Handout on Health: Sports Injuries

“In recent years, increasing numbers of people of all ages have been heeding their health professionals’ advice to get active for all of the health benefits exercise has to offer. But for some people—particularly those who overdo or who don’t properly train or warm up—these benefits can come at a price: sports injuries.

Fortunately, most sports injuries can be treated effectively, and most people who suffer injuries can return to a satisfying level of physical activity after an injury. Even better, many sports injuries can be prevented if people take the proper precautions.

This booklet answers frequently asked questions about sports injuries. It discusses some of the most common injuries and their treatment, and injury prevention. The booklet is for anyone who has a sports injury or who is physically active and wants to prevent sports injuries.

It is for casual and more serious athletes as well as the trainers, coaches, and health professionals who deal with sports injuries.

What Are Sports Injuries?

The term sports injury, in the broadest sense, refers to the kinds of injuries that most commonly occur during sports or exercise. Some sports injuries result from accidents; others are due to poor training practices, improper equipment, lack of conditioning, or insufficient warmup and stretching.

Although virtually any part of your body can be injured during sports or exercise, the term is usually reserved for injuries that involve the musculoskeletal system, which includes the muscles, bones, and associated tissues like cartilage. Traumatic brain and spinal cord injuries, (relatively rare during sports or exercise) and bruises are considered briefly in the Appendix on pages 36–39. Following are some of the most common sports injuries.

Sprains and Strains

A sprain is a stretch or tear of a ligament, the band of connective tissues that joins the end of one bone with another. Sprains are caused by trauma such as a fall or blow to the body that knocks a joint out of position and, in the worst case, ruptures the supporting ligaments. Sprains can range from first degree (minimally stretched ligament) to third degree (a complete tear). Areas of the body most vulnerable to sprains are ankles, knees, and wrists. Signs of a sprain include varying degrees of tenderness or pain; bruising; inflammation; swelling; inability to move a limb or joint; or joint looseness, laxity, or instability.

A strain is a twist, pull, or tear of a muscle or tendon, a cord of tissue connecting muscle to bone. It is an acute, noncontact injury that results from overstretching or overcontraction. Symptoms of a strain include pain, muscle spasm, and loss of strength. While it's hard to tell the difference between mild and moderate strains, severe strains not treated professionally can cause damage and loss of function.

Knee Injuries

Because of its complex structure and weight-bearing capacity, the knee is the most commonly injured joint. Each year, more than 5.5 million people visit orthopaedic surgeons for knee problems.
Knee injuries can range from mild to severe. Some of the less severe, yet still painful and functionally limiting, knee problems are runner's knee (pain or tenderness close to or under the knee cap at the front or side of the knee), iliotibial band syndrome (pain on the outer side of the knee), and tendonitis, also called tendinosis (marked by degeneration within a tendon, usually where it joins the bone).

More severe injuries include bone bruises or damage to the cartilage or ligaments. There are two types of cartilage in the knee. One is the meniscus, a crescent-shaped disc that absorbs shock between the thigh (femur) and lower leg bones (tibia and fibula). The other is a surface-coating (or articular) cartilage. It covers the ends of the bones where they meet, allowing them to glide against one another. The four major ligaments that support the knee are the anterior cruciate ligament (ACL), the posterior cruciate ligament (PCL), the medial collateral ligament (MCL), and the lateral collateral ligament (LCL). (See diagram on page 5.)

Knee injuries can result from a blow to or twist of the knee; from improper landing after a jump; or from running too hard, too much, or without proper warmup.

**Compartment Syndrome**

In many parts of the body, muscles (along with the nerves and blood vessels that run alongside and through them) are enclosed in a “compartment” formed of a tough membrane called fascia. When muscles become swollen, they can fill the compartment to capacity, causing interference with nerves and blood vessels as well as damage to the muscles themselves. The resulting painful condition is referred to as compartment syndrome.

Compartment syndrome may be caused by a one-time traumatic injury (acute compartment syndrome), such as a fractured bone or a hard blow to the thigh, by repeated hard blows (depending upon the sport), or by ongoing overuse (chronic exertional compartment syndrome), which may occur, for example, in long-distance running.

