



City of Burlingame

Ergonomic Program



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1.0 INTRODUCTION

Ergonomics is the study of the relationship between the work environment and the worker. Ergonomics addresses the physical capabilities of the worker as they interact with tools, equipment, work methods and tasks within the working environment. The goal of ergonomics is to provide an understanding of the best practices that will reduce the incidence of work-place injuries (usually neuromusculoskeletal in nature) and provide effective and safe work environments. This is accomplished in two ways:

- a. By open communication between the employer and the employees and,
- b. By providing training to the employee. Training empowers the employee with the knowledge of how work injuries occur. With this knowledge, the employee and employer can take steps to reduce the injury rates and the severity of injuries that do occur.

Providing the employees of the City of Burlingame with a basic understanding of ergonomic principles is the goal of this document.

1.1 THE ERGONOMIC PROGRAM

The core of the ergonomic program consists of individual workstation evaluations, group lectures and this informational document. During the lecture portion, there will be information presented on the anatomy, physiology and biomechanics of the body. There will also be discussions about how injuries occur, how to recognize potential risks, how to minimize risks and actions to take if an injury occurs. A hand out will be provided to be used as a daily reminder of proper ergonomic methods. Individual employee training in their immediate work area will assist in implementing a successful ergonomic program. By understanding how the body functions and how it reacts to various stimuli in the work environment, the employee and employer can recognize risk factors and possibly prevent injuries before they occur. With proper training, a basic knowledge of biomechanics and the ability to recognize the symptoms of cumulative trauma injuries, employees are less likely to sustain an injury in the workplace.

1.2 NEUROMUSCULOSKELETAL DISORDERS

Neuromusculoskeletal disorders involve muscles, tendons, ligaments, bones, and nerves. Symptoms, such as pain, swelling, fatigue, stiffness, numbness, inflammation and tingling are common in neuromusculoskeletal disorders. These disorders include sprains, strains, degeneration, arthritis, stress fractures and fractures in addition to many other disorders.

1.3 COST OF INDUSTRIAL INJURIES

According to the American Industrial Hygiene Association, four out of ten injuries resulting in loss of work time are due to sprains and strains, mostly involving the back. The Bureau of Labor Statistics, in 1993, reported more than one million workers suffer back injuries each year. Back injuries account for one in five workplace injuries or illnesses. In 1997, approximately 2.9 million injuries led to lost workdays, restricted duties at work, or both. Additionally, 65% of all working women suffer from musculoskeletal disorders, resulting from jobs such as keyboarding, data entry, cashier work and laser scanning.

1.4 ERGONOMICALLY DESIGNED WORKSTATIONS

Ergonomically designed workstations can:

- a. Decrease incidence and severity of industrial injuries.
- b. Increase safety, efficiency, and productivity.
- c. Provide physical comfort for specific tasks.

1.5 REDUCING MUSCULOSKELETAL DISORDERS

Reducing musculoskeletal disorders such as Repetitive Motion Injuries (RMI) through:

- a. **Work site analysis:** a safety and health review that identifies workstation risk factors,
- b. **Risk prevention and control:** recognize potential risk factors and minimize the impact of those risk factors,
- c. **Medical management:** prompt treatment of workplace injuries.
- d. **Training and education:** provide employees with an understanding of the risk factors, the potential for injury and the causes and symptoms of injuries. With this knowledge, employees are empowered to prevent injuries from occurring and understand the importance of treatment if an injury has occurred.

2.0 THE FOUR "W" S OF ERGONOMICS

What is ergonomics?

Applied ergonomics is the science of fitting workplace conditions and job demands to the capabilities of employees. Ergonomic principles are used to improve the "fit" between the worker and the workplace, taking into consideration the relationship between employees and the work environment, including tools, equipment and work processes. These interrelationships are then evaluated to ensure suitable work environments with an emphasis on safety and efficiency.

Why is ergonomics beneficial?

Applying ergonomic principles can decrease workplace injuries, illnesses, workers' compensation costs, absenteeism and turnover. It can also increase worker productivity, morale and overall feelings of health and well being.

Where should ergonomics be implemented?

Ergonomics programs should be implemented at work, in the home, and anywhere the body is bending, twisting, lifting, standing or sitting for a long period of time. Ergonomic principles should be incorporated into activities of daily living.

