



## Developing an Ergonomics Program

This material is for training purposes only. Its purpose is to inform Oregon employers of best practices in occupational safety and health and general Oregon OSHA compliance requirements. This material is not a substitute for any provision of the Oregon Safety Employment Act or any standards issued by Oregon OSHA.

### INTRODUCTION

**Note:** This on-line course includes information first published as the [NIOSH Elements of Ergonomics Program](#) in 1997. We are grateful for the hard work on NIOSH in producing much of this material.

#### What are work-related musculoskeletal disorders (MSDs)?



Musculoskeletal disorders include a group of conditions that involve the nerves, tendons, muscles, and supporting structures such as intervertebral discs. They represent a wide range of disorders, which can differ in severity from mild periodic symptoms to severe chronic and debilitating conditions. Examples include carpal tunnel syndrome, tenosynovitis, tension neck syndrome, and low back pain.

Work-related Musculoskeletal Disorders are caused or made worse by the work environment. MSDs can cause severe and debilitating symptoms such as:

- pain, numbness, and tingling
- reduced worker productivity
- lost time from work
- temporary or permanent disability
- inability to perform job tasks, and
- an increase in workers compensation costs

MSDs are often confused with ergonomics. Ergonomics is the science of fitting workplace conditions and job demands to the capabilities of workers.

**In other words, MSDs are the problem and ergonomics is a solution.**

#### What are the risk factors for MSDs?

Risk factors for MSDs include;

- repetitive, forceful, or prolonged exertions of the hands
- frequent or heavy lifting, pushing, pulling, or carrying of heavy objects
- prolonged awkward postures, and
- vibration contribute to MSDs

Jobs or working conditions that combine risk factors will increase the risk for musculoskeletal problems. The level of risk depends on how long a worker is exposed to these conditions, how often they are exposed, and the level of exposure.

#### How common are MSDs?

MSDs of any cause are among the most prevalent medical problems, affecting 7% of the population and accounting for 14% of physician visits and 19% of hospital stays.

When looking specifically at work-related MSDs, the Bureau of Labor Statistics (BLS) reports that in 1995, 62% (308,000) of all illness cases were due to disorders associated with repeated trauma. This figure does not include

back injuries. BLS also reports that the number of cases of repeated trauma has increased significantly, rising from 23,800 cases in 1972 to 332,000 cases in 1994—a fourteen-fold increase. In 1995, the number of cases decreased by 7% to 308,000 reported cases, but this number still exceeds the number of cases in any year prior to 1994.

When looking specifically at cases involving days away from work, for which more detailed information is available, BLS reports that in 1994, approximately 32% or 705,800 cases were the result of overexertion or repetitive motion. This figure includes back injuries.

## **NIOSH research and prevention**

The National Institute for Occupational Safety and Health (NIOSH) is the only federal agency mandated to conduct research and train professionals to identify and prevent workplace hazards. The Institute is part of the Centers for Disease Control and Prevention. NIOSH conducts and funds a substantial amount of research on musculoskeletal disorders, currently a total of 80 projects on work-related MSD-related topics. A directory of all these projects has been published by NIOSH (DHHS [NIOSH] Publication No. 97-109). For more information on work-related MSDs or on other workplace safety and health issues call: 1-800-35-NIOSH (1-800-356-4674).

## **What this course is about**

This internet course has been developed to help you

- Evaluate the potential for workplace musculoskeletal disorders, and
- Develop an effective ongoing ergonomics program

---

## **MODULE 1: SETTING THE STAGE FOR ACTION**

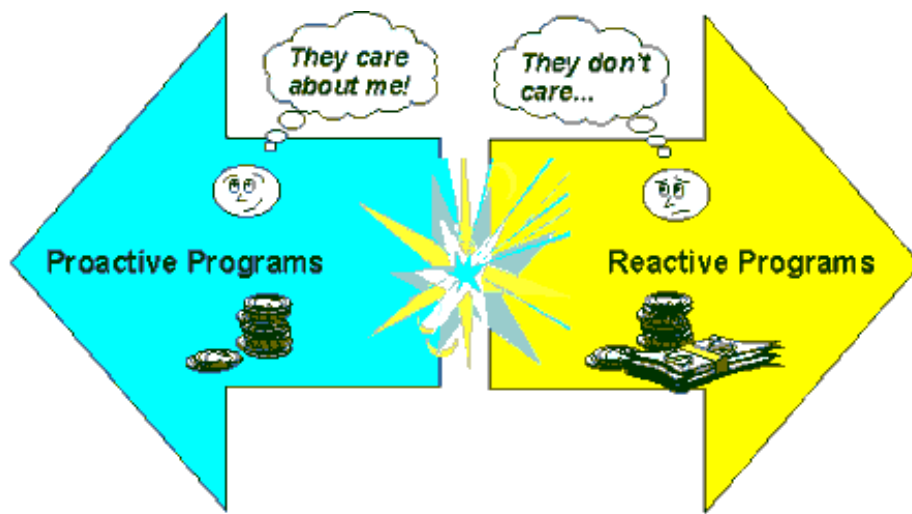
### **INTRODUCTION**

As with other workplace safety and health issues, managers and employees both play key roles in setting the stage: developing and carrying out an ergonomics program. It's important that management understand the of an effective ergonomics program.

### **Ergonomics as part of a company safety and health program**

Ergonomics programs should not be regarded as separate from those intended to address other workplace hazards. Aspects of hazard identification, case documentation, assessment of control options, and health care management techniques that are used to address ergonomic problems use the same approaches directed toward other workplace risks of injury or disease. Although many of the technical approaches described in this course are specific to ergonomic risk factors and musculoskeletal disorders (MSDs), the core principles are the same as efforts to control other workplace hazards.

### **Reactive vs. Proactive approaches**



Proactive ergonomics activities emphasize efforts at the **design stage of work processes** to recognize needs for avoiding risk factors that can lead to musculoskeletal problems. The goal is to design operations that ensure proper selection and use of tools, job methods, workstation layouts, and materials that impose no undue stress and strain on the worker.

### Essential considerations

Ergonomics issues are identified and resolved in the planning process. In addition, general ergonomic knowledge, learned from an ongoing ergonomics program, can be used to build a more prevention-oriented approach.

Management commitment and employee involvement in the planning activity are essential. For example, management can set policy to require ergonomic considerations for any equipment to be purchased, and production employees can offer ideas on the basis of their past experiences for alleviating potential problems.

Planners of new work processes involved in the design of job tasks, equipment, and workplace layout, must become more aware of ergonomic factors and principles. Designers must have appropriate information and guidelines about risk factors for MSDs and ways to control them. Studying past designs of jobs in terms of risk factors can offer useful input into their design strategies.

### Expressions of management commitment



Management commitment is a key and perhaps the most important controlling factor in determining whether any worksite hazard control effort will be successful. Management commitment can be expressed in a variety of ways. Lessons learned from NIOSH case studies of ergonomic hazard control efforts in the meatpacking industry emphasize the following points regarding evidence of effective management commitment:

#### Policy statements are issued that:

- treat ergonomic efforts as furthering the company's strategic goals,
- expect full cooperation of the total workforce in working together toward realizing ergonomic improvements,
- assign lead roles to designated persons who are known to "make things happen,"
- give ergonomic efforts priority with other cost reduction, productivity, and quality assurance activities, and
- have the support of the local union or other worker representatives.

- allow full discussion of the policy and the plans for implementation.
- set concrete goals that address specific operations and give priority to the jobs posing the greatest risk.

