Functional Approach to Reducing Injury Risk

Jeff Carlson M Ed, ATR, CDMS

The Goals of this Program:

- A better understanding of the ways employees unknowingly set themselves up for injury.
- Identify ways to perform essential tasks with less injury risk.
- Identify exercises to reduce injury risk.

Pretest

- Problem?

National Statistics Identify An Undeniable Problem

- 1.8 million workers are affected by musculoskeletal disorders (MSDs)
- 80% of workplace injuries are due to worker habits (DOL)
- 600,000 Americans miss work due to MSDs annually

How about MN?

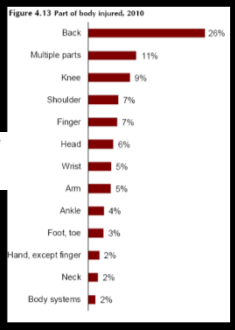
- **In MN 3.2 million people employed**
- **In MN 76,700 work injuries in 2010**
- **Men accounted for 59% of work related injuries**

(MN DOLI, 2012)

How Are MN Being Injured?

The estimated number of cases with back injuries has decreased substantially in recent years, from 7,750 cases in 2003 to 5,650 cases in 2010, a 27 percent decline.

MSD cases accounted for 38 percent of the DAFW cases in 2010, the highest percentage since 2005.



FACT: Work-Related Injuries are expensive…

. . . Direct costs included medical expenses for hospitals, physicians, and drugs were estimated to be $51.8 billion

The National Academy of Sciences

NATIONAL ACADEMY OF SCIENCES

Work-Related Injuries are expensive…

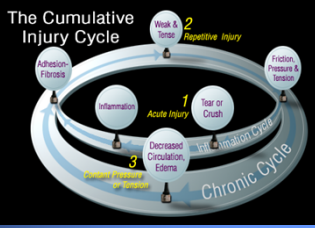
… they account for a leading reason for early retirement.

Reducing MSDs with a Functional Approach - Ergonomics

- The relationship between a human, work and the working environment
- Physiological and engineering principles to make motion, function and work both safe and efficient
- Arranging and adjusting the work environment to fit the needs of the individual employee, integrated with the needs of the job.

MSD Defined…

- Injuries and disorders of the muscles, nerves, tendons, ligaments, joints, cartilage and spinal discs.
- Disorders caused by exposure to activities and conditions that involve known risk factors in an industry.



Historical Perspective of Occupational Injury

1. Bernardo Ramazzini - 1717 – First to introduce literature regarding common MSDs in eighteenth century occupations
   a) Ascribes particular diseases to, " *… certain violent and irregular motions and unnatural postures of the body …*"
   b) Regarding Sedentary workers, " *Men and women who sit while they work…become bent, hump-backed and hold their heads like people looking for something on the ground…*"
   c) Regarding clerks, " *The maladies that afflict the clerks…first, constant sitting, second the incessant movement of the hand and always in the same direction, thirdly the strain on the mind from the effort not to disfigure the books by errors…*"

   De Morbis Atificum Diatriba, 1717

However, Today we better understand the Physiology of Work-Related Injuries

The effect of these factors is to:

1. Reduce Blood flow and nutrition to working tissues, creating an hypoxia which eliminates the progression of wound repair seen in acute injuries (Josza, et al, 1990).
2. Results in neural inhibition (Jensen et al., 2000).
3. Results in overfiring of muscle tissues due to lack of proprioception (Mense et al., 2001: Yaksh, 1996).
4. Results in more stress at the site of injury (Headley and Hocking, unpublished: Headley, 1997).

We see this every day, or do we?

Neuromuscular Dysfunction

- Neuromuscular Consequences of Injury and Core Dysfunction

Robert R. Hammill MA, ATC[a], James R. Beazell PT, DPT, OCS, FAAOMPT, ATC[b] and Joseph M. Hart PhD, ATC[c]

- Recurring episodes of present a dilemma for patients and clinicians. Patients who experience disability caused by repeated episodes are limited in their activities of daily living and may experience inappropriate neuromuscular adaptations to maintain and/or preserve function. Unfortunately, it is likely that these changes create an environment where and spine joints are exposed to unusual and possibly excessive forces while attenuating impact from walking, running, or other activities. Individuals who want to maintain a healthy lifestyle may be restricted because of recurring and disabling nonspecific . Individuals who must continue with normal and necessary activities of daily living may choose an adaptive mechanism to preserve functional gait. Some individuals may use an adaptive strategy that is unfavorable, possibly exposing joints to further injury or long-term degenerative processes.

