; a goalkeeper's shirt (different in color than the shirts of the field players, the opposing goalkeeper and officials) that is snug fitting with full-length sleeves and built-in padding for protection; standard elbow pads (optional); goalkeeper's pants (three styles with built-in padding); kneepads (optional); goalkeeper's helmet; and an athletic supporter with cup (boys) or an athletic bra (girls).

Weather

Administrators and coaches of youth soccer in Michigan must be able to deal with extreme weather conditions as part of their mandate to protect the health and welfare of athletes, coaches and spectators.

- Weather policies should be clearly defined in a written plan before a season begins.
- The weather plan should include policies for modifying or canceling games and practices, the chain of command for making decisions about severe weather conditions, the method to be used to document severe weather, and the specific weather conditions that would result in specific precautions.
- Athletic programs should use a weather radio equipped with the emergency alert system provided by the National Weather Service to be fully informed about life-threatening weather conditions.

Extreme Heat and Humidity

High temperatures in combination with high humidity can threaten the safety of athletes. During hot weather:

- Determine the danger level for heat illness using National Weather Service guidelines that take both temperature and relative humidity into account. See Appendix C.
- Acclimatize athletes to heat by gradually increasing the demands of physical activity.
- Conduct practices and games in lightweight clothing or uniforms.
- Make cold water available. Encourage drinking cold water before, during and after practices and games. Schedule and enforce rest and water breaks.
- To avoid cumulative fluid depletion, track weights over several days by weighing players before and after practices and games to monitor how much water is lost. If a player's weight is down more than 3% by the end of the practice or game, immediate fluid replacement is critical. If hot weather continues, check players' pre-practice weights for several days to make sure they have regained the water lost by sweating on previous days. If an athlete is more than 2% down from the previous pre-practice weight, the athlete should not be allowed to participate until fluid has been replaced.
- Provide covered shelter for breaks in play.
- Observe all athletes for signs of heat illness: fatigue, weakness, dizziness, pounding headache, visual disturbances, lethargy, cramps, inattention, confusion, nausea or vomiting, awkwardness, weak and rapid pulse, flushed appearance or fainting. Identify and observe more closely athletes at higher-than-normal risk for heat illness. If heat illness is suspected, cool the victim and seek a physician's immediate service.
- Salt and electrolytes lost through sweating should be replaced through a normal diet with plenty of fruit and vegetables. Salt tablets are a potentially dangerous, inappropriate remedy for heat illness.

- When the combination of heat and humidity create dangerous conditions (as determined by the National Weather Service heat index guidelines), the following actions should be taken: (1) suspend or cancel the activity; (2) schedule or reschedule the activity for a less dangerous time; (3) reduce the intensity of the activity; (4) modify the rules to permit additional breaks in play, greater substitution, and reduced length of practices and games; (5) schedule and enforce rest and water breaks; (6) cool the players by applying cool water or ice packs to the head, neck and extremities; and (7) keep highest-risk athletes out of action.

Lightning

- Consider using lightning detectors, which can identify severe weather before the storm arrives.
- Designate a safe shelter for each venue. Safe shelter for lightning is defined as any building normally occupied or frequently used by people, with plumbing or wiring that electrically grounds the structure. Avoid using shower facilities for safe shelter.
- Suspend games and practices whenever lightning is sighted.
- Establish a policy where an individual may leave an athletic site if the person feels in danger of impending lightning.
- Do not wait until you hear thunder to take evasive action. By the time thunder is heard, the storm is already sufficiently close to pose a danger to individuals.
- If lightning is spotted or imminent, all individuals must leave the outdoor soccer area to go to safe shelter. If no safe shelter is available, avoid being the highest point in an open field, near the highest point or on wet soil.
- If refuge is sought in a motor vehicle, keep the windows closed. Do not touch metal door or window handles or the metal framework of the vehicle.
- If an individual is about to be struck by lightning (hair stands on end or skin tingles), the person should not lie flat on the ground, but should immediately assume “the lightning safe position.” This is a crouched position on the ground, balancing on the balls of the feet, with hands on knees and head lowered.
- Do not shower, bathe, use plumbing or talk on landline telephones when lightning is present. Cell phones are safe to use during lightning storms.
- After activities have been suspended, wait at least 30 minutes following the last sound of thunder or flash of lightning prior to resuming an activity or returning outdoors.
- If someone is struck by lightning: (1) activate the local Emergency Medical Service; (2) if necessary, move the victim with care to a safer location; (3)

evaluate airway, breathing and circulation and then begin CPR if necessary; and (4) evaluate and treat for hypothermia, shock, fractures and/or burns.

Severe Storms and Tornadoes

- Designate an individual who will monitor weather forecasts before and during a practice or event when there is any threat of severe storms and tornadoes.
- Athletes and coaching staff should know the location of the closest safe shelter. Safe shelter for tornadoes is defined as the basement of a sturdy building, away from windows, glass doors and chimneys. If a basement is not available, an interior hallway on the lowest floor is best. Gymnasiums should be avoided. The inside of an automobile is a not safe place if a tornado is imminent. If no safe building is nearby, individuals should seek shelter in a ditch, ravine or other place below ground level and stay as low as possible.
- If a tornado warning or severe thunderstorm warning is issued 3 hours before a game or during a game or practice, the activity should be canceled or suspended and all participants moved to safe shelter. Athletic activity should not be resumed until the National Weather Service suspends the warning.

Cold Weather

To avoid injury from frostbite and hypothermia, suspend activity whenever the combination of wind speed and temperature may induce frostbite within 30 minutes (wind chill index of -18° F or lower; see Appendix D for recently revised guidelines) or whenever precipitation (rain, sleet, snow or hail) and temperature combine to increase the possibility of hypothermia.

- Athletes are most vulnerable during periods of inactivity, like time on the bench or at half time, and must be provided with rain gear, coverings for the head, gloves and dry uniforms. If proper apparel cannot be provided, the activity should be canceled.
- Coaches and officials must monitor the athletes for symptoms of hypothermia (confusion or disorientation, loss of memory, drowsiness, poor hand-eye-foot coordination, slurred speech and an inability to understand directions) or frostbite (white or grayish-yellow skin that feels unusually firm or waxy, numbness or a lack of sensation in the afflicted areas, most often on ears, nose, fingers and toes). The victim should be moved to a warm environment where wet gloves, shoes and clothing can be exchanged for dry, warm apparel. Blankets should be provided until circulation and function are restored to their normal level.
- If symptoms of either hypothermia or frostbite are present, recognized first aid procedures should be followed.

SUMMARY OF RECOMMENDATIONS FOR LEVELS OF RESPONSIBILITY TO PREVENT SOCCER INJURIES

The responsibility for minimizing injuries in soccer must be shared by program administrators, coaches, officials, medical personnel, parents or guardians and athletes.

RESPONSIBILITIES OF PROGRAM ADMINISTRATORS

Program administrators are responsible for providing a structure that promotes a safe soccer environment.

Facilitating the Education of Coaches and Officials

Program administrators should ensure that coaches and officials, even unpaid volunteers, are qualified to teach athletic skills and to implement injury-prevention strategies (see Appendix E). This means raising necessary money, enforcing minimum educational standards and making educational programs accessible. See Appendix F and Appendix G for sources of education and information for coaches and officials, respectively.

Securing and Evaluating Coaches and Officials

- Program administrators should implement a system to verify that coaches and officials are performing their duties. If the soccer program cannot achieve acceptable standards of performance for both paid and volunteer personnel, the program should be postponed until pre-established standards can be met.

Selecting, Assigning and Monitoring Facilities

- Program administrators must establish a process of monitoring facilities to ensure continued safety, including a system in which anyone can report safety hazards.

Planning for Medical Emergencies

- Program administrators should develop a comprehensive emergency plan for every practice and competition site, with all personnel who are to carry out the plan identified, instructed and rehearsed on emergency procedures. See Appendix H for a sample. Emergency transportation should be available on the scene or within six minutes from the soccer field. Access routes for emergency vehicles to the playing field must remain free of obstructions.

Establishing Concussion Management Policies

- Program administrators should work with a knowledgeable physician to develop clear local guidelines for identifying and giving initial treatment for concussions, including guidelines for return to play. See Appendix I.

Providing Safety Items

Program administrators and coaches share the responsibility of ensuring that items essential to the safety of athletes are available at all practices and contests. At a minimum, these should include:

- Water containers.
- Plainly marked first aid kits and supplies (see Appendix J). These supplies should be checked periodically.
- Up-to-date medical information for each athlete that includes any health conditions or medications of the athlete, emergency contacts, preferred physician, preferred hospital and a signed consent form giving permission to provide emergency care (see Appendix K).
- Cell telephone with list of numbers of ambulance services, paramedics, first aid personnel and police.

Arranging for Medical Personnel

Program administrators are responsible for arranging some level of medical oversight, either as staff or on a consulting basis. As minimum requirements, agency-sponsored and interscholastic soccer programs should have:

- A consulting arrangement with a certified athletic trainer whose duties include overseeing the health and safety aspects of the soccer program and performing safety education for parents and athletes. The athletic trainer also directs the conditioning program, develops or assists in developing the written plan for handling emergencies, helps to implement this plan, administers first aid, recommends appropriate medical attention for athletes with injuries and supervises the rehabilitation of injured athletes.
- An established, written plan for emergency medical services.
- A system for providing low-cost pre-participation physical examinations for athletes 14 years and older.
- A referral service with physicians who are qualified to deal with soccer-related injuries.
- Coaches who are certified in first aid and CPR, and desirably, American Red Cross Sport Safety Training, if practices and games are held without the presence of a certified athletic trainer or a physician on the sidelines.
- A policy and procedures with regard to transmission of blood-borne pathogens, including education of coaches, parents and athletes.
- If possible, an automatic external defibrillator (AED) and someone who is trained to use it.

Use of Drugs

School districts and youth leagues should aggressively discourage children and youth from using steroids and all performance-enhancing drugs, as well as use of alcohol, tobacco and recreational drugs.

Matching Athletes by Maturity and Skill

As part of the structure for the level of competition, program administrators are responsible for establishing reasonable age groupings to reduce mismatches in age, maturation, skill, knowledge, strength, height and weight. This may include carefully designed policies that guide placing a player in a different age grouping and permitting a player to “play-up” or “play-down.”

Modifying the Rules of Play

For different age groupings, program administrators should consider modifying the rules of play to reduce the risk of injury. These may include adopting the Michigan High School Athletic Association (MHSAA) regulations. These include the number and length of the matches, reducing the size of the field, increasing the opportunities for breaks in play for substitutions and for adverse weather conditions, regulating the length and number of practices, and limiting the length of the soccer season. In addition, restrictions on slide tackling and heading should be considered in youth play.

Limiting the Number and Length of Matches

Soccer program administrators should consider adopting the Michigan High School Athletic Association regulations on number of matches:

- Limit high school soccer teams to 18 games and 4 scrimmages per season.
- Limit middle school/junior high school soccer teams to 12 games per season.
- At the high school level:
 - ◊ No player may compete in more than 3 games of soccer in one week or one game per school day.
 - ◊ A team may compete in a multi-team tournament in which total allowable playing time for any team is no more than 180 minutes and the event counts as one of 18 regular-season contests. Additional provisions also apply.
- At the middle school/junior high school level, a game consists of four 15-minute quarters, with tie games at the end of regulation playing time remaining tied.

Regulating the Length and Number of Practices

Soccer program administrators should consider setting reasonable time limits on weekly practices, with recreation leagues limited to two 90-minute practices per week.

Limiting the Length of the Soccer Season

Soccer program administrators should consider limiting active competition in soccer by young athletes to a three-month season (MHSAA rules).

Establishing Weather-Related Policies

Program administrators should establish policies that clearly define weather conditions that require cancellation of matches or adoption of special precautions.

Establishing Policies for Transporting Athletes

- Program administrators should develop policies and guidelines for public and private transportation of athletes to and from scheduled athletic activities, including the kinds of transportation that is acceptable, when and where teams may travel, and who may transport the athletes.
- The vehicles must be properly maintained, inspected for safety and driven by drivers who are appropriately licensed and insured. When athletes are to be transported in private vehicles, guidelines must be in place. Transportation via public vehicles is preferred because many of the responsibilities are assumed by trained professionals.

Establishing a System for Injury Reporting

- Program administrators should establish a system for coaches to use to document injuries over the course of a season. The program administrator should review injury records to look for trends or patterns of injuries that may identify problems with facilities or training methods that need to be corrected. See Appendix L.
- Soccer programs should work toward eventual adoption of a uniform injury reporting system using recognized nomenclature that tracks the type, site, severity, and likely cause of each injury, as well as when the injury occurred (within which practice, match and season).

RESPONSIBILITIES OF COACHES

The coach has overall responsibility for the safety of the athletes. This begins with having coaching education, knowing the rules of soccer thoroughly, knowing about soccer equipment and attending appropriate in-service educational clinics and courses on soccer. See Appendix F for sources of education. If there will be no physician or athletic trainer available, coaches should also be certified in first aid and CPR. Coaches' responsibilities also include the following.

Teaching Safety to Players

Coaches should teach soccer safety to both the athletes and their parents, including teaching athletes proper soccer techniques and sportsmanship that emphasizes fair and safe participation, adherence to rules, and skill and tactical ability.

Teaching Safety to Parents

Coaches should hold a preseason orientation meeting for parents and guardians that should include: times and duration of practices; appropriate conditioning procedures; how to avoid injuries; selection, fitting, maintenance and use of protective equipment; proper nutrition; policies for medical care and rehabilitation of injured athletes; plan for emergency care of injured athletes; and arrangements for transportation beyond local community sites. The role of parents and guardians in keeping their athletes safe should also be clarified.

Prevention of Communicable Diseases

Before any equipment is reassigned from one athlete to another, it should be sanitized. All players should be up-to-date with recommended immunizations. Athletic staff should follow universal precautions for protecting themselves and athletes from blood-borne illnesses. See Appendix M.

Ensuring a Safe Playing Environment

- The coach should monitor the playing environment for both practices and games to ensure safe conditions exist, including facilities, equipment and weather conditions. The coach should also check to be sure that players are wearing their protective equipment. The coach should take appropriate action to remedy the unsafe condition or adjust to the weather conditions by following policies and guidelines adopted by the soccer program and good coaching practices.
- Coaches must be realistic about physiological and psychological capabilities of athletes and conduct practices and contests within these constraints.
- Because of the potential for serious injuries from heading and tackling, coaches must be qualified to teach these skills so they are developmentally appropriate for the age group of the athletes. See Appendix N.

Selecting Safe Drills

Training sessions should include various drills and exercises that are designed to enhance the players' fitness and their technical and tactical abilities. Coaches should know how to conduct safe drills.†

Using Progressions in Physical Training and Skill Development

- Athletes should be taught how to perform the basic motor skills of soccer and the techniques of kicking, trapping, passing, tackling and heading correctly and progressively, commensurate with the skill level and experience of the athletes. These should be taught in a systematic way from training session to training session, with gradual progression. Appendix B provides an overview of the important skills to be taught, their developmental progression and suggested levels of difficulty.
- Coaches should avoid overloading body systems of young athletes, which could increase the risk of injury, by providing three or more weeks of preseason training before placing athletes in high-intensity matches. Note that the MHSAA prohibits competition until 11 days have elapsed from the first practice.

Using Warm-Up and Cool-Down Activities

Before practices and matches, athletes should perform a minimum of 15 minutes of warm-up activities that consist

of light aerobic exercises followed by stretching. Athletes also should warm up for five minutes after any prolonged breaks in activity (half time). Athletes should also engage in a cool-down period consisting of light aerobic activity followed by stretching.

Using Appropriate Substitution Patterns

In addition to using substitution for tactical, social and psychological reasons, coaches must carefully observe play to identify and remove athletes who may be injured or physically exhausted.

Dealing with Medical Conditions and Injuries

- Coaches should have a basic understanding of human anatomy and physiology, recognize the common injuries in soccer, know how to handle a medical emergency and how to rehabilitate athletes who have sustained minor injuries.
- Coaches should be aware of players who are at-risk for exercise-induced asthma, know about their asthma management plans, understand the conditions that could place the athletes at-risk for an asthma attack and monitor their activities to minimize this risk.

Knowing When to Permit Previously Injured Athletes to Return to Activity

Coaches need to err on the side of caution. Athletes should not return to practice or play until injuries are healed, range of motion is restored and strength is recovered. Policies for return to play after head injuries established at the program level should be scrupulously followed.

RESPONSIBILITIES OF OFFICIALS

The management of matches is the responsibility of the officials. They should have knowledge and proficiency for officiating soccer at agency-sponsored and interscholastic levels and seek opportunities to enhance their knowledge and skills. See Appendix G for sources of education. Officials' responsibilities include all activities that are directly related to a contest and its immediate surroundings. Officials should:

- Know and enforce all rules of play.
- Warn and instruct players about possible violations of play and how to avoid potentially injurious situations.
- Inspect the facilities, equipment and apparel to identify potentially hazardous situations and take appropriate actions to remove these hazards or to delay or cancel the match until approved conditions prevail.
- Interpret the weather policies and cancel matches if there is adverse weather (high heat and humidity, lightning, tornado warnings, high winds, extreme cold), unplayable field conditions or poor lighting.

†Methods for conducting safe drills are described in Brown, E.W., *Youth Soccer: A Complete Handbook*. Traverse City, MI: Cooper Publishing Group, 1993.

- Stop a match to provide an opportunity for treatment of injuries.
- Be in proper positions to observe and penalize individuals who violate the rules.

RESPONSIBILITIES OF MEDICAL PERSONNEL AND COACHES

The presence of medical personnel (athletic trainer, nurse or physician) at practices and contests is strongly encouraged. If medical personnel are not present, the coach must assume some of the following responsibilities.

- Have a well-stocked first aid kit at all practices and competitions. See Appendix J for a list of items.
- Know how to provide immediate care for minor injuries and manage more serious injuries until trained medical personnel arrive. If coaches are responsible, they should become certified through the Sport Safety Training program offered by the American Red Cross.
- Know how to handle a medical emergency by implementing the emergency plan adopted by the soccer program's administrators. See Appendix H for a sample emergency plan. The local emergency plan should include guidelines for identifying and giving initial treatment for concussions and guidelines for return to play.
- Keep records of any injuries that occur over the course of the season, using the reporting system established by the soccer program administration. If no athletic trainer is available, the coach is responsible.

RESPONSIBILITIES OF PARENTS AND GUARDIANS

Parents and guardians have important roles for helping their children participate safely in soccer. These include:

- Monitoring and advocating for injury prevention.
- Reporting injuries that occur inside and outside of soccer, including pre-existing medical conditions and, if a child has asthma, the child's asthma management plan.
- Overseeing injury treatment and rehabilitation to make sure the athlete complies with treatment recommendations. A parent or guardian should have input into the decision about returning the athlete to play.
- Reinforcing compliance to safety practices that are implemented by others (e.g., learning and obeying the rules of play, physically and mentally preparing for competition, learning how to perform skills in a safe manner, wearing shin guards and mouth guards, and sportsmanship).
- Purchasing appropriate equipment and apparel (soccer balls, shin guards, mouth guards, clothing or padding) for their children with advice about what is appropriate and safe.

RESPONSIBILITIES OF ATHLETES

Athletes have some responsibilities for safety and prevention of injuries, including the following.

- Preparing actively, both physically and mentally, for the demands of competition; fully engaging in the physical conditioning and training offered, participating in warm-up and cool-down activities; and attending all team functions.
- Wearing protective equipment and apparel.
- Engaging in appropriate behavior toward others, understanding and abiding by the rules of soccer, and engaging in fair play and avoiding illegal behavior.
- Following official rules of play for matches and working to master drills and other practice activities.
- Reporting safety problems associated with equipment, apparel, facilities and teammates to those in charge so that the problems can be eliminated. They must also report all injuries to parents and the coach, and comply with any prescribed rehabilitation exercises.

