Determining and Addressing Prevailing Factor. Is this in fact work related?

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June 5, 2017
Prevailing Factor

- The primary factor, *in relation to any other factor*, causing both the resulting medical condition and disability
Quintilemma

- Employers .... Details of job
- Adjustors ... Medical records
- Patients .... “I hurt myself while at work.”
- Attorneys .... Law ..... Responsibility
- Physicians ..... Science
We have no idea what you're talking about

Trust me, it's science
Most medical disorders are *multi-factorial* in origin.

Past traditional viewpoints have given greater weight to work activities *rather than genetics*.

Degenerative disc disease - strongly associated with *age and genetics* and not cumulative trauma.

Sometimes ... “What caused X?” ... Cannot be determined.

*The Key: How the medical evidence is applied to a legal context*
NIOSH and ACOEM guidelines for determining work relatedness

1. Identify evidence of disease
2. Review epidemiological evidence
3. Evaluate exposure (Work risk factors)
4. Consider other relevant factors (Individual risk factors)
5. Judge the validity of the testimony
6. Form conclusions about the work relatedness.
Causation Analysis

- Bradford-Hill Criteria
- Parallel factors
- Causality exam
- Occupational vs. Individual risk factors
- Cases
Causation Analysis

- Bradford-Hill Criteria
- Parallel factors
- Occupational vs. Individual risk factors
- Cases
Bradford-Hill Criteria

- Outlines the *minimal conditions* needed to establish a causal relationship between two occurrences.
- How to determine a causal link between a specific factor and a disease.
- Attempts to establish scientific validity
- Basis of evaluation used in all modern scientific research
- Causation involves *multiple factors* - individual and risk factors
Agent A
SMOKING

Agent B
LUNG CANCER
Agent A
REPETITIVE MOTION

Agent B
CTS
Bradford-Hill Criteria

- Duration
- Timing
- Strength of Association
- Dose
Bradford-Hill Criteria

- Duration
- Timing
- Strength of Association
- Dose
Duration

- How long have the symptoms been present?
- Is there a history of pre-existing symptoms or injuries?
- Did the onset of symptoms follow the projected scientific models?
Timing

- When did symptoms first appear?
- When was the injury reported?
- The quicker symptoms appear relative to the injury the *more likely* the two are related
Fallacy to conclude that one event followed by a second necessarily demonstrates a causal relationship between the events. i.e. Black cat crossing the street - you wreck

Patients ... “I hurt ..... I hurt on the job..... therefore my job is responsible for my pain.”
Angina Pectoris

- Angina is caused by vascular occlusion to the heart.
- We understand that exertional activities (i.e. climbing stairs) brings on symptoms, BUT is NOT the cause of the disease..... OR it would be called “Stair Climber’s Chest Pain.”
Timing

- Just because symptoms appear while performing a task does NOT mean the activity is the *prevailing factor* of the symptoms.
Bradford-Hill Criteria

- Timing
- Dose
- Duration
- Strength of Association
Dose Response

- Was the extent of injury enough to cause the symptoms?
- Was there a previous tear or bulge?
- Was there previous surgery?
- Were there pre-existing symptoms?
Bradford-Hill Criteria

- Duration
- Timing
- Dose
- Strength of Association
Strength of Association

- How bad was the injury?
- Was there swelling? Bruising? Fractures?
- Is the diagnosis plausible?
Strength of Association

- **Injury Expectations**
- Do symptoms improve during modified duty?
- Are symptoms better at the *start* of the work week and worse at the *end* of the work week?
- Do symptoms improve when patient is off work?
- Do symptoms improve with routine treatment?
Causation Analysis

- Bradford-Hill Criteria
- Parallel factors
- Occupational vs. Individual risk factors
- Cases
Normal Incidence of Low back pain

- #1 cause for missed work
- #2 reason for doctor visit
- 25-60% of all working Americans admit to having back pain symptoms each year.
- Lifetime prevalence of 80%
Degeneration

- Affects 20+ million adults in the U.S.
- Most prevalent chronic condition
- Most common cause of disability
Lumbar Disc - Axial View
Fig. #2

Anulus

Nucleus
Causation Analysis

- Bradford-Hill Criteria
- Parallel factors
- *Causality Exam*
- Occupational vs. Individual risk factors
- *Cases*
Causality Exam - **History**