Who provides ergonomic services?

Ergonomic services are provided by individuals with an extensive knowledge of anatomy, physiology and biomechanics. However, input from the employee is critical since they perform tasks on a routine basis, and may assist the ergonomist by describing any symptoms they may be experiencing. Therefore, a symbiotic relationship develops between the evaluator and the employee. Both benefit from the expertise and experience of the other.

3.0 RISK FACTORS OF INDUSTRIAL INJURIES

The seven risk factors for developing musculoskeletal disorder (MSD) or repetitive stress injuries (RSI) increase with the number and severity of these risk factors.

1. Frequency: how often the task is performed per unit of time.
2. Duration: how long the task is performed.
3. Temperature Extremes: exposure to extreme heat or cold has an effect on soft tissue.
 - a. Extreme cold constricts blood vessels and reduces sensitivity and coordination of the hands.
 - b. Excessive heat can result in increased fatigue and heat stress.
4. Vibration: either whole body (jackhammer) or localized (power tools). Prolonged vibration can cause micro trauma to the involved areas.
5. Awkward Position: compromises the supportive soft tissue (muscles, ligaments, tendons and discs). Injury risk increases when exertion is applied during awkward positions or postures.
6. Static Posture: occurs when one position is held for a prolonged period of time.
7. Contact Stress: is caused by any sharp or hard object putting localized pressure on a part of the body.

4.0 TWO MAIN CATEGORIES OF INJURIES

There are two main categories of injuries: traumatic and cumulative trauma (also known as "insidious onset") injuries.

- a. *A traumatic injury* occurs at a given moment in time and symptoms are present immediately. Examples of this type of injury include being hit by a truck, falling down a flight of stairs, twisting an ankle or hurting your back while lifting a heavy object. These types of injuries are easy to recognize because of the sudden onset of the injury and the symptoms. Injuries of this nature require immediate reporting and treatment.
- b. *Cumulative-trauma*, or "insidious onset" injuries, is harder to recognize. They occur over a longer period of time and the symptoms often present themselves gradually. Examples of this type of injury include carpal tunnel syndrome, thoracic outlet syndrome, low back pain, headaches, trigger points, stress

fractures, repetitive motion injuries, strain or sprain injuries and many others. These injuries are often referred to as repetitive strain injuries RSI.

Cumulative trauma injuries are usually not recognized or reported immediately because of the slow progression of the symptoms. Employees often rationalize these conditions, thinking they must be getting old, or that the problem will go away, or that sitting at a desk cannot cause an injury, etc. This rationalization or denial delays recognition and subsequent treatment of the condition. The injury is finally reported when the condition reaches a point where the employee can no longer perform the usual and customary duties at work, or when the pain becomes intolerable. By this stage, the injury has progressed, making treatment more difficult, prolonging recovery time and often increasing costs dramatically. Very often simple modifications to a work area, or work method can resolve many problems, but only if the problem is recognized and reported early enough.

5.0 SIGNS AND SYMPTOMS OF INJURIES

Depending on the type and severity of the injury, the signs and symptoms may include, but are not limited to, one or all of the following:

- a. Pain (sharp, shooting, radiating, diffuse, burning, pinpoint)
- b. Swelling
- c. Stiffness
- d. Redness
- e. Numbness
- f. Tingling
- g. Inflammation
- h. Muscle weakness
- i. Muscle atrophy or muscle loss
- j. Joint irritation or pain
- k. Discomfort with exertion, etc.

These symptoms can be localized in one anatomical area or present diffusely over a larger area, If an employee experiences any of these signs or symptoms, especially while performing usual and customary work duties, it may be the start of a cumulative trauma injury and needs immediate attention. Most individuals take their good health for granted until an illness or injury is sustained. Acute low back pain can sometimes be debilitating enough to make activities of daily living unbearable.

6.0 IN THE EVENT OF AN INJURY OR SUSPECTED INJURY

6.1 REPORT THE INJURY

If an injury does occur, regardless of how minor the employee may think it is, an incident report must be filed. This will start a chain of events that will allow the employee to seek treatment for

the injury if it is warranted. In California, a work-place injury is considered a no fault event. This means that only under certain circumstances is either the employer or employee considered to be negligent for their actions or inaction. Reporting the incident establishes a permanent record, which is especially important if future complications should arise.

