

Fitness and Nutrition : Preventing Injury

Lesson 5 Overview

Exercising feels good. Getting hurt doesn't. Participation in any fitness activity presents some risk of injury. A person should do everything possible to ensure that he or she is exercising safely.

In this lesson, you'll explore some common fitness injuries and learn how to prevent them. This lesson is an overview of fitness safety.

5.1 Identify the causes of exercise-related injuries

The Five Commandments of Injury Prevention

READING ASSIGNMENT

Many people think that grunting and groaning during workouts and suffering with aching muscles is the way to fitness. By now you should know that the "no pain, no gain" school of thought has been totally discredited. However, there's no escaping the fact that gains make pain more likely.

Overexertion can cause injuries. People don't set out to hurt themselves, but sometimes things happen. However, most injuries don't "just happen." A vast number of injuries are completely preventable if people follow fitness safety basics.



[Doctor Talking to Patient]

Always consult a medical

professional before beginning a new fitness program.

Most injuries involve damage to soft tissues, usually pulls or strains. Fit muscles are stretchable and bendable, which usually makes them pretty forgiving. But you have to know and respect their limits, not only to avoid short-term pain and inconvenience, but also to prevent future pain.

Many injuries can have long-term ramifications, both physically and economically. Doctors see patients all the time who complain about injuries they got 25 years ago. If you avoid injuring muscles, you'll likely avoid damaging tougher parts of the body as well, such as bones, tendons, and ligaments, now and in the future.

Here are some thoughts to consider to ensure your health and safety:

Start with a medical check-up. Anyone who hasn't exercised in a long time should have a medical exam before starting a fitness program. A healthcare professional can offer precautions if preexisting conditions are present, such as a high cholesterol level or high blood pressure or a bad knee or a weak back that would make some exercises dangerous. If possible, talk to your healthcare professional about the type of exercise you're planning to do.



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Try to vary your exercise routines to strengthen opposing muscle groups.

Variety is the spice of life. To avoid overuse injuries that come from repetitive exercise,

vary your exercises from day to day and season to season. By choosing fitness workouts that vary the area worked and the activities of joints and muscles, you aren't likely to overstress any one of them. Mixing it up is especially important if your sport of choice is especially trying to your joints, such as basketball, jogging, or aerobics.

Varying your exercise routine also strengthens opposing muscle groups, which reduces the chance of injury. For example, serious walkers and runners inevitably build strong quadriceps, but they tend to have weak hamstrings. This imbalance can cause a variety of problems. The muscles can exert tension on the tendons and ligaments around the knee, for example, causing inflammation.

By including exercises that build the quadriceps, such as weight training, cycling, rowing, or calisthenics, this imbalance can be avoided. No matter how much you love running, swimming, or biking, you might become bored. By mixing up your choice of exercise, you can avoid boredom and overuse injuries. And you're more likely to stick with your exercise routine!

Exercise year-round. Your exercise program should include strength, flexibility, and aerobic training. By staying strong, flexible, and in good cardiovascular shape year-round, you're less likely to injure yourself during any one season.

Muscles serve a vital role in stabilizing joints. Year-round conditioning strengthens muscles to prevent unwanted or extreme movements. The knee joint, for example, relies on all the muscles around it to provide stability. Strengthening the muscles around the knees can help prevent some injuries.

Some athletes believe that participation in a sport during the season maintains cardiovascular fitness year-round. Depending on the sport, this might not be true. If you participate in a specific seasonal sport, such as softball, incorporate an aerobic exercise program into your fitness routine year-round. Your goal should be to condition yourself year-round so that you're able to participate effectively and enjoy your sport. Put another way, you should be in shape to play the sport—not play the sport to get in shape.

Train for your sport. Part of maintaining year-round conditioning is to prepare all the parts of your body for your sport or fitness exercise of choice. This includes training the muscle groups and energy systems (think: anaerobic versus aerobic) required for the sport. For

example, a runner would want to work on general lower-extremity muscle flexibility, power, and strength, in addition to aerobic conditioning, but a defensive back in football would want to ensure that foot speed and agility are optimal, along with excellent short-burst (anaerobic) capabilities. Everyone who exercises regularly should be tuned into the condition of his or her body and recognize subtle changes, such as aches, pain, stiffness, favoring one part of the body over another, and fatigue. These signs won't always be obvious, but it's wise to become attuned to these signals, because they might help you avoid injury. Also, be sure that you train using the appropriate equipment and protective gear.



[People Kickboxing]

To maintain year-round conditioning, a runner might choose a fitness routine that includes exercises to increase lower extremity muscle flexibility.

An important aspect of preseason conditioning is training at an intensity that's below the competitive level. You're more likely to maintain and enjoy a conditioning program that's comfortably paced and progresses in intensity, frequency, and duration as the competitive season nears. Preseason goals might include increasing speed, power, agility, balance, coordination, and the ability to concentrate and relax. *Interval training*, which involves short periods of activity (stair climbing, weightlifting, calisthenics, sprinting, and other exercise activities), can build speed, strength, and power. This type of training involves working hard for short periods in the middle of an aerobic workout. Running bursts of 50 yards or so after every mile during a long running session constitutes interval training. You can slowly

increase the number of sprints in the workout, as well as the distance and speed of the sprints.

Interval training can help you prepare to participate in activities that require intense effort, such as sprinting, as well as support aerobic conditioning during soccer games. If you're just starting an interval-training program, ease into each activity to help prevent injury and keep your intervals short to avoid fatigue and overuse injuries.

