Managing the Aging Workforce: 
*Workplace Safety for the Aging Workforce.*

2009

Presented by
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‘I can’t get old, I’m working. As long as you are working you stay young’

George Burns
1896-1996

‘Age is an issue of mind over matter
If you don’t mind it doesn’t matter’

Mark Twain
1835-1910

The secret of staying young is to live honestly, eat slowly, and lie about your age.

Lucille Ball
Session Outline

- Introduction
- Aging Workers and Occupational Safety
- Cognitive and Physical Changes in Aging Workers
- Designing the Work Environment for an Aging Workforce: Using Ergonomics and Human Factors Engineering to Prevent Injury and Error

Designing for
- Cognitive Changes
- Decreased Visual & Auditory Acuity
- Decreased Thermoregulation
- Reduced Musculoskeletal System Capability
- Aging Workers and Driving
- Wrap UP

Background Materials:

- OSHA, NIOSH, CDC, and numerous ergonomics, occupational health and safety publications.
- FDA’s Human Factors Program.
- The VA Patient Safety Center of Inquiry
- Insight on ergonomics programs and strategy gleaned from over 25 years’ experience as an ergonomist, occupational safety and health professional and as an RN.
Defining Older Workers

- Average age of workforce increasing about 6mo/year
- Scientists: > age 50-55 performance decrement (possibly)
- Aging effects manual laborers > 40 yrs
- Mining industry research 45+ yrs
- Average age of a Nurse RN – 48yrs
- Average age of a Nurse in the Operating Room – 55 yrs
- Seniors 65 yrs. or older
- Defined by AARP as 50+
- Age Discrimination in Employment Act (ADEA): Any worker over age 40

Source: Maynard, 2009; BLS 2008

Aging Workers and Occupational Safety
Incidence rates for nonfatal occupational injuries and illnesses involving days away from work per 10,000 full-time 2007

![Bar chart showing incidence rates by age range.](chart.png)

Injuries and Illnesses Cases with Days Away from 2007 by Occupation

1. Laborers and freight, stock, and material movers
2. Heavy and tractor trailer truck drivers.
3. Nursing aides, orderlies, and attendants
4. Construction laborers
5. Light or delivery service truck drivers  *(BLS, 2009)*
Median Days Away From Work for Nonfatal Occupational Injuries and Illnesses with Days Away from Work (2007)

Aging Workers and Occupational Safety

- Bureau of Labor Statistics (BLS) data,
  - Older workers actually have fewer lost-time injuries than younger workers per full-time equivalent
  - Older workers who do experience a lost-time injury, the average length of disability is longer than that of their younger counterparts

- 1 study of 4 states showed:
  - Workers over the age of 55 are 12 percent to 35 percent less likely to return to work vs. workers between the ages of 25 and 39
  - Workers over the age of 55 are out of work 62 percent to 276 percent longer.

(Fox et. Al, 2005)
Aging Workers and Occupational Safety

- Another study showed that:
  - Job tenure
  - Job satisfaction
  - Treatment
  - Satisfaction account for more of variance in outcomes and problems in Return to Work

- Age + prior injury were not strong contributors to the model  
  (Maynard, 2009)

- Some researchers speculate that the greater length of disability is associated with longer work absences due to retirement from the workforce after the injury.

The Incidence of MSDs in Health Care 2007 ( # of cases)

1. Nursing aides, orderlies & attendants  
   had a MSD rate of 252 cases per 10,000 workers, a rate more than seven times the national MSD average for all occupations

2. Emergency Medical Personnel

3. Laborers and material movers

4. Light and delivery service truck drivers

(United States Department of Labor [USDOL], 2008)
The Cost of Injuries to Older Workers

- 1 study - The cost per lost-time workers compensation claim for workers aged 45-64 was more than twice that of workers aged 20-24.