### **Resources are committed to:**

- train the workforce to be more aware of ergonomic risk factors for MSDs,
- provide detailed instruction to those expected to assume lead roles or serve on special groups to handle various tasks,
- bring in outside experts for consultations about start-up activities and difficult issues at least until in-house expertise can be developed, and
- implement ergonomic improvements as may be indicated.
- provide release time or other compensatory arrangements during the workday for employees expected to handle assigned tasks dealing with ergonomic concerns.

It's important to furnish information to all those involved in or affected by the ergonomic activities. Misinformation or misperceptions about such efforts can be damaging: If management is seen as using the program to gain ideas for cutting costs or improving productivity without equal regard for employee benefits, the program may not be supported by employees. For example, management should be up-front regarding possible impacts of the program on job security and job changes. All injury data, production information, and cost considerations need to be made available to those expected to make feasible recommendations for solving problems.

### **Employee involvement**



Promoting employee involvement in efforts to improve workplace ergonomic conditions has several benefits. They include

- enhanced worker motivation and job satisfaction,
- added problem-solving capabilities,
- greater acceptance of change, and
- greater knowledge of the work and organization.

**Worker involvement** in safety and health issues means obtaining worker input on several issues.

- The first input is defining real or suspected job hazards.
- Another is suggesting ways to control suspected hazards.
- A third involves working with management in deciding how best to put controls into place.

Employee participation in an organization's efforts to reduce work-related injury or disease and ergonomic problems may take the form of direct or individual input. A common involvement process is participation through a joint labor-management safety and health committee, which may be company-wide or department-wide in nature. Membership on company-wide committees includes union leaders or elected worker representatives, department heads, and key figures from various areas of the organization.

Two factors are critical to the different forms of worker involvement. One is the need for training both in hazard recognition and control and in group problem solving. The second is that management must share information and knowledge of results with those involved.

No single form or level of worker involvement fits all situations or meets all needs. Much depends on the nature of the problems to be addressed, the skills and abilities of those involved, and the company's prevailing practices for participative approaches in resolving workplace issues.

### **Who should participate?**

Ergonomic problems typically require a response that cuts across a number of organizational units. Hazard identification through job task analyses and review of injury records or symptom surveys, as well as the development and implementation of control measures, can require input from:

- safety and hygiene personnel,
- health care providers,
- human resource personnel,
- engineering personnel,
- maintenance personnel, and
- ergonomics specialists.

In addition, worker and management representatives are considered essential players in any ergonomics program effort.

In small businesses, two or more of the functions noted on this list may be merged into one unit, or one person may handle several of the listed duties. Regardless of the size of the organization, persons identified with these responsibilities are crucial to an ergonomics program. Purchasing personnel in particular should be included, since the issues raised can dictate new or revised specifications on new equipment orders.

How best to fit these different players into the program could depend on the company's existing occupational safety and health program practices. Integrating ergonomics into the company's current occupational safety and health activities while giving it special emphasis may have the most appeal.

### **Last Words**

Now that's a lot of good information. Time now to draft answers in the quiz below. When you're finished with all of the modules, you'll enter and submit the quiz answers using the Final Examination and Quiz web page. If you are not sure about the answers to the questions, just scroll up and review the subject area.

### **MODULE Quiz**

**1. According to the text, a proactive approach to ergonomics would emphasize:**

- a. reduction in injury costs**
- b. early return to work programs**
- c. workstation design**
- d. aggressive accident investigation**

**2. Which of the following is not listed as an effective ergonomics program policy?**

- a. give ergonomics efforts high priority**
- b. further strategic goals**
- c. allow full discussion and cooperation**
- d. set flexible goals**

3. Each of the following is a way management can demonstrate commitment to an ergonomics program, except:

- a. conduct awareness training
- b. encourage compliance
- c. bring in outside experts
- d. carry out ergonomic improvements

4. Management should be up-front regarding possible impacts of the program on job security and job changes.

- a. True
- b. False

5. According to the text, all of the factors below are critical to worker involvement except:

- a. Incentives for registering complaints
- b. Training in hazard identification and control
- c. Sharing information and results
- d. Incentives for involvement

---

## MODULE 2: ANALYZING THE WORKPLACE

### Gathering and examining evidence of MSDs



Once a decision has been made to initiate an ergonomics program, a necessary step is to gather information to determine the scope and characteristics of the problem or potential problem. A variety of techniques and tools have been used; many provide the basis for developing solutions to identified problems.

- Following up of worker reports
- Reviewing OSHA logs and other existing records
- Conducting symptom surveys
- Using periodic medical examinations
- Identifying Risk Factors in Jobs
  - Screening jobs for risk factors
  - Performing job analyses
  - Setting priorities

### Conditions and Symptoms

What are some of the clues that MSDs are a real or possible workplace problem? Some signs are obvious while others are more subtle.

- OSHA Form 300 logs or workers compensation claims show cases of MSDs such as carpal tunnel syndrome, tendonitis, tenosynovitis, epicondylitis, and low back pain. Sometimes

these records contain nonspecific entries like "hand pain," which may be an indicator of a significant health problem if severe or persistent.

- Certain jobs or work conditions cause worker complaints of undue strain, localized fatigue, discomfort, or pain that does not go away after overnight rest.
- Workers visiting the clinic make frequent references to physical aches and pains related to certain types of work assignments.
- Job tasks involve at risk activities such as repetitive and forceful exertions; frequent, heavy, or overhead lifts; awkward work positions; or use of vibrating equipment.

If you uncover signs like these in your workplace, it might be a good idea to request a confidential evaluation by an Oregon OSHA or insurer ergonomics consultant. Ergonomic evaluations may uncover significant problems and be very helpful in correcting them.

Other sources that could alert employers to potential problems include the following:

- Trade publications, insurer newsletters, or references in popular literature indicating risks of MSDs
- Cases of MSDs found among competitors or in similar businesses
- Proposals for increasing line speed, retooling, or modifying jobs to increase individual worker output and overall productivity

### Following up on Worker Reports

Assuring that employees feel free to report, as early as possible, symptoms of physical stress is a key component of any ergonomics program. Early reporting makes it possible to begin corrective measures before the effects of a job problem worsen.

As mentioned earlier, individual worker concerns that certain jobs cause undue physical fatigue, stress, or discomfort may be signs of ergonomic problems. Following up on these reports, particularly reports of MSDs, is essential. Such reports indicate a need to evaluate the jobs to identify ergonomic risk factors.

### Reviewing OSHA Logs and other existing records

Inspecting OSHA 200 logs and plant medical records, as well as workers compensation claims, insurance claims, absentee records, and job transfer applications can yield information about the nature of MSDs. Finding workers in certain departments or operations experiencing more of these problems than others would suggest some immediate areas for study with regard to possible risk factors.

Jobs with elevated rates of low back musculoskeletal disorders often also have higher risks for acute injuries due to slips and trips or other safety hazards. In these cases, acute musculoskeletal injuries may also be an important problem.

### Conducting symptoms surveys

Interviews or symptom surveys can be used to identify possible MSDs that might otherwise go unnoticed. In addition to questions about the type, onset, and duration of symptoms, symptom survey forms may include a body map. The employee is asked to locate and rate the level of discomfort experienced in different areas of his or her body. The assumption is that any discomfort or symptoms may be associated with some increased risk for MSDs.

