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Preventative Measures for Common Musculoskeletal Disorders Found in the Office Environment

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Although working in an office environment might seem like it should be risk free, there are still opportunities for workers to become injured or to develop illnesses. A company that is proactive in eliminating risks and hazards can reduce the likelihood of injuries and illnesses occurring. One way to do this is to embrace ergonomics.

Ergonomics studies the relationship between people and their working environment. It is concerned with fitting the job to the worker, not the worker to the job. In this respect, ergonomics plays an important role in ensuring that the risk factors associated with developing musculoskeletal disorders (MSDs) are recognized and eliminated. MSDs are injuries and disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, and spinal discs. Examples of physical signs associated with MSDs are decreased range of motion or grip strength, and examples of physical symptoms are numbness, burning, pain, tingling, cramping, and stiffness.

The Need to Reduce MSDs

Despite an overall decrease in the number of MSDs occurring each year, they still account for one-third of all lost workday injuries and illnesses (BLS, 2003; Chao, 2002). MSD cases in 2001 accounted for 522,500 lost workday cases with carpal tunnel syndrome (CTS) having the highest median days (25) away from work (BLS, 2003). Data collected by the California Department of Health Services found that of those who had been diagnosed with CTS, 49 percent reported using a computer (NIOSH, 2000). Specifically, injuries and illnesses caused by typing or key entry resulted in a median of 16 days away from work (BLS, 2003). What's more, MSDs cost businesses $15 to $20 billion dollars in workers' compensation costs each year. Indirect costs may run as high as $45 to $60 billion dollars (OSHA, 2000). The average total cost per claim for a cumulative trauma disorder is $15,301, and the average cost per claim for a carpal tunnel injury is $16,308 (NSC, 2002).

MSDs, Risk Factors, and Work Association

Reviews of epidemiological research have provided reliable evidence that there is an association between MSDs and certain work environment risk factors. The probability of an MSD occurring is even greater when there are high levels of exposure and when individuals are exposed to a combination of more than one risk factor (Bernard, 1997; NRC, 2001). Specific work-related risk factors that have been identified as causing MSDs are:

- Awkward, deviated, or static postures
- Excessive force
- Highly repetitive work
- Contact stress or pressure
- Vibration
- Environmental factors — cold or hot temperature extremes, noise, lighting, etc.

Evidence has also been found that factors such as age, gender, smoking, physical activity, and obesity can be related to the development of MSDs. Non-occupational activities might also increase the risk for developing MSDs because an individual is continuing exposure to risk factors for longer periods of the day (Bernard, 1997; NRC, 2001). That being said, it is a reality that people are exposed to risk factors at work that could result in developing MSDs. It is important to be able to identify those risk factors in order to reduce or eliminate workers' exposure to them.

MSDs and the Office Environment

Parts of the body commonly affected by MSDs are the eyes, neck, shoulders, arms, wrists, hands, fingers and thumb, back, and legs. Several epidemiologic studies of physical exposures (force, repetition) and psychosocial exposure (perceived stress, job demands) have found a relation between computer-related tasks and the development of MSDs (NRC, 2001). In one study, 20 to 25 percent of employees who performed data entry tasks had almost daily discomfort in the upper torso (Sauter, et al., 1991). Besides discomfort in the upper torso, computer users are experiencing more vision-related symptoms as the time they spend on computers continues to rise. It has been reported that 50 percent or more of individuals who use computers experience at least occasional eye strain (Lim, et al., 1998). Additionally, these studies have found the development of MSDs by computer users to be partially explained by user posture, workstation ergonomics, repeated work measurements, and keyboard and monitor positioning. (Sauter, et al., 1991; Bergqvist, et al., 1995).

Being proactive and using ergonomic principles to design workstations and select furniture from the outset of a project is the most cost-effective approach companies can take to reduce MSDs in the work environment. However, sometimes a company must take a reactive approach to ergonomics when workers develop MSDs. The table that follows identifies and discusses some of the MSDs that are commonly experienced in the office environment and identifies commonly recommended preventive measures that may help alleviate a worker's symptoms. Fortunately, solutions to ergonomic problems in the workplace are quite often simple and inexpensive (Bellingar, 2001).

Workstation Seating

- Provide ergonomic chair or stool.
- Ensure chair is properly adjusted.

