February 2016

Handout on Health: Sports Injuries

This publication is for adult athletes at all levels, for people who exercise, as well as for health care professionals, coaches, and others who want to find out more about musculoskeletal sports injuries. This publication describes the different types of musculoskeletal sports injuries and how they can be treated and prevented. If you have further questions after reading this publication, you may wish to discuss them with a health care professional.

Introduction

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.

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Fortunately, most musculoskeletal 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.

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 warm-up and stretching.

Following are some of the most common sports injuries.

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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. Although 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 a commonly injured joint.

Lateral View of the Knee

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 tendinitis, 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 illustration “Lateral View of the Knee.”)

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 warm-up.

**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**

Although 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, warm-up, 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**

An Achilles tendon injury results from a stretch, tear, or irritation to the tendon connecting the calf muscle to the back of the heel. These 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.

**Lateral View of the Ankle**
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 Shoulder Joint

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 Is the Difference Between Acute and Chronic Injuries?

Regardless of the specific structure affected, musculoskeletal 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 the section “Who Should I See for My Injury?”), 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.

To learn about treating sports injuries, see the section “How Are Sports Injuries Treated?”

**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.

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**The Body’s Healing Process**

From the moment a bone breaks or a ligament tears, your body goes to work to repair the damage. Here’s what happens at each stage of the healing process:

**At the moment of injury:** Chemicals are released from damaged cells, triggering a process called inflammation. Blood vessels at the injury site become dilated; blood flow increases to carry nutrients to the site of tissue damage.

**Within hours of injury:** White blood cells (leukocytes) travel
down the bloodstream to the injury site where they begin to tear down and remove damaged tissue, allowing other specialized cells to start developing scar tissue.

**Within days of injury:** Scar tissue is formed on the skin or inside the body. The amount of scarring may be proportional to the amount of swelling, inflammation, or bleeding within. In the next few weeks, the damaged area will regain a great deal of strength as scar tissue continues to form.

**Within a month of injury:** Scar tissue may start to shrink, bringing damaged, torn, or separated tissues back together. However, it may be several months or more before the injury is completely healed.

### Who Should I See for My Injury?

Although severe injuries will need to be seen immediately in an emergency room, particularly if they occur on the weekend or after office hours, most musculoskeletal 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:

- **An orthopaedic surgeon** is a doctor specializing in the diagnosis and treatment of the musculoskeletal system, which includes bones, joints, ligaments, tendons, muscles, and nerves.

- **A physical therapist/physiotherapist** is 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.¹

¹All medicines can have side effects. Some medicines and side effects are mentioned in this publication. Some side effects may be more severe than others. You should review the package insert that comes with your medicine and ask your health care provider or pharmacist if you have any questions about the possible side effects.

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 box “The Body’s Healing Process”). 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 nonsteroidal anti-inflammatory drug (NSAID) such as aspirin, ibuprofen, or naproxen sodium. For more severe pain and inflammation, doctors may prescribe one of several dozen NSAIDs available in prescription strength.²

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

²Warning: Side effects of NSAIDs include stomach problems; skin rashes; high blood pressure; fluid retention; and liver, kidney, and heart problems. The longer a person uses NSAIDs, the more likely he or she is to have side effects, ranging from mild to serious. Many other drugs cannot be taken when a patient is being treated with NSAIDs,
because NSAIDs alter the way the body uses or eliminates these other drugs. Check with your health care provider or pharmacist before you take NSAIDs. NSAIDs should only be used at the lowest dose possible for the shortest time needed.

Immobilization

Immobilization is a common treatment for musculoskeletal 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 adjust. 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 musculoskeletal 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 exercises 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 warm-up 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 box “Tips for Preventing Injury.”

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 used in rehabilitating sports injuries include:

- **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.

### Tips for Preventing Injury

Whether you’ve never had a sports injury and you’re trying to keep it that way or you’ve had an injury and don’t want another, the following tips can help.

