



Insurance Brokers &
Consultants

This Might Hurt – An Introduction to Back Pain

December 5, 2023

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[EPICBROKERS.COM](https://www.epicbrokers.com)

Dedicated to:

Libby Pacheco Brogmus 10/4/27 to 10/5/23



Marta Nulart Urquiza 7/16/37 to 12/1/23



Today let's talk about...

- How big is the back pain problem?
- How good is medical diagnosis and treatment?
- Prevention approaches
- A clue to future prevention
- What you CAN do



Have you ever had back pain? (Yes or No)

(Poll Q1)



**Do you have back
pain now?
(Yes or No)
(Poll Q2)**

The Low Back Pain Problem



- Greater than 80% lifetime prevalence
 - 1 out of 4 of us experience it monthly
 - 1 of 10 of us have it now!
 - #1 cost driver for worker injuries
 - Costs US Over \$500 Billion!
 - Continues to be the #1 cause of Days Lived with Disability worldwide
 - Diagnosis and treatment largely ineffective, in some cases iatrogenic
 - Workplace interventions have had limited effectiveness
-

Global low back pain prevalence and years lived with disability from 1990 to 2017: estimates from the Global Burden of Disease Study 2017



Wu, et al., 2020. Annals of Translational Medicine

In 2017 there were 64.9 million Years Lived with Disability (YLDs) Worldwide due to back pain

“Globally, LBP is the leading global cause of YLDs. Greater attention is urgently needed to mitigate this increasing burden and the impact it is having on health and social systems.”

Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021.
Ferreira, et al., 2023

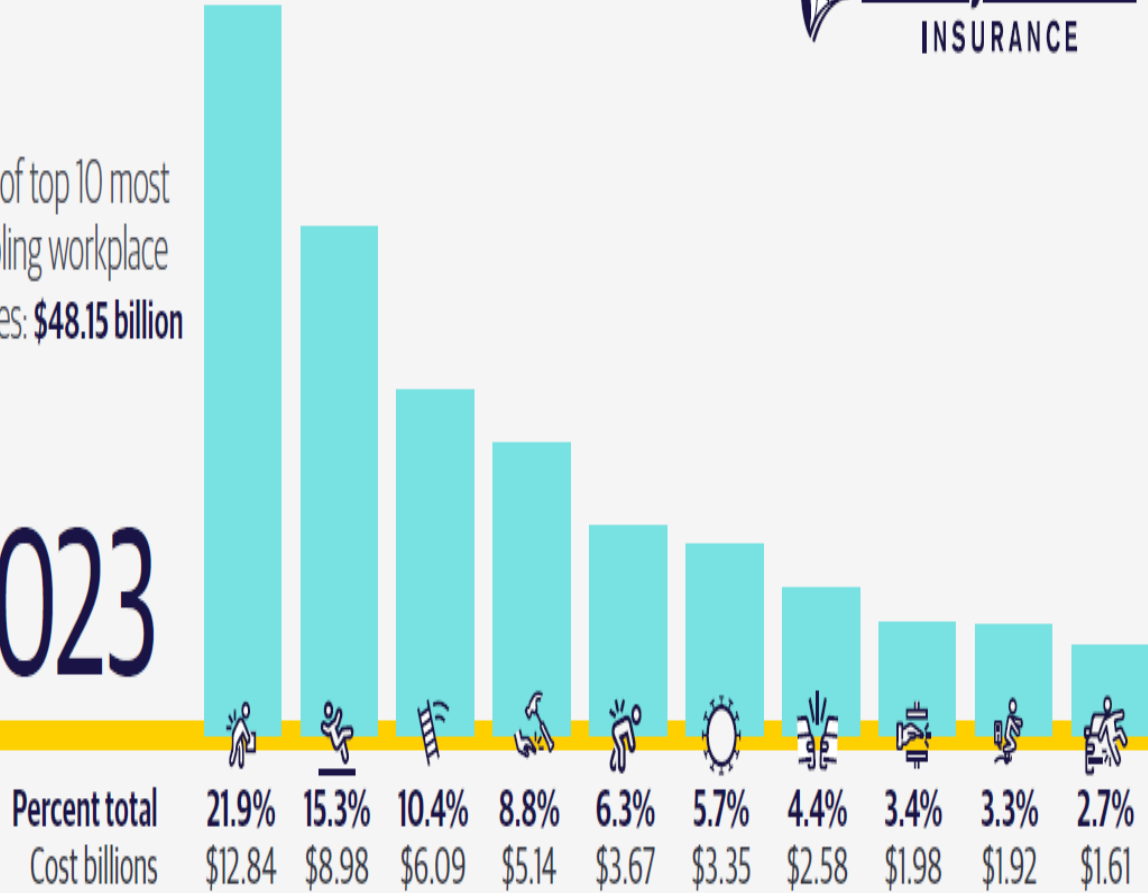
“Low back pain remains the leading cause of YLDs globally, and in 2020, there were more than half a billion prevalent cases of low back pain worldwide.”

The 2023 Liberty Mutual Workplace Safety Index (2020 data)