- History from the patient - self reported
- Employment factors
- Details of alleged exposure
- Equipment involved, duration of exposure to risk factors, equipment malfunction
- Recent workplace changes (supervisors, hours, quotas, staffing)
Causality Exam - **History**

- Recent performance review
- If repetitive trauma - what happens when away from work?
Causality Exam - *Past Medical History*

- Prior work accidents, MVA’s, personal injuries
- Prior surgeries and outcomes
- Prior treatment for the same symptoms or injury
- Medications
Causality Exam - Social History

- Alcohol and smoking use
- If married, spousal employment? Disabled?
- Hobbies and exercise habits
Causality Exam - **Biopsychosocial History**

- Anxiety, depression, drug or alcohol addiction
- Job dissatisfaction
- Lack of social support
- Pain onset coincident with life events
- Unusual or extreme pain ratings
Causation Analysis

- Bradford-Hill Criteria
- Parallel factors
- Causality Exam
- *Occupational vs. Individual risk factors*
- *Cases*
Occupational Risk Factors vs Individual Risk Factors

Based on the Medical Literature
Occupational Risk Factors

- Body position
- Lifting, pushing, pulling, carrying requirements
- Forces exerted
- Frequency of movement
- Awkward postures
Individual Risk Factors

- Age
- BMI
- Gender
- Genetics
- Past Medical History
- Smoking History
- Personal Activities
- Biopsychosocial Situation
62 year old female with right CTS

- 20 year employee - office worker (keyboarding, telephone, filing; changes positions frequently)
- Complains of right hand numbness and weakness
- No history of trauma
- + Family history of CTS
- BMI 36
- + Diabetes
62 year old female with right CTS

- Meds
- Occupational hand therapy
- Splinting
- NCS + moderate right CTS
- Corticosteroid injection - temporary help
62 year old female with right CTS

*Very Strong* evidence

- Age (62) (High)
- Weight (BMI-36) (High)
- Female Gender (Y) (High)
- Biopsychosocial (N) (High)
- Genetics (Y) (High)
- Co-morbidities (Y) (High)
  (diabetes, RA, thyroid, wrist fx)
Carpal Tunnel Syndrome

Occupational

Individual

Genetics Diabetes
BMI
Gender
Age
62 year old female with right CTS

**Occupational Risk Factors**

- **Very Strong and Strong evidence**
  - Combinations (force/repetition, force/posture (N)) (Low)
  - Forceful work (N) (Low)
  - Highly repetitive (Low)

- **Low evidence**
  - Vibration

- **Insufficient evidence**
  - Keyboarding, cold
Carpal Tunnel Syndrome

Occupational

Individual

Genetics
Diabetes
BMI
Gender
Age

Keyboarding
62 year old male with right CTS (Change Variables)

- 20 year employee - **male carpenter**
- Complains of right hand numbness and weakness
- No history of trauma
- + Family history of CTS
- BMI 36
- + Diabetes
Carpal Tunnel Syndrome

**Occupational**
- Force
- Force/Posture
- Force/Repetition

**Individual**
- Genetics
- Diabetes
- BMI
- Age
30 year old male with right CTS
(Change variables)

- 2 year employee - male assembly line worker
- Complains of right hand numbness and weakness
- No history of trauma
- + Family history of CTS
- BMI 25
- No diabetes
Carpal Tunnel Syndrome

- Occupational
- Highly Repetitive
- Individual
- Genetics
Work

Genetics
DJD - Knee

- Individual Factors
Knee DJD - Worsens with Age

**Very Strong Evidence**

- 8% ... 18-44 years
- 29% 45-64 years
- 48% > 65 years

- Centers for Disease Control (CDC)., 2003 *Morb Mortal Wkly Rep* 2007;56(01):4-7
Knee DJD - Worsens with Weight

Very Strong Evidence

- Dose Response
- Higher the weight - Higher the risk.

Knee DJD - Worsens with trauma or surgery

*Strong Evidence*

Knee DJD  -  Family History

Strong Evidence

- Twin studies demonstrate greater effect from genetics than in the workplace
34 year old female with left knee pain

- 10 year employee - meter reader
- Complains of left knee pain
- No history of trauma
- No family history of knee arthritis
- BMI 33
- + history of left medial meniscal tear in high school requiring arthroscopic surgery
34 year old female with left knee pain.

