

Occupational Injury Causation Fact or Fiction

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or19359

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Thank You for the Invitation





AMERICAN SOCIETY for SURGERY OF THE HAND

WICHITA STATE UNIVERSITY

AAOS American Association of Orthopaedic Surgeons®
melhorn@onemain.com

The Hand Center
ORTHOPAEDICS OF THE HAND & UPPER EXTREMITY

American Academy of Orthopaedic Surgeons®

IAIME
International Academy of Independent Medical Evaluators
Formerly American Academy of Disability Evaluating Physicians

Physical Health Insights, LLC
Detection and Prevention of Injury

Wichita State University
A Community - Based Medical School Campus
• About the Campus
• Campus Resources
• Departments
• Dean's Message
• Medical Education
• Patient Services

Declare

- The Hand Center
- MAP Managers, owner of CtdMAP
- PHI = Physical Health Index – Health Assessment
- Books: Physician's Guide to Return To Work, Guides to the Evaluation of Disease and Injury Causation, etc
- Professional Organizations: ABA, AMA, AADEP, AAOS, ACOEM, ASSH, AAHS, IAIABC, SDPM, etc
- Organizations: MDA, ODG, SEAK, etc
- Speaker: multiple national and state level organizations
- Reviewer: multiple journals and books
- Any other task or job that will improve outcomes for injured workers

2022



- AAOS Annual Workers' Compensation CME
Nov 3, 4, 5, 6 San Antonio, TX
- IME / QME
- Whiplash and Other Reported Injuries
- Volunteer Faculty – no financial benefit

General Disclaimer



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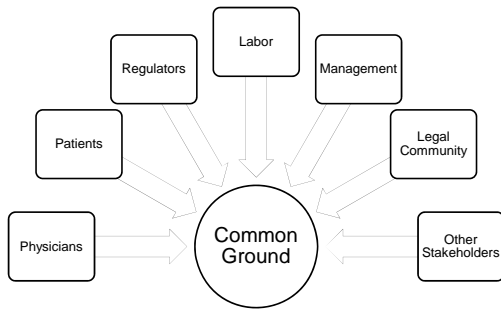


Occupational Health

5 Primary Issues

1. Dx – what we do best
2. Causation – who is responsible for costs
3. Treatment – cost of care & outcomes
4. Return to Work – disability duration
5. Impairment & Disability – final costs

Shared Objectives



8

Remember

The majority of individuals

- who may have a workers' comp claim
- involved in motor vehicle collision
- or have a tort claim

want to and do improve or respond to appropriate medical care

Remember

Some discussions will illustrate the more difficult individual who

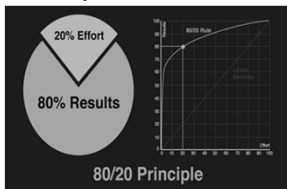
- does not respond appropriately to medical care
- presents with disproportional or non-anatomical symptom complaints
- may have biopsychosocial concerns
- or may have secondary gains issues

My discussions are designed to improve the outcomes for these individuals

- Understanding the 80/20 rule

Remember 80/20 Rule

Do Workers' Comp Claims follow the 80/20 Rule?



The Pareto Principle = a popular rule in business = The Pareto principle states that for many outcomes, roughly 80% of consequences come from 20% of causes

Remember 80/20 Rule

Do Workers' Comp Claims follow the 80/20 Rule?



NCCI data 2014 Cost

Percentage of all Claims that are Lost Time Claims: 24%
Percentage of all Losses that are from Lost Time Claims: 93%
Using loss distribution curve with \$27,000 as Median
Percentage of all Claims that are larger than \$27,000: $24\% \times 50\% = 12\%$
Percentage of all Losses from claims larger than \$27,000: $93\% \times 87\% = 81\%$
So – 81% of all losses come from only 12% of all claims
No = WC does not follow the 80/20 Rule = it can be worse

<http://www.hbactuarial.com/do-workers-comp-claims-follow-the-8020-rule/>

Remember 80/20 Rule

The Science says
Compensation impacts medical outcomes

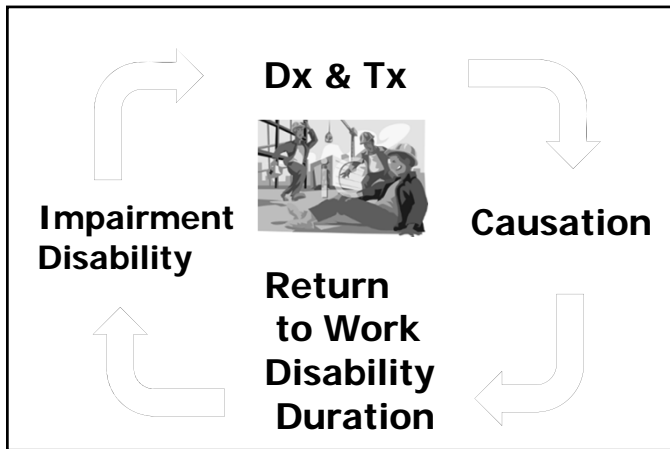
List of 18 from a Medline search listing
2019 articles with search for
"compensation, outcome, work"

- 1. Friedman LS, De S, Alberg KS, Cohen RA: Association Between Financial Conflicts of Interest and ILO Classifications for Black Lung Disease. *Ann Am Thorac Soc* 2021. Reference ID: 19157
- 2. Bernstein DN, Kurucan E, Fear K, Hammert WC: Impact of Insurance Type on Self-Reported Symptom Severity at the Preoperative Visit for Carpal Tunnel Release. *J Hand Surg Am* 46:215-222, 2021. Reference ID: 19008
- 3. Cohn MR, Wichman DM, Newhouse AC, et al: High Rate of Full Duty Return to Work After Hip Arthroscopy for Femoroacetabular Impingement Syndrome in Workers Who Are Not on Workers' Compensation. *Am J Sports Med* 363546520985517-2021. Reference ID: 18920
- 4. Smith P, LaMontagne AD, Lilley R, Hogg-Johnson S, Sim M: Are there differences in the return to work process for work-related psychological and musculoskeletal injuries? A longitudinal path analysis. *Soc Psychiatry Psychiatr Epidemiol* 55:1041-1051, 2020. Reference ID: 18843
- 5. Greve KW, Ord JS, Bianchini KJ, Curtis KL: Prevalence of malingering in patients with chronic pain referred for psychologic evaluation in a medico-legal context. *Arch Phys Med Rehabil* 90:1117-1126, 2009. Reference ID: 18839
- 6. Haunschild ED, Gilat R, Lavoie-Gagne O, et al: Return to Work After Primary Rotator Cuff Repair: A Systematic Review and Meta-analysis. *Am J Sports Med* 363546520975426-2021. Reference ID: 18814
- 7. Peters S, Johnston V, Hines S, Ross M, Coppieters M: Prognostic factors for return-to-work following surgery for carpal tunnel syndrome: a systematic review. *JBI Database System Rev Implement Rep* 14:135-216, 2016. Reference ID: 18709


