The Aging Worker: Physiological and Functional Considerations

Kevin Komes, MD FAADEP, FAAPMR
Associate Professor of PMR
University of Missouri Columbia
Medical Director
Missouri Occupational Injury Center
Goals and Objectives:

Describe normal physiological changes of aging and functional implications.

Identify high risk tasks in aging workers.

Examine medical records for terminology separating acute injury versus normal aging findings.

Acknowledge incidence of radiographic abnormalities in the aging population.
MOIC
Missouri Occupational Injury Center (573) -884-MOIC
is not
MOI
(Missouri Orthopedic Institute)
Defining Aging Worker

- Biological
- Psychological
- Social
- Functional
Definitions of Aging Workforce

- Over 40 years - Age Discrimination in Employment Act 1967
- Over 55 - Literature
- Over 65 - OASDI Social Security
According to the U.S. Bureau of Labor Statistics (BLS), in 2016, 35 million workers age 55 and older were in the labor force, representing nearly 22% percent of the total, or just above one in five workers.
By 2024, BLS projects 40.1 million workers age 55 and older, representing 24.7 percent of the total, or one in four workers, will be in the labor force.
Over the next decade, the number of “prime-age” workers in the labor force (between the ages of 25 and 54) will grow by -1.3 percent, compared to a projected 55 percent growth in the number of workers who are at least 65 years old (BLS, 2015).
Laws Protecting Aging Workers

- Age Discrimination in Employment Act
- Older American Act 1965
- Civil Rights Act 1964
- Americans with Disabilities Act 1990
Benefits of an Older Worker

- Older workers are more willing to work different schedules,
- Older workers serve as mentors for workers with less experience,
- Older workers have invaluable experience,
- Older workers are more reliable,
- Older workers add diversity of thought/approach to team projects,
- Older workers are more loyal,
- Older workers take work more seriously,
- Older workers have established networks of contacts and clients,
- Older workers have higher retention rates,
- Older workers have more knowledge and skills,
- Older workers are readily available, and
- Older workers are more productive
Conditions Associated with Aging

Age-related limitations can involve a wide range of conditions, including depression and anxiety, addiction, repetitive use, and other cognitive, sensory, and physical limitations.
Arthritis, diabetes, osteoporosis, dementia, and hypertension are among the most prevalent conditions that increase with age (Abel, 2005).
Physical Changes of Aging

• **Strength** - 25-30 percent decrease at 65 yrs
• **Flexibility** - 18-20 percent decrease at 65 yrs
• **Balance** – One-third of 65 yrs or older fall each year
• **Sight** – All aspects deteriorate
• **Reaction time and speed** – Decreases
• **Hearing** – One-third of 65-74 yr olds have problems
• **Manual dexterity and tactile feedback** – Motor skills deteriorate
• **Body fat** – Increases
Physiologic Changes of Aging

- **Oxygen exchange** – 40 percent decrease at 65 yrs
- **Respiratory system** – 25 percent less at 65 yrs, 50 percent less at 70 yrs
- **Cardiovascular system** – 15-20 percent less at 65 yrs
- **Systemic blood pressure** – Increases
- **Fatigue** – Occurs more rapidly
- **Extreme temperatures** – More challenging
Top Two Places Are the Same for 65+ and All Ages—Sprain Rotator Cuff is 3rd for 65+ and Is Above Average for Severity

<table>
<thead>
<tr>
<th>All Claims</th>
<th>Rank by Claim Counts</th>
<th>Average Incurred $ at 18 Months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65+</td>
<td>All Ages</td>
</tr>
<tr>
<td>Open Wnd Finger/s Comp</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sprain Lumbar Region</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Sprain Rotator Cuff</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>Sprain of Neck</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Lower Leg Injury Nos</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Open Wound Hand/s Comp</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Contusion of Knee</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Sprain Lumbosacral</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Carpal Tunnel Syndrome</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Contusion Face/Scalp/Nck</td>
<td>10</td>
<td>21</td>
</tr>
<tr>
<td>All</td>
<td>8,930</td>
<td>4,850</td>
</tr>
</tbody>
</table>

