

Prevention tips for older workers

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Sensory systems

Many workers as they age may not be aware of changes in vision, hearing, balance or reaction time since these changes are usually gradual. These sensory systems work together so this section will start by a brief explanation of the aging process specific to each sensory system followed by recommendations to try to reduce the likelihood of injury for all workers, and in particular older workers.

Vision: Visual performance in all sorts of activities deteriorates with age, varying in degree across individuals. A number of diseases whose prevalence increases with age (e.g. diabetes) can affect vision. Reduced vision may be due to a combination of changes in visual acuity, reduction in depth or contrast perception, development of eye conditions such as cataracts, or the result of treatment of these problems including use of corrective lenses. Corrective lenses themselves may cause alteration in the visual fields, increased glare, and for individuals wearing bifocals, distortion of objects when viewed at a distance of more than two to three feet through the bifocal lens. Therefore, objects viewed at low levels are less focused when the worker is viewing through the bifocal lens and standing upright. After 50, the ability to detect depth perception begins to decrease and peripheral awareness of movement is delayed, however, these changes are not really significant until the age of 65. Sensitivity to glare starts to increase sharply after 40 (e.g. headlights) and glare recovery takes more time.

Hearing: As an individual ages, especially after 50 years, there is usually a gradual loss of hearing for the higher frequencies, a decreased ability to distinguish between sounds from similar frequencies and a decreased ability to localize things in space through hearing. Until the age of 60, excluding any pathology and/or previous cumulative exposure to chemicals and noise, hearing perception is only slightly hampered by aging. After 60, changes in hearing are more significant. These changes in hearing are often so gradual that the older worker and coworkers may be completely unaware of the deficit. Auditory needs are apt to vary a great deal from one task to the other, and particularly if hearing takes place against a background of noise. Perhaps the only manifestation is difficulty hearing and understanding a conversation in a noisy room or a room with multiple conversations occurring simultaneously. An echoing environment (sound reflections on the walls) makes it much more difficult for older persons to hear.

Reaction time and balance: Balance is a function of several sensory structures working together: vision, proprioception, touch and vestibular. In response to the feedback from these sensory structures, muscles work to maintain balance. As an individual ages, reaction time is frequently reduced due to slower neurological detection, slower processing, and slower movement in response to instructions from the brain. Therefore, an older worker may not be able to react as rapidly to a hazardous situation which may include operating certain types of machines particularly if they are not familiar with the equipment. Balance also is reduced in older individuals whether due to vestibular or inner ear deterioration, blood flow to the brain, cardiac output, medications, or other neurological conditions. The rate and extent of such changes are variable among individuals.

Touch: With aging, sensation to touch diminishes, however it is not known if it is sufficient to cause difficulties on the job. Sensitivity to vibration decreases after 50 years with the legs more affected than the arms, especially when the older person tries to maintain their equilibrium in moving transport vehicles.

Proprioception: Proprioception is important for knowing your body's position in space and essential for adjusting posture (e.g. to prevent a fall). Proprioception decreases with age and is especially noticeable after 70 years when the person tries to maintain their balance in response to unexpected movements.

Vestibular: The vestibular system is located in the ear and brain. There is little information about vestibular aging. Vestibular changes with age appear gradually after 40-50 years of age without noticeable effects until after 65-70 years with equilibrium problems and changes in visual perception when the head is moving.

Prevention

- Encourage older workers, particularly those who seem to be having difficulty to consider evaluation by a vision specialist to identify any problems or need for use of corrective lenses.
- Vision based problems are very individual and an in-depth analysis of each worker situation can be helpful.
- Aging workers will need more light. Standards in the US and Canada include recommendations for adapting lighting levels to the age of the worker.
- Since older workers may have more difficulty with adaptation to light, avoid need for light/dark adaptation. This is most easily performed by trying to eliminate work in brightly lit areas after working for a time in relatively dark areas or vice versa. Having nearly uniform lighting throughout the workplace is preferred and reduces the need for accommodation by the visual system.
- Design gradual transition zones between areas of low and high lighting, such as entrances to an underground area (e.g. tunnels, garages).
- Moving into brighter surroundings can cause problems. Luminance ratios in the environment should be controlled and light sources can be concealed to reduce glare.
- Increase illumination, not glare. To avoid intense sunlight or reflected light, shades and awnings for windows can be used to deflect or eliminate direct light. Diffusers on light sources can decrease glare. Indirect lighting, particularly with larger number of lower power and adjustable sources are good methods to try to increase illumination while controlling or reducing glare.
- Compensate for color changes with age – avoid shades of blue, blue on green or blue on black on signs, instructions, pamphlets, etc..
- Place signage in places easily seen and avoid distractions and cluttering
- Many individuals with known or unknown hearing have difficulty hearing in environments with significant background noise whether it is machinery, conversation, or other sources of sound. Therefore, it is important to minimize machine, air conditioning and other sources of background noise. This can be performed by enclosing noisy machinery or plant operations, insuring machinery is in good repair, and use of sound absorbing

construction material for the ceiling, walls, and floors when possible. Trying to avoid work environments or rooms that create echoes can be very important.