6.2 SEEK APPROPRIATE TREATMENT

Employees must report symptoms or potential injuries to their supervisor or Human Resources as soon as they are discovered. Once an injury has been reported, prompt treatment can be provided. It is important that injuries be treated early to ensure a more serious problem does not develop. Employers should urge injured workers to report and seek treatment for all work place injuries.

6.3 RE-EVALUATION OF THE INJURED WORKERS' WORK ENVIRONMENT

Re-evaluation of the injured workers' work environment can reveal clues as to why the injury occurred and how to prevent future injury. Upon returning to work, this re-evaluation should occur promptly. The goal is to identify and address all factors that could prevent full recovery of the injured employee.

6.4 TRAINING

Ergonomic training for the City of Burlingame includes:

- a. identifying risk factors and potential causes
- b. defining symptoms of musculoskeletal disorders
- c. informing employees on where to report symptoms
- d. informing employees how to report risk factors

All new employees, or current employees in new jobs, require appropriate training. Training is also advisable when:

- a. new processes, equipment or procedures are introduced in the workplace
- b. an employee has been off of work for more than 30 days
- c. injury incidence or severity increases
- d. performance diminishes

7.0 A TEAM APPROACH

Both the employer and the employee are responsible for minimizing risks in the work environment. The employer should provide effective workstations, work areas, training and education to all employees. Each employee should follow the guidelines and training provided by the employer. If this does not occur, both may realize a financial loss, but the employee will endure the pain and suffering of the injury.

Work practice controls are methods and procedures to reduce the risk of industrial injuries that should be implemented by management and followed by managers, supervisors and workers.

7.1 GRADUAL INTRODUCTION TO WORK

New and returning employee involved in higher risk jobs, such as those requiring prolonged repetitive motion, should be introduced gradually to a full workload to improve work capacity and prevent injury.

7.2 RECOVERY PAUSES

Regular "recovery" pauses in work can help prevent eye strain, headache, neck, back, shoulder, and arm or hand pain. Employees can perform activities that involve different muscle groups during these pauses, which should be at least 60 seconds in length every 15 minutes.

7.3 JOB ROTATION

Job rotation is an effective method to reduce injury rates. It also increases the value of each employee, because individual skill sets broaden. Job rotation can be used as an intermediate solution to injury avoidance while other strategies are implemented. Employees rotate into jobs using different muscle groups to reduce fatigue and potential for injury.

7.4 JOB DESIGN

Jobs can be (re-) designed to incorporate good ergonomic practices. These include providing relief from frequent repetitive motions, static or awkward postures, excessive forceful exertion, or mental and muscular fatigue.

7.5 MAINTENANCE AND HOUSEKEEPING

Regular tool maintenance ensures that employees have the proper tools and equipment, and that they are in proper working order, performing to specifications. Equipment that is not maintained and cleaned can make regular operations difficult. Worn-out tools or furniture should be replaced; dull tools should be sharpened. Housekeeping should be done as often as necessary to reduce neuromusculoskeletal injuries.

7.6 WORK METHODS DESIGN

Work methods should be designed so that work can be completed safely and comfortably, and factors contributing to work-related musculoskeletal disorders are minimized. Here are several risk factors, and examples of how work methods can be changed to reduce them:

1. Static or awkward postures:

Prolonged static or awkward postures can rapidly cause fatigue. Work should be done so neutral postures are maintained, and awkward positions are avoided.

2. Mechanical stress:

Muscles, nerves, tendons and blood vessels can be damaged by exposure to hard or sharp edges, such as a table edge. Equipment should be placed such that employee minimizes contact with it. Padding corners and surfaces can reduce contact stress to the extremities, which is where most contact injuries occur.

3. Repetitive-motion tasks:

Tasks involving repetitive motion are major contributors to cumulative-trauma disorders. You can minimize repetition by:

- a. using automation, including stapling, sorting, labeling and filling operations
- b. changing the job to include tasks that alternate muscle groups
- c. providing mini rest breaks

4. Work rates:

The capacity of workers should be considered in establishing production goals. Increased work rates, excessive overtime and incentive programs for piece-work can cause fatigue, increasing the chance for injury.

