



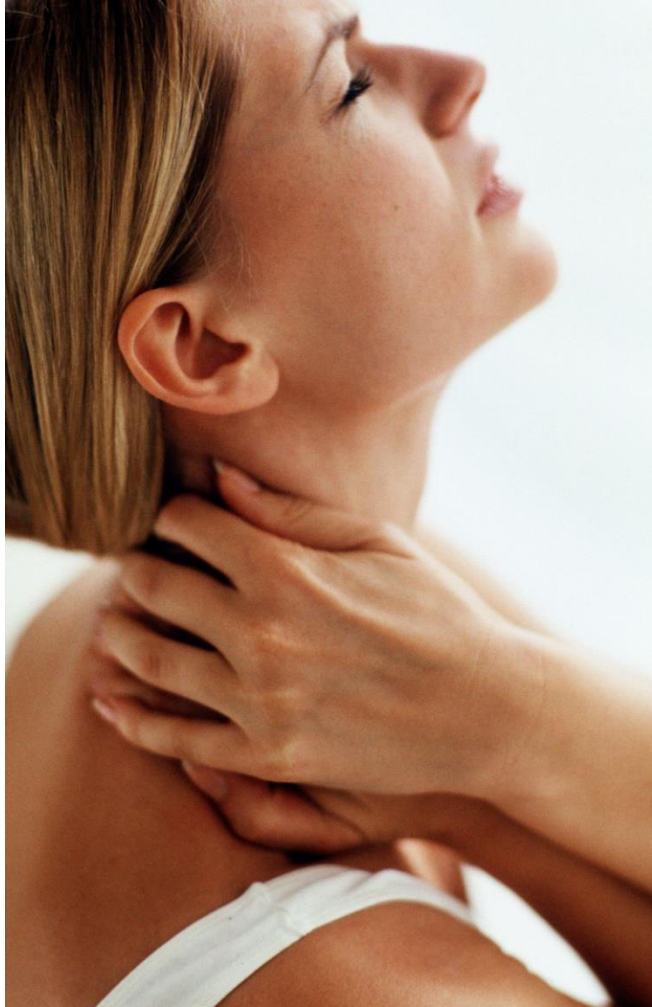
Mechanism of Injury

How to Drive Excellent Outcomes in Physical Therapy

Michelle Despres, PT, CEAS II
VP, National Product Leader, One Call

- Mechanism of Injury:
 - 4 Factors
 - Laws of Motion & Energy
- Patient & Clinical Factors
 - Obesity
 - Aging workforce
 - Co-morbidities
- Things to Consider
 - Questions to ask or investigate by body part to help determine MOI





Case study:

- 48 y/o female
- Medical Diagnosis: Cervical Pain
- Clinical Presentation:
 - Pain
 - Stiffness
 - Trigger Points
 - Lack of Motion
 - Abnormal Posture
 - ***Radiating pain/numbness down right arm to wrist/hand***
- What is the suspected pathology?
- What was the mechanism of injury?
- Validate clinical evidence for MD

This information will drive the treatment plan and expectations for response to therapy treatments



Mechanism of Injury Defined



VS



- The Mechanism of Injury (MOI) refers to the way damage to skin, muscles, organs and bones happen
 - Helps clinicians determine injury severity
 - To develop treatment plan and goals
 - Validates clinical findings for MD (diagnostics, differential diagnosis, other treatments)
 - Manage/monitor clinical progress
 - Determine clinical outliers
 - Helps payors determine compensable injuries



BASIC LAW OF MOTION:

- "Energy cannot be created or destroyed, but it can change in form or be absorbed"
- Motion injury is basically caused by the body's absorption of energy
- Twists, falls, hit by object



Mechanism of injury (MOI) is the force or forces that cause injury when applied to the human body.