2008

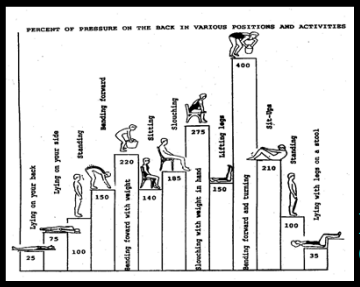
Occupational Risk Factors that Lead to Preventable Injuries

- Repetition, Repetition, Repetition
- **FORCE**
- **Awkward** and Sustained Postures
- Mechanical or Contact **Pressure**
- Vibration
- Cold Temperatures

More Risk Factors that Lead to Preventable Injuries

- Poor Body Mechanics:
  While Lifting, Reaching, Twisting, Bending
- Fitness and Activity Level
- General Physical Health
- Stress
- Non-Occupational Activities

Posture Affects Your Whole Body

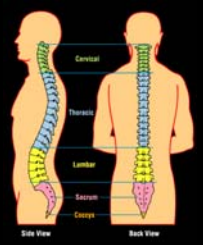


- Neck
- Shoulders
- Wrists
- Hands

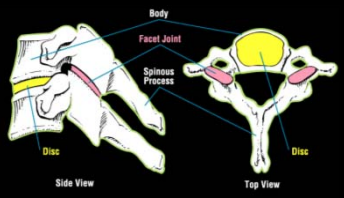
Nachemson's
(supported by Sato, 1999)

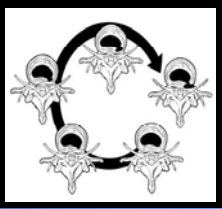
Structural Support

- Bony Structure
- Muscle Structure



Back Basics





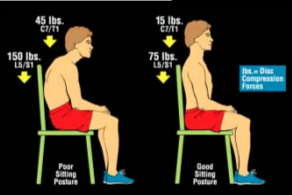
Spine – Effect of Postures

The Response of the Nucleus Pulposus of the Lumbar Intervertebral Discs to Functionally Loaded Positions

Lyndsay A. Alexander, BSc,* Elizabeth Hancock, MSc,* Ioannis Agouris, PhD,* Francis W. Smith, MD,† and Alasdair MacSween, PhD*

SPINE Volume 32, Number 14, pp 1508–1512

Conclusion. These results support for the first time the validity of clinical assumptions about disc behavior in functional positions: sitting postures may increase risk of posterior derangement, and prone and supine may be therapeutic for symptoms caused by posterior disc displacement.



How to Focus Treatment

Spine - Centralization Phenomenon

- **Find Directional Preference**

Does it Matter Which Exercise?

A Randomized Control Trial of Exercise for Low Back Pain

Audrey Long, BScPT,* Ron Donelson, MD,† Tak Fung, PhD‡

SPINE Volume 29, Number 23, pp 2593–2602

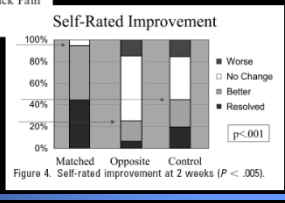
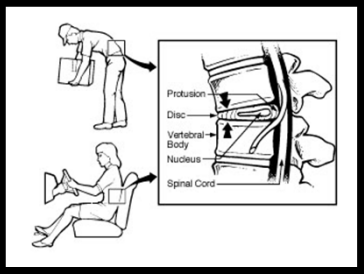


Figure 4. Self-rated improvement at 2 weeks ($P < .005$).

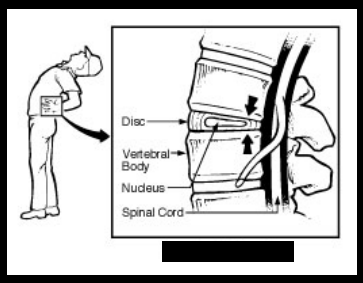
Test photo

- What are the differences in these two workers?