Cost of top 10 most disabling workplace injuries: **\$48.15 billion**

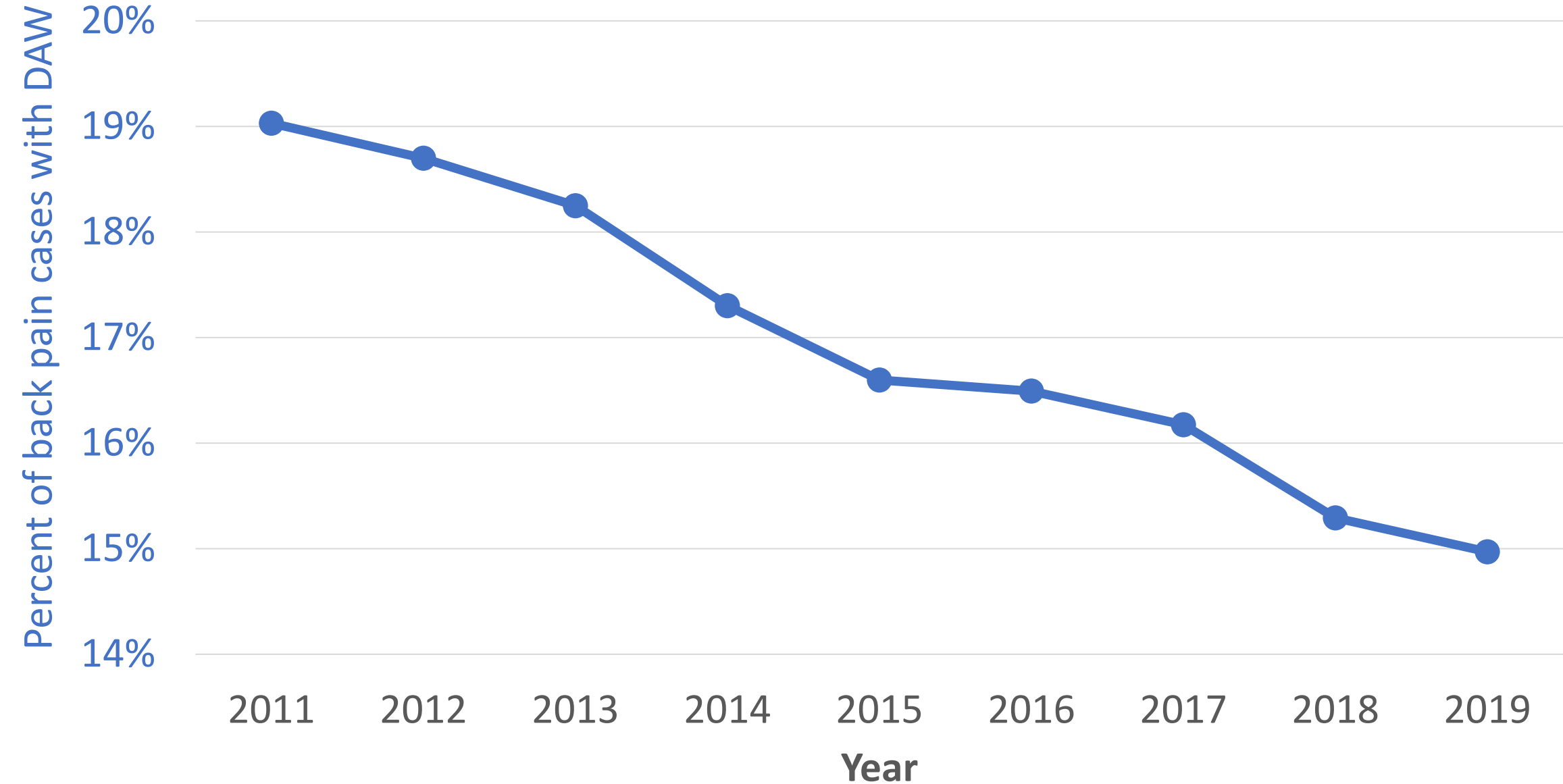
2023



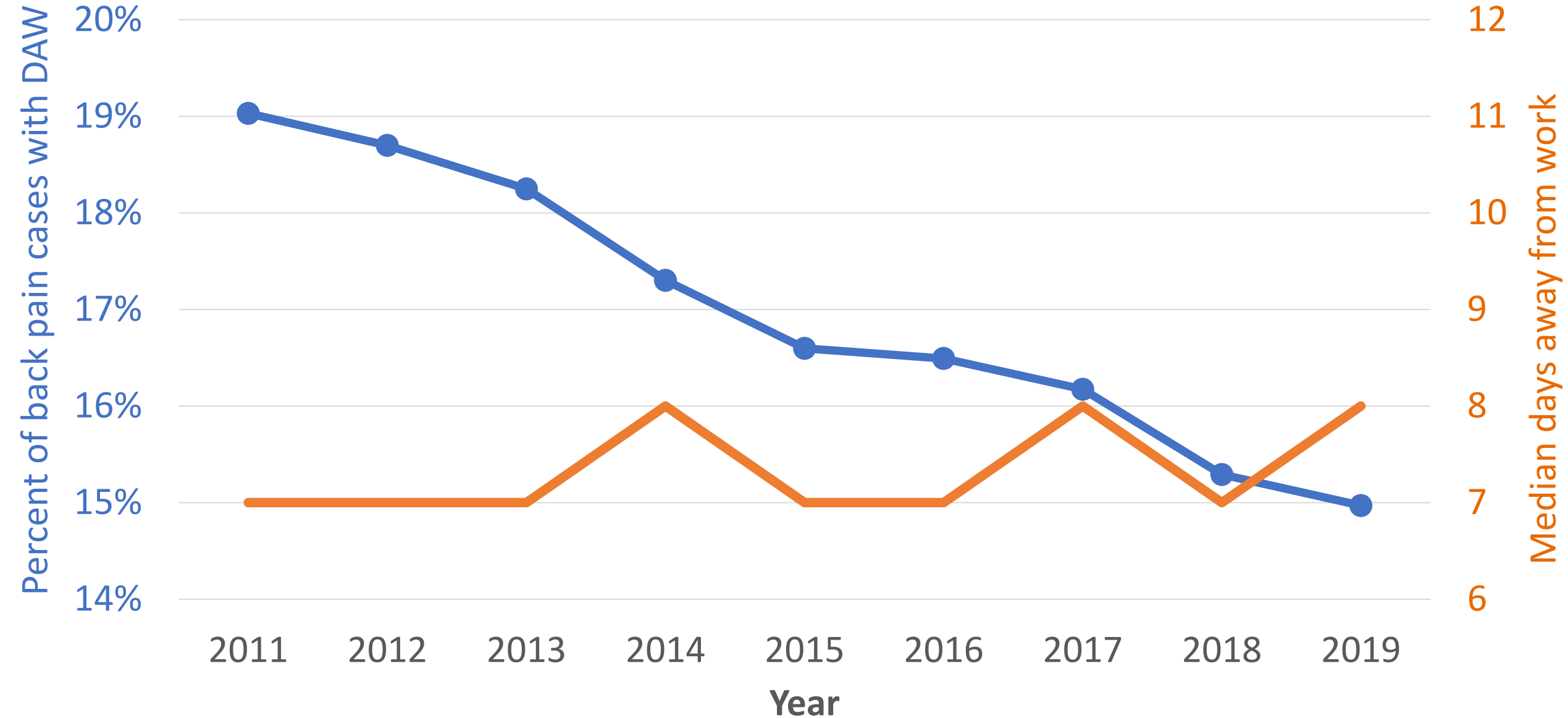
	Percent total	Cost billions	
1.	21.9%	\$12.84	Overexertion involving outside sources (handling object)
2.	15.3%	\$8.98	Falls on same level
3.	10.4%	\$6.09	Falls to lower level
4.	8.8%	\$5.14	Struck by object or equipment (being hit by objects)
5.	6.3%	\$3.67	Other exertions or bodily reactions (awkward postures)
6.	5.7%	\$3.35	Exposure to other harmful substances (Includes COVID-19)
7.	4.4%	\$2.58	Roadway incidents involving motorized land vehicle (vehicle crashes)
8.	3.4%	\$1.98	Caught in or compressed by equipment or objects (running equipment or machines)
9.	3.3%	\$1.92	Slip or trip without fall
10.	2.7%	\$1.61	Pedestrian vehicular incidents

Back, #1 Body Part (18% of cost) "Torso" another 13%

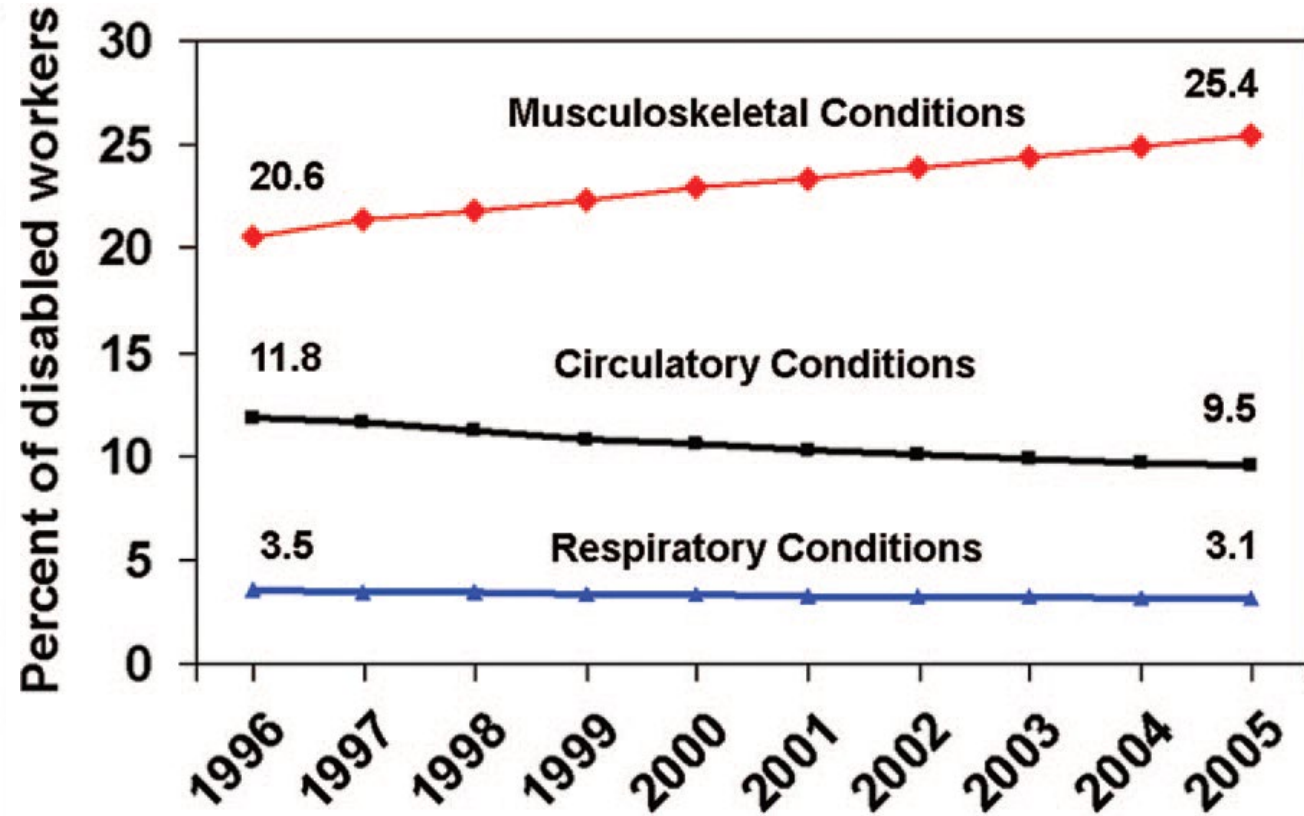
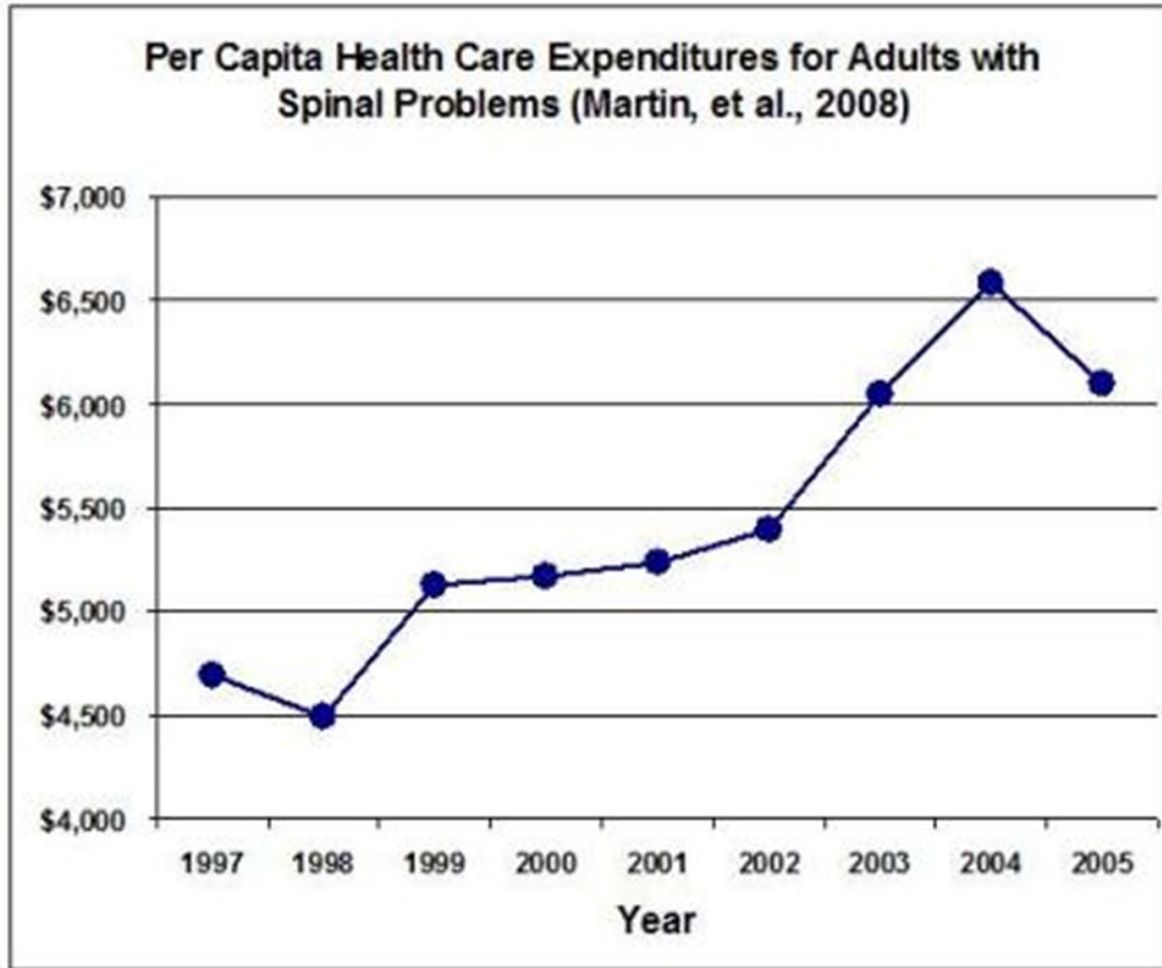
Percent of back pain (injury) cases with days away from work (DAW) by year



