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NIOSH INVESTIGATORS
Susan Burt, M.Sc., M.S.N.
Libby Steward, M.A.
Julie Robinson, M.P.H., R.N., C.O.H.N.

SUMMARY

In April, 1993 the National Institute for Occupational Safety and Health (NIOSH) received a confidential request from employees of WBZ-TV News to conduct a health hazard evaluation (HHE) at the television/radio station in Boston, Massachusetts. The request was prompted by concerns about carpal tunnel syndrome (CTS) and other musculoskeletal problems among videotape editors. The requestors noted ergonomic problems with mixing and editing equipment, inadequate work space, and other concerns about work conditions and practices. In response to this request, NIOSH investigators conducted a site visit at the news station on March 31 - April 1, 1994.

The medical component of the health hazard evaluation included a review of Occupational Safety and Health Administration injury and illness logs (OSHA 200 logs), pertinent medical records, and confidential interviews with employees. The ergonomic assessment was accomplished via walk-through inspections and videotape evaluation. Four medically-confirmed cases of carpal tunnel syndrome occurred among employees at this workplace within the past two years. Two of the CTS cases occurred among the eight videotape editors. Risk factors that have been associated with carpal tunnel syndrome and other musculoskeletal disorders were observed to be present in the videotape editing jobs. Several sources of musculoskeletal stress associated with news editing were identified, including suboptimal workstation and chair design. In addition, stressful work organization and psychosocial factors, including working under deadline pressure, and a lack of control over the workload, the work environment and equipment were also identified.

Recommendations are provided in Section VII, including engineering and administrative controls, and the creation of a joint labor/management committee. Because of the upcoming move into a new facility, a unique opportunity exists to consider ergonomic principles when designing the new videotape editing rooms and workstations.

On the basis of this evaluation, NIOSH investigators concluded that ergonomic risk factors and possibly work-related musculoskeletal symptoms and disorders were observed at WBZ News Station in Boston, MA. Recommendations to prevent and control musculoskeletal disorders are provided in this report.

KEYWORDS: SIC 4833, ergonomics, musculoskeletal disorders, carpal tunnel syndrome, psychosocial, television broadcasting stations.

INTRODUCTION

In April 1993, the National Institute for Occupational Safety and Health (NIOSH) received a confidential request from employees of WBZ-TV News to conduct a health hazard evaluation (HHE) at the television/radio station in Boston, Massachusetts. The request was prompted by concerns about carpal tunnel syndrome (CTS), musculoskeletal symptoms, and eye fatigue among videotape editors in the News Department. The requestors noted ergonomic problems with mixing and editing equipment, inadequate work space, temperature and lighting problems, and concerns about work conditions and practices. In response to this request, NIOSH investigators conducted an investigation at the news station on March 31 - April 1, 1994.

BACKGROUND

WBZ-TV and Radio News Group produces and broadcasts local news in the Boston, Massachusetts, area. The news station employs 258 people, 190 of whom work in the TV group. The current facility was built in 1978. A new building is under construction adjacent to the existing building. Occupancy of the new facility is scheduled for late 1994. Approximately five years ago, changes in programming resulted in a workforce reduction. Syndicated television shows replaced live shows, and now news shows are the only live TV broadcasts. Currently, there are six live TV news shows each day. Within the past year, a new news director was hired, and the position of human resources manager (which was previously vacant) was filled. The average length of employment at WBZ is approximately 15 years.

The job of videotape editing consists of monitoring video screens to select segments of previously-recorded video, and copying these segments onto another videotape using a video player and a video recorder. In most cases, the seated employee uses one control panel/keyboard, which contains numerous keys and one or two dials, to control both the player and the recorder.

Seven rooms are dedicated to video editing. Six of the rooms are similar with respect to equipment, layout, and size (approximately 7' X 7'). The seventh room, which is larger, contains additional special-effects audio and video equipment, and has a window. The current editing equipment has not been replaced or updated for several years, despite advances in video-editing technology.

