

## Spine Safety and Body Mechanics

### Introduction

Back pain is a common problem for those who work in an industrial setting. A significant number of injuries occur each year, but many of these injuries can be prevented through proper body mechanics and back safety techniques.

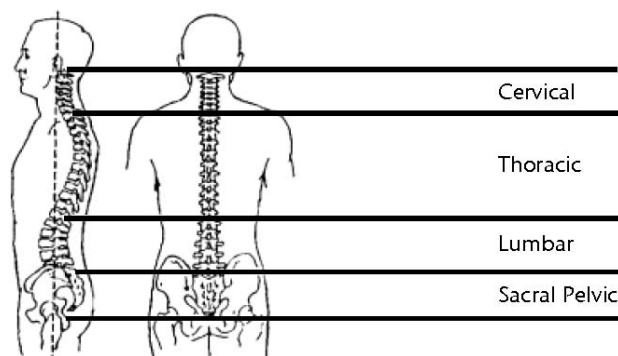
Statistics show nearly 8 out of 10 in the general population will experience a back disorder at some time in their life. Most are caused by a combination of cumulative trauma, poor posture, faulty body mechanics, stressful living and working habits, loss of flexibility and a general decline in physical fitness. The incidence of back pain and injury can be significantly reduced through correction and modification of these common causes of back pain and injury.

### Basic Anatomy and Mechanics

#### The spine consists of three natural curves:

- Seven vertebrae in the cervical curve of the neck
- Twelve vertebrae in the thoracic curve of the middle back
- Five vertebrae in the lumbar curve of the low back

The body's weight is evenly distributed throughout the vertebrae and discs when the three natural curves are maintained in their normal alignment. The three curves are in correct alignment when the ears, shoulders, hips, knees, and ankles are in a straight line. In this position, the back is least vulnerable to injury.



#### Joints

- Joints in the spine control the amount and direction of motion in the spine. They mainly allow forward and backward motion and limit twisting. The bony part of the spine protects the spinal cord.



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### Discs

- The discs are like jelly doughnuts, with a gelatinous middle and fibrous outer rings, and are located in between vertebral bodies
- They allow the spine to flex and act as shock absorbers.
- When we bend forward and backward, the jelly-like substance moves and may put pressure on the outer rings.



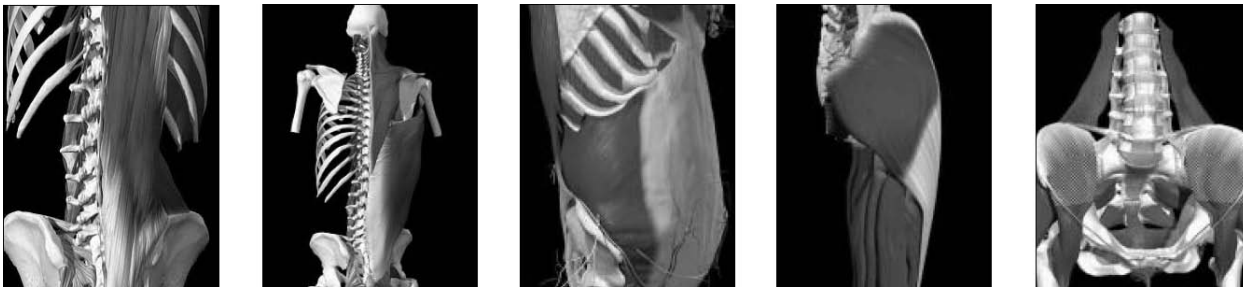
### Ligaments

- Ligaments are strong non-elastic structures that support the spine and hold bones together.
- They don't resume their normal length once overstretched.



### Muscles

The muscles of the abdomen, back, buttocks, and thighs support the three natural curves. Strength and flexibility in these muscle groups help them perform properly and reduce the risk of back injury.

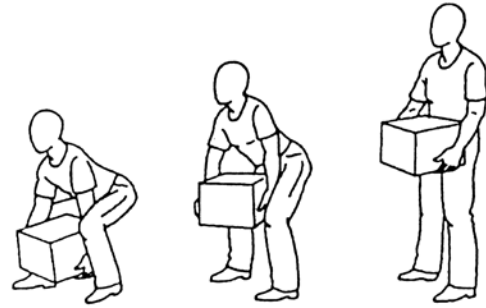


The spine works most efficiently when in a balanced position, maintaining the three natural curves. Pressure on the discs is distributed evenly and the muscles are in their strongest position. A load held away from the body can exert up to 10 times the weight to the low back, thus increasing the risk for low back pain and injury.