INTRODUCTION TO RECOMMENDATIONS

The purpose of this paper is to gather, review and summarize the existing research on soccer injuries into an understandable collection of information and to provide guidance on the prevention of soccer injuries. Two sources of information served as the basis for the paper: (1) the scientific literature related to injuries in soccer and (2) the official recommendations of respected authorities in sports injuries. While the numerous reports about injuries in soccer are difficult to interpret and compare because of the differences in the studies and reports, factors that are most likely to influence the incidence and severity of the soccer injuries have been identified. Applying this knowledge toward the prevention of soccer injuries has led to the development of recommendations that are discussed in subsequent sections of this paper. It is acknowledged that it is not feasible for every youth soccer program in Michigan to adopt every known preventive measure. However, being well-informed is the most effective way to reduce injuries in soccer.

SOCCER PARTICIPATION IN THE UNITED STATES

According to the Sporting Goods Manufacturers' Association, there are approximately 17.6 million people six years of age or older who participate in soccer at least once per year, 3.8 million of whom play 52 or more days per year. Soccer is the favorite sport for 4.1 million Americans. Forty-one percent (41%) of soccer players are female.¹

Growth of Soccer Participation in the United States

From the previous section, it is evident that soccer is a popular activity among youth and adults in the United States and in Michigan. Not only has soccer made its way

into the sports culture but it also continues to demonstrate growth in its number of participants. The growth among youth can be estimated from figures published by the Soccer Industry Council of America.² Since 1980, registration in the youth leagues American Youth Soccer Organization (AYSO), Soccer Association for Youth (SAY) and the United States Youth Soccer Association (USYSA) has increased by 382%. High school participation by boys and girls has increased, respectively, by 199% and 551%.³ Since the 1990-91 season, the number of NCAA institutions sponsoring soccer has increased by 21% for men and by 127% for women. Adult registration in the United States Amateur Soccer Association (USASA) has increased 64% since the 1990-91 season.

Interscholastic Soccer Participation Compared with Other Sports

Between the 1998-99 and 1999-2000 school years, soccer gained more high school participants than any other sport, for both boys and girls. Currently, soccer ranks fifth in participants, for both boys and girls, among high school sports. Although soccer ranked fifth overall in popularity of team sports, soccer and basketball were the only sports that experienced a net increase in participants during the 1990s, gaining 14% and 10%, respectively.¹

SOCCER GOVERNANCE STRUCTURE

Affiliated Soccer Programs: The sport of soccer is played in many countries of the world under the auspices of an international governing body. Figure 1, located just before the appendices, shows the relationship of soccer programs in the United States that are affiliated with the world governing body.²

Nonaffiliated Soccer Programs: Much of the soccer played within the United States is not under the auspices of the international structure shown in Figure 1. These nonaffiliated groups include indoor and outdoor leagues at the community and recreational levels, teams sponsored by youth-serving organizations (such as religious organizations, the YMCA/YWCA, 4-H Clubs and Boy and Girl Scouts) and programs sponsored by the Amateur Athletic Union. Similarly, all soccer played at the interscholastic and intercollegiate levels is played beyond the bounds of the international structure. These include programs of the National Federation of State Associations (high school athletics), the National Collegiate Athletic Association (NCAA), National Junior College Athletic Association (NJCAA), National Association of Intercollegiate Athletics (NAIA) and the National Christian College Athletic Association (NCCAA). The independent nature of the nonaffiliated organizations precludes an accounting of the number of participants in these programs. However, it can be assumed that the unaffiliated programs include a large portion of the 3.8 million people who indicate that they play soccer at least 52 times each year, as defined by the Sporting Goods Manufacturers' Association.¹

RISK/BENEFIT RATIO OF PARTICIPATION IN SOCCER

There are many potential benefits to be obtained from participation in soccer. These include developing specific skills, developing physical fitness and a lifetime pattern of regular physical activity, and learning conditioning techniques that affect health and performance. Benefits also include developing a realistic and positive self-image, developing respect for rules as facilitators of safe and fair play, obtaining enjoyment and recreation, and developing positive personal, social and psychological skills.⁴

On the other hand, there is some risk of injury that accompanies participation in soccer. To minimize this risk, the rates, sites, types and severity of injuries in soccer should be explored so that initiatives for injury prevention can be clearly identified.

EPIDEMIOLOGY OF SOCCER INJURIES

According to Caine, Caine and Lindner, "the epidemiologist in sports medicine is concerned with quantifying injury occurrence (*how much*) with respect to *who* is affected by the injury, *where* and *when* injuries occur, and *what* is their outcome, for the purpose of explaining *why* and *how* injuries occur and identifying strategies to control and prevent them" (page 2).⁵ This section addresses the epidemiology of injuries in soccer. Based on the research on injuries in soccer, suggestions are made on how to decrease the incidence of injuries and how to reduce the severity of injuries that may occur.

THE INJURY MECHANISM

Injuries in soccer result from interactions between an athlete (internal factors) and the soccer environment (external factors).⁶

Internal Factors Related to Injury (The Athlete)

Each athlete comes to the soccer setting with his or her own set of physical, psychological and cognitive characteristics. These characteristics are internal to the performer and are the result of past experiences and development. Therefore, they change over time. Examples of these characteristics are: (a) *physical characteristics*: strength, body type, weight, gender, skeletal and sexual maturation; (b) *psychological characteristics*: anxiety, self-confidence, risk taking; and (c) *cognitive characteristics*: basic intelligence plus knowledge of rules, safe performance, the opponent, how to use training equipment and strategies. Each specific physical, psychological and cognitive characteristic may have an influence on an athlete's potential for injury.

External Factors Related to Injury (The Soccer Environment)

Each soccer setting, whether for training or actual competition, contains many environmental factors that

may be contributors to injury. These environmental factors are external to the athlete and often change over time. They include elements such as the condition of the field, characteristics of the facilities, structures and equipment used in soccer, and properties of protective equipment. It also includes forces and torques applied to the athlete by the athlete him/herself, by other athletes or by the environment, enforcement of rules by officials, incitement to violence by parents, and stresses placed upon athletes by their parents and coaches.

STUDIES OF INJURIES IN SOCCER

It is evident that many factors interact to determine whether or not an injury will occur in soccer. Wherever possible, recommendations to prevent injuries should be based on sound research studies. One major problem in summarizing the large body of research studies on soccer injuries is that studies differ in their (a) definition of what constitutes an injury, (b) research design and (c) method of collecting data. Therefore, the research on injuries in soccer has been categorized to provide the reader with the context under which these studies were conducted.

Rates of Injuries in Soccer

The strongest support for statements about rates and severity of injuries in soccer is derived from prospective studies, e.g., studies in which the selection of subjects and measures were predetermined, usually involving experimental and control groups. However, some support for trends or tendencies may be provided in broad reviews that span several studies. In order to compare studies, rates of injuries must be calculated, where the number of injuries is expressed in relation to a unit of time. For example, a study reporting the number and severity of injuries along with the amount of time spent in practices and competition would allow the investigator to calculate how many injuries occurred per unit of time.

Injury Rates in Outdoor Play

Based on review of 17 studies addressing rates of injuries for youths 19 years and under, several generalizations can be made.^{7 through 23}

Differences by Gender: Girls had higher rates of injuries than boys, regardless of age, level of play, or whether the injuries occurred during practices, games or tournaments.^{7,8,15,17,22}

Age of Competitors: In general, the rate of injuries increased as age advanced. Also, as the competitive level increased within an age group, there was a corresponding increase in injury rates.^{10,15,22} However, Nilsson et al.¹⁵ and Sullivan et al.²² noted that 15-16 year old males had slightly higher rates of injuries than did 17-18 year old athletes.

Games versus Practices: Rates of injuries clearly indicate that more injuries per unit of time occurred during games.^{9,23} Reasons for the increased rates of injuries

during competition include potentially greater exertion during contests, fatigue (which may be under greater player control in practices), and the stress of muscular tension (which may be higher during contests).

Tournaments versus Regular Season Play: Direct comparisons between rates of injuries in tournaments versus regular games are not possible because none of the studies made direct comparisons between these distinct levels of competition. However, rates of injuries reported for regular competition are generally similar to rates reported for tournaments.^{7,8,9,10,11,15} An exception to this general finding was reported by Nilsson and Roaas¹⁵ who found a higher rate of injuries per 1000 playing hours in tournaments, with 23 injuries for males and 44 injuries for females. The only rates for regular season play that approached those reported by Nilsson and Roaas were cited by Inklaar et al.,¹⁰ who noted 34.6 injuries per 1000 hours of play for elite-level 17-18 year old males.

Injury Rates for Indoor Play

The general belief of soccer players and coaches is that there is a greater incidence of injury in indoor play in comparison to outdoor play. This belief is attributed to the perceived danger in indoor play associated with players colliding with fixed walls and reduced predictability of play due to balls rebounding off the walls. It is also associated with a close proximity of players in a relatively small area per player, increased shear force and torque on the foot from traction on the artificial surface, greater abrasive qualities of the artificial surface and greater number of short- and high-intensity shifts on the field.

Unfortunately, few studies have addressed injuries in indoor soccer.^{24,25,26,27,28,29} Of the limited research available, all studies involved indoor play on artificial surfaces that were surrounded by dasher boards. No studies were found on injuries in futsal, the popular small-sided indoor game played on a basketball-type court without surrounding dasher boards.

The limited data available cannot prove that indoor play is associated with increased injury rates, but the data suggest that it is true. Only two studies directly compared indoor and outdoor play.^{24,27} One of these involved professional players, for whom injury rates were 19% higher in outdoor than in indoor soccer.²⁷ The other involved youth players, for whom injury rates were 6.1 times higher in indoor than in outdoor play.²⁴ Two additional studies suggest that indoor injury rates are relatively high.^{25,26}

Types and Sites of Soccer-Related Injuries

In order to focus injury prevention efforts, it is important to know the types and sites of injuries that are most common. There are several factors that may cause difficulty in interpreting injury statistics. These include

inconsistent definitions of injury, inconsistent methods of data collection, the possibility of older and more competitive players ignoring and not reporting “minor injuries” (e.g., abrasions and contusions), and a lack of accuracy associated with athletes’ retrospective self-reports of injuries (e.g., differentiating between sprains and strains).

Eighteen studies were reviewed in which investigators reported the types and sites of injuries in soccer for athletes aged 19 years and younger.^{29 through 46} Older players were more likely to incur more severe injuries, such as concussions and fractures, than younger athletes. Irrespective of age, gender and level of play, the highest percentage of injuries were reported to be contusions (25-47%), and sprains and strains (9-35%). Concussions accounted for 5% of the total injuries, but 89 of the 97 concussions were reported by Nilsson et al.¹⁵ and Volpi.²⁹ Fractures accounted for an average of 8% of the reported injuries, with a range of 0⁸ to 14%.⁷

The lower extremities were, by far, the most frequent sites of injuries (61-82%), followed by the trunk (13%) and the upper extremities (2-8%).^{7 through 29} Despite the common impression that the ankle is the most frequently injured site in youth soccer, these reports indicated that the knee (40%) was the most frequently injured site in the lower extremity. The ankle (20%) followed the knee, with the foot, shank and thigh each represented by 13% of the injuries in the lower extremities.

Severity of Soccer Injuries

The severity of an injury is determined by the strength of the tissues of which a body part is composed and the magnitudes, numbers and frequencies of forces and torques received by these tissues. In general, if the forces and torques are mild and infrequent and the body parts are strong, no injuries are likely to occur. However, the occurrence of repetitive, forceful trauma is highly likely to result in tissue damage, such as strains, sprains and stress fractures.^{12,17}

The difficulty in evaluating and comparing the severity of injuries in soccer arises from two inconsistencies in data reporting. First, categories of injuries are not uniform (e.g., mild, moderate, major, severe). Second, different methods are used to measure injury severity. For example, some studies quantify time lost from practice, games, school and work, while others quantify the financial cost of medical care that is required to treat the injury and rehabilitate the injured athlete.

Whatever method is used to document severity of injury in youth soccer, the vast majority of injuries are at the mildest level. In a study of injuries at a summer soccer camp, 81% of those injured only missed one two-hour training session.⁸ In studies of tournament play, injuries described as *minor* or *slight* accounted for 41 to 63% of

all injuries.^{11,20} Having previously noted a higher rate of injuries in females, it is interesting that in the only report comparing the severity of injuries in boys and girls, boys had a higher percentage of their injuries labeled as *slight*, girls had a higher percentage of their injuries labeled as *moderate*, and both groups sustained 7% of their injuries in the *severe* category.²⁰

Limitations of Data

The research reports on soccer injuries that are currently available do not include some of the most important information that would be helpful for designing injury prevention programs. Studies are needed in which the frequency and severity of injuries are documented in relation to when they occur, how the injury occurred and where the injury occurred. The status of the athlete regarding gender, position played and physical condition as well as any environmental qualities that may have contributed to the injury are also needed.

Etiology of Injury in Soccer

Because soccer is a contact sport, injuries occur as a result of interactions between soccer players and between soccer players and their environment. Several investigators have reported interactions that contribute to injury in soccer.

Player-to-Player Injuries

Various studies of indoor and outdoor soccer play have determined that most injuries occur during player-to-player contact, ranging from 31 to 77% of all injuries.^{7,10,11,14,15} Player-to-player contact, often involving tackling, was identified as the cause of a high proportion of serious knee injuries.^{30,31,32,33} Gainor et al.³¹ and Levy et al.³² reported on player-to-player impact injuries associated with kicking the ball and kicking an opponent. They concluded that kicking involves the generation of high amounts of energy, which makes the kicker vulnerable to injury and is also dangerous to anyone who inadvertently receives a blow from a kick.

Head Injuries

There are four common ways in which soccer players sustain trauma to the head: (1) when a player deliberately strikes the ball with his or her head, especially if incorrect form is used; (2) when a forcefully kicked ball strikes the head of a player; (3) when head-to-head contact occurs as two players attempt to intercept or redirect the ball; and (4) in collisions with other players, causing one or both players’ heads to strike the playing surface. The soccer injuries that may result from such traumas include lacerations, injuries to the mouth and teeth and, perhaps of greater concern, concussions.^{33,34,35,36,37,38}

Although injuries to the head are relatively rare in soccer, accounting for 1 to 20% of all soccer injuries,^{39,40,41,42} it is the potential for chronic, latent brain damage rather than acute head injuries that have caused the greatest concern regarding head trauma in soccer. The practice of heading the ball, in which a player

deliberately strikes the ball with the head, has recently come under intense scrutiny. The fears of parents, physicians and coaches that heading the ball can result in injury have recently been renewed by a series of studies that suggest that repetitive striking of the ball with the head can have lingering, permanent effects on brain functions.^{43,44,45,46}

The first death due to heading a soccer ball was reported in 1925.⁴⁷ However, several decades elapsed before attention was directed to the potential damage caused by repeatedly heading a soccer ball. The potential chronic, cumulative effects of microtrauma to the brain were initially reported by McMaster and Walter⁴⁸ in 1978 and Smolaka⁴⁹ in 1981. But more recently, the issue has become so controversial that nearly one-fourth of the articles selected as pertinent to this review of injuries in soccer were devoted wholly or in part to the potential cognitive consequences of heading the ball. Perhaps the most influential of these reports were submitted by Tysvaer and Storli in 1981 and 1989,^{50,51} by Tysvaer and Lochen in 1991,⁵² by Witol and Webbe in 1994,⁵³ by Jordan et al. in 1996,³⁶ and by Matser et al. in 1998 and 1999.^{40,41}

The ominous warning presented by the studies of Tysvaer, Storli, Lochen and Matser is that acute or chronic trauma to the brain may be cumulative and irreversible. Tysvaer and Lochen⁵² and Tysvaer and Storli^{50,51} found significantly increased EEG disturbance in active soccer players compared with control subjects. In addition, neuropsychological examination demonstrated mild to severe deficits in attention, concentration, memory and judgment in 81% of the 37 former members of Norway's National Team. Matser et al. compared 33 amateur soccer players with 27 amateur runners and swimmers in the Netherlands on a series of 16 neuropsychological tests.⁴¹ The amateur soccer players exhibited impaired performance on tests of planning and memory compared with their matched controls. The results obtained from amateur soccer players were similar to those obtained by Matser et al. in a previous report, wherein 53 professional soccer players were compared with 27 elite athletes from non-contact sports.⁴⁰ The professional soccer players exhibited impaired performance in memory, planning and visuoperceptual processing when compared with the control subjects. Performance on these tasks was inversely related to the number of concussions incurred and the frequency with which players had headed the ball. Forward and defensive players exhibited the greatest impairment. Witol and Webbe reported that 60 high school players who most frequently headed the ball (10 or more times per game) scored lower on tests of attention, mental flexibility, facial recognition and visual searching than did players who headed the ball less often.⁵³

Debate regarding the dangers of heading in soccer intensified when several recent reports suggested that heading may not be the main culprit in soccer-related brain effects. Reports by Jordan et al. in 1996,³⁶ Barnes et al. in 1998,⁵⁵ and Powell and Barber-Foss in 1999¹⁷ indicated that player-to-player and player-to-surface contacts might be more influential in causing psychological and physiological deficits than the routine heading of the soccer ball. Jordan et al. compared the magnetic resonance images of the brains of 20 members of the U.S. Men's National Soccer Team with 20 age-matched male elite track athletes and found no statistical differences between the two groups.³⁶ However, encephalopathy in soccer players correlated with acute head injuries rather than results of an exposure index that estimated the time spent playing soccer and number of times that players actually struck the ball with their heads.

The perception that heading the soccer ball frequently results in acute head injuries is not supported by the reported research. Powell and Barber-Foss reported that mild traumatic brain injury (MTBI) occurred in 1,219 of 23,566 injuries in 10 interscholastic sports during a three-year period.¹⁷ None of the 10 popular high school sports were without the occurrence of MTBI. Football accounted for 63.4% of MTBIs; wrestling, 10.5%; girls' soccer, 6.2%; and boys' soccer, 5.7%. Even though the number of MTBI injuries in soccer was relatively low, this study indicates that acute head injuries are a significant factor that must be taken into account when studying brain functions of soccer players.

After a thorough review of the literature pertaining to injuries in youth soccer, the committee on Sports Medicine and Fitness of the American Academy of Pediatrics issued the following statement regarding heading:

“The potential for permanent cognitive impairment from heading the ball needs to be explored further. Currently, there seems to be insufficient published data to support a recommendation that young soccer players completely refrain from heading the ball. However, adults who supervise participants in youth soccer should minimize the use of the technique of heading the ball until the potential for permanent cognitive impairment is further delineated” (page 660).⁵⁶

This statement on heading by the American Academy of Pediatrics is not likely to satisfy either the proponents or the opponents of heading in youth soccer. Those who are in favor of teaching heading and using it as a tactic in competition will say that the statement errs on the side of caution because there are no data linking heading to brain injury in youth. Those who are fearful of the potential traumatic effects of heading on the

brain will say that the statement is not sufficiently restrictive in light of insufficient evidence that heading is safe.

In addition to potential injuries associated with microtraumas from repeatedly heading the ball, there have been recorded cases of death from single and multiple blows to the head from a soccer ball.^{54,57} One reason given for these adverse effects was the past use of leather balls that lacked a plastic coating. These balls could double in weight when used in wet conditions.⁵⁸ The use of non-absorbing materials in the manufacture of soccer ball covers may have greatly reduced trauma caused to the heads of soccer players.

