

# Ergonomic Principles

## Physiotherapy in Ottawa Area for Work Activities

Ergonomics is about fitting the task to the person, and fitting the person to the task. When ergonomic principles are applied in a work environment, many workplace injuries are avoided and work performance can be improved.

To have "good ergonomics", ergonomic risk factors with the task and the individual must be identified and eliminated or reduced.

### THE TASK

**Some common ergonomic risk factors associated with the task include:**

Awkward postures.

- Prolonged positions.
- Repetitive movements.
- Excessive force.
- Contact stress.
- Environmental conditions such as heat, cold, loud noise and poor visibility.
- Vibration.



**Awkward postures:**

Awkward postures are body positions that are uncomfortable, or put the body parts in use in a mechanical disadvantage. Muscles and joints work most efficiently in specific positions, usually at the mid point of the joint's range of movement. When muscles are working at the same time as they are being stretched, they are more susceptible to injury.



**Prolonged positions:**

Positions held for long periods of time can cause fatigue to supporting muscles which results in discomfort and can lead to injury if fatigued muscles are required to work. Certain positions place increased pressure on body structures, and if held for long periods of time can cause damage to those structures. A common example of this is the pressure exerted on discs in the lower back whenever the low back is in a flexed position such as driving or sitting in a chair.



### **Repetitive movements:**

Repetitive movements can lead to overuse of muscles and tendons. Muscles and tendons may be subjected to microtrauma that causes pain. This is especially problematic if the repetitive movements are also performed in an awkward posture. In this case, muscles and tendons may actually rub against other bony structures causing wear or breakdown within the muscles and tendons.



### **Contact Stress:**

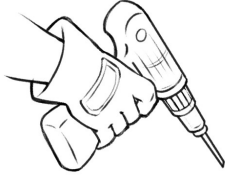
Contact stress occurs when there is pressure exerted on a body part, for example, when kneeling on the floor for an extended period there is contact stress on the knees. Contact stress can cause irritation to the body, particularly when combined with awkward postures.

### **Environmental conditions:**

Muscles fatigue faster in hot conditions and gripping objects or tools can become difficult to maintain with sweaty palms. Alternating between tasks, or taking more frequent breaks from the task may be required when working in hot weather or confined spaces.

In cold conditions, blood flow to the extremities is reduced and consequently muscle performance is reduced. Wearing appropriate clothing and warming up the working muscles with light exercise before commencing the work duties may minimize the impact of cold weather.

Loud noise can compromise attention to a task and can create tension within the body. Poor visibility may lead to poor hand-eye co-ordination during a task, or may place the body in an awkward position while straining to see properly.



### **Vibration:**

The blood supply to vibrating areas of the body is reduced, which reduces the ability of the muscles to contract and leads to more rapid fatigue. Whole body vibration is experienced by operators of vehicles, particularly heavy vehicles. Hand-arm vibration occurs in workers using vibrating or impact tools such as rattle guns, drills or hammers.

### **How to Reduce Ergonomic Risk Associated with the Task. (Heirarchy of Control):**

1. Eliminate the task.

This is the most effective way to reduce ergonomic risk, but is usually the most difficult, and is often not an option. For example, repairing a heavy piece of machinery (such as a pump or engine) on site, rather than removing it for repair, eliminates the task of moving the machinery.

2. Substitute the task.

For example, using a trolley to transport boxes from A to B, instead of a person carrying the boxes.

3. Modify the task.

This includes changing tools or equipment, breaking up the task so that it is shared between people or is performed in shorter bursts of activity interchanged with different activities.

4. Personal protective equipment.

This is the least effective method of managing ergonomic risk. It includes the use of knee pads and gloves for absorbing pressure, shock and vibration, reducing the impact on the body.

### **THE INDIVIDUAL**

#### **Some common ergonomic risk factors associated with the individual include:**

1. Acquired postural changes:

Over time the body can develop poor posture from repeated tasks, even in a proper ergonomic environment. Without regular attention to posture, these changes have a risk of causing strain, nerve compression, muscle injury, and may lead to permanent changes.

2. Restricted range of motion:

If joints don't have full range of motion due to degenerative change or previous injury, the joint surfaces may be under increased or abnormal load. Muscles and tendons surrounding the affected joints may also be at risk of overuse or injury due to altered biomechanics.

3. Inadequate cardiovascular fitness:

Cardiovascular endurance is essential for many physical jobs. Without proper fitness, the individual will fatigue quickly and be unable complete job demands.

4. Inadequate physical strength:

If the individual does not possess enough strength to complete the job tasks such as lifting, carrying, pushing, pulling or tool use he or she will be at risk of physical injury.

5. Physical disabilities:

Individuals with permanent physical disabilities (eg. altered visual acuity or hearing, amputation, spinal cord injury, physical trauma) may have increased risk of overuse in affected or other tissues due to altered perception, biomechanics, or strength.

### **How to Reduce Ergonomic Risk Associated with the Individual.**

Maintaining physical health and good posture is essential for preventing injury. A Functional Abilities Evaluation (FAE) can assess an individual's fitness to perform tasks associated with a job.

### **How Physiocare Physiotherapy & Rehab Centre can help:**

At Physiocare Physiotherapy & Rehab Centre, we can help reduce your ergonomic risk factors by analyzing the postures and movements that you use during your work activities, as well as analyzing your body and it's ability to perform the tasks. Physiotherapists can conduct a Functional Abilities Evaluation (FAE) to assess your physical ability to meet the demands of your job. We may identify risks within your job such as awkward postures and make suggestions for improvement. We may discuss your typical work day with you and provide guidance for avoiding injury or to assist in the recovery of an existing injury. We may suggest you plan your work day to break up prolonged positions with other tasks. We may design a program of stretches that you can do at your workplace to reduce muscle tension created by work activities.