Changes to the Future of Work

• Workforce
  – Age
  – Gender
  – Culture

• Employment
  – Precarious
  – Benefits
  – Global & Virtual

• Hazards
  – New Technologies
  – Organization of Work
  – Stress

The Changing U.S. 21st Century Workforce

Chronologically older
Limited availability
Key skills lacking
Global & Virtual
Diverse
  – Race
  – Gender
  – Age Generations
  – Culture

Source: Testimony by Tamara J. Erickson to the U.S. Senate Committee on Health, Education, Labor and Pensions, May 2005

Screeching to a Halt: Growth in the Working-Age Population


Dramatically Different Patterns of Growth by Age

Percent Growth in U.S. Population by Age: 2000-2010

- 16-24: 5%
- 25-34: 5%
- 35-44: -9%
- 45-54: 18%
- 55-64: 48%
- 65+: 15%

Source: U.S. Census Bureau

Continuing Into the Future

Percent Growth in U.S. Workforce by Age: 2000-2020

Age of Workers

Source: U.S. Census Bureau

In 2000, A Fairly “Young” World . . .

Percent of Population Age 60+ in 2000

Rapidly Aging by 2025

Percent of Population Age 60+ in 2025

Source: U.S. Census Bureau

"Sudden" Boom in Life Expectancy

Life Expectancy at Birth: 1000 – 2000

Source: U.S. Census Bureau, 2000
Obesity Trends* Among U.S. Adults


(*BMI ≥30, or about 30 lbs. overweight for 5’4” person)
Average Retirement Age of Males

<table>
<thead>
<tr>
<th>Country</th>
<th>1960</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td>64.5</td>
<td>59.2</td>
</tr>
<tr>
<td>Germany</td>
<td>65.2</td>
<td>60.5</td>
</tr>
<tr>
<td>Italy</td>
<td>64.5</td>
<td>60.6</td>
</tr>
<tr>
<td>Canada</td>
<td>66.2</td>
<td>62.3</td>
</tr>
<tr>
<td>UK</td>
<td>66.2</td>
<td>62.7</td>
</tr>
<tr>
<td>US</td>
<td>66.5</td>
<td>63.6</td>
</tr>
<tr>
<td>Japan</td>
<td>67.2</td>
<td>66.5</td>
</tr>
</tbody>
</table>

Source: Center for Strategic and International Studies

Proportion of 50+ yr olds Still Employed at Subsequent Ages by Age Attained and Class (U.S.)
National Research Council Study
Commissioned by NIOSH, 2004

• Characterize the older adult workforce over next 20-30 years
• Identify the key policy and research issues
• Address retirement patterns and characteristics of the older adult workforce and their jobs
• Conduct workshop on differential effects of environmental hazards
NRC Study (2004), (cont’d)

- Life course perspective emphasizes *aging* productively versus *age*
- Beginning clearly to detect age-related changes
- Can address disease risk factors to extend years of healthy living
- Promote research to capture precursors of age-related changes
Age and Chronic Conditions: How healthy are older workers?
Key Health Issues for 21st Century Workers

- Hypertension
- Cardiovascular Disease (Stroke, MI, PAD)
- Insufficient Sleep
- Fatigue
- Arthritis/Musculoskeletal Disorders
- Diabetes
- Chronic Pain
- Kidney Disease
- Multiple Medication Usage
Key Health Issues for the 21st Century

- Obesity/Overweight
- Dementia
- Depression
- Decreased Cognition
- Cancer
- Visual Difficulties
- Hearing Loss
- Decreased Pulmonary Capacity
- Chronic Obstructive Pulmonary Disease
- Decreased Strength, Coordination, Reaction Time
Potential Effects of Obesity

• Increased asthma severity (Taylor et al, 2008)
• GERD (Choi et al, 2008; El – Sorag et al, 2007)
  – High correlation with IPF (Raghu et al, 2006; Salviolo et al, 2006)
  – Highly related to asthma, chronic cough, hoarseness (Multiple References)
• Musculoskeletal disorders (the “worn out employee”)

Disease Interactions

- Obesity ➔ Diabetes ➔ CV, PN, GERD, Arthritis

- GERD ➔ Asthma, IPF
Workers with >1 Chronic Condition

Prevalence of Chronic Conditions in the Workforce

- Stroke
- Diabetes
- Any Cancer
- Coronary Heart Disease
- Arthritis
- High Blood Pressure