**Shin Splints**

While the term “shin splints” has been widely used to describe any sort of leg pain associated with exercise, the term actually refers to pain along the tibia or shin bone, the large bone in the front of the lower leg. This pain can occur at the front outside part of the lower leg, including the foot and ankle (anterior shin splints) or at the inner edge of the bone where it meets the calf muscles (medial shin splints).

Shin splints are primarily seen in runners, particularly those just starting a running program. Risk factors for shin splints include overuse or incorrect use of the lower leg; improper stretching, warmup, or exercise.
technique; overtraining; running or jumping on hard surfaces; and running in shoes that don’t have enough support. These injuries are often associated with flat (overpronated) feet.

**Achilles Tendon Injuries**

A stretch, tear, or irritation to the tendon connecting the calf muscle to the back of the heel, Achilles tendon injuries can be so sudden and agonizing that they have been known to bring down charging professional football players in shocking fashion.

The most common cause of Achilles tendon tears is a problem called tendinitis, a degenerative condition caused by aging or overuse. When a tendon is weakened, trauma can cause it to rupture.

Achilles tendon injuries are common in middle-aged “weekend warriors” who may not exercise regularly or take time to stretch properly before an activity. Among professional athletes, most Achilles injuries seem to occur in quick-acceleration, jumping sports like football and basketball, and almost always end the season’s competition for the athlete.

**Fractures**

A fracture is a break in the bone that can occur from either a quick, one-time injury to the bone (acute fracture) or from repeated stress to the bone over time (stress fracture).

- **Acute fractures:** Acute fractures can be simple (a clean break with little damage to the surrounding tissue) or compound (a break in which the bone pierces the skin with little damage to the surrounding tissue). Most acute fractures are emergencies. One that breaks the skin is especially dangerous because there is a high risk of infection.

**Stress fractures:** Stress fractures occur largely in the feet and legs and are common in sports that require repetitive impact, primarily running/jumping sports such as gymnastics or track and field. Running creates forces two to three times a person’s body weight on the lower limbs.

The most common symptom of a stress fracture is pain at the site that worsens with weight-bearing activity. Tenderness and swelling often accompany the pain.

**Dislocations**

When the two bones that come together to form a joint become separated, the joint is described as being dislocated. Contact sports such as football and basketball, as well as high-impact sports and
sports that can result in excessive stretching or falling, cause the majority of dislocations. A dislocated joint is an emergency situation that requires medical treatment.

The joints most likely to be dislocated are some of the hand joints. Aside from these joints, the joint most frequently dislocated is the shoulder. Dislocations of the knees, hips, and elbows are uncommon.

What’s the Difference Between Acute and Chronic Injuries?

Regardless of the specific structure affected, sports injuries can generally be classified in one of two ways: acute or chronic. **Acute Injuries**

Acute injuries, such as a sprained ankle, strained back, or fractured hand, occur suddenly during activity. Signs of an acute injury include the following:

- Sudden, severe pain
- Swelling
- Inability to place weight on a lower limb
- Extreme tenderness in an upper limb
- Inability to move a joint through its full range of motion
- Extreme limb weakness
- Visible dislocation or break of a bone.

**Chronic Injuries**

Chronic injuries usually result from overusing one area of the body while playing a sport or exercising over a long period. The following are signs of a chronic injury:

- Pain when performing an activity
- A dull ache when at rest
- Swelling

**What Should I Do if I Suffer an Injury?**

Whether an injury is acute or chronic, there is never a good reason to try to "work through" the pain of an injury. When you have pain from a particular movement or activity, STOP! Continuing the activity only causes further harm.
Some injuries require prompt medical attention (see “Who Should I See for My Injury?” on page 15), while others can be self-treated. Here’s what you need to know about both types:

**When to Seek Medical Treatment**

You should call a health professional if

- The injury causes severe pain, swelling, or numbness
- You can’t tolerate any weight on the area
- The pain or dull ache of an old injury is accompanied by increased swelling or joint abnormality or instability.

