Enough research! The when, what, who and how of pain science in clinical practice

Adriaan Louw, PT, PhD

Disclaimers...

I publish books on pain and receive an honorarium for the sales. These are not being specifically promoted in the presentation. The intent is to share our research and not promote products.

I teach for a seminar company offering continuing education for healthcare providers. The session is not designed to promote the attendance of the seminars.

Learning Objectives

Upon completion of this educational session the participants will be able to:

• Develop a greater understanding of the content and delivery methods of pain neuroscience education
• Develop a greater understanding of why neuroscience education is needed and why it provides superior results compared to biomedical education
• Develop strategies to educate patients regarding various aspects of pain
• Combine neuroscience education with movement-based approaches to practice in line with current best-evidence for treating chronic pain
• Apply the information from the educational session into clinical practice
Pain is 100% produced by the brain...

Pain is a multiple system output, activated by an individual's specific pain neural signature. The neural signature is activated whenever the brain perceives a threat.


Example 1: Ankle Sprain

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Example 2: PTs and Low Back Pain


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**Threats**

- Injury
- Surgery
- Emotions
- Body Maps


**Options for altering threat...**

Gifford LS. Pain, the tissues and the nervous system. Physiotherapy. 1998;84:27-33.

**Traditional: Bottom up...**

What about a top-down approach?


Traditional Education


These models are very prevalent in PT

• Prevailing biomedical models focus on tissues and tissue injury.
• Orthopedic-based professions commonly use anatomy and patho-anatomy based models to explain pain to their patients.


Research into anatomy, biomechanical and pathoanatomy models

Not only have these models shown limited efficacy in decreasing pain and disability, but they may increase fear in patients, which in turn, may increase their pain.


The dichotomy...

Tissue Problem

Pain Problem


Shift Happens....(in orthopedics)

Cyriax
Mulligan
McKenzie
Kaltborn
Elvey
Grieve
Butler
Maitland

Prevalence and awareness of persistent pain

Time

Teaching People About Pain...1998


Evidence Based Medicine

Guru
Expert
Clinician
Pioneers

RCT
Systematic
Review
Scientists

Louw, Puentedura, Zimney and Schmidt – Accepted for publication

First RCT

Each subject participated in a one-hour education session, once per week for four weeks. The education session was in a one-to-one seminar format, was conducted by an independent therapist, and focused on the neurophysiology of pain with no particular reference to the lumbar spine. In addition, the subjects completed a short workbook which consisted of one page of revision material and three comprehension exercises per day for 10 days.


**Evidence**

Conclusions: For chronic MSK pain disorders, there is compelling evidence that an educational strategy addressing neurophysiology and neurobiology of pain can have a positive effect on pain, disability, catastrophization, and physical performance.


**Clinical?**

**Education Delivery Methods**

**Professionals**
- Physical therapists

**Duration and frequency**
- 20-60 minutes
- 1-2x/week

**Educational format**
- One-on-one verbal communication
- Two studies utilized group sessions.

**Educational tools**
- Prepared pictures
- Metaphors
- Examples
- Hand drawings
- Workbook


**Adjunct treatment**
- Manual therapy
- Soft tissue treatment/massage
- Neural tissue mobilisation
- Spinal stabilisation exercises
- Home exercises
- None (neuroscience education only)
- Circuit training
- Aerobic exercise

**Content**
- Neurophysiology of pain
- No reference to anatomical or patho-anatomical models
- No discussion of emotional or behavioral aspects to pain
- Nociception and nociceptive pathways
- Neurones
- Synapses
- Action potential
- Spinal inhibition and facilitation
- Peripheral sensitization
- Central sensitization
- Plasticity of the nervous system


Updated Systematic Review

The Efficacy of Therapeutic Neuroscience Education on Musculoskeletal Pain – An Updated Systematic Review of the Literature

- Adriaan Louw, PT, PhD
- Kory Zimney, PT, DPT
- Louie Puentedura, PT, PhD
- Ina Diener, PT, PhD

The results of this updated systematic review of TNE for MSK pain provides strong evidence for TNE improving pain ratings, pain knowledge, disability, pain catastrophization, fear-avoidance, attitudes and behaviors regarding pain, physical movement and healthcare utilization.

Accepted for publication

So what?

• Therapeutic neuroscience education works really well for:
  - Central sensitization
  - Pain Catastrophization
  - Fear-Avoidance
  - Disability
  - Pain

So what?