Develop mental skills. Mental readiness for sport and fitness should be part of every year-round conditioning regimen. Both the mind and the body need to be conditioned. A mental-conditioning program can help you to relax and focus. Practice relaxation techniques and imagery. Studies have shown that a number of psychological factors can predispose an athlete to an acute injury.

Each of us has an optimal arousal level that works to enhance our athletic performance. This means that different people have different "mind-sets" for the competition and intensity of exercise or sports. If you're overly "psyched out" by the importance of how many repetitions you can do or how many games you win, or if the environmental conditions in which you must perform aren't ideal ("it's too windy/cold/hot"), your psychological state could detract from your performance and put you at risk for injury. If you're already injured and are still attempting to engage in activity, this, too, can be a distraction that puts you at greater risk.

Too much arousal causes increased muscle tension and attention deficits, which detract from coordination and flexibility and increase the risk of sprains, strains, and other injuries. Fear of competition, fear of failure, and other distractions have caused many athletes to lose their focus, leading to errors that lead to injury.

It's important to develop mental concentration and relaxation skills to cope with life's stresses. How you respond to competitive stress may be a predictor of how likely you are to be injured. "Relax and enjoy," not "kill the enemy," is the right mindset for fitness and exercise.

Key Points and Links

READING ASSIGNMENT

Key Points

- Five important aspects of injury prevention are (1) get a check-up first, (2) choose a variety of exercises, (3) exercise throughout the year, (4) train for your sport, and (5) develop mental concentration and relaxation skills.

Links

- [ACE Fit](http://www.acefitness.org/acefit/healthy-living-article/60/1210/why-is-it-important-to-vary-my-workout/) (www.acefitness.org/acefit/healthy-living-article/60/1210/why-is-it-important-to-vary-my-workout/)
- [4 Ways to Vary Your Workout](http://www.everydayhealth.com/columns/american-council-on-exercise/4-ways-to-vary-your-workout/) (www.everydayhealth.com/columns/american-council-on-exercise/4-ways-to-vary-your-workout/)

Exercise: The Five Commandments of Injury Prevention

Based on what you've read, answer the following questions.

1. What are some common causes of exercise-related injuries?
2. How can mental alertness help to prevent injuries?
3. How can training specifically for a sport help to prevent injury?

Exercise Answer Key:

Exercise: The Five Commandments of Injury Prevention

1. A “no pain, no gain” mentality, overtraining, and lack of knowledge about particular activities.
2. Studies have shown that a number of psychological factors might predispose an athlete to an acute injury. Different people have different “mind-sets” for the competition and intensity of exercise or sports. If you’re overly “psyched out” by the importance you place on the number of repetitions you can do or the number of games you win, or if the environmental conditions in which you must perform aren’t ideal (“it’s too windy/cold/hot”), your psychological state could detract from your performance and put you at risk for injury. If you’re already injured and are still engaging in activity, this, too, can be a distraction that puts you at greater risk.
3. Training specifically for a sport will allow a person to strengthen and develop the major muscle groups, movements, and energy systems that are unique to that particular sport.

5.2 Determine best practices for preventing exercise-related injuries

Becoming Immune to Injury

READING ASSIGNMENT

Starting Out



[Woman Weight Training]

Proper training and gradual progression will help you avoid injury.

By now you know that people have a tendency to overexercise, overstretch, and overcompete. These can all lead to injuries related to overtraining. The following steps can help you ease your way into enjoyable fitness programs that you'll be able to continue for a long time.

Progress gradually. Nobody likes being told to take things easy, but you can't safely rush fitness. Pushing the body harder than it's ready to be pushed results in damage, whether it's tiny tears that make your muscles sore or larger traumas, such as lower-back spasms. This is a critical point to remember for anyone beginning a new fitness program. Many marathon coordinators will tell you that people with the least amount of training have the most injuries.

Warm up. "Without question, inadequate warm-up is the major cause of injury," says Allan M. Levy, MD, team physician for the New York Giants and partner at the Sports Medicine Center in Fort Lee, New Jersey. Muscle fibers are like rubber bands: When they're cold, they're stiff and liable to tear. Not only are warm muscles more pliable, but they also contract faster and become stronger. Higher body temperature also lubricates joints and improves

muscle cells' ability to convert oxygen and glucose to energy. Warm up just enough to raise your body temperature about two degrees—enough to break into a light sweat—by doing light calisthenics, jogging, riding a bike, or walking briskly.



[People Stretching]

Warmed-up muscles are pliable and less likely to tear.

Use safety gear. A lot of injuries come from a lapse of common sense, such as not wearing a helmet when performing sports that call for one. People offer many reasons for “forgetting” the helmet: loving the feel of the wind in their hair, not having anywhere to put the helmet when they aren’t using it, not wanting to look dorky. The same goes for leg and kneepads, cushioned mats, and so on. Call a local emergency room and get the frightening statistics on the number of cracked heads and other broken body parts they see every year that could have been prevented by the proper safety gear.

Learn the right moves for the right activities. Many fitness professionals will tell you that if their clients took the time to acquire the fundamental skills and understood the basic forms and techniques of their activities, the vast majority of sports injuries would vanish. See the following box for a list of what not to do.

Avoiding Injury During Exercise

Don't Do This	Reason
Deep knee bends	Causes undue strain to knees
Use ankle weights when running or walking	Damages muscles and ligaments

Twist quickly at the waist	Could damage vertebrae
Twist the knee	Could damage the meniscus and ligaments
Complete head/neck rotations	Damages vertebrae
Hold breath for more than three to five seconds	Could cause fainting
Ballistic stretches	Damages muscles and tendons
Use equipment you haven't been trained on	Could cause all kinds of damage to you and the equipment!