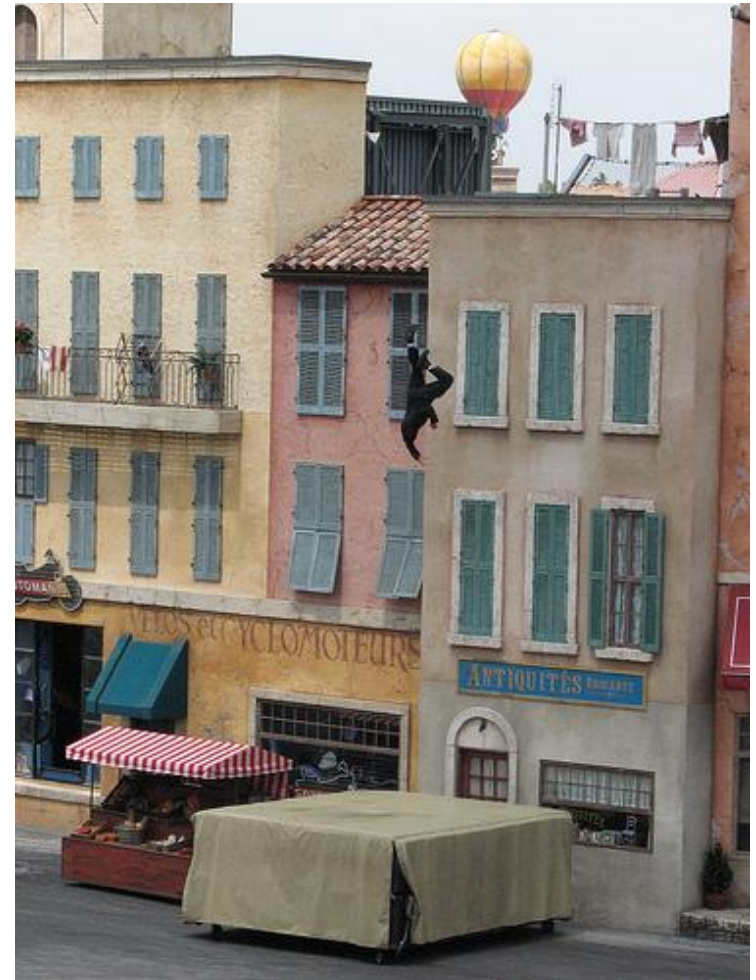
- Forces have characteristics such as speed, size and direction.
- There are four factors to consider when assessing a mechanism of injury.
 - Work area factors
 - Force and speed
 - Force and size
 - Direction of force



- Slippery Floors
- Moving equipment/objects: vehicles, forklifts conveyor belts, carts
- Trip hazards: electric cords, rugs, anti-fatigue mats



- Fall from standing
- Height of fall
- Surface: landing on concrete floor or padding?



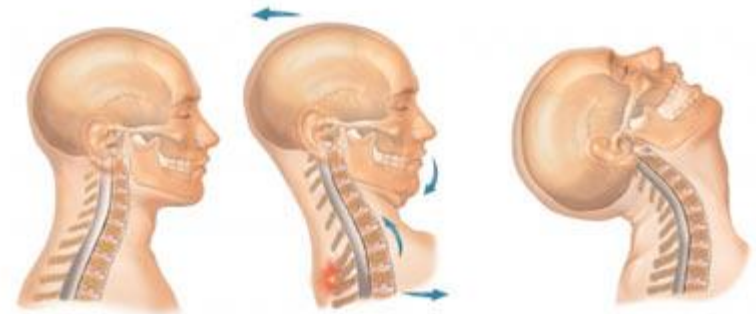
3: Force Type & Size Factor

- Automobile collision
- Air-powered nail gun (1-inch nails)



4: Direction of Force Factors

- Joint flexed outward
- Joint hyperextension
- Joint dislocation



- In sports it is often very easy to identify the Mechanism of Injury: immediate, traumatic
- In workplace it is often hard to identify the Mechanism of Injury: develops overtime, cumulative trauma, due to exposure to multiple or repeated ergonomic risk factors





Workplace Risk Factors



Why Do Work Injuries Happen?

- Clinically, cumulative trauma disorders occur when there is inadequate blood flow or tissue recovery time due to work cycles or exposure to ergonomic risk factors.
- Tissue damage can lead to inflammation, degeneration, loss of function (ROM, Strength), impairment, disability

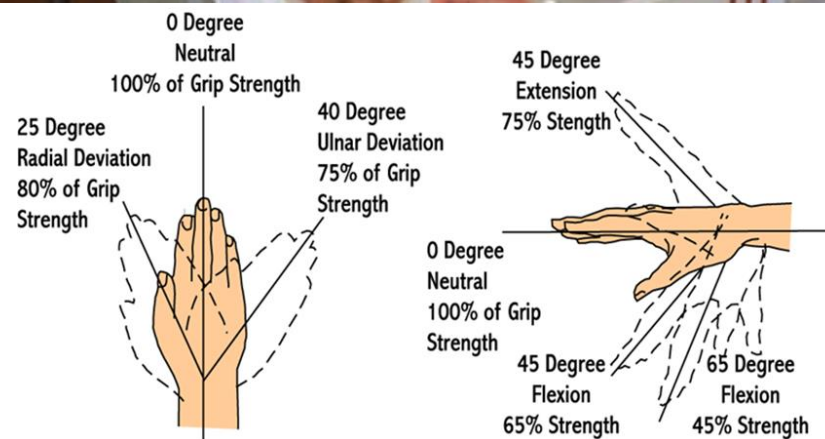


- Personal protective equipment
- Worker behavior
- Body mechanics
- Body morphology
- Environment



