

# Manual Material Handling

## Risk Factors and Controls

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# Introducing Your Host



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# Objectives

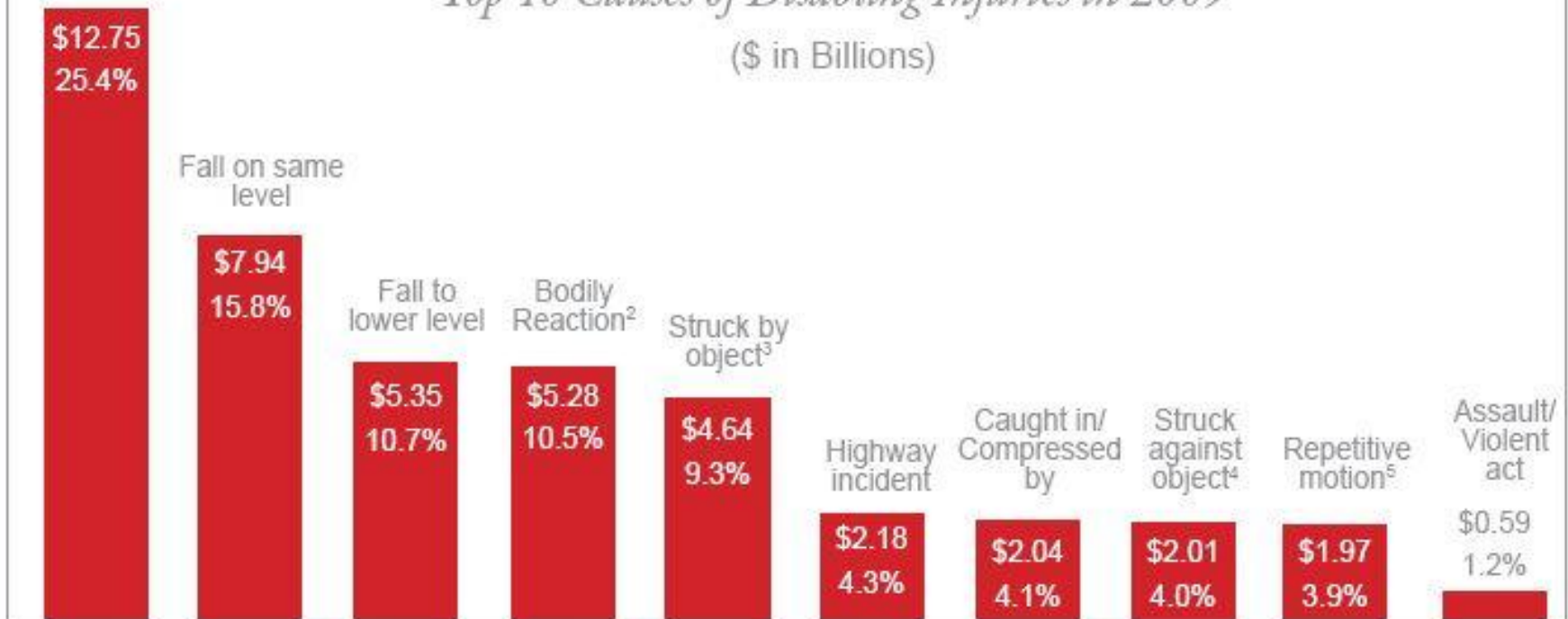
- Discuss the impact of incidents related to manual materials handling on workers compensation losses.
- Define how to recognize the major risk factors for overexertion and low back pain.
- Outline basic strategies for controlling risk factors.
- Share some examples of successful approaches to reducing manual handling risk and losses.
- Review resources that you can use to analyze and reduce your manual materials handling risks.