**When and How to Treat at Home**

If you don’t have any of the above symptoms, it’s probably safe to treat the injury at home—at least at first. If pain or other symptoms worsen, it’s best to check with your health care provider. Use the RICE method to relieve pain and inflammation and speed healing. Follow these four steps immediately after injury and continue for at least 48 hours:

- **Rest.** Reduce regular exercise or activities of daily living as needed. If you cannot put weight on an ankle or knee, crutches may help. If you use a cane or one crutch for an ankle injury, use it on the uninjured side to help you lean away and relieve weight on the injured ankle.

- **Ice.** Apply an ice pack to the injured area for 20 minutes at a time, four to eight times a day. A cold pack, ice bag, or plastic bag filled with crushed ice and wrapped in a towel can be used. To avoid cold injury and frostbite, do not apply the ice for more than 20 minutes. (Note: Do not use heat immediately after an injury. This tends to increase internal bleeding or swelling. Heat can be used later on to relieve muscle tension and promote relaxation.)

- **Compression.** Compression of the injured area may help reduce swelling. Compression can be achieved with elastic wraps, special boots, air casts, and splints. Ask your health care provider for advice on which one to use.

- **Elevation.** If possible, keep the injured ankle, knee, elbow, or wrist elevated on a pillow, above the level of the heart, to help decrease swelling.

**Who Should I See for My Injury?**

While severe injuries will need to be seen immediately in an emergency room, particularly if they occur on the weekend or after office hours, most sports injuries can be evaluated and, in many cases, treated by your primary health care provider.

Depending on your preference and the severity of your injury or the likelihood that your injury may cause ongoing, long-term problems, you may want to see, or have your primary health care professional refer you to, one of the following:

- **Orthopaedic surgeon:** A doctor specializing in the diagnosis and treatment of the musculoskeletal system, which includes bones, joints, ligaments, tendons, muscles, and nerves.
• Physical therapist/physiotherapist: A health care professional who can develop a rehabilitation program. Your primary care physician may refer you to a physical therapist after you begin to recover from your injury to help strengthen muscles and joints and prevent further injury.

How Are Sports Injuries Treated?

Although using the RICE technique described previously can be helpful for any sports injury, RICE is often just a starting point. Here are some other treatments your doctor or other health care provider may administer, recommend, or prescribe to help your injury heal.

Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)

The moment you are injured, chemicals are released from damaged tissue cells. This triggers the first stage of healing: inflammation (see “The Body’s Healing Process” box on page 14). Inflammation causes tissues to become swollen, tender, and painful. Although inflammation is needed for healing, it can actually slow the healing process if left unchecked.

To reduce inflammation and pain, doctors and other health care providers often recommend taking an over-the-counter (OTC) nonsteroidal anti-inflammatory drug (NSAID) such as aspirin, ibuprofen (Advil, Motrin IB, Nuprin), ketoprofen (Actron, Orudis KT), or naproxen sodium (Aleve). For more severe pain and inflammation, doctors may prescribe one of several dozen NSAIDs available in prescription strength.

1 Brand names included in this booklet are provided as examples only, and their inclusion does not mean that these products are endorsed by the National Institutes of Health or any other Government agency. Also, if a particular brand name is not mentioned, this does not mean or imply that the product is unsatisfactory.

2 Like all medications, NSAIDs can have side effects. The list of possible adverse effects is long, but major problems are few. The intestinal tract heads the list with nausea, abdominal pain, vomiting, and diarrhea. Changes in liver function frequently occur in children (but not in adults) who use aspirin. Changes in liver function are rare in children using the other NSAIDs. Questions about the appropriate use of NSAIDs should be directed toward your health care provider or pharmacist.

Though not an NSAID, another commonly used OTC medication, acetaminophen (Tylenol), may relieve pain. It has no effect on inflammation, however.

