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Use of Workplace Intelligence in Medical Causation Determinations

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Causation Determinations

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Causation Determination

I. History

- mechanism / personal statement
- job duties
- circumstances
- pre-existing conditions

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2. Exam

- correlation with mechanism
- anatomy / diagnosis

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3. Supervisor

- corroboration of the history
- background factors
- witness statements

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4. Safety Team Investigation

- re-enactment
- video footage
- detailed notes / witness statements
- safety learnings
- safety culture

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Summary

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Case Studies

- 48 yo warehouse worker bends at the waist and rotates to the right to pick up a 40 pound box of parts to load onto a conveyer belt. Sustains acute onset of low back pain and right leg pain.
- 36 yo assembly line worker stacks 20 pound boxes of parts 7 ft high then plastic-wraps them. He does this consistently as his primary full time job duty. He reports right shoulder pain to his supervisor because it has started to bother him not only at work but at night.
- 28 yo maintenance worker was coming down a ladder with a large 40 pound light fixture. He stepped onto the shop floor and rotated to move the fixture to the right and felt a snap in his right knee with acute onset of pain.

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**Assessing Injury Causation:
The Role of the Biomechanical Engineer**

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Who is ARCCA?

ACCIDENT RECONSTRUCTION BIOMECHANICS CRASHWORTHINESS

Failure/Explosion Construction MECHANICAL Property Loss Human Factors/Premises Liability

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Role of a Biomechanical Engineer

Medical Doctor
Diagnosis, treatment, prognosis

Biomechanical Engineer
Amount/Direction of force

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Injury Mechanism

Tension Compression Transverse Oblique FRACTURE

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Injury Mechanism and Use in our Investigations

Injury Mechanism:
Amount of Force + Direction of Force

Type of Investigations:

- Quantify loading during work-related task (lifting, object transfer, etc.)
- Evaluate forces imposed via adverse events
 - Fall objects strikes individual
 - Slip, trip, and falls
 - Sudden external loading to joint
 - Motor vehicle accidents

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Case Study #1: Evaluating Loads During Lifting Task

Ensuring proper lifting techniques can drastically reduce risk of injury

COMPRESSIVE FORCE

<https://www.medicash.org/articles/blog/lifting-technique-why-it-matters-and-how-to-do-it/>

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Case Study #1: Effect of Posture on Lumbar Loading

Proper lifting (with knees)

Hard Forces (lb)
 Left: 100 Right: 100

Improper lifting (no knees)

COMPRESSIVE FORCE

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Case Study #1: Effect of Posture on Lumbar Loading

Proper lifting (with knees)

Improper lifting (no knees)

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Low Back Compression (lbs)
 25 Pounds with Proper Lifting < 10 Pounds with Improper Lifting

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Falling Object Cases

FALLING OBJECTS

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Case Study #2a: Falling Object Investigation using ATDs

Tiles 4.5 to 18.5 lbs

Measured:

- Head Accels
- Spinal Forces

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Case Study #2b: Onsite Investigation of Falling Object

Worker was moving items across a roll-down door when it unexpectedly struck them in the head.

As a result of the incident, the individual was claiming a:

- Concussion
- Cervical Disc Injuries
- Lumbar Disc Injuries

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Case Study #2b: Onsite Investigation of Falling Object

Peak Compressive Force of 73.60 lbs

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Case Study #3: Onsite Investigations to Investigate Hazards

Investigation into the Effort needed to Different Buses

40-Foot Long Standard Bus Vs. 60-Foot Long Articulated Bus

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Case Study #3: Onsite Investigations to Investigate Hazards

EMG was used to Evaluate Effort

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Slip, Trip, Falls

Slip Injuries

- Back of head
- Elbow
- Shoulder
- Wrist

Trip Injuries

- Front of head
- Knee
- Shoulder
- Wrist

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Slip Mechanism

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Slip Resistance

Slip Resistant –
The walkway surface provides adequate slip resistance (i.e. coefficient of friction) to prevent the foot from sliding forward upon foot contact

Frictional Forces

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Measuring Slip Resistance

COF Ranges from 0.0 – 1.0

Portable Slip Tester

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Evaluation of STF based on an Individual's Kinematics

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Evaluation of STF based on Claimed Injuries – Trip and Fall

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Evaluation of STF based on Claimed Injuries – Trip and Fall

Cervical Disc Herniation

Lumbar Disc Herniation

Medial Meniscus Tear

COMPRESSIVE FORCE

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Evaluation of STF based on Claimed Injuries – Trip and Fall

Cervical Disc Herniation

Lumbar Disc Herniation

Medial Meniscus Tear

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Evaluation of STF based on Claimed Injuries – Trip and Fall

Cervical Disc Herniation

Lumbar Disc Herniation

Medial Meniscus Tear

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Materials needed for our Investigations

Useful Resources for our Investigation:

- Video Footage depicting Event
- Witness Statements
- Incident Reports
- Training and Job Requirements
- Re-enactments of the Incident

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Wrap Up:
What Can be Done to Reduce Injuries in the Future?



THANKYOU!