Disk Response to Movement - Flexion

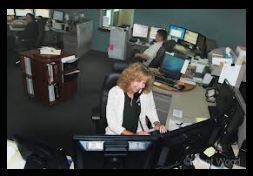


Disk Response to Movement - Extension



Situations That Increase Risk!

- Forward bending - “C” curve
- Forward bend and rotation
- Sustained postures
- Repetitive movement



Abdominal Strengthening


Low Back Strengthening


- Shoulder

Pretest

- Problem?

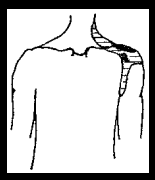
Shoulder Injuries

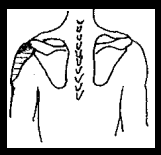
Glenohumeral Joint
- Instability
- Impingement
- Rotator cuff tears

Acromioclavicular Joint
- Arthritis
- Instability

How to Focus Treatment

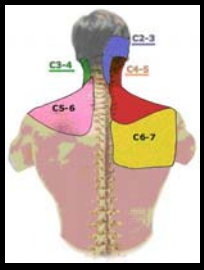
Shoulder Injury
Referral Patterns





How to Focus Treatment

Neck Injury
Referral Patterns



Shoulder Mechanics

- Keep mechanical advantage
- Thumb up
- Fatigue Resistance

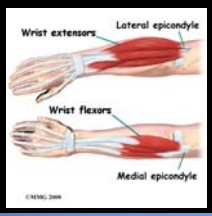
Shoulder Strengthening –

One Arm Row

Pull Down

Elbow Tendonitis

- Active Inflammation
- Pain on outside (Tennis Elbow) or inside of elbow (Golfer's Elbow)



Over Use?

How to Focus Treatment

Treating Tendon issues

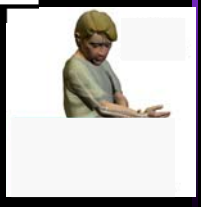
- Elbow, Achilles and beyond

In vivo investigation of ECRB tendons with microdialysis technique—no signs of inflammation but high amounts of glutamate in tennis elbow

Håkan Alfredson[1,3], Björn-Ove Ljung[2], Kim Thorsen[1,3] and Ronny Lorentzon[1,3]

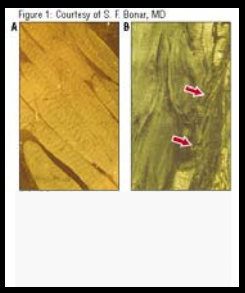
Acta Orthop Scand 2000; 71 (5): 475–479

- **<u>The pathology is not inflammatory</u>; it is a failed healing response. The source of pain in tendinopathy could be related to the neurovascular ingrowth seen in the tendon's response to injury.**



Anatomic Difference - Tendinosis

- Normal tendon
  - White
  - Glistening
  - Firm
  - Uniform bundled collagen fibers
- Abnormal tendon
  - Dull
  - Soft
  - Brown/grayish in color
  - Loss of collagen continuity



A New Paradigm for a Difficult Clinical Problem

Karim M. Khan, MD, et al

THE PHYSICIAN AND SPORTSMEDICINE

VOL 28 - NO. 5 - MAY 2000

- Knee and ankle

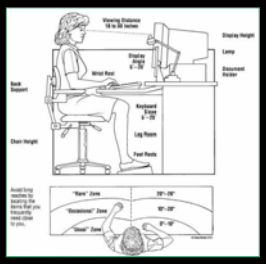
Knee and Ankle

- Mechanics at the foot and ankle can set up knee injuries
- Straight line between ankle, knee and hip

Leg Strengthening and Improved Balance

Office Design

- Self Test
  - Thigh parallel to the floor
  - Chair back is supportive
  - Wrist is at level of elbow or slightly higher
  - Keyboard legs out of use
  - Keep items commonly used with in easy reach

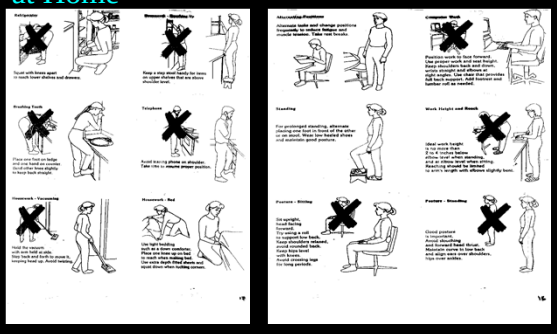


So, where do we start?

