

Naval Facilities Engineering Command Ergonomic Risk Assessment for Naval Hospital

Introduction

This report summarizes the ergonomic risk assessment conducted at the Naval Hospital, July 2001 after receiving project approval from the Chief of Naval Operations (CNO) Hazard Abatement Program. The focus of the evaluation was on microscope users. This assessment is based upon interviews with employees, Industrial Hygienists, Safety Specialists, as well as an evaluation by the Naval Facilities Engineering Command (NAVFACENGCOM) Hazard Abatement (HA) Ergonomist.

The operations reviewed present opportunities to reduce the risk of work-related musculoskeletal disorders (WMSDs) and improve safety, health and productivity. Musculoskeletal Disorders (MSDs) are injuries and illnesses that affect muscles, nerves, tendons, ligaments, joints, spinal discs, skin, subcutaneous tissues, blood vessels, and bones. Work-Related Musculoskeletal Disorders (WMSDs) are:

- Musculoskeletal disorders to which the work environment and the performance of work contribute significantly or
- Musculoskeletal disorders that are aggravated or prolonged by work conditions.

Recommendations to the command to further reduce the probability of injury include considering new equipment shown in Appendix A¹ and implementation of administrative controls². As a participant in the BUMED and NAVFAC joint hospital studies, sample equipment will be purchased for the Great Lakes hospital. The Safety and Industrial Hygiene office will co-ordinate the study by selecting work areas to participate in the study. Participating employees will take a baseline survey as well as equipment evaluation surveys. At the completion of the study, a final survey will be administered to evaluate the effectiveness of the ergonomic equipment.

Industrial Hygiene Lab

Description of the operation: There are approximately 3 Industrial Hygienists and 4 Industrial Hygiene Technicians who analyze asbestos samples. Employees can spend a few hours at a time each day at the microscope. Technicians noted pain and discomfort associated with extended periods of microscope use.



Photo 1: Hood Use in IH Lab

Ergonomic issue description: Technicians use a binocular microscope under a HEPA hood for extended periods, while analyzing asbestos samples. Microscope work is a visually demanding task that requires a fixed head and neck posture, which can result in sustained muscle contractions, muscle fatigue and pain. Research by Pheasant found the prevalence of neck problems among microscopists to be 66%³. Due to storage space below the hood, the employees have nowhere to put their legs forcing them to lean forward and place strain on the shoulders and back, as shown in photo 1. The workers also rest their elbows and forearms on the metal edge of the hood, which creates contact and cold stress. Due to the combination of risk factors and frequency of exposure, there is a risk of developing a WMSDs.

Recommendations:

1. Remove the storage space below the hood to create leg room for seated users
2. Cover the edge of the hood with an edge protector to reduce contact stress
3. A Hag Capisco chair used with the chair back against the hood may help the user get closer to the microscope while supporting their torso and arms.
4. A microscope lift and tilt mechanism combined with arm supports would help accommodate a variety of users and allow employees to change postures during the day

A new vented microscope workstation placed at work surface with adequate legroom would encourage neutral postures by allowing the user to get closer to their work

Microscope Users

Description of the operation: There are many microscope users throughout the hospital. Many of the microscope users mentioned discomfort in their neck, back, and upper extremities. Time spent using microscopes varies by employee but can range from a few hours to almost the entire day.