- Average cost for workers' compensation and medical treatment:
  
  * Carpal Tunnel Syndrome & Back Injuries
    - $ 20-31,000 if surgery is required
    - (Back injuries can be as high as $80-115,000)
    - $ 8-11,000 if non-surgical
  
  Source: US DOL, NCCI, Marsh, Liberty Mutual

Evidence Based for Impact of Aging Workforce on Injury Severity; Return to Work and Costs etc is not well developed

The Cost of Occupational Injuries & Illness

Direct Costs (Largely Workers Comp)
Indirect Costs (e.g. temp and permanent staff replacement costs)

Operational Losses
- Staff Turnover
- Quality of Service; Product or Process
- Quality of Care (Omission in Care)
- Productivity
- Compensating Actions
- Human Error

$60-90 to replace an RN
Types of Injuries/Illness Sustained by Older Workers

- Falls alone account for more than one-third of all injuries sustained by workers 65 and older
- Musculoskeletal Disorders, e.g. sprains and strains
- Fatalities and injuries from motor vehicle accidents*
- Non highway motor vehicle crashes (those that occurred or originated entirely off the highway or on industrial or commercial premises)
- Homicide
- Cardio-pulmonary injury due to over-exertion, loss of heat and cold tolerance, and working at heights in a respirator or in confined spaces

Types of Injuries/Illness Sustained by Older Workers: Motor Vehicle Accidents (MVAs)

- Roadway crashes are the leading cause of occupational fatalities for older workers in the U.S.
- Between 1992 and 2002, nearly 3,200 workers aged 55 years and older died in motor vehicle crashes on public highways, accounting for 22% of all occupational fatalities among this worker group.
- Safe driving - Death rates for work-related roadway crashes increase steadily beginning at around age 55 (and increase more dramatically after age 65-70)
- Older drivers (55 and above) are more likely than other drivers to have a crash at an intersection or when merging or changing lanes on a highway.

The relationship between age and driving behavior is complex.

Changes due to normal aging may affect an older person’s ability to drive. These may include diminished vision (e.g., reduced night vision and intolerance of glare), slower reaction times, declines in cognitive functioning, and decreasing muscle strength and range of motion.

Although most do not affect a person’s ability to work, they may affect the ability to safely operate a vehicle. These changes are gradual and highly variable, affecting some drivers much more than others.

Older workers may also experience a variety of chronic conditions that can affect their ability to drive, including arthritis and macular degeneration.

Unlike their retired counterparts who can wait for better driving conditions, older workers often have to drive in poor conditions to meet deadlines or delivery dates.

*NIOSH, 2005*
What About Productivity?

- Link between aging (through 70) and productivity is not clearly defined
- Link between aging and error is not clearly defined
- The experience, quality and learned efficiencies of older workers may make them more productive than younger workers.
- In jobs that require high physical demands, older workers may have a more difficult time being as productive as younger workers.

Cognitive and Physical Changes in Aging Workers
Aging & Cognitive Changes

Note: The research related to aging and cognition is variable and not definitive

We need to know more about how people naturally develop different habits to match or suit their learning and working styles as they age

- Recent research shows that our brains do not reach their peak performance until we are 45 or older.
- Not until after the early 80s do 30 percent to 40 percent of people experience a significant decline in their mental capacity.

Aging & Cognitive Changes

- Decline in ability to access information from short and long term memory
- Increase in decision making and response time (no decrease in decision quality)
- Difficulty in multi-tasking and making spatial judgments
- Difficulty in discerning between relevant vs irrelevant information (influence of background ‘noise’)
- Declines in memory:
  - Episodic (What did I have for breakfast?)
  - Source (Where did I learn about that new car?)
  - Flashbulb (Where was I Sept 11, 2001?)

(Source: APA Online, 2006)
Aging & Cognitive Changes

- Verbal tasks and vocabulary (talking and expressing themselves) remain constant or may improve
- Less change in procedural tasks (riding a bike)
- Essentially no change in implicit learning (turning on the light switch at home without thinking)
- Learning new skills
  - Older workers can require about 50% more training time to learn.
    Partly due to their increased knowledge that result in more processing to integrate new information or procedures.
  - Older workers are more likely to complete training programs than younger workers.