- 8. Melhorn JM: Work Ability - Upper Limb. In Melhorn JM, Yodowski ML, (eds). 23th Annual AAOS Workers' Compensation and Musculoskeletal Injuries: Improving Outcomes with Back-to-Work, Legal, and Administrative Strategies. Rosemont, IL, American Academy of Orthopaedic Surgeons 2021. Reference ID: 18705
- 9. Sears JM, Schulman BA, Fulton-Kehoe D, Hogg-Johnson S: Workforce Reintegration After Work-Related Permanent Impairment: A Look at the First Year After Workers' Compensation Claim Closure. *J Occup Rehabil* 2020. Reference ID: 18673
- 10. Gross DP, Park J, Rayani F, Norris CM, Esmail S: Motivational Interviewing Improves Sustainable Return to Work in Injured Workers After Rehabilitation: A Cluster Randomized Controlled Trial. *Arch Phys Med Rehabil* 98:2355-2363, 2017. Reference ID: 18527
- 11. Rudbeck M, Johansen JP, Omland O: Characteristics of Compensation Claimants Reporting an Occupational Injury Associated With Disability Benefits in the Subsequent Year: A Follow-Up Study. *J Occup Environ Med* 60:279-285, 2018. Reference ID: 18507
- 12. Bui G, Gao Y, Glass N, et al: Subsequent Pain or Injury After Foot and Ankle Surgery in Patients Receiving Workers' Compensation. *Foot Ankle Int* 41:17-24, 2020. Reference ID: 18260
- 13. Wickizer TM, Franklin G, Fulton-Kehoe D, et al: Improving quality, preventing disability and reducing costs in workers' compensation healthcare: a population-based intervention study. *Med Care* 49:1105-1111, 2011. Reference ID: 17861
- 14. Caruso GM: Biopsychosocial Considerations in Unnecessary Work Disability. *Psychol In and Law* 6:164-182-2013. Reference ID: 17835
- 15. Iglesias M: The Intersection of Medicine and Disability. *AMA Guides Newsletter* July/August:3-8, 2018. Reference ID: 17726

- 16. Black O, Keegel T, Sim MR, Collie A, Smith P: The Effect of Self-Efficacy on Return-to-Work Outcomes for Workers with Psychological or Upper-Body Musculoskeletal Injuries: A Review of the Literature. *J Occup Rehabil* 28:16-27, 2018. Reference ID: 17446
- 17. Hibbard JH, Greene J, Sacks R, Overton V: Does Compensating Primary Care Providers to Produce Higher Quality Make Them More or Less Patient Centric? *Med Care Res Rev* 72:481-495, 2015. Reference ID: 17380
- 18. Honkonen N, Liira J, Lamminpaa A, Liira H: Work ability meetings-a survey of Finnish occupational physicians. *Occup Med (Lond)* 2018. Reference ID: 17335

The Science says
 Compensation impacts medical outcomes
 Medical Outcomes Include
 Impairment and Disability



AMA Guides Editions 1 - 5
 Model of Disablement



- Based upon *International Classification of Impairments, Disabilities and Handicaps (ICIDH)* (WHO 1980)

Pathology	Impairment	Disability	Handicap
The underlying disease or diagnosis	The immediate physiological consequences, symptoms, and signs	The functional consequences, abilities lost	The social and societal consequences, freedoms lost

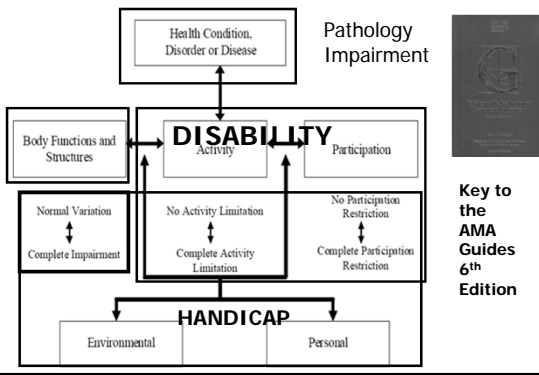
Montana = 6th Edition



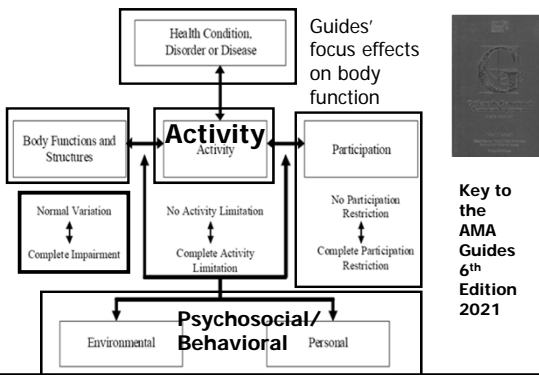
Mont. Code Ann. § 39-71-116(27)(a), 39-71-711(1)(b)

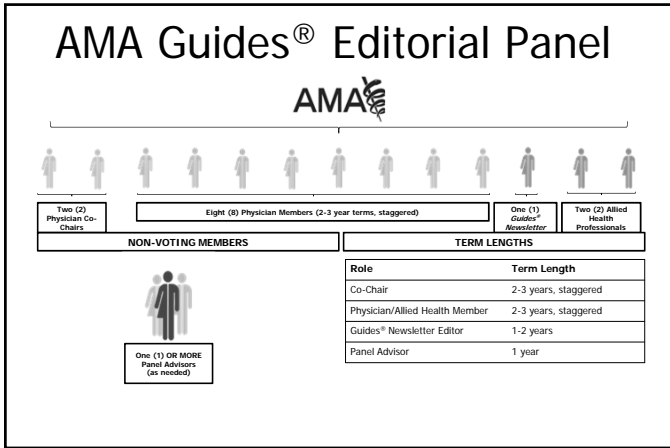
Mont. Code Ann. § 39-71-711(1) (b) provides that impairment ratings must be based on the 6th ed. Of AMA Guides

ICF Model of Impairment



ICF Model of Impairment





AMA 6th Edition

2008

Disclaimer – co-chair Guides Panel
paid for time
no direct financial interest

What's New to AMA Guides Sixth Edition 2021

Summary of Updates

- Revised content, including new evidence-based medicine and clinical health concepts to improve clinical utility, content of guides, and organizational structure
- Change from three to five editions and methodology
- New edition of assessment tool and data
- Revisions of methodology and evidence
- Addition of new evidence-based medicine and evidence-based medicine
- New organizational structure to improve readability and ease of use

Significant Changes to Content and Methodology

Changes to the 6th Edition: This site uses cookies. By continuing to use our website, you are agreeing to our privacy policy. [Accept](#)

What's New to AMA Guides Sixth Edition 2022

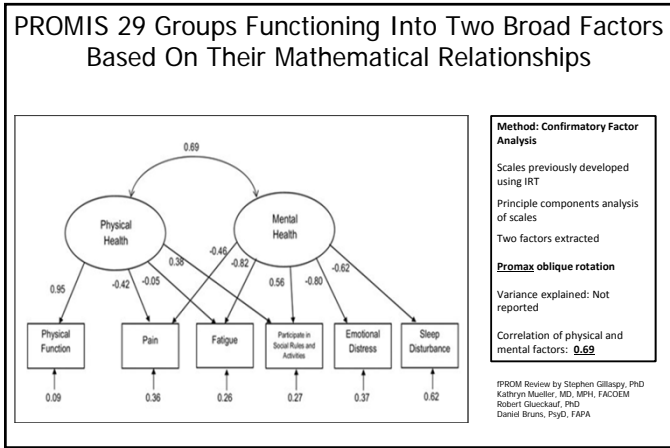
Summary of Updates

- Language throughout the new evidence-based medicine process explains why the latest edition of the AMA Guides is needed
- Revised and new evidence
- Language describing evidence and the standard used to determine the impairment rating in ratings
- No changes to impairment ratings or methodology