- When the primary concern is warning of potentially hazardous situation such as moving machinery, insure the equipment has warning devices that are sufficiently loud, properly working, and recognizable such as horns to warn workers in the area when they are being operated or moved about the plant.
- Due to the likelihood of serious injury with falls, try to eliminate or avoid work at heights particularly in windy conditions, moist or slippery footing, or on moving equipment.
- Be concerned with placing older workers in jobs requiring operation of equipment with which they are not familiar.

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Falls and slips among older workers

Although the majority of injuries (fatal and non-fatal) occur to workers age 20-44, lost work time and claim cost increases with age. While varying greatly by industry, falls account for 14-40% of non-fatal occupational injuries. Over one-third of persons aged 63 years and older seen in the emergency room due to a work injury are due to falls. Injuries related to falls are more common among older than younger workers. This observation could be caused by more falls among older workers or at least more significant injuries when falls do occur. There are several factors that increase the risk of falls with increasing age including: disturbance of balance due to deterioration of the nervous system, changes in blood flow or regulation of blood flow, deterioration of the inner ear (vestibular) system and visual system that maintain balance, inability to recognize objects on the floor due to visual acuity or corrective lenses, or the effect of medications used to treat other conditions. Once a fall happens in an older worker there are several physiologic changes that may increase the likelihood of a severe injury such as decreased reaction time to avoid fall, osteoporotic or more brittle bones increasing the likelihood of fracture, and thinner skin which may be more prone to tear.

General fall prevention tips can be accessed through several sources as listed below; the following are tips specific to the older worker.

Prevention Tips:

- Try to avoid walking on slippery surfaces which may increase the likelihood of loss of balance. In particular, avoid marble, polished wood and tile flooring which are frequently slippery and, due to their texture, may present difficulty discerning spills or water on the surface. These surfaces can contribute to loss of balance resulting in a slip and fall.
- Use absorbent material on the floor surface to reduce slipping.
- To avoid loss of balance or tripping, keep floors in good repair. Uneven surfaces contribute to falls because of loss of balance either through rotation “turning” of the ankle or stumbling.
- Keep walkways free of obstruction. Clutter walkways particularly when dimly lit can cause trips and falls as the worker is frequently focused on performing job tasks while they may be maneuvering through the work area or at least not watching the floor as they are moving.
- Clean up spills particularly of substances that may lead to slippery surfaces such as oil and grease.
- Keep footwear snug fitting (tie shoes best) with firm non-slippery soles. Encourage workers to wear shoes with pliable soles and low heels.
- Avoid devices that obstruct visual fields (e.g. certain styles of respirators, protective eye wear). While important to protect the worker, try to insure such equipment does not obstruct the visual field especially the upper and lower visual fields.
- Although aging changes are very individual, consider the age of worker with respect to specific job assignments or requirements to perform certain jobs (e.g. ladders, scaffolds). For example, is it necessary for an older worker to work at heights or can the job be assigned to another worker.

- Stairs
 - Use high color contrast between risers and treads.
 - Provide good lighting and hand rails.
 - As most falls occur at the first or last 2 steps, make certain lighting and color contrasts are good at landings and the edge of steps. In particular white, yellow, or silver usually provide good contrasts and can be visualized easier.
 - Keep risers low and use non-slip surfaces on treads.

Sources for overall fall prevention tips

- OSHA
 - www.osha.gov/SLTC/fallprotection/recognition.html
 - www.osha.gov/SLTC/fallprotection/otherresources.html
 - <http://safetynet.smis.doi.gov/oshaFalls.htm>
- Prevent Slip, Trip and Fall Injuries (Eagle Insurance Companies) Update No. 97-03, <http://www.eig.com/ssus/ssu9703.html>
- Prevention of Slips, Trips and Falls, (CCOHS), www.ccohs.ca/oshanswers/safety_haz/falls.html
- Fall protection training products, (All about OSHA), <http://store.yahoo.com/allaboutosha/fall-protection.html>
- Fall prevention in the health care setting, (OSHA), www.osha.gov/SLTC/etools/hospital/hazards/ergo/ergo.html#slips/falls