(Maynard, 2009)

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Aging & Physical Changes: Decreased Visual Acuity

- Presbyopia (near point vision) increases significantly over 50 years.
- Reduced
  - Visual acuity (how clear, and "unfuzzy" things appear)
  - Peripheral visual field
  - Depth perception
  - Contrast sensitivity
  - Color sensitivity
- Increased
  - Sensitivity to glare
  - Time to adapt to large and sudden changes in adaptation luminance
- Rate of visual changes accelerates after 60
Aging & Physical Changes: Decreased Auditory Ability

- Decreased auditory ability in high frequency range
- Discerning auditory signals in a noisy environment difficult
- May have difficulty hearing verbal instructions; auditory alarms
- Occupational hearing loss

Aging & Physical Changes: Decreased Thermoregulation

- Less able to maintain internal body temperatures
- Less able to adjust to changes in external temperature or due to physical activity.
- Less tolerance for extremes of temperature
- May prefer warmer environment when performing sedentary work
Aging & Physical Changes:  
Musculoskeletal & Cardiovascular Systems

- Decline in muscular strength and range of joint movement (less flexible)
  - In general, people lose 15 to 20% of their strength from the ages of 20 to 60.
  - Older workers may perform the same tasks as a younger worker, but they may be working closer to their maximum capacity.
  - Tasks requiring highly repetitive motions may be more difficult.

- Respiratory functions decline from 15 percent to 25 percent from age 20 to age 65. Oxygen uptake sharply declines after the age of 50, making intense physical activity more difficult for older workers.

Aging & Physical Changes:  
Musculoskeletal System

- Decline in regulation of posture and balance:
  - Increasing risk for falls (visual problems)
  - Reduced strength may affect an older worker’s ability to recover balance or footing to avoid a fall (plus slower reaction time)

- Decline in large motor movements ability (walking, bending, sitting, and climbing)

- Decline in small motor movements ability affect dexterity and the ability to grasp and manipulate objects.

- Joint mobility itself decreases slightly from the ages of 20-60, the incidence of arthritis increases beyond the age of 45.
Aging & Physical Changes: Musculoskeletal System

- Slowing of reaction and movement times.
  - Significant decrease in movement time between the ages of 16-25 and 28-56.
  - Average reaction time of older groups (age 66-87) was 30 percent slower than that of younger groups (age 18-30).

- Older workers may use experience to achieve satisfactory performance that compensates for any slow-down.

- However, when job demands exceed the worker's capacity, the older worker may compensate by using increased physical effort or taking fewer rest periods to complete tasks in a timely manner.

Aging & Physical Changes
Musculoskeletal Disorders (MSDs)

Acute:
A sudden or one-time traumatic event or incident, e.g., slip, trip, fall or car wreck

Chronic or Cumulative:
Injuries that occur over a period of time (months/years) & are caused by a combination of risk factors

MSDs affect ligaments, muscles, tendons, cartilage, blood vessels & nerves & spinal discs
Aging & Physical Changes
Risk Factors that can contribute to the
development of Musculoskeletal Disorders

Awkward, Static & Poor Postures + Force (Lifting, Pushing, Pulling, Carrying, Gripping) + Repetition + Duration = MSD

Additional factors:
- Contact Stress
- Cold/Heat
- Vibration
- Lack of Adequate Rest
- Poor Physical Condition

The Cumulative Effect
Duration of Exposure to Risk Factors (Time)

Affected by:
- Working through breaks
- Overtime
- Task variability

When the musculoskeletal system is exposed to a combination of these risk factors (too quickly, too often and for too long) without sufficient recovery or rest time, damage occurs
Culmulative Impact of Manual Handling on the Spine

Biomechanical Load – Tolerance Logic

(Following 4 slides courtesy of William Marras, PhD)