Percent of and median days away from work for back pain (injury) cases with days away from work (DAW) by year



Back Pain Expenditure per Capita in the US by Year & Increasing Numbers of Disabled Workers By Year

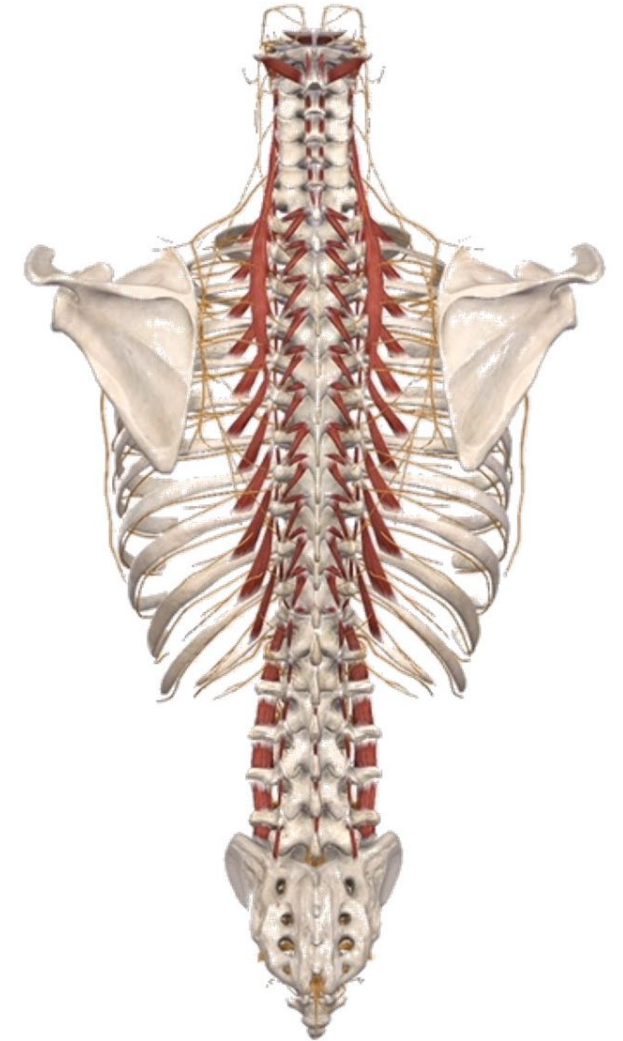


Source: Overtreating chronic back pain: Time to back off? (Deyo, et al., 2009)

What Causes Most Back Pain?

(Poll Q3)

- A. Lifting wrong
- B. Herniated Disc
- C. Pinched Nerve
- D. Muscle/Tendon Strain
- E. Ligament Sprain
- F. Muscle Spasm
- G. Arthritis
- H. Spinal deformity
- I. None of the above



Commonly Claimed Causes for Back Pain

- Muscle Spasms (Bogduk, 1995; van Dieen, et al., 2003)

“There are no consistent physiological correlates (such as EMG activity) that are diagnostic of muscle spasm; there is no evidence that such activity, if detected, is at all painful.” (Bogduk, 1995)

- Muscle/Tendon Strains & Ligament Sprains

(Bogduk, 1995; Deyo, 1998; Deyo and Weinstein, 2001)

“Strain and sprain have never been anatomically or histologically characterized, and patients given these diagnoses might accurately be said to have idiopathic low back pain.” (Deyo and Weinstein, 2001)



The Myth of Disc “Damage” and The Failure of Imaging

- Herniated/Prolapsed Discs Other Disc Features via Imaging Techniques (See also: Deyo, 1998; Boos, et al., 2000; Kleinstuck, et al., 2006; Waris, et al. 2007, Cohen, Argoff and Carragee, 2009)
 - “Herniated discs occur in 20–70% of people **without low back pain**, depending on age, selection, and definition of disc herniation.” Implication: A herniated disc is only that and no more. (Snook, 2004)
 - “Disc degeneration, disc bulging, and endplate changes on MRI have been shown to either **not correlate at all** or correlate poorly with clinical outcomes, suggesting that MRI is not useful for the vast majority of patients.” (ACOEM, 2007)
 - “The ACP has found strong evidence that routine imaging for low back pain by using radiography or advanced imaging methods is **not associated with a clinically meaningful effect on patient outcomes**. Unnecessary imaging exposes patients to preventable harms, may lead to additional unnecessary interventions, and results in unnecessary costs.” (Chou, et al., 2011)



Do not routinely offer imaging for uncomplicated low back pain

Hall, et al., 2021. BMJ

Table 1 Age-specific prevalence estimates of degenerative spine imaging findings in asymptomatic people⁶

Image finding	Prevalence (%) of findings by age (years)						
	20	30	40	50	60	70	80
Disc degeneration	37	52	68	80	88	93	96
Disc signal loss	17	33	54	73	86	94	97
Disc height loss	24	34	45	56	67	76	84
Disc bulge	30	40	50	60	69	77	84
Disc protrusion	29	31	33	36	38	40	43
Annular fissure	19	20	22	23	25	27	29
Facet degeneration	4	9	18	32	50	69	83
Spondylolisthesis	3	5	8	14	23	35	50

Iatrogenic Consequences of Early MRI in Acute Work-Related Disabling LBP. Webster, et al., 2013

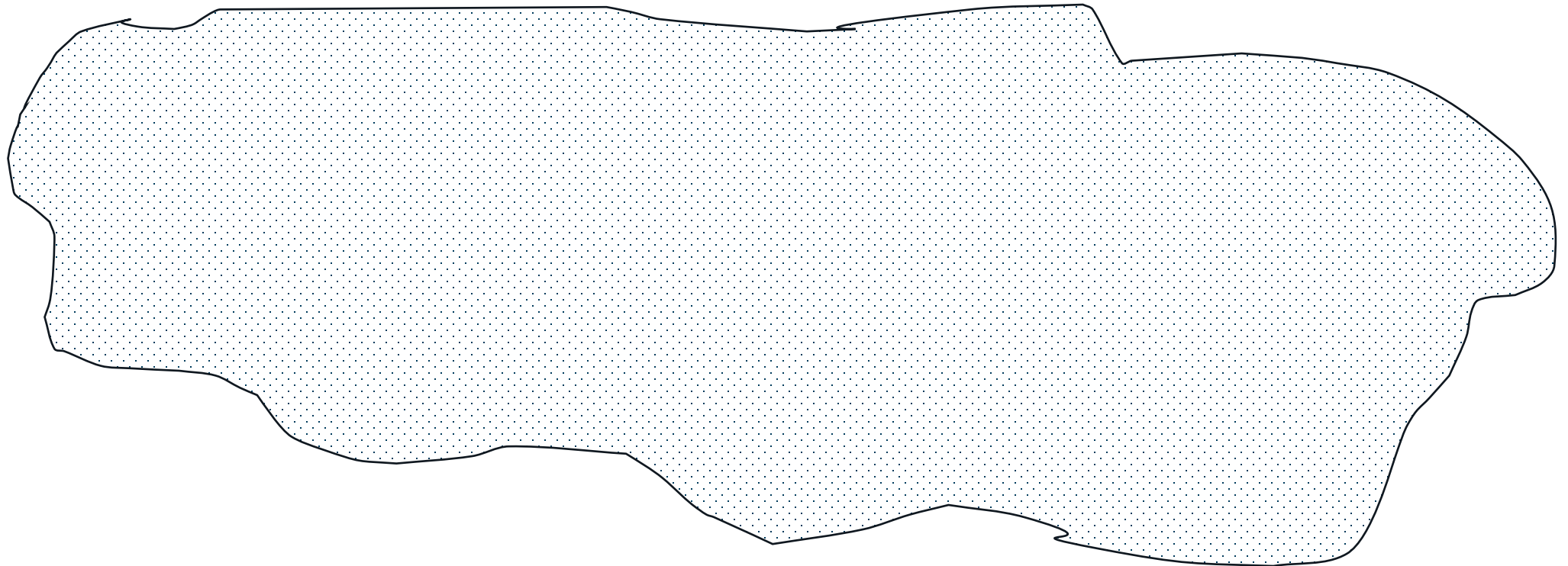
“Early MRI without indication has a strong iatrogenic effect in acute LBP, regardless of radiculopathy status. Providers and patients should be made aware that when early MRI is not indicated, it provides no benefits, and worse outcomes are likely.”