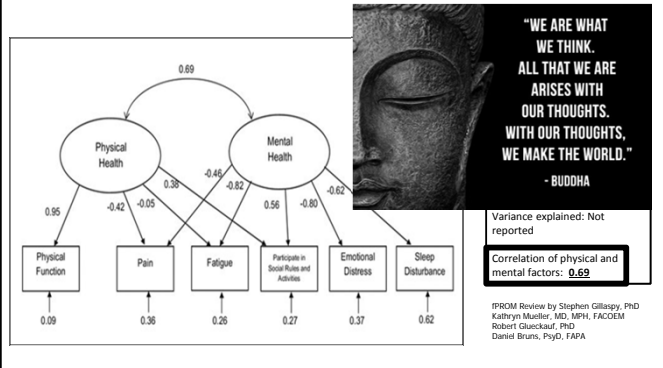
Conceptual Foundations and Philosophy (Chapter 1)

- Section 1.1: History of the AMA Guides
- Section 1.2: Purpose, Mission, and Vision of the AMA Guides, including the evidence-based approach to practice
- Section 1.3: Purpose and Mission of the AMA Guides
- Section 1.4: Evidence-based medicine and evidence-based medicine
- Section 1.5: Application of Evidence-Based Medicine to the AMA Guides, International Appeal and Applications

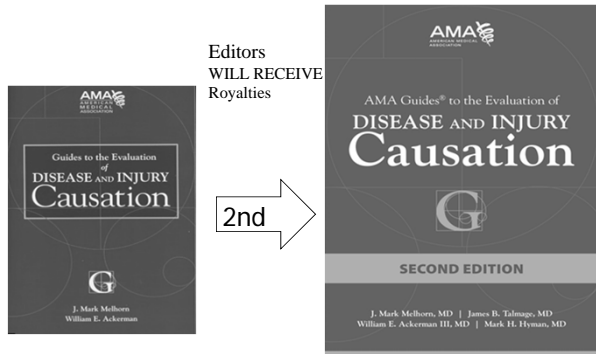
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PROMIS 29 Groups Functioning Into Two Broad Factors Based On Their Mathematical Relationships



AMA Press



I have gifted all of my royalties to charity

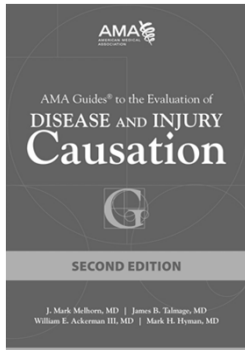
Request for Help

Make the 3rd edition better – email all info, data, and suggestions to Mark Melhorn at

melhorn@onemain.com

Target date?

All discussions are 2nd edition unless otherwise indicated



The Blue Book

Misconceptions

Heart attacks more deadly in winter

True



False

Misconceptions

Heart attacks more deadly in winter

False – it is not the cold –

Regardless of data (Arizona, California, Texas, Massachusetts, or Pennsylvania)

Diet – holiday foods

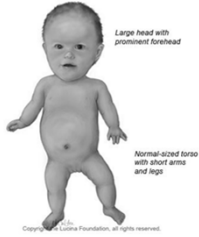
Depression

Family Stress

L. Carroll. Heart Attacks More Deadly In Winter - But It's Not The Cold. NBC News
http://vitals.nbcnews.com/_news/2012/11/06/14950020-heart-attacks-more-deadly-in-winter-but-its-not-the-cold?title
accessed on March 3, 2013, 2013. (12154)

Causation Example

- What causes this condition?



Causation Example

What type of tree is hit by lightning more frequently than others?

- Simple question
- Frequency established
- What is the cause?

Causation Example

Who is more likely to have an ACL Strain - Tear from Jumping?



1. Males
2. Females
3. Tall people
4. Tibial slope angle

Causation Example

Long-term exposure to residential road traffic noise is associated with a higher risk of MI?

Yes

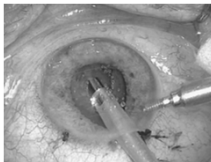
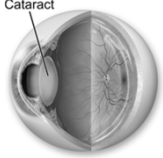
No



Causation Example

What do these pictures have in common?

Cataract



Causation Example

• Which of the following does not belong?

- a. Large green square
- b. Large red circle
- c. Large green circle
- d. Small green circle





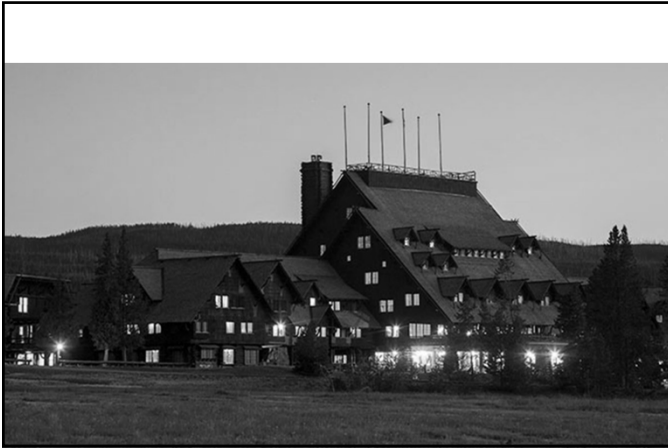
Example



- When the first ever episode of angina occurs when Joe walks up stairs at work, we recognize that this was when, but not why he had angina.
 - Not a worker' comp claim
- Yet, in the past, when the first episode of ____ (back pain, shoulder pain, knee pain, etc.) occurs with normal activity at work or minimal trauma at work, doctors have assumed this was intended to be "work compensable" even if they understood it was not actually CAUSED BY the work exposure.







Fun with the word "Repetitive"

- "Repetitive" is a word misused repetitively by physicians.
- A dictionary definition would state repetition is the "act of doing a thing a SECOND time, or again and again".

Fun with the word "Repetitive"

- Therefore, punching a time clock at the start of work each day is done "repetitively".
- What is the purpose of the definition?
 - Research
 - Medical
 - Legal

Fun with the word "Repetitive"

- From a legal point of view – there are no validated (scientifically proven) numbers for defining repetitive.
- In other words, there is no cutoff threshold that says – if you do more than x/hour you get this Dx.

Fun with the word "Repetitive"

- From a medical point of view –

Silverstein and Armstrong are generally credited with (or blamed for) the current obsession with linking symptoms to work activity based on their paper ("Occupational Factors and Carpal Tunnel Syndrome" AM J Ind Med 1987; 11:343-358) which . . .

Fun with the word "Repetitive"

- From a medical point of view –

. . . which defined "HIGH repetitions" as jobs with a cycle time of less than 30 seconds, or more than 50% of the cycle time involved in performing fundamentally the same cycle or activity

Fun with the word "Repetitive"

- From a medical point of view –

Many ergonomists and many subsequent papers have adopted this definition.

But have we ever been wrong?

Fun with the word "Repetitive"

- From a medical point of view –



FIGURE 1: Flow diagram demonstrating the process by which study findings become clinical dogma. Note that reader assumptions rather than validity of findings are the key factor that leads to application of findings toward increasing levels of "truth."

Fun with the word "Repetitive"

- From a medical point of view –

"Numerous examples can be found in the medical literature in which prospective RCTs have found vastly disparate results compared with the observational epidemiologic studies preceding them that had been accepted as the final answer."