Because of the difficulty of directly studying impacts to the head from a soccer ball, some researchers have employed modeling techniques to study these impacts.^{59,60,61} These simulated studies have suggested that the impact forces in heading are significant, ranking only one order of magnitude less than those experienced by blows to the heads of boxers. They also suggest that the impact forces could be reduced by using appropriate heading techniques⁶² and by decreasing the mass of the ball used by youth players.⁶³

The preceding review of literature regarding the association of heading in soccer with traumatic brain injury indicates that longitudinal studies with greater control of determinants are needed. Heading the precautions issued by various groups regarding the progressive teaching of heading may also prevent potential brain injuries. To this end, the proposed guide for teaching heading is provided in Appendix N.

Player-to-Goal Injuries

Collisions between players and goal posts are rare, but they can result in serious injury. Janda et al. reported that over the course of 471 soccer games played by youth, teen and adult players, 7 player collisions with the goal post occurred.⁶⁴ These impacts occurred in two ways: players hitting the goal post or an improperly anchored goal toppling onto a player. Player-to-goal impacts are more likely to occur to goalkeepers.^{47,65}

Movable soccer goals have been involved in deaths and numerous injuries. The use of improperly anchored and movable goal posts caused 8 deaths over an eight-year period in the United States.⁶⁶ The deaths were the result of goals toppling because of children climbing on them, people attempting to move them, or goals being blown over by high winds. A Waterford Township, Michigan, boy was killed in 1994 when a goal on which he had been climbing fell on his chest.⁶⁷ From 1979 through 1993, 120 injuries involving falling goal posts were treated each year in hospital emergency rooms.⁶⁸

Player-to-Surface Injuries

Little research has been published on player-to-surface impact injuries. Kibler reported that contact with the ground accounted for 17.5% of the injuries that occurred in a youth tournament, and contact with other objects (goal posts, corner flag sticks and sideline objects including chairs, spectators and equipment bags) accounted for 6.5% of injuries.¹¹

Injuries occur on “good grass” playing surfaces as well as on poorly maintained fields. McMaster and Walter indicated that soccer players were particularly vulnerable to hazards within the playing surface (e.g., chuck holes, sprinkler heads and hidden objects).⁴⁸ Incomplete epidemiology in most reports, however, do not clarify whether the injuries occurred because of player-to-surface impact or because the surface precipitated other types of injuries (e.g., ankle sprains).

Exercise-Induced Asthma

Exercise-induced asthma afflicts from 4 to 20% of the general population and from 10 to 50% of sport-specific athletic populations.^{69,70,71,72,73} The percent of athletes who have respiratory complications from asthma is probably higher than those reported in surveys because athletes tend to under-report conditions that will keep them from activity. It may also be low because the symptoms of exercise-induced asthma are frequently mistaken for a lack of proper fitness or an allergic reaction.⁷⁴ Under-reporting is common because of embarrassment, peer pressure or fear of losing one’s status on the team.

Soccer players are susceptible to exercise-induced asthma because the disease is precipitated by (1) vigorous physical activity, (2) breathing large volumes of cold, dry air, and (3) pollutants, especially if they are contained in air with low humidity.⁷² Symptoms of exercise-induced asthma are fast hard breathing, coughing or wheezing, shortness of breath, prolonged recovery from activity and, in children, chest tightness. Symptoms usually begin within five to 10 minutes after exercise and may last as long as 30 minutes.

Diagnosis depends on an accurate medical history, a physical examination and a test of pulmonary function. However, many athletes with exercise-induced asthma may have results in clinical testing of lung function that are well-above average, and the disease may not be detected until the lung function is severely challenged, as in the actual competitive environment.⁷⁵

Warm, humid air that is free of pollutants should reduce the incidence of symptoms;⁷⁶ and, pharmacological therapy may permit the player to participate at his or her full capacity.^{77,78}

Currently there is no known cure for exercise-induced asthma, but the non-pharmacological treatment and successful athletic careers of millions suggests that the disease can be diagnosed, monitored and managed

without undue interruption of physical activity. When non-pharmacological strategies are insufficient, there are numerous medical solutions that have proven to be effective.

Immunizations

Vaccines to combat infectious diseases are listed among the top 10 achievements in public health during the 20th century.⁷⁹ Although vaccination rates for children are at an optimal level, those for adolescents and adults are less than desirable.⁷⁹ Soccer players of all ages should be immunized against measles, mumps, rubella, varicella, tetanus, and diphtheria. Because soccer is a contact sport, involving close bodily contact during playing conditions, travel and use of common facilities and equipment, athletes should also be immunized against hepatitis A and B.^{80,81,82}

Immunization should take place well before the soccer player begins strenuous training sessions. Although there is no compelling evidence that links exercise to a temporary loss of immunity, the side effects of some inoculations may cause temporary sensitivity at the point of inoculation.⁷⁹ Timely prevention will also ensure that the immunization offers optimal protection when the soccer player is most vulnerable—that is, when initiating a strenuous training program and coming in close physical contact with teammates who may be infected with communicable diseases.^{83,84}

Osteoarthritis and Soccer Related Injuries

Osteoarthritis is a common form of arthritis that is related to injuries that are sometimes sustained in soccer, such as fractures of articular surfaces of the ankle, knee and hip; dislocations of joints; ruptures of ligaments, tendons and menisci; and the general overloading of joints through repetitive movements.^{85,86,87,88,89} Osteoarthritis is the leading cause of chronic pain in the United States^{85,86} and the most common reason for total-hip and total-knee replacements. This condition involves the entire joint in a disease process that includes progressive destruction of the hyaline cartilage, with accompanying changes in the bone beneath the cartilage. Soft tissue are also affected: the synovium may become inflamed, ligaments lax, and muscles weak.^{86,90}

Osteoarthritis has been regarded as a condition that affects elderly individuals, with over 50% of those over 65 years of age having radiographic evidence of the disease. However, the rapid increase of documented cases in the last decade has implications for the sports setting.^{89,91,92} Although there are more than 20 known causes of osteoarthritis, the most direct link to the future development of the disease is serious injuries to joints. In general, the more impact and twisting forces that are applied to the joint, the greater the risk is for developing osteoarthritis. Excessive body weight and obesity also increase the risk for osteoarthritis.^{86,88,90}

RECOMMENDATIONS FOR INJURY PREVENTION

In soccer, injuries occur because of interactions between the player and the soccer environment. Techniques to prevent injuries focus on important elements of the *athlete* and the *soccer environment* that can be manipulated to prevent injuries and to reduce the severity of injuries. The responsibility to prepare the athlete for participation is shared by several people (e.g., program administrators, athletes, coaches, parents, trainers, and physicians). It is important for all of these individuals to fulfill their designated roles in injury prevention related to the physical, psychological and cognitive preparation of the athlete.

PREPARING THE ATHLETE

Pre-Participation Assessment

The likelihood that an athlete will become injured when engaging in soccer is determined, in part, by his or her physical, cognitive and psychological status. The first step in preparing athletes for soccer is to understand their current health condition. There are two basic approaches to learning about the health status of athletes: (1) self-reported medical history and (2) physician reporting via a pre-participation physical examination, including a dental check-up.⁹⁴ (See Appendix O for an example of a comprehensive medical information and injury history form, and Appendix P for an example of a pre-participation examination form.) For self-reporting, a modified form of self-reporting of health status may be used wherein youth who participate in recreational activities are assisted in preparing the self-report by parents or guardians.

The goals of a pre-participation assessment include: (1) detecting conditions that could make playing soccer life-threatening or disabling; (2) discovering medical or musculoskeletal conditions that may limit participation or predispose the athlete to injury or illness during practice or competition; (3) evaluating past injuries to prevent re-injury; and (4) bringing attention to areas of weakness that can be corrected before competition begins. An assessment is recommended for individuals who will be engaging in high levels of competition and training, irrespective of age. It should be mandatory for participation in organized soccer for all middle and high school students in interscholastic competition and all youth over age 14 years in agency-sponsored competition. For youth with pre-existing health problems, it is recommended that a physician be consulted before the individual participates in soccer. The assessment should be administered at least six weeks prior to preseason practice to allow time for correction or rehabilitation of identified problems.^{94,95}

The physical examination should be performed by a physician, physician assistant or nurse practitioner with the training and medical skills to recognize heart disease and orthopedic conditions of concern for soccer. In addition to cardiovascular screening, the examination for soccer should include (1) an orthopedic exam focusing on neck strength, joint range of motion, flexibility, anatomical malalignments and muscle-tendon imbalances and (2) documentation and re-examination of past neurological, bone and joint injuries. Conditions that have potential implications for an athlete's safety during practice or games should be documented. These conditions include cardiovascular, neurological, injuries to bones and joints, visual impairment, diabetes, hypertension, asthma, severe allergies, sickle cell disease, history of heat illness, history of concussions, use of medications, use of steroids, and symptoms of eating disorders. The physician should also ensure that the athlete's immunizations are up-to-date.

While a pre-participation physical assessment is generally not required for players 14 years and younger who are involved in agency-sponsored soccer, these players should have a complete physical evaluation from their family physicians every two years, as recommended by the American Academy of Pediatrics.⁹⁴ In addition to the routine physical examination, an interim history should be taken prior to competing in any new sports season. In the interim history, the family physician should ask specifically about conditions that have potential implications for the athlete's safety while participating in soccer, as noted previously. The physician's written report assessing these conditions should be on record with administrators of the sponsoring agencies and the athlete's coaches. If the interim history identifies a potential problem, then a physical examination should be performed.

Immunizations

An athlete's immunization record should be reviewed during the pre-participation physical. If no pre-participation physical is required, the immunization survey should be conducted during the annual/biennial physical examination. Soccer players of all ages should be immunized against measles, mumps, rubella, varicella, tetanus, diphtheria, and hepatitis A and B.^{80,81,82} Immunization should take place well before the soccer player begins strenuous training sessions. For detailed statements about each vaccine, contact the Centers for Disease Control and Prevention Advisory Committee on Immunization Practices. See Appendix Q for contact information.

Exercise-Induced Asthma

Symptoms of exercise-induced asthma are fast, hard breathing, coughing or wheezing, shortness of breath, prolonged recovery from activity and, in children, chest tightness. Symptoms usually begin five to 10 minutes after exercise and may last as long as 30 minutes.

If exercise-induced asthma is suspected, the soccer player should be referred to a physician who is qualified to treat respiratory disorders. Diagnosis depends on an accurate medical history, a physical examination and a test of pulmonary function. In cooperation with the athlete and the parents or guardian, the physician should prescribe a written asthma management plan. The athlete can help the physician by: (1) keeping a diary of activities and when he or she has symptoms, including steps taken to get relief; (2) asking the physician when the best times are to take any medications in relation to the exercise schedule; and (3) telling the physician which kinds of exercises feel best and the amount of time the exercises can be done without asthma symptoms (for example, whether the athlete can complete a workout cycle or play a whole game comfortably). If the athlete still has trouble breathing even when following the asthma management plan, the athlete's parents or guardian should be advised to talk to the physician who can then adjust the plan.

The goal of effective management of exercise-induced asthma is to have the soccer player participate fully in practices and contests without respiratory difficulties. This treatment may involve any or all of the following strategies: (1) giving the coach a copy of the asthma management plan and explaining the condition to teammates; (2) ensuring a 15-minute warm-up to allow the lungs to adjust to the increased demands for oxygen (if athletes experience their first episode during the warm-up, the second episode, referred to as a *refractory period*, is generally less severe); (3) ending the practice or contest with a 15-minute cool-down rather than stopping abruptly; (4) avoiding situations that could trigger exercise-induced asthma (for example, by avoiding or adjusting exercise when there is a high pollen count, covering the mouth and nose to warm the air during cold weather or playing with periodic breaks rather than continuous play); (5) following physician's instructions about using medications before or during activity, which may include use of a quick-relief medicine or the use of an inhaler (note that organizational or school policy may require the doctor to write a letter explaining why a child needs to use the medication or inhaler); (6) improving ambient air conditions (i.e., humidifying, warming and filtering air); and (7) educating the athlete, coach and parents regarding the need for proper conditioning, management of the level of activity, and appropriate pharmacological therapy.

Currently there is no known cure for exercise-induced asthma, but the non-pharmacological treatment and successful athletic careers of millions suggests that the disease can be diagnosed, monitored and managed without undue interruption of physical activity. When non-pharmacological strategies are insufficient, there are numerous medical solutions that have proven to be effective. Whenever the diagnosis of exercise-induced asthma is in doubt, health care providers should refer to

the clinical guidelines provided by the National Asthma Education and Prevention Program. See Appendix Q for contact information.

Physical Conditioning

Participation in soccer places high levels of stress on both the energy-production and muscular systems of the body. Therefore, the second step in preventing injuries is to provide appropriate physical conditioning to prepare the athlete for the physical stresses that he or she will encounter. Conditioning programs for soccer should promote anaerobic capacity, cardiovascular endurance, flexibility, range of motion, muscle strength and power. There should be a minimum of three weeks of preseason preparation for recreational play and six weeks for interscholastic play. For athletes 14 years and older engaging in higher levels of competition, yearlong conditioning programs involving exercise and appropriate nutrition are essential to the athlete's safety. In addition, more intensive conditioning and strength training should be initiated a minimum of six weeks before the start of daily practice, so athletes will be conditioned before the first day of practice.

A minimum ratio of one practice per game throughout the season has also been recommended for youth play.⁹⁶ Specific training programs that are designed to prepare cardiovascular and muscular systems for soccer are available in the literature and should be employed.⁹⁷

To aid in injury prevention, all training sessions for soccer involving vigorous physical activity should begin with a warm-up phase of light aerobic activities followed by stretching.⁹⁸ The principle of progression should be followed, gradually increasing exercise intensity from session to session. Each session should end with a cool-down period of light aerobic activities followed by stretching.⁹⁸

Muscle Strengthening

Resistance training programs to strengthen muscles and joints may help to prevent injuries in youth soccer. If resistance training is included in the training program, fitness professionals who have a thorough understanding of resistance training and safety procedures should supervise every exercise session. Equipment should be in good repair and properly adjusted to each individual. Strengthening exercises should be preceded by five to 10 minutes of general warm-up exercises (low intensity aerobic exercise and stretching). Any individual muscle group should be trained only two to three times per week, to allow two to three days of rest between resistance training sessions. Resistance training regimens should be individualized for each athlete; competition among athletes for levels of strength should be discouraged.

Resistance Training Equipment for Immature Athletes

If equipment is used as part of the strengthening regimen for players who have not completed puberty, the equipment should be selected so that it can be adjusted for size and load to accommodate immature users. A qualified adult should provide direct supervision. Youth should be instructed in techniques and adjustment of equipment. No one-repetition maximum lifts should be attempted by physically immature athletes.

Neck Strengthening Exercises

To reduce the risk of injuries from heading the soccer ball, players should correctly perform scientifically validated exercises to strengthen the neck muscles as part of their total conditioning program. Players should be instructed in correct technique. If muscle-strengthening equipment is used, people trained in its use must supervise the athletes' workouts. Since many athletes do not have access to strengthening equipment and people trained in its use, they should use exercises involving muscle forces against self-provided resistance. See Appendix A for examples of exercises to strengthen the musculature of the neck. While athletes of all ages can use the self-provided resistance neck strengthening exercises, they are especially useful for athletes under 14 years old that may not have the qualified people available to monitor neck-strengthening exercises performed on equipment.

Nutrition

Good nutrition is also an important factor in preparation for soccer. The food and water that athletes ingest not only provide the essential nutrients for living but also contribute to the overall well-being of the individual and reduce the stress on the body from vigorous physical activity. Therefore, it is recommended that athletes eat a well-balanced diet consisting of the five food groups (grains, fruits, vegetables, dairy products and meat, fish or poultry) and water. Athletes should be encouraged to drink the equivalent of 8 to 16 ounces or more of water prior to exercise and during exercise. After exercise, athletes should replace fluids in amounts equivalent to their weight loss to prevent dehydration and to reduce the risks of heat illnesses, such as heat exhaustion and heat stroke.^{97,98}

Skill Development

Soccer Skills

The enjoyment that leads to retention of young players is directly related to achievement of physical and social goals.⁹⁹ Coaches must ensure that physical skills and the techniques of kicking, trapping, passing, tackling and heading should be taught correctly and progressively, commensurate with the skill level and experience of the athletes.⁹⁸ There are two reasons for teaching the skills of soccer in a progressive order. First, by matching the level of difficulty with the potential of young athletes to

understand and perform skills, the coach can make them feel more successful and motivated in their attempt to learn and perform. The safety of the athletes is the second reason for using progressions in teaching skills. In some situations, athletes are not developmentally mature and asking them to attempt to perform certain skills (e.g., scissors kicks and slide tackles by a seven year old) exposes them to an unwarranted chance of injury. These more difficult skills usually have limited utility for younger athletes and require an inordinate amount of time for players to master.

In other situations, young athletes may expose themselves to danger because they are not be able to make good judgments about when to perform certain skills. For example, young soccer players should not be taught to perform a diving header. Younger athletes do not have the developmental maturity to execute this move. In addition, they are not mature enough to quickly decide about placing their head and neck within range of the feet of players attempting to kick the ball.

Note that Appendix B contains guidelines for teaching selected skills that have been known to cause injuries if they are taught to inexperienced players, or taught to athletes who are too developmentally immature to learn these complex skills. A complete progression for teaching soccer skills developmentally is provided in chapters 13 through 19 of *Youth Soccer: A Complete Handbook* by Eugene W. Brown, Ph.D.⁹⁸

Overuse Injuries

Young athletes are especially susceptible to injuries caused by undue repetitions of the same movement task.^{95,100,102,103,104,105} Signs of overuse can include pain in feet, ankles, knees, legs and lower back. Four stages of overuse injuries are described in the publication by the National Youth Sports Safety Foundation: (1) Pain only after activity. Pain is gone by the next morning; (2) Pain that begins near the end of activity, continues after the activity, but does not interfere with performance; (3) Pain during the activity that causes a drop in performance; (4) Constant pain during any activity.¹⁰⁶

Risk factors that predate most overuse injuries include the following: abrupt increases in the intensity of conditioning; errors in technique that cause disproportionate load-bearing or malalignment of the body; muscle/tendon imbalances, especially in the lower extremities; inadequate foot wear to absorb the impacts of running; surfaces that do not absorb the impacts of running; improper nutrition, especially inadequate amounts of calcium in the diet; immaturity of the skeleton; and repetitive actions over long periods of time.^{107,108,109} Of these risk factors, those most frequently implicated in overuse injuries are abrupt increases in the intensity of conditioning and repetitive actions over long periods of time.¹⁰⁹

Fortunately, these risk factors can be modified or neutralized, thus leading to a reduction in soccer-related overuse injuries. To prevent overuse injuries, coaches must distribute the frequency, intensity and duration of conditioning drills by using a gradual progression in the physical demands placed upon athletes and minimizing repetitive activities during practice. Practice drills for dribbling, kicking, trapping and especially heading should be short. The majority of practice time should be devoted to the integration of these skills into game-like situations during which the young athletes have opportunities to practice a variety of skills.