Begin with…

- Proper Equipment
- Watch for hazards
- Know your environment

Changing Habits Begins at Home



Training to reduce risk.

- Strength vs. endurance
- Proprioception
- Stabilization
- Recovery

NovaCare WORKSTRATEGIES
Keeping America on the Job!

Our Mission is to reduce injury risk and optimize your health!

Thank you

All Good Things

C

Correct

Complete Forms

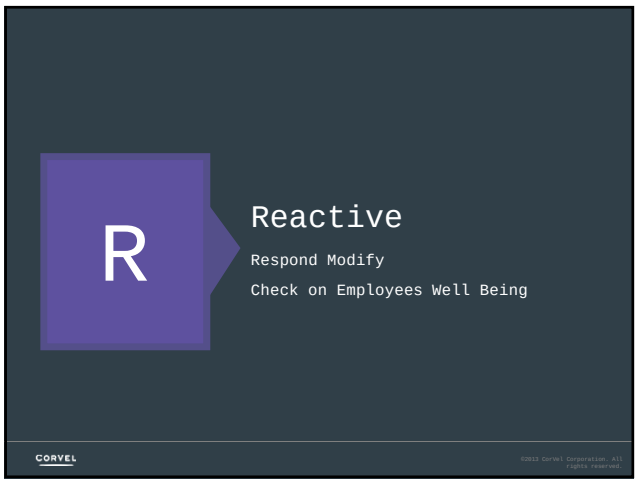
Contact Names and Phone Numbers on First Report of Injury

New Posters Hung, ID Cards

O

Objective

Measurable, defined time lines


R
Reactive
Respond Modify
Check on Employees Well Being
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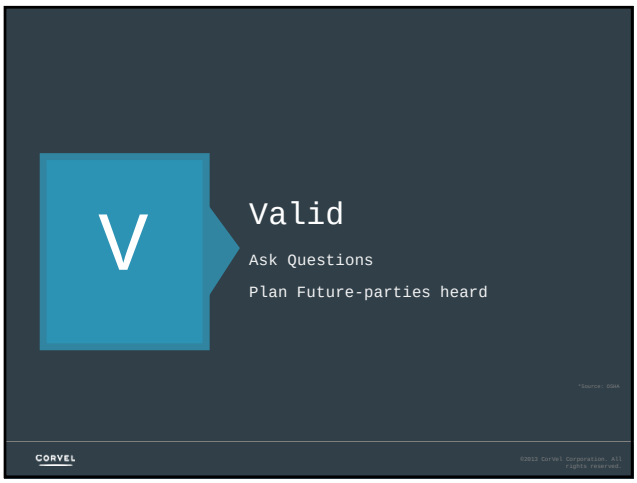
V
Valid
Ask Questions
Plan Future-parties heard
*Source: OSHA
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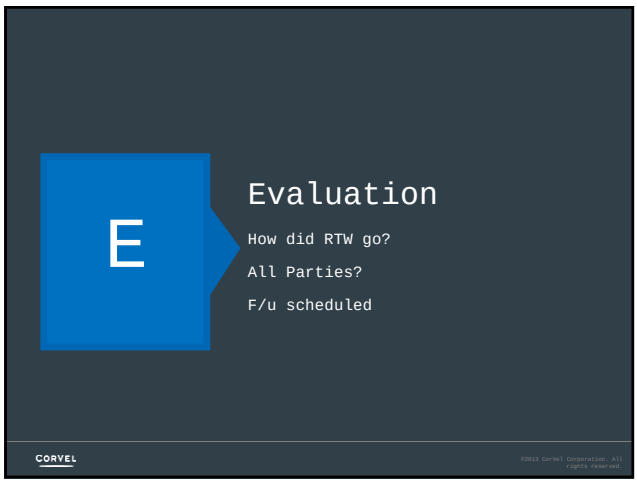
E
Evaluation
How did RTW go?
All Parties?
F/u scheduled
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L
Legible/Logistics
No Abbreviations, Signature
MD, PA, CNP
Who has the work slip
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Don’t forget
we have PPO
App!
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