Fun with the word "Repetitive"

- From a medical point of view –

Examples of "Been Wrong"

- JAMA 2001; 286: 821-830. Comparison of evidence of treatment effects in randomized and nonrandomized studies.
- JAMA 294 (2):218-228, 2005. Contradicted and initially stronger effects in highly cited clinical research.
- JAMA 298(21):2517-2526, 2007. Persistence of Contradicted Claims in the Literature

Fun with the word "Repetitive"

- From a medical point of view –

Unfortunately, these were retrospective epidemiological studies exploring data end points and were based on inclusion criteria by subjective symptoms for Dx. This data is also only applicable to automotive industry.

Fun with the word "Repetitive"

- From a medical point of view -

Therefore, at best these studies are hypothesis generating but not confirming.
Furthermore, this works out to about 1000 repetitions per 8 hour work shift (actually a minimum of 960 reps).

Fun with the word "Repetitive"

- From a medical point of view –
- For companies who routinely work 12 hour shifts, this would permit almost 1500 repetitions per work day before the possible threshold is crossed and does not take into account the object to which task is being applied.

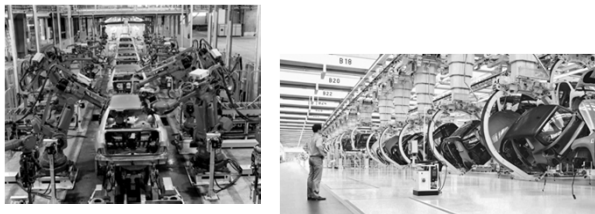
Fun with the word "Repetitive"

Are job tasks in 1987 applicable to same job title today?



Fun with the word "Repetitive"

Are job tasks in 1987 applicable to same job title today?



Fun with the word "Repetitive"

Can you move the concept of repetitive in job to repetitive in a different job?



Fun with the word "Repetitive"

- From a research point of view

current studies suggest that the best assessment instrument for CTS is the Strain Index

(J. S. Moore and A. Garg. The Strain Index: a proposed method to analyze jobs for risk of distal upper extremity disorders. American Industrial Hygiene Association Journal 56 (5):443-458, 1995. and A. Garg, J. Kapellusch, K. Hegmann, J. Wertsch, A. Merryweather, G. Deckow-Schaefer, and E. J. Malloy. The Strain Index (SI) and Threshold Limit Value (TLV) for Hand Activity Level (HAL): risk of carpal tunnel syndrome (CTS) in a prospective cohort. Ergonomics 55 (4):396-414, 2012.)

Fun with the word "Repetitive"

- From a research point of view

Moore - Garg Strain Index

	Strain Index	4.5
Description of task		Uncertain
Intensity of Exertion	Somewhat hard: Noticeable or definite effort (BS-3)	3.0
Duration of Exertion (% of Cycle)	30-49%	1.5
Efforts Per Minute	4-8	1.0
Hand/Wrist Posture	Good: Near Neutral	1.0
Speed of Work	Fair: Normal speed of motion	1.0
Duration of Task Per Day (hours)	4-8	1.0

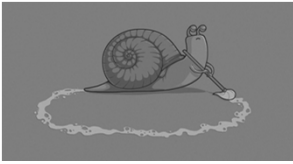
Fun with the word "Repetitive"

- From a research point of view

What is the best assessment instrument for all of the other Dx's that currently are commonly related to work activities?

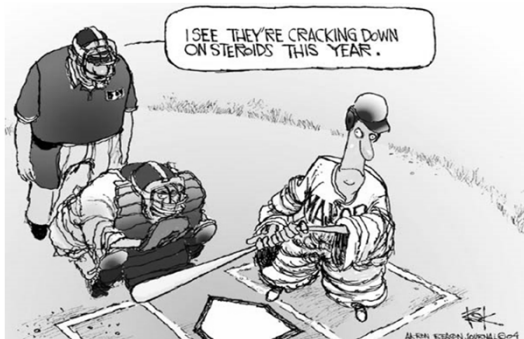
Fun with the word "Repetitive"

The End



Thank you for coming today

Doctor's Role = Tell the Truth



Causation In A Nut Shell

- Physician - determination of causation leads to amelioration of the causative agent and restorative treatment
- Legal - the primary effect of the determination of causation is cost-shifting, e.g., from the individual or health insurance to liability or WC insurance.



Causation, Etiopathogenesis and Biostatistics

Honorable "Judge"
Administrative Law Judge Industrial
Commission of "State"

Suggested the following
Case Studies = Clinical Examples

Morton's Neuroma

- The injured worker is a 40 year old male warehouse workers whose job required him to be on his feet for most of the work day. While working in the ware house he would be required to lift and move heavy mining equipment that weighed over 100 lbs.

Morton's Neuroma

- The claimant filed a workers' compensation claim alleging these work activities caused a Morton's neuroma in his right foot that required surgical treatment. The applicant's Doctor opined that prolonged pressure on the foot, repetitive trauma resulting from standing and heavy lifting contributed to the gradual development of the Neuroma.

Morton's Neuroma

- The defense expert believed the condition was idiopathic in cause and not related to the repetitive work activities of the employee.
- Is this a compensable injury?

Morton's Neuroma

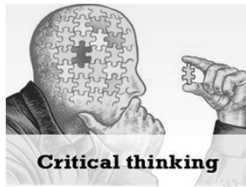
The Original Question

Is this a compensable injury?

Yes vs No = you vote

Causation

- Medical = Science
- Legal = Social Justice



Medical Causation

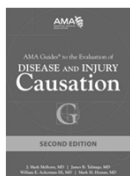
How do I make a decision or provide an opinion on causation?

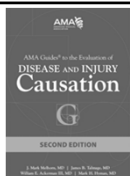


Medical Causation

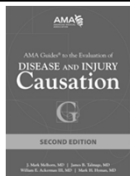
Two Approaches

- Due it on your own
- Use the Blue Book





- Chapter 1 Introduction
- Chapter 2 Understanding Work-Relatedness
- Chapter 3 Causal Associations and Determination of Work-Relatedness



- Chapter 4 Methodology
- Chapter 5 Apportionment
- Chapter 6 The Causality Examination
- Chapter 7 Report Writing

Use the Causation Book

- Only six easy steps to complete your opinion after your have read chapters 1 to 7.
- What are the six steps?

Causation Table 3-2

1. Identify evidence of disease
2. Review and assess the available epidemiologic evidence for a causal relationship
3. Obtain and assess the evidence of exposure
4. Consider other relevant factors
5. Judge the validity = the facts
6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation

Use the Causation Book

- Use the Dx to find the correct Chapter

Chapter 10

Lower Limb

Naomi N. Shields, MD,
David A. Fetter, MD,
Matthew J. Dietz, MD, and Hany Bedair, MD*

Foot and Ankle Disorders/Dysfunction
The Knee
Hip Osteoarthritis
Avascular Necrosis of the Femoral Head
Acetabular Labral Tears

Use the Causation Book

- Confirm your Dx and review the data
- Locate the risk factors
- Unfortunately, our Dx is not in the Book

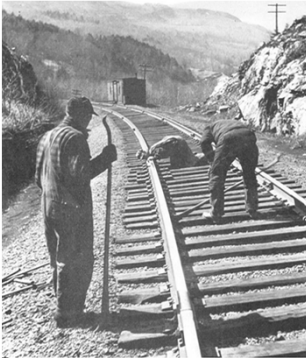
Plantar Fasciitis and Heel Pain

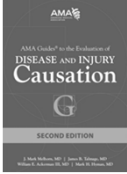
Chronic plantar heel pain is 1 of the most common foot disorders and has been estimated to account for 15% of all adult foot complaints requiring medical care.³ Approximately 2 million people are affected in the United States each year and approximately 10% of the population during a lifetime, usually adults older than 40 years. It is important that a correct diagnosis of plantar fasciitis be made supported by morning pain, pain after resting, and pain over the medial tubercle of the calcaneus. Differential diagnosis includes central heel pain, heel pad atrophy, and tarsal tunnel syndrome. Central heel pain and heel pad atrophy are much more common in the older age group. Although many risk factors have been proposed in the literature, there is limited conclusive evidence on plantar fasciitis.