McGill, 1997

Culmulative Impact of Manual Handling on the Spine

Biomechanical Load-Tolerance View of Cumulative Trauma

Reproduced with permission from HumanFit © 2009
Culmulative Impact of Manual Handling on the Spine

Tolerance Changes with Age vs. Cumulative Trauma

<table>
<thead>
<tr>
<th>Force</th>
<th>Time (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

Tolerance due to age
Tolerance due to cumulative exposures
Tissue Load

Arrows show direction of load or force on lower back (L5/S1) when manually lifting and moving patients

Compression
3400-6400 N Limit

A-P and Lateral Shearing
1000 N Limit

Maximum weight limit 50lb (99% males; 75% females) under ideal conditions (NIOSH, 91)

Maximum weight limit 35lb (patient handling) if patient is cooperative and load close to the body (NIOSH, 2007)

There is No Safe method to lift and transfer patients manually

What about the weight limit for an older worker e.g., over 55 yrs?
Mean and Range of Disc Compression Failures by Age

Compressive Forces Resulting in Disc-Vertebral Failures at L5S1 Level (N)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>&lt;40</th>
<th>40-50</th>
<th>50-60</th>
<th>&gt;60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force (N)</td>
<td>10000</td>
<td>8000</td>
<td>6000</td>
<td>4000</td>
</tr>
</tbody>
</table>

(Adapted from Evans, 1959 and Sonoda, 1962.)

Risk Factors that can contribute to the development of Musculoskeletal Disorders

Other Issues to Consider

Risk Factors:
- Physical Risk Factors (on & off the job)
- Psychosocial Factors (e.g., perceived stress)
- Individual Factors
- Work methods & organization (Staffing, Shiftwork, etc)

Rest & Recovery

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Fatigue
Discomfort
Pain
Injury
Disability

Continued Exposure to Risk Factors

Time

The Cumulative Effect

Nurses report here
### Aging & Physical Changes: Decreased Sleep Regulation

- Harder to initiate and maintain sleep at different times of the day.
- Sleep restriction causes a degradation of performance and mood that is cumulative and dose-dependent.
- May need longer recovery time between extended shifts or night shifts.

### Aging & Physical Changes
Musculoskeletal System

However:

- Sub-maximal endurance and continuous-work capacity relatively unchanged.
- Declines in physical strength are more closely related to DISUSE rather than chronological age!
- Strength training in 60 to 70-year olds can compensate for much of the "age-related" declines in strength through muscle fiber recruitment and coordination.
Aging & Physical Changes
Some Good Points to Note….

- While older workers have more sickness absence days, they are less likely to miss work due to non injury reasons (e.g., family obligations.)

- Older workers develop compensatory strategies (time acquired skills?) that make them as effective as or more effective than younger workers for many kinds of tasks.

  e.g., Experience compensates for error corrections, Accuracy traded for speed, context experience compensates for auditory processing decrements (Maynard, 2009)

- Individual variability is VERY high.

Aging & Physical Changes
Some Good Points to Note….

- Chronological age does not always = Functional age

- Functional age measures seem more important for the workplace (grip strength, heart rate, etc)

- Determining the physical demands of age, determining the functional demands of the job and then matching the two

- To keep the mind active and prevent further mental decline older workers can learn a new language, solve crosswords puzzles, and play games that require thought and strategy, etc.
Designing the Work Environment for an Aging Workforce:

Using Ergonomics and Human Factors Engineering to Prevent Injury and Error

Ergonomics is about Designing for the User:

Employees,

Patients,

Families

Physical Capabilities
Cognitive Capabilities

Wayfinding

Defining the Science of Ergonomics/Human Factors

DEFINITION: Ergos = Work  Nomos = Natural Laws

Applying knowledge of the physical and mental abilities and limitations of humans to the design of systems, organizations, jobs, machines, tools and consumer products, for safe, efficient and comfortable human use

(Chapanis, 1995, Helander, 1997)

or

“Fitting the Task to the User”

NOT

“Fitting The Person To The Task”
When Physical and/or Cognitive Demands Exceed Capabilities?

