Risk Control Bulletin
Fatigue — In The Work Enviroment

RISK CONTROL

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Fatigue is the temporary inability or decrease in ability or a strong disinclination to respond to a situation because of previous over-activity, either mental, emotional or physical. Fatigue is defined as a reduced muscular ability to continue an existing effort. This phenomenon of reduced performance in the workplace is referred to as muscular fatigue and is characterized by reduced power and slower body movements. When muscular fatigue is excessive we see the manifestation of accidents (soft tissue injuries), increased errors that affect quality, and, in some cases, impaired coordination.

Muscles

The primary purpose of muscles is to support the skeletal system and to provide movement to body segments. The use of muscles to affect movement is the basis of all industrial tasks. Whether the tasks are large or small, muscles must contract so the worker can perform their job task.

What happens to the muscle when an employee is involved in heavy work? We know that when you start pushing, pulling, lifting, and carrying, the muscular contraction that ensues initiates a chemical process that provides the energy for a mechanical effort (the movement of the body and limbs). After the muscle contracts and is in a resting state the energy reserve is replenished (aerobic state). If the energy demand from the work being completed exceeds the rate of regeneration, the muscles begin to fatigue and go into an anaerobic state (lack of oxygen). This results in the development of lactic acid and potassium, which are believed to be the primary reason for muscle fatigue that can lead to soft tissue injuries and a reduction in productivity.

Dynamic and Static Movements

There are two types of work tasks; dynamic and static. The dynamic ones are characterized as movements of the body such as walking or lifting over hours or minutes. Static tasks are intense work activities for a short period, measured in seconds or minutes with an absence of body movement. The intensity of dynamic work that is acceptable in a job task varies with the length of time it must be sustained, so measuring this work is best done by determining the maximum percentage of oxygen uptake over different work times, expressed in hours. For example, a workload over an eight-hour shift should not exceed 33 % of a worker's capacity for that type work. If the hours are reduced, the maximum oxygen usage for a job task can be increased.

Static work efforts are when the muscles are contracted which, in turn, decreases the blood flow. This makes the heart work harder to overcome the resistance by increasing the beating rate and blood pressure. There is little energy supplied to the contracted muscles; however, this static state can be exhausting to the individual, leading to an increase in susceptibility to a soft tissue injury. When observing the industrial work environment, we see dynamic movement of bending; however, we typically do not recognize the use of static postures and do not identify these as risk factors in the workplace.

Therefore, we need to better design the job tasks to reduce the peaks and valleys of energy expenditure so there are short periods of high exertion and periods of lesser exertion. Working in this manner with peaks and valleys through an eight-hour work shift affects the productivity of the individuals by raising heart rates, blood pressure, and oxygen demands that are associated with excessive energy demands. These high levels of exertion require longer periods for rest and recovery, thus the efficiency and productivity of the employee begins to suffer over an eight-hour work shift, along with increased employee error rates, and reduced quality. Jobs should, therefore, be designed so the individual does not exceed 33% of their maximum aerobic capacity over an eight-hour shift.

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Strategy for Lowering the Exertion Levels

There are three basic methods to achieve a reduction in energy expenditure for job tasks with significant physical demands. The first is redesigning the job task or eliminating the activity that facilitates the high level of energy expenditure. If this can be accomplished then in most cases, the high-energy expenditure can be eliminated and the employee can work in a steady state that allows the optimal oxygen intake, heart rate, and blood pressure, thus reducing worker fatigue and the probability of soft tissue injury while improving worker productivity.

The second method involves providing manual material handling aids, such as lift tables, hoist, vacuum lifts, and conveyors, etc., to assist the employee during the job task. By providing aids of this nature, the physical task demands are reduced, as well as the amount of oxygen needed and high heart rate in job tasks with high-energy expenditures. Although these will not eliminate the high-energy expenditures, they will reduce the amount of energy needed to complete the task.

The third method entails the use of administrative controls, whereby the employee would get help from another employee or job rotation is used with several employees rotating in and out of the high exertion job tasks. This allows for a recovery period where the body can get back to a steady state. This method should only be set up for short periods, typically ninety days or less. The preferred method is redesigning or eliminating the job task with high level of energy expenditure.

Fatigue is a real issue in the work environment, and with the onset of the aging workforce that all employers face in every job sector today, it is very important that management begin to identify and evaluate those jobs associated with a high level of energy expenditure. By taking actions that address physical job fatigue you will not only be able to reduce the risk factors associated with job tasks that create the high energy expenditures, but can likewise improve productivity, and enhance quality.

For more information on fatigue and your work environment, please contact CNA Ergonomic Services at 214-220-5807.