Causation Table 3-2

1. Identify evidence of disease
2. Review and assess the available epidemiologic evidence for a causal relationship
3. Obtain and assess the evidence of exposure
4. Consider other relevant factors
5. Judge the validity
6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation

Methodology





Chapter 4

Methodology

J. Mark Melhorn, MD,
Kurt T. Hegmann, MD, MPH,
James B. Talmage MD,
Mark H. Hyman MD, and William E. Ackerman III, MD*

Methods for Determining Work-Relatedness
Study Design
Outcomes from Literature Search and Causations Analysis
Causation: Strength of Evidence Definitions
Quality Scoring Method for Epidemiologic Studies
Limitations and Other Considerations
Summary
Appendix A: Study Design Definitions
Appendix B: Techniques for Reading the Medical Literature

Methodology

Table 3-2 National Institute for Occupational Safety and Health/American College of Occupational and Environmental Medicine Steps for the Determination of Work-Relatedness of a Disease

1. Identify evidence of disease
2. Review and assess the available epidemiologic evidence for a causal relationship
3. Obtain and assess the evidence of exposure
4. Consider other relevant factors
5. Judge the validity of testimony
6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation

Source: Adapted from Kusnetz and Hutchison, Eds. DHEW, CDC, NIOSH, Pub. No. PB298-561; 1979 and Occupational Medicine Practice Guidelines, 2nd and 3rd Eds. ACOEM OEM Press, 2004, 2008, 2011.

K. T. Hegmann, M. S. Thiese, S. J. Oostema, and J. M. Melhorn. Causal Associations and Determination of Work-Relatedness. In: Guides to the Evaluation of Disease and Injury Causation, edited by J. M. Melhorn, J. B. Talmage, W. E. Ackerman, and M. H. Hyman, Chicago, IL: American Medical Association, 2013, p. 105-114. {10680}

Causation Table 3-1

1. Collect all epidemiologic literature on the disorder = see Methodology page 121

Five Steps

1. Literature search = Table 4-3
2. Article reviewed by panel = Table 4-5
3. Quality score = Table 4-4
4. Quality score x weight factor = Table 4-5
5. All relative articles are summed = Table 4-7

Methodology

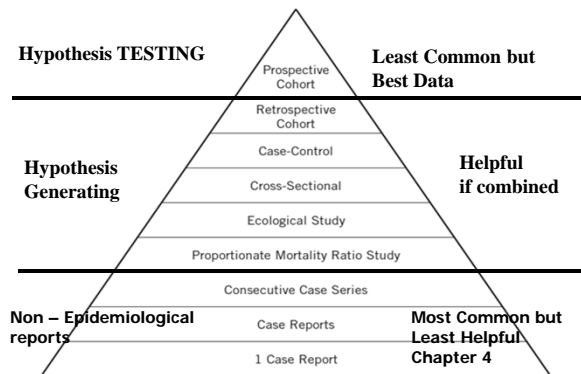
Literature Search

- Morton's, Neuroma, risk, factor = 0
- Morton's, Neuroma, risk = 6 = 1 = or 14773
- Morton's, neuroma = 292 = 11 and 1 duplicate
- Morton's, neuroma, trauma = 27 = 27 duplicates

Causation Table 3-1

2. Identify the design of each study giving stronger consideration to superior study designs, provided each study has sound methodology
2. In Blue Book reviewed by panel = to determine the study design and score the article

Figure 3-1 Study Design Pyramid (2nd edition Causation pg 107)



Ecological Study

- Ecological studies are studies of risk-modifying factors on health or other outcomes based on populations defined either geographically or temporally.
- Both risk-modifying factors and outcomes are averaged for the populations in each geographical or temporal unit and then compared using standard statistical methods.

Ecological Fallacy

- Findings for the groups may not apply to individuals in the group.
- All epidemiological studies include some people who have health outcomes related to the risk-modifying factors studied and some who do not.

Ecological Fallacy

- Thus, concern about the ecological fallacy should not be used to disparage ecological studies.
- The more important consideration is that ecological studies should include as many known risk-modifying factors for any outcome as possible, adding others if warranted.

Ecological Fallacy

- Then the results should be evaluated by other methods, using, for example, Hill's criteria for causality in a biological system.
- This is how we developed the Scoring System used in Chapter 4 Methodology

Methodology

- 3. Quality Score
 - Strength of association
 - Psychosocial factors
- Range of 0 to 140

Epidemiologic Evidence

- 11 articles {or14773-14784} Summarized
- The etiology and pathogenesis of Morton's Neuroma remains controversial.
- It is not a true neuroma and therefore, it is better referred to as Morton's metatarsalgia.

Epidemiologic Evidence

- Incorrect terminology suggests that the underlying pathological process is a nerve tumor, although histological examination reveals the presence of inflammatory tissue that is a perineural fibrosis. The common digital nerve and its branches in the third planter webspace are most commonly affected.

Epidemiologic Evidence

- Symptom complex should not be given the diagnosis of nerve compression.
- Incidence interdigital neuroma between two elderly human populations by age 80
25% Japanese and 33% Finnish
- Prevalence in US 33% with + MRI findings or 54% + by sonogram who were asymptomatic

Epidemiologic Evidence

- Left-handed people were less likely to have foot pain or any foot disorders ipsilateral but were more likely to have hallux valgus

Epidemiologic Evidence

- Right-handed people have statistically significant increased odds of having an ipsilateral versus contralateral Morton's neuroma by 30%, 18% for hammer toes, 21% for lesser toe deformity, and a twofold increased odds of any foot disorder; there was a 17% decreased odds for Tailor's bunion and an 11% decreased odds for pes cavus

Epidemiologic Evidence

Non-occupational Risk Factors - all trending positive but insufficient evidence by Methodology

- Age: increased risk with age
- Gender: Female (mainly affecting middle aged women)

Epidemiologic Evidence

- Increase with Specific Risk Factors:
- second metatarsophalangeal joint instability and increased second metatarsal length
- ankle equinus
- moderate or severe hallux valgus 70% of Japanese 0% Finnish
- wearing pointed and high-heeled shoes
- Diabetes
- Rheumatoid arthritis

Epidemiologic Evidence

Occupational Risk Factors:

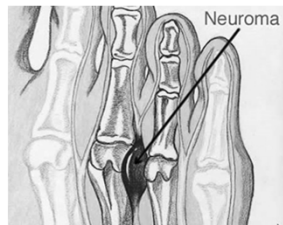
- force, standing, trauma were all insufficient evidence

Methodology Table 4-7

Table 4-7 Strength of Evidence of Causation in Epidemiologic Studies

Evidence	Point Value
Very strong	> 500
Strong	300-500
Some	100-299
Insufficient	< 100
Conflicted	See conflicted evidence
Insufficient risk	See insufficient risk

Morton's Neuroma



Causation Table 3-2

1. Identify evidence of disease

- Make the correct Diagnosis
- Pain in foot is not the same as a Morton's neuroma



Causation Table 3-2

2. Review and assess the available epidemiologic evidence for a causal relationship

- See Table 3-1 Steps for Concluding a Causal Association Exits
- See the word "association" above not cause

Causation Table 3-2

1. Identify evidence of disease
2. Review and assess the available epidemiologic evidence for a causal relationship
3. Obtain and assess the evidence of exposure
4. Consider other relevant factors
5. Judge the validity
6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation

Causation Table 3-2

3. Obtain and assess the evidence of exposure

Table 3-3 Hierarchy of Exposure Data

Type of Data	Estimation of Actual Exposure
1. Quantified personal or individualized measurement	
2. Quantified surrogate of exposure (another worker used to infer all workers' exposures doing same job)	
3. Quantified pseudosurrogates of exposure (another worker used to infer all workers' exposures doing similar jobs)	
4. Employment in a defined job category	
5. Employment in a defined job trade	
6. Employment in a plant or obtained from the employer	

Source: Adapted from Nieuwenhuijsen MJ, ed. *Exposure Assessment in Occupational and Environmental Epidemiology*. Oxford University Press; 2003.