*Exhibit 11. Rotator Cuff Sprains Rank High for 65+*
<table>
<thead>
<tr>
<th>Condition</th>
<th>Rank by Total Incurred</th>
<th>Total Incurred $ at 18 months</th>
<th>Average Incurred $ at 18 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>65 &amp; over</td>
<td>All ages</td>
<td>65 &amp; over</td>
</tr>
<tr>
<td>Sprain Rotator Cuff</td>
<td>1</td>
<td>4</td>
<td>25,211,350</td>
</tr>
<tr>
<td>Lumbar Disc Displacement</td>
<td>2</td>
<td>1</td>
<td>11,224,940</td>
</tr>
<tr>
<td>Oth Brain Inj-Loc Nos</td>
<td>3</td>
<td>14</td>
<td>11,208,060</td>
</tr>
<tr>
<td>Carpal Tunnel Syndrome</td>
<td>4</td>
<td>2</td>
<td>9,395,270</td>
</tr>
<tr>
<td>Tear Med Menisc Knee-Cur</td>
<td>5</td>
<td>6</td>
<td>9,035,960</td>
</tr>
<tr>
<td>Rotator Cuff Synd Nos</td>
<td>6</td>
<td>9</td>
<td>8,059,680</td>
</tr>
<tr>
<td>Fx Neck of Femur Nos-Cl</td>
<td>7</td>
<td>88</td>
<td>7,903,230</td>
</tr>
<tr>
<td>Lumbosacral Neuritis Nos</td>
<td>8</td>
<td>5</td>
<td>6,878,850</td>
</tr>
<tr>
<td>Cervicalgia</td>
<td>9</td>
<td>3</td>
<td>6,820,950</td>
</tr>
<tr>
<td>Lumb/Lumbosac Disc Degen</td>
<td>10</td>
<td>10</td>
<td>6,592,010</td>
</tr>
<tr>
<td><strong>All</strong></td>
<td>—</td>
<td>—</td>
<td><strong>400,438,650</strong></td>
</tr>
</tbody>
</table>

H.Shuford 2005
## Diagnosis Mix and Indemnity Severity Index Differences

**Top 10 Claim Diagnoses for Lost-Time Claims With Temporary Payments That Closed Within 24 Months of Date of Injury, Accident Years 1996-2007**

<table>
<thead>
<tr>
<th>Ages 20–34</th>
<th>Diagnosis and Indemnity Severity Index</th>
<th>Ages 45–64</th>
<th>Diagnosis and Indemnity Severity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Sprain Lumbar Region</td>
<td>0.32</td>
<td>2 Sprain Rotator Cuff</td>
<td>2.98</td>
</tr>
<tr>
<td>2 Lower Leg Injury, not otherwise specified</td>
<td>0.62</td>
<td>3 Unilateral Inguinal Hernia</td>
<td>0.49</td>
</tr>
<tr>
<td>3 Sprain of Ankle, not otherwise specified</td>
<td>0.21</td>
<td>4 Carpal Tunnel Syndrome</td>
<td>1.64</td>
</tr>
<tr>
<td>4 Unilateral Inguinal Hernia</td>
<td>0.38</td>
<td>5 Tear Medial Cartilage/Meniscus of Knee</td>
<td>1.75</td>
</tr>
<tr>
<td>5 Cervicalgia</td>
<td>1.07</td>
<td>6 Lower Leg Injury, not otherwise specified</td>
<td>1.01</td>
</tr>
<tr>
<td>6 Lumbar Disc Displacement</td>
<td>2.21</td>
<td>7 Sprain Lumbar Region</td>
<td>0.43</td>
</tr>
<tr>
<td>7 Carpal Tunnel Syndrome</td>
<td>1.31</td>
<td>8 Cervicalgia</td>
<td>1.89</td>
</tr>
<tr>
<td>8 Lumbago</td>
<td>0.50</td>
<td>9 Rotator Cuff Syndrome, unspecified</td>
<td>2.38</td>
</tr>
<tr>
<td>9 Sprain Lumbosacral</td>
<td>0.25</td>
<td>10 Lumbar Disc Displacement</td>
<td>2.83</td>
</tr>
<tr>
<td>10 Sprain of Neck</td>
<td>0.38</td>
<td>11 Lumbosacral Neuritis, not otherwise specified</td>
<td>2.19</td>
</tr>
</tbody>
</table>

The severity index is the ratio of paid temporary indemnity severity for that diagnosis and age cohort to average paid temporary indemnity severity for all claims.