- Meds
- Therapy. She does not like to exercise
- X-rays: Medial compartment DJD
- Three corticosteroid injections - no help
34 year old female with left knee pain

**Individual Risk Factors (DJD)**

- **Very Strong or Strong evidence**
  - Age (34) (Low)
  - Weight (BMI-33) (High)
  - Prior Trauma (Y) (High)
  - Prior Surgery (Y) (High)
  - Family History (N) (Low)

- **Some Evidence**
  - Female Gender (Y) (High)
Knee DJD

Occupational

Individual

Female

Prior Surgery

Prior Trauma

BMI (33)
34 year old female with left knee pain

**Occupational Risk Factors (DJD)**

- *Some evidence*
  - Kneeling (N) (Low)
  - Squatting and Knee bending (N) (Low)
  - Combinations (N) (Low)
    - (Kneeling, squatting, heavy lifting)

- *Insufficient evidence*
  - Standing and walking (Y)
Knee DJD

Occupational

Individual

- Female
- Prior Surgery
- Prior Trauma
- BMI (33)
34 year old female with left knee pain (Variable)

- 10 year employee - meter reader
- Complains of left knee pain
- Stepped in a hole and twisted her knee
- Recurrent medial meniscal tear requiring surgery
- No family history of knee arthritis
- BMI 33
- History of left medial meniscal tear in high school requiring arthroscopic surgery
34 year old female with left knee pain

**Occupational Risk Factors (meniscal tear)**

- *Some* evidence
  - Kneeling (Y) (High)
  - Squatting and Knee bending (Y) (High)
  - Combinations (Y) (High)
  - (Kneeling, squatting, heavy lifting)
Knee DJD

Occupational

Twisting Injury requiring knee surgery

Individual

Female
Prior Surgery
Prior Trauma
BMI (33)
Female
BMI
Recent Injury & Surgery
Prior Trauma
Prior Surgery
Knee DJD
To Determine Causation

- Clear and concise history (Duration, Time, Dose, Strength of Association)
- Is the patient reliable?
- Confirm with medical records
- Parallel Issues
- Dig deep - Personal and Occupational history
- Apply conclusions from the medical literature
Thank You!

- Questions?
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Low back pain

- Imaging studies consistent with lumbar degenerative changes are almost universal in adults.

Low back pain

- Heavy physical loading is often associated with accelerated degenerative disc disease (DDD.)
- Recent studies with twins has demonstrated a primary genetic component with degenerative disc disease (DDD.)

Low back pain

- In general, pathology on MRI has shown little relationship to symptoms or disability

40 year old male with low back pain

- 40 year old employee - maintenance at school district
- Complains of low back pain
- He noticed pain over a few days after frequent bending and lifting 30 lb boxes. No specific accident
- BMI 32; + smoking hx
- + prior episodes of low back pain (2) Resolved with Tx.
40 year old male with low back pain

- Meds
- Therapy. He does not like to exercise
- X-rays: L4/5 DDD, facet joint hypertrophy
- MRI: L4/5 disc bulge; DDD
- Epidural steroid injections - temporary help
40 year old male with low back pain

**Individual Risk Factors (Low back pain)**

- **Strong evidence**
  - Age (N) (High)
  - Obesity (BMI-32) (High)
  - Sleep disturbance (N) (High)

- **Insufficient evidence**
  - Smoking (N)
Low back pain

- Occupational
- Individual

Obesity
40 year old male with low back pain

**Occupational Risk Factors (Low back pain)**

- **Strong evidence**
  *Frequent Bending (Y)*
  *Standing and Walking*
  *Work Stress*

- **Some evidence**
  *Sitting*

- **Insufficient evidence**
  *Awkward Occupational Postures (Y)*
  *Trunk Flexion (Bending) +/- Twisting (Y)*
Low back pain

- Occupational
- Individual

- Frequent Bending
- BMI (33)
Low back pain

BMI

Frequent Bending
40 year old male with low back pain

- 40 year old employee - maintenance at school district
- Complains of low back pain
- He noticed pain **immediately** while lifting 30 lb boxes.
- BMI 32
- No prior low back pain episodes
BMI

Work

Low back pain
Female

BMI

Prior Trauma

Recent Injury & Surgery

Prior Surgery
To Determine Causation

- Clear and concise history (Duration, Time, Dose, Strength of Association)
- Is the patient reliable?
- Confirm with medical records
- Parallel Issues
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- Apply conclusions from the medical literature
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