Teaching patients about pain

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Pain

A subjective experience involving interactions between sensory, cognitive & affective processes.
Persistent pain is a complex, costly and challenging public health problem throughout the world.

“One in 3 patients sees a primary care physician (PCP) for chronic pain yet most PCPs receive no training in this field.”

Worldwide, persistent pain is increasing. In the US alone, incidence of persistent pain has doubled in the last 15-20 years.

Approximately 9 million to 12 million people in the United States have chronic or persistent pain. The majority are treated with opioids.

CDC estimated that in 2014 there were almost 19,000 overdose deaths in the United States associated with prescription opioids.

Nationally, the annual number of deaths from opioid overdoses now exceeds the number of deaths caused by motor vehicle accidents.

With this increase, comes increased cost. Within Medicare the use of opioids (for example, hydrocodone and oxycodone) is up 423%.

Why are heroic treatments (opioids, injections, surgery, amputations, etc.) often not working or making the problem worse?

Learning the biological processes of pain is called neuroscience or pain education (the science of nerves). This has been shown to have a positive therapeutic effect.
Adapted Moseley’s Pain Sciences Quiz

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6) The body tells the brain when it is in pain
7) The brain can sends messages down your spinal cord that can increase the nociception (danger messages) going up the spinal cord

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9) Chronic pain means an injury hasn’t healed properly
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12) Worse injuries always result in worse pain
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14) It is possible to have pain and not know about it.

15) Stress can make a peripheral nerve fire.
16) Your internal pain control system is more powerful than any drug taken by mouth or injected.

17) The immune system has nothing to do with a pain experience.

18) Pinched nerves always hurt.
19) It is possible to treat pain by causing pain

20) Chronic pain is more common in wealthier countries than poorer countries.
Why do patients typically present to the clinic with pain and leave as experts in biomechanics?

“Patients in pain want to know more about pain than anatomy”. Louw et al 2009.
Using a tissue injury model actually increases fear and anxiety. Words like "bulging," "herniated," "rupture" "tear", “bone spurs”, “disc degeneration” increase anxiety and make people fear movement which is essential for recovery.

Can create a noxious placebo or “nocebo” effect.
Learning the biological processes of pain is called neuroscience or pain education (the science of nerves). This has been shown to have a positive therapeutic effect.
“For Chronic MSK pain disorders, there is compelling evidence that an educational strategy addressing the neurophysiology and neurobiology of pain can have a positive effect on pain, disability, catastrophizing, and physical performance.” (Puentadura, Booksby et al., 2009; Louw, Puentadura et al., 2011; Moseley, 2005)
Teaching people with pain more about the neuroscience of their pain produces some impressive immediate and long-term changes

- Pain decreases
- Function improves
- Fear diminishes
- Thoughts about pain are more positive
- Knowledge of pain increases
- Movement improves
- Muscles work better
- Patients spend less money on medical tests and treatments
- The brain calms down, as seen on brain scans
- People are more willing to do much-needed exercise.
Acute pain

• Useful $\equiv$ Protect by Pain
• Amount of pain $\neq$ amount of tissue damage
• Influenced by perception, thoughts, beliefs, fear, society, culture.
• Alarm system is activated
Rene Descartes’ Pain Pathway

Traditional Pain Theory:

• Strict biomedical model.

• Assumes that injury and pain are the same.

• An increase in pain means increased tissue injury and increased tissue problems leads to more pain.

This is the Cartesian model of pain. It is over 350 years old, and it's incorrect.

Neurophysiology: There are no pain receptors

There are nociceptors:
They don’t send ‘pain’ signals, they send the same signals as other receptors but just at a higher threshold.
if pain is an accurate indicator of tissue damage and pain...

Why do 40% of the people (alert, rational & coherent and “not in shock”) admitted to an emergency room with horrific wounds feel no pain or pain of low intensity even after long delays? ?
Pain Is More Than Nociception

**Nociception**
- Stimulated nerves send info to brain

**Pain**
- Subjective perception affected by emotions, genetics, social connections, context, inhibitors/enhancers
pain models

Pathoanatomical

- Emphasizes anatomy, injury and tissue damage.
- Pain intensity equates with damage severity.
- Emphasizes further tests.
- Focus on pain rather than activity.
- Encourage passivity and dependency

Biopsychosocial

- There is no sign of serious disease.
- Lower back pain is a symptom indicating that the back is somehow de-conditioned or unfit.
- Treatment can help, but long-term results depend on the patient.
- Recovery depends on restoring function - the sooner the better.
- Positive attitudes result in speedier recovery.
Sociopsychobiological model

- group processes (e.g., family, job, culture, religion) mold the pain experience and response to therapy of acute, chronic, and cancer-related pain.
- pain as an interpersonal, inherently social process
- attention to complex patient-centered experiences can improve clinical outcomes and increase patient satisfaction

Every patient has a story of why they hurt, or why they can’t move.

