

## **Ergonomics and the Elderly**

### **Why is it Important?**

By the year 2030 there will be 80 million Americans over the age of sixty-five. According to the National Institute for Occupational Safety and Health (NIOSH), in 1998 workers in the United States over age 65 represented 2.8 per cent of the total labor force. By 2008 that figure is expected to increase to 3.0 per cent.

As baby boomers reach retirement age the ratio of workers to retirees will equalize over the next twenty years. Considering that the source of Social Security benefits is generated from the workforce it is evident that benefits will be inadequate for future retirees. In order to survive, the elderly will be forced to keep working beyond the current retirement age.

As our increasing knowledge of the aging process brings about breakthroughs in life extension technologies, the elderly will come to play a greater and greater role in the productivity of our economy. Future ergonomic developments will be critical in order to accommodate the elderly as viable and productive members of the workforce.

### **What are the Physical Limitations Associated with Aging?**

Although workers 65 and over represent such a small segment of the workforce they represent a group with the highest occupational fatality rate (13.6 per 100,000 workers). For this reason it may be prudent to look at some of the physical limitations which affect the elderly.

Probably the most obvious limitation of the elderly is a loss of strength. According to Hettinger (1960) at the age of 65 we have about 70% of the strength that we had at our youthful peak from 25 to 30.

Also characteristic of aging is a progressive decline in hearing. We consider two types of hearing loss: age related and noise induced. People tend to be most vulnerable to noise induced hearing loss at frequencies of around 4000 Hertz (Hz). Damage from noise exposure at that frequency can cause a loss of 50 to 60 decibels (dB). Unlike noise induced hearing loss, in age induced hearing loss there is a progressive hearing loss as the sound waves increase in frequency. The elderly typically experience a combination of both age related hearing loss and noise induced hearing loss and it can be difficult to distinguish between the two. Age related hearing loss is more significant in men than women and it is the upper frequency ranges that are most affected. At 65 years of age there is a loss of approximately 30 dB with a sound source that has a frequency of 3000 Hz.

As we age the ability of our eyes to focus on objects (accommodation) declines. This is due to the loss of elasticity in the lens of the eye. The shortest distance at which we are able to maintain clarity is called 'near point' vision. To maintain focus of a near object as its image is projected onto the retina the ciliary muscle of the eye must increase the curvature of the lens. It is significant that between age 50 and 60 on average the near point distance doubles from 500 to 1000 millimeters. In other words, at 60 years of age, in order to maintain a near object in focus we must hold it at least twice the distance away from the eyes than we did at 50.

To do near work comfortably the object distance should be maintained so as not to exceed two-thirds the accommodation power for the particular individual otherwise the over straining of the ciliary muscle will soon bring on visual fatigue.

The elderly are not particularly adaptable to night or shift work as are younger workers. This is due to the fact that the elderly are frequently prone to sleeping disturbances and are less resistant to the stresses that characterize night shifts. For these reasons the elderly are more vulnerable to health problems as a result of night or shift work. It is therefore recommended that the elderly be given the choice of earlier shifts if possible.

### **How Are the Elderly Better Accommodated in the Workplace?**

As would be expected there is considerable overlap between the elderly and the disabled. Basically, as defined by the Americans with Disabilities Act (ADA) the disabled are any individuals who have or have had a record of physical or mental impairment that substantially limits one or more major life activities. With the physical limitations that naturally come with age we can expect that many elderly would be regarded as having disabilities and the ones who are not technically disabled could be considered physically and mentally compromised to some degree. Therefore, any workplace modifications that serve to overcome limitations in strength, coordination, endurance, sight, hearing and shift adaptability will accommodate the elderly into the workplace.

Visual limitations can be overcome with a greater reliance on verbal communication with regard to instructions and assistive technology such as audio recorders. Labels should be in large, clear print with large, high-resolution computer monitors. Voice recognition software is also helpful. Other modifications include document holders and bookstands that allow for optimal positioning of written materials, voice mail systems for messages and raised edges along the sides of work surfaces to prevent objects from falling off.

In workers with hearing limitations any audible information should be supplemented with some form of visual presentation. Whole body vibration transmitted to chairs and workstations should be minimized by utilizing anti-vibration seating surface. Ambient noise should be minimized through

workstation design, isolating noisy printers, sound dampening etc. Workers should have vibrating pagers, visual call indicators and sound amplifiers on telephones.

Most elderly have some limitations in motor activity and manipulation due to decreases in strength, coordination and flexibility or due to such conditions as osteoarthritis. The worker should be provided with ergonomic tools that have tool holders and handles which are built up with foam and grip tape. Utilize carts and shoulder straps to avoid the possible dropping of materials. If latches are necessary provide for non-precision closures such as Velcro or magnets. Use lever type door closures rather than knobs on entrances. Use controls with lever handles or ones that can be controlled by gross rather than precise movements of the hands. The activation forces should be less than two pounds, or be activated by remote control. Provide for power tools if possible such as electric staplers and letter openers. Head sets, speaker phones and phones with automatic dial minimize the need for handling phones. Similarly, the retrieval and handling of documents can be simplified by computer storage and microfilm.

The elderly should have their work environment arranged in such a way as to avoid excessive reaching, lifting and carrying. Storage systems with pull out shelves and workstation carousels help to keep frequently used materials within 18 inches of the body. Containers should be provided to break loads into manageable units and the worker should have the means to slide any materials over 2 pounds. Mechanical reaching devices should be available for accessing materials beyond the reach of the worker.

It is important that those in management level positions remain sensitive to the needs of the elderly so as to initiate administrative controls in the work setting such as job rotation and enlargement, work-rest scheduling, micro breaks and exercise programs. The physical decline of the elderly makes them vulnerable to cumulative trauma disorders. Job rotation and enlargement serves to vary job tasks with the idea of reducing general fatigue and the accumulation of stressors on particular body parts. The first step is to analyze the physical stressors that predominate in each job and then rotate or enlarge on the duties of the job in order to diffuse job stressors. Ideally, there will then be a balance of duties between high force and low force, high repetition and static components, sitting and standing etc.

Micro breaks are short rest pauses and are designed to augment regularly scheduled breaks. Their purpose is to reduce fatigue and restore blood flow to muscles. Every 10 to 15 minutes of continuous work should be interrupted with a pause of 20 to 180 seconds. A micro break may consist of stretching the contracted muscles or allowing them total rest. Any stretching or exercising activities should have a balancing effect on the muscles that are most active for the particular job. That is, contracted muscles need to be balanced with

stretching, and muscles that chronically undergo static contractions need movement for circulation and venous return.

Scientific research is providing us with surprising new information on brain function. The research has shattered the myth of the brain as a static organ with a genetically predetermined capacity. We are beginning to see that the chemistry of the brain is constantly changing and its functioning can be positively modified by lifestyle changes, diet and nutrition. This is all great news for the elderly, because although mental processes may become slowed down, it is becoming possible to preserve memory and prevent or reverse age related brain deterioration.

With the preservation of their mental faculties and the advent of ergonomic innovations for workers, the elderly will find themselves continuing to play a productive role in society into the later years.

**Sources:**

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