Safety Skills

In addition to soccer skills, athletes should also be taught skills related to safety. Common sense implies that if athletes know safety procedures (e.g., how to safely perform the skills, how to avoid violations of rules, how to avoid structural hazards in the soccer setting, how to use training equipment), the players are less likely to be injured. One key to teaching safety is for the coach to prudently interject safety tips whenever appropriate.⁹⁸ Raschka et al. have suggested that knowing standard evasive maneuvers and methods of falling may reduce the incidence of injuries in both indoor and outdoor soccer.²⁸

Reducing Risk for Osteoarthritis

Injuries commonly sustained in soccer may increase a player's risk of developing osteoarthritis in later life.^{85,86,88,90,91} Reducing the risk of osteoarthritis in the lower extremity can be accomplished in several ways. The first line of defense is strengthening the muscles surrounding the knee and ankle joints because of the direct association between weak muscles and osteoarthritis. Learning how to perform drills, exercises and soccer skills correctly will help avoid unnecessary stress on muscles and joints. Proper treatment after an acute injury is essential, especially if the injury caused bleeding and swelling in the joint. An important precaution against early onset of osteoarthritis is a comprehensive rehabilitation program that restores the joint as nearly as possible to its previous function. Another precaution is avoidance of excessive body weight and obesity.^{86,88,90,91} A final precaution is use of equipment and surfaces (e.g., shoes, pads, braces, playing surfaces) that reduce the impact of the player's own weight and contacts with the playing surface and other players. Players who are at risk for injury-induced osteoarthritis should receive counseling regarding their options to reduce the early and late onset of osteoarthritis.

Osteoarthritis is deceptive in its onset, frequently occurring years after the athlete's career has ended. For this reason, the specific causes of the disease are often difficult to document because the athlete may not remember injuries that initiated the osteoarthritis. Nevertheless, the direct association between acute injuries

and the early onset of osteoarthritis obligates those in charge of the athlete's well-being to create an environment that helps to prevent osteoarthritis and provide for appropriate care and rehabilitation of all injuries.

Psychological Considerations

Recent research has established a direct relationship between psychological variables such as the personality traits of an athlete, his or her reaction to stress, and a predisposition to injury. For a more thorough discussion of this topic, see the reviews in Rowland,¹¹⁰ Weinberg and Gould,¹¹¹ Lewis¹¹² and Pargman.¹¹³ The evidence underscores a fundamental principle: Coaches should get to know their athletes. By knowing the personality traits of an athlete, the coach is in a position to modify the athlete's behavior and, perhaps, to place the athlete in positions where injuries are less likely to occur.

The athlete's ability to deal with stress is associated with a predisposition to injury.¹¹¹ For example, an athlete with low self-esteem and low social support may depend on his/her ability to be on the team or to make a recognizable contribution to the team. This need may lead to increased muscle tension during practices and games, a tendency to over-train, and the inclination to play through pain for fear of losing a starting position. The need for recognition may also lead to aggressive play, which, if positively reinforced, may lead to even more aggressive play until these acts result in injuries. Coaches are in a position to recognize the traits and characteristics that may lead to injuries and, consequently, are obligated to persuade the athlete to change his or her behavior.

In situations where injuries have occurred, the coaches are in an excellent position to assist with the psychological reactions to injury by the athlete.^{114,115,116} Reactions such as shock, disbelief, denial and self-pity will vary in intensity and duration. Coaches should be aware that the recovery process may include such negative preconceptions as fear of isolation from the team, anxiety about the pain involved in rehabilitation, medical uncertainty about complete recovery, and despondence over missed opportunities. Coaches can help by initiating the following actions:

- Maintain close contact with the injured athlete throughout the recovery period.
- Ensure that the injured athlete remains a member of the team by having team members visit the athlete and keep him or her informed about team activities.
- Ensure that the athlete understands the nature of the injury, the recovery process and the timeline for return to play.
- If developmentally appropriate, be sure that the athlete has the coping skills for positive recovery, e.g., goal setting, self-talk strategies and mental imagery.
- Establish a close rapport with the athlete's parents to ensure that the athlete has a positive social support group within the family.

THE SOCCER ENVIRONMENT

The soccer environment includes facilities, equipment, supplies and apparel, a competitive level of play, and climate. Methods for modifying conditions associated with each of these factors to reduce the potential for injury in soccer are discussed in this section.

Facilities

In most soccer settings, the only facility available is the field. There are three aspects of the field that may contribute to injury: (1) the surface of the field, (2) the structures required for play (goals, corner flags and dasher boards for indoor play) and (3) other permanent or temporary extraneous structures.

The surface of outdoor fields (potholes and wet surface) contributed to over 24% of the injuries in a study of youth soccer.²² Soccer players are particularly vulnerable to hazards within the playing surface such as chuck holes, sprinkler heads and hidden objects.⁴⁸ Outdoor fields used for youth play typically present considerable injury risks because they may not be appropriately groomed, are usually in constant use and often serve multiple purposes.

Little information is available on the influence of the indoor field surface and its contribution to injuries. Indoor fields may cause greater impact and shear forces that increase the potential for injuries in comparison with outdoor fields. Common sense suggests that the surfaces of indoor fields should be even and unbroken.

Goal Posts—Design, Padding, Anchoring

Goal posts for outdoor play have generated serious discussion because deaths and serious injuries have occurred either when players have collided with goal posts or when goal posts have toppled over and hit players.^{47,65,66} If moveable goals are to be used, Caruso has proposed the use of lightweight goals as a method of reducing injuries from toppling goals.¹¹⁷ The Consumer Product Safety Commission (CPSC) reported approximately one death per year associated with moveable goal posts toppling over on children.⁶⁸ Children climbing on goals or high winds are the typical causes of tip-overs. The CPSC issued a list of safety tips for moveable goal posts:

- Anchor or counterweight soccer goals at all times.
- Prevent accidents when goals are not in use by chaining or anchoring the goals to each other (or to themselves when folded down) or to a fence post or other sturdy source. If this is impractical, store soccer goals in a place inaccessible to children.
- Remove nets when goals are not being used.
- Inspect the equipment before each use; immediately replace damaged or missing parts.
- Prohibit climbing on the net and goal posts.
- Attach and ensure the visibility of safety labels.
- Disassemble goals when soccer season ends.

The Prevention of Injuries in Youth Soccer

- Exercise caution when moving goals. Only authorized and trained personnel should move the goals.
- Educate players about soccer goal safety.
- Use soccer goals only on level fields.

The use of permanent goals would reduce or eliminate many of the injuries due to goals falling over and striking athletes.¹¹⁸ However, it may be difficult to require permanent goals on fields that are used for other purposes. Janda et al. suggested that the use of permanent goals could increase the number of injuries in which the player strikes the goal.⁶⁴ The padding of goals has been suggested as a method to reduce player-goal impact injuries.^{35,64} In the laboratory component of a study of goal posts,⁶⁴ the authors determined that impact forces could be diminished by padding the posts. Application of padding to goals in the field portion of their study resulted in no injuries over the course of a total of 471 youth, teen and adult games without altering the nature and enjoyment of the game. It should be noted, however, that only seven player collisions with the goal posts occurred during these games.

The CPSC, reacting to injuries and fatalities caused by goals falling on children, has strongly urged that soccer games begin only if the goals are anchored.⁶⁸ To most communities, death from a toppling goal post is often seen as something that “will not happen here.” Therefore, to lend strength and immediate importance to the statement by CPSC, the author of the current position paper encourages leagues to add a statement to their guidelines. The statement should indicate that if the goals are not sufficiently anchored or counterweighted 30 minutes prior to the start of the game, the game must not be played and the home team will forfeit the game. The anchoring of goal posts must be a condition that is also followed for all practices.¹¹⁹

In indoor play, the goals are anchored and flush with the back walls. Therefore, injuries from toppling posts are eliminated. However, the goalkeeper may be more susceptible to injuries from hitting the posts because the uprights are closer together and there is a tendency for more action to take place in the goal area.

Corner flags for outdoor play must be a minimum of five feet in height with a blunt or rounded top. Flexible posts, which minimize the chance of impaling injuries, are recommended for corner flags.

In indoor play, the walls around the field are permanent barriers that may precipitate injuries. Surfaces of the walls must be smooth and continuous without any projections. Doors used for substitutes to enter the playing area must always open away from the field and should be kept closed when the game is in progress.

Structures that are extraneous to soccer (e.g., benches, bleachers, water fountains, vehicles, fencing and poles) are often present at the soccer setting. These structures can be more hazardous than the structures that are part of the game because they may be unexpectedly encountered. Where feasible, indoor soccer fields should be designed with a 4-meter (approximately 13-foot) buffer zone between the boundaries of the soccer field and all other structures, including the walls of the arena.

Indoor facilities where arena walls coincide with playing field boundaries present potential risk of injury from high speed collisions with walls. Research is needed to determine whether padding on walls would reduce injuries, and if so, what types of padding would be effective.

It is the responsibility of the adults in charge (i.e., coaches and officials) to avoid exposing players to hazards associated with facilities. If hazards exist, they should be removed, or the activity should be restricted, rescheduled or relocated. If safety cannot be assured, the hazardous situation should be reported to the individuals in charge of the facilities and activity should be canceled until a safe environment can be achieved.

Equipment, Supplies and Apparel

A properly equipped and attired athlete is less likely to be injured. The essential equipment for all soccer players is a ball, shin guards, shoes, mouth guard, shirt and shorts. Additional equipment for goalkeepers includes gloves, padded shirt, padded pants or shorts, helmet, elbow and kneepads, and an athletic supporter with cup for males or a sports bra for females. If eyeglasses are essential for vision, they must be a type of glasses made for contact sports, with strong frames and unbreakable lenses. Although no material can totally eliminate the risk of eye injuries, the standard for lenses developed by the American Society for Testing and Materials (ASTM F803) is the strictest standard for protection of the eyes while playing sports.¹²⁰ For athletes with severely impaired vision, previous eye injuries or vision in one eye, sports protective eye devices, often described as sports goggles, should be mandatory^{96,121} and are recommended by the American Academy of Pediatrics.¹²² Wearing jewelry (including rings, bracelets, necklaces, wrist watches and any type of adornment) is inappropriate for practices or matches. Only Medic Alert® bracelets or necklaces are allowed, if they are properly taped down with medical information showing.

The Soccer Ball

Soccer balls are made in a variety of sizes (generally 3, 4 or 5) with different construction and materials. The size used for organized play is dictated by the league or organization. The general approach is that younger players (4-7 years old) should use a smaller and lighter ball (size 3), 8-11 year old players should use the size 4

ball and older players (12 years old and up) should use a larger and heavier standard-sized ball (size 5). Youth organizations sometimes use larger balls at younger ages for elite teams. No reference to the rate or severity of injury associated with player-to-ball contact for different-sized balls was found in the literature. However, there is evidence that ball construction and materials have an influence on injury.^{58,60} The outer surface of a soccer ball is composed of several panels of plastic, synthetic leather or leather. These panels may be glued to an inner shell or sewn together. The plastic ball tends to “sting” on contact with the skin, especially in cold weather. Panels may also become partially torn from the ball, and the flap created by this tear can be a hazard for the eyes when heading the ball.

Leather balls have been associated with serious injuries to the head. In the past, leather balls were not coated with a waterproof material, and under wet conditions the balls could double in weight by absorbing water. It is possible for the waterproof coating to wear off soccer balls and eventually result in this dangerous situation. Therefore, balls should be inspected to ensure that they do not have any loose panels, and when playing under wet conditions, leather balls that absorb water should not be used.

Shin Guards

Properly fitting shin guards are important for injury control. As previously noted, the lower extremities are the sites where the greatest frequency of injuries occurs. To promote safety in this region of the body, the international rules of play require all players in a match to wear shin guards.

Shin guards vary in size. Their size should be matched to the length of the player’s lower leg. They should not inhibit running by extending beyond the knee or ankle joints, but they should also not be too short and leave areas of the shank unprotected. Shin guards vary in their design and construction. They should conform to the contour of the lower leg to dissipate the force of a direct blow. They should also be constructed of materials that provide good force-absorbing qualities.^{123,124}

It is the responsibility of the official to ensure that players are wearing shin guards, and that the shin guards fit properly and do not project from beneath the socks, thus creating a potential hazard for opponents. Coaches must be responsible for inspecting the equipment of their players in practice and game settings to ensure that they are wearing shin guards that are completely covered by their socks. Coaches should not permit participation in active drills unless properly fitting shin guards are in place.

Shoes

Shoes are the most important piece of personal equipment for a soccer player. Poorly fitted shoes may cause injury to the foot and ankle.^{125,126} Shoes should be purchased to fit. Buying larger shoes that a child will “grow into” is not appropriate from an injury-prevention perspective. On the other hand, highly competitive and skilled players tend to purchase shoes that are too small because they get a “better feel for the ball.” This may also lead to foot problems. Gym shoes, multi-cleated molded shoes and shoes with screw-in cleats are all permissible apparel for soccer players. Gym shoes or “flats” are appropriate for indoor play or for outdoor play when the surface is not wet.

Wet outdoor surfaces cause increases in players slipping and falling; consequently, such conditions present the potential for an increased incidence of injury. Cleats can provide traction on natural outdoor surfaces. There is, however, a balance that should be considered in the use of cleated shoes. The greater the traction created by the cleats, the greater the forces and torques that must be absorbed in the anatomical structures of the legs. In other words, if the cleats do not permit the shoe to slide when experiencing high forces and torques, these loads will be transmitted to parts of the lower extremity and may result in injury.

Generally, a shoe that has few, narrow and long cleats (characteristic of shoes with screw-in cleats) tends to have greater traction. However, the player has an increased chance of injury from this traction. A study of the use of cleated shoes in American football supports these statements.¹²⁶ When traction is diminished because of wet, sloppy conditions, judgment must be used in deciding whether to use screw-in cleats. The multi-cleated molded shoe is recommended as a versatile shoe for most outdoor play. Another concern associated with injuries from shoes is related to injuries to opponents. Inspection of the shoes for conditions that are potentially hazardous to opponents is the responsibility of officials before matches and the responsibility of coaches before practices. However, the first level of inspection for all protective equipment rests with the parents and athletes.

Mouth Guards

All players should wear properly sized, molded mouth guards throughout all practices and games. In addition to protecting the players’ teeth, mouth protectors also dissipate the shock of a blow to the head and may reduce the chance for skeletal or tissue damage to the face.^{127,128} The American Dental Association recommends that orofacial protection, including mouth guards, be worn by all participants in soccer at all levels of competition, including practices.¹⁵⁰ The Academy of Sports Dentistry recommends that professionally made, properly fitted custom mouth guards be worn by all participants in contact and collision sports.¹⁵¹

Clothing

The amount and style of clothing should be related to the temperature and humidity that are present and the intensity of activity. Under cold conditions, athletes should wear extra clothing, especially substitutes sitting on the bench. Under conditions of high heat and humidity, lighter clothing that leaves the arms and parts of the legs uncovered should be used.

Additional considerations for clothing worn by goalkeepers include the following:

- *Goalkeeper's Gloves:* Goalkeeper's gloves are not required by the rules. However, gloves provide protection for the hands and better control for receiving a kicked ball. Therefore, coaches should insist that goalkeeper's gloves be worn by anyone who is assigned this position whether in practice or in matches. Goalkeeper's gloves should be included in the team's equipment bag so that they can be provided to players who do not normally play this position.
- *Goalkeeper's Shirt:* According to the rules of play, a goalkeeper's shirt must be different in color than the shirts of the field players, the opposing goalkeeper and officials. These shirts are usually snug fitting with full-length sleeves and built-in padding for protection. Additional protection can be added by providing goalkeepers with standard elbow pads.
- *Goalkeeper's Pants:* Goalkeeper's pants come in three styles: shorts, three-quarter-length pants, and full-length pants with stirrups. The seat, hip area and knees (in full-length pants) should have built-in padding to protect the goalkeeper. Auxiliary kneepads and clothing can be worn to provide additional protection.
- *Goalkeeper's Helmet:* A goalkeeper's helmet consists of a soft, pliable helmet without a bill, held in place with a chinstrap. Because of the open face, the helmet does not protect this region. Most goalkeepers do not wear helmets until after they have received a head injury. To be proactive, it is recommended that all goalkeepers wear helmets in practice and games.
- *Athletic Supporter with Cup or Athletic Bra:* It is recommended that all male goalkeepers wear an athletic supporter with cup. Field players may choose to also wear these devices. An athletic bra provides support and protection to mature female players and is recommended for both field players and goalkeepers.⁹⁸

Weather

Administrators and coaches of youth soccer in Michigan must be able to manage *extreme weather* conditions as part of their mandate to protect the health and welfare of athletes and spectators. The broad category of extreme weather includes high temperatures and humidity, precautions when lightning is in the area, reactions to

severe storms and tornadoes, and precautions against extreme cold, as well as rain and snow. The following suggested responses to these conditions augment the recommendations in the preceding section of this document.

Extreme Heat and Humidity

The year-round promotion of youth soccer signifies that many administrators and coaches will be required to make decisions about conducting practices, attending tournaments or playing games when temperatures and humidity threaten the safety of young athletes. Combinations of high heat and humidity under conditions of intense activity can result in heat illnesses (heat exhaustion and heat stroke), which may result in death.¹²⁹ See Appendix M for a heat index chart. The extent of precautions necessary to prevent heat illness depends on the degree of risk that exists. The danger level for heat illness should be determined, taking both temperature and relative humidity into account. Rigorous application of the guidelines provided here will reduce and eventually eliminate health-related problems associated with extreme heat and humidity.

- When training in hot weather, acclimatize athletes to heat gradually over a week or more by slowly increasing the demands of physical activity.
- During hot weather, conduct practices and games in lightweight clothing or uniforms, without long-sleeved jerseys.¹³³
- Make cold water available. Encourage drinking cold water before, during and after practices and games. Rest and water breaks should be scheduled and enforced.
- To avoid cumulative fluid depletion, track weights over several days by weighing players before and after practices and games to monitor how much water is lost. If a player's weight is down more than 3% by the end of the practice or game, immediate fluid replacement is critical. If hot weather continues, check players' pre-practice weights for several days to make sure they have regained the water lost by sweating on previous days. If an athlete's weight is down more than 2% from the previous pre-practice weight, the athlete should not be allowed to participate in the practice session until the fluid has been replaced.¹³⁴
- Provide covered shelter for breaks in play.
- Observe all athletes for signs of heat illness: fatigue, weakness, dizziness, pounding headache, visual disturbances, lethargy, cramps, inattention, confusion, nausea or vomiting, awkwardness, weak and rapid pulse, flushed appearance or fainting. Identify and observe more closely athletes at higher-than-normal risk for heat illness, e.g., those who are overweight, those who are physically unfit, and those who have a history of physical problems in heat and high humidity. If heat illness is suspected, cool the victim and seek a physician's immediate service.¹³⁴

- Salt and electrolytes lost through sweating should be replaced through a normal diet with plenty of fruit and vegetables. Salt tablets are a potentially dangerous, inappropriate remedy for heat illness.

When the combinations of temperature and humidity reach extremely dangerous levels, the following actions should be taken until conditions improve:

- Suspend or cancel the activity.
- Schedule or reschedule the activity for a time when it is less likely for dangerous combinations of high heat and humidity to occur.
- Reduce the intensity of the activity (e.g., modify the practice plan and provide rest periods of 15 to 30 minutes each hour of workout).
- Modify the rules to permit additional breaks in play, greater substitution, and reduced length of matches.
- Schedule and enforce rest and water breaks.
- Cool the players by applying cool water or ice packs to the head, neck and extremities.
- Keep high-risk athletes out of action.