- Fatigue (physical & mental) which can lead to:
  - Cumulative Musculoskeletal Disorders (MSDs)
  - Accidents, Incidents, Near Misses
    - A few seconds/mins time lost
    - Damaged/waste product
    - Quality of care issues
    - Traumatic or acute injury (to user or others)
    - Death

$$\text{Lost: Insurance costs, replacement costs, legal costs, regulatory fines, loss of market share, etc.}$$

Application of Ergonomics & Human Factors in Work Design: A Systems Approach

Function Relationship to Other Departments/Units

- Work Organization, Logistics & Job Design
- Psychosocial Environment
- Physical Environment
- Personal Workspace
  - Equipment & Tools
  - Provider
  - Task
  - Care Recipient

Benefits of Work Systems Ergonomics

...for Employees & Patients

Health Safety Comfort Satisfaction

Less absenteeism and labor turnover. Larger labor pool More involvement and commitment to change.

Well-being of Employees & Patients

...for Health Care Organizations

Quality Performance Efficiency Flexibility Reg. Compliance Reduced Liability

Well-being of organization

Well-being of organization

Adapted from: Corlett, 1995

Designing the Work Environment for an Aging Workforce:
Use a Combination of ‘Controls’ to Address Issues/Hazards

Primary Controls:
1. Eliminate the risk factor(s) through design
   - Engineering of the: 
     ▪ Task - Using patient handling equipment
     ▪ Tools
     ▪ Equipment
     ▪ Facilities

Secondary Controls:
2. Work Practice changes
3. Administrative Controls - Policy & Procedures/Algorithms, etc
4. Warnings (not very effective)
5. Training (staff and patients/clients)
6. Personal Protective equipment (back belts are ineffective)
Overall Design Guidelines

Designing for the User
Cognitive Considerations

1. Provide a good conceptual model (avoid reliance on memory)
2. Simplify structure of tasks
3. Make things visible
4. Proper mapping
5. Provide feedback
6. Exploits the power of constraints
7. Allow for error
8. Permit easy reversal of actions
9. Standardize when possible
10. Provide adequate training for operators

(adapted from Norman, 1988)

Designing for Cognitive Changes

Interface Design Principles: Concepts

Ground rule: Is the equipment intuitive to use & user friendly?

Intuitive design

- To understand the state of the system at a glance
- Minimize the need for additional information/training
- Procedures (menus and navigation) - logical and intuitive
- Feedback for action if correct (e.g., light comes on) or incorrect; auditory signals; other. Immediate, visible, and meaningful
- Error - allows for reversal of errors
- Dangerous error - designed out
Interface Design Principles: Concepts

*Intuitive design cont.*

- Functions clearly communicated:
  - Control type is appropriate for function/use
  - Legible and consistent labels adjacent to corresponding control
  - Comprehensible icons or pictograms
  - Structured/redundant coding systems (shape, size, color)
  - Controls and displays are consistent
  - Remove clutter from control panels and computer screens and use large video displays
Examples of Contrast Sensitivity

<table>
<thead>
<tr>
<th>Poor Contrast</th>
<th>Good Contrast</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0mg/ml</td>
<td>1.0mg/ml</td>
</tr>
<tr>
<td>1.0mg/ml</td>
<td>1.0mg/ml</td>
</tr>
</tbody>
</table>

Interface Design Principles: Concepts Access & Viewing Of Controls and Displays

GOAL: Quick and easy access

- Allow Direct Access
- Correct Reach Distances
- Minimize Viewing Distance
- Eliminate Glare
- Adequate Lighting
- Other Environmental Conditions
Minimize Reach Distances

Desiging for Cognitive Changes
Aids to Reduce Decision Making Errors

- Checklists
- Training (repetitions, drills, simulations)
- Decision aids (flow process aids, decision trees, trouble-shooting guides)
- Reduced numbers of choices
- Error messages
Designing for the User
Environmental Considerations