Ergonomic Issue Description: Microscopes are generally designed to maximize viewing capabilities rather than user comfort. Ergonomic stressors associated with microscope use include neck inclinations, bent back postures, non-neutral arm positions, wrist deviations, and contact stress to the forearms and elbows. While short-term microscope use can be easily tolerated, sustained awkward postures can cause fatigue and discomfort and place the employee at risk of developing WMSDs. Photos 2, 3, and 4 show common ergonomic issues associated with microscope users. Photo 2 shows a microscope user with a severely bent back posture and contact stress to the forearms. The microscope at this workstation is placed on a low work surface, which encourages neutral hand and arm postures but induces a bent neck and upper back. The chair is not providing sufficient lumbar or upper back support. The microscope user in photo 3 has a bent neck and contact stress on the elbows, which are resting on the work surface. This microscope is placed on a high work surface, which encourages a better neck and back posture than photo 2, but can cause contact stress to the elbows and forearms as well as raised shoulders. Prolonged contact stress to the upper extremities can result in nerve damage. The chair at this microscope station is also not providing adequate support. The inherent design of microscopes does not allow for neutral head and back postures as well as neutral hand and wrist postures in most users. Photo 4 shows a microscope work area in a very small space, this room was formerly a restroom. The chair lacks adequate adjustability and the table doesn't allow for sufficient legroom.

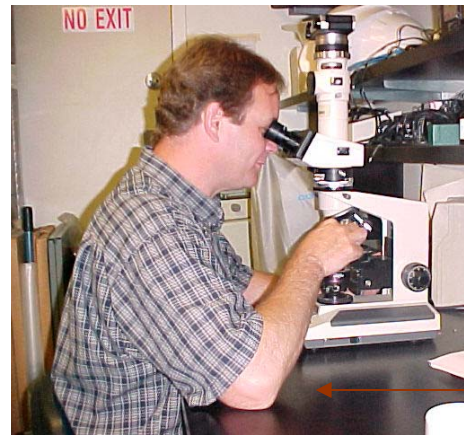


Photo 2 and 3: Microscope Users



Photo 4: Microscope Work Area

Recommendations:

1. Retrofit microscope workstations with ergonomic equipment to reduce ergonomic stressors and encourage users to change posture throughout the day. Appendix A includes resources for seating, work surfaces and microscope accessories. Adjustable workstations allow users to change postures during the day and reduce muscle strain and fatigue.
2. Employees should be encouraged to take stretching breaks during the day to relieve discomfort and encourage muscle movement.²

The following websites have exercises that can be printed and posted. Cite the source when reproducing any information.

www.steelcase.com/knowledgebase/healthex.htm

www.shelterpub.com/_fitness/_office_fitness_clinic/OFC_online_stretches.html

www.ucsc.edu/opers/wellness/pages/basic_office_stretches.htm

www.safety.duke.edu/Ergonomics/90_seconds.htm

*Some information has been removed from this report that is specific to the activity.

End Notes:

¹ Equipment purchase without proper and repeated training will not mitigate risk and may in fact increase hazards. This report does not constitute an endorsement of any particular product. Rather, it is a recitation of how Navy personnel may address a particular work place safety issue. Neither the Navy nor its employees and agents, warrant any product described in this report for any use, either general or particular.



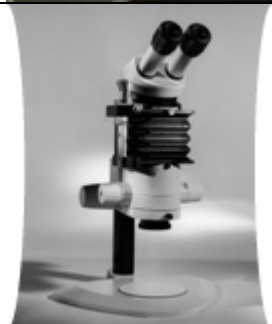

² Administrative controls are management-controlled work practices and policies designed to reduce exposures to work-related musculoskeletal disorders (WMSDs) hazards by changing the way work is assigned or scheduled. Administrative controls reduce the exposure to ergonomic stressors and thus reduce the cumulative dose to any one worker. Examples of administrative controls that are used in the ergonomics context are employee rotation, employer-authorized changes in the pace of work and team lifting.

³ Pheasant, S. (1991). Ergonomics, Work and Health. Gaithersburg, MD: Aspen Publishers.