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Postural balance among the older worker

In recent years there has been a significant increase in older workers returning to the workforce after retirement. An estimated 22.1 million Americans aged 55 years and older will be part of the labor force in 2005. Many workplace tasks are not designed to accommodate the physical capabilities of workers older than 55 years of age. A mismatch between task demand and worker capacity may jeopardize the health and safety of older workers resulting in greater traumatic and acute injuries. Many job-related physical and personal risk factors might affect postural stability: environmental lighting, surface condition, task type and aging. With aging all of the physiological systems (vision, muscle strength, body joint sensation, inner ear sensing of the pull of gravity) that play a key role in balance maintenance become impaired. Impairment to any of these physiological systems jeopardizes older workers' ability to maintain safe upright balance while carrying out tasks.

Prevention

- Make sure all areas have good environmental lighting.
- Keep walking surfaces free of contaminants such as water, oil and ice.
- Exercise caution when performing tasks such as reaching, bending and walking on contaminated surfaces.
- Use a cane, walking stick, or walker if you are unsteady or feel dizzy.
- Keep one hand on a handrail when carrying items up and down stairs and ramps.
- Consult your doctor or pharmacist about side effects of medications that might affect balance.
- Have vision and hearing tested often, wear properly fitted glasses and hearing aides.
- Limit alcohol intake.
- Wear slip-resistant and low-heeled shoes that fully support your feet.
- Keep up a regular exercise program.

Sources for additional information:

- Resource Directory for Older People ~ www.nia.nih.gov/resource
- National Institute on Aging's AgePage ~ 1-800-222-2225
- Access America for Seniors ~ www.seniors.gov
- Administration on Aging ~ www.aoa.gov
- National Resource Center for Safe Aging ~ www.safeaging.org

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- National Institute of Aging. AgePages. www.nia.nih.gov/health/agepages/falls.htm

Musculoskeletal back

With the persons aged 55 and over being the fastest growing workforce age group (expected increase of 3.9% annually to 16.9% of the workforce by 2010), this sector of the population will represent the greatest number of individuals who suffer from Low Back Pain (LBP). Recent estimates of the total cost of LBP are between \$25 billion and \$95 billion per year. Research has indicated that 65% of individuals above 65 years old suffer from stiffness in the joints with 30% suffering from back pain. Low back pain is the third most frequently reported symptom among individuals 75 years or older. While back pain is widespread, there are a few tips that can reduce the potential for developing a low back injury as well as reduce the effects of current symptoms.

Prevention

- Lift objects from waist level. Avoid lifting from floor level or above shoulder level.
- Maintain physical fitness, activity, and strength
- Get as close to the object as possible when lifting
 - Keep object next to body
 - Step closer to the object rather than reaching, even for small objects
 - Eliminate obstacles between you and the object you are lifting
- Bend legs when lifting
 - Lift smaller object that allow you to straddle and bend knees
- Design job station and tasks to limit exposure to back pain risk factors
- Lifting
 - Environment should not require bending, stopping or twisting with the load
 - Provide adequate rest between repetitive lifting tasks
 - Assure good foot traction and no tripping hazards (approximately 20% of back injuries are due to falls/slips/trips).
- Static standing: Prolonged static postures should be avoided
 - Position objects, controls, and displays in locations that minimize prolonged flexed, bending, or stopped postures,
 - Have seats and workstations that adjust to individual anthropometry and good lumbar and arm supports
 - Allow the use of different torso positions throughout the day
 - Low frequency vibration (e.g. common in driving tasks) should be minimized, if prolonged exposures exist, by using seats specifically designed to control vibration and offer good lumbar support.
- Avoid twisting or bending to the side when lifting or moving
- Reduce the object weight as much as possible
 - Lift less items at a time
 - Use carts and other mechanical assist devices when possible
- Don't carry items when walking on slippery or unstable surfaces
- Place heavier objects on shelves at or above knee height, preferably at waist height
- Use snow blower instead of shovel
- Take routine breaks during prolonged driving.