Watch this [Rotator Cuff Workout - Rotator Cuff Exercises for Injury Prevention](https://www.youtube.com/watch?v=EY2tNBOmvGs) (www.youtube.com/watch?v=EY2tNBOmvGs) video for a sample fitness routine to help prevent rotator cuff injury.

When muscles talk, listen. Working through pain doesn't earn you any points, and it could lead to lifelong injuries. If pain persists, then something's wrong, and you need rest or treatment. Know that feeling a little bad might come with the territory; that first 10 minutes of aerobics or the first turns around the track might not feel wonderful. That's understandable. Learn to distinguish between your body's "I'd rather be in bed" feeling and the "I'm going to fall apart if you continue to do this to me" feeling.

Watch the temperature. You don't need to smash or twist your body to get it into trouble. There's also danger of damage that starts from the inside out. Let your body temperature swing too far to either end of the thermostat and you'll face potentially deadly problems.

Hypothermia occurs when a low internal body temperature interferes with the body's ability to regulate vital processes, such as metabolism and the heartbeat. One risk for hypothermia is getting wet, which vastly increases heat loss in the cold. Wear clothes that wick moisture away from the body rather than holding it close to the skin. Polypropylene underwear is better than cotton in cool weather. Another key factor is loss of energy. When you're active,

body heat generally makes up for lost warmth, but you should head for shelter once intensity, and with it body heat, begins to decrease.



[Woman on Bicycle Drinking Water]

When you exercise in extreme temperatures, be sure to stay hydrated and to wear clothes that wick away moisture.

Heat exhaustion is a condition that results from your body overheating. It can be caused by exposure to high temperatures and humidity along with strenuous physical activity. Symptoms may include heavy sweating and a rapid pulse. Without prompt treatment, heat exhaustion can lead to heatstroke, a life-threatening condition.

Heat exhaustion is a supply-and-demand problem: Muscles and skin, which compete for fluids from the blood, become depleted in extreme heat and/or humidity. Obviously, avoiding exercise in extreme heat or humidity will prevent problems. Schedule hot-day activity before 10 A.M. or after 3 P.M. Wear loose-fitting clothes, drink lots of fluids, and realize that muscle cramps, goose bumps, fatigue, and lightheadedness are some of the first signs of heat-related trouble.

You've learned about some general fitness safety areas. Let's take a look at some particular activities and identify their specific safety needs. First, however, complete the following exercise.

Preventing Running Injuries



[Woman Walking]

Alternate running sessions with a fast walk or light jog to lessen the impact on your muscles and joints.

Running doesn't sound that hard: place one foot in front of the other. However, the repetitious movements involved in running set up a chain of events from head to toe. Be a tiny bit out of alignment at either end, and your entire body can be affected. Physical therapists and chiropractors are guaranteed a steady flow of runners year-round.

Freeze a picture of a runner in midstride and what will you see? A person who is airborne. A person who is about to land on one foot with all his or her body weight, multiplied two to three times by the forces of gravity and forward momentum. With this kind of hammering, it's no surprise that a study that tracked an Atlanta 10-K race for 10 years found that 53 percent of the participants reported injuries. You can do a number of things to lessen the chance of injury while running.

Add some walking. Walking is much easier on the muscles, joints, and tendons than running. Alternate a fast walk for five minutes with a light run for five minutes and then walk again. The next time you go out, alternate running seven minutes and walking five, gradually increasing your intensity. You'll be building endurance and helping to strengthen muscles

without all the banging and gravitational pulling.

Wear properly fitting, properly designed running shoes. Running is one of the few sports that really need activity-specific footwear. Running shoes cushion the impact of planting your feet and help keep you rolling smoothly from one stride to the next.

SAFETY DOWN BELOW: SHOES AND SURFACES

Look for the following characteristics in a fitness shoe:

- Solid but lightweight construction, made of material that “breathes”
- Flexible front (where the toes go), with enough room for the toes
- Acceptable width, with enough room for the metatarsals
- Properly fitting arch support
- Sufficient support for the back and the sides of the foot

Exercise surfaces must meet the following criteria:

- They should provide good shock-absorption.
- They should be stabilizing.
- They should be uniform and level.
- They should be easy to clean (they’re for exercising bodies, after all!).
- They should have a nonskid surface.

Think smooth and soft surfaces. Try to run on even surfaces. Running on a potholed path is an invitation to ankle twists and sprains. Also, when possible, run on soft surfaces, such as dirt, lawn grass (don’t get caught!), or packed gravel, which cushion the stresses of running more than hard surfaces, such as asphalt or concrete.

Train, don’t strain. Six months of consistently running 50 miles per week will allow steady progress. A few weeks at 60 miles may result in an injury.

While recovering from the injury, you lose training time and you lose a significant part of the fitness gained in prior months. You often have to start from scratch.

The following are some signs of overtraining: feeling tired; not sleeping well; repeated illness, such as sore throat, colds, flu, and cold sores; swollen lymph glands; and weight loss. Stress

or fatigue can express itself in your running speed—your pace might decrease for a while.

Many running injuries can be reduced through proper warm-up, conditioning, footwear, and running surfaces. The following offers additional tips on running safety from the USA Track and Field, the Road Runners Club of America, and the American Orthopaedic Society for Sports Medicine.