Awkward Postures & Grip Strength

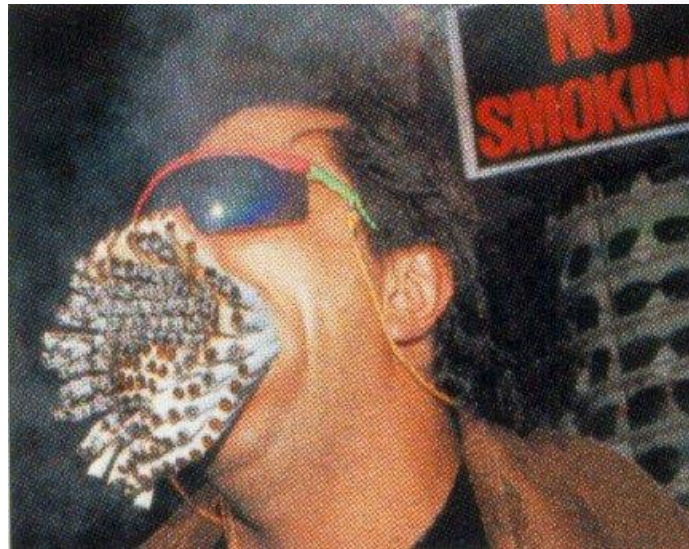
- Neutral joint posture:
 - least amount of stress on tendons, ligaments and joints
 - strongest
- Working outside of neutral:
 - loss of strength of 50% or more
- Gloves:
 - 10% more strength required





Patient & Clinical Factors

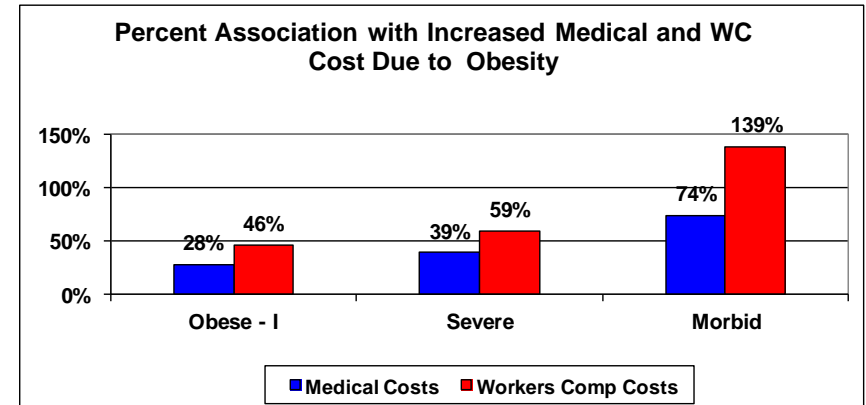
Factors that impact injury rates and healing process



- Affect injury rates, contribute to injuries and delayed healing:
 - Poor level of fitness / General de-conditioning
 - Overweight - high BMI
 - Advanced age
 - Pregnant
 - Blood thinners
 - Smoking



- Moderately Overweight, BMI 25-29.9:
 - 7% more WC claims
 - Missed 3.5x more work days
 - Medical costs 1.5x higher
 - Indemnity costs 2x greater
- Morbidly Obese, BMI 40+:
 - 45% more WC claims
 - Missed 8x more work days
 - Medical costs 5x higher than normal weight workers
 - Indemnity costs 8x greater
- 37% of obese individuals represent 61% of all costs



