

## **HEALTH HAZARDS OF COMPUTER USE: AN EMPLOYER'S RESPONSIBILITY TO ITS EMPLOYEES**

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### **ABSTRACT**

The authors describe a variety of health hazards associated with video display terminals, including repetitive strain injuries, vision problems, ergonomic injuries, and radiation-emission and psychological/stress problems. A number of suggestions are made to diminish or prevent these hazards, categorized by equipment and office design, employee training, policies, and job redesign.

Video display terminals (VDTs) have permeated the workplace. They can be found everywhere from cash registers to copy machines, and electronic "bulletin boards" to security monitors. Of course, they are most numerous in their incorporation into personal computers. According to various estimates, between 40 million and 70 million VDTs are in use today. This number is expected to swell to 100 million by the year 2000. Half of all North American workers spend some part of each work day in front of a VDT [1]. The catalyst for this surge in the use of computers and similar devices is America's hunger for increased productivity.

Increased productivity, yes, but at what cost? As with other innovations of the technical age, with progress come problems. "Manufacturers of VDT equipment and the companies that use them have focused on designing a device that will increase worker output but have neglected the comfort and well-being of the wage earner who is essential to operate it," said Morton Bahr, President of the Communication Workers of America [2, p. 17]. While the question of ultimate liability for any occupation-related diseases has not been settled by either the courts or Congress, it is clear that the Occupational Safety and Health Administration

(OSHA) requires at least that the employer be aware of, and correct, any hazards to which employees may be exposed [3].

OSHA has levied fines against companies such as Pepperidge Farm, IBP, and John Morrell & Co. for VDT-related health hazards. In addition, many local governments such as Suffolk County, New York, and San Francisco, California, have enacted legislation designed to protect employees from VDT-related health risks. California, Colorado, Massachusetts, New Mexico, Washington, and Wisconsin have already passed protective laws, and thirty other states are presently considering similar legislation.

## WHAT ARE THE HEALTH HAZARDS?

Research into the long-term effects of prolonged exposure to VDTs is in its infancy, and there are many contradictory findings. Even with this limitation, VDTs do appear to be related to a wide variety of problems, ranging from pregnancy difficulties to high levels of employee stress. Possibly of even more immediate importance are employee's attitudes. It has been reported that a full two-third's of employees exposed to rapid technological change are concerned about VDT health effects [4].

### Repetitive Strain Injuries

The most common health problems related to VDTs are repetitive strain injuries (RSIs), also known as cumulative trauma disorders. These injuries are due to nerve damage caused by rapid repetitive physical motions, such as keypunching at a computer. By 1987, RSIs had become the fastest growing occupational injury, with close to 75,000 cases reported annually in the United States. OSHA has predicted that by the year 2000, at least 50 percent of all worker compensation claims will be related to RSIs. More damning yet is that these injuries are not completely curable.

RSIs can take the form of a loss of dexterity and/or severe pain to the fingers, palms, thumbs, wrists, and arms. Carpal tunnel syndrome, possibly the most publicized of these injuries, affects the wrists and fingers, and can be entirely debilitating. Carpal tunnel syndrome has become prevalent among clerical workers because of the great speed related to their use of computers. Computer keyboard operators can type 40 percent faster than those using conventional typewriters, up to 45,000 keypunches per hour.

### Vision Problems

Another common problem related to VDTs is vision difficulties. In one study, ten to fifteen percent of VDT users reported daily eye irritation, and almost 50 percent of the users reported occasional problems. These problems include

general eye strain, blurred vision, vision fatigue, cataracts, headaches, burning sensations, and color perception difficulties [5].

Screen glare is one cause of vision problems, as are screen displays with poor contrast. The human eye tends to lose sensitivity to contrast over prolonged periods, which makes focusing difficult. Another major cause of vision problems is the display "flicker," a normal but imperceptible rapid screen change as the ions continuously refresh the display.

### **General Ergonomic Problems**

There are a host of injuries related to the physical use of VDTs. This list includes chronic acute pain and/or stiffness in the back, shoulders, neck, and sometimes in the arms and legs. These pains, in turn, can cause other musculo-skeletal problems, as well as severe headaches, and possibly anesthesia or paresthesia of the extremities.

Some of these problems are, no doubt, caused by improper employee posture. However, the majority are due to improperly designed work stations, most notably desks and chairs that do not permit personalized adjustment. Other causal factors that have been linked to these problems are the repetitive nature of the tasks and a general lack of exercise or break times [6].

### **Radiation Emission-Related Problems**

VDT emissions are prone to three hazards that may effect employee health: radiation, static electricity, and polychlorinated biphenyls. While VDTs do emit radiation, there is a great deal of controversy as to what, if any, health hazard this poses to the employee/user. For the most part, the research centers around adverse pregnancy outcomes. One recent study did find that women who used VDTs for more than twenty hours per week had 1.8 times the normal rate of miscarriages and a 40 percent higher rate of birth defects [7]. While a likely explanation is radiation, other factors such as stress and musculoskeletal problems are cited as other possible causes. On the other hand, a study completed by representatives of the National Institute for Occupational Safety and Health (NIOSH) concluded that there is no increased risk of spontaneous abortions or miscarriages resulting from VDT use. However, the study failed to address the most problematic relationship between VDTs and pregnancy: the prevalence of birth defects among children of VDT users [8].