8.0 WORK STATION DO'S AND DON'TS - GENERAL GUIDELINES

Try to maintain good posture, paying special attention to the positioning of the head, neck, arms, wrists, shoulders, and back. Alternating postures will also reduce muscle soreness and joint stiffness.

- a. Is the head straight, not bent upwards (extended) or bent downwards (flexed)?
- b. Are the arms at 90-degree angles to the trunk of the body?
- c. Are the wrists positioned in a neutral position, not extended or flexed? This can help prevent tendonitis in the elbows and wrists.
- d. Are the shoulders held down and back, not elevated and rounded forward? This can help prevent shoulder and upper back pain?
- e. Does the chair back have proper support to protect it from irregular curvature? This can help prevent back pain.
- f. Avoid resting elbows, forearms or wrists on hard surfaces or sharp edges such as tabletops or work surfaces.
- g. Try to alternate between work activities to use different muscle groups and avoid muscle fatigue and soreness.
- h. Do several stretching exercises throughout the day, preferably every 15 to 20 minutes. Standing up and stretching only takes a few seconds and will help the individual stay alert while reducing body stiffness and muscle soreness.
1. Do not cradle the telephone between your head and shoulder.
- j. Reduce monitor glare by using anti-glare filters or adjusting the monitor angle to be near vertical.

- k. Adequate and proper lighting will reduce eye strain.

8.1 WORKSTATION CHECKLIST

A "no" response indicates potential problem areas that should receive further investigation.

- a. Does the working space allow for a full range of body movement?
- b. Are mechanical aids and equipment available?
- c. Is the height of the work surface adjusted properly?
- d. Is the workstation designed to reduce or eliminate bending or twisting at the waist, reaching above the shoulder, static muscle loading, extending the arms, bending or twisting the wrists or raised elbows?
- e. Is the employee able to vary their posture?
- f. Are hands and arms free from pressure from sharp edges on work surfaces?
- g. Is an armrest or footrest provided where needed?
- h. Is the floor flat and clear of obstructions?
- i. Are cushioned floor mats provided for employees who are required to stand for long periods?
- J. Is the chair or stool easily adjustable and suited to the task?
- k. Are all task requirements visible from comfortable positions?

9.0 SPECIFIC WORK ENVIRONMENTS

9.1 VDT OPERATORS

Monitor

- a. Is the monitor located in front of the operator, with the top of the screen horizontal to the employee's eye level?
- b. Is the monitor vertical?
- c. Is text font large enough to read easily?
- d. Is use a document holder used when transcribing information?

Keyboard

- a. Is the keyboard located in front of the employee?
- b. While typing or data entry, there should be no contact stress of the forearms, elbows or wrists
- c. The elbow should be at an angle of 90 degrees and the forearms parallel with the floor. This might require the keyboard be placed on a keyboard tray.
- d. Are the wrists in a neutral position or bent slightly downward?

- e. Is a wrist pad used for comfort and the proper elevation of the wrists?

Mouse

- a. The mouse should be directly beside the keyboard.
- b. A wrist pad provides support while operating the mouse.
- c. The wrist should be in a neutral position while operating the mouse.

Chair

- a. The chair should be adjusted so that the employee's feet are flat on the floor and the knees are at a 90-degree angle.
- b. Employee should sit all the way back in the chair so that the low back is supported by the chair back.
- c. The back and neck should be straight and not leaning forward, arms should not be in constant contact with the armrests.
- d. Remove wallets from back pockets.

Telephone

- a. Do not cradle the telephone between the head and shoulder.
- b. For frequent phone users, having a hand free head set improves efficiency and decreases shoulder and neck fatigue.

9.2 MATERIALS HANDLING/MOVEMENT

Lifting, carrying, pushing or pulling objects can strain the back, arms and shoulders. Strength and lifting limits should not be exceeded. Pushing and pulling objects towards and away from the body, instead of across the midline (from side to side), reduces injury risk, especially injury to the back. This proper body mechanic technique prevents the body from awkward postures and harmful twisting of the shoulders, upper and lower back, and mid torso.