### Using periodic medical examinations

A disadvantage of using OSHA logs or company medical information to identify possible cases of MSDs is the lack of specific or uniform medical information. This limitation may make identifying MSDs difficult. One optional approach to overcome this limitation is to have each worker undergo a periodic standard examination that includes a history and physical examination. Such an examination program should be designed and administered by a health care provider.

### Final words

The analysis process is crucial to an effective ergonomics program. Carefully plan and carry out your workplace analysis and make sure you include as many employees as possible in this process. You'll be glad you did. OK, time to take the module quiz.

### MODULE Quiz

6. Which of the following is not one of the listed techniques and tools for developing solutions?

- a. reviewing OSHA logs
- b. brainstorming solutions
- c. periodic medical exams
- d. screening jobs for risk factors

7. According to the text, if you uncover signs like these in your workplace, it might be a good idea to:

- a. implement a training program
- b. assess for signs and symptoms
- c. request a confidential evaluation
- d. Purchase safety belts

8. Once a decision has been made to initiate an ergonomics program, what is your next step?

- a. identify players
- b. determine risk factors
- c. determine scope of the problem
- d. identify costs

9. Assuring employees feel free to report, as early as possible, symptoms of physical stress is a key component of any ergonomics program.

- a. True

**b. False**

**10. A disadvantage of using OSHA logs or company medical information to identify possible cases of MSDs is the:**

- a. reliance on self-reports**
  - b. a lack of specific information**
  - c. a lack of employee participation**
  - d. analysis may be too simple**
- 

## **MODULE 3: IDENTIFYING RISK FACTORS**

### **Screening for Risk Factors**

**Screening jobs for physical and psychological risk factors is very proactive, and should involve one or more of the following:**

- Walk-through observational surveys of the work facilities to detect obvious risk factors**
- Interviews with workers and supervisors to obtain the above information and other data not apparent in walk-through observations, such as time and workload pressures, length of rest breaks, etc.**
- Checklists for scoring job features against a list of risk factors**

**A great deal of research has been conducted to identify workplace factors that contribute to the development of musculoskeletal disorders. NIOSH has recently summarized the epidemiological studies that show a relationship between specific work activities and the development of musculoskeletal disorders.**

**According to the scientific literature, the following are recognized as important risk factors for musculoskeletal disorders, especially when occurring at high levels and in combination.**

**Physical risk factors include:**

- Awkward postures**
- Forceful exertions**
- Repetitive motions**
- Duration of exposure**
- Frequency of exposure**
- Contact stresses**

- **Vibration**
- **Other conditions**

**Let's take a closer look at each of these risk factors.**

## **Physical Risk factors**



### **Awkward postures**

Body postures determine which joints and muscles are used in an activity and the amount of force or stresses that are generated or tolerated. For example, more stress is placed on the spinal discs when lifting, lowering, or handling objects with the back bent or twisted, compared with when the back is straight. Manipulative or other tasks requiring repeated or sustained bending or twisting of the wrists, knees, hips, or shoulders also impose increased stresses on these joints. Activities requiring frequent or prolonged work over shoulder height can be particularly stressful.

### **Forceful exertions (including lifting, pushing, and pulling)**

Tasks that require forceful exertions place higher loads on the muscles, tendons, ligaments, and joints. Increasing force means increasing body demands such as greater muscle exertion along with other physiological changes necessary to sustain an increased effort. Prolonged or recurrent experiences of this type can give rise to not only feelings of fatigue but may also lead to musculoskeletal problems when there is inadequate time for rest or recovery. Force requirements may increase with:

- increased weight of a load handled or lifted,
- increased bulkiness of the load handled or lifted,
- use of an awkward posture,
- the speeding up of movements, increased slipperiness of the objects handled (requiring increased grip force),
- the presence of vibration (e.g., localized vibration from power handtools leads to use of an increased grip force),
- use of the index finger and thumb to forcefully grip an object (i.e., a pinch grip compared with gripping the object with your whole hand), and
- use of small or narrow tool handles that lessen grip capacity.



### **Repetitive motions**

If motions are repeated frequently (e.g., every few seconds) and for prolonged periods such as an 8-hour shift, fatigue and muscle-tendon strain can accumulate. Tendons and muscles can often recover from the effects of stretching or forceful exertions if sufficient time is allotted between exertions. Effects of repetitive motions from performing the same work activities are increased when awkward postures and forceful exertions are involved. Repetitive actions as a risk factor can also depend on the body area and specific act being performed.

## Duration

Duration refers to the amount of time a person is continually exposed to a risk factor. Job tasks that require use of the same muscles or motions for long durations increase the likelihood of both localized and general fatigue. In general, the longer the period of continuous work (e.g., tasks requiring sustained muscle contraction), the longer the recovery or rest time required.



**Frequency** Frequency refers to how many times a person repeats a given exertion within a given period of time. Of course, the more often the exertion is repeated, the greater the speed of movement of the body part being exerted. Also, recovery time decreases the more frequently an exertion is completed. And, as with duration, this increases the likelihood of both localized and general fatigue.

## Contact stresses

Repeated or continuous contact with hard or sharp objects such as non-rounded desk edges or unpadded, narrow tool handles may create pressure over one area of the body (e.g., the forearm or sides of the fingers) that can inhibit nerve function and blood flow.



## Vibration

Exposure to local vibration occurs when a specific part of the body comes in contact with a vibrating object, such as a power handtool. Exposure to whole-body vibration can occur while standing or sitting in vibrating environments or objects, such as when operating heavy-duty vehicles or large machinery.

**Other conditions** Workplace conditions that can influence the presence and magnitude of the risk factors for MSDs can include

- cold temperatures,
- insufficient pauses and rest breaks for recovery,
- machine paced work, and
- unfamiliar or unaccustomed work.



## Psychological Risk Factors



In addition to the above conditions, other aspects of work may not only contribute to physical stress but psychological stress as well. As long as we believe we have adequate control over all aspects of our job, we may experience normal stress. However, if we believe we have little control over job demands, we may suffer from **distress** with accompanying ill health and possible irrational behaviors. Under distress, the probability of an accident increases greatly.

Research is examining work factors such as performance monitoring, incentive pay systems, and unreasonable management production demands to determine whether these factors have a negative effect on the musculoskeletal system. Another related area of research is to determine which personal, work, or societal factors contribute to acute musculoskeletal disorders developing into chronic or disabling problems.

## Using a checklist

**The checklist procedure provides the most formal and orderly procedure for screening jobs. Numerous versions of checklists exist in ergonomics manuals. When checklist data are gathered by persons familiar with the job, task, or processes involved, the quality of the data is generally better.**

## Last Words

**Time now to draft answers in the quiz below. If you are not sure about the answers to the questions, just scroll up and review the subject area.**

## MODULE Quiz

**11. The purpose of the walk-through observational survey is to:**

- a. interview safety committee members**
- b. detect obvious risk factors**
- c. score unsafe behaviors**
- d. conduct in-depth analysis**

**12. According to the text, the quality of the checklist data collected is generally better when:**

- a. interviews cover supervisors as well as workers**
- b. data is expressed as percentages**
- c. employees providing data do not feel intimidated**

d. persons are familiar with the job, task

13. Activities requiring frequent or prolonged work below shoulder height can be particularly stressful:

- a. True
- b. False

14. Force requirements may increase with:

- a. the speeding up of movements
- b. pinch grip
- c. decreased slipperiness
- d. vibration

15. To determine possible negative effects on the musculoskeletal system, research is conducted all of the following areas except:

- a. performance monitoring
- b. incentive pay systems
- c. group dynamics
- d. production demands

---

## MODULE 4: ERGONOMICS JOB HAZARD ANALYSIS

### INTRODUCTION



Efforts to identify jobs or tasks having known risk factors for musculoskeletal problems can provide the groundwork for changes aimed at risk reduction. Even without clear medical evidence, screening jobs for musculoskeletal risk factors can offer a basis for early interventions.