# Liberty Mutual Workplace Safety Index

Overexertion<sup>1</sup>

## Top 10 Causes of Disabling Injuries in 2009

(\$ in Billions)



<sup>1</sup>Overexertion – Injuries from excessive lifting, pushing, pulling, holding, carrying, throwing

<sup>2</sup>Bodily reaction – Injuries from bending, climbing, reaching, standing, sitting, slipping or tripping without falling

<sup>3</sup>Struck by object – Such as a tool falling on a worker from above

<sup>4</sup>Struck against object – Such as a worker walking into a door

<sup>5</sup>Repetitive motion – Injuries due to repeated stress or strain

# Important Background Overexertion and Low Back Pain

- 60-80% lifetime prevalence of Low Back Pain (LBP) for general population.
- Around 14% of Americans (31 million) currently experience LBP.
- Recurrence rates can be high.



# Low Back Pain Causes

- Up to 85% of LBP has no definite cause and is classified idiopathic or non-specific.
  - The natural aging process of the spine contributes to back pain issues.
- Many back symptoms are of spontaneous and gradual onset, without a precipitating accident or unusual activity.
  - Many do not feel sudden pain.
  - Symptoms can begin after work ends.

# Categories of LBP

- Simple acute pain
- Low back impairment
- Low back disability
  - Often a function of the job demands
- Low back compensation
  - Often a function of WC statutes
- Important to recognize that we cannot prevent all back pain but we can have a positive impact on claims, disability and costs



# Recognizing Risk Factors





# Risk Factors

## Overexertion and Low Back Pain

- Manual materials handling
  - Lifting/lowering
  - Pushing/pulling
  - Carrying/holding

# Occupational Risk Factors

- Heavy weights / high forces
- High frequency repetitive lifting
- Stressful and awkward body motions
  - Bending
  - Reaching
  - Twisting
- Prolonged sitting / posture
- Whole body vibration
- Slips, trips and falls

# Lifting and Lowering



- Associated with majority of low back problems
- Often involves bending
- **Watch out for:**
  - Heavy weights
  - High-repetition lifting
  - High or low lifts
  - Long lifting distance
  - Load characteristics
    - Unbalanced load
    - Poor grip on load

# Recognizing Risk Factors Awkward Body Motions

- Awkward body motions
  - Bending
    - Especially low bending for floor level loads
  - Reaching
    - Reaching hands away from body and reaching above shoulder
  - Twisting
    - Rotating torso while handling load

# Bending

- Increased disk pressure
- Upper body weight load is 'lifted' when you bend
- Shifts center of gravity
- **Watch out for:**
  - Material stored on the floor
  - Palletizing tasks
  - Very low storage shelves
  - Tasks requiring ground level work



# Reaching

- Shifts the load center of gravity forward
  - Increases forces on low back
- Often forces a bend
- Additional risk factor for shoulder injury



# Reaching



## Watch out for:

- High stacked palletized loads
- High storage shelves
- Reaching across obstacles

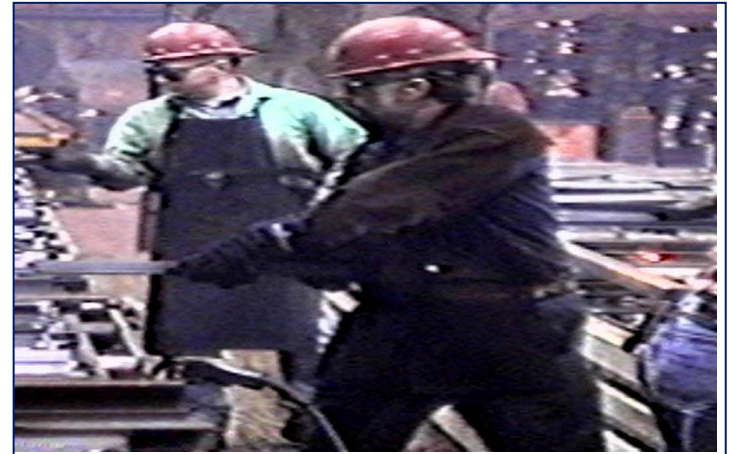
# Reaching Risk Factors – Awkward Positions





# Twisting

- Increased disk pressure
- Increased torsional forces on the spine
- Asymmetrical loading
- Often performed under load or in a confined area