- Early MRIs:
 - LONGER lengths of disability
 - Higher Costs: >\$12,000 on average

Prevalence of and Screening for Serious Spinal Pathology in Patients Presenting to Primary Care Settings With Acute Low Back Pain

Henschke, et al., 2009

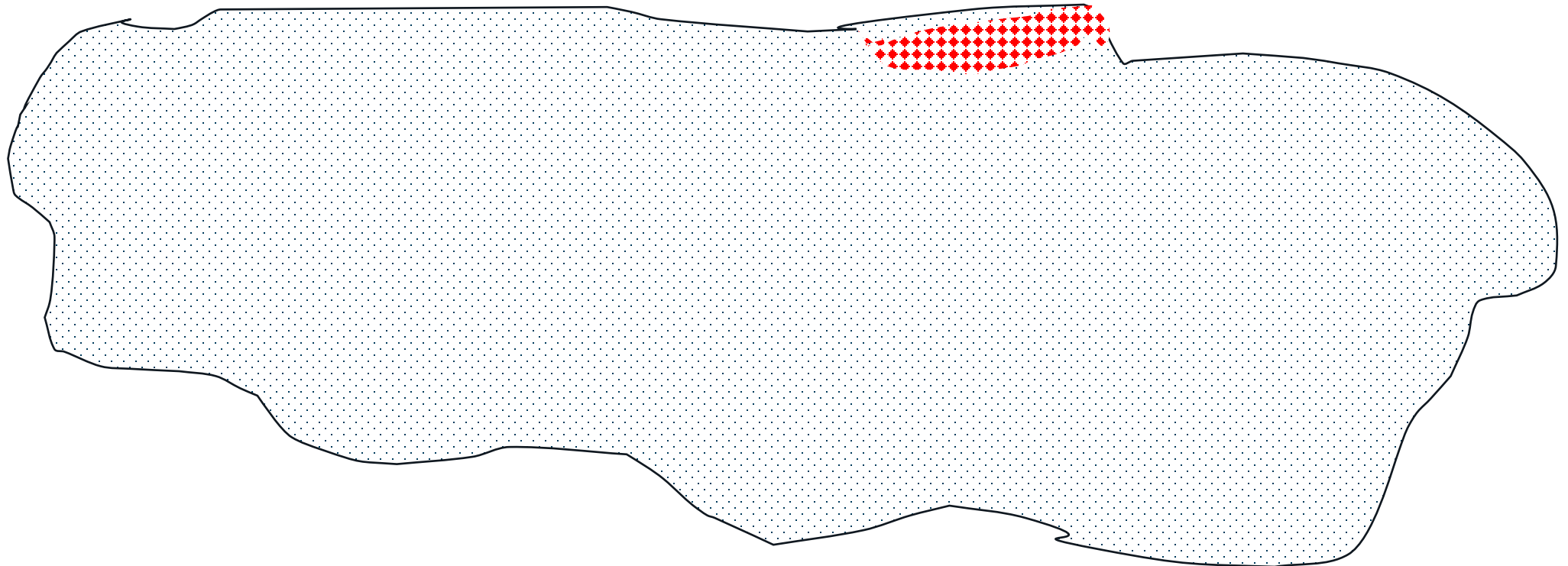
- 1,172 consecutive patients at 3 primary care clinics in Sydney, Australia



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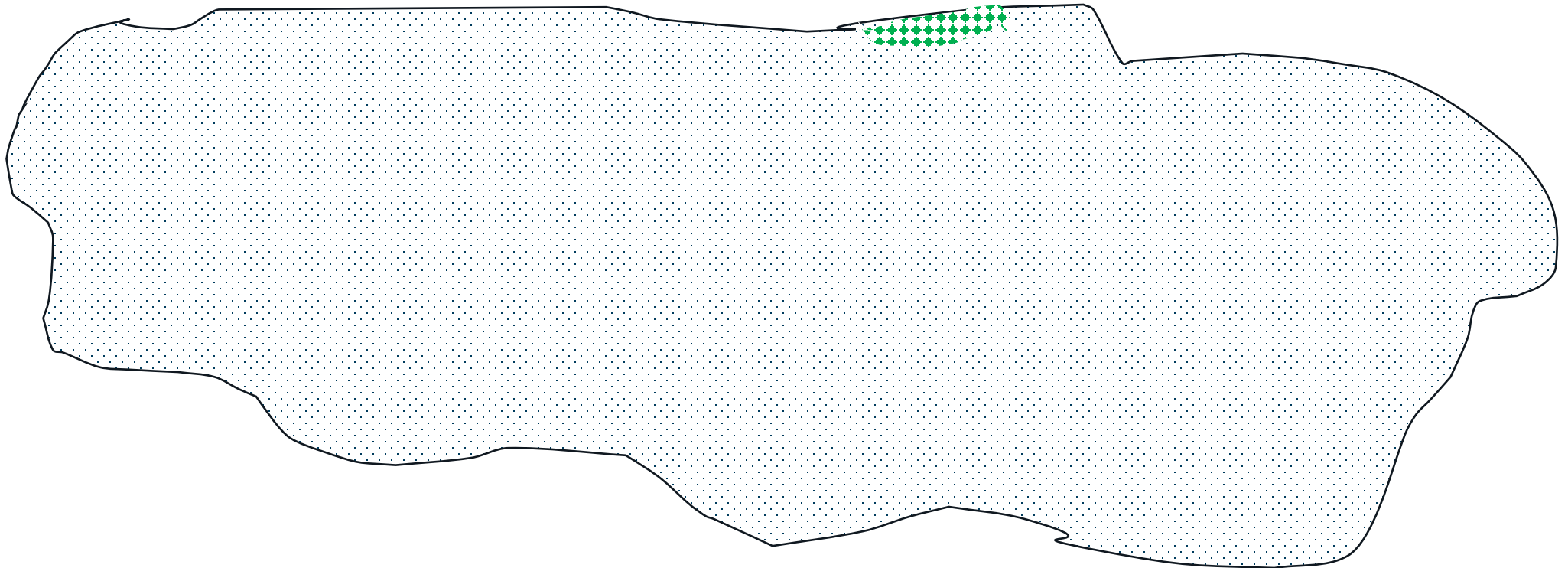
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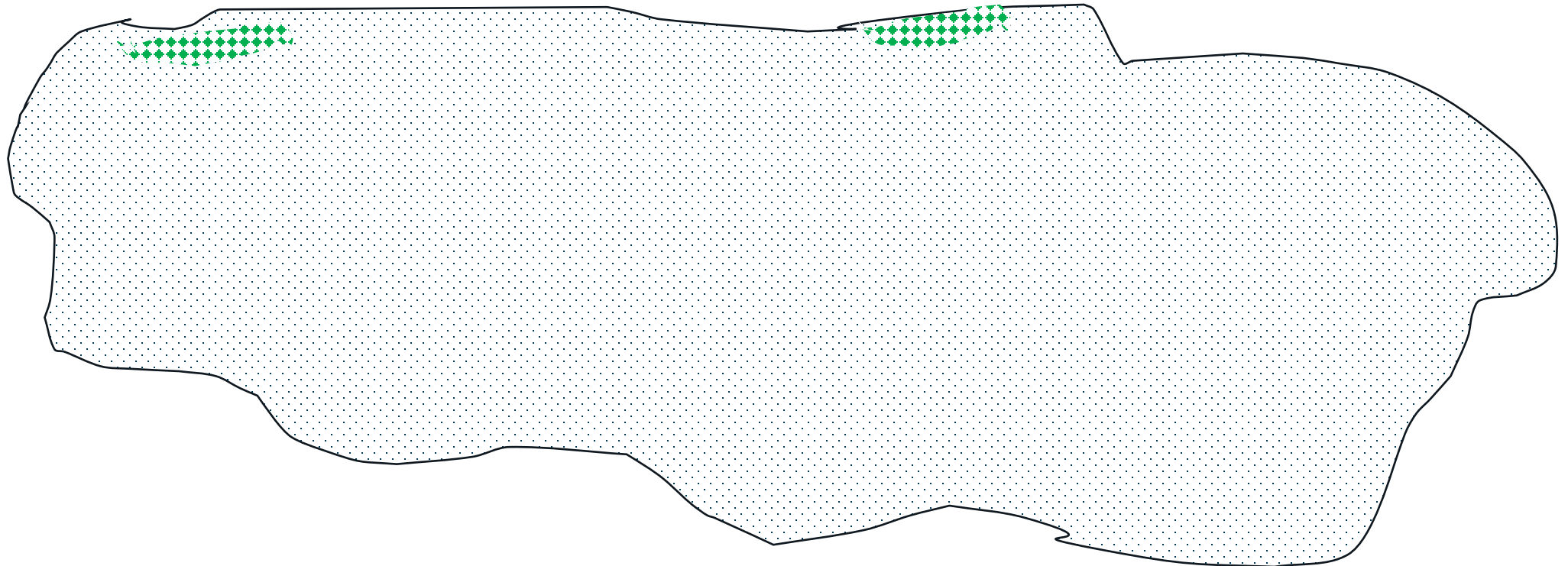
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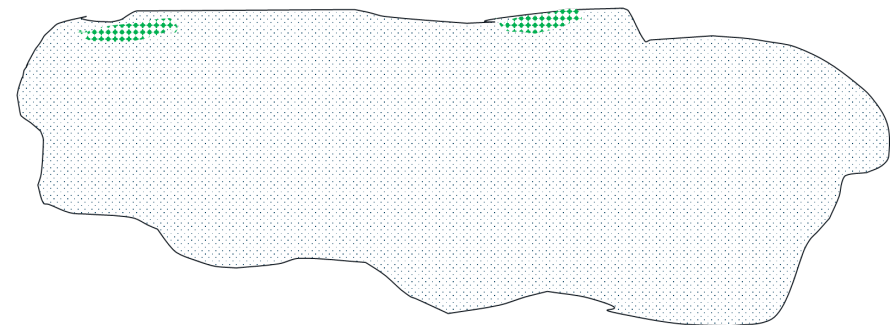
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Implications:

- **Less than about 1% of presenting back pain involves serious pathology**
- **The “red flags” physicians use to identify serious pathology are terrible!**