An effective identification method is the Ergonomics Job Hazard Analysis which breaks a job into its various elements or actions, describes them, measures and quantifies the ergonomics risk factors inherent in the elements, identifies conditions contributing to the risk factors, and

determines corrective measures.

Job analyses are usually done by persons with considerable experience and training in these areas. While most job analyses have common approaches, such as a focus on the same set of risk factors described above, no "standard" protocol exists for conducting a job analysis to assess ergonomic hazards.

Most job analyses have several common steps:

- A complete description of the job is obtained.

- **Employees are often interviewed in order to determine if the way the job is done changes over time.**
- **During the job analysis, the job is divided into a number of discrete tasks.**
- **Each task is then studied to determine the specific risk factors that occur during the task.**
- **Sometimes each risk factor is evaluated in terms of its magnitude, the number of times it occurs during the task, and how long the risk factor lasts each time it occurs.**

**The tasks of most jobs can be described in terms of:**

- **the tools, equipment, machinery and materials used to perform the job**
- **the workstation layout and physical environment**
- **the task demands and organizational climate in which the work is performed**

**More definitive procedures for collecting information on these components can include the following:**

- **Observing the workers performing the tasks in order to furnish time-activity analysis and job or task cycle data; videotaping the workers is typically done for this purpose**
- **Still photos of work postures, workstation layouts, tools, etc., to illustrate the job**
- **Workstation measurements (e.g., work surface heights, reach distances)**
- **Measuring tool handle sizes, weighing tools and parts, and measuring tool vibration and part dimensions**
- **Determining characteristics of work surfaces such as slip resistance, hardness, and surface edges**
- **Measuring exposures to heat, cold, and whole body vibration**
- **Biomechanical calculations (e.g., muscle force required to accomplish a task or the pressure put on a spinal disc based on the weight of a load lifted, pulled, or pushed)**
- **Physiological measures (e.g., oxygen consumption, heart rate)**
- **Special questionnaires, interviews, and subjective rating procedures to determine the amount of perceived exertion and the psychological factors influencing work performance**

### **Setting Priorities**



**Jobs associated with cases of musculoskeletal problems deserve the highest consideration in follow-up efforts to identify ergonomics risk factors and implement control actions. Jobs in which current cases have been identified should receive immediate attention, followed by those in**



which past records have noted a high incidence or severity of MSDs despite the lack of current cases.

Priority for job analysis and intervention should be given to those jobs:

- in which most people are affected or in which work method changes are going to be taking place anyway.
- associated with worker complaints of fatigue and discomfort.
- where screening efforts suggest the presence of significant risk factors for musculoskeletal disorders.

There you have it! I hope you've gained a better understanding of the ergonomics job hazard analysis process and how to prioritize corrective actions. Time for the review quiz, so let's go.

## MODULE Quiz

16. The ergonomics job hazard analysis does all of the following except:

- identifies conditions contributing to risk factors
- measures and quantifies ergonomic risk factors
- breaks down task into individual steps
- excludes employee involvement in the analysis

17. While most job analyses have common approaches, such as a focus on the same set of risk factors described above, no "standard" protocol exists for conducting a job analysis to assess ergonomic hazards.

- True
- False

18. Which of the following procedures is not one listed for collecting information on the ergonomic components of a job?

- videotaping
- observation
- investigation
- measurements

19. Jobs in which current cases have been identified should receive \_\_\_\_\_ attention, followed by those in which past records have noted a high incidence or \_\_\_\_\_ of MSDs despite the lack of current cases.

- planned, probability
- some, number

- c. immediate, severity
- d. primary, type

20. Priority for job analysis and intervention should be given to those jobs:

- a. employees complain of discomfort
- b. in which most people are affected
- c. significant risk factors exist
- d. all of the above

---

## MODULE 5: CONTROLLING RISK FACTORS

### Rid the job of risk factors

Ergonomic improvements are changes made to improve the “fit” between a job and the capabilities of the employees performing it. Analyzing jobs to identify factors associated with risks for MSDs lays the groundwork for developing ways to reduce or eliminate ergonomic risk factors for MSDs.

### Types of Controls

The following control measures are widely accepted as intervention strategies for controlling workplace ergonomic hazards:

- **Engineering Controls.** Reduce or eliminate potentially hazardous conditions through design, redesign, substitution, and replacement.
- **Management Controls.** Change work procedures and scheduling to reduce exposure to the hazard.
- **Interim Measures** Temporary use of engineering and/or management controls until permanent controls are in place.

### Engineering Controls

Engineering controls involve making changes to workstations, tools or equipment used on the job. These controls are preferred over all others because they make permanent changes that can totally eliminate hazards at the source. Although they may be more expensive to implement than other controls, their effect is often more significant.

Let's take a look at some of the various engineering control strategies that may be effectively used to eliminate hazards.



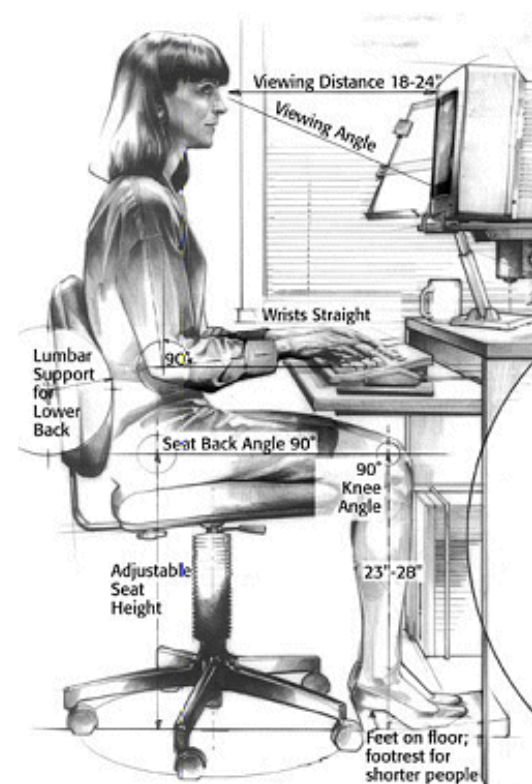
## Workstation design

Aspects of workstations you can change with engineering controls include:

- workspace layout,
- work surfaces,
- standing and walking surfaces,
- seating,
- storage,
- work fixtures,
- work environment.

## Computer workstations

Computer workstations have special considerations you should be aware of. The monitor and keyboard positions, lighting and seating are especially important in preventing work-related MSDs and eye discomfort. Shared workstations should be easily adjustable so the screen and keyboard can be at the proper level. Take a look at some specific [workstation design considerations](#) and [problems/solutions](#) for computer workstations.



There are five components of proper computer workstation design that you must address to maintain proper posture: the work surface, the keyboard, the pointing device or trackball, the monitor and the chair.