METHODS

A. Medical Evaluation

The medical evaluation included review of the Occupational Safety and Health Administration injury and illness logs (OSHA 200 logs), pertinent medical records, and confidential interviews with employees. All videotape editors who were present were interviewed, as well as employees in other areas of the TV/radio station who shared concerns

related to musculoskeletal problems with NIOSH investigators during the walk-through tour of the facilities. Interviews focused on work history, work-related CTS and musculoskeletal symptoms, medical treatment, concerns related to the job, and suggestions for improving work conditions. Relevant medical records of employees who reported CTS were reviewed.

B. Ergonomic Evaluation

The primary purpose of the ergonomic exposure assessment was to identify risk factors for musculoskeletal discomfort or injury associated with video editing, and to make recommendations for reducing worker exposure to such factors. The ergonomic assessment was accomplished via walk-through inspections and videotape analysis. NIOSH staff videotaped a representative work segment of the news editing process during the hour preceding a news broadcast. The videotape was later reviewed to identify the occurrence and intensity of musculoskeletal risk factors.

RESULTS

A. Medical

NIOSH investigators reviewed OSHA 200 logs for 1990-1993. There was one entry under disorders associated with repeated trauma (DART) in 1992, a videotape editor with CTS. In 1993, there were three entries under DART; all three were for CTS. One of these entries was for the same videotape editor who was listed in 1992, but for CTS involving the other hand. The second '93 case was also a videotape editor; the third was a photographer who also did some videotape editing. A review of workers' compensation records revealed a case of brachial neuritis in a photographer that was not recorded on the OSHA 200 log.

Confidential medical interviews were conducted with eleven employees, including all of the videotape editors who were present during the site visit, and employees who worked in other areas at the TV/Radio station. One employee who was not present during the NIOSH site visit was interviewed by telephone. The diagnosis of CTS was confirmed in four of five reported CTS cases, by medical records. The criteria used by the health care providers to diagnose CTS was unknown. No medical records could be obtained for the fifth self-reported CTS case. Two of the five employees who reported to NIOSH staff that they were diagnosed with CTS had not reported this to their employer, despite believing that their CTS was work-related. Two other employees reported intermittent hand/wrist symptoms, and one had visited a health care provider for these symptoms and had used a wrist splint. Neck, shoulder and back symptoms were also reported by an employee. Symptomatic employees related that their symptoms occurred during high workload periods.

B. Ergonomic Evaluation

Workstations

Several sources of musculoskeletal stress associated with news editing were identified, with the primary source being workstation and chair design. Several elements of the workstations do not satisfy ergonomic principles. These elements are identified below:

1. Lack of adjustable surfaces to support the keyboard, the video player and recorder, and video monitors. Fixed-height work surfaces do not accommodate employees of different sizes. This is evidenced by editors working in awkward or non-neutral postures when monitoring video screens and when using keyboards.

2. Insufficient leg room under the keyboard. This causes editors to sit a distance from the workstation and lean forward or extend the arms during keyboard operation.

3. Equipment layout in the editing rooms necessitates distant or awkward reaches during equipment operation. This is particularly marked in the editing room known as the "Hilton."

4. Glare on video monitors.

5. Lack of an adequate surface to support the wrists during keyboard operation. Some workstations do not have a surface on which to rest the hands or wrists, causing the operator to exert static muscle tension to maintain the hands and arms in the operating position. In some cases, using the available support surface results in wrist extension. In addition, the front edges of some of the keyboards and support surfaces are unpadded, resulting in direct pressure on the wrists.

6. Location of the dial on the control panel/keyboard. The dial, which is rapidly rotated and depressed, is the primary means for controlling the video players and recorders, and as such, is used frequently. Placement of the dial on the right side of the keyboard requires exclusive use of the right hand, and may result in muscle overload. Striking the dial with unnecessary force increases musculoskeletal stress to the right arm.

7. Chair design, particularly lack of adjustability, and lack of armrests. Most of the chairs have seat pans that are height-adjustable. However, many of the chair backs are not height-adjustable or tilt-adjustable, or are not easily adjusted from a seated position.