RUNNING SAFETY

- Plan a progressive running program to prevent injuries. A five-minute warm-up (which should raise your temperature by two degrees Fahrenheit), followed by stretching exercises, is essential before starting a run. Following the run, stretching again is important, because microtears that may have occurred will heal better.
- During hot weather, running should be scheduled in the early morning or evening hours to avoid heat exhaustion. Don't run when pollution levels are high. Be sure to have adequate rest between training sessions.
- Start your run with the body feeling "a little cool," because body temperature will increase when you start running.
- You can lose between 6 and 12 ounces of fluid for every 20 minutes of running. Drink 10 to 15 ounces of fluid 10 to 15 minutes prior to running and every 20 to 30 minutes along your route. Weigh yourself before and after a run. For every pound lost, drink one pint of fluid.
- In cool weather, you're less likely to get chilled if you run into the wind when you start running and run with the wind at the finish.
- Run in the shade, if possible, and avoid direct sun and blacktop. If exposed to the sun, apply at least SPF 15 sunscreen. Wear sunglasses to filter out UVA and UVB rays, and wear a hat with a visor to shade your eyes and face.
- In high altitudes, runners should gradually acclimate themselves to lower oxygen levels by slowly and steadily increasing speed and distance.
- When selecting a running shoe, look for good shock absorption and construction that will provide stability and cushioning to the foot. Make sure that there's a thumbnail's width between the end of the longest toe and the end of the shoe. Buy shoes at the end of the day, when the foot is the largest.
- Sixty percent of a shoe's shock absorption is lost after 250 to 500 miles of use, so

people who run up to 10 miles per week should consider replacing their shoes every 9 to 12 months.

- Excessive clothing can produce sweating, which causes the body to lose heat rapidly and can increase the risk of hypothermia. Instead, dress in layers. The inner layer should be material that takes perspiration away from the skin (not cotton); the middle layer (not necessary for legs) should be for insulation and absorbing moisture (cotton is OK here); the outer layer should protect against wind and moisture (nylon).
- To avoid frostbite in cold weather, don't have gaps of bare skin between gloves and jackets, wear a hat, and cover the neck. Petroleum jelly can be used on exposed areas, such as the nose.
- Don't run at night, but if you run at dusk or dawn, do wear reflective material. Don't wear a headset or jewelry while running.
- Run with a partner. If alone, carry identification or write your name, phone number, blood type, and medical information on the inside sole of your running shoe.
- Let others know where you'll be running and stay in familiar areas, away from traffic. Have a whistle or other noisemaker to use in an emergency and carry a cell phone.
- Whenever possible, run on a clear, smooth, resilient, even, and reasonably soft surface. Avoid running on hills, which increases stress on the ankle and foot. When running on curved surfaces, change directions in forward movement so that you have even pressure on both feet during the run.

Preventing Bicycling Injuries

There are between 700 and 800 bike-related deaths a year, according to the National Highway Traffic Safety Administration, and thousands of nonfatal bicycle accidents that result in permanent injuries. Following are a number of ways to ensure your safety while riding a bicycle.

Wear a helmet. Many cycling deaths are the result of head injuries sustained in crashes. Insurance against this horrible injury comes in two parts. The first, of course, is not to take your head for a ride while your helmet hangs out in the trunk of your car. The second is not to crash. Keep loose items (knapsack straps, extra shoes, sweat shirts, and other similar articles) out of bicycle spokes and chains. If you're riding on the pavement, watch out for unexpected obstacles, such as opening car doors. If you're off-road, keep your speed within your abilities.

Pedal fast. Straining against the resistance of a high gear could make you more susceptible to overuse injuries. Spinning at lower gears reduces strain and propels you more efficiently. Save the high gears for when you have sufficient speed to keep each pedal moving at the recommended 80 to 100 revolutions per minute for non-racers and 100 to 150 for racers.

Get fitted. One size does not fit all when it comes to cycling. If you do a lot of riding, it's common to experience knee and back pain from improper positioning on the bike. Ask a cycle shop mechanic to check the position of your saddle, handlebars, and pedals.

Support your back. The leaned-over stance used when riding road and mountain bikes can strain the lower back. To shore up your torso, strengthen your abdominal muscles (which provide most of the spine's support) with abdominal exercises, such as crunches, two or three times a week.

Preventing Swimming Injuries

Each year, almost 150,000 swimming-related injuries are treated in hospitals, doctors' offices, clinics, ambulatory surgery centers, and hospital emergency rooms. The American Academy of Orthopaedic Surgeons offers the following tips to prevent swimming injuries.

Always take time to warm up and stretch. Research has shown that cold muscles are more prone to injury. Warm up with jumping jacks, stationary cycling, or running or walking in place for three to five minutes. Then slowly and gently stretch, holding each stretch for 30 seconds.

Learn how to swim and don't swim alone. Swim in supervised areas where lifeguards are present. Inexperienced swimmers should wear life jackets in the water.

Don't attempt to swim if you're too tired, too cold, or overheated.

Avoid diving into shallow water. Approximately 1,000 disabling neck and back injuries occur each year from people diving headfirst into water that's too shallow or too murky to see objects.

Make sure you can see the bottom. Swim in a pool only if you can see the bottom at the deepest point; check the shape of the full diving area to make sure it's deep enough.

Dive only off the end of a diving board. Don't run on the board, try to dive far out, or

bounce more than once. Swim away from the board immediately after the dive to allow room for the next diver. Make sure there's only one person on the board at a time.

When swimming in open water, never run and enter waves headfirst. Make sure the water is free of undercurrents and other hazards.

Watch for flooding. Don't swim in a lake or river after a storm if the water seems to be rising or if there's flooding, because currents may become strong. The clarity and depth of the water may have changed, and new hazards may be present.

Check the forecast. Check weather reports before going swimming to avoid being in the water during storms, fog, or high winds. Because water conducts electricity, it's dangerous to be in the water during an electrical storm.

Alcohol and water don't mix. Alcohol not only affects judgment, but it also slows movement and impairs vision. It can reduce swimming skills and make it harder to stay warm.