The following steps will make materials handling/movement easier and safer:

- a. Lift with the legs, keep the back straight, keep the load close to the body.
- b. Do not exceed the physical ability of the employee.
- c. Provide adequate recovery time for tasks that require frequent lifting.
- d. Provide easy access so the load is in front of the person lifting.
- e. Eliminate twisting during lifting.
- f. Provide handles or cutouts to make grasping easier and permit a closer lift.
- g. Decrease the weight of objects or get assistance.
- h. Distribute a load evenly within a container.
- i. Use hand carts or hand trucks, when necessary.

- j. Use loaders, cranes, and motorized material pallets to help move loads that are larger or heavier than one or two people can safely handle.

9.3 STORAGE

Storage areas should be organized so workers can maintain good body positions, reduce muscular forces and avoid excessive reaching. Store heavy items between knee and shoulder height and frequently used items closest to the worker.

9.4 WORKSPACE LAYOUT

- a. The worker should maintain a neutral posture. Avoid awkward or extended reaches and jerky movements while performing tasks.
- b. Use a variety of working positions to avoid static postures.
- c. Ensure adequate leg room.
- d. Provide adequate space for all necessary tools and equipment, while providing easy access to them.
- e. Frequently used work items to be within easy arm's reach.

9.5 MINIMIZE WORK-ENVIRONMENT HAZARDS

- a. Isolate equipment or operations that produce loud or distracting noise.
- b. Make lighting bright enough without causing glare.
- c. Isolate hands and feet from cold.
- d. Reduce whole-body vibration while riding in a vehicle or standing near vibrating equipment.
- e. Isolate workers from excessive heat; provide adequate cooling and ventilation.

10.0 EMPLOYEE ON THE MOVE

10.1 STRETCHING ROUTINE

Stretching of muscles, tendons and ligaments is important for proper body function. Stretching increases the flexibility of muscles, increases blood flow and aids in the removal of metabolites. Stretching provides additional lubrication for the joints and assists in relaxing the muscles that move those joints. Muscles become tight and sore from overuse or maintaining static or awkward postures. Since muscles overlap joints, tight or contracted muscles pull on the joints causing joint and muscle pain that can even alter posture.

10.2 EYE EXERCISES

VDT operators can experience eye fatigue while operating computers for extended periods. Eyes become fatigued or strained if a static contraction is held on a fixed object at a fixed distance, such as a monitor. Eyes should be moved in a full range of motion and focus,

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- a. Focus on a fixed object within close reach, then focus on a fixed object across your office, then focus on a fixed object across the room or outside. Repeat this exercise frequently; it only requires a few seconds.
 - b. Roll your eyes in circles. Use the full range of eye movement.

11.0 **GLOSSARY**

Awkward posture: Deviation from the ideal neutral working posture. Awkward postures include reaching behind, twisting forward or backward while bending, pinching with the fingers, or squatting among others.

Engineering controls: A method of controlling worker exposure to risk factors by redesigning equipment, tools, and work stations. Engineering controls are part of injury prevention and control.

Ergonomics: Is the study of the relationship between the work environment and the worker. Ergonomics addresses the physical capabilities of the worker as they interact with tools, equipment, work methods, tasks, and the working environment. The term comes from the Greek words "ergos" meaning "work", and "nomos," meaning "natural laws off". Ergonomics addresses the physical and mental capabilities and limits of the worker as he or she interacts with tools, equipment, work methods and tasks within the work environment.

Fatigue: A condition that results when the body cannot provide enough energy for the performance of a specific task.

Musculoskeletal disorders: Illnesses and injuries that affect one or more parts of the musculoskeletal system.

Neutral posture: Comfortable working posture that reduces the risk of musculoskeletal disorders.

Personal protective equipment: Gloves, kneepads, protective eye wear and other equipment that help reduce risks.

Repetitiveness: Performing the same motions repeatedly. The severity of risk depends on the frequency of repetition, speed of the movement or action, the number of muscle groups involved, and the required force.

Risk factors: An aspect of a job that increases the worker's chance of getting a work-related musculoskeletal disorder.

Static loading: A physical effort or posture that is held statically and requires muscles to sustain prolonged contractions.

Work practice controls: Procedures for safe and proper work that are used to reduce the duration, frequency or severity of exposure risk. They include work methods training, job rotation, and gradual introduction to work. Work practice controls are part risk prevention and control.

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