Lightning

Lightning kills approximately 100 people annually in the United States. More deaths from lightning occur in Michigan than in any other state except Florida.¹³⁵ Approximately 500 more suffer injuries including amnesia, paralysis, burns, and damage to the lungs and heart.¹³⁶ Since most victims of lightning die of respiratory failure, there should be personnel who are qualified in first aid and CPR at outdoor soccer venues. In addition, it is desirable to have an automatic external defibrillator (AED) and someone trained to use it at the site. The following recommendations should be addressed in a written plan specific to lightning safety as precautions to prevent injuries caused by lightning during competitions.^{137,138,139}

Before Competition

- Establish a chain of command that identifies who is to decide to remove individuals from the field, athletic arena, or venue.
- Designate a weather watcher (a person who actively looks for the signs of threatening weather and notifies the chain of command if severe weather becomes dangerous).
- Obtain a weather forecast and have a means of monitoring local weather and warnings. Consider a weather radio that broadcasts weather reports and gives warnings about bad weather.
- Consider lightning detectors, which can identify severe weather before the storm arrives—often long before thunder or lightning is apparent. Most lightning detectors have an audible sound to alert observers about the threat of severe weather. Lightning detectors are activated by very subtle, but rapid, changes in light intensity (lightning) and may therefore detect lightning before it becomes apparent to coaches and program supervisors.

- Designate a safe shelter for each venue. Safe shelter for lightning is defined as any building normally occupied or frequently used by people, with plumbing or wiring that electrically grounds the structure. Avoid using shower facilities for safe shelter.
- Games and practices should be suspended whenever lightning is sighted. The Michigan High School Athletic Association guidelines state that on threatening days, game management should consult with contest officials about steps to follow if conditions worsen and that outdoor contests should be suspended under certain conditions. It states that, “Lightning necessitates that contests be suspended. The occurrence of lightning is not subject to interpretation or discussion—*lightning is lightning*” (page 13).¹⁴⁰
- Establish a policy that all individuals have the right to leave an athletic site in order to seek a safe structure if the person feels in danger of impending lightning activity, without fear of repercussions or penalty from anyone.¹³⁹

During Competition

- Do not wait until you hear thunder to take evasive action to prevent lightning strikes to athletes and spectators. By the time thunder is heard, the storm is already sufficiently close to pose a danger to individuals.
- Administrators, officials and coaches should know where the closest safe shelter is located. If lightning is spotted or imminent, all individuals must leave the athletic field to go to safe shelter. If no safe shelter is available, avoid being the highest point in an open field, in contact with, or in proximity to the highest point, on wet soil, or on the open water. Do not take shelter under or near trees, flagpoles, light poles or other metal objects, such as soccer goals, drinking fountains and metal fences.
- If refuge is sought in a motor vehicle, keep the windows closed. Do not touch metal door or window handles or the metal framework of the vehicle.
- Individuals will know when they are about to be struck by lightning. The attraction of positive ions from the body to the negative charges in a cloud causes hair to stand on end, the skin to tingle or the individual to hear “crackling” noises. If this happens, the person should not lie down flat on the ground. Instead, he or she should immediately assume “the lightning safe position.” This is a crouched position on the ground, balancing on the balls of the feet, with hands on knees and head lowered.
- Do not shower, bathe, use plumbing or talk on landline telephones when lightning is present. Cell phones are safe to use during lightning storms.
- After activities have been suspended, wait at least 30 minutes following the last sound of thunder or flash of lightning prior to resuming an activity or returning outdoors.^{139,141,142}

If Someone is Struck by Lightning

Observe the following basic first aid procedures in managing victims of a lightning strike:

- Survey the scene for safety.
- Activate the local emergency medical services.
- Lightning victims do not “carry a charge” and are safe to touch.
- If necessary, move the victim with care to a safer location.
- Evaluate airway, breathing and circulation. Begin CPR if necessary.
- Evaluate and treat for hypothermia, shock, fractures and burns.

Severe Storms and Tornadoes

Tornadoes and winds resulting from severe storms are a serious threat to athletes and spectators because finding shelter in such instances is much more difficult than in cases of lightning. Asking individuals to return home is often not the best option because vehicular travel also may be dangerous. The most effective precautions against severe storms and tornadoes are to monitor weather information and cancel activities whenever violent weather is forecast. The Michigan High School Athletic Association (MHSAA) policy of canceling competitions whenever a tornado watch or warning is in effect is a prudent way to ensure the safety of athletes and spectators.¹⁴⁰ The following guidelines should be considered by any provider of organized youth soccer programs:

- Designate an individual who will obtain a weather forecast each day before a practice or event, and monitor weather forecasts constantly when there is any threat of severe storms and tornadoes.
- Designate a chain of command for making the decision to remove individuals from an athletic site.
- Athletes and coaching staff should know the location of the closest safe shelter. Safe shelter for tornadoes is defined as the basement of a sturdy building, away from windows, glass doors and chimneys. If a basement is not available, an interior hallway on the lowest floor is best. Rooms with large, free-span roofs like gymnasiums should be avoided. The inside of an automobile is a not safe place if a tornado is imminent. If no safe building is nearby, individuals should seek shelter in a ditch, ravine or other place below ground level and stay as low as possible.
- If a tornado warning or severe thunderstorm warning is issued 3 hours before a game or during a game, the competition should be canceled or suspended.
- If a tornado watch or severe thunderstorm warning is issued during either a practice or game, athletic activity should be suspended and all participants moved as rapidly as possible to safe shelter. Athletic activity should not be resumed until the National Weather Service suspends the warning. For a list of the National Weather Service offices serving Michigan, see Appendix R.

Cold Weather

Promoters of youth soccer are often hesitant to cancel competitions or practices because of cold conditions, but medical evidence indicates that suspending the activity may be the prudent action under the following conditions:^{143,144}

- Whenever the combination of wind speed and temperature may induce frostbite within 30 minutes (wind chill index of -18° F or lower). See Appendix D for recently revised guidelines regarding the relationships between wind speed, temperature and the occurrence of frostbite issued by the National Weather Service.
- Whenever precipitation (rain, sleet, snow or hail) and temperature combine to increase the possibility of hypothermia.

The greatest dangers to athletes from playing in cold conditions are frostbite and hypothermia. However, snow and ice on the soccer fields increase the risk of injury from falls. Athletes are most vulnerable during periods of inactivity, like time on the bench or at half time. Hypothermia may occur at temperatures of +40° F or higher if accompanied by damp and windy conditions. Athletes experiencing such conditions must be provided with rain gear, coverings for the head, gloves and dry uniforms. If proper apparel cannot be provided or is not available, the activity should be canceled.

Symptoms of hypothermia are confusion or disorientation, loss of memory, drowsiness, poor hand-eye-foot coordination, slurred speech and an inability to understand directions. Frostbite appears as white or grayish-yellow skin that feels unusually firm or waxy. Victims may have numbness or a lack of sensation in the afflicted areas. Most often frostbitten are ears, nose, fingers and toes, although any exposed area of skin could be affected.

If symptoms of either hypothermia or frostbite are present, recognized first aid procedures should be followed. The athlete should be removed from activity and taken to a warm environment where wet gloves, shoes and clothing can be replaced with warm, dry apparel. Blankets should be provided. First aid and CPR should be available until circulation and all functions have returned to normal levels.

LEVELS OF RESPONSIBILITY TO PREVENT SOCCER INJURIES

The responsibility for minimizing injuries in soccer must be shared by administrators, coaches, officials, medical personnel, parents or guardians and athletes.

RESPONSIBILITIES OF PROGRAM**ADMINISTRATORS**

Program administrators, who may be far removed from the actual training of athletes, are responsible for providing a structure that promotes a safe soccer environment. This may be done in concert with a soccer board comprised of administrators, coaches, officials, medical personnel, parents or guardians and athletes. The responsibilities of program administrators are varied and may include those listed below.

Facilitating the Education of Coaches and Officials

Coaches and officials—even unpaid volunteers—must be qualified to teach athletes skills and to implement injury-prevention strategies. Program administrators should do everything possible to enable coaches to obtain the educational competencies defined in the *National Standards for Athletic Coaches*.¹⁴⁵ See Appendix E for an overview of competency domains. At the administrative level, this can mean:

- Raising money to cover the cost of educational programs and materials.
- Enforcing minimum educational standards for the coaches and officials associated with league or program.
- Making educational programs accessible and appealing to volunteer coaches by bringing qualified educators to a convenient location and providing refreshments.

See Appendix F for educational resources available to Michigan's soccer coaches.

Securing and Evaluating Coaches and Officials

Coaches and officials serve important roles in creating a safe environment for soccer. The well-being of the athletes could be placed in jeopardy if these individuals neglect their duties. The tendency in most soccer programs is to have an abundance of athletes wanting to participate, a shortage of qualified personnel to supervise them and serve as their coaches, and a very limited budget for salary and education. Nevertheless, program administrators should implement a system to verify that coaches and officials are performing their duties. If the soccer program cannot achieve acceptable standards of performance for both paid and volunteer personnel, the program should be postponed until pre-established standards can be met. See Appendix F and Appendix G for sources of education and information for coaches and officials, respectively.

Selecting, Assigning and Monitoring Facilities

All soccer facilities must be safe for play prior to assigning them as a site for practices or matches. (See the previous section on facilities.) Program administrators must establish a process of monitoring facilities to ensure continued safety. A system in which anyone involved with the soccer program can report safety hazards also should

be in place. Also, see the sections on coaches, officials, parents and guardians, and athletes for specific responsibilities.

Planning for Medical Emergencies

Each soccer program should develop a comprehensive emergency plan, addressing specific procedures and responsibilities for every practice and competition site. Key personnel who are to carry out the plan should be identified, with all staff instructed and rehearsed on emergency procedures. See Appendix H for a sample. Among the items that the plan should include are responses to severe injuries, hypothermia, heat illness and allergic reactions to plants and stinging insects. Planning for medical emergencies also should include making sure that emergency transportation will be available within six minutes from the soccer field.

Establishing Concussion Management Policies

The soccer program administrator should work with a knowledgeable physician to develop clear local guidelines for identifying and giving initial treatment for concussions, including guidelines for return to play. There is no national consensus within the sports medicine community as to how to classify the severity of concussions and when athletes who have had concussions should return to play. Research is currently going on so that definitive guidelines can be developed. In the meantime, each soccer program needs to decide on local policies and guidelines. A physician who is qualified to analyze neurological problems should deal with each serious head injury. See Appendix I for the concussion management recommendations developed by the American Academy of Neurology.

Providing Safety Items

Program administrators and coaches share the responsibility of ensuring that items essential to the safety of athletes are available at all practices and contests. At a minimum, these should include:

- Water containers.
- Plainly marked first aid kits and supplies (see Appendix J). This equipment should be inspected periodically to assure its completeness, cleanliness and usability.
- Up-to-date medical information for each athlete that includes any health conditions or medications of the athlete, emergency contacts, preferred physician, preferred hospital and a signed consent form giving permission to provide emergency care (see Appendix K).
- Cell telephone with prominent posting of numbers of ambulance services, paramedics, first aid personnel and police.

Arranging for Athletic Trainer and Medical Personnel

Program administrators are responsible for arranging some level of medical oversight. Although the presence of

The Prevention of Injuries in Youth Soccer

medical personnel at soccer practices and contests is desirable, such services are generally beyond the financial capabilities of most agency-sponsored and interscholastic programs. Whenever possible, the services of a certified athletic trainer should be obtained. The athletic trainer directs the conditioning program, develops or assists in developing the written plan for handling emergencies, helps to implement this plan, administers first aid, recommends appropriate medical attention for athletes with injuries, documents injuries, and supervises the rehabilitation of injured athletes. When financial constraints prohibit the employment of certified athletic trainers for youth programs, the sponsors should, at a minimum, contract with athletic trainers on a consulting basis to oversee the health and safety aspects of the soccer program.

As minimum requirements, agency-sponsored and interscholastic soccer programs should have:

- An established, written plan for emergency medical services.
- A consulting arrangement with a certified athletic trainer whose duties are described above.
- A system for providing low-cost pre-participation physical examinations for athletes 14 years and older.
- A referral service with physicians who are qualified to deal with soccer-related injuries.
- Coaches who are certified in CPR and first aid, and preferably, American Red Cross Sports Safety Training, if practices and games are held without the presence of a certified athletic trainer or a physician on the sidelines.
- A policy and procedures with regard to transmission of blood-borne pathogens, including education of coaches, parents and athletes.
- If possible, an automatic external defibrillator (AED) and someone who is trained to use it. Since an AED is fairly expensive, this may not be possible for many programs.

Use of Drugs

School districts and youth leagues should aggressively discourage children and youth from using steroids and all performance-enhancing drugs, as well as use of alcohol, tobacco, and recreational drugs.

Matching Athletes by Maturity and Skill

Mismatches in age, maturation, skill, knowledge, strength, height and weight of competing players may be factors that contribute to injuries in soccer.^{8,132,145,146,147} By reducing the range of ages of players who are permitted to compete against one another, all of these mismatches tend to be reduced. This may include carefully designed policies that guide placing a player in a different age grouping. A reasonable grouping to reduce most mismatches uses a maximum age designation, such as “Under age X” (Under age 8, Under age 10, Under age 12, Under age 14, Under age 16, Under age 19 and adult levels).

Some leagues permit players to “play up” into older groups. This usually occurs at the request of parents who think this will give their child an advantage over his or her classmates. Most soccer programs do not have policies to permit children to “play down” an age group. However, “playing down” may be a valid policy when children who are biologically immature for their age have difficulty competing with their classmates. Each request to “play up” or “play down” an age group should be evaluated carefully to ensure that the change in status does not create mismatches and increased chances for injury.

Modifying the Rules of Play

It is acceptable to modify the rules of play for the sake of safety by making them compatible with the characteristics of young players and the quality of activity desired. Specific modifications that should be considered are: (a) reduction in match length; (b) reduction in field length and width; (c) increased opportunities for breaks in play for substitution and for adverse environmental combinations of high heat and humidity; (d) restricted slide tackling in beginning-level play, in youth recreational play and in indoor play; and (e) restricted use of heading in youth play.

Limiting the Number and Length of Matches

Injury risk is increased when players are pushed to play when they are fatigued. Despite this fact, many young soccer players are required to participate in numbers of matches in a day or week that would be unheard of in professional soccer. Soccer program administrators should consider adopting the Michigan High School Athletic Association regulations on number of matches:¹⁴⁰

- 18 games and 4 scrimmages per season are permitted at the high school level.
- Middle school/junior high school soccer teams are limited to 12 games per season.
- At the high school level,
 - ◊ “No student may compete in more than 3 games of soccer in one week (Monday through Sunday), including regular and MHSAA tournament play. An individual is limited to one game per school day.
 - ◊ A team may compete in a multi-team tournament in which total allowable playing time for any team is no more than 180 minutes and the event counts as one of 18 regular-season contests. The following provisions would apply: (1) A team would be allowed a maximum of 2 multi-team tournaments in its regular-season schedule; (2) No more than 30-minute halves could have been played; (3) Multi-team tournaments could only be held on non-school days; (4) Tie games may only be resolved by a shoot-out method; no overtime could be played; (5) If an individual participates in a multi-team tournament, he or she is allowed in one other game date that week, Monday through Sunday.”

- At the middle school/junior high school level, “a game shall consist of four 15-minute quarters. Games that are tied at the end of regulation playing time shall remain tied.”

Regulating the Length and Number of Practices

For youth play, there may be a need to restrict overzealous coaches from scheduling physically intense, daily practices. This type of training may lead to overuse injuries and player “burnout.” Soccer program administrators should consider setting reasonable time limits on weekly practices. Typically, recreation leagues limit training sessions to two 90-minute practices per week.

Limiting the Length of the Soccer Season

Recent trends toward extending the soccer season can interfere with young athletes’ social development and academic achievement. Additionally, extended seasons may compromise the resting time that is needed for complete healing of minor injuries. Soccer program administrators should consider placing limits on the number of months young athletes actively compete in soccer. MHSAA rules limiting the length of the soccer season to three months makes sense.

Establishing Weather-Related Policies

Policies should be clearly defined regarding weather conditions (e.g., heat/humidity, lightning, extreme cold, severe storms or tornadoes) that require cancellation of matches or adoption of special precautions.

Establishing Policies for Transporting Athletes

The sponsoring organization should have a written policy on transportation. This policy should identify the kinds of transportation the agency finds acceptable, when and where teams may travel, and who may transport the athletes.¹⁴⁸ The responsibility for transporting athletes to and from scheduled athletic activities varies with the sponsoring organization. In some situations, private vehicles are the only practical means of transport, while in other situations, public vehicles are available. In either case, the transportation of athletes presents an opportunity for injury.

Whether transportation is by commercial transportation agencies, agency-owned vehicles, school-owned vehicles, public transportation, or private vehicles driven by parents or athletes, the vehicles must be properly maintained, inspected for safety and driven by drivers who are appropriately licensed and insured.¹³⁶ When athletes are to be transported in private vehicles, guidelines must be in place to ensure that the drivers (a) have a safe driving record; (b) have a medical release form in their possession for each passenger; (c) use a properly maintained vehicle; (d) can control the behavior of the athletes entrusted in their care; (e) have a plan of action for handling emergency situations; (f) do not permit

overcrowding of the vehicles; and (g) are unlikely to engage in risky behavior. Transportation via public vehicles is preferred because trained professionals assume many of the responsibilities.

Establishing a System for Injury Reporting

Program administrators should establish a system for coaches to use to document injuries over the course of a season. The program administrator should review injury records to look for trends or patterns of injuries. If trends exist, they may be inherent in soccer, or they could be the result of problems with the facilities or training methods employed by the coach. Recognizing a trend is the first step in identifying problems with facilities or training methods that could be corrected. A systematic method of recording injuries as they occur during the season is provided in Appendix L. Injuries should be recorded according to uniform definitions and exposures that are used by the physicians and athletic trainers who treat the athletes.

Soccer programs should work toward eventual adoption of a uniform injury reporting system using recognized nomenclature that tracks the type, site, severity, and likely cause of each injury, as well as when the injury occurred (within which practice, match and season).¹⁴⁹ Ideally, the injury reporting system also documents injuries for each team position and time of exposure to injury (i.e., number of minutes at practice or games), so that injury rates can be calculated. This level of injury reporting is not feasible for most youth soccer programs at the present time.

RESPONSIBILITIES OF COACHES

The responsibilities of coaches for the safety of their players include the following.

Getting Some Coaching Training

Even though many coaches are unpaid volunteers, some amount of coaching education is very important for every coach. An excellent overview of what coaches should know can be found in *Youth Soccer: A Complete Handbook*.⁹⁸ If there will be no physician or certified athletic trainer available, first aid and CPR certification are important. In addition, American Red Cross Sports Safety Training and the use of Automatic Electronic Defibrillators are desirable. In Michigan, the Michigan High School Athletic Association recommends that all coaches participate in the Program for Athletic Coach Education conducted by Michigan State University’s Institute for the Study of Youth Sports. See Appendix F for sources of education for coaches in Michigan.

Knowing and Teaching the Rules

Many of the rules of soccer were created to prevent injuries. Coaches must be thoroughly familiar with the current rules of soccer and incorporate rules into training sessions.

Teaching Safety to Players

Coaches must inform their athletes about the potential risks of injury associated with performing certain activities (e.g., slide tackles and heading the ball) and methods of avoiding injury. By informing athletes of the safety-related reasons for various rules and procedures, coaches can reduce the chance of injury to their players. Coaches should point out safety issues routinely during practices.

Teaching Safety to Parents

Coaches should hold a preseason orientation meeting for parents and guardians. As an effective strategy for reducing injuries during the competitive season, a certified athletic trainer would also address both parents and athletes at this meeting. Topics should include the following: times and duration of practices; appropriate conditioning procedures; how to avoid injuries; selection, fitting, maintenance and use of protective equipment; proper nutrition; policies for medical care and rehabilitation of injured athletes; plan for emergency care of injured athletes; and arrangements for transportation beyond local community sites. The role of parents and guardians in keeping their athletes safe should also be clarified. See also the section on the responsibilities of parents and guardians in injury prevention.