### Work Surfaces

- Surface needs to be deep enough to allow proper keyboard positioning and to accommodate a monitor viewing distance of 18-24".
- Surface needs to be wide enough to accommodate keyboard, mouse and reference material.
- Surface height (or keyboard height independent of the main surface) should be adjusted for the user or adjustable for multiple users.
- Avoid resting your wrists on a hard or sharp surface (use a wrist rest if necessary).
- Leave enough leg room to allow your legs to move freely.

## Keyboards

**Should be thin and detachable. Must be positioned low enough to keep wrists straight, shoulders relaxed, and elbows angled between 90 and 120 degrees. (A wrist rest can help you maintain straight wrists.) Alternative keyboards now on the market provide additional options which may alleviate discomfort.**

### **Mouse or Trackball**

**Should be within easy reach and at the same height as the keyboard. Trackballs may be a better alternative because they eliminate some arm movement required by the mouse.**

### **Monitors**

**Should be positioned so that the top of the screen is slightly below eye level, for a viewing angle of about 30 degrees. The viewing distance should be 18-24”.**

### **Chairs**

**Should have adjustable back support that presses firmly against your lower back and extends at least up to mid-back. Should have an easily adjustable seat height to permit your feet to rest flat on the ground with a knee angle of roughly 90 degrees. (some people might need a foot rest to achieve this angle.) Should have a rolling, five-pronged base for stability and to prevent unnecessary twisting. Should have adjustable padded arm rests to support the weight of the shoulders and the arm. Should have an adjustable seat pan to allow the computer user to work comfortably in a forward or reclined position.**

### **Workspace layout**

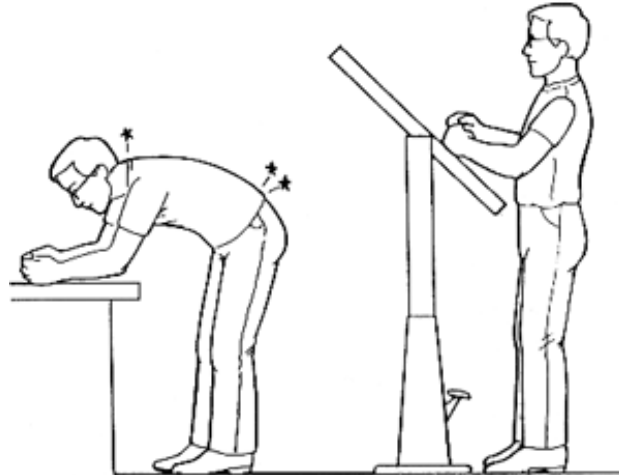
**Workspace layout and arrangement should be carefully designed so that it meets the following requirements:**

- The workspace should be adjustable to fit each worker's size.**
- The worker should be able to maintain the neutral position and avoid awkward or extended reaches and jerky movements while performing the task.**
- A full range of motion with adequate leg room, as well as a variety of working positions to avoid static postures should be provided.**
- The worker should have adequate space for access to all necessary tools and equipment, and frequently used tools should be within easy reach.**

### **Work surfaces**

- Work surfaces should be at the proper height and angle for the individual worker's size and tools and equipment used.**
- They should permit neutral postures and be adjustable, especially where different kinds of tasks are performed or the workstation is shared.**

**For example, where workers inspect or assemble small parts, or perform other visually intensive task, work surfaces could be tilted to reduce neck, shoulder and arm strain.**



### **Walking and standing surfaces**



Surfaces on which people stand for long periods should be designed to prevent slipping and provide adequate traction and comfort. Anti-fatigue floor mats, sit-stand stools, and footrests can help make workers more comfortable.

### **Seating**

**Seat-height adjustability and lower back support are important for work done for a long time while seated. Some workers may choose to sit part of the time and stand other times to reduce stress on the body from working in one position too long. Chairs or seating should:**

- **Adequately support the back and legs.**
- **Have padded seats.**
- **Have separately adjustable back and seat cushions.**
- **Permit feet to be supported either on the floor or with a foot rest.**
- **Be easily adjustable while seated.**
- **Be able to swivel for most tasks.**
- **Isolate the worker from whole-body vibration.**

- Have adjustable arm support when appropriate.

## Storage

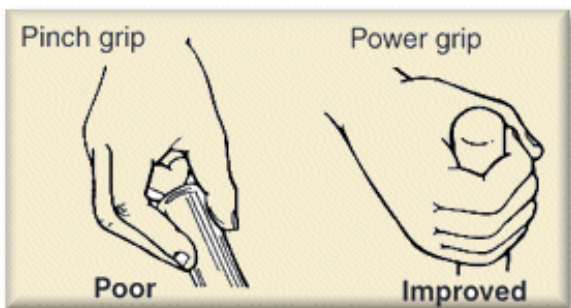
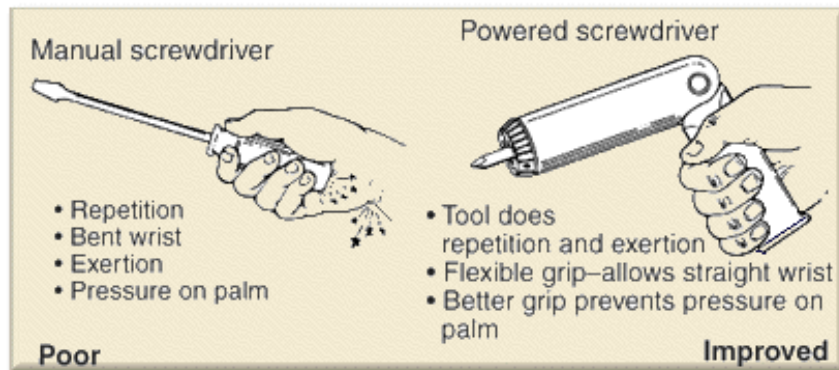
Storage areas should be organized so that workers maintain good body positions, reduce muscular forces and avoid excessive reach. Store heavy items between knee and shoulder height and frequently used items close to the worker.

## Work fixtures

Workers should not have to use their hands or bodies as a vise to hold objects; mechanical devices do this much better. Tooling fixtures and jigs should be set up to avoid awkward postures and excessive forces.

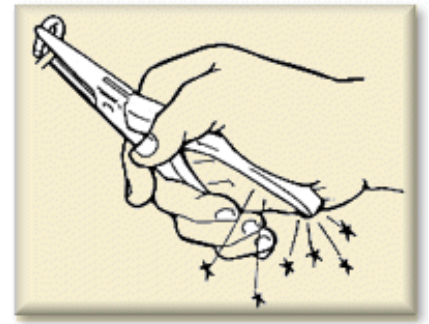
Improper hand tool selection or improper use of tools can cause CTDs. Hand tools should fit the employee's hand; employees with small hands or who are left-handed may need tools designed specifically for these situations. Hand and wrist posture are important because they affect how much force the muscles must produce to hold objects. When selecting and purchasing hand tools, these guidelines should be followed:

Select tools that allow the wrist to be held straight and that minimize twisting of the arm and wrist. Good working posture can be maintained when properly designed tools are used.



Select tools that allow the operator to use a power grip, not a pinch grip. Minimal muscle force is required to hold objects in a power grip posture. The pinch grip requires excessive fingertip pressure, and can lead to a CTD.

Avoid tools that put excessive pressure on any one spot of the hand (i.e., sides of fingers, palm of the hand).