- Avoid bending knees past 90 degrees when doing half knee bends.
- Avoid twisting knees by keeping feet as flat as possible during stretches.
• When jumping, land with your knees bent.
• Do warm-up exercises not just before vigorous activities like running, but also before less vigorous ones such as golf.
• Don’t overdo.
• Do warm-up stretches before activity. Stretch the Achilles tendon, hamstring, and quadriceps areas and hold the positions. Don’t bounce.
• Cool down following vigorous sports. For example, after a race, walk or walk/jog for 5 minutes so your pulse comes down gradually.
• Wear properly fitting shoes that provide shock absorption and stability.
• Use the softest exercise surface available, and avoid running on hard surfaces like asphalt and concrete. Run on flat surfaces. Running uphill may increase the stress on the Achilles tendon and the leg itself.

More information on research is available from the following websites:

• **National Institutes of Health (NIH)**
  [Clinical Research Trials and You](https://www.niams.nih.gov/health_info/sports_injuries/) was designed to help people learn more about clinical trials, why they matter, and how to participate. Visitors to the website will find information about the basics of participating in a clinical trial, first-hand stories from clinical trial volunteers, explanations from researchers, and links on how to search for a trial or enroll in a research-matching program.

• **ClinicalTrials.gov** offers up-to-date information for locating federally and privately supported clinical trials for a wide range of diseases and
conditions.

- **NIH RePORTER** is an electronic tool that allows users to search a repository of both intramural and extramural NIH-funded research projects from the past 25 years and access publications (since 1985) and patents resulting from NIH funding.

- **PubMed** is a free service of the U.S. National Library of Medicine that lets you search millions of journal citations and abstracts in the fields of medicine, nursing, dentistry, veterinary medicine, the health care system, and preclinical sciences.

### For More Information

**National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)**

Information Clearinghouse
National Institutes of Health

1 AMS Circle
Bethesda, MD 20892-3675
Phone: 301-495-4484
Toll free: 877-22-NIAMS (877-226-4267)
TTY: 301-565-2966
Fax: 301-718-6366
Email: NIAMSinfo@mail.nih.gov
Website: [https://www.niams.nih.gov](https://www.niams.nih.gov)

If you need more information about available resources in your language or another language, please visit our website or contact the NIAMS Information Clearinghouse at NIAMSinfo@mail.nih.gov.

### Other Resources

- **American Academy of Orthopaedic Surgeons**
  
  Website: [http://www.aaos.org](http://www.aaos.org) (con información en español)

- **American Academy of Pediatrics**
  
  Website: [http://www.aap.org](http://www.aap.org)

- **American College of Sports Medicine**
  
  Website: [http://www.acsm.org](http://www.acsm.org)

- **American Medical Society for Sports Medicine**
  
  Website: [http://www.amssm.org](http://www.amssm.org)

- **American Orthopaedic Society for Sports**
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Information on bone and its disorders can be obtained from the NIH Osteoporosis and Related Bone Diseases ~ National Resource
Center by calling toll free at 800–624–BONE (2663) or by visiting www.niams.nih.gov/Health_Info/Bone/default.asp.

For Your Information

This publication contains information about medications used to treat the health condition discussed here. When this publication was developed, we included the most up-to-date (accurate) information available. Occasionally, new information on medication is released.

For updates and for any questions about any medications you are taking, please contact

U.S. Food and Drug Administration

Toll free: 888-INFO-FDA
(888-463-6332)
Website: http://www.fda.gov

For additional information on specific medications, visit Drugs@FDA at http://www.accessdata.fda.gov/scripts/cder/daf/. Drugs@FDA is a searchable catalog of FDA-approved drug products.

For updates and questions about statistics, please contact

Centers for Disease Control and Prevention, National Center for Health Statistics

Toll free: 800-232-4636
Website: http://www.cdc.gov/nchs

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