Prevention of Communicable Diseases

Before any equipment is reassigned from one athlete to another, it should be sanitized. All players should be up-to-date with recommended immunizations, including being immunized for hepatitis B.¹⁵⁰ Athletic staff should follow universal precautions for protecting themselves and athletes from blood-borne illnesses. For a complete list of precautions and procedures, see Appendix M.

Ensuring a Safe Playing Environment

The coach should monitor the playing environment for both practices and games to ensure safe conditions exist. These conditions include facilities, equipment and weather conditions. The coach should also check to be sure that players are wearing their protective equipment. The coach should take appropriate action to remedy the unsafe condition or adjust to the weather conditions by following policies and guidelines adopted by the soccer program and good coaching practices.

Teaching Appropriate Techniques

Coaches must teach their athletes the proper methods to perform specific soccer techniques, such as tackling and heading. See Appendix N for recommended techniques for teaching the skill of heading to young and inexperienced players, Appendix B for suggested ages and skill levels at which skills of soccer should be taught to promote safety and Appendix F for sources of education for soccer coaches.

Teaching Sportsmanship

Coaches should promote fair and safe participation in practices and matches with strict enforcement of the rules to encourage skill and tactical ability as the primary factor in determining the outcome of a contest. They must promote an atmosphere in which intentional fouls or intended violence are never acceptable and where the athletes enjoy and gain satisfaction from playing soccer. In addition, coaches should reinforce respect for competing players and for the decisions and instructions of game officials.

Selecting Safe Drills

Training sessions should include various drills and exercises that are designed to enhance the players' fitness and their technical and tactical abilities. Drills and exercises that in and of themselves present a likelihood of injury should be avoided. Coaches can learn how to conduct safe drills by reviewing the information found in *Youth Soccer: A Complete Handbook*.⁹⁸

Using Progressions in Physical Training

A gradual progression, from training session to training session, in the physical demands of the activity should be the basis for conditioning. Coaches who follow a training program that rapidly overloads systems of the body also increase the risk of injury to their athletes. Common overuse injuries, such as patellar tendinitis, commonly called shin splints and stress fractures can be reduced or avoided by minimizing repetitive activities during practices. Providing three or more weeks of preseason training helps coaches to follow a more gradual training progression before placing athletes in high-intensity matches. Note that the MHSAA prohibits competition until 11 days have elapsed from the first practice.

Using Progressions in Skill Development

Athletes should be taught how to perform the basic motor skills of soccer in a systematic way, with gradual progression. The controversy associated with acute and latent injuries due to heading and the direct relationship of tackling to injuries of the lower extremities signify that coaches must be qualified to teach these skills so they are developmentally appropriate for the age group of the athletes. Appendix B provides an overview of the important skills to be taught to promote safety, their developmental progression, and suggested levels of difficulty. Coaches who desire a more thorough review of the skills in their developmental sequence should see Brown's handbook devoted to this topic.⁹⁸

Using Warm-Up and Cool-Down Activities

Before practices and matches, athletes should perform a minimum of 15 minutes of warm-up activities that consist of light aerobic exercises followed by stretching. Besides increasing the breathing rate, heart rate and muscle temperature to exercise levels, a warm-up period helps lubricate the joints to prepare them for exercise. Athletes

also should warm up for five minutes after any prolonged breaks in activity (half time, before being substituted into the game, etc.). Each of these factors may contribute to the reduction of injuries in soccer. Following practices and matches, coaches should engage their athletes in a cool-down period also consisting of light aerobic activity followed by stretching. This routine helps to relieve post-exercise soreness that accompanies vigorous physical activity. Although warm-ups, stretching and cool-downs may not be as important physiologically to athletes age 13 and younger, they should become accustomed to properly participating in these conditioning activities at young ages as a habitual part of athletics.

Using Appropriate Substitution Patterns

In addition to using substitution as a method to regulate the playing time of athletes in matches for tactical, social and psychological reasons, coaches must carefully observe play to be aware of the need to remove athletes who may be injured or physically exhausted. In most cases the need to remove injured or tired players is obvious. However, knowing the typical behavior patterns of all players will help in making decisions when situations call for change.

Dealing with Medical Conditions and Injuries

Coaches should have a basic understanding of human anatomy and physiology, know about players' medical conditions that could create problems for the athlete, recognize the common injuries in soccer, know how to handle medical emergencies and know how to rehabilitate athletes who have sustained minor injuries.¹⁴⁶ Coaches should be aware of players who are at risk for exercise-induced asthma, know about their asthma management plans, understand the conditions that could place the athletes at risk of an asthma attack and monitor their activities to minimize this risk. Also, see the section titled *Responsibilities of Medical Personnel and Coaches*.

Knowing When to Permit Previously Injured Athletes to Return to Activity

Decisions about re-entry into physical activity following an injury are difficult for coaches to make. Often, athletes who are removed from matches or from practice sessions because of a minor injury can be returned to activity within minutes. However, because many injuries can result in chronic problems, coaches need to err on the side of caution when deciding whether or not to permit an athlete to return to activity.

To minimize the occurrence of re-injuries, early intervention on a new injury and appropriate rehabilitation is important. Athletes should not return to practice or play until injuries are healed, range of motion is restored and strength is recovered. If coaches have the assistance of trained medical personnel to guide their actions, they should depend on this advice. Whenever an athlete who sustains an injury needs to be removed from

a match or training session and is not permitted to return that day, medical advice should determine when and under what conditions an athlete should be returned to training and play.¹⁴⁷ This is especially crucial for head injuries. Policies for return to play after head injuries established at the program level should be scrupulously followed.

RESPONSIBILITIES OF OFFICIALS

The management of matches is the responsibility of the officials. This includes all activities that are directly related to the contest and its immediate surroundings. How officials perform their managerial duties can have an impact on the incidence and severity of injuries in soccer. Education of officials is important. Officials who wish to increase their knowledge and proficiency of officiating soccer at the agency-sponsored and interscholastic levels should contact individuals listed in Appendix G. The cited organizations provide opportunities for members to meet and discuss various aspects of soccer officiating. Each organization provides rules interpretation sessions, programs devoted to officiating mechanics, mentoring programs for beginning officials, and a support system for officials. Some of the responsibilities of officials include those listed below.

Enforcing Rules

The rules of play in soccer establish conditions of fair competition for all individuals and teams. Included within these regulations are rules associated with safety that are designed to (a) penalize athletes who willfully use violent and aggressive techniques that may be injurious to opponents, teammates and self and (b) promote skillful techniques and tactics as the basis of winning. At all levels of play, it is important that officials know and enforce all rules of play. If this is not done, a match can quickly escalate into a situation where winning through skillful play becomes secondary to physical retaliations for what was perceived to be unfair play. Enforcing the rules of play minimizes the potential for injury.

Educating Players about Rules and Safety

Players learn about what is acceptable through the officials' calls. In addition, good officials seize opportunities prior to, during and after matches to warn and instruct players about possible violations of play and how to avoid potentially injurious situations.

Inspecting for, Recognizing and Avoiding Hazardous Conditions

Managerial duties of officials include (a) inspecting the facilities and surrounding area, equipment, and apparel for hazards; (b) recognizing potentially hazardous situations associated with the facilities, equipment, apparel, environmental conditions, and behavior of players and spectators; and (c) taking appropriate actions to remove these hazards or to delay or cancel the match until approved conditions prevail. Officials should take

appropriate action to remedy unsafe conditions or adjust to the weather conditions by following policies and guidelines adopted by the soccer program.

Canceling Matches

Weather and field conditions should dictate whether or not matches should be canceled. Matches should be canceled if there are adverse combinations of high heat and humidity, lightning in the area, tornado warnings, high winds, extreme cold or unplayable field conditions. Matches should also be canceled if lighting is poor. Game officials are responsible for interpreting how the weather policies established at the administrative level apply to the current situation. However, coaches who believe that the conditions for play are dangerous should act on their beliefs. See Appendices C and D.

Stopping Matches for Injuries

If a player is suspected to have sustained a serious injury, the match should be stopped to prevent the injury from being exacerbated and to provide an opportunity for treatment.

Following Good Officiating Mechanics

Referees and assistant referees should be placed in proper positions to observe and penalize individuals who violate the rules.

RESPONSIBILITIES OF MEDICAL PERSONNEL AND COACHES

The presence of medical personnel at practices and contests is an indisputable asset to coaches. However, in many situations the assistance of an athletic trainer, nurse or physician is not possible. If medical personnel are not present at practices and contests, the coach must assume some of the duties and procurement of supplies.

Having an Appropriate First Aid Kit

A well-stocked first aid kit should contain basic items that can be dispensed and applied by the person(s) who will be called on to provide care to injured athletes. A list of items for a kit designed for a soccer coach is included in Appendix J. Items should be added or subtracted from this list on the basis of the first aid and emergency care skills of the intended user.

Knowing How to Provide Immediate Care for Injuries

Coaches should be able to attend to minor injuries and manage more serious injuries until trained medical personnel arrive. Medical professionals and coaches educated in emergency care should be able to aid in more serious injuries and facilitate the transfer of injured athletes until emergency personnel arrive on the scene. If coaches are responsible for attending to seriously injured athletes until medical support arrives, they should become certified through the Sports Safety Training program offered by the American Red Cross.

Knowing How to Handle a Medical Emergency

Depending on the organization of the soccer team/program, medical personnel or the coach affiliated with the team are responsible for the initial care of an athlete in an emergency. It is the responsibility of the medical personnel or coach to implement the emergency plan adopted by the soccer program's administrators. See Appendix H for a sample emergency plan. The local program's guidelines for identifying and giving initial treatment for concussions, including guidelines for return to play, should be included in the local emergency plan.

Keeping Records of Injuries

If no athletic trainer is available to do it, the coach is responsible for keeping records of any injuries that occur over the course of the season, using the reporting system established by the soccer program administration. The coach, athletic trainer and medical advisor can assist in looking for trends in injuries that suggest problems that could be prevented.

RESPONSIBILITIES OF PARENTS AND GUARDIANS

Parents and guardians have important roles for helping their children benefit from participation in soccer. Many of these responsibilities are specifically related to safety and injury prevention. This begins with ensuring that the child has a pre-participation assessment and up-to-date vaccinations.

Monitoring and Advocating for Injury Prevention

Parents and guardians have important roles in monitoring the youth soccer setting. If adverse conditions exist, especially related to the potential for physical or psychological harm to their children, parents and guardians must serve as advocates for safety by reporting problems to individuals in charge and making sure that changes are made.

Reporting Injuries That Occur Inside and Outside of Soccer

If an athlete has an existing medical condition, the condition and the medical prescription for attending to it must be reported to the coach and/or medical personnel. As an example, if their child is at risk for exercise-induced asthma, parents or guardians should make sure that the child's asthma management plan is given to the coach. In some situations, athletes withhold information about their injuries from their coaches. This may be done because of social pressure to "be tough" or to avoid "being benched." Observant parents and guardians may be the first to know if their child has sustained an injury, especially injuries that occur outside the soccer setting. Even though parents and guardians may want their child to "be tough" and to play, it is important that they report all injuries to the coach and/or the team's medical personnel. Exposing injured athletes to certain soccer activities can increase the severity of existing injuries and result in injuries becoming chronic.

Overseeing Injury Treatment and Rehabilitation

If an athlete sustains a soccer injury, parents and guardians should make sure the athlete complies with treatment recommendations. A parent or guardian may be in a better position to decide whether healing is complete and should have input into the decision about returning the athlete to play.

Reinforcing Sportsmanship and Compliance to Safety Practices

Even though parents and guardians do not directly control the behavior of their children in the soccer setting (during practices and matches), they must reinforce safety practices that are implemented by others. These practices include learning and obeying the rules of play, physically and mentally preparing for competition, learning how to perform skills in a safe manner, wearing shin guards and mouth guards, and sportsmanship. Parents and guardians should promote good sportsmanship through their actions in respecting players, coaches and game officials.

Purchasing Appropriate Equipment and Apparel

Before purchasing any soccer balls, shin guards, mouth guards, clothing or padding for their children, parents and guardians must seek advice from experts and become informed about what is appropriate and safe.

RESPONSIBILITIES OF ATHLETES

Irrespective of all the safety measures that may be employed by administrators, coaches, officials, medical personnel, parents and guardians, athletes must fulfill their own responsibilities for safety and prevention of injuries.

Preparing Actively for Soccer

It is the responsibility of all athletes to prepare themselves physically and mentally for the demands of competition. Fully engaging in the physical conditioning offered in training acclimates athletes to the rigors of competition and may prevent injury. It is the responsibility of the athletes to attend all team functions or make up missed training sessions. In addition to the technical and tactical elements included in training sessions and matches, players must fully participate in warm-up and cool-down activities.^{97,98}

Wearing Protective Equipment and Apparel

Even though they may have been advised to wear appropriate protective equipment, some athletes covertly violate equipment requirements. Coaches and officials who are not very observant may be placed in legally tenuous positions if an injury occurs when athletes are not wearing the prescribed protective equipment. It is the responsibility of the athlete to wear the prescribed protective equipment. If equipment seems ill-fitting or is uncomfortable, the athlete should inform the coach.

Engaging in Appropriate Behavior Toward Others

Soccer is a physical sport that allows aggressive behavior when this behavior is within the rules of play. However, some players misinterpret the attention they receive for fair, aggressive play and extend their behavior into violations of the rules. Uninformed coaches, parents and spectators may encourage these violations, making it very difficult for players to stay within the limits of fair play. Studies of soccer injuries have pointed to rule violations as one of the reasons for injuries. These injuries are not limited to players being fouled but also occur to players who commit the fouls. It is the responsibility of the athlete to understand the rules of soccer and to abide by them to the best of his or her ability.

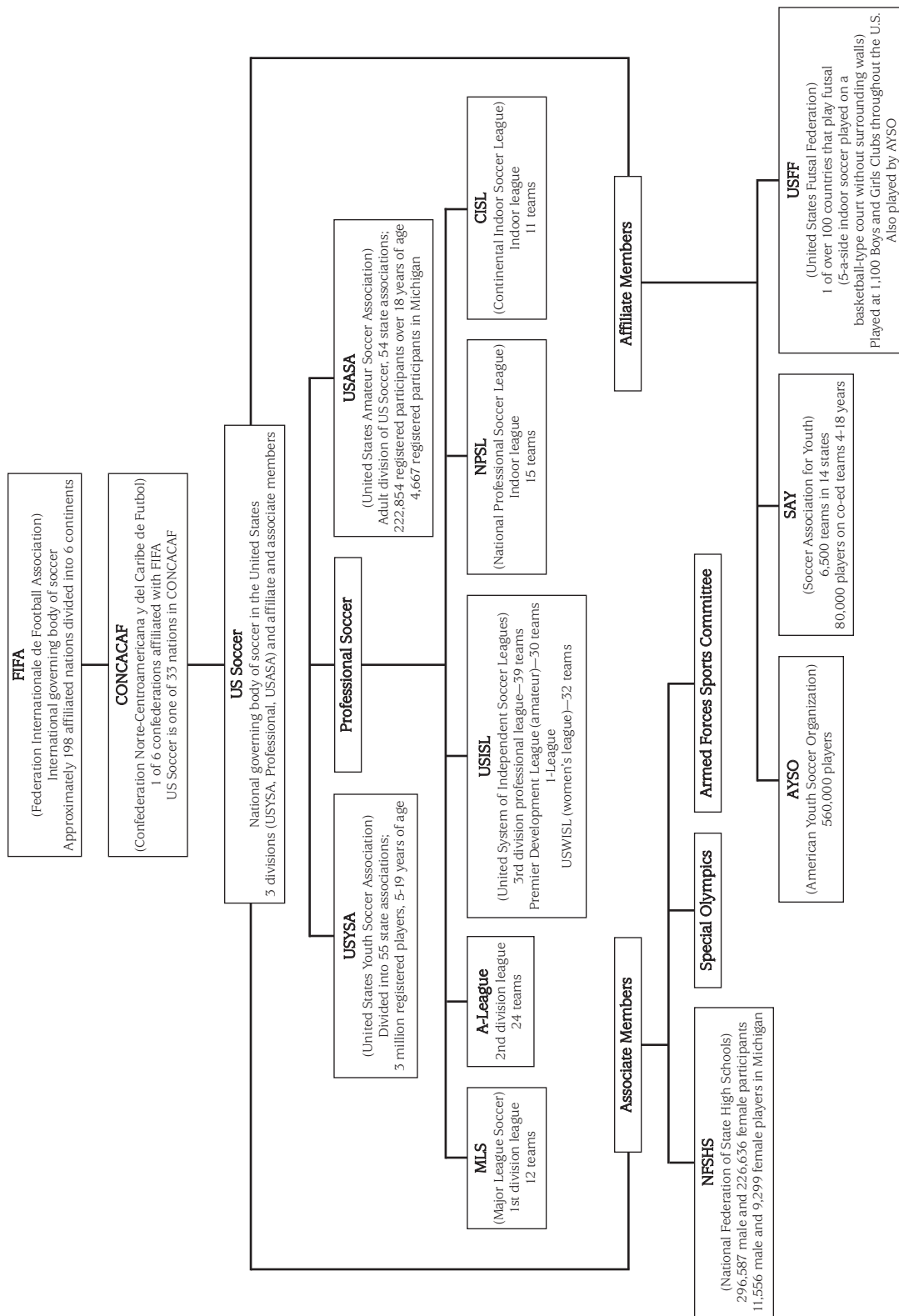
Following Safety Rules

In addition to complying with the official rules of play for matches, soccer players must conscientiously work to master drills and other practice activities. Being able to correctly perform soccer techniques greatly reduces the risk of injury.

Reporting Safety Problems

Reporting safety problems is the responsibility of everyone associated with a soccer program. However, because of the intimate involvement of the players in the activity, they are often the first to become aware of safety problems associated with equipment, apparel, facilities and teammates. They must report these problems to those in charge so that the problems can be eliminated. They must also report all injuries to parents and the coach, and comply with any rehabilitation exercises prescribed by a physician.

FIGURE 1 - ORGANIZATIONAL STRUCTURE OF SOCCER IN THE UNITED STATES



Structure and participation of organizations affiliated with the Federation Internationale de Football Association (FIFA).

LIST OF APPENDICES

- Appendix A:** Exercises to Strengthen Neck Muscles
- Appendix B:** Selected Soccer Skills for Which Maturity of the Athlete Must Be Taken Into Account for Injury Prevention
- Appendix C:** Heat Index Temperature Chart, Showing Danger Levels of Physical Activity During Conditions of High Heat and Humidity
- Appendix D:** Wind Chill Index, Showing How Wind Speed and Temperature Determine the Time When Frostbite Occurs
- Appendix E:** National Standards for Athletic Coaches
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- Appendix H:** A Comprehensive Emergency Plan, with Designated Responsibilities for Five Individuals
- Appendix I:** Summary of Suggestions for Management of Concussion in Sports
- Appendix J:** Suggested Contents of a First Aid Kit for Soccer Coaches
- Appendix K:** Medical Treatment Consent Form
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- Appendix N:** Recommended Techniques for Teaching the Skill of Heading to Young and Inexperienced Players
- Appendix O:** Medical Health Questionnaire
- Appendix P:** Pre-Participation Examination Form (Physical)
- Appendix Q:** Other Resources
- Appendix R:** National Weather Service Offices Serving Michigan

APPENDIX A

Exercises to Strengthen Neck Muscles

Athletes of all ages can use the following neck strengthening exercises to make their necks stronger to help them from getting hurt when heading the ball. They are especially useful for athletes under 14 years old that may not have qualified people to monitor neck-strengthening exercises performed on equipment. If muscle-strengthening equipment is used, people trained in its use must supervise the athletes' workouts. Ask the coach what exercises are used to make the players' necks stronger.