Appendix A: Laboratory Equipment

This report does not constitute an endorsement of any particular product. Price quotes are estimates, please contact the vendor for current pricing. Neither the Navy nor its employees and agents, warrant any product described in this report for any use, either general or particular.

| Vendor | Product | Price | Figure |
|--|---|---------|---|
| Edge Protector | | | |
| Alimed 1-800-437-2966 | SoftEdge (30" in length) #JA70459 | \$17.95 |  |
| | Deluxe Edge Rest (22" in length) #JA73075 | \$29.95 | |
| Lumbar Cushions | | | |
| Alimed www.alimed.com 1-800-437-2966 | T-Foam Lumbar Support | \$49.95 |  |
| | Freedom Backrest | \$59.95 | |
| North Coast Medical www.ncmedical.com 1-800-277-6826 | WorkMod Back Support | \$21.95 | |
| | WorkMod Lumbar D-Roll | \$13.95 | |
| | Accu-Back Back Support | \$43.00 | |
| Microscope Workstation | | | |
| Flow Sciences, Inc. 1-800-849-3429 | Microscope Workstation (2 ft. width x 18" deep x 19" tall) | \$2,504 |  |
| | Vent Kit 4" ID | \$170 | |
| | Fan Filter Housing | \$1,792 | |
| | Bagout HEPA Filter | \$422 | |
| | *workstations are available in different 2',3',4', and 5' wide and 19" and 30" heights. | | |

| Microscope Accessories | | | |
|--|--|---|---|
| Scopeease http://www.imebinc.com/IMEB/pages/scopeease.html 1-800-543-8496 | Scopeease Microscope tilter and arm supports | \$159-\$259 |  |
| Alimed www.alimed.com 1-800-437-2966 | Microscope Arm Support #JA73911 | \$120-\$180 |  |
| Ergosource http://www.thomasregister.com/olc/ergosource/rests.htm | Labtop-Adjustable forearm support A5000, A6000 | \$300 | |
| Bay Optical www.bayoptical.com (415) 431-8711 Tel | Ergoadaptor Leika and Nikon model specific | \$860 |  |
| Bi Optics Paul Means 408-736-2116 | Bi Optics carries adjustable retrofit accessories for various microscopes. | Contact the vendor for products and pricing specific to each microscope model | |
| Bay Optical www.bayoptical.com (415) 431-8711 | Extended Eye Tube Leika model specific | \$1300 |  |

| Furniture | | | |
|---|--|-----------------|--|
| Third and Fourth Microscope Service John Massey 217-425-2657 | Microscope Table DV 100 Dual Viewing Microscope Table 48"x32" A height adjustable option can be custom designed | \$400 |  |
| Alimed 1-800-225-2610 | Hand Crank Adjustable Height Work Tables | \$805-\$1,325 |  |
| New Dominion 1-800-850-8559 X132 | Hand Crank Adjustable Height Table | \$1,123-\$1,325 | |
| Lab Safety 1-800-356-0783 | Adjustable Workbenches | \$1018-\$1190 |  |
| Vestil 1-800-348-0868 | Adjustable Work Benches | \$965 (30"x60") | |
| Alimed 1-800-225-2610 | Dyna-Lift Retrofit a table to become height adjustable | \$449 | |

| Chairs | | | |
|---|--|---|--|
| Global Industrial 1-800-645-1232 | Effortless Stool- completely adjustable XF252374 Casters optional | \$252 |  |
| C&H 1-800-558-9966 | Workspace, Bevco, and Krueger Stools | \$226-\$243 | |
| Lab Safety and Supply 1-800-356-0783 | Biofit and Bevco | \$206-322 | |
| Alimed www.alimed.com 1-800-437- | 2966Advantage Surgeon's Chair JA93-1001 | \$2,495 (chair) \$599 (armrests) |  |
| Hag www.haginc.com Ken Krauss/Bonnie Momsen Chicago, IL (312)321-0761 | Hag Capisco* | \$442 |  |
| ErgoResource Charles Hartman (919) 661-0300 (GSA Contract) | Hag Capisco*- Vinyl Cover Seat Height Adjusts from 16" to 20" Seat Height adjusts from 20" to 27" (ideal for bench work) | \$436.25 \$445.74 | |



*The Capisco can be straddled and used to support the chest and upper extremities. The Capisco has a large range of adjustability and could be used as a laboratory stool depending on the workstation height.