Source: NCCI
# Diagnosis Mix and Medical Severity Index Differences

Top 10 Claim Diagnoses for Lost-Time Claims With Temporary Payments That Closed Within 24 Months of Date of Injury, Accident Years 1996-2007

<table>
<thead>
<tr>
<th>Ages 20–34</th>
<th>Diagnosis and Medical Severity Index</th>
<th>Ages 45–64</th>
<th>Diagnosis and Medical Severity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sprain Lumbar Region 0.30</td>
<td>2</td>
<td>Sprain Rotator Cuff 2.66</td>
</tr>
<tr>
<td>2</td>
<td>Lower Leg Injury, not otherwise specified 0.72</td>
<td>2</td>
<td>Unilateral Inguinal Hernia 0.94</td>
</tr>
<tr>
<td>3</td>
<td>Sprain of Ankle, not otherwise specified 0.20</td>
<td>3</td>
<td>Carpal Tunnel Syndrome 1.28</td>
</tr>
<tr>
<td>4</td>
<td>Unilateral Inguinal Hernia 0.83</td>
<td>4</td>
<td>Tear Medial Cartilage/Meniscus of Knee 1.69</td>
</tr>
<tr>
<td>5</td>
<td>Cervicalgia 0.99</td>
<td>5</td>
<td>Lower Leg Injury, not otherwise specified 0.93</td>
</tr>
<tr>
<td>6</td>
<td>Lumbar Disc Displacement 1.75</td>
<td>6</td>
<td>Sprain Lumbar Region 0.36</td>
</tr>
<tr>
<td>7</td>
<td>Carpal Tunnel Syndrome 1.15</td>
<td>7</td>
<td>Cervicalgia 1.48</td>
</tr>
<tr>
<td>8</td>
<td>Lumbago 0.47</td>
<td>8</td>
<td>Rotator Cuff Syndrome, unspecified 2.18</td>
</tr>
<tr>
<td>9</td>
<td>Sprain Lumbosacral 0.25</td>
<td>9</td>
<td>Lumbar Disc Displacement 1.92</td>
</tr>
<tr>
<td>10</td>
<td>Sprain of Neck 0.38</td>
<td>10</td>
<td>Lumbosacral Neuritis, not otherwise specified 1.58</td>
</tr>
</tbody>
</table>

The severity index is the ratio of paid medical severity for that diagnosis and age cohort to average paid medical severity for all claims.

Source: NCCI
Exhibit 4. Average Incurred Severity at 18 Months for All Lost-Time Claims
Workers Compensation Considerations for the Provider
Causation vs Association
Post hoc ergo propter hoc.
The rooster crowed (post hoc) and the sun came up. (ergo propter hoc)

Conclusion: The crowing rooster made the sun rise.

There is an association but is crowing causal?
<table>
<thead>
<tr>
<th>Hill Criteria for Causality</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Temporality</td>
</tr>
<tr>
<td>• Strength of Association</td>
</tr>
<tr>
<td>• Dose response</td>
</tr>
<tr>
<td>• Consistency</td>
</tr>
<tr>
<td>• Coherence</td>
</tr>
<tr>
<td>• Specificity</td>
</tr>
<tr>
<td>• Plausibility</td>
</tr>
<tr>
<td>• Reversibility</td>
</tr>
<tr>
<td>• Prevention/elimination</td>
</tr>
<tr>
<td>• Experiment</td>
</tr>
<tr>
<td>• Analogy</td>
</tr>
<tr>
<td>• Predictive Performance</td>
</tr>
</tbody>
</table>
“Doctor, Mr. Jones began having back pain after performing his work activities on March 17, 2017. Is it your opinion to a reasonable degree of medical certainty that his work activity was the prevailing factor in the need for medical treatment and the resultant work disability? (post hoc, ergo propter hoc?)

“Yes! (ipse dixit)
Missouri Compensation

• Work must be “prevailing factor” in causation 287.140.1 August 2005

• It is felt that the patient’s work activity on (date) is/is not the prevailing factor in the need for medical treatment and the resultant work disability
Causation

• Patient history can be unreliable
• Physical examination not helpful unless significant underlying medical condition found
• Testing may be required before causation can be determined
• Medical records showing previous treatment of effected part extremely helpful
Testing

- Normal changes of aging on Xray/MRI occur
- Delineating acute injury from previous injury on MRI may be difficult
- EMG specific for acute neuropathic process (physiological)
- Previous studies and reports of effected part extremely helpful
Abnormal MRI Findings in Asymptomatic Patients

• MRI Cervical 86% in 60yo male (Matsumoto 1997)
• MRI Lumbar- 57% in 65 yo (Boden 2006)
• MRI Shoulder- 54% in 60yo+(Scher 1995)
• MRI Knee 68% cartilage 60+yo(Guermazi 2012)
• MRI Arthrogram Shoulder
• MRI Arthrogram Wrist – 74% total, 29%TFCC (Maizlen 2008)
• MRI Arthrogram Hip – 69% labral tear avg 38 years (Register 2012)
MRI Arthrogram Abnormalities in Asymptomatic Patients