**For power or pneumatic tools, select tools with vibration dampening built in whenever possible. Provide personal protective equipment such as gel-padded gloves to reduce exposure to vibration.**



## Work environment

Workplace environmental factors interact with those the worker and the task bring to the job, and deserves careful consideration. Methods to minimize work-environment hazards include:

- Isolating equipment or operations that produce loud or distracting noise.
- Making [lights](#) bright enough without causing glare.
- Isolating hands and feet from cold.
- Reducing whole-body vibration while riding in vehicles or standing near equipment.
- Isolating workers from excessive [heat](#) by providing adequate cooling and ventilation.

## Management Controls



Management controls are management-dictated procedural and scheduling changes designed to reduce or prevent exposures to ergonomic risk factors. Although engineering controls are preferred, management controls may be needed as well, especially when engineering controls can not totally eliminate a hazard or when engineering controls are not technically feasible. Since management controls do not eliminate hazards, managers must continually ensure safe procedures and policies are followed to make sure exposure to hazards is minimized.

**Common examples of management control strategies for reducing the risk of MSDs are as follows:**

- **Safe procedures that maintain workers in neutral postures, and reduce frequency, duration, and severity of exposure to risk factors. Lifting, carrying, pushing or pulling objects can strain the back, arms and shoulders. Strength and lifting limits should not be exceeded; extreme muscular exertion can cause injury. [Effective lifting techniques](#) should always be used.**
- **Broadening or varying the job content to offset certain risk factors (e.g., repetitive motions, static and awkward postures).**
- **Adjusting the work pace to relieve repetitive motion risks and give the worker more control of the work process.**
- **Training in the recognition of risk factors for MSDs and instruction in work practices that can ease the task demands or burden.**
- **Requiring the use of Personal Protective Equipment (PPE) while performing tasks.**

**Reducing shift length or curtailing the amount of overtime.**

- **Rotating workers through several jobs with different physical demands to reduce the stress on limbs and body regions.**
- **Scheduling more breaks to allow for rest and recovery.**

### **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.**

### **Job Enrichment**

**Tasks involving repetitive motion are major contributors to CTDs. You can minimize repetition by:**

- Using automation, such as in stapling, sorting, labeling or filling operations.
- Changing the job to include tasks that don't use the same muscle groups.

For example, in a check-sorting operation, instead of having one person open mail, another take stamp them and yet another record the figures, each worker could do each of those tasks.

## Personal Protective Equipment

One of the most controversial questions in the prevention of MSDs is whether the use of personal equipment worn or used by the employee (such as wrist supports, back belts, or vibration attenuation gloves) are effective. Some consider these devices to be personal protective equipment (PPE).

In the field of occupational safety and health, PPE generally provides a barrier between the worker and the hazard source. Respirators, ear plugs, safety goggles, chemical aprons, safety shoes, and "hard hats" are all examples of PPE. Whether braces, wrist splints, back belts, and similar devices can be regarded as offering personal protection against ergonomic hazards remains open to question.

Although these devices may, in some situations, reduce the duration, frequency, or intensity of exposure, evidence of their effectiveness in injury reduction is inconclusive. In some instances they may decrease one exposure but increase another because the worker has to "fight" the device to perform his or her work. An example is the use of wrist splints while engaged in work that requires wrist bending.

On the basis of a review of the scientific literature completed in 1994, NIOSH concluded that insufficient evidence existed to prove the effectiveness of **back belts** in preventing back injuries related to manual handling job tasks [NIOSH 1994]. A recent epidemiological study credits mandatory use of back belts in a chain of large retail hardware stores in substantially reducing the rate of low back injuries [Kraus 1996]. Although NIOSH believes this study provides evidence that back belts may be effective in some settings for preventing back injuries, NIOSH still believes that evidence for the effectiveness of back belts is inconclusive. More on [backbelts](#) [Still more!](#).



Less controversial types of personal equipment are vibration attenuation **gloves** [NIOSH 1989] and **knee pads** for carpet layers [Bhattacharya et al. 1985]. But even here, there can be concerns. For example, do the design and fit of the gloves make it harder to grip tools?

## Safety System Improvements

**An effective ergonomics program operates within a larger safety management system that is composed of many interrelated programs. Each program or "subsystem" includes specific processes that may not interrelate directly to ergonomics. When hazardous conditions and unsafe behaviors exist, it's usually because the safety management system is failing somehow. These failures represent the root causes for accidents and may be categorized as follows:**

- **Design root causes.** Inadequate design of the safety management system. The development of written safety plans, policies, processes, procedures and practices is very important to make sure appropriate conditions, activities, behaviors, and practices occur.
- **Implementation root causes.** Failure to carry out the plan as designed. Failure to effectively implement the safety management system is critical to the success of the system. You can develop a wonderfully designed system, yet if it's not implemented correctly, it won't work.

**A missing or inadequate component in any one of these subsystem processes might negatively impact on ergonomics. Examples of safety subsystems include:**

- Safety training
- Safety accountability
- Hazard identification and control
- Employee involvement
- Incident/Accident investigation
- Safety communications
- Evaluation and improvement

**Missing or inadequate safety system components may represent the root causes for ergonomic injuries. Hazardous conditions and unsafe behaviors represent the outward symptoms that give clues about the underlying safety system weaknesses. Therefore, every effort should be made to improve system components to ensure long term workplace safety.**

**Making safety system improvements might include some of the following:**

- Including "safety" in a mission statement.
- Improving safety policy so that it clearly establishes responsibility and accountability.
- Changing a work process so that checklists are used that include safety checks.
- Revising purchasing policy to include safety considerations as well as cost.
- Changing the safety inspection process to include all supervisors and employees.

**Notice that in each example we are describing a missing or inadequate process, policy, procedure, plan, or program that may or may not be directly related to ergonomics.**

**Last words**

**Almost everything you need to know about ergonomic control strategies, right? Well, not quite, but you do have a good introduction to them. Remember, ergonomics control strategies may not be immediately obvious. If you can't figure out an effective solution, don't forget to take advantage of an outside expert (my pitch for our Oregon OSHA ergonomist). Participating in the consultation process with an ergonomist is a real win-win for your company and an excellent education for**

you. Time to take the module review quiz, so let's go. Answer each question as best you can. Scroll up the page to review if you like.

## Module Quiz

21. Which of the three ergonomics control strategies is most effective?

- a. Technical Controls
- b. Engineering Controls
- c. Management Controls
- d. Interim Measures

22. Which of the three ergonomics control strategies limits exposure to the hazard?

- a. Technical Controls
- b. Engineering Controls
- c. Management Controls
- d. Interim Measures

23. Which of the following is not listed as a component of proper computer workstation design you must address to maintain proper posture?

- a. the printer
- b. the work surface
- c. the keyboard
- d. the chair

24. According to the text, effective and safe procedures should incorporate each of the following ergonomics goals, except:

- a. decrease recovery time
- b. maintain neutral postures
- c. reduce duration of exposure
- d. reduce frequency of exposure

25. According to the text, inadequately developed written safety plans, policies, processes, procedures and practices is describes this safety management system failure:

- a. system implementation failure
- b. system design failure
- c. system personal failure
- d. system management failure

---

## MODULE 6: IMPLEMENTING CONTROLS

Implementing effective control strategies

Once ergonomic hazards are identified and analyzed so that you have a good idea what's required to reduce or eliminate them, it's important to carefully plan and carry out the change. Ideas for effective ergonomic control measures can be derived from a variety of sources:

- **Employees/work teams who perform the jobs requiring control strategies**
- **Oregon OSHA has professional ergonomists that can evaluate and offer ideas for improving your ergonomics protection program**
- **Trade associations may have information about good control practices for addressing different problem operations within an industry**
- **Insurance companies that offer loss control services to their policyholders**
- **Private consultants and vendors who deal in ergonomic specialty services and products**
- **Networking with other safety professionals and visits to worksites known to have dealt with similar problem operations**

The process of implementing controls normally consists of:

- **trials or tests of the selected solutions**
- **making modifications or revisions**
- **full-scale implementation**
- **follow up on evaluating control effectiveness**

### **Testing and evaluation**

Testing and evaluation verify that the proposed solution actually works and identifies any additional enhancements or modifications that may be needed. Employees who perform the job can provide valuable input into the testing and evaluation process. Worker acceptance of the changes put into place is important to the success of the intervention.