Worksurfaces and Workstation Layout

- Properly adjust worksurface height.
- Position input devices at approximately the same height and distance from the user as the keyboard.
- Position supplies and equipment within easy reach.
- Lay out workstation to reduce or eliminate reaching above the shoulder. For example, don't place overhead storage units behind computer monitors.
- Ensure workstation has proper task lighting to reduce eye strain.

Computer Monitors

- Ensure the top line of the screen is slightly below eye level with the user in an upright posture. This may be different for individuals that wear bifocals/trifocals.
- Ensure that the monitor is placed between 18 and 30 inches from the user.
- Provide a flat-panel monitor for work surfaces that are less than 30" deep.
- Reduce glare on the monitor screen.

Keyboards

- Place keyboard directly in front of the user.
- Ensure keyboard or keyboard tray is at the appropriate height and angle for the user.

Input Devices (Mouse/Trackball/ Touch Pad)

- Place the input device directly to the side of the keyboard.
- Ensure user's mouse is clean.

Workstation Accessories

- Provide document holders.
- Provide footrests.
- Provide telephone headsets.

Work Practices and Tasks

- Encourage individuals to vary tasks.
- Ensure individuals take breaks — this is important for the eyes as well as the body.

Laptop Computers

- Provide an external keyboard and mouse or monitor when using a laptop computer in the office.

Conclusion

Embracing ergonomics and making ergonomic changes to the work environment will improve the safety and health of workers, as well as reduce the company's costs and productivity or quality issues.

Being able to recognize the risk factors workers can be exposed to in the work environment and the resulting MSDs that can develop will go a long way toward ensuring that workers do not develop work-related MSDs. However, recognizing them is just one step in the process. Evaluating workstations to determine which risk factors users are being exposed to, making the necessary changes, and training workers in how to adjust furniture and accessories cannot be overlooked. It's also important to consider the differences between people so that a proactive approach to ergonomics is taken when designing workstations and purchasing furniture and equipment.

The following table has been designed to help identify commonly recommended preventive measures that may aid in alleviating a worker's symptoms. It is not meant to be used as a tool to diagnose a musculoskeletal disorder. Anyone suffering from symptoms should seek medical attention from a physician. At any time, if an individual continues to experience discomfort after changes have been made to their workstation, or if you are unsure how to best apply these suggestions to the work environment, please consult an ergonomist.

Common Musculoskeletal Disorders in the Office Environment

Disorder (Body Part Affected)	Description	Symptoms	Contributing Factors	Commonly Recommended Preventive Measures
Bursitis (Joints)	Inflammation or irritation of the fluid-filled sac beneath the tendons (bursa).	Pain and stiffness aggravated by movement.	Injury or overuse during work or play. Often occurs in individuals who are poorly conditioned, have bad posture, or use the affected limb in an awkward posture.	Reduce or avoid the activity that caused the issue. Use proper positioning during the activity to prevent reoccurrence.
Bursitis — Shoulder (Shoulder/Upper Arm)	Inflammation of one of the bursa, located in the shoulder between the tendons and the head of the humerus bone.	Pain and stiffness aggravated by movement.	Arm elevation, adduction, and rotation.	Reduce work done above shoulder level.
Carpal Tunnel Syndrome (Hand/Wrist)	Compression of the median nerve in the carpal tunnel of the wrist.	Numbness, tingling, and pain in the wrist, thumb, index, middle and ring fingers — not the little finger. Early symptoms often wake people in the middle of the night. May also include swelling, weakness or clumsiness in the hand.	Rapid, often repeated finger movements, excessive wrist deviations, excessive or repeated forceful pinching and grasping. Swelling from adjacent problems may also aggravate or bring on carpal tunnel syndrome.	Reduce or eliminate repetitive work, wrist deviations, and forceful pinching and grasping. Avoiding or reducing the activity that is causing the symptoms often alleviates symptoms in mild cases.
Computer Vision Syndrome (Eyes)	Eye and vision problems related to near work, experienced during or related to computer use.	Eyestrain, blurred near or distant vision, headache, dry or irritated eyes, neck or back aches, light sensitivity, or double vision.	Improper workplace conditions. Work habits. Vision characteristics.	Make a conscious effort to blink while working and to take breaks away from your work. Refer to "Dry Eye Syndrome" for specifics related to it.
Cubital Tunnel Syndrome (Elbow/Ring and Little Fingers)	Compression of the ulnar nerve below the notch of the elbow. Often occurs in combination with medial epicondylitis.	Numbness, tingling and pain in the ring and little fingers. May include clumsiness and weakness in the hand. Also often results in elbow pain on the inside of the arm.	Resting the elbow on hard surfaces or sharp edges, excessive flexion of the elbow creating tension on the nerve.	Avoid or reduce contact stressors or prolonged pressure on the nerve. Avoid direct trauma to the nerve.