Immobilation

Immobilation is a common treatment for sports injuries that may be done immediately by a trainer or paramedic. Immobilization involves reducing movement in the area to prevent further damage. By enabling the blood supply to flow more directly to the injury (or the site of surgery to repair damage from an injury), immobilization reduces pain, swelling, and muscle spasm and helps the healing process begin. Following are some devices used for immobilization:

• Slings, to immobilize the upper body, including the arms and shoulders.

• Splints and casts, to support and protect injured bones and soft tissue. Casts can be made from plaster or fiberglass. Splints can be custom made or ready made. Standard splints come in a variety of shapes and sizes and have Velcro straps that make them easy to put on and take off or...
Splints generally offer less support and protection than a cast, and therefore may not always be a treatment option.

- **Leg immobilizers**, to keep the knee from bending after injury or surgery. Made from foam rubber covered with fabric, leg immobilizers enclose the entire leg, fastening with Velcro straps.

### Surgery

In some cases, surgery is needed to repair torn connective tissues or to realign bones with compound fractures. The vast majority of sports injuries, however, do not require surgery.

### Rehabilitation (Exercise)

A key part of rehabilitation from sports injuries is a graduated exercise program designed to return the injured body part to a normal level of function.

With most injuries, early mobilization—getting the part moving as soon as possible—will speed healing. Generally, early mobilization starts with gentle range-of-motion exercises and then moves on to stretching and strengthening exercise when you can without increasing pain. For example, if you have a sprained ankle, you may be able to work on range of motion for the first day or two after the sprain by gently tracing letters with your big toe. Once your range of motion is fairly good, you can start doing gentle stretching and strengthening exercises. When you are ready, weights may be added to your exercise routine to further strengthen the injured area. The key is to avoid movement that causes pain.

As damaged tissue heals, scar tissue forms, which shrinks and brings torn or separated tissues back together. As a result, the injury site becomes tight or stiff, and damaged tissues are at risk of reinjury. That’s why stretching and strengthening exercises are so important. You should continue to stretch the muscles daily and as the first part of your warmup before exercising.

When planning your rehabilitation program with a health care professional, remember that progression is the key principle. Start with just a few exercises, do them often, and then gradually increase how much you do. A complete rehabilitation program should include exercises for flexibility, endurance, and strength; instruction in balance and proper body mechanics related to the sport; and a planned return to full participation.

Throughout the rehabilitation process, avoid painful activities and concentrate on those exercises that will improve function in the injured part. Don’t resume your sport until you are sure you can stretch the injured tissues without any pain, swelling, or restricted movement, and monitor any other symptoms. When you do return to your sport, start slowly and gradually build up to full participation. For more advice on how to prevent injuries as you return to active exercise, see the “Tips for Preventing Injury” box, on page 27.

### Rest

Although it is important to get moving as soon as possible, you must also take time to rest following an injury. All injuries need time to heal; proper rest will help the process. Your health care professional can guide you regarding the proper balance between rest and rehabilitation.
Other Therapies

Other therapies commonly used in rehabilitating sports injuries include:

- **Electrostimulation**: Mild electrical current provides pain relief by preventing nerve cells from sending pain impulses to the brain. Electrostimulation may also be used to decrease swelling, and to make muscles in immobilized limbs contract, thus preventing muscle atrophy and maintaining or increasing muscle strength.

- **Cold/cryotherapy**: Ice packs reduce inflammation by constricting blood vessels and limiting blood flow to the injured tissues. Cryotherapy eases pain by numbing the injured area. It is generally used for only the first 48 hours after injury.

- **Heat/thermotherapy**: Heat, in the form of hot compresses, heat lamps, or heating pads, causes the blood vessels to dilate and increase blood flow to the injury site. Increased blood flow aids the healing process by removing cell debris from damaged tissues and carrying healing nutrients to the injury site. Heat also helps to reduce pain. It should not be applied within the first 48 hours after an injury.

- **Ultrasound**: High-frequency sound waves produce deep heat that is applied directly to an injured area. Ultrasound stimulates blood flow to promote healing.

- **Massage**: Manual pressing, rubbing, and manipulation soothe tense muscles and increase blood flow to the injury site.

Most of these therapies are administered or supervised by a licensed health care professional.