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Ergonomics in Conservation: How to Limit the Risk of Injury

The tools and tasks of the conservator contribute to a work environment that is conducive to injuries caused by excessive stress to muscles,

tendons, ligaments and joints. Conservators work with the available tools in limited and often repetitive ways. Since the tools are often designed for the task, not for the conservator, sometimes injury can result. Ergonomics, which seeks to adapt work or working conditions to suit the worker, offers a number of ways to avoid stress-related injuries. These injuries generally cause pain and/or swelling and may become chronic if left untreated. The best strategy is to learn about ways to alter the use of tools and the work environment before injuries result.

Injuries to which conservators may be prone in the course of their work are of several different types. Probably the most common are cumulative trauma disorders (CTDs), in which excessive stress is placed on muscles, tendons, ligaments, or joints over time. Carpal tunnel syndrome (CTS), tendonitis, epicondylitis (tennis elbow), and thoracic outlet syndrome are all cumulative trauma disorders. Carpal tunnel syndrome occurs when the wrist is repeatedly bent, placing too much pressure on the median nerve, located in a narrow space in the wrist surrounded by wrist bone and ligament. Symptoms include pain, numbness or tingling, and/or a feeling of weakness or clumsiness in the hand, thumb, or first three fingers. Typically the symptoms are worse at night. Advanced symptoms can involve muscle atrophy and difficulty with pinching motions. If left unchecked, CTS can result in permanent nerve damage and loss of muscle control. Both tendonitis and tennis elbow involve swelling and pain of the tendons. This inflammation can cause compression injury to the surrounding structures. Thoracic outlet syndrome is a compression disorder of nerves and blood vessels between the neck and the shoulder.

A second type of injury to which conservators may be prone is Reynaud's phenomenon (also called "white fingers" or "dead fingers"). This disorder, which affects the circulation of the fingers causing them to turn pale or lose sensation, is one of a group known as vibration disorders, which are caused by pneumatic and vibrating equipment. Finally, one-time lifting of heavy artworks, tools, or other equipment can cause lifting and back disorders. Microfractures can also result from unwise use of tools and failure to plan the work environment carefully.

Since bad positioning, excessive force, and intense repetition of tasks often cause these injuries, conservators need to evaluate carefully not only their hand and body positions during tasks, but also the duration of the task. A task such as inpainting, which is not problematic as a one-hour activity, may result in injury if the conservator inpaints eight hours a day. Individual medical history and present physical condition also affect the planning of tasks.

Diagnosis of cumulative trauma disorders is often tricky, since identical symptoms can be caused by a variety of disorders. Physical tests (checking range of motion, strength, sensation, coordination, and posture), x-rays, CAT (computerized axial tomography) scans, MRIs (magnetic resonance imaging), and

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The AIC accepts position available ads only from equal opportunity employers. The cost of Grants and Internships, Position Available, and Classified Ads is: $.85 per word for members and $2.00 per word for non-members; minimum charge is $50.00.

The cost of advertising in Supplier's Corner is $100 for 100 words.

The cost of display ads is: ⅙ page $155; ⅓ page $290; ½ page $365; ⅔ page $400; one full page $600. Deadlines for camera-ready copy are February 1, April 1, June 1, August 1, October 1, and December 1.

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medical observation of the person while performing the task may be needed to confirm diagnosis. Treatment usually involves resting the injured area, and sometimes the use of ice or splints is recommended. Surgery is a last resort. Making the workplace ergonomically safer may prevent injuries from becoming so severe that surgery is needed.

Injury Prevention

Conservators should avoid a number of work practices. Tightly gripping tools invites injury. However, gripping a cushioned surface is less stressful than gripping a hard one, so cushioning the handles of tools with polyethylene foam (used in plumbing) or athletic tape is a sensible way of lessening the risk of injury. Tennis players have been aware of this rule for some time, and therefore many players have rackets made with a grip that fits their hands. Tools in which the handle has a larger surface area are also less stressful to use in some situations, since they result in less cramping. Textured handles are good because they increase surface friction for cold or wet hands.

It is important to choose tools that, when gripped, direct stress away from the palm, where most of the easily damaged ligaments and tendons that control finger movement are located. For example, putty knives with Y-shaped handles are made to exert force to the base of the thumb rather than the more delicate palm.

Bending the wrist up and back (extension) or bending the wrist toward the palm (flexion) can cause musculoskeletal injury. Keep the forearm, wrist, and hands as straight as possible. Many tools are now available with curved or right-angled handles that allow the wrist and forearm to be kept straighter. It is important to note that there is no general optimum angle for tools, since the angle varies depending on how the tool will be used and how the force is applied when using it. However, any tool that allows less wrist stress is desirable. One example is a clamp that can be attached to large brushes, allowing less flexion in the user's wrist when applying a substance by brush over a large vertical surface such as a wall.