### Percentage of Fire Fighters in Each Age Group Exceeding Selected Clinical Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Age Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20-25</td>
</tr>
<tr>
<td>&gt;25% Body Fat</td>
<td>0</td>
</tr>
<tr>
<td>Borderline to moderate hypertension</td>
<td>20</td>
</tr>
<tr>
<td>Positive exercise stress test</td>
<td>0</td>
</tr>
<tr>
<td>Mid to moderate pulmonary impairment</td>
<td>10</td>
</tr>
</tbody>
</table>

What is Osteoarthritis (OA)?

Osteoarthritis is a disease affecting the joints which is very treatable. It is rarely deforming or crippling, although it can be painful if not treated. Osteoarthritis is very common and affects almost everybody as they get older. The older you get, the more likely you are to have it, and around eight out of ten people over the age 50 are affected. In the hand, it typically affects the base of the thumb first, then the finger joints. Women are affected more than men.
Distal and Proximal Interphalangeal Joints
Carpometacarpal Joint

- Radiograph shows severe changes
- Most common location in hand
- May cause significant loss of function
Secondary OA: Diabetic Neuropathy

- MTPs 2 to 5 involved in addition to the 1st bilaterally
- Destructive changes on x-ray far in excess of those seen in primary OA
- Midfoot involvement also common
Potential Etiologic and Risk Factors for OA

Breakdown of Dynamic Cartilagenous Physiology Through:

- Aging
- Obesity (Local OA v OA Generalized)
- Gender
- Systemic Disease (DM, Gout, Other Arthropathies)
- Smoking
- Mechanical Loading ("Wear & Tear")
- Acute Trauma
- Muscular Dysfunction
- Genetic Propensity
Respiratory/Allergic Disorders of Older Workers in the Workplace

- Allergic Rhinitis (AR), Reactive Airways Disease/Asthma (RAD), Allergic Dermatitis
- Workplace Allergens – flour dust, metal salts, isocyanates, animal (large-molecular weight) allergens, aldehydes, anhydrides, chromates
- Common General Environmental Allergens – Dust mites, foods, animals, molds, pollens/grasses/trees
Range of Occupational Respiratory Concerns

- Irritation
- Inflammation
- Chemical Pneumonitis
- COPD
- RAD (e.g. Asthma)
- Reactive Airway Dysfunction Syndrome (RADS)
- Interstitial Pulmonary Fibrosis (IPF)
- Lung Cancer
- Hypersensitivity Pneumonitis
- Allergic Disorders
Prevalence of Some Respiratory/Allergic Disorders in the Workplace

- Prevalence of Allergic Disease
  - AR – 20 – 40%
  - RAD – 8%
  - Atopy – 10 – 30%
  - Sinusitis – 30 million in US
Symptom or Exposure Approaches?

- **Sxs** versus **PELs**
- CALOSHA Sensitizer Standard
- Allergic sensitization resulting in disease
- Non-specific irritant triggers/response
Fig 1 Graph of lung function against age showing how smoking accelerates age related decline in lung function (adapted from Fletcher and Peto11)

Enhancing Successful Worker Placement: A Balance of Factors

• Possible Limitations
  – Mental Capacity
  – Chronic Conditions
  – Physical Capacity

• Compensating Factors?
  – Attitude
  – Judgment
  – Flexibility
  – Interest in learning new things

Avoid Non-Predictive Testing

• Laboratory Tests
  – Cognition speed
    • Information retrieval slower, unless material is familiar
  – Learning and recall slower, but equally successful in the end
  – Greater retention, higher learning achievement and more likely to complete a new field of study than younger workers
Avoid Non-Predictive Testing
(cont’d)

• Lab tests do not translate well to actual work settings

• Factors other than *psychometric* cognitive abilities appear important to perform well at work
  – How well worker gets along with co-workers
  – Desire to perform well
Physical Capacity Considerations

• Physiology
  – Maximal strength at 20-30 years
  – O₂ uptake reduced to 70% (max) by 65 years
  – Older adults work closer to capacity

• Match Ability to Job Requirements
  – Change in industry from manufacturing to services
  – Change in job duties from physical to mental
Work Settings: Employing “Chronologically Gifted” Workers

• Decreased performance
  – For physically demanding work only
• Work uncommonly demands maximal effort
• Non-physical advantages that older workers bring to a job are rarely measured
• Workers abilities matched to the job results in less morbidity
  – Accommodation thinking rare in industry\(^1\)
    • May change with ADA Amendments Act of 2008
    • Workers are changing (aging) and jobs are changing

\(^1\) Eur J App Phys 2003 89:536
Aging Productively

• Injury risk and its consequences differ in older workers.