Sources for General Low Back Ergonomics:

Ergonomics of Living

http://www.ergoboy.com/ergo_for/elderly.php

Spine Health

<http://www.spine-health.com/topics/cd/ergo/ergo01.html>

Working Well

http://www.working-well.org/sports_guideln.html

American Academy of Orthopaedic Surgeons recommendations on preventing low back pain

http://orthoinfo.org/brochure/thr_report.cfm?Thread_ID=10&topcategory=Spine&all=all

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Musculoskeletal system: Upper extremities and lower extremities

Prevalence of upper extremity work related musculoskeletal disorders (WMSDs) are greater among older workers compared with younger. From 1999-2002, shoulder and knee injuries were among the top 10 most common and most costly injuries for older workers in the State of Ohio. Osteoarthritis (OA) has significant impact on society with 16% (43 million) of the U.S. population having been diagnosed with some form of OA. Prevalence of carpal tunnel syndrome is estimated between 1 and 10% of the U.S. population with annual costs approaching \$2 billion. Based on 20001 BLS data, while back injuries account for the greatest number (345, 294) of occupational injuries and illnesses, upper extremity (328,274) and lower extremity (304,453) follow close behind. With an aging musculoskeletal system, high repetitive and sustained loading associated with prolonged standing and/or walking may detrimentally affect the health of the weight bearing joints (hip, knee and ankle).

Muscular strength diminishes from 12-25% between 45 and 65 years of age with the greatest changes after 60. This decrease in strength varies by muscle group with loss in the legs greater than the arms. Prior to age 60, there seems to be little change in muscle strength and endurance (length of time that a muscular effort can be sustained). After 60-65, muscle fiber loss becomes greater with a noticeable decline in the capacity for muscular exercise. Bone mass and resistance begins slowly at the age of 20 then proceeds more rapidly after 50-55 years, at a rate of 1% per year. Cartilage tissue covers joints and distributes pressures to make joint movement easier; with age, it atrophies, loses elasticity and dehydrates, causing joint stiffening. Ligaments connect bones to each other; with age ligaments become less elastic resulting in decreased range of movement.

The effects of skeletal aging will be felt mainly in the knees, fingers, hips and spinal column. Pain and decreased mobility at times is detectable from age 30-40 years on (especially spine), and appear clearly between 40-50 years of age, and usually only become a serious hindrance after 50 years of age. The spine exhibits disk deterioration in 70% of men 55-64 years old and 50% of women the same age.

Sometimes it is difficult to determine if injuries among workers are due to aging, work or extra-professional activities. In order to **prevent** these injuries, physical activity is important as it delays musculoskeletal declines associated with age. Physical industrial work is not adequate training to maintain muscular strength. It is important for older workers to regularly exercise and training (physical activity exercised in small doses). In fact, operators who face heavy muscular work with static muscle activity are often in poorer condition compared to office workers who exercise regularly. It may be that sustained muscular work may cause vascular changes or nervous dysfunctions that are associated with musculoskeletal disorders responsible for muscle strength loss. In addition, the influence of genetic, hormonal and nutritional factors cannot be underestimated. Researchers have not determined what extent of deterioration is due to aging per se or other potential contributing causes such as declining levels of physical activity and motivation, or the occurrence of disease.

Prevention

- Job design and organization are important factors in the prevention of musculoskeletal injuries.
- When increased efforts are required, use a mechanical aid or get help from one or several operators.
- Organize the work station so the worker does not have to lift or reach above shoulder level.
- Avoid repetitive tasks, incorporating job rotations if possible.
- Avoid prolonged standing. If prolonged standing is essential to the job, provide the worker with anti-fatigue mats.
- The older worker can usually work just as fast as the younger with the proper job design:
 - Sufficient spacious workstation so the task can be performed in alternating posture
 - Location or tools that avoid extreme postures or having to work in a bent-over position (places extreme demand on the joints).

Additional source for Upper Extremity

- <http://www.arthritis.ca/types%20of%20arthritis/carpal/default.asp?s=1>

Additional sources for ergonomics

- NIOSH work related musculoskeletal disorders Fact Sheet <http://www.cdc.gov/niosh/muskdsfs.html>
- DHHS (NIOSH). Cumulative trauma disorders in the workplace bibliography. September, 1995 Publication No. 95-119. <http://www.cdc.gov/niosh/95-119.html>
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Cardiovascular respiratory

Respiratory function associated with maximum exercise levels decline 15-25% from age 20 to age 65. Consumption of oxygen sharply declines after 50 years making intense physical activity more difficult. Training and regular maintenance of the body may compensate for this and moderate work may not be affected.

Prevention

- Due to reduced capacity and stress from temperature extremes, be cautious or avoid strenuous work in hot/humid environment or cold environments.
- If environment is hot, take precautions to avoid dehydration, drinking water and other fluids that do not contain caffeine.
- Be cautious with high physically demanding work particularly if individual does not routinely perform such work.
- Encourage self-paced rather than machine paced work
- Provide shorter working hours, especially if work is physically or cognitively demanding
- Avoid overtime
- Breaks are necessary
- Allow workers to work in positions where they will benefit from their experience

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