And they all lived crappily ever after… The End
A New Model:

Anoop Balachandran, MS.
01/08/2014
Pain is 100% an “output” of the brain!

You will not experience pain unless and until the brain believes that there is a threat to the body and hence an action is required.
“Pain is an *opinion* on the organism’s state of health rather than a mere reflective response to an injury. There is no direct hotline … to ‘pain centers’ in the brain”

VS Ramachandran
The Brain and Pain

The brain receives a sensation → then “decides” if it hurts

- **Meaning** – post mastectomy pain worse if fear of cancer recurrence
- **Other information** – “your joints are a mess”
- **“Pain Memory”** – phantom pain worse if pre-amputation pain

**Increased perception of threat → increased pain**
Fear

“A distressing negative sensation induced by a perceived threat”.

Cleland, Fritz & Childs 2008
“the fear of pain is worse than pain itself”

Arntz and Peters, 1995
Chronic Pain

- Persistent pain at 3-6 mos after onset
- Modulated by fear, catastrophization, anxiety, beliefs, culture, systemic inflammation.
- Inhibitory Chemicals (GABA etc) reduced
- Repeated activation of pain signature
- Sensitized nervous system
- Plastic Changes
Chronic pain means the injury has not healed properly – FALSE!

Many patients have pain in regions well past the healing time for tissues
Many patients have chronic pain yet no history of physical injury.
How does acute pain become chronic or persistent?

- Most tissues in the human body heal between 3-6 months.
- Persistent pain is more due to a sensitive nervous system.

In other words, the body’s alarm system stays in alarm mode after tissues have healed.

Demographics

- 63% Women
- Average duration of symptoms 14-31 months
- Mean age 38.2 years
Learning is a gift. Even when pain is your teacher.

With some pain education, the patient learns that pain may not correctly represent the health of the tissue, but may be due to extra-sensitive nerves. Second, fear is eased, and the patient is more able and willing to move and exercise.
Top-down intervention

Education

- physiology of pain
- the role of the brain in pain
- the role of society, culture
- "hurt does not equal harm"
Instead of simply seeing pain from a “broken tissue” perspective, they see pain from a sensitive nervous system perspective. They understand they may have a pain problem rather than a tissue problem.
What do we call these programs?

- Neurophysiology of Pain Education
- Pain Physiology Education
- Pain Biology Education,
- Pain Neurophysiology Education
- Therapeutic Neuroscience Education (TNE)
Content of a pain education program:

- Neurophysiology of Pain
- No reference to anatomical or pathoanatomical models
- No discussion of emotional or behavioral aspects of pain
- Nociception and nosicceptive pathways
- Neurons
- Synapses
- Action potential
- Spinal Inhibition and facilitation
- Peripheral Sensitization
- Central Sensitization
- Plasticity of the nervous system
Examples, Metaphors, Illustrations
Alarm System

Adapted from: Why Do I Hurt? Louw (2013 OPTP)
Alarm System

Off to the brain
for processing...

Insult

Normal
Excited
Level

Alarm Activates

summation

Alarm goes off!

Danger

Adapted from: Why Do I Hurt? Louw (2013 OPTP)
Extra Sensitive

Health & Wellness Conference 2016
PAIN AND MOVEMENT

When a person has a sensitive, easily fired up pain problem, every input such as movement or a thought of movement defaults to pain.
Smoke Alarm
Q: How does my health care provider know the alarm system is extra sensitive?

- No medical tests but typically serious conditions are ruled out first by other tests.
- Extra sensitive to certain movements, pressures or activities.
- Indirectly by the types of medications that have been prescribed ie: membrane stabilizers (gabapentin or pregabalin) or antidepressants.
Q: Why did my nerves stay extra sensitive and not calm down?

The sensitivity of the alarm system will be determined by various personal and social factors going on in your life at the time of the pain.

- Ineffective treatment
- Family issues
- Fear
- Job stressors
- Unclear or conflicting explanations about your pain
Descending facilitation

In acute pain, your brain responds by pouring out cholecystokinin and amplify pain related nerve messages from the threatened body part.
Q: How can the extra-sensitive nerves be calmed?

- Understand WHY nerves have remained extra sensitive = less fear.
- Learning that tissues are “safe” and pain is from sensitive nerves.
- Gentle aerobic exercise—walk, swim, ride a bike. Just enough to make you sweat a bit.
Chemicals released by the brain involved in increasing descending inhibition that ease pain:

- Dopamine
- Serotonin
- Dynorphin
- Endorphin
- Enkephalin
- Noradrenaline
- Endocannabinoid
- gamma-Aminobutyric acid (GABA)
People with persistent pain have “dry” brains, that is they don’t produce enough pain relieving chemicals to create descending inhibition of danger signals from sensitive nerves. Understanding pain and aerobic exercise increases production.
Nerves have other ways to increase sensitivity to protect you.