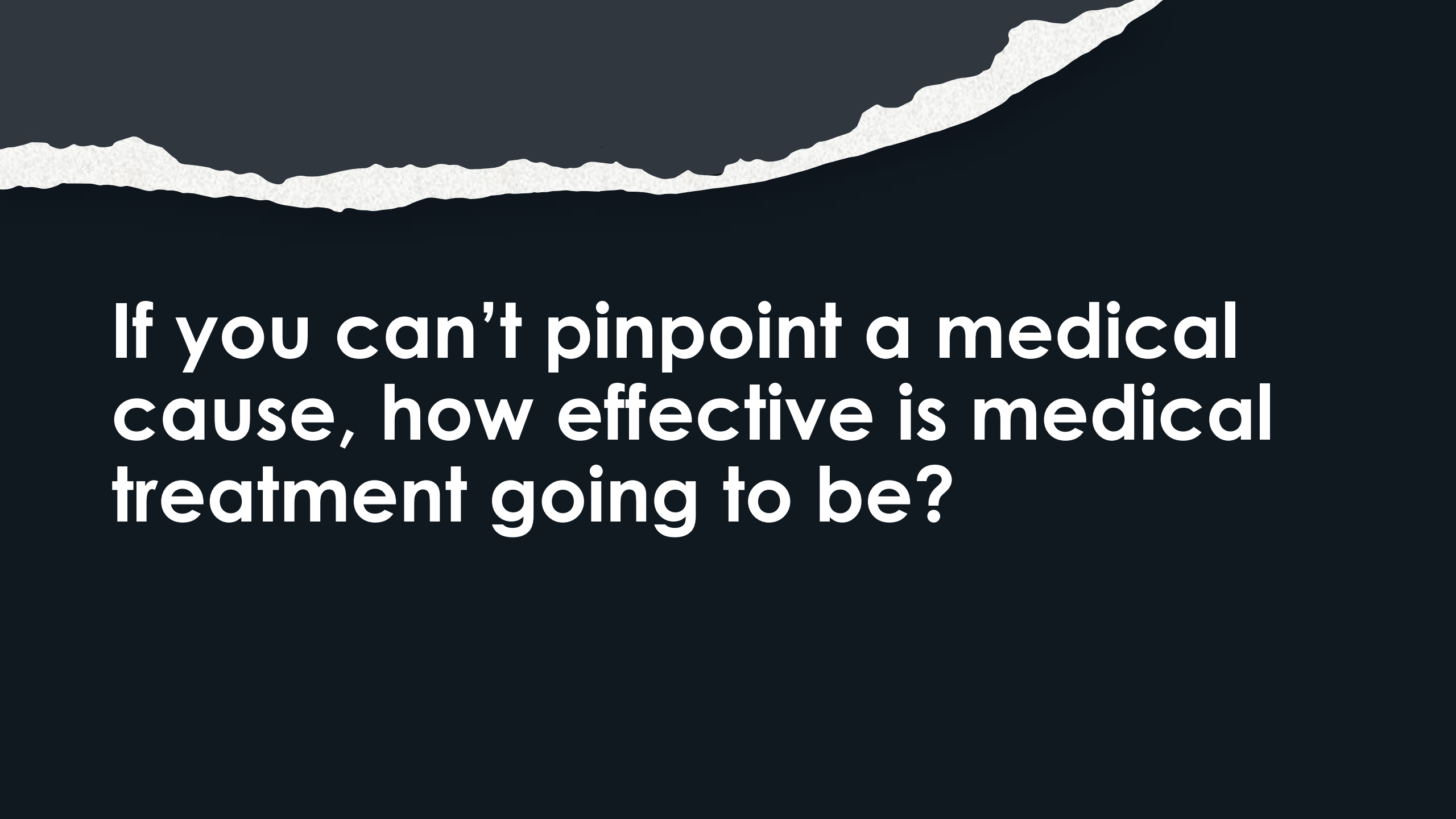


How Much Back Pain Can Dr.'s Find A Cause For?

Serious Disease (Cancer)	0.3% to 0.7%
Arthritis (ankylosing spondylitis)	0.3% to 5.0%
Traumatic Fracture	<1.0%
Spinal Stenosis	≤3.0%
Sciatica (a symptom, not cause!)	
TOTAL.....	0.6% to 9.7%

This means that 90 to 98% of patients going to a doctor have **NO IDENTIFIABLE MEDICAL CAUSE OF THEIR BACK PAIN** = “nonspecific” or “idiopathic” back pain.

“More than 95% of patients have no identifiable cause for their LBP.” ACOEM Occupational Practice Guidelines, 2007.



If you can't pinpoint a medical cause, how effective is medical treatment going to be?

Treatment (In?) Effectiveness

“Among patients with acute low back pain, the outcomes are similar whether they receive care from primary care practitioners, chiropractors, or orthopedic surgeons.” Carey, et al., 1995

“Chiropractic care and medical care for low back pain were comparable in their effectiveness. Physical therapy may be marginally more effective than medical care alone for reducing disability in some patients, but the possible benefit is small.” Hurwitz, et al., 2002

“Individual education appeared to be equally effective to interventions like chiropractic manipulation and physiotherapy for patients with acute or subacute LBP.” Engers, et al., 2008

“For patients with low back pain... physical therapy and chiropractic manipulation had similar effects and costs, and patients receiving these treatments had only marginally better outcomes than those receiving the minimal intervention of an educational booklet. Whether the limited benefits of these treatments are worth the additional costs is open to question.” Cherkin, et al., 1998

“There is no evidence that spinal manipulative therapy is superior to other standard treatments for patients with acute or chronic low back pain.” Assendelft, et al., 2003

“there is no clinically relevant difference between SMT and other interventions for reducing pain and improving function in patients with chronic low-back pain” Rubinstein, et al., 2008

Evidenced-Based Treatment Outcomes: Treatments are equally (in)effective

- Primary care practitioners
- Chiropractors
- Orthopedic surgeons
- Physical Therapists
- Education

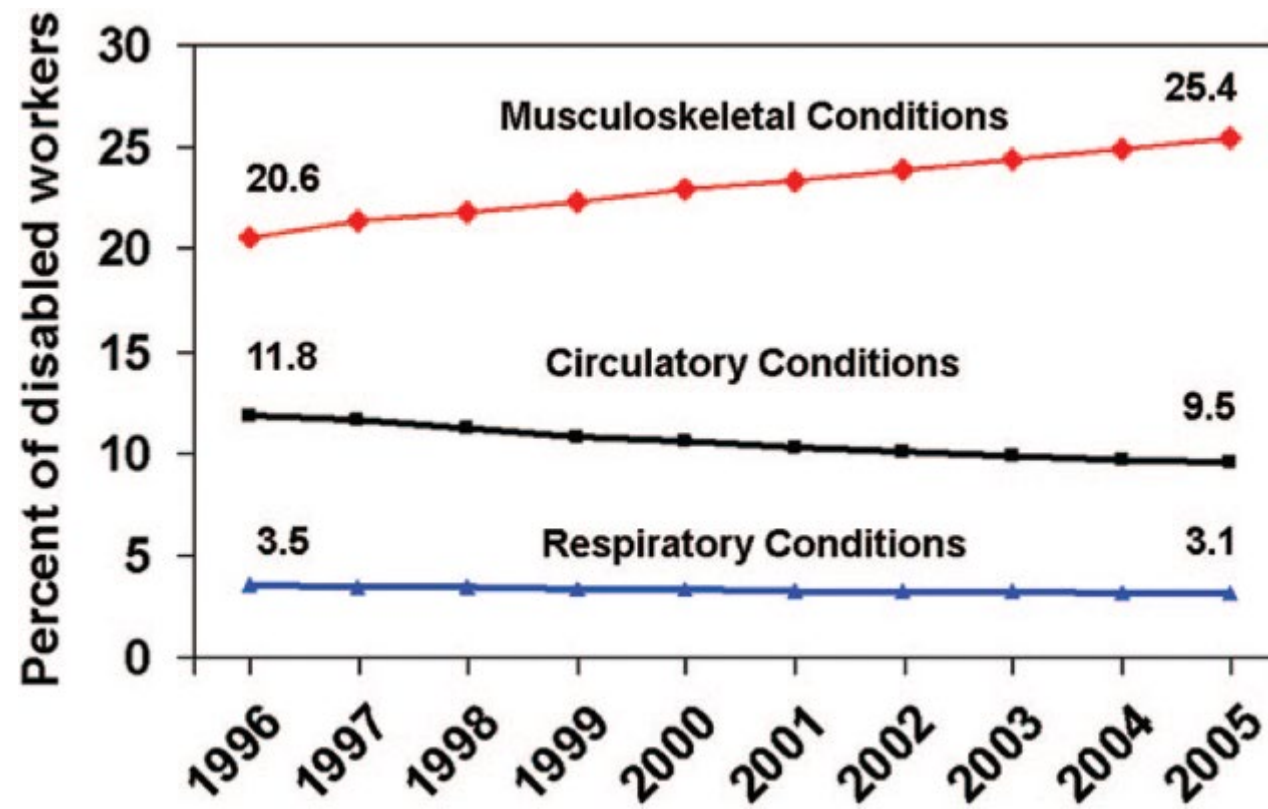


Same!

Overtreating Chronic Back Pain: Time to Back Off?

Deyo, et al., 2009

“the data suggest that the current management of musculoskeletal pain is not highly successful. In contrast, for conditions where effective prevention and treatment have emerged, such as circulatory and respiratory diseases, the proportion of disabled beneficiaries fell.”



**The Lancet Series
call to action to
reduce low value
care for low
back pain – an
update
Buchbinder, et
al., 2020. The
Lancet**

Low back pain is still the number one cause of disability in the world.

Many patients with low back pain are still receiving the wrong care (opioids, unproven therapies, cannabis, regenerative medicine).

Much of the money spent on low back pain is wasted.