Work Organization and Psychosocial Factors

Several sources of stress associated with these factors were identified. These are detailed as follows:

1. Pressure to complete work prior to deadlines, which limits editors' control over their work pace. To prepare a video segment for a news broadcast, producers and reporters give videotapes to editors, who record selected segments onto another video tape. Often this work is performed at the time of the producer's or reporter's request. Due to the nature of daily news broadcasts, much of the editing work is performed in the few hours prior to news telecasts, which leads to pressure to meet deadlines.

2. Limited control over workload. Workload is governed primarily by producers and reporters, who select editors to edit their news segments. Due to this selection method, editors do not regulate their own workload. Furthermore, workload often is not equally distributed among editors, with the result that some editors do not have adequate recovery time between editing sessions.

3. Interrupted lunch periods. Approximately two years ago, the amount of time allotted for lunch was reduced from one hour to thirty minutes. Given the limited amount of time, it is now impractical to leave the building for lunch. While this may not be a problem in itself, it is common for reporters or producers to ask editors to work during lunch breaks. Thus, editors may not receive an adequate rest period, which is essential during times of high workload.

4. Lack of control over the work environment and equipment. Poor quality images on monitors make videotape editing more difficult, for example. Videotape editors have no opportunity to participate in decision-making about the design and layout of workstations. Work space is inadequate. The videotape editing rooms are small (7' X 7'), and unused equipment occupies valuable space. Noise and traffic near the editing rooms may be distracting to some employees, but closing the doors exacerbates the cramped environment.

DISCUSSION

CTS is characterized by pain, numbness and tingling in the first three fingers, resulting from compression of the median nerve as it passes through the wrist. Compression of the median nerve may occur following inflammation of the finger flexor tendons, which also pass through the rigid carpal tunnel.[1] Although CTS is the most commonly diagnosed nerve entrapment disorder, it occurs much less frequently than other musculoskeletal disorders, such as tendinitis.

The physical risk factors for CTS are similar to those for other musculoskeletal problems, and include repetitive motion, stressful postures, excessive force, and lack of adequate rest or recovery.[2] Sustained static loading, and asymmetrical loading of the joints, such as that which occurs during wrist extension and flexion, ulnar and radial wrist deviation, and shoulder abduction are among the components of stressful postures.[2] Sustained static loading occurs when the

muscles are held in fixed positions for prolonged periods. It impairs circulation to the involved tendons, which is a causative factor in tendon degeneration.[3,4] Even a low-level load can increase the risk of musculoskeletal injury if the load is maintained for an extended period.[5] It is particularly important to ensure adequate recovery time from static exertions, as static work can be more fatiguing than dynamic work, even if the static work is lighter.[6,7]

Repetitive or stereotypical motion also is known to result in fatigue and microtrauma to soft tissues and joints of the body.[8] As repetition rate increases and joint and tissue stress accumulates, the risk for musculoskeletal injury increases.[9] Forceful movements also are linked to the development of musculoskeletal injuries. As muscle exertion increases, blood flow to the muscles decreases, resulting in fatigue.[4] The harmful effects of force are exacerbated if combined with repetitive movements and stressful postures.[9,10]

In addition to physical risk factors, several psychosocial and work organizational characteristics of jobs have been associated with musculoskeletal problems. These include working under the pressure of deadlines, lack of control over various job aspects, high workload without adequate recovery time, and a perceived lack of support from supervisors.[11]

CONCLUSION

Four medically-confirmed cases of carpal tunnel syndrome occurred among employees at this workplace within the past two years. Two CTS cases occurred among the eight videotape editors. Risk factors that have been associated with carpal tunnel syndrome and other musculoskeletal disorders and symptoms in epidemiological studies were observed to be present in the videotape editing jobs. Because of the upcoming move into a new facility, a unique opportunity exists to consider ergonomic principles when designing the new videotape editing rooms and workstations. Work organization and the psychosocial environment, including lack of job control, pressure to complete work prior to deadlines, and disparity in workload between video editors, may also contribute to musculoskeletal problems.