# Pushing or Pulling

- “Assumed” to be easy
- Resistance, not weight is critical

## Watch out for:

- High initial and/or sustained forces
- Long distances
- Inclines
- Obstructions/surface conditions
- Overloaded containers



# Carrying

- Slightly easier than lifting
- Usually associated with lift & lower
- **Watch out for:**
  - Heavy, bulky loads
  - Frequent handling
  - Long horizontal travels
  - Walking with awkward load
  - Poor grip on load



# Risk Factors

## Slips, Trips and Falls

- Slips, trips and falls a leading cause of back pain
- **Watch out for:**
  - Poor housekeeping and obstacles in the path
  - Lack of traction on floor surface
- Keep paths clear
- Ensure slip resistant floor surfaces



# Seated Risk Factors Stressful Postures for the Back

## Watch out for:

- Twisting to reach behind
- Unsupported back
- Leaning forward
- Slouched forward
- Prolonged sitting



# Solutions To Reduce Manual Handling Losses

Focus on Risk Factors

# Eliminate/Reduce Risk Factors

- Minimize weights and forces
- Minimize body motions
  - Bending
  - Reaching
  - Twisting
- Minimize frequency of handling/re-handling

# Solutions - ????





# Minimize Weights and Forces

- Redesign/modify the process to use handling equipment
  - Mechanical handling solutions
  - Power assisted equipment
  - Air ride surfaces
- Redesign/modify the task
  - Optimum layout, access, methods, etc.
- Redesign/modify the load to facilitate handling
  - Increase and use mechanical handling
  - Decrease weight
  - Change container/packaging

# Mechanize Heavy Jobs



# Ergonomic Guidelines: Minimize Bending



- Keep material off the floor if the material must be raised later.
- Keep work at the mid-range level (knuckle height to shoulder height).
- Use lift tables, work dispensers, or other aids to raise the work-level.
- Provide material at work-level height.
- Explore possibilities of reducing sizes of boxes, & other packaging materials.

# Aids to Reduce Bending



# Solutions



- Book Printer - Manual Handling Books
  - 43% of Claims: 75% of Cost
  - Vacuum Lift Installed
  - No overexertion injuries - \$20K savings

# Minimize Reaching

- Controls:
  - Redesign workstation
  - Store items between knuckle and shoulder height
  - Keep objects close to body
  - Reduce sizes



Images courtesy of NIOSH 2007-131



# Solutions



- Beverage Production & Distribution - Manual Handling
  - MH Injuries Unloading Cases
  - Scissor Lift with Rotatable Top Installed
  - No Overexertion Injuries Since Installation

# Ergonomic Guidelines: Minimize Twisting

- Position all materials and tools in front of the worker.
- Use conveyors, chutes, slides or turntables to change the direction of material flow.
- Provide sufficient work area for whole body to turn.
- Improve workstation layout to eliminate need to twist.
- Define critical work activities, provide worker training and reinforcement.



Cut-out work surface



# Process Improvements Redesign Heavy Jobs



Before



After

# Minimize Pushing & Pulling

- Controls
  - Use powered equipment.
  - Use as large a caster as practical.
  - Select casters based on floor surface.
- Maintain casters and bearings.



# Minimize Pushing & Pulling Forces



# Minimizing Carrying

- Controls
  - Provide conveyor
  - Provide cart
  - Reduce distance



Images courtesy of NIOSH 2007-131

# What about Two Person Handling?

- Advantages
  - Can reduce the load for one person
    - If load is equally distributed on a smooth, coordinated, well balanced lift
- Disadvantages
  - Potential for increased loading if not smooth and balanced.
  - Means two people are now exposed
  - One person may be going backwards on a carry.



# Two Person Lifting

- Don't rely on this approach. Use as a last resort -
  - Try to redesign the task first so can be an acceptable task for one worker.
- Ensure well balanced, coordinated lifts.



