



Back Injury Prevention Training Module

Anatomy of the Back

In order to understand why back injuries are so common, it is important to understand a little bit about the anatomy of the back and the physical forces that may come into play.

The Spine

The human spine (or backbone) has three natural curves that combine to create a soft S-shape. At the top of the spine, from the neck to the shoulder, is the *cervical area*. This is the region associated with the upper portion of the back. Moving downward is the *thoracic area* that extends from the neck to about the waist. The thoracic curve is the middle region of the back ending near the waist. At the bottom of the spine is the *lumbar area*. The lumbar curve extends from the waist to the pelvis incorporating the lower back area.

The three curves act together to keep the weight and pressure placed on the spine evenly distributed. When weight and pressure is evenly distributed, no part of the spine is stressed to withstand more than it can typically handle. Of the three regions—cervical, thoracic, and lumbar—the lumbar curve is the hardest working.

The lower part of the back carries a greater portion of the body's weight and bends and moves more than any other spinal section. Because of this, most back injuries occur in the lower back region. Even a minor problem with the bones, muscles, ligaments, tendons or discs in this area can cause pain when a person stands, bends, or moves around.

The spine is made up of small bones called vertebrae. The vertebrae are stacked on top of each other to form a column. Between each vertebra is a pad of cartilage known as a disc. Every time you move, the discs act as shock absorbers, preventing the vertebrae from banging into each other and allowing flexibility of the spine. The vertebrae are held together by ligaments, and muscles are attached to the vertebrae by bands of tissue called tendons.

Openings in each vertebra line up to form a long hollow canal. The spinal cord runs through this canal from the base of the brain. Nerves from the spinal cord branch out and leave the spine through the spaces between the vertebrae.

Types of Back Injuries

Every time you bend over, lift a heavy object, or sit leaning forward, you put stress on the components of the back and spine. Over time, they can start to wear out and become damaged.

Many of the problems that cause back pain are the result of injury and degeneration of the intervertebral disk. Degeneration is a process where wear and tear causes deterioration. The disk is subjected to different types of stress as we use our backs each day.

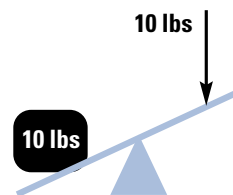
Eventually, disks can collapse or herniate; vertebrae can shift; bone spurs can develop.

Acute or immediate injuries to the back can be caused by tearing or straining ligaments and muscles. Muscles can also spasm due to stress or tension.

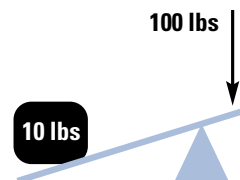
Forces Involved with Lifting

The amount of force placed on the back under certain conditions can be surprising. Anytime you bend or lean over to pick something up, you put tremendous pressure on the lower back.

Think of the back as a lever. With the fulcrum in the center of the lever, it only takes ten pounds of pressure to lift a ten pound object.



However, if you shift the fulcrum to one side, it takes much more force to lift the same object. The waist actually acts like the fulcrum in a lever system, and it is not centered. In fact, it operates on a 10:1 ratio. Lifting a ten pound object actually puts 100 pounds of pressure on the lower back.



When you add in the 105 pounds of the average human upper torso, you see that lifting a ten-pound object actually puts 1,150 pounds of pressure on the lower back.

And...if you were 25 pounds overweight, it would add an additional 250 pounds of pressure on the back every time you bend over.

Given these figures, it is easy to see how repetitive lifting and bending can quickly cause back problems. Even leaning forward while sitting at a desk or table can eventually cause damage and pain.

Factors Contributing to the Risk for Back Injuries

The following factors may contribute to the risk of injuring the back:

- **Poor physical condition** - The stomach muscles provide a lot of the support needed by the back. If you have weak, flabby stomach muscles, the back may not get all the support it needs, especially when you're lifting or carrying heavy objects. Good physical condition in general is important for preventing strains, sprains, and other injuries.
- **Poor posture** - When the mother told you to sit and stand up straight, she was giving you good advice. It is best to try to maintain the back in its natural "S" shaped curve. You want to avoid leaning forward (unsupported) when you sit, or hunching over while you're standing.
- **Extra weight** - Remember the fulcrum / lever principle? The more you weigh, the more stress it puts on the back every time you bend over... on a 10:1 ratio.
- **Stress** - Tense muscles are more susceptible to strains and spasms.
- **Overdoing it** - Don't be afraid to say, "This is too heavy for me to lift alone." It's important to recognize the own physical limitations and abilities. Many people have injured their backs because they were afraid to ask for help.