### **Making modifications or revisions**

After the initial testing period, the proposed solution may need to be modified. If so, further testing should be conducted to ensure that the correct changes have been made, followed by full-scale implementation. Designating the personnel responsible, creating a timetable, and considering the logistics necessary for implementation are elements of the planning needed to ensure the timely implementation of controls.

### **Full-scale implementation**

A good idea in general is that ergonomic control efforts start small, targeting those problem conditions that are clearly identified through safety and health data and job analysis information. Moreover, the control actions can be directed to those conditions that appear easy to fix. Early successes can build the confidence and experience needed in later attempts to resolve more

complex problems.

Since full-scale implementation represents change in the workplace, it's important to communicate the importance of the change to all affected employees. Education and training is an important component that should not be overlooked.

### Follow-up evaluation

A follow-up evaluation is necessary to ensure that the controls reduced or eliminated the ergonomic risk factors and that new risk factors were not introduced. This follow-up evaluation should use the same risk factor checklist or other method of job analysis that first documented the presence of ergonomic risk factors. If the hazards are not substantially reduced or eliminated, the problem-solving process is not finished.

The follow-up may also include a symptom survey, which can be completed in conjunction with the risk-factor checklist or other job analysis method. The results of the follow-up symptom survey can then be compared with the results of the initial symptom survey (if one was performed) to determine the effectiveness of the implemented solutions in reducing symptoms.

Because some changes in work methods (and the use of different muscle groups) may actually make employees feel sore or tired for a few days, follow-up should occur no sooner than 1 to 2 weeks after implementation. A month is preferable. Recognizing this fact may help avoid discarding an otherwise good solution.

Long-term indicators of the effectiveness of an ergonomics program can include:

- Reduction in the incidence rate of musculoskeletal disorders
- Reduction in the severity rate of musculoskeletal disorders
- Increase in productivity or the quality of products and services
- Reduction in job turnover or absenteeism

The above-mentioned indicators offer bottom-line results in evaluating interventions that have been put into place. Other indicators may also be used that represent in-process or interim accomplishments achieved on the path to building an ergonomic program. For example, the extent of the ergonomic training given the workforce, the number of jobs analyzed for potential problems, and the number of workplace solutions being implemented.

### Last Words

There you have it? Now it's time to take the module review quiz. If you have difficulty answering any of the questions, scroll up the page and review the material.

### MODULE Quiz

26. Which of the following is not mentioned as a valuable source of help in evaluating your ergonomics program?

- a. employees/work teams
- b. Oregon OSHA
- c. private consultants
- d. public libraries

27. What is the purpose of the testing and evaluation phase of implementation?

- a. verifies duties and responsibilities
- b. verifies proposed solutions
- c. identifies additional enhancements
- d. identifies additional modifications

28. A good idea is that ergonomic control efforts start small, targeting those problem conditions that are clearly identified.

- a. True
- b. False

29. What of the following is not listed as a purpose of the follow-up evaluation?

- a. new risk factors do not exist
- b. controls reduce risk factors
- c. controls eliminate risk factors
- d. controls are identified

30. Long-term indicators of the effectiveness of an ergonomics program can include:

- a. reduced severity rates
- b. reduced incidence rates
- c. increased product quality
- d. reduced productivity

---

## MODULE 7: MEDICAL MANAGEMENT

### INTRODUCTION



Company health care management strategies and policies and health care providers is an important part of the overall ergonomics program.

In general, medical management emphasizes the prevention of impairment and disability through early detection, prompt treatment, and timely recovery. Medical management responsibilities fall on employers, employees, and health care providers.

### Employer responsibilities

**The employer can create an environment that encourages early evaluation by a health care provider by:**

- **Providing education and training to employees regarding the recognition of the symptoms and signs of MSDs and the employers procedures for reporting MSDs**
- **Encouraging employees to report symptoms early so prompt evaluation by an appropriate health care provider can be provided**
- **Giving health care providers the opportunity to become familiar with jobs and job tasks**
- **Modifying jobs or accommodating employees who have functional limitations secondary to MSDs as determined by a health care provider**
- **Ensuring, to the extent permitted by law, employee privacy and confidentiality regarding medical conditions identified during an assessment**

### **Employee responsibilities**



Employees should participate in the health care management process by:

- following applicable workplace safety and health rules,
- following work practice procedures related to their jobs, and
- reporting early signs and symptoms of MSDs.

**Employees may be faced with conflicting job demands or requirements. Safe work practices or rules may conflict with pressures or incentives to be more productive. If the message from management is that job security depends on working fast... employees will work fast... possibly choosing unsafe shortcuts in safe procedures. On the other hand, if management sends the message that job security depends on working safe... you can bet employees will not take those shortcuts.**

### **Health Care Provider Responsibilities**

**The health care provider can support the employer's ergonomics program by:**

- **Acquiring experience and training in the evaluation and treatment of MSDs**
- **Seeking information and review materials regarding employee job activities**
- **Ensuring employee privacy and confidentiality to the fullest extent permitted by law**
- **Evaluating symptomatic employees including:**
  - **medical histories with a complete description of symptoms**

- **descriptions of work activities as reported by the employees**
- **physical examinations appropriate to the presenting symptoms and histories**
- **initial assessments or diagnoses**
- **opinions as to whether occupational risk factors caused, contributed to, or exacerbated the conditions**
- **examinations to follow up symptomatic employees and document symptom improvements or resolutions**

## **Job Familiarity and Job Placement Evaluations**



Health care providers who evaluate employees, determine their functional capabilities, and prepare opinions regarding work relatedness should be familiar with employee jobs and job tasks. With specific knowledge of the physical demands involved in various jobs and the physical capabilities or limitations of employees, the health care provider can match the employees capabilities with appropriate jobs. Being familiar with employee jobs not only assists the health care provider in making informed case management decisions but also assists with the identification of ergonomic hazards and alternative job tasks.

One of the best ways for a health care provider to become familiar with jobs and job tasks is by periodic plant walk-throughs. Once familiar with plant operations and job tasks, the health care provider should periodically revisit the facility to remain knowledgeable about changing working conditions. Other approaches that may help the health care provider to become familiar with jobs and job tasks include reviewing job analysis reports, detailed job descriptions, job safety analyses, and photographs or videotapes that are accompanied by narrative or written descriptions of the jobs.