Dr. James Weinstein, an orthopedic surgeon and Editor-in-Chief of the journal Spine, offers the following advice:

“...if I had an acute backache, I would want to take two aspirin and try to keep moving. I would not want to go to the emergency room, I would not want a prescription painkiller, and I would not want to undergo radiography or magnetic resonance imaging. My decision about the management of my own backache would be strongly influenced by my beliefs, as an orthopedic surgeon specializing in backs, about the efficacy of invasive management for back pain, my aversion to the risks of surgery, and my conviction that aspirin and movement are as likely to be as effective in relieving my symptoms as surgery, at a fraction of the cost to me and to the health care system” (Weinstein, 2000).

**Dr. Gordon Waddell -
orthopedic surgeon -
led the evidence
review team for the
U.K. guidelines,
under the Royal
College of General
Practitioners (1996)**

“Clinical impression and psychological studies suggest that patients who accept personal responsibility for their pain do better than those who leave it to others. Those who feel it is entirely up to doctors or therapists or someone else to cure them do worse”

Waddell, 2004 The Back Pain Revolution

Self-efficacy is more important than fear of movement in mediating the relationship between pain and disability in chronic low back pain.
Costa, et al., 2011

- Pain Self-Efficacy = Confidence I (myself) have ability to achieve pain reduction
- ONLY Pain Self-Efficacy mediated pain and disability in the long-term.

**Individual recovery expectations and prognosis of outcomes in nonspecific low back pain: prognostic factor review
Hayden, et al., 2019**

- 52 Studies
- Conclusions:

“We found that individual recovery expectations are probably strongly associated with future work participation (moderate-quality evidence) and may be associated with clinically important recovery outcomes (low-quality evidence).”

“People with low back pain who have positive expectations of their own recovery are more likely to return to work and to recover from pain and increase the activities they are able to do.”

**Evidence for managing chronic low back pain in
primary care: a review of recommendations from
high-quality clinical practice guidelines
Meroni, et al., 2021**

**“Increasing evidence suggests
the efficacy for self-
management to improve low
back pain outcome.”**

**The Old Good
News is Still the
New Good
News!**

“The good news is that most back-pain patients will substantially and rapidly recover, even when their pain is severe. This prognosis holds true regardless of treatment method or even without treatment.”

(Deyo, 1998)

**So, what treatment does
the medical profession
currently recommend?**

The image features a dark blue background. At the bottom, there is a white, irregular, torn-paper-like border that curves upwards from left to right. The text is positioned in the upper left quadrant of the image.

Noninvasive Treatments for Acute, Subacute, and Chronic Low Back Pain: A Clinical Practice Guideline From the American College of Physicians

Qaseem, et al., 2017; Annals of Internal Medicine

Key Points

1. Back Pain almost always gets better **regardless of treatment** (or no treatment)
2. Even the best treatments have only **moderate** evidence of a **moderate** effect at best; most have **weak** evidence of a **weak** effect.
3. **Best Treatments: Externally applied heat (for Acute and Subacute pain) and Exercise (for Chronic Pain).**

(Do you need a Dr. for this?)

Management of Low Back Pain: Guidelines From the VA/DoD Buel, et al., 2023

- “The U.S. Department of Veterans Affairs and U.S. Department of Defense (VA/DoD) have published guidelines on the diagnosis and treatment of low back pain.”

“Because no treatments for low back pain are clearly superior, patients should be engaged in shared decision-making about whether to consider nonpharmacologic, pharmacologic, or watchful waiting approaches to managing acute or chronic low back pain.”

**When to involve your health care provider:
(From: <https://www.nlm.nih.gov/medlineplus/backpain.html>)**

“Most back pain goes away on its own, though it may take awhile. Taking over-the-counter pain relievers and resting can help. However, staying in bed for more than 1 or 2 days can make it worse.

If your back pain is severe or doesn't improve after three days, you should call your health care provider. You should also get medical attention if you have back pain following an injury.”

Note: It does not say to “see” your health care provider, but to “call.

Health Care Provider Beliefs (Werner et al., 2005)

Health Care Provider

% Who Believe LBP gets better on its own no matter what we do.

Physicians

85.5%

Physical Therapists

54.2%

Chiropractors

4.8%

What about Workplace Interventions to Prevent Back Pain?

Occupational Prevention Effectiveness

- Lifting Technique Training
 - Does NOT work!
- Back Belts
 - Do NOT work!
- Exercise
 - Might work but tough to accomplish in workplace (recreational?)



Keep the load close to your body and lift by pushing up with your legs.

Effects of Recreational Physical Activity and Back Exercises on Low Back Pain and Psychological Distress: Findings from the UCLA Low Back Pain Study

Hurwitz, Morgenstern and Chiao, 2005



- 681 Low Back Pain patients
- Low Back Pain, Psychological Distress, and Exercise measures at 6-weeks, 6, 12, and 18-month Follow-ups
- Exercise Measures:
 - **Recreational**: Hours walking and 1 or more light, moderate or strenuous sport or recreational physical activities
 - **Back Exercises**: Frequency of exercises intended to prevent or deal with low back pain
- Results:
 - Exercises intended to prevent or deal with low back pain are counterproductive, corresponding to increased pain (64%) and disability (22%).
 - Recreational exercise corresponds to decreased pain, disability (30%) and psychological distress (25%).
- Conclusion: **“individuals with low back pain should refrain from specific back exercises and instead focus on nonspecific physical activities to reduce pain and improve psychological health.”**

Occupational Prevention Effectiveness

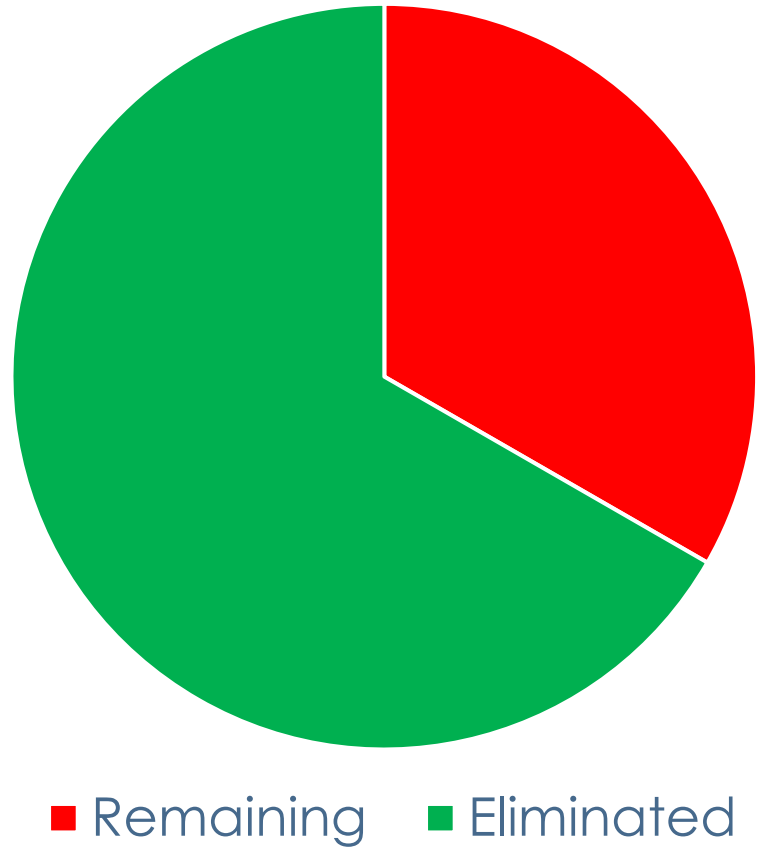
- Lifting Technique Training
 - Does NOT work!
- Back Belts
 - Do NOT work!
- Exercise
 - Might work but tough to accomplish in workplace
 - **Recreational exercise works!**
- Pre-placement Approaches?
 - Logical, but not demonstrated cost-effective/legally defensible
- Task Redesign (Ergonomics)

“Strenuous” Tasks ARE associated with more Back Pain Claims

Among “Strenuous” Tasks Ergonomics is VERY Effective

**Among
“Strenuous” tasks,
ergonomics (Task
Redesign) can
eliminate 2/3rds
of the back pain
claims**

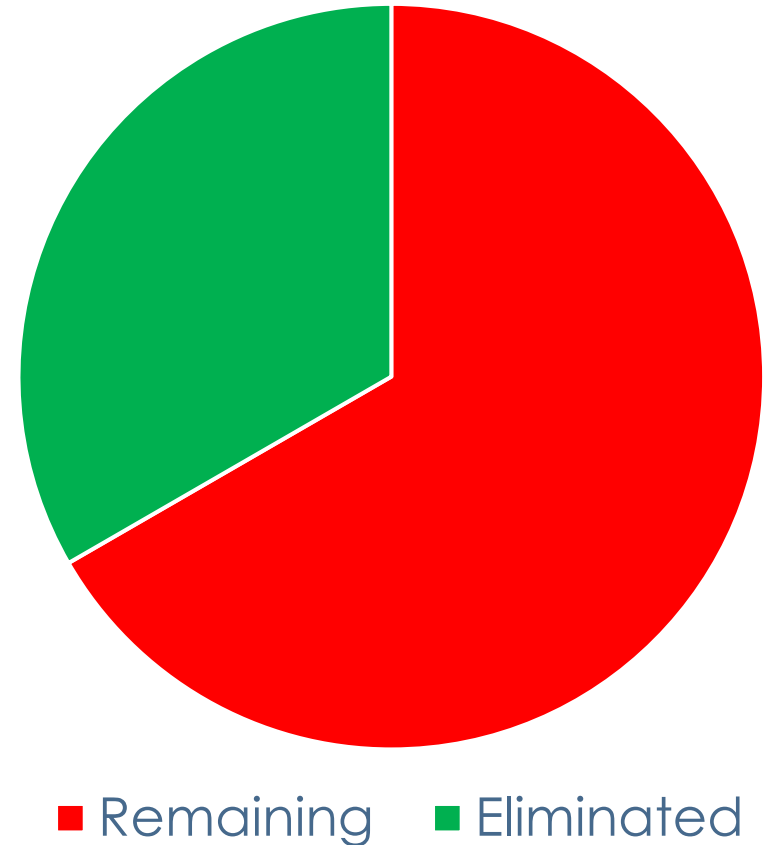
Percent Back Pain Claims Reduced



What if we eliminate ALL “Strenuous” Tasks?