Know first aid. Be knowledgeable about first aid and be able to administer it for minor injuries, such as facial cuts, bruises, and minor tendinitis, strains, or sprains.

Be prepared for emergency situations. Have a plan to reach medical personnel to treat injuries such as concussions, dislocations, elbow contusions, wrist or finger sprains, and fractures.

Key Points and Links

READING ASSIGNMENT

Key Points

- To avoid exercise-related injury, you should progress gradually, warm up, use safety gear, learn the right moves for the right activities, listen to your muscles, and watch the temperature.
- Runners need good shoes and appropriate surfaces to run on. They should alternate walking and running.
- Bicyclists need to wear protective gear, support their backs, and use a bike that's properly fitted.

- Swimmers need to warm up and make sure of what's in the water.

Links

- [National Center for Injury Prevention & Control](http://www.cdc.gov/injury/) (www.cdc.gov/injury/)
- [Stop Sports Injuries](http://www.stopsportsinjuries.org/sports-injury-prevention.aspx) (www.stopsportsinjuries.org/sports-injury-prevention.aspx)
- [Rotator Cuff Workout - Rotator Cuff Exercises for Injury Prevention](http://www.youtube.com/watch?v=EY2tNB0mvGs) (www.youtube.com/watch?v=EY2tNB0mvGs)

Exercise: Preventing Injuries

Based on what you've read, answer the following question.

Why is running so hard on the body?

Exercise Answer Key:

Exercise: Preventing Injuries

A person who's running lands on one foot with all of his or her body weight, multiplied two to three times by the forces of gravity and forward momentum. With this kind of hammering, it's no surprise that injuries occur.

5.3 Discuss treatments for and recovery from exercise-related injuries

First Aid Essentials

READING ASSIGNMENT

First-Aid Kit

Even with the best of training and the exercising of caution, accidents happen. It's important that you always have a well-stocked first-aid kit available should an injury occur.

Here's what to include, as recommended by Eric A. Weiss, MD, associate professor of medicine at Stanford Medical Center and board member of the Wilderness Medical Society.

For relief:

- Ibuprofen tablets (for example, Motrin or Advil) for reducing inflammation from sprains and strains and reducing the pain of headache and sunburn (*Note: Be extremely cautious in offering even over-the-counter medication to clients.*)
- Benadryl or other antihistamines for hay fever, poison ivy, rashes, and bee stings
- Pepto-Bismol or Imodium (if allergic to aspirin) for sudden stomach trouble
- Aloe vera gel for minor burns and frostbite
- Second-skin dressings, such as moleskin for blisters

For cleaning:

- A 10-cc irrigation syringe with an 18-gauge catheter tip for use as a squirt gun to flush dirt and microorganisms
- Neosporin or another triple-antibiotic ointment (single-use packets are more convenient than large tubes)
- Antiseptic towelettes with benzalkonium chloride for swabbing

For patching:

- Sterile dressings (2 × 2, 3 × 3, and 4 × 4 inch)
- Sterile eye pads
- Sterile gauze bandages
- Assorted adhesive bandages
- Elastic bandages
- Wound-closure strips or butterfly closures for pulling wound edges together
- Tincture of benzoin to help adhesive bandages, wound-closure strips, and moleskin stick better

For technical assistance:

- Tweezers
- Tape
- Safety pins
- Blunt-tip bandage scissors, for cutting cloth
- Waterproof matches
- A pencil and writing paper in a sealed plastic pouch

- Small first-aid book
- Epi-Pen, for injecting a single dose of epinephrine in case of severe allergic reaction to bee stings or food (prescription required)
- Latex surgical gloves and CPR Microshield to protect against infectious diseases, such as AIDS

Major and Minor Injuries

Many common fitness injuries are minor, such as sprains or pulls. RICE is the most commonly used treatment for such minor injuries.

- R = *Rest*; immobilize the injured area.
- I = *Ice*; a common treatment is to apply ice for 15 to 20 minutes at a time over a three-hour interval. In a pinch, use a bag of frozen vegetables or a can of frozen juice, wrapped in a towel, in place of ice. Be careful not to leave ice on for too long. Don't let the skin come in direct contact with ice.
- C = *Compression*; light pressure can help relieve some pain and swelling. Don't compress too tightly or for too long a time period.
- E = *Elevation*; elevation slows the circulation to the injured area and may help to relieve swelling.

Common Injuries	Injury Symptom
Open wound	Break in skin, bleeding
Closed wound	Cold skin, rapid or weak pulse, pain in injured area, rapid breathing, vomiting, no bleeding
Shin splint	Aches and pains along the tibia, including swelling, bumps, and tingling
Plantar fasciitis	Pain in the ball or heel of the foot (inflammation of the connective tissue in the bottom of the foot)
Heel bruise	Pain in the heel, especially after periods of rest
Stress fracture	Pain at point of injury, with more pain brought on by exercise
Achilles tendonitis	Pain in the lower part of the leg, above the ankle
Ankle sprain	Pain, swelling, bruising, and “hot spots” at the ankle
Torn meniscus	Pain, swelling, and buckling of knee
Pulled hamstring	Pain and tightness at the back of the thigh, difficulty walking or bending to touch toes
Dislocated shoulder	Severe pain, swelling, urge to cradle arm close to the body
Rotator cuff syndrome	Sharp pain when reaching overhead from the shoulder
Epicondylitis (golf/tennis elbow)	Soreness or pain at wrist and forearm
Head injury	(VERY SERIOUS—SEEK IMMEDIATE EMERGENCY ATTENTION) Syncope (fainting); uneven pupils; seizures; slurred speech; impaired vision; weak, fast pulse; nausea; pale or flushed skin; bleeding from nose, ears, or mouth

[Table of Common Injuries and Symptoms]

In addition to being able to handle minor injuries, you should always be prepared for emergency situations. Being prepared includes having an emergency kit on hand.