Ref- Move It or Lose It



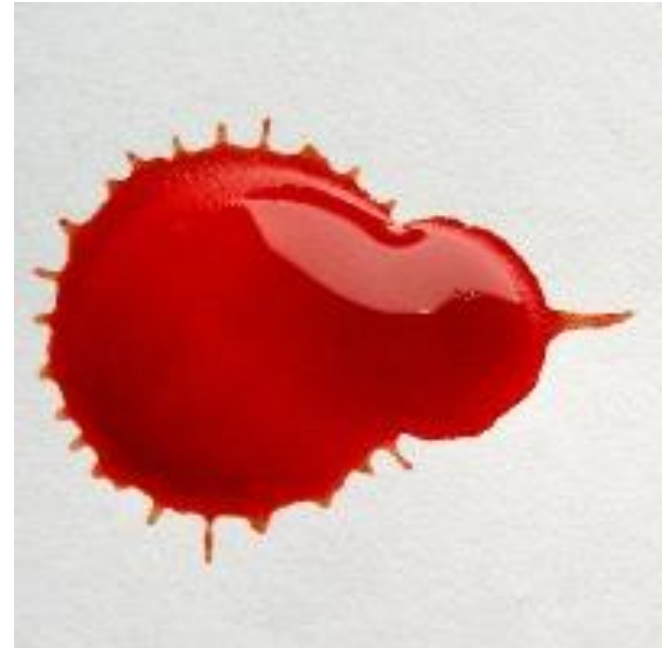
Ref: <https://today.duke.edu/2010/10/workobese.html>
<https://www.medpagetoday.com/upload/2007/4/24/766.pdf>

- Represents 23% of U.S. workforce in 2017, nation's fastest growing segment
- Longest duration of work related absences
- Higher severity of work injuries
- Mechanism of Injury:
 - Most common: Falls on same level
- Injury Types:
 - Strain, sprain, soft tissue injuries low
 - Fractures, multiple injuries, co-morbidities higher prevalence
- Longer recovery times, extended P.T. durations

Ref: U.S. and state government researchers (CDC, BLS and several state agencies)



- “Low mechanism injuries like ground level falls become serious life threatening events.”
- Alcohol thins blood; less likely to clot
- Liver or kidney disease can thin blood
- Prescription medications



Ref: <https://www.verywellhealth.com/mechanism-of-injury-1298672>

- Lack of oxygen to wounds
- Raises blood sugar levels
- Sensation of increased pain

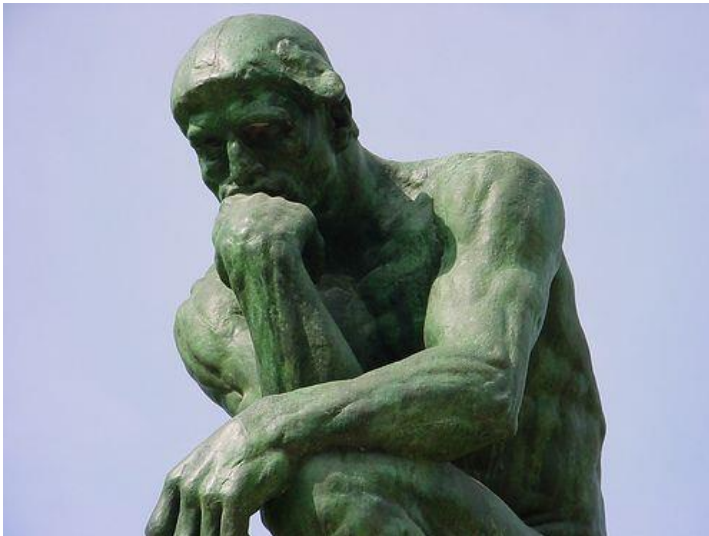


Ref: <https://advancedtissue.com/2017/03/smoking-negatively-impacts-wound-healing/>



Things to Consider

Additional questions to ask or investigate to help you solve the MOI puzzle.....



- Was onset slow or sudden?
- Has this condition occurred in the past?
- How long have you had this condition? Duration? Frequency?
- Is duration/frequency increasing?
- **Pain constant or intermittent?**
- **What makes better? Worse? Activity? Rest?**
- Has pain moved or spread?
- Is pain sharp? Dull/nagging? Burning? Stabbing?
Numbness/tingling?
- **Is pain localized? Or diffuse over several or large area? How far does pain go?**
- Do you have joint locking? Giving way? Instability?
- Any changes in color of skin? Swelling?



- **What are you unable to do functionally with arm?**
- what movements/activities make pain worse?
- any positions that relieve pain?
- do you need to support arm? or use sling?
- Does arm tire easily?



- What is your usual past time or activity?
- Numbness or tingling?
- **What activities or movements are restricted?**
- Prior history of injury to hand or arm?



- What is your usual past time or activity?
- Any abnormal sensations?
- What activities or functions are you unable to do?
- **Is this your dominant arm/hand?**
- **Any problems pinching? Gripping? Tying shoes? Buttoning?**



- Any difficulty breathing?
- Any problems with digestion?
- Any numbness or tingling? Radiating pain?
- Particular posture more painful?
- Which hurts more bending or straightening?
- Is pain affected by coughing or sneezing?