Unfortunately, not all back pain claims come from “strenuous” tasks and so eliminating ALL of them only reduces back pain claims by 1/3rd

Percent Back Pain Claims Reduced



**What can we do
about the
remaining 2/3rds
of all back pain
claims?**

Percent Back Pain Claims Reduced

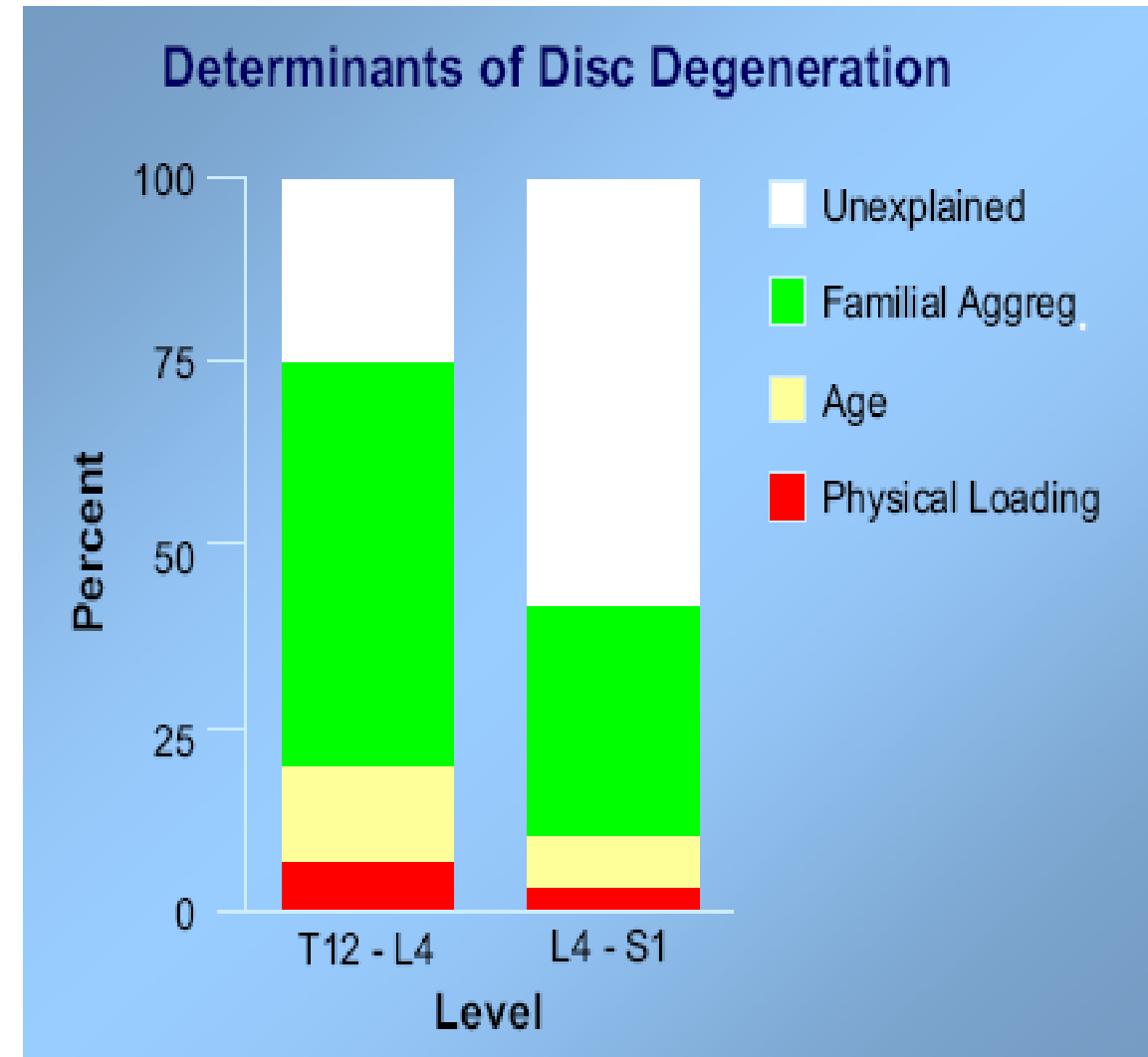


■ Remaining ■ Eliminated

Challenging the Mechanical Basis of Back Pain

The twin spine study - contributions to a changing view of disc degeneration. Battie et al., 2009

- 300 Pairs of Twins from the Finnish Twin Cohort
- Disc Degeneration assessed with MRI, Disc Signal, Disc Height, Annular tears, Bulging, Herniation, Endplate irregularities, etc.
- “extraordinary discordance between twin siblings in occupational and leisure-time physical loading conditions throughout adulthood”
- **“The once commonly held view that disc degeneration is primarily a result of aging and ‘wear and tear’ from mechanical insults and injuries was not supported by this series of studies. Instead, disc degeneration appears to be determined in great part by genetic influences.”**
- ***“...routine loading may actually have some benefits to the disc.”***

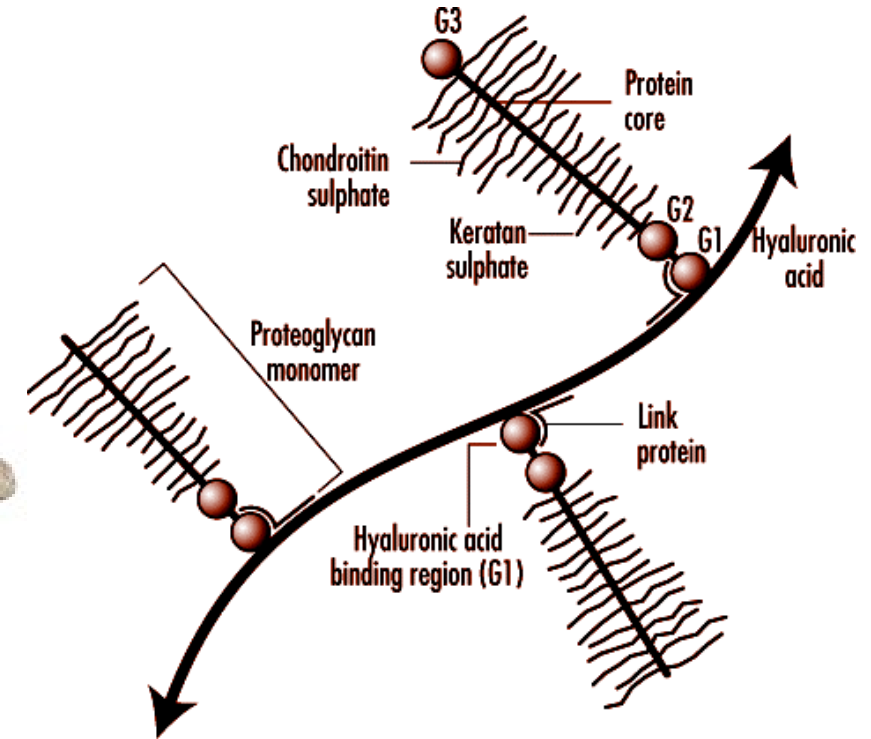


Are there any other causation theories for the 90-95% of idiopathic low back pain?

A Theory to Explain More

Pain via Proteoglycans

- Proteoglycans: Large, “bristly” biopolymers
- Abundant in the Nucleus Pulposus of the intervertebral disc
- Highly hydrophilic – maintains water content in disc which serves to hydraulically equalize forces throughout disc



Problems with Proteoglycans

Physiological & Mechanical

No problem when sequestered in the nucleus, but radial fissures in the disc annulus provide a pathway for proteoglycans to reach innervated portions of the disc and surrounding structures.

- **Physiological Impact:**

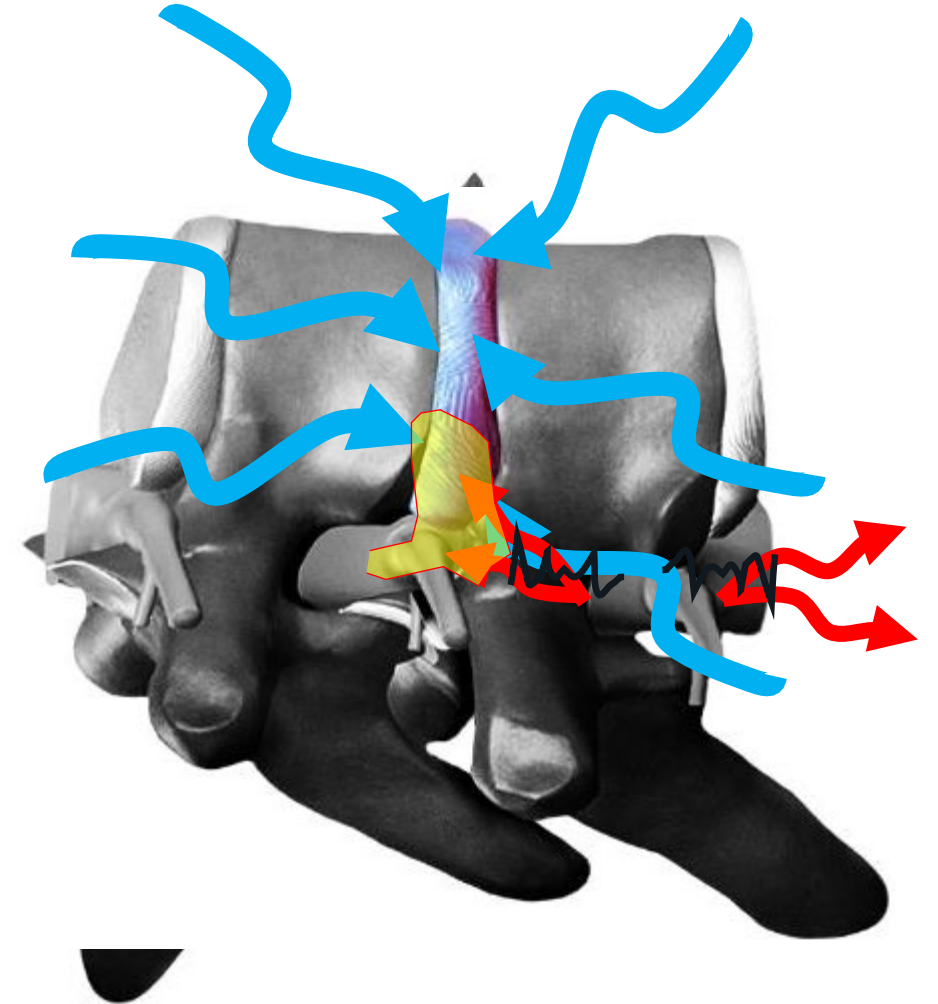
- Inflammatory response (Marshall and Trethewie, 1973; McCarron et al., 1987)
- Neuronal windup – hypersensitizing dorsal root ganglion to fire (Takebayashi, et al., 2001; Cuellar, et al., 2005)