Causation Table 3-2

3. Obtain and assess the evidence of exposure



3. Obtain and assess the evidence of exposure

Standard forms can be helpful

Causation Table 3-2

3. Obtain and assess the evidence of exposure

ESSENTIAL JOB FUNCTIONS

- Must be available to work weekday afternoons.
- Knowledge of and strict adherence to high journalistic standards.
- Knowledge of all facets of online news production, including writing for the web, editing, graphic design, photography, and audio/visual production.
- Excellent writing, grammar, and proofreading skills. Knowledge of AP style.
- Achieve and maintain knowledge of Wisconsin current events and issues.
- Knowledge of ways to use social media to develop stories and interact with audience.
- Ability to work independently and with a team of news staff throughout Wisconsin.
- Ability to work on multiple projects simultaneously on deadline.
- Aural and visual acuity to capture and edit sound and pictures/video for non-broadcast news platforms.
- Ability to work for sustained periods at computer work station.



Causation Table 3-2

1. Identify evidence of disease
2. Review and assess the available epidemiologic evidence for a causal relationship
3. Obtain and assess the evidence of exposure
4. Consider other relevant factors
5. Judge the validity
6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation

Use the Causation Book

4. Consider other relevant factors

- Individual risk factors
- Two jobs
- Hobbies
- Previous conditions

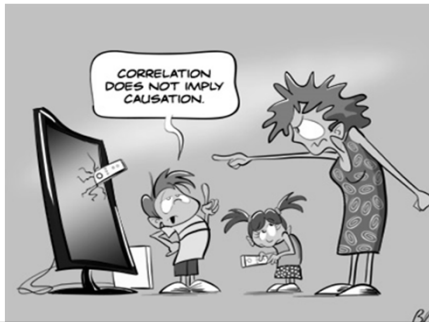


Use the Causation Book

5. Judge the validity

5. Assess the studies using the Updated Hill Criteria; apply the criteria to individual studies (especially 5a–5c) and to the studies as a whole (5a–5l)
- a. Temporality
 - b. Strength of association
 - c. Dose-response relationship
 - d. Consistency
 - e. Coherence
 - f. Specificity
 - g. Plausibility
 - h. Reversibility
 - i. Prevention/elimination
 - j. Experiment
 - k. Analogy
 - l. Predictive performance

Temporal Correlation does NOT prove Causation



Temporality

- Post hoc ergo propter hoc
- The rooster crows, then the sun rises.
 - Perfect temporal correlation
 - Therefore, the rooster crowing **CAUSES** the sun to rise.
 - ERROR: “When” does not equal “Why”
 - “As I turned into the discount store parking lot, a part broke on my 6 year old car; therefore, the store is liable for injuring my car.



Plausibility

Gray Hair Correlates With

- Type 2 Diabetes Mellitus
- Myocardial Infarction
- Cervical Spondylosis
- Lumbar Spinal Stenosis



Cannot Replace the Physician

6. Form conclusions about the work-relatedness of the disease in the person undergoing evaluation = convert data from the whole to data for the individual?

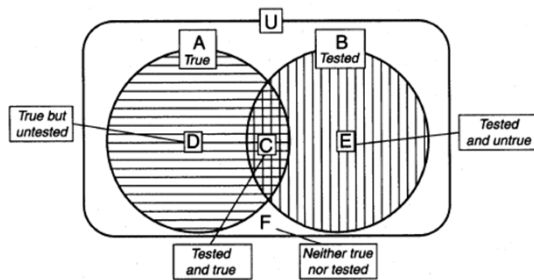


Limitations of Epidemiology

- Like Science in general,
Epidemiology can NOT prove a theory.
- Epidemiology can disprove a theory.
 - Can establish that proposed explanation or association is due to chance.
 - Can disprove a theory's predictions.

– Hadler N M, *Occupational Musculoskeletal Disorders, 2nd Edition*, Lippincott, Williams, and Wilkins, Philadelphia, 1999

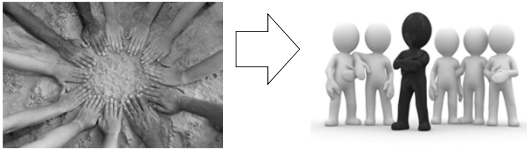
What We Know



Source: © 2004 American Academy of Orthopaedic Surgeons. Reprinted from the *Journal of the American Academy of Orthopaedic Surgeons*, Volume 12(2), pp. 80-88, with permission.

Cause

- Limited Prospective Studies
- Many Epidemiological Studies
- How do we convert data from the whole to data for the individual?



But Wait

- You're in the deposition and the attorney or you're in the court room and the judge wants to know how you plan to support your opinion!





Chapter 2

Understanding Work-Relatedness

J. Mark Melhorn, MD,
William E. Ackerman III, MD,
Lee S. Glass, MD, JD,
David C. Deitz, MD, PhD, and Steven Babitsky, Esq., JD

Prevalent Perceptions of Work-Relatedness
Cause in Fact
Proximate Cause
Epistemology
Definition of Terms
Study Types
Level of Certainty Needed to Establish Causation
Summary
Appendix: Specific Statutes or Case Law Thresholds

Relative Risk

- Relative risks come from prospective cohort in which you know the denominators (how many are in each group you're following).
- You are dividing know risk (absolute risk) in the exposed group by the risk in the unexposed group.

Relative Risk

Risk	Disease Status	
	Present	Absent
Exposed	a	b
Non-exposed	c	d

- 2 x 2 Table
- Relative risk (RR) for exposed relative to non-exposed
- $RR = a/(a+b) / c/(c+d)$
- $RR = 1$ = no association
- $RR < 1$ = negative association
- $RR > 1$ = positive association

Relative Risk

- 2 x 2 Table
Lung CA 20%
in smoker and
1% non-smoker in study of 100 individuals
- $RR = a/(a+b) / c/(c+d)$
- $RR = 1$ = no association
- $RR < 1$ = negative association
- $RR > 1$ = positive association

Risk	Disease Status	
	Present	Absent
Smoker	a	b
Non-smoker	c	d

Relative Risk

- 2 x 2 Table
Lung CA 20%
in smoker and
1% non-smoker in study of 100 individuals
- $RR = a/(a+b) / c/(c+d)$
- $RR = 20/(100) / 1/(100)$
- $RR = 20$

Risk	Disease Status	
	Present	Absent
Smoker	a = 20	b = 80
Non-smoker	c = 1	d = 99

Relative Risk

- A RR of > 1 means the event is more likely to occur in the exposed group than in the control (non-exposed) group.
- RR of > 2 sufficient to consider association for causation by legal definition
- Just how small is an RR of > 2

Relative Risk

- 2 x 2 Table exposure to force

Risk	Disease Status	
	Present	Absent
Force	a = 2	b = 98
Non-force	c = 1	d = 99

- resulted in 2 true positives (a) while 1 developed disease but was not exposed (c)
- $RR = a/(a+b) / c / (c+d)$
- $RR = 2/100 / 1/100 = 2$ so only need to change a to 3 and $RR > 2$

Relative Risk

- The concept of using the relative risk of at least 2.0 to determine "legal" causation has legal precedent (see Table 4-1), even though epidemiologists consider a relative risk of < 3 as "weak" evidence, especially if the risk estimate comes from case control studies.