1. Provide suitable level of lighted based on the task
   (delicate work: 1,000-10,000 lux; reading or assembling
   objects: 200-800 lux; navigating through hallways and
   avoiding objects: 10-200 lux)

2. Avoid glare or large differences in brightness between
   objects

3. Keep noise levels between 30 and 80 dB.

4. Separate noisy work from quiet work.

5. Floor surfaces that provide anti-fatigue properties but do not
   increase push-force re equipment

5. Use acoustic screens or ceilings to absorb noise.

6. Adjust air temperature depending on the nature of the
   task
   (sedentary work: 18-24°C [64.4-75.2°F]; light manual
   work: 15-21°C [59-69.8°F]; heavy work: 13-19°C [55.4-
   66.2°F]).

7. Keep humidity between 30 and 70.

8. Limit time spent in hot or cold environments and use
   protective clothing

Joint Commission Resources, 2005
Design for Decreased Visual Acuity
Lighting/Illumination

- 200 to 500 lux (20 to 50 foot candles) for VDT work or, preferably, 30 to 40 foot candles with documents
- Stairwell lighting preferably 20 foot candles (ANSI/IES)
- Task lighting should be no more than three times brighter than ambient light

Design for Decreased Visual Acuity
Lighting/Illumination

- Decrease glare (direct and indirect)
  - Use shades and awnings for windows
  - Turning off overhead lights or removing some fluorescent bulbs
  - Diffusers on light sources can decrease glare, as can flat screen computers.
  - Use indirect lighting e.g. task lighting
  - Encourage workers to get their eyes checked regularly
  - Computer users should consider using ‘computer glasses’
Lighting & Glare

- Parabolic lenses in overhead light fixture
- Suspended, indirect light is more uniform, creates less glare
- Monitor screen between, and at right angles to, bright light sources
- Instruct lighting reflected off of matte finish wall
- Vertical blinds in windows to direct incoming sunlight

Don’t Forget Bifocal/Trifocal Users
Design for Decreased Visual Acuity
Color and Visual Contrast

- Provide color contrast in stairs and other changes in elevation drawing attention to the change and making the surface easier to identify.
- Use primary colors (not pastels)
- Use transition lighting when going from a well-lit to darker zone to allow visual system to adapt or
- Eliminate the need for older workers to constantly move between bright areas and shady or dim areas.

Design for Decreased Visual Acuity
Color and Visual Contrast

- Avoid shades of blue, blue on green or blue on black in the work environment
- ADA specifies that detectable warnings "shall contrast visually with adjoining surfaces, either light-on-dark, or dark on-light." (70% contrast in light reflectance value LRV)
- Safety Yellow (ISO 3864, ANSI Z535.1) "most visually detectable" (US Access Board Research).
- Make signs clear, easily seen and easy to read and follow.
Dear Mr. Bloggs:
Thank you for meeting with me yesterday. I hope that we will be able to work together in the future.

Dear Mr. Bloggs:
Thank you for meeting with me yesterday. I hope that we will be able to work together in the future.

Decreased Auditory Ability

- Design Recommendations
  - Equipment Selection
  - Barriers
  - Enclosures
  - Change Direction
- Restrict frequency of sound to 1000-2000 Hz
- Try to eliminate reverberation or creating locations that have echoes
- Investigate methods to reduce background noise (phones, pagers, alarms)
- Minimize background noises to accommodate hearing problems
- Utilize hands-free volume-adjustable telephone equipment
Designing for Decreased Thermoregulation

- Avoid strenuous work in hot/humid or cold environments
- Reduce exposure to temperature extremes
- Provide period for acclimatization
- Provide frequent rest breaks
- Provide plenty of fluids – water and non-caffeinated/non-alcoholic beverages
- Appropriate protective equipment
- Allow for self-paced work rather than machine paced work