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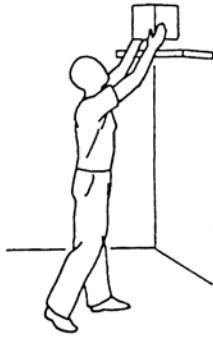
Lifting from the floor with a full squat.



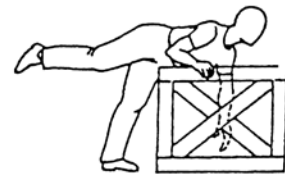
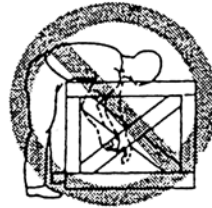
Lifting from the floor with a partial squat.

## Rules for Lifting

1. Always check the weight of the load before you attempt to lift.
2. Keep your feet shoulder-width apart for a stable base of support.
3. Position yourself as close to the load as possible.
4. Bend knees and hips, not your back.
5. Move your feet as you turn, do not twist at the waist.
6. Keep your stomach muscles firm, preventing over-arching of your back.
7. Lift with your legs, not with your back,
8. Maintain the three natural curves of your spine.
9. Use smooth, controlled movements to lift.



Lifting/reaching overhead. Keep abdominals tight and shift weight onto



Golfer's Lift

## Rules for Reaching

1. Always check the weight of the load before moving it. Test one corner.
2. Reach only as high as you comfortably can. Avoid stretching.
3. Use a step stool when appropriate.
4. Let your arms and legs carry the weight, not your back.
5. Keep the load close to you. Allow one leg in front of the other for support.

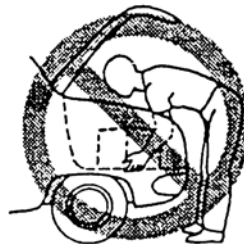
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## Rules for Pulling and Pushing

1. Stay close to load, do not lean forward.
2. Whenever possible, push rather than pull. You can push twice as much as you can pull without strain.
3. Use both arms.
4. Tighten your stomach muscles when pushing.
5. Keep hips facing in the direction of the push.



Kneel when working in a low position.



Reaching into car.



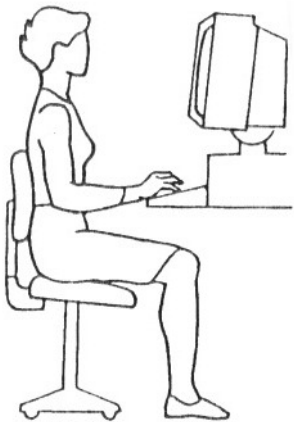
## Rules for Bending

1. Kneel down on one knee or squat with feet apart.
2. Maintain the three natural curves of your back.
3. Bend knees and hips, not your back.
4. When leaning forward, move your whole body, not just your arms.

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## Rules for Sitting

- 1. Maintain the normal curves in your spine.**  
Use a cushion or rolled towel if your chair does not provide adequate support for your lower back.
- 2. Place feet comfortably on the floor or footrest.**  
The chair should not dig into the back of your knees. Your feet should rest on the floor or footrest and should not dangle.
- 3. Locate materials within arm's reach.**  
This will help you avoid awkward movements or excessive reaching.
- 4. If you have limited legroom, try sliding forward on the chair slightly and lowering your knees.**  
This will allow you to get closer to your work. This position is not recommended for extended periods of time because it increases pressure on the backs of the legs.
- 5. Perform some of your work standing, if the job permits.**  
This can reduce some of the pressure on your back.
- 6. Change positions frequently throughout the day.**  
This is the best way to handle the demands of sitting.



Proper Sitting Posture  
Head Positioned  
Shoulder Blades Positioned  
Neutral Pelvis

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## Rules for Standing

1. **Maintain the normal curves of your spine as much as possible.**  
This may require you to raise or lower the workstation.
2. **Stand on anti-fatigue mats and/or wear soft-soled shoes or inserts.**  
This will reduce the demand on your legs and back.
3. **Use a foot support to relieve the demand on your legs, or place your foot on an elevated surface from time to time.**  
This also keeps the back in a balanced position.
4. **Do not stand with your legs in a locked position.**  
Stand with a slight bend in the knees to help the muscles in your legs absorb shock. This also improves circulation.
5. **Stand with your legs shoulder-width apart, with one foot slightly ahead of the other.**  
This provides a wide base of support and allows you to shift your weight comfortably while you are working.
6. **Keep your stomach muscles firm while standing.**  
This will prevent you from standing with your back in an over-arched position.
7. **Stretch periodically to give your back a break.**  
This is important if your workstation is not adjustable and you work in a forward bent posture.