• Medical costs rise with age.
  – Estimated 25% increase from age 40 to 50 to 35% from age 50 to 60

• BUT, age is less a factor in health care costs than the presence of such risk factors as smoking, obesity, lack of exercise, and diabetes!

• There is such a thing as “aging productively” or “healthy aging”!
Do Aging Workers Need Special Accommodations?

• A well-designed workplace benefits everyone.
• Work stations and job tasks need to be matched to the capacity of each worker.
• There should be no conflict between ergonomic principles vs. reasonable accommodations.
Are There Any Specific Health and Safety Concerns Related to Aging Workers?

• Older workers have fewer injuries, but when one occurs, that injury tends to be more severe and it takes worker longer to get better.
• Injuries differ in older workers—there are more musculoskeletal injuries (especially involving the low back).
• No consistent relationship between aging and work performance!
What Should Your Company be Doing?

- Understanding changes in your workforce
  - Better accommodate your changing needs
- Cost Analysis by injury, illness, age, type of claim
- Implementing/Updating Medical Standards and Fitness for Duty Medical Determinations
- Expanding Range of Reasonable Job Accommodations
- Health Promotion Activities
- Disease/Case Management
- Special Exposure Considerations
- Utilize Enhanced Medical Expertise/Services

Would You Hire or RTW Someone…

- 68 years old
- BMI – 35
- 40 Pack-Year Smoking History
- History of DM, OA, HD, RAD, COPD, Spinal Fusion, BCTS Release, Partial Rotator Cuff Tear
- Rx – Percocet, Prozac, Ambien, Statin, Anti-Hypertensive, Allopurinol
For a Job With…

• Moderate Physical Demands, e.g. Frequent Lifting
• Dusty Environment, Solvent Cleaning
• Occasional Stooping, Bending, Squatting, Climbing, Twisting, Reaching
• Overtime
• Rotating Shifts
• Equipment Operator Requirements
Medical Standards and Fitness for Duty Evaluations

- Medical and Physical Characteristics to Perform Essential Job Elements With/Without Reasonable Accommodations to Address Significant, Near-Term Risk of Injury/Disease
- Define/Group Job Characteristics/Jobs/Placement
- MS for Initial Hire, RTW, MMS, Respiratory Protection, Fitness for Duty Issues

Medical Examinations/Evaluations

• Functional Job Screening
• Exam Components
• Medical Restrictions/Accommodations
• Medical Standards – Medical Criteria
• Decisions, Decisions, Decisions
• “Rejection” Rates
# MEDICAL STANDARD JOB MATRIX

## JOB: TRUCK DRIVER

<table>
<thead>
<tr>
<th>FUNCTIONAL CATEGORIES</th>
<th>A. Physical Forces</th>
<th>B. Lower Extremity</th>
<th>C. Locomotion</th>
<th>D. Upper Extremity</th>
<th>E. Back/Neck</th>
<th>F. Standing/Sitting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lift, carry, push/pull</td>
<td>postures, balance - squat, stoop, crouch, etc.</td>
<td>walk, climb, jump, run</td>
<td>movement, coordination - grip/grasp, repetition, reaching, etc.</td>
<td>Postures</td>
<td>bending, twisting/turning</td>
</tr>
</tbody>
</table>

### JOB SPECIFIC DATA

<table>
<thead>
<tr>
<th></th>
<th>Transport, Transfer: Max. 1500 lifts/shift, avg. 45 lbs, max. 60 lbs to chest (100 lbs meat area), carry 5 ft, max. push 200 lbs distance of 80 feet</th>
<th>Drive, Transfer: Squat, stoop, crouch, kneel; work at heights</th>
<th>Transport: Walking, climb, jump</th>
<th>Drive, Transfer: Fine motor, object transfer, grip/grasp, overhead</th>
<th>Drive, Transfer: Bend, Twist/turn</th>
<th>Drive, Transfer, Transport: Stand, sit (while driving)</th>
</tr>
</thead>
</table>