Common Causes of Back Injury

Many back injuries cannot be attributed to a single causal factor; in other words, they tend to be the result of cumulative damage suffered over a long period of time. However, certain actions, motions, and movements are more likely to cause and contribute to back injuries than others.

Your risk for injury increases when you:

- Lift heavy objects
- Twist at the waist while lifting or holding a heavy load
- Reach and lift at the same time
- Lift or carry objects with awkward or odd shapes
- Work in awkward, uncomfortable positions
- Sit or stand too long in one position

Preventing Back Injury

The best way to prevent back injuries is to develop habits that reduce the strain placed on the back. There are some basic things you can do to help.

- Avoid bending while lifting whenever you can. Anytime you can spare the back the stress and strain of lifting and bending, do so! If you don't use the back like a lever, you avoid putting it under so much potentially damaging force.
- Place objects up off the floor. If you can set something down on a table or other elevated surface instead of on the floor, do it so you won't have to reach down to pick it up again.
- Raise / lower shelves. The best zone for lifting is between the shoulders and the waist. Put heavier objects on shelves at waist level, lighter objects on lower or higher shelves.

- Use carts and dollies to move objects, instead of carrying them. (Remember that it is better on the back to push carts than it is to pull them.)
- Use cranes, hoists, lift tables, and other lift-assist devices whenever you can.
- Use Proper Lifting Procedures

You can't always avoid lifting, but there are ways to reduce the amount of pressure placed on the back when you do so. By bending the knees, you keep the spine in a better alignment, and you essentially take away the lever principle forces. Instead of using the back like a crane, you allow the legs to do the work.

Proper Lifting Procedures

Follow these steps when lifting:

- Take a balanced stance with the feet about a shoulder-width apart. One foot can be behind the object and the other next to it.
- Squat down to lift the object, but keep the heels off the floor. Get as close to the object as you can.
- Use the palms (not just the fingers) to get a secure grip on the load. Make sure you'll be able to maintain a hold on the object without switching the grip later.
- Lift gradually (without jerking) using the leg, abdominal and buttock muscles and keeping the load as close to you as possible. Keep the chin tucked in so as to keep a relatively straight back and neck line.
- Once you're standing, change directions by pointing the feet in the direction you want to go and turning the whole body. Avoid twisting at the waist while carrying a load.

When you put a load down, use these same guidelines in reverse.

Also follow these lifting tips:

- Reduce the amount of weight lifted. If you're moving a bunch of books, better to load several small boxes than one extremely heavy load.
- Use handles and lifting straps.
- Get help if the shape is too awkward or the object is too heavy for you to lift and move by yourself!

Body Management & Exercising

It's important to know the body's limitations, and it's important to be aware of the body position at all times. Learn to recognize those situations where the back is most a risk: bending, lifting, reaching, twisting, etc. Then take measures to avoid an injury.

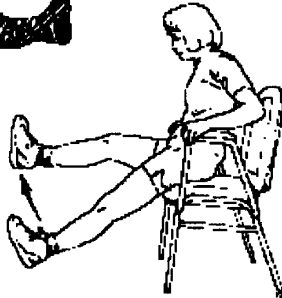
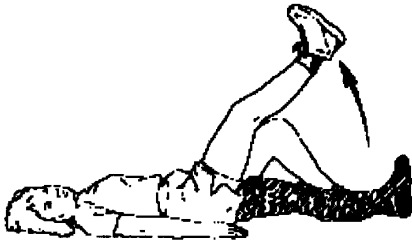
- **Stretch first** - If you know that you're going to be doing work that might be hard on the back, take the time to stretch the muscles before starting, just like a professional athlete would do before a workout. This will help you avoid painful strains and sprains.
- **Slow down** - If you're doing a lot of heavy, repetitive lifting, take it slowly if you can. Allow more recovery time between lifts, as well. Don't overdo it.
- **Rest the back** - Take frequent, short (micro) breaks. Stretch. If you've ever been working in an awkward position for a long time, then stood up and felt stiff and sore, you know you've been in that position too long, and the body is now protesting. Taking a one-minute stretch break every now and then can help you avoid that.
- **Sleep on a firm mattress** - Also, the best sleeping position for many people is either on the back with the knees slightly elevated (by a pillow), or on the side with knees slightly bent.
- **Get in shape** - Strengthen the stomach muscles, lose a little weight, increase the flexibility.