Exercise 1: Exercise to strengthen the muscles that move the head forward: Place a towel or similar article around the head at the level of the forehead, as shown. Hold the head erect. While moving the head forward, resist this motion by pulling back on the towel.



Exercise 2: (Exercise is the opposite of Exercise 1.) Exercise to strengthen the muscles that move the head backward. Begin by placing a towel or similar article around the back of the head to cover the lower portion of the skull. Use the hands to hold the towel in place while attempting to move the head backward, resisting this motion by pulling forward on the towel.



Exercise 3: This photo shows that hands can be substitutes for a towel when strengthening the neck muscles. In this picture, the athlete is pushing against resistance provided by the right arm. The muscles being strengthened are used to move the head sideways.



Exercise 4: This photo shows the use of a towel to strengthen the muscles used to move the head sideways in the direction opposite of that in Exercise 3.

Note: Always insist that young athletes provide their own resistance in neck strengthening exercises. Do not permit partners to provide the resistance. Only the individuals who receive the resistance know the difference between tolerable and excessive forces.

APPENDIX B

Selected Soccer Skills for Which Maturity of the Athlete Must Be Taken Into Account for Injury Prevention*

Skill	Sub-skills	Suggested Ages at Which Skill Should be Taught		
		Beginning** 6-9 years	Intermediate** 10-13 years	Advanced** 14 years and up
Kicking	1. Low drive inside of the foot kick	✓	✓	✓
	2. Over-the-shoulder scissors			✓
Receiving and Controlling	1. Sole of the foot on a rolling ball	✓	✓	✓
	2. Outside of the foot on an air ball		✓	✓
Dribbling and Maintaining Control	1. Inside of the foot	✓	✓	✓
	2. Ball and body feints			✓
Heading	1. Diving header			✓
Throw-in	1. Approach run	✓	✓	✓
Defensive Techniques	1. Marking	✓	✓	✓
	2. Slide tackle			✓
Goalkeeping	1. Bowled ball distribution	✓	✓	✓
	2. Forward diving save			✓

*The skills shown are those that have been known to cause injuries if they are taught to inexperienced players, or taught to athletes who are too developmentally immature to learn these complex skills. For a complete listing of soccer skills and the progression in which they should be taught, see the book that is the source for this chart.

**“Beginning,” “Intermediate” and “Advanced” do not always correspond with the age range given. Coaches should use this classification system as an approximation, adjusting the techniques to suit their players’ ability levels, and levels of physical and mental maturity.

APPENDIX C

Heat Index Temperature Chart, Showing Danger Levels of Physical Activity During Conditions of High Heat and Humidity

Table C1
Heat Index Temperature Chart
 (The apparent temperature felt by the body, by temperature & relative humidity)

Relative Humidity	Temperature (°F)														
	70	75	80	82	84	86	88	90	92	94	96	98	100	102	104
40%	68	74	79	81	83	85	88	91	94	97	101	106	110	116	121
50%	69	75	81	83	85	88	91	95	99	103	108	114	120	125	131
60%	70	76	82	84	88	91	95	100	105	110	116	123	129	136	144
70%	70	77	85	86	90	95	100	106	112	119	126	135	144	149	158
80%	71	78	86	89	94	100	106	113	121	129	138	144	155	164	
90%	71	79	88	91	98	105	113	122	131	141	152	157	168		
100%	72	80	91	95	103	112	121	132	143	155	168				

Exposure to full sun can increase the heat index values by up to 15°F.

Table C2
Danger Level by Heat Index

Heat Index	Danger Level	Symptoms
80 to 90	Caution	Fatigue possible with prolonged exposure and/or physical activity.
90 to 105	Extreme Caution	Sunstroke, heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity.
105 to 130	Danger	Sunstroke, heat cramps, and heat exhaustion likely, and heatstroke possible with prolonged exposure and/or physical activity.
Above 130	Extreme Danger	Heat stroke/ sunstroke highly likely with continued exposure.

Source: National Weather Service, www.nws.noaa.gov, search "heat index temperature chart."

APPENDIX D

Wind Chill Index, Showing How Wind Speed and Temperature Determine the Time When Frostbite Occurs

A Wind Chill Chart

Minutes until frostbite occurs		
30	10	5

Wind Speed	Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Calm	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
5 mph	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
10 mph	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
15 mph	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
20 mph	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
25 mph	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
30 mph	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
35 mph	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
40 mph	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
45 mph	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
50 mph	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
55 mph	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98
60 mph																		

This reflects the new wind chill temperature index implemented on November 1, 2001.

Specifically, the new index:

- Uses wind speed calculated at the average height (5 feet) of the human’s face, which is typically the most exposed portion of the body, instead of 33 feet (the standard anemometer height);
- Is based on the human face model;
- Incorporates modern heat transfer theory (heat loss from body to its surroundings, during cold and breezy/windy days);
- Uses the calm wind threshold to 3 mph;
- Uses a consistent standard for skin tissue resistance; and
- Assumes the worst case scenario for solar radiation (clear night sky). The sun’s impact is not factored into the wind chill temperature formula.

Source: National Weather Service, www.crh.noaa.gov/mpx/windchill_new.html, updated November 2001.

APPENDIX E

National Standards for Athletic Coaches

The National Association for Sport and Physical Education (NASPE) has published National Standards for Athletic Coaches. Every athletic coach, including volunteer parent coaches, should have some competencies in each of the following domains:

1. Injuries/prevention/care
2. Risk management
3. Growth/development
4. Training/conditioning
5. Social/psychological
6. Skills/tactics/strategies
7. Teaching/administration
8. Professional preparation

The national standards describe five levels of coaches, each with greater degrees of competency in each of the eight domains. For additional information and ordering information, check the NASPE web site <http://www.aahperd.org/naspe/template.cfm>

Source: National Association for Sports and Physical Activity web site: <http://www.aahperd.org/naspe/template.cfm>

APPENDIX F

Educational Resources Available to Michigan Soccer Coaches

The following agencies/organizations offer courses designed for individuals who coach young athletes:

American Red Cross

Mid-Michigan Chapter
1800 East Grand River
Lansing, MI 48912
(517) 484-7461

American Sport Education Program

Human Kinetics Publishers
P. O. Box 5076
Champaign, IL 61825-5076
(217) 351-5076
www.humankinetics.com

American Youth Soccer Organization - Section 8

http://personalpages.tds.net/~lhuen/ayso_s8.html

Institute for the Study of Youth Sports

213 I. M. Sports Circle
Michigan State University
East Lansing, MI 48824
(517) 355-4741
ythsports@msu.edu

Michigan High School Athletic Association

1661 Ramblewood
East Lansing, MI 48823
(517) 332-5046
www.mhsaa.com

Michigan Interscholastic Soccer Coaches Association

Clark Udell, President
Forest Hills Central High School
5901 Hall Street, S.E.
Grand Rapids, MI 49546
(616) 493-8700

Michigan State Youth Soccer Association

(Michigan affiliate of United States Soccer Federation)
Tom K. Faro, Executive Director
9401 General Drive, Suite 120
Plymouth, MI 48170
(248) 557-8220
Tom Faro: (734) 459-6220, Ext. 205
tomfaro@msysa.net

Michigan Recreation and Park Association

2722 East Michigan Avenue, Suite 201
Lansing, MI 48912
(517) 485-9888
www.mrpaonline.org

National Alliance for Youth Sports

2050 Vista Parkway
West Palm Beach, FL 33411
(561) 684-1141
www.nays.com

National Safety Council

First Aid and CPR
Jones and Bartlett Publishers
40 Tall Pine Drive
Sudbury, MA 01776
(800) 832-0034
www.jbpub.com/nsc/

United States Soccer Federation

1801 South Prairie Avenue
Chicago, IL 60616
(312) 808-1300
www.ussoccer.com

Updated September 2002

APPENDIX G

Sources of Information for Officials of Soccer in Michigan

West Michigan Soccer Referees Association

Contact: Heinz Meyer
4408 Sunset Drive
Kalamazoo, MI 49008
Res. (269) 344-4848
Bus. (269) 344-4848
www.wmsra.com

South Michigan Soccer Referees Association

Contact: Jill Hill
3310 Southard
Adrian, MI 49221
Res.
Bus. (517) 547-3684

Soccer Referees Association

Contact: Pat Hayes
486 Pilgrim
Birmingham, MI 48009
Res. (248) 644-0199
Bus.

Tri-County Soccer Referees Association

Contact: Larry Briggs
10528 Brookwood
Plymouth, MI 48170
Res. (734) 455-2285
Bus. (734) 523-4694

Macomb County Referees Association

Contact: Dan Kuskowski
59285 Elizabeth Lane
Ray, MI 48096
Res. (586) 677-4776
Bus. (586) 747-0419

Down River Soccer Referees Association

Contact: Michael Mullin
2521 King Road
Trenton, MI 48183
Res. (734) 675-1075
Bus. (734) 692-7616

United Federation of Officials

Contact: Jennifer Ellis
1347 Highview
Dearborn, MI 48128
Res. (313) 561-4072
Bus. (313) 814-9544

Saginaw Valley High School Referees Association

Contact: William Larson
3502 Mark Twain Dr.
Midland, MI 48642
Res. (989) 832-8786
Bus. (989) 636-0926

Eastern Michigan Officials Association

Contact: Scott Tallmadge
519 12th Street
Port Huron, MI 48060
Res. (810) 985-5253
Bus. (810) 340-2044
Voicemail/Fax. (810) 958-6030
www.emoa.org

Soccer Officials Association of the Vehicle City

Contact: Stephen Tesler
401 Lafayette Street
Flint, MI 48503
Res. (810) 237-5174
Bus. (810) 237-6107

Greater Lansing Area Soccer Referees Association

Contact: Francisco Villarruel
1700 Cranston St.
East Lansing, MI 48823
Res. (517) 351-1668
Bus. (517) 353-4505
www.glasra.org

Mid Michigan Officials Association

Contact: Jaimie Holcomb
P.O. Box 371
Fremont, MI 49412
Res. (231) 924-6780
Bus. (231) 924-6780

Grand Traverse Area SocJames Cook

Contact: Stephen Tesler
420 Boughey Street
Traverse City, MI 49684
Res. (231) 941-46684
Bus. (231) 935-7728

Updated August 2003

Note: For updated contact information, please see the Michigan High School Athletic Association website:
www.mhsaa.net/officials.associations.cfm

APPENDIX H

A Comprehensive Emergency Plan, with Designated Responsibilities for Five Individuals

- A. Medical Personnel or Coach
- Take charge of situation
 - Alert Previously assigned people to their tasks.
 - Contact parents, guardians or their designees.
 - Complete an injury report form.

B. Medical Personnel or Coach

(Name & alternate person in charge of injured athlete)

1. Calm and assure athlete.
2. If possible, determine nature and extent of injury.
3. If possible, privately report nature and extent of injury to person calling for emergency medical assistance.

Requires First Aid Skills*

4. If athlete is unconscious or a spinal injury is suspected, do not move the athlete.
5. Provide appropriate emergency care if warranted.
 - a. **A**BC's (open Airway, restore **B**reathing, and restore **C**irculation).
 - b. Control bleeding by direct pressure.
 - c. For heat stroke, immediately cool body by cold sponging, immersion in cold water, and cold packs.
 - d. For shock, have athlete lie down, calm athlete, elevate feet unless head injury, control athlete's temperature, loosen tight fitting clothing, and control pain or bleeding if necessary.
 - e. For allergic reaction, use ana-kit if available.
6. If coach is tending to the athlete, transfer care to emergency medical personnel. (Note that the Medical Release Form and one individual whose name appears on the form must accompany the athlete to the medical center unless parents or guardians are available.)
7. Athlete's Medical Information must be available.

C. (Name and alternate person in charge of uninjured athletes)

1. Direct uninjured athletes to a safe area.
2. Have a plan in place to divert the attention of uninjured athletes from the emergency situation.
3. Use accepted procedure to dismiss uninjured athletes from practice/competition.

D. (Name and alternate person responsible for phoning for emergency medical assistance) (Note: Coach is responsible for having a cellular phone at each practice and game.)

1. Emergency phone number by site of activity:	Site	Phone No.
_____	_____	_____

2. Report the nature of the injury and calmly respond to questions.
3. Directions to site:

Site	Directions
_____	_____
_____	_____
4. Location of flag person by site:

Site	Location
_____	_____
5. Remain on the phone until other person hangs up.
6. Return to person attending to injured athlete and privately report status of emergency medical assistance.

E. (Name and alternate person responsible for flagging down emergency vehicle)

1. Go to designated location to flag down emergency vehicle.	Site	Location
_____	_____	_____

2. Direct emergency medical personnel to injured athlete.

(Note that the site and location information corresponds to D.6. If no phone is within reasonable distance from the activity site, flag person should go to location where a vehicle can be flagged down.)

*Note: Activities 4 and 5 (Column B, Medical Personnel or Coach) should only be attempted by persons who are certified in First Aid and emergency care.

Source: Reprinted with permission from Kimball, R, et al., "Care of Common Sports Injuries," Chapter 15, pgs 109-120. In V. Seefeldt and M. Clark (editors) *Program for Athletic Coaches Education*, Cooper Publishing Group. 3rd edition, 2001.

APPENDIX I

Summary of Suggestions for Management of Concussion in Sports

Severity	Description	Initial Treatment and Return to Play Guidelines
Grade 1: Mild	Transient confusion, no loss of consciousness and a duration of mental status abnormalities of less than 15 minutes.	The athlete should be removed from sports activity, examined immediately and at 5-minute intervals and allowed to return that day to the sports activity only if postconcussive symptoms resolve within 15 minutes. Any athlete who incurs a second Grade 1 concussion on the same day should be removed from sports activity until asymptomatic for one week.
Grade 2: Moderate	Transient confusion, no loss of consciousness and a duration of mental status abnormalities of greater than or equal to 15 minutes.	The athlete should be removed from sports activity and examined frequently to assess the evolution of symptoms, with more extensive diagnostic evaluation if the symptoms worsen or persist for more than one week. The athlete should return to sports activity only after asymptomatic for two weeks.
Grade 3: Severe	Loss of consciousness, either brief (seconds) or prolonged (minutes or longer).	The athlete should be removed from sports activity for one full week after symptoms have disappeared if the loss of consciousness is brief or two full weeks after symptoms have disappeared if the loss of consciousness is prolonged. If still unconscious or if abnormal neurologic signs are present at the time of initial evaluation, the athlete should be transported by ambulance to the nearest hospital emergency department. An athlete who suffers a second Grade 3 concussion should be removed from sports activity until asymptomatic for one month. CT or MRI scanning is recommended if headache or symptoms worsen or persist longer than one week. Any athlete with any abnormality on computed tomography or magnetic resonance imaging brain scan consistent with brain swelling, contusion, or other intracranial pathology should be removed from sports activities for the season and be discouraged from future return to participation in contact sports.

Source: Adapted from American Academy of Neurology Quality Standards Subcommittee, "Practice Parameter: The Management of Concussion in Sports." *Neurology*, 48, 581-585, 1997.

APPENDIX J

Suggested Contents of a First Aid Kit for Soccer Coaches

Adhesive tape (various widths)	Gauze bandage (1" x 126")	Scissors
Alcohol preps	Gauze pads (2" x 2" and 4" x 4")	Sling*
Betadine swabs	Gauze sponge (4" x 4" x 8 ply)	Soap
Biohazard plastic bags	Germ filter mask	Sterile cotton sticks
Blanket, lightweight foil	Hard candy	Sunscreen
Bottle - plastic (1 qt.)	Insect repellent	Syringe, bulb suction
CPR microshield, clear mouth barrier*	Knife, pocket	Tape measure
Cell phone (or coins for emergency phone calls)	Latex gloves, sterile	Tongue blades - regular, sterile
Cervical collar*	Liquid bleach (3 oz.)	Tweezers
Cling bandage (3" x 5 yds.)	Moleskin	Written materials: <ul style="list-style-type: none"> • A copy of team's Emergency Plan • Emergency phone numbers • First aid manual • Athlete medical information forms • Medical release forms • Emergency plan forms
Disinfectant	Nonstick pads, sterile (2" x 3")	
Elastic wraps (2", 3", 4" and 5")	Pen light	
Eye pads, small and large	Petroleum jelly	
Flexible bandages (3/4")	Plastic bags (qt., .5 gal., and 1 gal. sizes)	
Eye stream, 30 ml*	Plastic bandages (3/4")	
Foam rubber padding (various thicknesses)	Safety pins	

Optional: Automatic External Defibrillator (for use only by persons trained in its use)

*Note: These items are intended for use only by persons who are certified in first aid and emergency care. Administrators of programs for amateur soccer must ensure that appropriate medical care is available at practices and contests.

Source: Brown, E. W., *Youth Soccer: A Complete Handbook*. Traverse City, MI: Cooper Publishing Group, 1993.

APPENDIX K

Medical Treatment Consent Form

I hereby give permission for any and all medical attention necessary to be administered to my child in the event of an accident, injury, sickness, etc. under the direction of the persons listed below until such time as I may be contacted. My child's name is _____. This release is effective for the time during which my child is participating in the _____ program for the ____/_____ season, including traveling to or from competition. I also hereby assume the responsibility for payment of any such treatment.

Parents' Name: _____

Home Address (Street/City/State/Zip) _____

Home Phone _____ Work Phone _____ Work Phone _____

Insurance Company _____

Policy Number _____

Family Physician _____

Physician's Address _____ Physician Phone _____

Preferred Hospital _____

My child's known allergies include _____

Please list any known medical problems your child has _____

In case I cannot be reached, either of the following people is designated:

Coach's Name _____ Phone _____

Assistant Coach's Name _____ Phone _____

Signature of Parent or Guardian _____

Subscribed and sworn before me this _____ day of _____, 20 _____

Signature of Notary Public _____

THE INFORMATION PROVIDED HERE IS STRICTLY CONFIDENTIAL AND WILL BE TREATED AS SUCH. THE PURPOSE OF THIS INFORMATION IS TO BE ABLE TO TREAT THE STUDENT-ATHLETES OF _____ IN A SAFE AND TIMELY MANNER IN THE ABSENCE OF A PARENT.

Source: Brown, E. W., *Youth Soccer: A Complete Handbook*. Traverse City, MI: Cooper Publishing Group, 1993.

APPENDIX L

Summary of Season Injuries Form

Injury Type	First 4 Weeks	Middle Weeks	Last 4 Weeks	Total
1. Abrasion	_____	_____	_____	_____
2. Back or neck injury	_____	_____	_____	_____
3. Blisters	_____	_____	_____	_____
4. Cramps	_____	_____	_____	_____
5. Contusion	_____	_____	_____	_____
6. Dental injury	_____	_____	_____	_____
7. Dislocation	_____	_____	_____	_____
8. Eye (Foreign object)	_____	_____	_____	_____
9. Eye (Contusion)	_____	_____	_____	_____
10. Fainting	_____	_____	_____	_____
11. Fracture	_____	_____	_____	_____
12. Head (Conscious)	_____	_____	_____	_____
13. Head (Unconscious)	_____	_____	_____	_____
14. Heat exhaustion	_____	_____	_____	_____
15. Heat stroke	_____	_____	_____	_____
16. Laceration	_____	_____	_____	_____
17. Loss of wind	_____	_____	_____	_____
18. Nose bleed	_____	_____	_____	_____
19. Plantar fasciitis	_____	_____	_____	_____
20. Puncture wound	_____	_____	_____	_____
21. Shock	_____	_____	_____	_____
22. Sprain	_____	_____	_____	_____
23. Strain	_____	_____	_____	_____
24. Other	_____	_____	_____	_____
25. Other	_____	_____	_____	_____

Do you see a trend? YES NO (Circle one)

Source: Adapted from American Academy of Neurology Quality Standards Subcommittee, "Practice Parameter: The Management of Concussion in Sports." *Neurology*, 48, 581-585, 1997.