Inside nerves there are sensors for temperature, stress, movement and pressure, immunity, blood flow and all may contribute to extra sensitivity.

You might have more pain when you are stressed, move the part that was injured, don’t move at all, are worried or have an inflamed body part.
Sensors change all the time.

They can be calmed by

- Understanding pain
- Removing stimulus - move to increase blood flow, or put on a sweater
- Meditation, relaxation, deep breathing
Which is more dangerous, speeding bus or ankle sprain?
The Brain as CEO Decides

Brain:
- The organ that forms part of the central nervous system. It controls everything in our body, including emotions, personality, memory, language, and movement.

You're Fired!
Spreading pain -“Nosy Neighbors”
How does pain spread?
Sensory topography reflects repetitive use

Repetitive tapping with tip of finger 2 coupled with behavioral reward causes neuronal receptive fields in S1 to expand into neighboring cortex.

Figure 13.31, page 457

With sensitization due to persistent pain and altered processing the brain develops a poorer view of the tissue. The map of the affected area is “fuzzy” or “smudged”.

Butler 2003
Plasticity, sensitivity and chronic pain

The brain and nervous system has become so good at constructing the particular pain signature that you experience pain when the “fuzzy” area is even mildly stimulated.
Neurotag

A neurotag is a "pattern of neuron activation which creates a certain output of the brain, such as a perception, thought, movement or immune system response."

Pain

Nerve messages from receptors in the back

Thoughts  Movements  Sensations

Motivation
Focus and concentration
Memories
Emotions, especially fear
Vision
Balance
Blood pressure

Health & Wellness Conference 2016
Living with your pain.
Temporal summation.

“Nerves That Wire Together, Fire Together”
Living with your pain.

“Nerves That Wire Together, Fire Together”
Perception

Both the tables A & B are of the exact same length. Your eyes saw both the tables being the same length, but your brain perceived them being as different lengths in a nano second!
Context

Social/environmental factors influence pain experience.
Job satisfaction is as important a factor in whether or not a worker will develop LBP as is repetitive heavy lifting.
Being in a state of constantly feeling threatened by the pain sensation, the brain persistently activates the descending facilitation system and CCK levels increase.

<table>
<thead>
<tr>
<th>DELTA</th>
<th>Localized, specific terrorist threat or attack.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHARLIE</td>
<td>Imminent threat of terrorism.</td>
</tr>
<tr>
<td>BRAVO</td>
<td>Increased and predictable threat of terrorism.</td>
</tr>
<tr>
<td>ALPHA</td>
<td>Possible threat of terrorist activity.</td>
</tr>
<tr>
<td>NORMAL</td>
<td>No known enemy or threat.</td>
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Stress response and chronic pain
Experiences, thoughts, culture, society, beliefs and attitude (ex. Fear and catastrophizing).

Psychological states: depression, anxiety, social conditions.

Pain modulators aid in creating a “sensitive” nervous system.

Food Intolerances
GI Disorders
Nutritional Deficiencies
Toxins
Injuries
Drugs
Genetics
Endocrine Imbalances
• 2.5 to 4 hours in approximately 30 min sessions, one on one verbally
• often during course of manual therapy or therapeutic exercise (reframing).
63% Women
Avg duration of symptom 14-31 months
Mean age 38.2 years
Many researchers believe that a large part of pain relief seen with exercise and other rehabilitation methods is from lowering the threat level in the brain using the graded approach.
“When a patient learns more about pain and how pain works, their pain eases considerably and they experience a variety of other benefits, such as increased movement, better function and less fear. These effects are measurable and we believe they can do more than some of the most powerful drugs in the world, without any of the side-effects.”

-Aadrian Louw, PT, PhD from Institute for Chronic Pain blog post: Therapeutic Neuroscience Education “Teaching People About Pain”
Masterclass

How to explain central sensitization to patients with ‘unexplained’ chronic musculoskeletal pain: Practice guidelines

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Pain Education Resources For Patients

https://www.youtube.com/watch?v=gwd-wLdlHjs

https://www.youtube.com/watch?v=C_3phB93rvl
Tired of waiting for pain to go away?

This free online course will teach you a science based approach to reducing symptoms and getting back to the life you want to live.

START THE COURSE

http://www.retrainpain.org/
http://www.neuroplastix.com/
Continuing education for clinicians

http://www.retrainpain.org/symposium/

http://www.noigroup.com/en/Courses

https://www.ispинstitute.com/ispi/CoursesList.aspx

http://sandiegopainsummit.com/
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