Relative Risk

- The relative risk of > 2.0 was selected based on several legal cases (common law). (page 118)

J. M. Melhorn, W. E. Ackerman, L. S. Glass, D. C. Dietz, and S. Babitsky. Understanding Work-Relatedness. In: Guides to the Evaluation of Disease and Injury Causation, edited by J. M. Melhorn, J. B. Talmage, W. E. Ackerman, and M. H. Hyman, Chicago, IL: American Medical Association, 2013, p. 15-104.

Relative Risk

- If in a factory with 1000 employees,
- 100 "Work related" cases
- In the general non-factory working population 100 cases/1000 people
- Relative risk is 1.0
- Incidence or prevalence (whichever the study measured) is not affected by work, but is the rate of illness in the general population.

Relative Risk

- If in a factory with 1000 employees,
- 200 "Work related" cases [Total cases]
- In the general non-factory working population 100 cases/1000 people
- Relative risk is 2.0
- But only half of the cases may have occurred because of the work exposure.

Relative Risk

- **CONSIDER THIS:**
If this illness is officially considered to be work related, work caused 100 cases, **BUT**, the employer will pay for all 200 cases covered by workers' comp.

- Medical Science
- Social Justice





Work-relatedness

- The final determination of work relatedness is established by legal definitions = jurisdictional statutes.
- Opinions regarding causation should be based the best available scientific evidence.

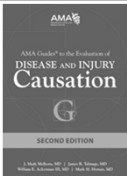


Table 2-6 States' Causation Threshold Definitions for Work-Relatedness

Jurisdiction	Causation Threshold
Federal	
Federal Black Lung Program	Medical testimony must express a "reasoned medical judgment"
Federal Employers Compensation Act	POTE / MPTN
Federal Employers Liability Act	MPTN in federal court or applicable phrase in state court
Jones Act	POTE / MPTN
Longshore and Harbor Workers' Compensation Act	MPTN, but if the evidence is balanced on both sides, the presumption favors the claimant
State	
Alabama	RDOMP
Alaska	POTE, presumption in favor of claimant (MPTN)
Arizona	RDOMP / MPTN
Arkansas	RDOMC and RDOMP
California	RDOMP
Colorado	RDOMP
Connecticut	RDOMP
Delaware	RDOMC, RDOMP, POTE, or MPTN
District of Columbia	MPTN / POTE
Florida	RDOMC, and the work injury must be the major contributing cause of the condition (i.e., > 50% contributory). There must be significant objective findings (by physical examination and diagnostic studies) causally related to the injury.
Georgia	RDOMP
Hawaii	Presumption in favor of claimant; employer must show by substantial evidence that the presumptions do not apply.
Idaho	RDOMP
Illinois	RDOMC
Indiana	RDOMC
Iowa	MPTN / POTE





Work-relatedness

- What is prevailing factor?

Table 2-6 (Continued)

Jurisdiction	Causation Threshold
Kansas	RDOMP – new law May 15, 2011, prevailing factor
Kentucky	RDOMP
Louisiana	Reasonable probability

Work-relatedness

Montana

Causation Threshold: More probable than contemporaneous of the evidence (MPTE) based on objective medical findings.

Summary: Medical causation in workers' compensation cases must be shown by a preponderance of the evidence, based on objective medical findings. Proof that causation is "medically possible" is insufficient.

Statutes:
 H.R. 316, revising Mont. Code Ann., § 39-71-407 (2009). Liability of insurers—Limitations. (Effective July 1, 2011.)

(2) (a) An insurer is liable for an injury, as defined in 39-71-119, if the injury is established by objective medical findings and if the claimant establishes that it is **more probable than not** that:

- i. a claimed injury has occurred; or
- ii. a claimed injury has occurred and aggravated a preexisting condition.

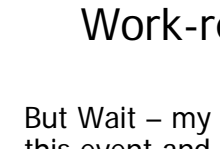
(b) Proof that it was **medically possible** that a claimed injury occurred or that the claimed injury aggravated a preexisting condition is **not sufficient** to establish liability.

Revising § 39-71-116. Definitions.

(22) "Objective medical findings" means medical evidence, including range of motion, atrophy, muscle strength, muscle spasm, or other diagnostic evidence, substantiated by clinical findings.

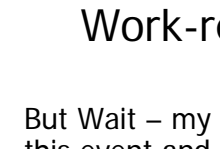
Claimant Need Not Rely on Medical Testimony to Prove That It Was "More Probable Than Not" That Injury Occurred. The lower court denied Plaintiff's claim on the basis that there was conflicting medical testimony pertaining to when Plaintiff had injured his eye and that therefore he had not met his burden of proving medically that it was "more probable than not" that an injury had occurred to his eye. The Supreme Court held that the statute does not require medical proof of probability and that Plaintiff had introduced other evidence that met his burden of showing that it was more probable than not that he had suffered an injury. *Plaschall v. Transamerica Ins. Co.*, 204 M 120, 870 P2d 76, 31 So. Rep. 811 (1994), followed in *Peterson v. Community Medical Center*, 204 M 134, 870 P2d 82, 31 So. Rep. 189 (1994), and distinguished in *Mathews v. St. Comp. Ins. Fund*, 199 MT 221, 208 So. 98, 893 P2d 741, 96 So. Rep. 688 (1999).

Case law:
 Under Mont. Code Ann. § 39-71-407(2)(a), an insurer is liable for an injury, as defined in Mont. Code Ann. § 39-71-119, if the injury is established by objective medical




Work-relatedness

- But Wait – my foot did not hurt before this event and it hurts now.
- Therefore the event had to be the cause of why my foot hurt now.

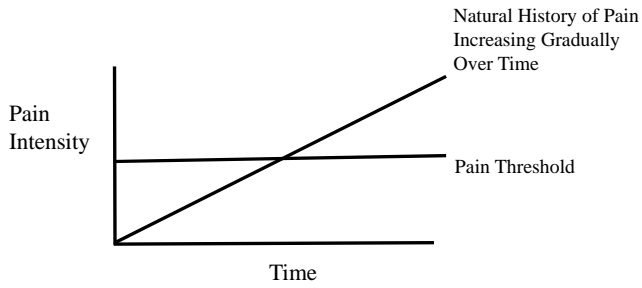


Work-relatedness

- But Wait – my foot did not hurt before this event and it hurts now.
- Therefore the event had to be the cause of why my foot hurt now.
- Post hoc ergo propter hoc

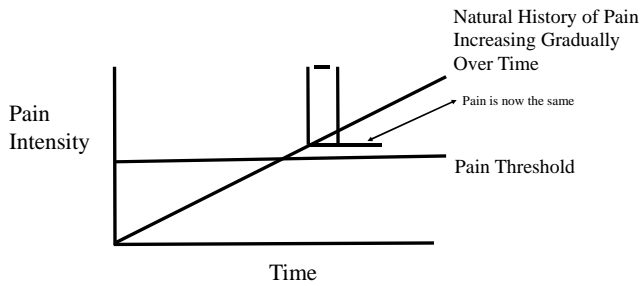


Natural History of a Progressive a Condition:
e.g. osteoarthritis, peripheral neuropathy, etc.