- **Mechanical Impact:**

- Osmosis brings fluids back into disc at night
- Morning bending stresses 4X ↑ (Adams, et al., 1987)

Diurnal Proteoglycan Pain Hypothesis

- Early morning stress on discs is 4 times higher than later in the day
- Fluids move out of discs during the day and back into the discs when we sleep
- Disc in morning is more prone to damage
- Disc fluids can cause delayed pain and can sensitize nerves



The reduction of chronic, non-specific low back pain through the control of early morning lumbar flexion: A randomized controlled trial.



Snook, et al., 1998

- 1. Rationale:** Control Early Morning Bending/Stress =
 - Less risk of re-damage to disc
 - More moderate flow of fluid out of disc
 - Improved opportunity for healing of micro-fractures in disc
 - Reduced exposure of innervated tissues to proteoglycan
- 2. Subjects:** Mild to Moderate (NON-medicalized, NON-WC) persistent or recurring Low Back Pain
- 3. Clinical Setting (sub-medical, general population)**
- 4. Training:** About 45 minutes. Sham: Exercises. Treatment: 1st 2hrs – Standing & Walking Only; 2-6 hours limited bending
- 5. Metric:** Diary for Pain (0-10 scale), Work Activities, Rec/Family Activities, Medication
- 6. Results:** 36%↓ Pain Intensity, 31%↓ Pain Days (56% at 3-yr follow-up), 63%↓ Disability Days and 64%↓ Impairment Days

(These results despite over 90% reporting difficulty with compliance and only 1 hour average compliance.)

Self-Care Guidelines

Stover Snook, 2004, 2005 Harvard School of Public Health

- Take non-prescription analgesics (pain medicine) as needed, following mfg. instructions.
- Remain active.
- Ask your doctor if the McKenzie Extension Exercises are OK for you to do. (McKenzie, 1997)
- Control Early Morning Flexion
- Use Ergonomic Aids to Reduce Bending
- Take Responsibility for Coping with Your Pain
- Revise Your Beliefs About Back Pain and Be Patient
- Minimize the chance of re-occurrence through reduced heavy handling, reduced bending (especially soon after waking), and exercise (McKenzie – 1997, and recreational - Hurwitz, et al., 2005).
- Does this approach work?

Public Awareness Campaign in Australia

(The BackLetter, 2001, Buchbinder, et al., 2001)

- \$3 million campaign (TV commercials, ads, billboards, seminars, evidenced-based info to health care providers, etc.)
- Emphasis on:
 - Staying active
 - Exercising
 - Not resting for prolonged periods
 - Remaining at work
- 15% decline in back pain claims
- 20% reduction in medical costs/claim
- \$36M saved in disability claims, \$5.7M in medical costs

Summary

- Back pain is the most disabling condition in the world, responsible for the largest portion of days lived with disability AND the most workers compensation costs.
- Medical diagnosis and treatment is shockingly ineffective. Physicians should still be consulted to rule-out or confirm serious pathology.
- The specific cause of most back pain is unknown, but genetics plays a key role and proteoglycans seem to explain a portion of back pain.
- Good news is most back pain is NOT serious and recovery is normal/natural.
- Self-efficacy and self-care appear the most effective approaches for recovery.
- Workplace Ergonomics (task redesign) can help, but other workplace interventions are questionable.
- Recreational exercise/activity is beneficial for recovery.
- Controlling early morning stress to the back is beneficial for recovery and re-injury prevention.

Upcoming Webinars

December 5, 2023	This Might Hurt – An Introduction to Back Pain <ul style="list-style-type: none">• What causes back pain?• How effective is treatment?• Can it be prevented?• Some “new” thinking
January 10, 2024	Wearables – What to Watch & Watch Out For <ul style="list-style-type: none">• Wearables Getting Attention – the Good and the Bad• Successful Wearable Interventions• Buyer Beware
February 6, 2024	Workplace Violence <ul style="list-style-type: none">• Employer Responsibilities• Methods for Assessing & Controlling Exposures• Training Requirements

Other EPIC Upcoming Webinars

<p>December 6, 2023</p>	<p>Annual Employment Law & Benefits Update December 6, 2023, 8:30am – Noon PT Registration Link</p>
<p>January 18, 2024</p>	<p>2023 Compliance Webinars Compliance Considerations for Fertility & Family-Building Programs January 18, 2024, 11:00 – Noon PT REGISTER FOR THE SERIES</p>

Questions



Key Publication

- Potvin, et al., 2021 – The Liberty Mutual Manual Materials Handling (LM-MMH) Equations.
 - Based on 19 LM studies, including the original 7 (1978) +4 (1991) + 8 since 1991 publication.
 - Nearly 400 task conditions; nearly 300 subjects (M&F).
- Tables replaced with maximum acceptable loads (MALs) – weights or forces.
- With CV, Population Percentiles

ERGONOMICS
<https://doi.org/10.1080/00140139.2021.1891297>



ARTICLE



The Liberty Mutual manual materials handling (LM-MMH) equations

Jim R. Potvin^{a,b}, Vincent M. Ciriello^a, Stover H. Snook^a, Wayne S. Maynard^a and George E. Brogmus^a

^aLiberty Mutual Insurance, Boston, MA, USA; ^bPotvin Biomechanics Inc, Tecumseh, ON, Canada

ABSTRACT

We summarise more than 40 years of Liberty Mutual psychophysical research on lifting, lowering, pushing, pulling and carrying, including the 7 studies used to develop the 1991 Liberty Mutual Tables and 12 subsequent studies. Predictive equations were developed based on 612 mean maximum acceptable loads (MALs), representing 388 unique conditions from 123 female and 149 male participants, starting with a maximum reference load that is scaled based on frequency, height, distance (vertical for lift & lower, horizontal for push, pull and carry tasks) and horizontal reach (for lift & lower tasks). Representative coefficients of variation are provided to allow for the calculation of MALs for any percentile. Each equation performed well and, overall, they explained 90% of the variance in MAL values, with RMS differences of 6.7% and 4.8% of the full range for females and males, respectively. We propose that these equations replace the 1991 Liberty Mutual Tables.

ARTICLE HISTORY

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KEYWORDS

Psychophysics; lifting; lowering; pushing; pulling; carrying; acceptable loads

Lift – Female

$$\text{MAL} = 34.9 \left[1.2602 - \frac{H}{0.7686} \right] \left[0.9877 + \frac{\text{VRM}}{13.69} - \frac{\text{VRM}^2}{9.221} \right] \\ \left[0.8199 - \frac{\ln(\text{DV})}{7.696} \right] \left[0.6767 - \frac{\ln(F)}{12.59} - \frac{\ln(F)^2}{228.2} \right]$$

$$\text{CV} = 0.260$$

Using the Liberty Mutual Equations

- Inputs:

- Weight (or Forces for Push/Pull)
- Horizontal Hand Distance (Start, End)
- Vertical Height (Start, End)
- Frequency

(and/or
Distance
Moved
For
Push/Pull
/Carry)

- Output: The Percent of the Population that can do the task “without overexertion” – we call this the “Population Percentage.” A Higher Number indicates an “easier” job (more people can do it without overexertion)

Liberty Mutual Insurance

Liberty Mutual Manual Materials Handling Population Percentiles

Home Population Percentiles Instructions Interpreting Results Cautions References

Manual Materials Handling

Tasks

Lift Lower Push Pull Carry

These online “Liberty Mutual Manual Materials Handling Population Percentiles” are based on the Liberty Mutual Manual Materials Handling Equations published by Potvin, et al., 2021. This manual material handling analysis online tool provides both the male and female population percentages capable of performing manual material handling tasks without perceived overexertion. The user is strongly advised to use the female population percentiles for design purposes (see “Interpreting Results”). The results can be used to perform ergonomic assessments of lifting, lowering, pushing, pulling, and carrying tasks with the primary goal of supporting ergonomic design interventions. This online tool provides the basic population percentiles but a full-featured iPhone app, ErgoValuator™, co-developed by Liberty Mutual and Kinetica Labs, will be available on the Apple App Store starting July 1, 2021. ErgoValuator™ allows data collection assisted by vision recognition AI and provides Liberty population percentile, NIOSH Revised Lifting Equation, Energy Expenditure, what-if, and sensitivity analysis tools to guide task redesign decision-making. A proprietary feature of ErgoValuator™ allows estimation of the impact of task redesign changes on back injury rate. For more information contact Kinetica Labs.

2022 4/17