- MRI Arthrogram Wrist – 74% total, 29% TFCC (Maizlen 2008)
- MRI Arthrogram Hip – 69% labral tear avg 38 years (Register 2012)
- MRI Arthrogram Shoulder
MRI terms distinguishing Chronic versus Acute Findings

**Chronic**
- Low Signal
- Fatty infiltration
- Cystic changes

**Acute**
- Increased Signal T2
Claims Management

• Was patient physically and cognitively capable of performing job prior to injury?
• What are the non physiological factors affecting outcome?
Modified duty, Reintegration and Job Transfer Considerations
Muscle Pain and Stiffness:

- Implement ergonomic workstation design, i.e., ergonomic chair and adjustable
- Use a workstation to alternate between sitting and standing
- Reduce repetitive tasks or interrupt the tasks with other duties
- Provide carts and lifting aids
- Modify work-site temperature and/or dress code
- Use fan/air-conditioner or heater at the workstation
- Allow work from home during extremely hot or cold weather
Fatigue/Weakness:

- Reduce or eliminate physical exertion and workplace stress
- Schedule periodic rest breaks away from the workstation
- Allow a flexible work schedule and flexible use of leave time
- Allow a self-paced workload

Practical Solutions • Workplace Success

- Provide parking close to the work-site and an accessible entrance
- Install automatic door openers
- Provide an accessible route of travel to other work areas used by the employee
- Move workstation close to other work areas, office equipment, and break rooms
Gross Motor Impairment:

- Modify the work-site to make it accessible
- Provide parking close to the work-site
- Provide an accessible entrance
- Install automatic door openers
- Provide an accessible restroom and break room
- Provide an accessible route of travel to other work areas used by the employee
- Modify the workstation to make it accessible
- Adjust desk height if wheelchair or scooter is used
- Make sure materials and equipment are within reach range
- Move workstation close to other work areas, office equipment, and break rooms
- Provide lifting devices and carts
Hearing Limitations:

- Provide visual or tactile alerting device
- Implement a buddy system
- Provide an assistive listening device (ALD)
- Provide communication access real-time translation (CART)
- Provide computer-assisted note taking
- Address environmental factors, i.e., background noise, lighting, and positioning
- Provide an interpreter
- Use Web-based meeting software or video conferencing
- Provide standard note taking or other text information
- Allow tape recording of meetings
- Provide speech recognition software
Vision Limitations:

- Magnify written material using hand/stand/optical magnifiers
- Provide large print material or screen reading software
- Control glare by adding a glare screen to the computer
- Install proper office lighting
- Allow frequent rest breaks
Respiratory Difficulties:

- Provide adjustable ventilation
- Keep work environment free from dust, smoke, odor, and fumes
- Implement a "fragrance-free" workplace policy and a “smoke-free” building policy
- Avoid temperature extremes
- Use fan/air-conditioner or heater at the workstation
- Redirect air-conditioning and heating vents
Maintaining Concentration:

- Reduce distractions in the work area
- Provide space enclosures or a private office
- Allow for use of white noise or environmental sound machines
- Allow the employee to play soothing music using a cassette player and headset
- Increase natural lighting or provide full spectrum lighting
- Reduce clutter in the employee's work environment
- Plan for uninterrupted work time
- Divide large assignments into smaller tasks and steps
- Restructure job to include only essential functions
Medical Treatment Allowances:

- Provide flexible schedules
- Provide flexible leave
- Allow a self-paced workload with flexible hours
- Allow employee to work from home
- Provide part-time work schedules
Psychological Aspects of Aging (Depression and Anxiety):

- Develop strategies to deal with work problems before they arise
- Provide sensitivity training to coworkers
- Allow telephone calls during work hours to doctors and others for support
- Provide information on counseling and employee assistance programs
- Allow time off for medical treatment
Activities of Daily Living:

- Allow use of a personal attendant at work
- Allow use of a service animal at work
- Make sure the facility is accessible
- Move workstation closer to the restroom
- Allow longer breaks or more frequent, shorter breaks
- Refer to appropriate community services
- Provide access to a refrigerator
Claims management in the aging worker may require obtaining previous medical records and increased communication efforts with the employer and the medical provider.
References

• H. Shuford, NCII Brief, Vol 1, May 2005
• L. Perry, Designing the Workplace for the Aging Workforce, Zurich
• B. Loy, Job Accomodation Network, askjan.org, February 2013
• M Heidkamp, J Christian, NTAR Leadership Brief March 2013
• https://www.ncci.com/Articles/Documents/II_2011_Aging_Workforce_Research_Brief.pdf