Sprains and Strains

Sprains and strains are among the most common injuries in sports. You should be very familiar with how to recognize such injuries. A *sprain* is a stretch and/or tear of a *ligament*,

the fibrous band of connective tissue that joins the end of one bone with another. Ligaments stabilize and support the body's joints. For example, ligaments in the knee connect the upper leg with the lower leg, enabling people to walk and run.

A *strain* is a twist, pull, and/or tear of a muscle and/or tendon. *Tendons* are fibrous cords of tissue that attach muscles to bone. A sprain is caused by direct or indirect trauma (a fall, a blow to the body, or other similar incident) that knocks a joint out of position and overstretches; in severe cases, it ruptures the supporting ligaments. Typically, this injury occurs when an individual lands on an outstretched arm, slides into a base, jumps up and lands on the side of the foot, or runs on an uneven surface.

Chronic strains are the result of overuse—prolonged, repetitive movement—of muscles and tendons. Taking inadequate rest breaks during intensive training precipitates a strain. *Acute strains* are caused by a direct blow to the body, overstretching, or excessive muscle contraction.

Professional and amateur athletes and the general public can sustain this injury. People at risk for the injury have a history of sprains and strains, are overweight, and are in poor physical condition.

All sports and exercises, even walking, carry a risk of sprains. The anatomic areas most at risk for a sprain depend on the specific activities involved. For example, basketball, volleyball, soccer, and other jumping sports share a risk for foot, leg, and ankle sprains. Soccer, football, hockey, boxing, wrestling, and other contact sports put athletes at risk for strains. So do sports that feature quick starts (for example, hurdling, long jump, or running races). Gymnastics, tennis, rowing, and golf—sports that require extensive gripping—have a high incidence of hand strains. Elbow strains frequently occur in racquet, throwing, and contact sports.

Although the intensity varies, pain, bruising, and inflammation are common to all three categories of sprains—mild, moderate, and severe. The individual will usually feel a tear or pop in the joint. A *severe* sprain produces excruciating pain at the moment of injury, as ligaments tear completely or separate from the bone. This loosening makes the joint nonfunctional. A *moderate* sprain partially tears the ligament, producing joint instability and some swelling. A ligament is stretched in a *mild* sprain, but there's no joint loosening.

Typical indications that a sprain has occurred include pain, muscle spasm, muscle weakness, swelling, inflammation, and cramping.

In *severe* strains, the muscle and/or tendon is partially or completely ruptured, often incapacitating the individual. Some muscle function will be lost with a *moderate* strain, where the muscle/tendon is overstretched and slightly torn. With a *mild* strain, the muscle/tendon is stretched or pulled slightly. Common strains include back strains and hamstring muscle strains.

Back strain. When the muscles that support the spine are twisted, pulled, or torn, the result is a back strain. Athletes who engage in excessive jumping in sports like basketball and volleyball are vulnerable to this injury.

Hamstring muscle strain. A hamstring muscle strain is a tear or stretch of a major muscle in the back of the thigh. The injury can sideline a person for up to six months. The likely cause is muscle strength imbalance between the hamstrings and the muscles in the front of the thigh, the quadriceps. Kicking a football, running, or leaping to make a basket can pull a hamstring. Hamstring injuries tend to recur.

Rest, ice, compression, and elevation (RICE) usually will help minimize the damage of a strain or sprain. It's important in all but mild cases for a medical doctor to evaluate the injury and establish a treatment and rehabilitation plan. A severe sprain or strain might require surgery or immobilization, followed by months of therapy. Mild sprains and strains may require rehabilitation exercises and activity modification during recovery.

No one is immune to sprains and strains, but here are some tips developed by the American Academy of Orthopaedic Surgeons to help reduce your injury risk:

- Participate in a conditioning program to build muscle strength.
- Perform stretching exercises daily.
- Always wear properly fitting shoes.
- Nourish your muscles by eating a well-balanced diet.
- Warm up before any sports activity, including practice.
- Use or wear protective equipment appropriate for that sport.

Risk Factors for Back Pain

Back pain is very preventable. Look over the following list to see how you can relate it to your clients to prevent them from experiencing back pain.

- Poor posture
- Weak lower-back muscles
- Lack of flexibility in lower back
- Lack of flexibility in hamstrings
- Using quick, sharp, jerking movements when exercising
- Repeated bending from the waist
- Osteoporosis
- Improper lifting techniques

Recovery

You might suffer an injury while working out, on the job, or at home. After an injury, it can take time to get back into a regular fitness routine. Following an injury, a person experiences both psychological and physical stages of healing. Psychologically, a person experiences shock, realization, acknowledgment, and coping, followed by the setting of specific minor and major goals for return to exercise. Physically, a person must progress through the stages of initial pain, swelling, and loss of the previous level of control of the injured limb or body part. Once healing has occurred through surgical/nonsurgical means, the person faces the challenge of reestablishing strength, balance, coordination, and confidence to a minimum level that's deemed safe and appropriate for return to exercise.

A major injury must be evaluated and diagnosed by an appropriate healthcare professional or specialist. Once the symptoms seem to have cleared or the medical staff feels it's safe to return to activity, the person can then gradually return to full capacity. Depending on the injury, a physician might suggest the use of protective padding, bracing, or other modifications to protect the injured area.



[Woman Putting on Knee Brace]

Medical professionals may suggest using protective padding or bracing to protect the injured area.