RECOMMENDATIONS

Engineering and administrative controls are useful measures for controlling worker exposure to musculoskeletal stress. Engineering controls, the preferred means to eliminate or reduce ergonomic risk factors, involve changes in jobs, tools, or workstations. Administrative controls, in contrast, are focused on the worker, and include training, job rotation, and rest breaks.

A. Engineering Controls

1. To reduce musculoskeletal stress attributable to chairs and workstations, easily adjustable chairs and workstations should be used. Specifically, the shelves that support the keyboard, video players, video recorders, and video monitors should be easily

adjustable without necessitating equipment removal. Chairs should contain the following features:

a. A padded seat pan that can be easily adjusted for height and tilt.
b. A seat pan with a rounded front edge.
c. A back that can be adjusted for height and tilt.
d. A five-pronged base for stability, and casters for mobility.
e. Adjustable armrests.

2. Position editing equipment to minimize awkward or distant reaches, and position equipment that is used most frequently nearest the operator.

3. Use video monitors that are tiltable, and/or equip monitors with a glare filter or screen shroud to minimize screen glare.

4. Use keyboards that minimize wrist extension (e.g., the keyboard in the "Nagasaki" editing room), or reconfigure workstations to alleviate awkward or deviated postures. For example, it may be possible to secure the keyboard in editing room 4 in a tilted position, with the front raised and the rear lowered, to allow the editor to work with the wrists in a neutral position.

5. Employ a padded wrist rest to support the hands and forearms to minimize static muscle tension in the arms and shoulders.

6. Make foot rests available for editors who want to use them.

7. Distribute workload between the left and right arms. Keyboards which have one control dial located on the right side promote use of the right hand, which may result in right-arm overload. To distribute workload between the two arms, keyboards with a control dial located in the center, or a keyboard with control dials on both the left and right sides should be used, if available. If neither type of keyboard is available, employees should be encouraged to use both the left and right hands when rotating the dial, if possible.

B. Administrative Controls

Although it may not be possible to eliminate the intense work periods that occur in the few hours prior to a news broadcast, it may be possible to reduce their effects. Several means are available:

1. Evenly distribute workload to all videotape editors, to prevent a few editors from being overburdened.

2. Encourage editors to take adequate rest pauses. To ensure that editors receive adequate recovery time, they should be encouraged to take breaks at the onset of fatigue or discomfort. It is also important to assure editors that taking necessary breaks will not adversely affect performance evaluations, as fear of negative consequences may deter editors from taking necessary rest breaks. In addition, lunch periods should be staggered so that it is not necessary to interrupt employees during lunch breaks.

3. Reduce exposure to physically stressful editing activities through job rotation. The purpose of job rotation is to reduce the duration of exposure to stressful movements associated with a particular job. If possible, it would be beneficial to allow editors to perform photography/videography work at frequent intervals. Such a schedule would permit recovery time for the muscles, nerves, and tendons that are used during editing, provided that photography/videography requires the use of different muscle groups.

4. Provide ergonomics training for management and other employees, including proper workstation adjustment, and application of general ergonomic principles.

5. Devise a preventive maintenance schedule for editing equipment.

6. Store equipment which is not currently being used elsewhere to reduce the confined conditions in the editing rooms.

7. Form a joint labor/management ergonomics committee to encourage employee involvement in decision-making.

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AUTHORSHIP AND ACKNOWLEDGEMENTS

Report Prepared by:

Susan Burt, M.Sc., M.S.
Senior Research Officer
Medical Section
Hazard Evaluations and Technical Assistance Branch
Division of Surveillance, Hazard Evaluations and Field Studies

Libby Steward, M.A.
Research Psychologist
Psychophysiology and Biomechanics Section
Applied Psychology and Ergonomics Branch
Division of Biomedical and Behavioral Science

Field Assistance by:

Julie Robinson, R.N., M.P.H., C.O.H.N.
Medical Investigator
Medical Section

Originating Office:

Hazard Evaluations and Technical Assistance Branch
Division of Surveillance, Hazard Evaluations and Field Studies

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