Images courtesy of NIOSH 2007-131

# Administrative Controls

- Rotation and job enlargement
- Work scheduling, recovery periods, and breaks
  - Overtime control
  - Shiftwork design
- Employee Selection & Placement
  - Recognize limitations
    - Has not been shown to be predictive of injury
  - Understand that it requires a comprehensive approach and has extensive legal requirements

# Organizational Interventions

- Exercise Programs
  - Limitations (See Reference Note LC 5607 Exercise Programs)
  - Program should be under direction of health care professional and customized.
- Health Promotion & Wellness
  - Beneficial but needs comprehensive approach
- Health Care Provider Integration
  - Evaluation and Treatment Protocols
- Back pain management protocols and training (including self-care)



# Work Practices - Limitations

Let's train them on 'Safe Lifting' ?

- Beware that generic safe lifting training has very limited impact –
  - Research shows limited or no impact on reducing frequency and severity of losses.
  - No definitive evidence to support 'use your legs' type training.
- Training on keeping load close and reducing twisting makes 'common sense' but must be task specific and integrated as part of an overall process for improvement.

# Psychosocial and Organizational Risk Factors

- Psychosocial
  - Related to the workers perceptions of how they are treated and the interactions in the workplace.
  - Response to initial reports/discomfort is a critical contact point.



# Responding to Incidents

- Recognize incidents will still occur and include planned response processes.
- Management trained and prepared for responding to concerns, complaints and symptoms.
- Ensure open communications are perceived as supportive and have a defined path for resolution.
- Optimizing Supervisor's Response
  - See Reference Note LC 5431- Disability Management Training for Supervisors: Optimizing Response to Work Injuries,

# Hierarchy of Controls

- Eliminate
- Substitution
- Engineering
- Administrative
- Training
- Warning
- PPE

# Implementing Integrated Solutions

- Ensure solutions include engineering, training and behavioral components.
- Get employees involved in risk assessment, solution development and implementation.
- Share solutions within site and across the organization.

# Resources to Support Your Program

## Liberty Mutual Reference Notes

- LC 5381 R3 Lifting/Lowering
- LC 5443 R3 Lifting and Lowering Worksheet
- LC 5177 Materials Handling
- LP 180 Manual Task Evaluation Concepts
- LC 155 Principles of Task Redesign
- LP 5435 Ergonomic Guidelines for One-Handed Lifting and Pulling
- LC 5431 Disability Management Training for Supervisors: Optimizing Response to Work Injuries
- LC 5361 Strength Testing for Worker Selection and Placement
- LC 148 Training Workers in Safe Lifting and Material Handling
- LC 182 Manual Material Handling Research
- LC 5067 Worksite Exercise Programs and Control of Upper Extremity Musculoskeletal Disorders
- LC 5012 Back Belts

# Resources to Support Your Program

## Internet Sites

- Liberty Mutual Manual Materials Handling Tables
  - [http://libertymmhtables.libertymutual.com/CM\\_LMTablesWeb/taskSelection.do?action=initTaskSelection](http://libertymmhtables.libertymutual.com/CM_LMTablesWeb/taskSelection.do?action=initTaskSelection)
- NIOSH Publication 2007-131, Ergonomic Guidelines for Materials Handling
  - <http://www.cdc.gov/niosh/docs/2007-131/>
- Cal/OSHA Easy Ergonomics  
[http://www.dir.ca.gov/dosh/dosh\\_publications/EasErg2.pdf](http://www.dir.ca.gov/dosh/dosh_publications/EasErg2.pdf)
- Material Handling Institute and Ergonomic Assist Systems and Equipment (EASE)
  - <http://www.mhia.org/industrygroups/ease>

# Closing Thoughts

It is important to:

- Eliminate or reduce need for manual handling
  - Reduce task demands with mechanical assists
    - Available when needed,
    - Suitable for the job and for the workers (involvement)
  - Control the risk factors
    - Bending, reaching, twisting
- Recognize back pain will occur and be prepared





# Questions and Comments



# Get Your Access to a Wealth of Risk Reduction Help Available 24/7

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