When a body part is injured, it should be rested. But, if approved by a healthcare professional, the rest of the body should be kept in shape. If possible, cardiorespiratory fitness should be maintained. People spend a lot of time getting the cardiorespiratory system in shape to handle various levels of exercise. When a person is sidelined by an injury, cardiorespiratory fitness can decrease rapidly.

Depending on the nature of the injury, a number of activities can be used to maintain cardiorespiratory fitness. When there's a lower-extremity injury, non-weight-bearing activities should be incorporated. Pool activities provide an excellent means for injury rehabilitation. Cycling also can positively stress the cardiorespiratory system. Of course, no activity should be taken without the approval of the medical staff.

Strength, balance, and hand-eye coordination can be maintained while recovering from a specific injury. Swimmers with upper-extremity injuries might use a stationary bike or climb stairs. They can work on trunk balance using a large medicine ball, in addition to performing their daily upper-extremity physical therapy routines. Runners with a lowerextremity injury can use an *upper-body ergometer (UBE)*, which resembles a bicycle for your arms. If the lower-extremity injuries aren't severe, an elliptical transporter or stationary bike can be used in addition to performing the appropriate lower-extremity rehabilitative exercises. This equipment also provides cardiovascular conditioning for people with upper-body injuries.

For hand–eye coordination, anything from throwing darts to shooting pool can be useful in stimulating the neuromuscular pathways.

In general, return to a regular fitness program can be outlined by a healthcare professional. Guidelines should be sports-specific; for example, runners should be on a walk/run program and should advance as tolerated and as indicated by performance and any symptoms. Once an injured person is cleared for regular activity, the basic rehabilitation program should be performed on a maintenance basis.

Once an injury has healed, the goal is to stay healthy and prevent re-injury. However, to prevent re-injury, you have to understand why or how the injury occurred in the first place. If the injury occurred because of inadequate conditioning, then attention should be paid to more conditioning. If an injury occurred because of poor form, then the focus should be on improving and mastering the correct technique. If the injury occurred because the person has musculoskeletal problems, such as lower-extremity misalignments or congenital abnormalities, that weren't appropriately supported through the use of braces or orthotics, then the use and condition of those devices should be evaluated. If an injury can't be explained and seems to have "just happened," then the person should continue with a maintenance rehabilitation program three days per week that includes exercises and activities that aided in his or her recovery and return to fitness.

Some of the best advice for staying healthy and preventing injury in the first place is to stay well conditioned and to exercise with controlled intensity. This includes consistently having good nutrition, good emotional balance while working out, endurance, and neuromuscular function and strength.

Key Points and Links

READING ASSIGNMENT

Key Points

- A well-stocked first-aid kit is essential for treating injuries that occur during exercise. You should also have an emergency kit on hand.
- Be able to recognize and know how to treat sprains and strains.
- Maintain cardiorespiratory fitness after an injury by exercising other parts of the body.

Links

- [Anatomy of a First Aid Kit](http://www.redcross.org/prepare/location/home-family/get-kit/anatomy) (www.redcross.org/prepare/location/home-family/get-kit/anatomy)
- [Building a Hiker's First Aid Kit](http://www.wta.org/hiking-info/basics/like-your-life-depends-on-it-building-your-first-aid-kit) (www.wta.org/hiking-info/basics/like-your-life-depends-on-it-building-your-first-aid-kit)

Exercise: First-Aid and Recovery

Based on what you've read, answer the following questions.

1. What should a first-aid kit include for “patching”?
2. How might a person maintain cardiovascular fitness when an arm or leg is injured?
3. How should a person who was injured return to a fitness program?
4. The acronym RICE is used to remind people how to treat minor strains and pulls. What do these letters stand for?

Exercise Answer Key:

Exercise: First-Aid and Recovery

1. Sterile dressings; sterile eye pads; sterile gauze bandages; assorted adhesive bandages; elastic bandages; wound-closure strips or butterfly closures for pulling wound edges together; tincture of benzoin for making adhesive bandages, wound-closure strips, and moleskin stick better.
2. When there's a lower-extremity injury, non-weight-bearing activities should be incorporated. Pool activities provide an excellent means for injury rehabilitation. Cycling also can positively stress the cardiorespiratory system. Of course, no activity should be undertaken without the approval of the medical staff.
3. Once an injury has healed, the goal is to stay healthy and prevent re-injury. However, to prevent re-injury, you have to understand why or how the injury occurred in the first place. If the injury occurred because of inadequate conditioning, then attention should be paid to more conditioning. If an injury occurred because of poor form, then the focus should be on improving and mastering the correct technique. If the injury occurred because the person has musculoskeletal problems, such as lowerextremity misalignments or congenital abnormalities, that weren't appropriately supported through the use of braces or orthotics, then the use and condition of those devices should be evaluated. If an injury can't be explained and seems to have “just happened,” then the person should continue with a maintenance rehabilitation program three days per week that includes exercises and activities that aided in his or her recovery and return to fitness.
4. Rest, Ice, Compression, Elevation

Lesson 5 Review

Self-Check

1. Which one of the following involves short periods of activity (stair climbing, weightlifting, calisthenics, sprinting, and other exercise activities), can build speed, strength, and power?
 - a. Strength Training
 - b. Interval training
 - c. Intense Training
 - d. Cardio Training
2. Which one of the following exercises can cause undue strain to knees?
 - a. Twist the knee
 - b. Twist quickly at the waist
 - c. Ballistic stretches
 - d. Deep knee bends
3. Which one of the following exercises can cause damages to muscles and tendons?
 - a. Twist the knee
 - b. Twist quickly at the waist
 - c. Deep knee bends
 - d. Ballistic stretches
4. Which one of the following occurs when a low internal body temperature interferes with the body's ability to regulate vital processes, such as metabolism and the heartbeat?
 - a. Edamame
 - b. Edema
 - c. Hypothermia
 - d. Heat exhaustion
5. Which one of the following should be done to prevent bicycling injuries?
 - a. Peddle slow
 - b. Always take time to warm up and stretch
 - c. Know first aid
 - d. Support your back