- What is usual past time or activity?
- Did lifting cause your pain?
- If yes: what was object? Did you lift over head? Did you bend your knees?
- **Any pain down your leg? Which leg? How far down?**
- Pins or needles or lack of feeling? Where?
- How does sleeping positions affect pain?
- Increase in pain with coughing or sneezing?
- Any postures that increase or decrease pain?
- **Is pain altered by changing position?**
- Pain worse in morning or evening?
- Any bowel/bladder problems?



- Is there catching sensation?
- Pain behind knee cap?
- Stiffness in morning?
- Do you have clicking or was there a pop?
- **Did you twist your knee? Inward or outward?**
- Did your knee lock or give away? Does it feel unstable?
- Does it hurt to kneel?
- Can you walk normally?
- Does leg feel weak?
- Can you bear all of your weight on your leg?
- Were you weight bearing during injury?
- Is knee swollen? Did you have fluid removed?
- Is there any grinding of the knee cap?
- What shoes do you wear?
- Are you wearing a knee brace? Does it help?



- What shoes do you wear most of day?
- Do you have orthotics?
- Does walking on different terrains increase your pain?
- Did you twist ankle? inward or outward?
- Is there a deformity of foot or ankle?
- Swelling or pitting edema?
- **Were you able to continue activity after you hurt your foot or ankle?**
- Any swelling or bruising?



- Are there any positions you hold for long periods of time?
- Do you frequently look up or overhead?
- **Do you wear glasses? bifocals?**
- **Did you hit your head or lose consciousness?**
- Does pain go down arms?
- What sleeping positions affect pain? what pillow size and type feels best?
- Do you have headaches? describe:
- Do you have dizziness or fainting?
- Is pain affected by laughing or coughing or sneezing?



- **When does pain occur? specific movements?**
- Do you feel weakness in legs?
- Recent pregnancy?
- Recent falls?
- **What is habitual working stance? Sitting or Standing? Twisting?**

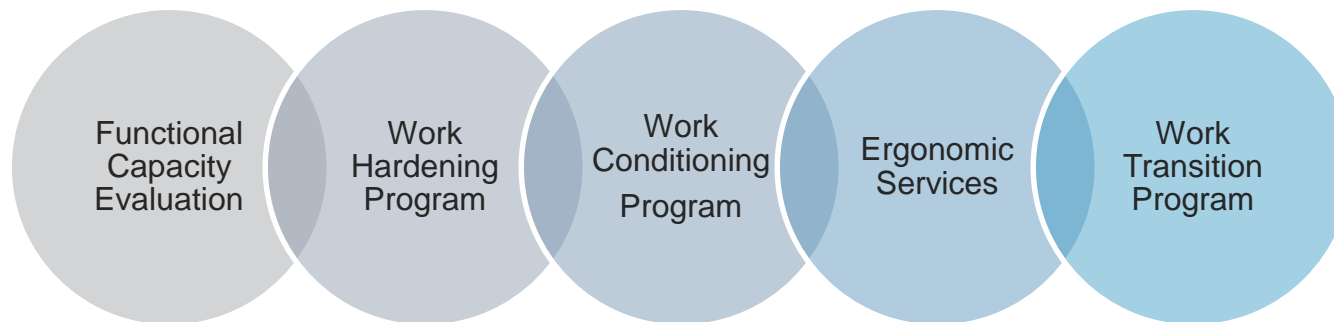




Industrial Rehab Programs



- Specialty industrial rehab programs can help prevent injuries, re-injuries & promote prompt RTW
- Can address mechanism of injury related to worksite/work area factors
- Review patient's RTW/SAW status and appropriateness for specialty industrial rehab services:
 - Functional Capacity Evaluation
 - Work Hardening/Conditioning
 - Ergonomic Services: addresses work related forces, safety of work area, tissue recovery times



- Mechanism of Injury Tied To:
 - Endurance component
 - Body mechanics
 - Worker behavior
 - Repetitive tasks
 - Heavier physical demands
- Strong focus on prevention of future injuries



“You do not get injured workers well to put them back to work. You put them back to work to get them well.”

- Richard Pimenthal



Thank you!

Michelle Despres, PT, CEAS II

VP, National Product Leader

michelle_despres@onecallcm.com

clinical_experts@onecallcm.com