### RANK 1 (meat area)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Arms, legs, neck, back ROM, strength, endurance for very heavy lifting, push/pull (!); hernia concern; chronic musculoskeletal stable</th>
<th>Leg ROM, strength, endurance for postures, balance (C)</th>
<th>Back and leg ROM, strength, endurance for walking (C)</th>
<th>Arm ROM, strength, endurance for object transfer, overhead (F); fine motor, grip/grasp (P)</th>
<th>Back/neck ROM, strength, endurance for bending, twisting/turning (C)</th>
<th>Leg and back strength, endurance for standing (C)</th>
</tr>
</thead>
</table>

### RANK 2

<table>
<thead>
<tr>
<th>Rank</th>
<th>Arms, legs, neck, back ROM, strength, endurance for heavy lifting, push/pull (!); hernia concern; chronic musculoskeletal stable</th>
<th>Leg ROM, strength, endurance for squat, stoop (!), balance (F)</th>
<th>Back and leg ROM, strength, endurance for walking, jumping (!), climb (F)</th>
<th>Arm ROM, strength, endurance for arm use (P)</th>
<th>Back/neck ROM, strength, endurance for bending, twisting/turning (P)</th>
<th>Leg and back strength, endurance for standing (P), sitting</th>
</tr>
</thead>
</table>

### RANK 3

<table>
<thead>
<tr>
<th>Rank</th>
<th>Arms, legs, neck, back ROM, strength, endurance for moderate lifting, push/pull</th>
<th>Leg ROM, strength, endurance for postures, balance (F)</th>
<th>Back and leg ROM, strength, endurance for walking (F)</th>
<th>Arm ROM, strength, endurance for arm use (F)</th>
<th>Back/neck ROM, strength, endurance for bending, twisting/turning (F)</th>
<th>Leg and back strength, endurance for standing (F), sitting</th>
</tr>
</thead>
</table>

### RANK 4

<table>
<thead>
<tr>
<th>Rank</th>
<th>Arms, legs, neck, back ROM, strength, endurance for light lifting, push/pull</th>
<th>Leg ROM, strength, endurance for postures, balance: (!)</th>
<th>Back and leg ROM, strength, endurance for walking (!)</th>
<th>Arm ROM, strength, endurance for arm use (!)</th>
<th>Back/neck ROM, strength, endurance for bending, twisting/turning (!)</th>
<th>Leg and back strength, endurance for standing (!), sitting (P)</th>
</tr>
</thead>
</table>

### RANK 5

<table>
<thead>
<tr>
<th>Rank</th>
<th>Sedentary Work - minimal to no physical forces encountered</th>
<th>No required leg use</th>
<th>No walking required</th>
<th>Single arm use or arm use not required</th>
<th>No required back/neck postures</th>
<th>Stand/sit as desired</th>
</tr>
</thead>
</table>

**C = 100% of shift**  
**F = 25-50% of shift**  
**L = <25% of shift**  
**ROM = range of motion**  
**LOC = loss of consciousness**  
**ND/C = neurologic, diabetic, cardiac**  
**Shaded areas are the ranks which apply to the job listed above.**
<table>
<thead>
<tr>
<th>JOB SPECIFIC DATA</th>
<th>G. Special Senses</th>
<th>H. Mental Activities</th>
<th>I. Aerobic</th>
<th>J. Environment</th>
<th>K Work Schedule</th>
<th>L. Medical Conditions/ Special Regulatory Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive, Identify, Communicate: Commercial driving, written instruction, recognition of visual and auditory signals, material handling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive, Identify, Communicate: Operate motor vehicle, customer interaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport, Transfer: Physical work in extreme outdoor conditions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive, Transport: Outdoor variable temperatures, refrigerated trailer, lifting, protective equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All: Up to 15 hrs/day (10 hrs driving), 60 hrs, 7 days/week</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All: Medical conditions stable; pregnancy considerations (ACOG)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