When lying on a scaffold in an uncomfortable position, try not to keep hands and limbs elevated for extended periods, since any position in which the limbs are held away from the body unsupported increases the risk of injury. Arm or shoulder supports can be built, to provide extra leverage. Don't hold heavy objects away from the body for extended periods, whether lying down or standing, since this may fatigue the small muscles of the forearm and shoulders. A 1983 Eastman Kodak study suggests it is risky to hold objects heavier than 5.1 pounds away from the body. Hand tools that must be manipulated with precision should not weigh more than one pound. When working at a computer terminal, use foam pads to support your wrists and forearms. These pads are available from a number of sources (see below), but they can also be made using foam sold through plumbing supply companies.

If you need to stand for long periods of time, standing chairs, sometimes known as "universal workstations," can be used to prevent lower back injuries, although they can be expensive. Chairs should be adjustable to accurately fit the person sitting in them. Both the back support and seat should be adjustable, so that, for example, a woman could work comfortably one day wearing heels and the next day wearing flat-soled shoes. Similarly, the workstation or table height should allow those working to keep their backs straight and their feet firmly on the floor. If you are working seated, it is best to build up your work surface so that you are not hunched over your work. You can also use a specially designed chair that tilts forward to support your back as you lean forward.

When maneuvering heavy objects, use adjustable-height carts. Lifting guidelines suggest that the maximum weight lifted for a man aged 20–35 should be 55 pounds. For women in that age group, the weight should not exceed 33 pounds. Bend knees and keep the back straight while lifting. Be careful not to twist the spine, and keep the object being lifted close to the body.

Vibration can also cause injury. There are two ways to minimize the risk in these situations. You can either wear special vibration-minimizing gloves or apply these types of materials to the tool handle. For example, you can buy a grip kit for a drill that consists of covers made of special absorbent material that reduces vibration. When using pneumatic tools, try to keep your hands warm and away from the air

blast. Clamp the object if possible, instead of using your hands to hold it in place. This approach reduces the stress on your hand and keeps it out of the cool air blast.

When undertaking tasks such as inpainting, scraping, swab cleaning, sewing, or other tasks that are repetitive motions, warm up before starting work. Stretching the muscles lubricates the tendons and joints while increasing blood circulation. Don't stretch to the point of pain or discomfort. Take rest breaks from repetitive activities. For example, typists are advised to take a 15-minute break every two hours. Conservators may want to stop work and stretch out every 45 minutes. If your repetitive motions are in short cycles, try to redesign the task to increase the actual cycle. Whenever you can alternate hands for a task, do so. Use a tool rather than personal force to accomplish a task whenever possible. For example, it is less damaging to use a razor or pair of scissors to open a package than to rip it open with your hands. Two articles discussing cumulative trauma disorders, by Chris Stavroudis and Rosamund Westmoreland, are part of the May 1993 *WAAC Newsletter.* Many conservators may want to consult them for additional information.

These catalogs supply ergonomically designed tools and furniture:

AliMed, (800) 225–2510: Grip kits for drills, pistol grip knives, paint brush handles, computer pads, curved needlenose pliers, footrests, standing supports, softgrip screwdrivers.

Sammons Work Therapy Catalog, (800) 323–5547: Curved-handled hammers, broom handles, seat cushions, footrests, ergonomically designed tools and furniture.

North Coast Medical Catalog, (800) 821–9319: Knives with ergonomically designed angled handles, universal pistol grip paint clamps, and other ergonomically designed tools and furniture.

Many of these catalogs also sell wrist splints and other medical products to treat injuries, but if you experience routine musculoskeletal problems, you should consult a physician to have rehabilitation, including physical therapy, arranged.

It is important to remember that you need to look carefully at everything you do, both at home or at work, to minimize stress from cumulative trauma disorders. If you are working on a large object, it is better to climb up and down a stepladder or scaffolding to reach it than to jump on and off a high stool and risk a knee injury. Be careful how you lift a cast-iron frying pan when in the kitchen, since it may weigh more than the recommended limit. Alter the handles of your tools or replace them if possible when they cause stress. By paying attention to your activities, tools, and work habits, you can lessen your chances of injury in the workplace.

Further Reading

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Foreign Members Take Note

AIC membership dues and publication orders may be paid by transfer of funds to the AIC account.

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Please contact the AIC if you have questions or need additional information.

Gettens Award Nominations: New Deadline

The board is accepting nominations for the 1994 Rutherford John Gettens Awards for outstanding service to the AIC. Please send the names of candidates and a one-page statement of each nominee's qualifications, including positions held, dates of service, and contributions to AIC projects and programs, and letters of support to the AIC board by **February 15.**

Want to Vote on the Revised *Code of Ethics* in 1994? Apply Now to Become a PA!

The 1994 deadlines for Professional Associate and Fellow applications are: January 14, May 2, July 15 and October 14. Contact the AIC office to receive application forms.

Your Dues Make the Continued Operation of AIC Possible!

Renewal notices were mailed in late-October. Reminders were sent in December. Please pay your dues promptly—a $15 late fee will be assessed as of **February 1.**