

Office Ergonomics – Working Comfortably

Introduction

Office ergonomic improvements involve the application of basic workplace principles to address a worker's discomfort, chronic pain or repetitive motion injuries. Good ergonomics does not always mean obtaining new furniture and equipment. A large part of ergonomics and comfort involves workstation arrangement, equipment orientation and work habits. This bulletin reviews equipment and materials that are typically used in a computer workstation, and provides suggestions to help reduce the risk of injuries.

Musculoskeletal disorders such as tendonitis and carpal tunnel syndrome can result from improperly positioned equipment that creates poor working postures. Symptoms can include pain and swelling, numbness and tingling (hands "falling asleep"), loss of muscle strength, and reduced range of joint motion. If these symptoms are not treated early, they can result in discomfort, chronic pain, or injury.

Chair

Appropriately adjusted chairs can be crucial to preventing back pain, as well as improving employee performance. Since the majority of office workers spend most of their time sitting, a properly designed and adjustable chair is critical.

Features of a good chair:

1. Seat pan adjusts up and down quickly and easily. The chair height is correct when the entire sole of the foot can rest on the floor or footrest and the knees are parallel to the hips.
2. Seat pan should be slightly concave with a softly padded, rounded or "waterfall" front edge. Select alternate seat pan and seat back sizes to accommodate large and small employees.
3. Seat back easily adjusts forward and back *and* up and down, with full lumbar contour. The fullest part of the contour should be positioned in the lower back curve.
4. Chair arms adjust up and down *and* in and out from body. Position chair arms so they support forearms in and near the sides, with elbows only slightly forward from the hipbones. If both features are not an option, eliminate armrests.
5. Five legs or casters for stable support.

Employees should sit back in their chairs so their lower backs are supported, and ensure their feet are flat on the floor or on a footrest. Chair arms should not prevent the user from getting close to their keyboard. Also, workers should not cross their legs at the knee while sitting. This puts a tilt in the hips and spine and reduces blood circulation in the legs.

Footrests should be available and provided for all computer users who cannot maintain a 1-inch (2.5 cm) clearance between the back of their knees and the seat pan when the chair is adjusted to the proper work height for the user.

Footrest design considerations should include:

- a. Footrests should be approximately the same size as the chair seats

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- b. They should be designed so that they cannot slide easily
- c. They should be tilted slightly toward the users
- d. They should have a non-skid surface

Keyboard and Mouse

Appropriately adjusted keyboards and mice can help reduce the likelihood of developing an upper extremity musculoskeletal disorder created by risk factors such as repetition; duration; force; and awkward postures of the hands, wrists and shoulders. Taking frequent micro-breaks throughout the work day can help employees maintain strength, flexibility and circulation.

The keyboard and mouse should be positioned at or slightly below seated elbow height. The keyboard can be positioned at a negative angle (downward away from the user), which allows the wrists to be straighter while keying. Employees using wrist rests should float their hands above it while keying, only resting them periodically on the wrist rest. The keyboard and mouse should be close enough that the elbows are in alignment with the hips. If an employee is reaching out as far as their knees, they are too far away. Additionally, the elbows should hang naturally at their side rather than on armrests. Using a left-handed keyboard can help minimize reaching to operate the mouse. The 10-key pad, arrow keys, etc., typically force the mouse to be farther away if positioned on the right.

Monitors, Reference Material, Copy

Monitors and/or reference materials that are positioned improperly can force workers to lean, turn, twist or tilt their heads. It can also cause eye fatigue.

The monitor should be positioned so the top of the screen is at seated eye level and about arm's length away. If the monitor needs to be lowered, put it on the desktop rather than on top of a stand, or use a height adjustable stand. Due to the potential for glare, monitors should not be placed so that a window is behind the monitor. If light sources are reflected on the screen, the monitor can sometimes be tilted downward to help reduce/eliminate the reflection.

If workers use bi- or tri-focal lenses, the monitor may need to be positioned lower or closer to avoid tilting the head back to look through the appropriate part of the lens. Others may prefer the monitor to be farther away or higher to use the top portion of the lens.

Hard copy materials, documents, books, binders, etc., should be positioned upright or at an angle beside the monitor, or between the keyboard and monitor, to reduce the need for employees to lean, tilt or turn their heads to see documents.

Lighting

Visual work can cause eyestrain for some people. Common complaints include headaches, blurred vision, irritation or itching and burning of the eyes, flickering sensations and double vision. Visual symptoms can result from improper lighting, glare from the screen, poor positioning of the screen, or copy material that is difficult to read or improperly placed. Sleepiness, general fatigue, stress, aging, or improperly corrected vision can also contribute to these symptoms.

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Lighting has a noticeable affect on eye comfort. High illumination "washes out" images on the display screen, so illumination levels should be somewhat low (average of 200 lux with a minimum of 100 lux). Diffused (indirect) lighting is typically best, as it results in reduced glare. The result is a more uniform visual field. Where direct lighting is provided, parabolic louvers on overhead lights can help diffuse light. Glare may result from direct light sources, such as windows, or from reflected light from polished or light-colored surfaces (e.g., paper, light-colored desktops).

To limit reflection from walls and work surfaces visible around the screen, these areas should be painted a medium color and have non-reflective finishes. The face of the display screen should be at right angles to windows and light sources. Glare filters that attach directly to the surface of a monitor can help reduce glare, but should be used as a last resort and be cleaned often.

