

MSD Prevention

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Abstract— The aim of this paper is to explain to the readers the definition of Musculoskeletal Disorder (MSD), what causes MSD to occur, who gets MSD, how to prevent MSD and last but not least the cost of ignoring MSD problems and some MSD studies. A couple of programs are tested that could prevent damage to the muscles.

Index Terms— Back Disability, Carpal Tunnel Syndrome, Musculoskeletal Disorder, Tenosynovitis, Trigger Finger, Raynaud's Syndrome, Rotator Cuff Tendinitis

1 INTRODUCTION

The aim of this paper is to explain to the readers the definition of Musculoskeletal Disorder (MSD), what causes MSD to occur, who gets MSD, how to prevent MSD and last but not least the cost of ignoring MSD problems and some MSD studies.

2 DEFINITION OF MSD

MSDs are injuries and disorders of the musculoskeletal system. They may be caused or aggravated by various hazards or risk factors in the workplace. The musculoskeletal system includes:

Table 1: Musculoskeletal System

Muscles, tendons and tendon sheathes	Nerves	Bursa
Blood vessels	Joints/spinal discs	Ligaments

MSDs do not include musculoskeletal injuries or disorders that are the direct result of a fall, struck by or against, caught in or on, vehicle collision and violence.

2.1 What Are Musculoskeletal Disorders (Msd)

MSDs are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints or spinal discs. A healthcare provider might diagnose the following common MSDs.

Table 2: Common Msd

Carpal Tunnel Syndrome	Rotator Cuff Syndrome	Trigger Finger
Sciatica	Tendinitis	Reynaud's Phenomenon
Herniated Spinal Disc		

2.2 Purpose of the Msd Prevention Guideline

The purpose of the MSD Prevention Guideline is to provide employers and workers with information and advice on a recommended generic framework for preventing MSDs in the workplace. For workplaces that already have an MSD prevention program in place, the MSD Prevention Guideline may be helpful when considering whether existing program elements can be modified or improved.

For workplaces that do not have an existing MSD prevention program, the guideline and related materials can be used to implement an effective MSD prevention framework and/or integrate MSD prevention into the existing health and safety program.

2.3 Health and Safety Program

MSD prevention does not have to be difficult or complex. All you really need is the ability and the will to recognize, assess and control MSD hazards in the same way you would any other hazard in the workplace.

3 WHAT CAUSES WORK-RELATED MSDS

Work-related MSDs occur when the physical capabilities of the worker do not match the physical requirements of the job. Prolonged exposure to ergonomic risk factors can cause damage a worker's body and lead to MSDs. Conditions that are likely to cause MSD problems include the following:

- Exerting excessive force;
- Excessive repetition of movements that can irritate tendons and increase pressure on nerves;
- Awkward postures, or unsupported positions that stretch physical limits, can compress nerves and irritate tendons.
- Static postures or positions that a worker must hold for long periods of time, can restrict blood flow and damage muscles.
- Motion, such as increased speed or acceleration when bending and twisting, can increase the amount of force exerted on the body;

Compression, from grasping sharp edges like tool handles, can concentrate force on small areas of the body, reduce blood flow and nerve transmission, and damage tendons and tendon sheaths;

- Inadequate recovery time due to overtime, lack of breaks, and failure to vary tasks can leave insufficient time for tissue repair.
- Excessive vibration, usually from vibrating tools, can decrease blood flow, damage nerves, and contribute to muscle fatigue.
- Whole-body vibration, from driving trucks or operat-

ing subways, can affect skeletal muscles and cause low-back pain; and

- Working in cold temperatures can adversely affect a worker's coordination and manual dexterity and cause a worker to use more force than necessary to perform a task.

These risk factors, either alone or in combination, can subject workers' shoulders, arms, hands, wrists, backs, and legs to thousands of repetitive twisting, forceful, or flexing motions during a typical workday. To contribute to MSDs, however, these risk factors must be present for a sufficient duration, frequency, or magnitude.

3.1 Can Non-Work-Related Factors Cause Msds?

Yes, risk factors not related to your job can cause or contribute to MSDs. These factors include:

- Physical conditioning.
- Medical conditions, such as obesity, diabetes, and arthritis.
- Pregnancy.
- Hobbies that are hand intensive or require manual handling. In these instances, however, because one can control the duration and exposures, hobbies usually are not primary risk factors.
- Psychological or social workplace stress.

3.2 What Types of Work Are Most Likely to Pose Ergonomic Hazards?

MSDs affect workers in almost every occupation and industry in the nation and in workplaces of all sizes.

The disorders occur most frequently in jobs that involve:

- Manual handling.
- Manufacturing and production.
- Heavy lifting.
- Twisting movements.
- Long hours of working in awkward positions.