## **Early Reporting and Access to Health Care Providers**

**Employees reporting symptoms or signs of potential MSDs should have the opportunity for prompt evaluation by a health care provider. In general, the earlier that symptoms are identified and treatment is initiated, the less likely a more serious disorder will develop. Employers should not establish policies that discourage employees from reporting symptoms. For example, programs that link a manager s earnings to the number of employees reporting symptoms may discourage supervisors from allowing symptomatic employees to be evaluated by the health care provider. Employees should not fear discipline or discrimination on the basis of such reporting.**

## **Treatment**

- **Health care providers are responsible for determining the physical capabilities and work restrictions of the affected workers.**

- The employer is responsible for giving an employee a task consistent with these restrictions.
- Until effective controls are installed, employee exposure to ergonomic stressors can be reduced through restricted duty and/or temporary job transfer.
- Complete removal from the work environment should be avoided unless the employer is unable to accommodate the prescribed work restrictions.
- Immobilization devices, such as splints or supports, can provide relief to the symptomatic area in some cases. These devices are especially effective off-the-job, particularly during sleep. They should not be used as prophylactic PPE to prevent the development of MSDs. Therefore, these devices should be dispensed to individuals with MSDs only by health care providers who have knowledge of the benefits and possible negatives of these devices.

### **Last words**

**Well, there it is: medical management in a nutshell. Coordinate with your health care provider to develop this component of the ergonomics program. When administered effectively, medical management can result in lowering costs, and it sends a very positive message to employees - a message that says "we care!"**

**Time to take the infamous review quiz, so let's get to it! Answer each question as best you can. Scroll up the page to review if you like.**

### **Module Quiz**

**31. In general, medical management emphasizes the prevention of impairment and disability through all of the following, except:**

- a. Early return to work
- b. Prompt treatment
- c. Early detection
- d. Timely recovery

**32. Employers should provide training to employees regarding all of the following, except:**

- a. symptoms and signs of MSDs
- b. methods of self-treating MSDs
- c. procedures for reporting MSDs
- d. All of the above

**33. Which of the following important activities was not listed as a way employees can participate in the health care management process?**

- a. following safety and health rules
- b. following procedures
- c. suggesting ergonomic improvements
- d. reporting signs and symptoms

34. According to the text, one of the best ways for a health care provider to become familiar with jobs and job tasks is by periodic \_\_\_\_\_.

- a. communication
- b. plant walk-throughs
- c. medical exams
- d. accident record reviews

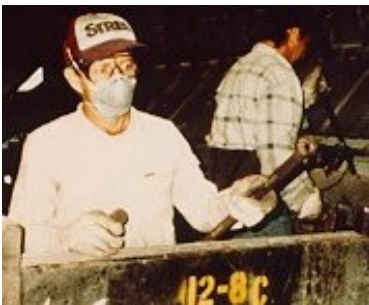
35. Immobilization devices, such as splints or supports, should be dispensed only by health care providers who have knowledge of the benefits and possible negatives of these devices.

- a. True
- b. False

---

## MODULE 8: ERGONOMICS EDUCATION AND TRAINING

### INTRODUCTION



Identifying and solving workplace MSD problems require some level of ergonomic knowledge and skills. Recognizing and filling different training needs is an important step in building an effective program.

For ergonomics, the overall goal of training is to enable managers, supervisors, and employees to identify aspects of job tasks that may increase a worker's risk of developing MSDs, recognize the signs and symptoms of the disorders, and participate in the development of strategies to control or prevent them.

The educational component of ergonomics training ensures employees are well informed about ergonomic hazards so they can actively participate in identifying and controlling exposures. To be "well informed," includes knowing why using ergonomically safe procedures is important.

Employers may opt to have outside experts conduct ergonomics education and training. If so, the outside instructors should first become familiar with company operations and relevant policies and practices before starting to present the training. Tailoring the instruction to address specific concerns and interests of the worker groups can enhance learning.

#### Ergonomics awareness training

The objectives for ergonomics awareness training are as follows:

- Recognize workplace risk factors for musculoskeletal disorders and understand general methods for controlling them.

- **Identify the signs and symptoms of musculoskeletal disorders that may result from exposure to such risk factors, and be familiar with the company's health care procedures.**
- **Know the process the employer is using to address and control risk factors, the employee's role in the process, and ways employees can actively participate.**
- **Know the procedures for reporting risk factors and musculoskeletal disorders, including the names of designated persons who should receive the reports.**

### **Training in job analyses and control measures**

**The objectives for training in job analyses and control measures are as follows:**

- **Demonstrate the way to do a job analysis for identifying risk factors for musculoskeletal disorders**
- **Select ways to implement and evaluate control measures**

### **Training in problem solving**

**The objectives for training in problem solving are as follows:**

- **Identify the departments, areas, and jobs with risk factors through a review of company reports, records, walk-through observations, and special surveys.**
- **Identify tools and techniques that can be used to conduct job analyses and serve as a basis for recommendations.**
- **Develop skills in team building, consensus development, and problem solving.**
- **Recommend ways to control ergonomic hazards based on job analyses and pooling ideas from employees, management, and other affected and interested parties.**

### **Special considerations and precautions**

**Training objectives are not intended to have workers, supervisors, or managers diagnose or treat MSDs. Rather, the purpose is to instill an understanding of what type of health problems may be work related and when to refer employees for medical evaluation. The training should include what is known about work and non-work causes of musculoskeletal disorders and the current limitations of scientific knowledge.**

Training should be understandable to the target audience. Training materials used should consider the participants educational levels, literacy abilities, and language skills. This may mean, for example, providing materials, instruction, or assistance in Spanish rather than English.



Open and frank interactions between trainers and trainees, especially those in affected jobs, are especially important. Employees know their own jobs better than anyone else and often are the source of good ideas for ways to improve them. At a minimum, employees must be given an opportunity to discuss ergonomic problems in their jobs as they see them and engage in relevant problem-solving exercises during the training.

## Last Words

Only one review quiz between you and completion of the course. So, let's get to it! Answer each question as best you can. Scroll up the page to review if you like.

## MODULE Quiz

36. For ergonomics, the overall goal of training is to enable managers, supervisors, and employees to do all of the following, except:

- a. Ensure compliance with safety and health rules
- b. Identify job tasks that may increase risk of MSDs
- c. Recognize signs and symptoms of MSDs
- d. Develop control and prevention strategies

37. According to the text, one of the objectives for ergonomics awareness training is to recognize workplace risk factors for \_\_\_\_\_ and understand general methods for controlling them.

- a. environmental injuries
- b. musculoskeletal disorders
- c. psychosocial factors
- d. ergonomic awareness

38. Ergonomics training in problem solving helps identify the departments, areas, and jobs with risk factors through all of the following, except:

- a. a review of reports
- b. a review of records
- c. walk-through observations
- d. compliance inspections

39. Training objectives are intended to have supervisors and managers diagnose and/or treat MSDs.

- a. True
- b. False

40. According to the text, training materials used should consider all of following, except:

- a. cultural diversity
- b. language skills
- c. education levels

#### **d. literacy abilities**

**That wasn't so bad, was it? Building an effective ergonomics program can be extremely cost effective, resulting in dramatic decreases in injuries and direct/indirect accident costs. I want to encourage you to begin right now to develop or improve your company's ergonomics program. I'm sure many of your co-workers will thank you. Now pat yourself on the back for the great job in completing the course.**

**If you haven't been working on the course assignments yet, now is the time to download the assignments page to draft your responses.**

**When you have completed your draft responses, return to the course outline page, and click on the "Submit Your Coursework" link.**

**I hope the information within these eight modules as been helpful to you and I hope to see you participate in another course soon. When you're ready, submit your coursework, evaluation, and certificate information. I'll see you in a workshop or another internet course! If you have any questions or comments, just drop me an email at [steve.j.geigle@state.or.us](mailto:steve.j.geigle@state.or.us).**