Exercises for the Back

Stand with your back against a wall and feet shoulder-width apart. Slide down into a crouch with knees bent to about 90 degrees. Count to five and slide back up the wall. Repeat 5 times.

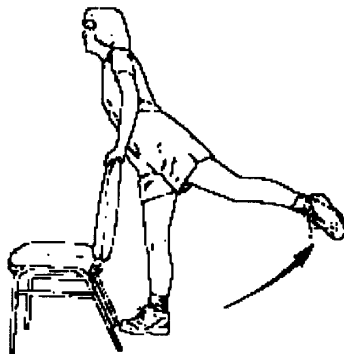
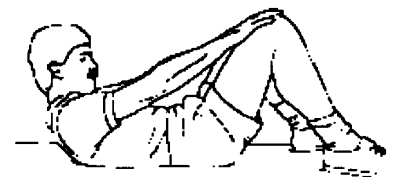


Lie on your stomach. Tighten the muscles in one leg and raise it from the floor. Hold your leg up for a count of 10 and return it to the floor. Do the same with the other leg. Repeat five times with each leg.



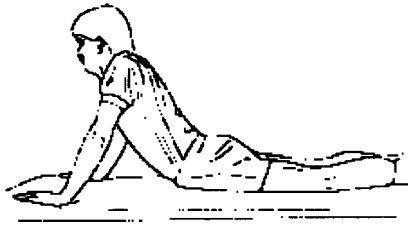
Lie on your back with your arms at your sides. Lift one leg off the floor. Hold your leg up for a count of 10 and return it to the floor. Do the same with the other leg. Repeat five times with each leg. If that is too difficult, keep one knee bent and the foot flat on the ground while raising the leg. You can also sit upright in a chair with legs straight and extended at an angle to the floor. Lift one leg waist high. Slowly return your leg to the floor. Do the same with the other leg. Repeat five times with each leg.

Lie on your back with knees bent and feet flat on floor. Slowly raise your head and shoulders off the floor and reach with both hands toward your knees. Count to 10. Repeat five times.



Stand behind a chair with your hands on the back of the chair. Lift one leg back and up while keeping the knee straight. Return slowly. Raise other leg and return. Repeat five times with each leg.

Stand with your feet slightly apart. Place your hands in the small of your back. Keep your knees straight. Bend backwards at the waist as far as possible and hold the position for one or two seconds.



Lie on your back with your knees bent and feet flat on your bed or floor. Raise your knees toward your chest. Place both hands under your knees and gently pull your knees as close to your chest as possible. Do not raise your head. Do not straighten your legs as you lower them. Start with five repetitions, several times a day.

Quiz

1. Back injuries account for one of every five workplace injuries or illnesses.
 - True
 - False
2. Once you have injured the back, you are very likely to re-injure it at some point in the future.
 - True
 - False
3. Which of the following might be considered a contributing factor for back injuries?
 - Poor physical condition
 - Stress
 - Poor posture
 - All of the above
4. Sitting in one position for long periods of time does not place any stress on the back.
 - True
 - False

It just makes sense.SM

5. Which are generally recommended as the best sleeping positions for the back?
- On the stomach or back (w/ legs level)
 - On the side (w/knees slightly bent) or back (w/pillow under knees)
6. The "safe lifting zone" is
- Between the floor and the knees
 - Above the head
 - Between the shoulders and the waist
 - At arm's length from the body.
7. Rather than using the back like a crane, it is better to allow the legs to do the work by bending at the knees while lifting.
- True
 - False
8. It is best to avoid twisting at the waist when carrying or lifting a heavy load.
- True
 - False
9. When carrying an awkward load, you want the heaviest part of the load to be furthest from the body.
- True
 - False
10. Taking frequent, short (micro) breaks can be beneficial to the back, particularly when working in awkward positions.
- True
 - False

Name:	Supervisor:
Business Unit:	Location:

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