| RANK | DOT; 20/40 OU Normal Field, Color Vision | Low Intensity Pitch: 25 dB AU .5,1,2,3 (average dB) | Tactile: Surface Changes | Taste/Smell Changes | No LOC risk; public safety; data analysis; judgment (C) | No active psychosis; manage, supervise, public contacts (C-P) | * Very Heavy: Cardiac IA; RF age 40+; FVC/FEV1 80%; ATS Grade 0 | Outdoor Extremes - C | 7 Days and/or 16+ Hours +On-call Status | Specified by regulation; no undiagnosed or unstable condition; no medication effect |
|------|----------------------------------------|---------------------------------------------|-----------------|----------------|-----------------|--------------------------|-----------------|-----------------|--------------------------|
| 1    | Patterns: 20/40 OU (near and far) + Color Vision | Range of Sounds, Driving, Equipment: 25 dB average Better Ear | Tactile: Pressure Changes | LOC Risk (ND/C) minimal; data analysis; judgment (P) | No active psychosis; instruct, organize, public contacts (F) | * Heavy: Cardiac IA; RF age 40+; FVC/FEV1 70%; ATS Grade 0 | Outdoor (P); Indoor Extremes (I) | Overtime Requirement Restricted Leave Policy |
| 2    | Distant Objects: 20/40 Better Eye, Field <125° | Speech, Warning Sounds: 40 dB .5,1,2 Better Ear | Tactile: Temperature Changes | Oral Temperature Changes | LOC risk (ND/C) low; verbal/visual analysis; judgment (F) | No active psychosis; group work (F) | * Moderate: Cardiac IA, FVC/FEV1 60%; ATS Grade 0 | Indoor extremes (P); outdoor (I) | Overtime Requirement and/or Rotating Shifts | No undiagnosed or unstable condition; no medication effect; potential pregnancy limits |
| 3    | 20/40 Better Eye | Warning Sounds: 50 dB .5,1,2 Better Ear | Tactile: Object Recognition | LOC risk acceptable; verbal/visual analysis (l); repetitive | Supervised individual work; group work (l) | * Light: Cardiac IIB, FVC/FEV1 60%; ATS Grade 1 | Indoor Varying - C | Fixed Shifts |
| 4    | No vision requirements | No hearing requirements | No tactile requirements | No requirements or analysis requirements | Individual work | * Sedentary: Cardiac IIB, FVC/FEV1 50% | Indoor Controlled | Flexible Hours, Part-time |
| 5    | No vision requirements | No hearing requirements | No tactile requirements | No requirements or analysis requirements |

C = 100% of shift  F = 25-50% of shift  ROM = range of motion  LOC = loss of consciousness  N/D/C = neurologic, diabetic, cardiac  ** Shaded areas are the ranks which apply to the job listed above.

* PULMONARY FUNCTION TESTING ONLY WHEN MEDICALLY INDICATED, REFER TO PROVIDER MANUAL
Case Identification, Evaluation and Resolution (CIER)

- Establish a Flow Process By Medical Issue/Regulatory Type (ADA, OSH, WC, FMLA)
- Design Case Selection Criteria
- Record Peer Review/Discussion
- CIER Action Plan With “Trackler” Approach

Medical Case Management (MCM)

- Cost
- Lost time duration
- Specific practitioner
- Practitioner type
- Suspected fraud, malingering
- Diagnostic type (Silicosis, CTS, RSD, FM, Cancer)
- Failure to progress (Strength, ROM, Sxs)
Medical Case Management (MCM) (cont’d)

- Extended modified duty
- Psychosocial factors
- Inadequate rehabilitation PLAN
- Unclear/Inappropriate restrictions
- Unusual treatments
- Failed RTW
Benefits of Worksite Wellness Programs

Companies receive many benefits after implementing a worksite wellness program in addition to reducing costs. They include increases in employee morale, improved employee health, reduction in workers compensation claims, reductions in absenteeism, and increases in productivity.

Source: National Business Group on Health, 2005

- Increased employee morale: 56%
- Improve employee health: 41%
- Reduce health care costs: 27%
- Reduce accidents on job: 9%
- Reduce absenteeism: 8%
- Increase productivity: 8%
Wellness Program Savings

A three year study conducted at a health system in Minneapolis found that health risks decreased after the implementation of a comprehensive worksite wellness program. This led to increased savings due to reduced health care costs, absenteeism, and workers' compensation claims each year of the program.

Source: Fairview Alive Program Evaluation (StayWell, 2004)
Thank You For Your Interest!

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