The Communication Workers of America have suggested that exposure to polychlorinated biphenyls emitted by VDTs may also cause birth defects. They also suggest that spontaneous abortions, liver problems, and cancer are possible effects of VDT use [9]. These problems remain conjecture, but until proved otherwise it is best to err on the side of safety.

Finally, VDTs emit an electrostatic field. This field can, under certain conditions such as low humidity, cause airborne particles to adhere to humans. Medical

studies indicate that within two hours, these deposits can cause facial irritation and rashes [10].

### **Psychological Difficulties**

An American Medical Association study reports that many VDT users voice stress-related complaints at least occasionally [11]. This stress can be caused by a number of factors. First, especially among mature employees, is cyberphobia (the fear of computers). In addition, stress can be due to the additional pressure to produce, heavy work loads, high levels of noise, and computer monitoring of work performance. Finally, possibly the most significant contributor to stress is the potentially tedious nature of the task. VDTs often turn clerical positions into the equivalent of assembly lines by removing the more complex tasks from the job description.

VDT stress-related problems include irritability, sleeping problems, depression, tension, fatigue, and job alienation. These direct manifestations of stress are serious enough, but they can also hamper the body's immune system, making the individual more susceptible to natural illnesses.

### **WHAT CAN BE DONE?**

The health problems posed by VDTs at the workplace are indeed serious. There are several things an employer can do to diminish and/or prevent these consequences. They can be grouped into four categories: equipment and office design, employee training, policies, and job redesign.

#### **Equipment and Office Design**

Possibly the most obvious way to decrease the health problems of VDT usage is through attention to the equipment and work environment. To diminish vision problems, one easy solution is to purchase terminals that have adjustable brightness and contrast controls. Placement of the VDT to prevent screen glare is also an effective strategy. VDTs that have an adjustable base are useful to prevent eyestrain as well as neck and back strain. Liquid crystal displays, like those frequently used for laptop computers, do not emit any radiation or electromagnetic fields. It is also important to provide employees with artificial indirect lighting.

At least two types of products can also help with eyestrain. Glare screens that can be placed in front of the monitor provide an inexpensive way to reduce glare and emissions. There is also at least one company, Vision Aerobics, Inc., that markets software which actually exercises the eyes through the VDT.

While screens can reduce radiation, it is also recommended that the VDT should have grounded copper foil shielding to fully protect the user from emissions. Some manufacturers have begun marketing such shielded VDTs in Scandinavia to comply with those countries' regulations. Such shielding can also be found as an

option in the United States. Maintaining proper humidity levels and ventilation will also help to diminish emission and electromagnetic-related skin problems.

Providing employees with desks and chairs that permit personalized adjustments will reduce musculoskeletal problems. Footrests, adequate leg room, wrist supports, and arm and back supports also are effective preventative measures. Adjustable document holders not only help the neck and eyes, but may also improve performance quality.

### **Training and Education**

Employee training and education will also prove to be a useful method to prevent health problems. Topics should include how to properly posture oneself and adjust equipment for the correct viewing distance and keyboard height. It is also important to teach the employee the proper placement of hands and wrists. Stretching and eye relaxation techniques need to be taught as well. Finally, providing employees with methods to assist in early detection of symptoms could arrest health problems before they become debilitating.

### **Policies**

Medical professionals advise, and several municipalities require, that employees who spend a majority of their time at VDTs should be given regular rest breaks of fifteen minutes every two hours. These breaks should also include exercises. Coupled together, these policies will be effective in reducing vision difficulties and musculoskeletal problems. Encouraging, or requiring, regular vision exams for VDT users will assist in detecting vision problems early enough to arrest them before they reach critical levels.

### **Job Redesign**

Redesigning the job can also provide significant benefits for employees and employers. A greater variety of tasks will reduce the damaging repetitive nature of many VDT-related jobs. This will prevent many of the physical and vision problems by moving the employee away from the screen. At the same time, these changes will reduce the monotony often associated with these jobs, thereby improving employee satisfaction and morale, and reducing stress.

## **CONCLUSION**

VDTs are a critical element of the modern workplace. Research has indicated that there are many health risks, some very serious, related to VDT usage. Employers must be aware of these risks. They should also actively pursue policies to reduce these problems by providing the proper equipment, environment, and

employee training, adopting reasonable policies, and looking into the possibility of redesigning jobs.

One final note: Companies should be careful to avoid gender-related discrimination. These hazards pose the most serious threats to clerical positions, jobs that tend to employ a disproportionate percentage of women. Females are also more susceptible to cataracts, carpal tunnel syndrome, and, of course, adverse pregnancy disorders. Employers should be aware, however, that much of the research on health hazards is not sufficiently conclusive to justify employment discrimination through job placement, such as is the case with the connection between pregnant women and certain chemicals.

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