Overall Design Guidelines

Designing for the User
Physical Considerations

*Not all inclusive*

1. Design within physical capabilities for at least a majority of users (90%)
2. Provide Adjustability
3. Allow for neutral working postures
4. Avoid static postures especially when combined with force
5. Acceptable force to activate hand/finger/foot controls
6. Minimal grip force required to hold controls or equipment
7. Acceptable force required to lift, maneuver, push or pull equipment
8. Minimal repetitive motion
9. No contact stress and pinch points (for employees or patients/clients)
10. Prevent or minimize transmission of vibration from equipment to operator

Resources: Kodak, 2004; MIL-STD 1472F
Designing for Reduced Musculoskeletal System Capability

Workstation Design

Goal: To maintain neutral body postures when performing all job tasks

Design Guidelines:
- Design of Work at Proper Heights
- Minimize Reach Distances
- Eliminate Contact Stress
- Avoid Static Loads or Fixed Postures
- Designing For Adjustability
- Choose the Correct Workstation for the Task

Workstation Design

Avoid Static Loads or Fixed Postures

Goal:
To minimize static postures, increase blood supply to muscles, etc.

- Allow use of electric height adjustable sit to stand stations
- Arm/wrist supports
- Clamps or tool to hold parts
- Change Position at least every 30 minutes
- Take a Microbreak & Stretch

For Example
Alternate Between Sitting & Standing
Use a Foot Rest & anti-fatigue matting when standing
Workstation Design

Designing For Adjustability

Goal: To accommodate a majority of the employee population

If the work height cannot be adjusted -

- Workstation height - design for largest person
- Reach distances - design for smallest person

Designing For Adjustability

Especially for Multi User Workstations

- Provide adjustable:
  - work surfaces
  - fixtures
  - work platforms
  - chairs or stools
  - footrests

- Make proper adjustments at start of shift.
- Make periodic adjustments throughout the shift.
Choosing the Correct Workstation

Standing is best for:
- Movement in the workplace
- Application of force
- Large work pieces
- Long reaches
- Lack of leg clearance for seated work
- Handling objects over 10 pounds
- Ensure:
  - Adequate leg/foot clearance
  - Use foot rests & anti-fatigue matting

Sitting is best for:
- Precision
- Long work durations
- Hands do not work higher than 6 inches above the worksurface
- Ability to see while working
- Wide variety of workers
- Reach distances are acceptable
- Feet can be used for controls Forces/loads are under 10 pounds

Designing for Reduced Musculoskeletal Operating Equipment & Using Tools

Goal
To maintain neutral postures; minimize forces; and eliminate contact stress

- The Right Size
- The Best Shape
- The Least Vibration
Designing for Reduced Musculoskeletal Operating Equipment & Using Tools

- Consider necessary reaction time when assigning older workers to tasks
- Replace knobs with levers and push buttons
- Use distinct shapes to improve tactile identification
- Reduce torque and force required to operate controls etc

Design for Decreased Musculoskeletal Capability Manual Materials Handling

- Use manual handling equipment
- Eliminate heavy lifts, elevated work from ladders and long reaches
- Use tables and stands to keep things off the floor
- Put less material in container
  - Smaller totes or boxes
  - False bottoms in containers
  - Mark "fill to" levels
- Attach handles near the tops of objects
- Remove obstructions
Design for Decreased Musculoskeletal Capability
Manual Materials Handling

- Reduce Carrying Tasks:
  - Short Distances - conveyor systems, ball-transfer or manipulators
  - Long Distances - carts, conveyors, or fork trucks
  - Change layout to reduce distance
  - Add handles

Design for Decreased Musculoskeletal Capability
Manual Materials Handling

- Solutions that Improve Pushing and Pulling
  - Maintain floors (avoid carpet if feasible)
  - Use larger casters
  - Use harder casters
  - Use handles on carts
  - Vertical handles work for more operators
  - Correct load rating
  - Use powered tugs and jacks
Design for Decreased Musculoskeletal Capability
Slips, Trips and Falls