Computer users can reduce eyestrain by taking rest breaks each hour, looking across the room or out the window from time to time at distant objects.

Sit-Stand Workstations

The current ergonomic trend highlights switching postures often to reduce exposure to prolonged static postures. For a long time, there was a misconception that sitting was not a harmful posture for the back. When sitting, the pelvis rotates backwards, and the curve of the back is altered creating more pressure at the discs. Conversely, standing for too long can cause stress to the back because muscle groups in the legs, hips, back, and neck are in a constant state of contraction. Sitting is also highly correlated with obesity and mortality by cardiovascular diseases despite an individuals' activity level. Research suggests that reducing the time spent sitting may improve metabolic consequences of obesity. A sit-stand workstation is a stage of the evolution of the computer workstation with the goal to combine the benefits of both sitting and standing.

Work Habits

Even someone with the best computer workstation and properly positioned equipment can develop discomfort or musculoskeletal disorders. Good work habits and a healthy lifestyle are essential to avoiding workplace injuries. Some good work habits to promote among computer users in your workplace include:

- Change work position, chair height and angle, and keyboard position throughout the day.
- Look away from the screen periodically to focus on distant objects.
- Use the Alt Functions where possible to reduce mouse use. Example: Alt-Tab moves from one window to another.
- Hold the phone with your non-writing hand or use a headset. Do NOT hold the phone handset with your chin and shoulder. Raising your shoulder can lead to neck tension, headaches and pinched nerves.
- Stand to reach items on shelves above your desk, rather than reaching from your chair.
- Squat or go to one knee while getting materials from bottom drawers and shelves.
- Make physical fitness a part of your day, such as a brisk 15-minute walk at lunch.

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Remember that changing work habits takes time and dedication. Even a slight keyboard height change can initially feel awkward for some employees. If a change feels awkward, ask the employee to work with the modified arrangement for at least a week to give it a chance to become natural.

Conclusion

Because computers have become a permanent part of our lives, it is important to arrange workstations and work habits to help reduce the risk of injury and discomfort. As with anything, exposing our body to repeated and prolonged stress can eventually have an adverse affect on our health. Taking time to ensure we are doing the best thing for our body at work can help prevent chronic health issues. Armed with this information, you can help increase employee safety and comfort through education and workstation modifications, rather than making costly purchases.

Computer Survey Checklist

The following checklist is designed to help you develop and implement corrective actions to address poorly designed computer workstations. It should be supplemented with additional questions specific to the unique characteristics of the represented workspace.

This checklist is designed so that optimal responses are positive (Yes). If the response is negative (No), it is up to the judgment of the evaluator to determine if the deficiencies identified are significant enough to warrant valid concern.

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Seats	Yes	No
1. Is the height of the seat easily adjustable?		
2. Is the seat depth adjustable?		
3. Is the seat adequately padded and upholstered?		
4. Does the seat have a well-rounded front edge?		
Backrest		
1. Does the chair have a backrest?		
2. Does the backrest have adequate lower back (lumbar) support?		
3. Is the backrest lumbar support height easily adjustable between 6 to 10 inches (15-25 cm) above the seat pan?		
4. Does the backrest tilt to positions in back and front of the vertical position?		
Armrests		
1. Does the chair have armrests?		
2. Can the height of the arm rests be adjusted suit the user?		
3. Are the armrests adequately padded and rounded?		
4. Do the armrests allow the user to get close enough to the keyboard without interference?		
Chair Base		
1. Does the chair base have 5 legs?		
2. Are the casters appropriate for the flooring (e.g., carpet, tile, wood) so the chair moves easily?		
3. Are footrests available and provided for users who need them?		
4. Are the footrests approximately the same size as the chair seat pan and moveable?		
Computer Screen		
1. Is the height of the screen adjustable in order to keep the top of the screen at the user's eye level when looking straight ahead?		
2. Is the entire screen located within a viewing angle of 5 degrees above and 30 degrees below the horizontal plane?		
3. Can the screen tilt and move forward and away from the operator to allow adjustment of the viewing distance to between 18"-24" (45-61 cm)?		
4. Is the screen positioned perpendicular to windows or long banks of overhead lights to minimize glare?		
5. Is the screen free from glare and reflections from overhead lights of other light sources?		

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Keyboard / Input Device Support Surface	Yes	No
1. Is the height of the keyboard adjustable?		
2. Is the keyboard angle adjustable between 0-15 forward		
3. Are wrist rests available and provided?		
4. Is there sufficient space on this surface to allow resting of the forearms?		
5. Can the keyboard support move toward and away from the user?		
6. If an alternative input device (such as a mouse) is used, is there sufficient room adjacent to the keyboard to support its use close to the user?		
7. Is there support for the user's wrists/forearms?		
8. Does the device work smoothly at a speed that suits the user?		
General		
1. Are support surfaces finished in a non-reflective finish to minimize glare?		
2. Is there adequate work surface space to allow needed documents or reference materials to be positioned within easy reach?		
3. When the support surfaces are adjusted for the user, is there sufficient knee or leg clearance?		
4. Are the controls/devices that adjusted the above components easy to use by the user?		
5. Do the support surfaces have rounded edges?		
6. Are document holders provided when a hard copy source documents are used?		
7. Are document holders adjustable in height, distance, position and angle?		
8. Is the lighting suitable for the activities being performed (not too bright or dim to work comfortably, especially if referring to hard copy documents)?		
9. Are temperature levels comfortable?		
10. Are noise levels comfortable? (no noisy printers, for example)		



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