You could have a work-related MSD if you experience any of the following:

- Numbness in your fingers.
- Numbness in your thighs.
- Difficulty moving your finger.
- Stiff joints.
- Back pain.

MSDs can affect nearly all tissues in the human body: the nerves, tendons, tendon sheaths, and muscles. The most frequently affected areas of the body are the arms and the back. Tendon disorders such as tendinitis, tenosynovitis, De Quervain's disease, trigger finger, and carpal tunnel syndrome are the most common occupational MSDs associated with the arm (Table 3).

Tendon disorders are very common and often occur at or near the joints where the tendons rub against other tendons, liga-

ments, or bones. The most frequently noted symptoms of tendon disorders are a dull aching sensation over the tendon, discomfort with specific movements, and tenderness to touch. Recovery is usually slow, and the condition may easily become chronic if the physical stresses causing the problem are not eliminated or reduced.

Another MSD that has received increased attention in recent years is carpal tunnel syndrome, or CTS, which affects the hands and wrists. CTS is the compression and entrapment of the median nerve where it passes through the wrist into the hand in the carpal tunnel. The median nerve is the main nerve that extends down the arm to the hand and provides the sense of touch in the thumb, index finger, middle finger, and half of the fourth, or ring, finger. When irritated, tendons housed inside the narrow carpal tunnel swell and press against the nearby median nerve. The pressure causes tingling, numbness, or severe pain in the wrist and hand often felt while sleeping. The pressure also results in a lack of strength in the hand and an inability to make a fist, hold objects, or perform other manual tasks. If the pressure continues, it can damage the nerve, causing permanent loss of sensation and even partial paralysis.

4 HOW MUCH DOES IT COST TO PREVENT MSDS?

- MSDs account for 34 percent of all lost-workday injuries and illnesses.
- Employers report 600,000 MSDs requiring time away from work yearly
- MSDs account for \$1 of every \$3 spent for workers' compensation.
- MSDs each year account for more than \$15 - \$20 billion in workers'
- On average, it takes workers 28 days to recover from CTS
- Workers with severe injuries can face permanent disability

4.1 Understand Msd Hazards

- **Force**

Force refers to the amount of effort made by the muscles, and the amount of pressure on body parts as a result of different job demands. All work tasks require workers to use their muscles to exert some level of force. However, when a task requires them to exert a level of force that is too high for any particular muscle, it can damage the muscle or the related tendons, joints and other soft tissue.

This damage can occur from a single movement or action that requires the muscles to generate a very high level of force. However, more commonly, the damage results when muscles generate moderate to high levels of force repeatedly, for a long duration, and/or while the body is in an awkward posture.

• Fixed or Awkward Postures

Posture is another name for the position of various parts of the body during any activity. For most joints, a good or "neutral" posture means that the joints are being used near the middle of their full range of motion.

The farther a joint moves towards either end of its range of motion, or the farther away from the neutral posture, the more awkward or poor the posture becomes and the more strain is put on the muscles, tendons and ligaments around the joint. For example, when arms are fully stretched out, the elbow and shoulder joints are at the end of their range of motion. If the worker pulls or lifts repeatedly in this position, there is a higher risk of injury.

• Repetition

The risk of developing an MSD increases when the same parts of the body are used repeatedly, with few breaks or chances to rest. Highly repetitive tasks can lead to fatigue, tissue damage, and, eventually, pain and discomfort. This can occur even if the level of force is low and the work postures are not very awkward.

• Remember You're Back When Lifting

B – Back Straight

A – Avoid Twisting

C – Close to the body

K – Keep the lift smooth (don't jerk)

Fingers, Hands	numbness, tingling; ashen skin; loss of feeling and control	chain saw, pneumatic hammer, and gasoline-powered tool operators	Raynaud's syndrome (white finger)
Fingers, Wrists	tingling, numbness, severe pain; loss of strength, sensation in the thumbs, index, or middle or half of the ring fingers	meat and poultry and garment workers, upholsterers, assemblers, VDT operators, cashiers	carpal tunnel syndrome
Back	low back pain, shooting pain or numbness in the upper legs	truck and bus drivers, tractor and subway operators; ware-house	Back disability

Table 3: Examples of Musculoskeletal Disorders

Body Parts Affected	Symptoms	Workers Affected	Disease Name
Thumbs	pain at the base of the thumbs	butchers, house-keepers, packers, seam-stresses, cutters	De Quervain's disease
Fingers	difficulty moving finger; snapping and jerking movements	meatpackers, poultry workers, carpenters, electronic assemblers	trigger finger
Shoulders	pain, stiffness	power press operators, welders, painters, assembly line workers	rotator cuff tendinitis
Hands, Wrists	pain, swelling	core making, poultry processing, meatpacking	Tenosynovitis

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