- Install skid-resistant material for flooring and stair treads
- Install shallow-angle stairways in place of ladders when space permits
- Use high contrast colors on risers and treads on stairs
- Use color contrast to identify different raised or uneven areas
- Use bright lighting and provide handrails
- Avoid marble, polished wood, and tile flooring were possible
- Transition trims should be as low as possible

Design for Decreased Musculoskeletal Capability
Slips, Trips and Falls

- Avoid equipment that obstructs vision, especially peripheral vision
- Maintain exterior walkways in good condition
- Check for uneven surfaces, cracks, accumulation of debris, and weather hazards due to rain, snow, or ice
- Practice good housekeeping and keep walkways clear and free of obstructions
- Clean up spills immediately and keep floors and carpets in good repair
- Encourage slip resistant low-heeled shoes on the job.
- Match work with abilities. Some older workers are at risk if required to use ladders or scaffolds
Design for Decreased Musculoskeletal Capability
Reducing Repetition

- Automation
- Use of power tools and equipment
- Provide opportunities for practice and time to develop task familiarity
- Increase task rotation to reduce the strain of repetitive motion
- Lengthen time requirements between steps in a task
- Minimizing the Number of Motions Required to Perform a Task, e.g., use shortcuts and macros when using a computer.
- Plan Work Organization

Aging Workers and Driving:
What Can Employers and Workers do to Prevent MVAs?

- Policies
  - Assign a key member of the management team responsibility and authority to set and enforce comprehensive driver safety policy.
  - Enforce mandatory seat belt use.
  - Do not require workers to drive irregular hours or far beyond their normal working hours.
  - Promote worker health and safety through activities aimed at improving the general health of the workforce (e.g., exercise, diet, and smoking cessation programs).
Aging Workers and Driving:
What Can Employers and Workers do to Prevent MVAs?

- **Promoting Safe Driving**
  - Provide “refresher” driver training and encourage older workers to attend.
  - Encourage using familiar routes of delivery.
  - Maintain complete and accurate records of workers’ driving performance.

Tips for Workers

- **Prior to Your Trip**
  - Make sure that you are well-rested.
  - Adjust steering wheel, seat, controls, and mirrors.
  - Clean lights and windows, and inspect your tires.
  - Plan your route, especially if you will be traveling in an unfamiliar area, and allow plenty of time to reach your destination safely.
  - Determine if there are construction zones or detours along your route.
  - Avoid driving at night and in inclement weather.

- **During Your Trip**
  - Use caution at intersections and interchanges, especially when making left hand turns, and avoid cutting between approaching vehicles when doing so.
Aging Workers and Driving:
What Can Employers and Workers do to Prevent MVAs?

Tips for Workers
- Do not use a cell phone while operating a vehicle
- Stop for regular rest breaks, and do not continue to drive if you are tired.

**Health and Mobility**
- Maintain good physical health through regular physical activity, proper diet, and regular physical exams by your health care provider.
- Talk with your health care provider or pharmacist about the individual or combined effects of prescription or non-prescription medications on your ability to safely operate a motor vehicle.
- If chronic pain or decreased range of motion is making it difficult to drive, seek advice from a professional with knowledge of driver rehabilitation or adaptive technologies. Simple changes such as extra mirrors or ergonomic seats can make a difference.

Summary
- Analyze your injury incident and cost data determine any age-related trends
- Incorporate ergonomics programs and design into your work environment and culture
- Evaluate and enhance your slips, trips and falls and driver safety program/controls
- Incorporate ergonomics and safety design in new build or retrofit; when redesigning processed and purchasing equipment and tools etc – Be Proactive (don’t assume that architects know ‘ergonomics’)
- Design effective training and skill development (don’t discriminate)
Summary

- Optimize early return to work programs

- Offer physical fitness and health promotion programs (including healthy vending/food service choices and information)

- Stay up to date with research related to design for an aging work force

- In the end, good risk management such as job hazard analyses, ergonomics, and wellness programs can maximize safety for older workers as well as their younger counterparts.

Questions