6. Which one of the following stands for the "R" in RICE?
 - a. Rest
 - b. Recover
 - c. Relief
 - d. Relive
7. Which one of the following stands for the "C" in RICE?
 - a. Compression
 - b. Compact
 - c. Concentrate
 - d. Control
8. Which one of the following is the most commonly used treatment for minor injuries?
 - a. RACE
 - b. RICA
 - c. RICO
 - d. RICE
9. Which one of the following is a stretch and/or tear of a ligament?
 - a. Strain
 - b. Twist
 - c. Sprain
 - d. Sprane
10. Which one of the following are fibrous cords of tissue that attach muscles to bone?
 - a. Cartilage
 - b. Ligament
 - c. Muscles
 - d. Tendons
11. Which one of the following is caused by a direct blow to the body, overstretching, or excessive muscle contraction?
 - a. Acute strains
 - b. Chronic strains
 - c. Complete strain
 - d. Accurate strain
12. Which one of the following is when a ligament is stretched but there's no joint loosening?
 - a. Moderate sprain
 - b. Middle sprain

- c. Mild sprain
- d. Severe strains

13. Which one of the following might require surgery or immobilization, followed by months of therapy?

- a. Mild sprain
- b. Middle sprain
- c. Moderate sprain
- d. Severe strains

14. Which one of the following injuries causes pain, swelling, and buckling of knee?

- a. Torn meniscus
- b. Epicondylitis
- c. Achilles tendonitis
- d. Plantar fasciitis

Self-Check Answer Key

1. Interval training

Explanation: Interval training, which involves short periods of activity (stair climbing, weightlifting, calisthenics, sprinting, and other exercise activities), can build speed, strength, and power.

Reference: Section 5.1

2. Deep knee bends

Explanation: *Deep knee bends* can cause undue strain to knees.

Reference: Section 5.2

3. Ballistic stretches

Explanation: Ballistic stretches can cause damage to muscles and tendons.

Reference: Section 5.2

4. Hypothermia

Explanation: Hypothermia occurs when a low internal body temperature interferes with the body's ability to regulate vital processes, such as metabolism and the heartbeat. One risk for hypothermia is getting wet, which vastly increases heat loss in

the cold.

Reference: Section 5.2

5. Support your back

Explanation: Support your back. The leaned-over stance used when riding road and mountain bikes can strain the lower back. To shore up your torso, strengthen your abdominal muscles (which provide most of the spine's support) with abdominal exercises, such as crunches, two or three times a week.

Reference: Section 5.2

6. Rest

Explanation: R = Rest

Reference: Section 5.3

7. Compression

Explanation: C = Compression

Reference: Section 5.3

8. RICE

Explanation: *RICE* is the most commonly used treatment for minor injuries.

Reference: Section 5.3

9. Sprain

Explanation: A sprain is a stretch and/or tear of a ligament.

Reference: Section 5.3

10. Tendons

Explanation: Tendons are fibrous cords of tissue that attach muscles to bone?

Reference: Section 5.3

11. Acute strains

Explanation: Acute strains are caused by a direct blow to the body, overstretching, or excessive muscle contraction.

Reference: Section 5.3

12. Mild sprain

Explanation: A ligament is stretched in a mild sprain, but there's no joint loosening.

Reference: Section 5.3

13. Severe strains

Explanation: A severe sprain or strain might require surgery or immobilization, followed by months of therapy.

Reference: Section 5.3

14. Torn meniscus

Explanation: A torn meniscus causes pain, swelling, and buckling of knee.

Reference: Section 5.3

Flash Cards

1. Term: Heat Exhaustion

Definition: A condition that results from your body overheating

2. Term: Interval Training

Definition: Involves short periods of activity (stair climbing, weightlifting, calisthenics, sprinting, and other exercise activities), can build speed, strength, and power

3. Term: Hypothermia

Definition: Occurs when a low internal body temperature interferes with the body's ability to regulate vital processes, such as metabolism and the heartbeat

4. Term: RICE

Definition: The most commonly used treatment for such minor injuries; stands for **R**est, **I**ce, **C**ompression, **E**levation

5. Term: Rest

Definition: To immobilize the injured area

6. Term: Ice

Definition: A common treatment is to apply ice for 15 to 20 minutes at a time over a three-hour interval

7. Term: Compression

Definition: A light pressure to help relieve some pain and swelling

8. Term: Elevation

Definition: Slows the circulation to the injured area and may help to relieve swelling

9. Term: Sprain

Definition: A stretch or tear of a ligament

10. Term: Ligament

Definition: The fibrous band of connective tissue that joins the end of one bone with another

11. Term: Strain

Definition: A twist, pull, or tear of a muscle or tendon

12. Term: Tendons

Definition: Fibrous cords of tissue that attach muscles to bone

13. Term: Chronic Strains

Definition: The result of overuse—prolonged, repetitive movement—of muscles and tendons

14. Term: Acute Strains

Definition: Caused by a direct blow to the body, overstretching, or excessive muscle contraction

15. Term: Moderate Sprain

Definition: Partially tears the ligament, producing joint instability and some swelling

16. Term: Mild Sprain

Definition: A stretched ligament with no joint loosening