**Sway Back**  
Too much arch  
in back; knees  
locked



**Flat Back**  
Rounded  
lower back



**Neutral**  
Efficient  
posture

## Rules for Repetitive Motion

1. Keep the loads small.
2. Turn your whole body by moving your feet instead of twisting.
3. Get close to the load; don't reach and lift.
4. Lift with your arms and legs, not your back.
5. Tighten your stomach muscles to lift.
6. Change positions frequently.

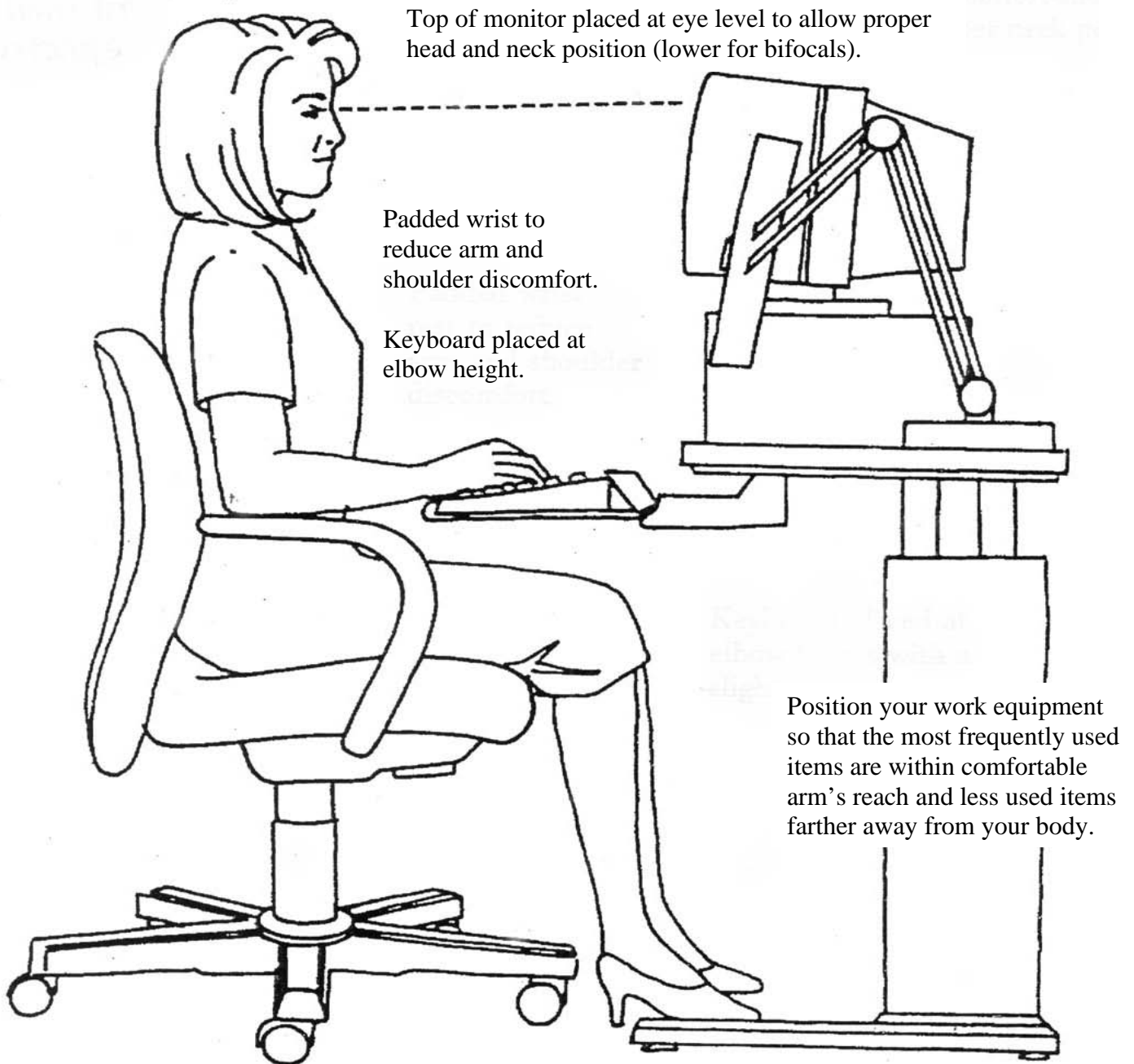
## Rules for Turning

1. Pivot with your feet – don't twist.
2. Maintain your three natural curves.
3. Allow for clearance.
4. Keep the load in front of you.

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## Working in Neutral

### What can you do to improve your work station?



A good chair with proper lumbar support.

Easily adjustable furniture.

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