DeQuervain's Disease/ Tenosynovitis (Wrist and Forearm)	Irritation of the tendons on the side of the wrist which moves the thumb, and at the base of thumb.	Pain and swelling on the side of the wrist and forearm just above the thumb.	Combined forceful gripping and hand twisting.	Reduce force to hands. Keep hands in neutral postures.
Dry Eye Syndrome (Eyes)	The decline in the quality or quantity of tears that bathe the eye.	Dry, red, or irritated eyes, contact lens discomfort, or excessive reflex tearing.	Decreased blink rate. High gaze angle. Dry office environment.	Take a break every 30 minutes and look 30 feet away for 30 seconds.
Epicondylitis Medial Epicondylitis (Golfer's Elbow) Lateral Epicondylitis (Tennis Elbow)	Irritation or inflammation of the bumps (epicondyles) on either the outside or inside of the elbow or surrounding tissues. Medial is on the inside of elbow and lateral on the outside of the elbow.	Tenderness and pain at the affected site. May also include pain in the forearm muscles.	Unaccustomed strenuous activity or excessive stress of the forearm muscles or tendons that bend or straighten the wrist and hand.	Reduce or avoid activities that require use of the flexor muscles in a bending motion or grasping with the hand.
Lumbosacral Strain/ Sprain (Spine)	Abnormal deviations of alignment that cause compression to the bony structures and tension on muscles and ligaments.	Low back pain and possible pain in the legs.	Faulty alignment, standing for long periods, unguarded forward bending, sudden forceful movement. Also poor conditioning, improper use, obesity, and smoking.	Reduce static loading, carrying, manual material handling, and poor back postures. When lifting, use correct lifting and moving techniques and get help if an object is too heavy or an awkward size or shape.
Sciatica (Lower Back/ Legs)	Pain along the course of the sciatic nerve, which runs from the lower back down the back of the legs.	Pain extends down the posterior thigh and lower leg to the sole of the foot and along the lateral aspect of the lower leg to the dorsum of the foot.	Pressure on one or more of the nerve roots contributing to the sciatic nerve. Mechanical factor of compression or tension. Pain often occurs following an unusual movement or exertion that causes a tear in one or more of the intevertebral discs.	Reduce or avoid manual material handling. Avoid lifting and twisting at the same time. Avoid sitting in a slouched posture.
Tendonitis (Joints)	Inflammation or irritation of a tendon. Tendons attach muscles to bones. Occurs most often in the flexor and extensor tendons of the fingers, thumb, forearm, elbow, or shoulder.	Symptoms can range from specific aching, stiffness, tightness, and burning sensations to a deep, nonspecific pain. Grasp can be impaired.	Injury or overuse during work or play. Often occurs in individuals who are poorly conditioned, have bad posture, or use the affected limb in an awkward posture.	Reduce or avoid the activity that caused the issue. Use proper positioning during the activity to prevent reoccurrence.

Tendonitis (Elbow)	Elbow tendon inflammation.	See tendonitis.	Repetitive forceful exertions of forearm, rotations around elbow joint.	Reduce hand fasteners.
Tendonitis (Wrist)	Inflammation and thickening of the tendons in the wrist.	See tendonitis.	Forceful ulnar deviation and thumb pressure, repetitive wrist motion, forceful wrist extension, and pronation.	Reduce repetitions, poor postures, and forceful motions.
Tension Neck Syndrome (Neck)	Irritation of the levator scapulae and trapezium, all muscles of the neck. Causes tightening of the muscles in the neck.	Neck stiffness as well as headaches. Headaches are often described as a pressure sensation around the head. Pain may build and intensify at the end of day.	Lateral, static movement of the head and neck — flexion or extension of the neck.	Ensure proper neck postures, correct working heights, and adjust visual cues.

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