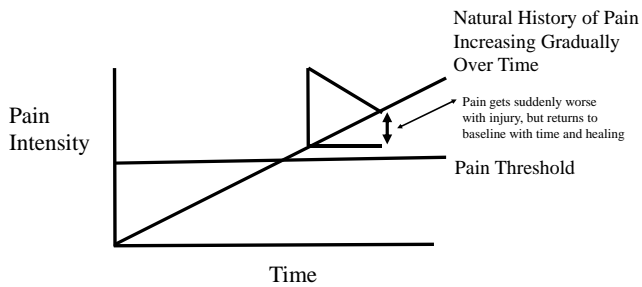
Natural History of a Sprain - Strain

Exacerbation = returns to baseline, and at same level as pre-injury pain = pain is the same.



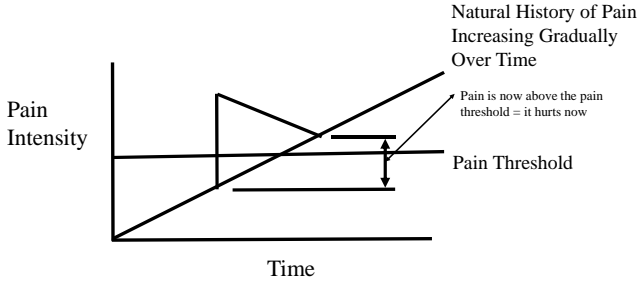
Natural History of a Progressive a Condition:
e.g. osteoarthritis, peripheral neuropathy, etc.

Exacerbation = returns to baseline, but to patient the pre-injury pain was worse or now is the same.



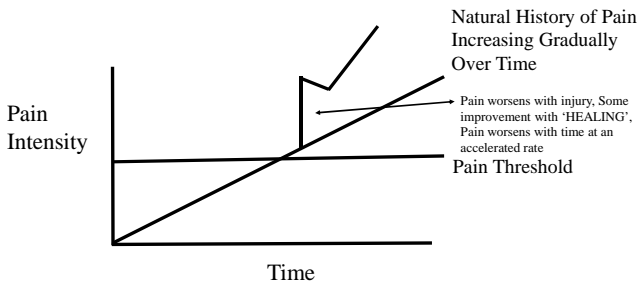
Natural History of a Progressive a Condition:
e.g. osteoarthritis, peripheral neuropathy, etc.

Exacerbation = pain occurs with injury and returns to baseline for pre-existing asymptomatic, but progressive condition therefore – "I did not hurt before, but I now hurt."



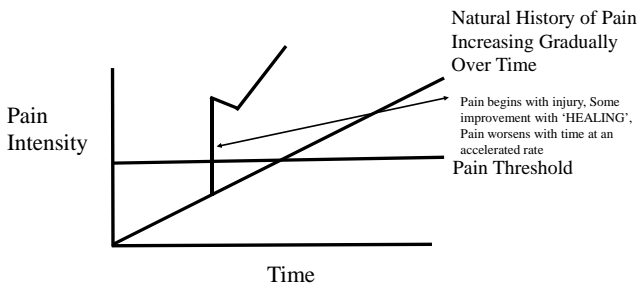
Natural History of a Progressive a Condition:
e.g. osteoarthritis, peripheral neuropathy, etc.

Aggravation = condition is worse after injury.



Natural History of a Progressive a Condition:
e.g. osteoarthritis, peripheral neuropathy, etc.

Aggravation = pre-existing asymptomatic condition is worse after injury.



Morton's Neuroma

The Original Question was

Is this a compensable injury?

Yes vs No = you vote

Morton's Neuroma

- 40 y/o male
- Warehouse worker = flat floor, proper steel toed shoes with wide toe area
- How long on the job?
- Previous history of Dx or Tx same or similar conditions?

Morton's Neuroma

- No epidemiological risk factor established for on feet all day or heavy lifting.
- No history of trauma, no studies to show increase with sports, running, jumping, weight lifters, etc.
- Increasing risk with age, he is 40 probably no adjustment.

Morton's Neuroma

- 33% to 54% of US populations has nerve changes by MRI / sonogram.
- Does he have co-morbidities such as RA, diabetes, ankle equinus, second metatarsophalangeal conditions?

Morton's Neuroma



- What is the legal threshold?
- No

in my opinion based on the current information available. However, I reserve the right to change my opinion if additional information is provided.

(1/1/20)

Morton's Neuroma

- So do you always get this level of analysis?
- Dx was not in Blue book, so, I had to do all the steps.
- 8 hours at "Special Reports" usually limited to \$100 if paid at all.
- Please do the math!!

But Wait - Causation Fallacies

Post hoc ergo propter hoc

- After this, therefore because of this
- Occurs when a causal relationship is asserted based on this false reasoning.
- It is a fallacy to conclude that one event followed by a second necessarily demonstrates a causal relationship between the events.

Causation Fallacies

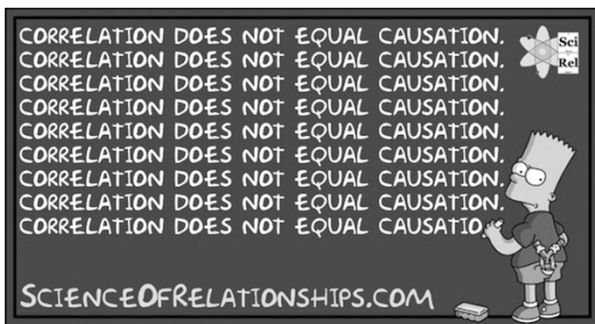
Non-Causal Relationship - example

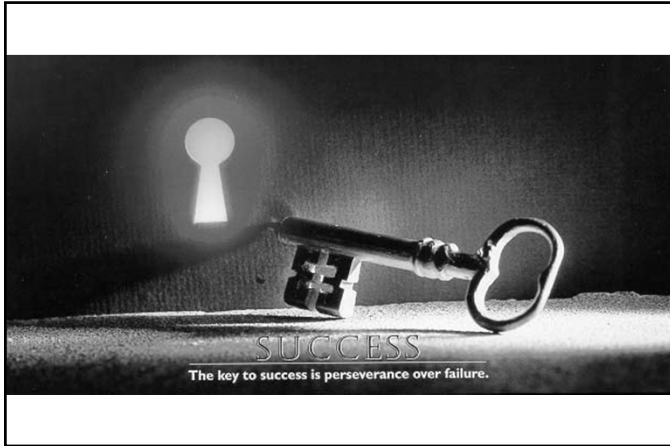
People with gray hair may have a higher incidence of infection after tendon laceration than people with black hair.

Gray hair does not, by itself or with other factors, provide a biologically plausible explanation for the occurrence of an infection.

Therefore, there is a non-causal relationship between hair color and infection because the presence of gray hair and the incidence of infection both increase with age, for unrelated reasons.


Causation Summary







2022
Want
More
Help?



- AAOS Annual Workers' Compensation CME
Nov 3, 4, 5, 6 San Antonio, TX
- IME / QME
- Whiplash and Other Reported Injuries
- Volunteer Faculty – no financial benefit