APPENDIX M

Procedures to Minimize the Risk of Transmitting Blood-Borne Pathogens (BBPS)

- All coaches and athletic trainers should be certified in first aid and emergency care and be trained in the prevention of transmission of blood-borne pathogens in the athletic setting.
- Athletic programs should educate athletes and their parents on their policies and procedures with regard to the transmission of blood-borne pathogens. Athletes and parents should also be educated on the nature of blood-borne pathogens and the risk of transmission through athletic activity.
- Athletes' and caregivers' cuts, abrasions, wounds, or other areas of broken skin should be covered with an occlusive dressing before and during participation.
- Caregivers should wear disposable, water impervious vinyl or latex gloves when treating athletes with bleeding injuries or handling equipment that may have been contaminated with blood. Hands should be cleaned with soap and water or an alcohol-based antiseptic handwash as soon as possible after gloves are removed.
- Athletes who are actively bleeding must be removed from competition as soon as possible and the bleeding stopped. Wounds should be cleaned with soap and water. If soap and water are unavailable skin antiseptics can be used. Wounds must be securely covered with an occlusive dressing before the athlete can return to competition.
- Athletes should be encouraged to report any injuries or wounds prior to and during competition. Injuries during competition should be reported immediately.
- Cuts or abrasions that are bleeding should be treated immediately. Any wounds that are not bleeding should be cleaned and covered during scheduled breaks. Any equipment or uniform that is wet with blood, should be immediately replaced or cleaned and disinfected.
- All equipment or playing areas that are contaminated with blood must be cleaned immediately with a germicide solution containing one part bleach in ten parts water. After a minimum contact time of thirty seconds with the germicide solution the equipment or area should be wiped dry with a disposable cloth or be allowed to air dry.
- In the case of serious or life threatening injuries emergency care should not be delayed because gloves or other protective equipment is not available. Equipment such as towels or clothing may be used to cover the wounds until appropriate equipment is available.
- If a player is not breathing, coaches or athletic trainers should give mouth-to-mouth breathing aid (CPR) until the player revives or emergency personnel arrive to take over care.
- All those involved in the maintenance of athletic equipment (e.g., equipment handlers, laundry personnel, and janitorial staff) should be educated on the appropriate procedures for handling garments and materials that have been contaminated with blood.

APPENDIX N

Recommended Techniques for Teaching the Skill of Heading to Young and Inexperienced Players**Purpose of Heading**

The technique of heading involves the use of the head to pass, shoot or receive a soccer ball. Specifically, the head may be used to clear a high cross, advance the ball to a teammate, receive a high pass, or deflect a lofted ball into the goal.

The importance of heading in the game of soccer varies with the nature of play engaged in by competing teams and the age (or ability) of the players. Heading skills are important in games involving intermediate and advanced youth players who can purposefully make accurate air ball passes.

Because of missed kicks and unjustified vocal encouragement by spectators to always kick balls long distances, balls are often played into the air by beginning players. However, because of their lack of accuracy in making air ball passes and their general lack of ability to purposefully head the ball, beginning players should be encouraged to try to control the ball on the ground.

- **Body Position and Movement**

Prior to heading a ball, the trunk should be arched back. This movement will result in a noticeable tension in the stomach muscles and will aid in the subsequent vigorous forward bending movement of the trunk that follows.

- **Arm Position and Movement**

During the preparatory phase of heading, the arms are held forward and to the side of the body and bent slightly at the elbows. This will assist in lateral balance. As the forward bending movement of the trunk occurs, the arms may be forcefully drawn back. This movement of the arms assists the trunk's forward movement and resultant impact velocity of the head on the ball.

- **Method of Contact**

Contact with the ball should be made with the forehead. This generally flat region of the head permits good ball control. The frontal bone of the skull, which encompasses the forehead, is also relatively thick and strong. The eyes should be kept open and focused on the ball throughout the performance of the skill to insure that contact is made with the forehead.

Heading the ball in regions other than the forehead may be painful and injurious and should be avoided. Additional forward speed of the head is obtained by simultaneously flexing the neck as the forehead is extended into the ball. When contact occurs, the jaw should be held firmly in place with the mouth open and the tongue retracted. The muscles of the neck should be tightened to prevent the head from recoiling.

There are important variations in heading techniques associated with the path and speed of the approaching ball, movement and position of the player before initiating an attempt at heading, and desired direction and speed of the pass or shot. Basically, the variations can be grouped into two categories: heading while on the ground (standing) and heading while in the air (jumping).

Heading While on the Ground

This most basic skill should be taught first and completely mastered by all players before they attempt any other form of the skill.

- **Forward Heading**

When heading while on the ground, the feet should be spread in a comfortable forward-backward alignment. This positioning provides the proper balance so the body weight can be shifted backward, then forward in the direction of the intended flight of the ball. Which foot is selected for the forward or back position should be based upon the player's personal preference. The back foot is turned out to provide lateral stability and to act as a base for the back leg to drive the body forward. When moving forward into the ball, a stride may be taken onto the front foot in the intended direction of the path of the ball.

This technique is the basic method of heading. It is composed of the fundamentals of heading (body position and movement, arm position and movement, and method of contact) and the foot position and movement described in the preceding paragraphs.

Heading While in the Air

Young and inexperienced players should not be taught or allowed to head the ball while jumping. Their technique can too easily lead to head-to-head collisions as multiple players simultaneously attempt to head the ball.

Source: Adapted with permission from E. W. Brown (editor), *Youth Soccer: A Complete Handbook*. Traverse City, MI: Cooper Publishing Group, 1993.

APPENDIX O

Medical Health Questionnaire

Sport(s): _____ Date: _____

Name: _____
Last First Middle

Student Number: _____ Sex: **F** **M** Date of Birth: _____

Address: _____
Street City Zip

Mother's Name: _____ Father's Name: _____

Mother's Work Phone #: _____ Father's Work Phone #: _____

In Case In Case of Emergency Contact . . .

	Name	Relationship		Phone
--	------	--------------	--	-------

- | | | | |
|--------|---------|----|--|
| No ___ | Yes ___ | 1. | Do you wear glasses or contact lenses?
If "yes," which? Glasses _____ Contacts _____ Both _____
If "yes," do you wear them during athletic competition? Yes ___ No ___ |
| No ___ | Yes ___ | 2. | Are the pupils of your eyes unequal in size?
If "yes," which is larger? R _____ L _____ |
| No ___ | Yes ___ | 3. | Do you wear any dental appliance? If "yes," which?
Permanent bridge, permanent crown or jacket, removable partial or full plate. |
| No ___ | Yes ___ | 4. | Are you on any medications? If "yes," please list:
_____ |
| No ___ | Yes ___ | 5. | Are you allergic to or have you ever reacted adversely to any medication or anesthetics?
If "yes," please list: _____ |
| No ___ | Yes ___ | 6. | Has anyone in your family died of heart problems or sudden death before age 50? |
| | | 7. | Date of last immunization: Tetanus _____ Measles: _____ |
| | | 8. | Please check the appropriate box if you have had or presently are having difficulty with the following and explain boxes marked "Yes." |

	Yes	No		Yes	No		Yes	No
Scarlet Fever			Recurrent Headaches			Ruptured Hernia		
Measles			Recurrent Colds			Mononucleosis		
German Measles			Pneumonia			Rheumatic Fever		
Mumps			Eye Trouble			Surgery:		
Diabetes			Ear/Nose/Throat Trouble			Appendectomy		
Epilepsy			Abdominal/Intestinal			Tonsillectomy		
Gum/Tooth Trouble			Chronic Cough			Hernia Repair		
Tumor, Cancer, Cyst			Hay Fever			Other (list)		
Shortness of Breath			Tuberculosis			High/Low Blood Pressure		
Heart Murmur			Asthma			Recent Weight loss/gain		
Heart Palpitations			Allergy:			Paralysis		
Dizziness during exercise			Penicillin			Anemia		
Fainting during exercise			Sulfonamides			Sugar in Urine		
Pain/Pressure in Chest			Serum			Frequent Urination		
Insomnia			Foods (which?)			Skin Conditions		
Frequent Anxiety			Other (list)			Females: Irregular periods		
Frequent Depression			Gallbladder/stone trouble			Excessive Flow		
Worry/Nervousness			Recurrent diarrhea			Severe Cramps		

Source: Reprinted with permission from McGrew, C. "Essential Medical Records for Athletes," Chapter 17, pages 138-151. In V. Seefeldt and M. A. Clark (editors) *Program for Athletic Coaches Education*, Cooper Publishing Group, 3rd edition, 2001. This version of the form was authored by R. Hoffman, A.T.C. and S. Pingston, A.T.C.

1. Have you ever sustained injury or illness to any of the following organs? If "yes," please indicate which organs and what the circumstances were.

- | | | | | | | | | | | | |
|----|-------|-----|-------|----|---------|----|-------|-----|-------|----|-----------------|
| No | _____ | Yes | _____ | a. | Brain | No | _____ | Yes | _____ | h. | Intestines |
| No | _____ | Yes | _____ | b. | Eyes | No | _____ | Yes | _____ | i. | Bladder |
| No | _____ | Yes | _____ | c. | Ears | No | _____ | Yes | _____ | j. | Spleen |
| No | _____ | Yes | _____ | d. | Nose | No | _____ | Yes | _____ | k. | Kidneys |
| No | _____ | Yes | _____ | e. | Heart | No | _____ | Yes | _____ | l. | Males—testicles |
| No | _____ | Yes | _____ | f. | Lungs | No | _____ | Yes | _____ | m. | Females—ovaries |
| No | _____ | Yes | _____ | g. | Stomach | No | _____ | Yes | _____ | n. | Other |

2. Do you have two functioning (working): If "no," please explain.

- | | | | | | |
|----|-------|-----|-------|----|-----------------|
| No | _____ | Yes | _____ | a. | Eyes |
| No | _____ | Yes | _____ | b. | Ears |
| No | _____ | Yes | _____ | c. | Kidneys |
| No | _____ | Yes | _____ | d. | Females—ovaries |
| No | _____ | Yes | _____ | e. | Males—testicles |

3. Have you ever sustained a head injury involving any of the symptoms listed? If "yes," please give date of injury and sport.

- | | | | | | | | | | | | |
|----|-------|-----|-------|----|------------------|----|-------|-----|-------|----|----------------|
| No | _____ | Yes | _____ | a. | Loss of memory | No | _____ | Yes | _____ | g. | Blurry visioin |
| No | _____ | Yes | _____ | b. | Disorientation | No | _____ | Yes | _____ | h. | Double vision |
| No | _____ | Yes | _____ | c. | Dizziness | No | _____ | Yes | _____ | i. | Tunnel vision |
| No | _____ | Yes | _____ | d. | Mental confusion | No | _____ | Yes | _____ | j. | Loss of vision |
| No | _____ | Yes | _____ | e. | Headaches | No | _____ | Yes | _____ | k. | Skull fracture |
| No | _____ | Yes | _____ | f. | Unconsciousness | | | | | | |

No ____ Yes ____ 4. Have you ever become ill from exercising in the heat? If "yes," indicate how often it happens and date of last episode.

No ____ Yes ____ 5. Do you want to weigh more or less than you do now? If "yes," explain.

The Prevention of Injuries in Youth Soccer

- No ___ Yes ___ 6. Have you ever taken any supplements or vitamins? If “yes,” indicate what and when.
- No ___ Yes ___ 7. Have you ever had a neck injury of any kind? If “yes,” indicate if chronic or temporary, “pinched nerve,” musculoskeletal, and dates.
- No ___ Yes ___ 8. Have you ever had any history of back pain? If “yes,” indicate chronic or temporary, location and dates.
- No ___ Yes ___ 9. Have you ever sustained a shoulder injury? If “yes,” indicate type of injury: subluxation, separation, muscle or skeletal, and dates (indicate right or left).
- No ___ Yes ___ 10. Have you ever sustained a knee injury? If “yes,” indicate which knee, time loss. If surgery was required, diagnosis and dates.
- No ___ Yes ___ 11. If yes to question 10, does injury still bother you? If “yes,” indicate if locking or swelling is present.
- No ___ Yes ___ 12. Do you have weak ankles or recurrent ankle sprains? If “yes,” indicate which ankle, severity, time loss, and dates.
- No ___ Yes ___ 13. Have you ever had an injury to the elbow, forearm, wrist, hand, or fingers? If “yes,” indicate nature of injury, time loss, which body part involved, and dates.
- No ___ Yes ___ 14. Have you ever worn a special brace, or had modifications made in equipment worn? If “yes,” indicate reason, duration worn, and dates.
- No ___ Yes ___ 15. Have you ever fractured a bone? If “yes,” indicate which bone, if surgery was required, and dates.
- No ___ Yes ___ 16. Have you ever worn a cast for anything besides a fractured bone? If “yes,” indicate reason, body part and dates.
- No ___ Yes ___ 17. Have you ever been treated for a mental condition? If “yes,” specify when, where, and give details.
- No ___ Yes ___ 18. Have you had or have you been advised to have any operations? If “yes,” describe and give dates.
- No ___ Yes ___ 19. Have you ever had shin splints? If “yes,” indicate dates.
- No ___ Yes ___ 20. Have you ever had stress fractures? If “yes,” indicate body part and dates
- No ___ Yes ___ 21. Have you ever passed out during exercise?

No ___ Yes ___ 22. Have you ever been dizzy during or after exercise?

No ___ Yes ___ 23. Have you ever had chest pain during or after exercise?

No ___ Yes ___ 24. Have you ever had racing of your heart or skipped heartbeats?

List any muscle strains: groin, hamstring, quad or other. Indicate right or left.

List abnormalities on previous physical exams.

List other injuries you have had.

Have you ever been medically limited or disqualified from sports activities? If "yes," explain.

When was your last physical exam? _____ Where? _____

When was your last dental exam? _____ Eye exam? _____

I hereby certify that I have completed this questionnaire completely and correctly to the best of my ability and knowledge. I certify that there are no previous illnesses or injuries that I have incurred, other than those I have listed on the preceding pages.

Mother's Signature

Athlete's Signature

Date

Date

Father's Signature

Athletic Trainer's Signature

Date

Date

APPENDIX P

Pre-Participation Examination Form (Physical)

Physical examination (to be completed by athletic medicine staff)

Name _____

Height _____ Weight _____ Blood pressure: Resting _____ After exercise _____

Pulse: Resting _____ After exercise _____

Visual acuity: Eyes (R) 20/_____ w/o glasses (L) 20/_____ w/o glasses w/glasses _____/_____

NORMAL

ABNORMAL FINDINGS

- | | | |
|-------------------------------|-----------|-------|
| 1. General | 1. _____ | _____ |
| 2. Skin | 2. _____ | _____ |
| 3. HEENT | 3. _____ | _____ |
| 4. Teeth (Dental examination) | 4. _____ | _____ |
| 5. Neck | 5. _____ | _____ |
| 6. Lungs | 6. _____ | _____ |
| 7. Heart | 7. _____ | _____ |
| 8. Breasts | 8. _____ | _____ |
| 9. Abdomen | 9. _____ | _____ |
| 10. Genitalia (hernia) | 10. _____ | _____ |
| 11. Back | 11. _____ | _____ |
| 12. Musculoskeletal | 12. _____ | _____ |
| 13. Peripheral pulses | 13. _____ | _____ |
| 14. Neurological | 14. _____ | _____ |
| 15. Mental status | 15. _____ | _____ |

Tanner Stage _____

Assessment _____

1. Clearance without limitation? _____
Sports _____
2. Clearance deferred? _____
Reason _____
3. Clearance with limitation? _____
Limitation _____
4. Disqualification? _____
Reason _____

Exam Date _____ Physician's signature _____

Source: Reprinted with permission from McGrew, C. "Essential Medical Records for Athletes," Chapter 17, pages 138-151. In V. Seefeldt and M. A. Clark (editors) Program for Athletic Coaches Education, Cooper Publishing Group, 3rd edition, 2001. This version of the form was authored by R. Hoffman, A.T.C. and S. Pingston, A.T.C.

APPENDIX Q

Other Resources

American Society for Testing and Materials (ASTM)

100 Barr Harbor Drive
 Conshohocken, PA 19428-2959
 Tel: (610) 832-9500
 Fax: (610) 832-9555
 Web site: www.astm.org

Centers for Disease Control and Prevention

1600 Clifton Road
 Atlanta, GA 30333
 Tel: (800) 311-3435
 Web site: www.cdc.gov/nip/ACIP/default.htm
 (See "Recommendations" link.)

FIFA (Federation Internationale de Football Association)

P.O. Box 85
 8030 Zurich, Switzerland
 Web site: www.fifa.com

Institute for the Study of Youth Sports

213 I.M. Sports Circle
 Michigan State University
 East Lansing, MI 48824
 Tel: (517) 353-7620
 Fax: (517) 353-5363
 Web site: ed-web3.educ.msu.edu/ysi

National Asthma Education and Prevention Program (National Heart, Lung, and Blood Institute)

National Institutes of Health
 Bethesda, MD 20892
 Tel: (301) 496-4236
 Web site: www.nhlbi.nih.gov/about/naepp

National Operating Committee on Standards for Athletic Equipment

P.O. Box 12290
 Overland Park, KS 66282
 Tel: (913) 888-1340
 Web site: www.nocsae.org

National Weather Service, NOAA

1325 East-West Highway
 Silver Spring, MD 20910
 Web site: www.nws.noaa.gov/
 (see "Tables and Documents" link)

National Youth Sports Safety Foundation

333 Longwood Avenue
 Suite 202
 Boston, MA
 Tel: (617) 277-1171
 Web site: www.nyssf.org

National Safe Kids Campaign

1301 Pennsylvania Avenue, NW
 Suite 1000
 Washington, DC 20004-1707
 Tel: (202) 662-0600
 Fax: (202) 393-2072
 Web site: www.safekids.org

U.S. Consumer Product Safety Commission (CPSC)

Washington, DC 20207
 Tel: (301) 504-0424
 Fax: (301) 504-0124
 Web site: www.cpsc.gov

Updated August 2002

APPENDIX R

National Weather Service Offices Serving Michigan

Detroit/Pontiac

NWS Office, NOAA
9200 White Lake Road
White Lake, MI 48386-1126
(248) 625-3309, Ext. 726
<http://www.crh.noaa.gov/dtx/>

Gaylord

NWS Office, NOAA
8800 Passenheim Road
Gaylord, MI 49735-9454
(989) 731-1194
<http://www.crh.noaa.gov/apx/>

Grand Rapids

NWS Office, NOAA
4899 South Complex Drive, SE
Grand Rapids, MI 49512-4034
(616) 949-0643, Ext. 726
<http://www.crh.noaa.gov/grr/>

Marquette

NWS Office, NOAA
112 Airport Drive, South
Negaunee, MI 49866
(906) 475-5782, Ext. 726
<http://www.crh.noaa.gov/mqt/>

Northern Indiana

NWS Office, NOAA
7550 East 850 N.
Syracuse, IN 46567
(219) 834-5178, Ext. 726
<http://www.crh.noaa.gov/iwx/>

September 2002

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