• Pelvic Pain – well documented:
  - Central sensitization
  - Pain Catastrophization
  - Fear-Avoidance
  - Disability
  - Pain
Now: We get to our topic…
Enough research! The when, what, who and how of pain science in clinical practice

Our plan…

1. Clinical “step-by-step” of how to do it
   - Application to pelvic pain
2. Pain education is only phase one
   - Behavior change
   - Application to pelvic pain
3. Clinical application pearls

The “Rules” when considering TNE

- Screen accordingly
- Use outcome measures
- Thorough interview
- Thorough “low tech” examination
- Compassion and empathy


- Various serious medical issues can mimic issues associated with
  - Pain
  - Urinary incontinence
  - Etc.
- Review of systems
- Red flags


Outcome Measures
- Function
- Function
- Function
- Pain Catastrophization
- Fear-Avoidance
- (? Pain knowledge)


Something to consider...


Interview

Traditional
• What brings you to therapy?
• Where is your pain?
• Describe your pain?
• Is it constant or intermittent?
• What makes it better?
• What makes it worse?
  - Not adequate

Interview...peeling layers
• What do you think is going on with your [fill in area they are seeking help for]?
• What do you think should be done for your [fill in area they are seeking help for]?
• Why do you think you still hurt?
• What would it take for you to get better?
• Where do you see yourself in 3 years in regards to [fill in area they are seeking help for]?

Interview...peeling layers
• What gives you hope?
• What is your expectation of PT?
• If I could flip a switch and remove all your pain, what things you have given up on would you do again?
• Are you angry at anyone about your [fill in area they are seeking help for]? Tell me about it
• Has anyone made you feel like you’re “just making it up” or “it’s in your head?” Tell me about it.

Listening is therapy...
Physical Examination (apart from pelvic)

- THOROUGH
- More "low tech" than high tech
  - Large, functional, physiological
- Neuro
  - Neurodynamic tests
  - Nerve palpation
  - Pressure algometry
  - TPD

Starting "the pain talk"

- Has anyone explained to you why you hurt?
- Would you like to know why your pain is not getting better?
- Before we start some of the "physical" treatment, I’d like to explain to you a little more about your pain?
- Etc.
Which story works best?

1 year follow-up RCT
1. Extra sensitive alarm system
2. The body's living alarm system
3. How to calm extra sensitive nerves

PNE survey of PT's
1. The nervous system works like an alarm system
2. Extra sensitive alarm system
3. Nerve sensors - ion channels

Accepted for publication
Submitted for publication

Your Body’s Alarm System

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Your Body’s Alarm System

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Your Body’s Alarm System

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Your Body's Alarm System

- This is a big part of why you hurt...

Metaphors for:
- Central Sensitization
- Peripheral Sensitization
- Hypersalgesia
- Allodynia

Your Body's Alarm System

- In all these years only 3 questions....
  1. How do you know this?
  2. Why this happen to me?
  3. How do I get it down?
Your Body’s Alarm System

1. How do you know this?
   – You told us – “used to could…”
   – Your Dr. told us - medicine
   – Your tests told us – palpation, PPT, neurodynamic test

2. Why did my nerves stay so sensitive?

3. How do we turn it down?

   - Knowledge
   - Aerobic exercise
   - Relaxation
   - Meditation
   - Diaphragmatic breathing
   - Pacing
   - Gradual exposure
   - Manual therapy
   - Modalities as needed
   - Goal setting
Your Body’s Alarm System

Your Body’s Alarm System

Pain by it’s nature is inconsistent


Yes, but you [stupid physical therapist] don’t understand…
Your Body’s Alarm System
But you [stupid physical therapist] don’t understand…

Your Body’s Alarm System
No pain; no gain…

Your Body’s Alarm System
If it hurts, don’t do it…
Your Body's Alarm System

Tease it
Touch it
Nudge it

In the clinic….after TNE

<table>
<thead>
<tr>
<th>Something physical</th>
<th>Homework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise</td>
<td>Think, read, questions</td>
</tr>
<tr>
<td>Movement</td>
<td>Walking program</td>
</tr>
<tr>
<td>Breathing</td>
<td>2-3 basic exercises</td>
</tr>
<tr>
<td>Relaxation</td>
<td>Goals</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
</tr>
</tbody>
</table>
Friday Afternoon: 5 PM

New evaluation

Only a “few” issues...

- 3 years – Chronic LBP and FM
- Numerous healthcare providers
- Spreading pain
- Pain comes and goes; have “a mind of its own.”
- She does not sleep well
- Standing < 20 minutes; pain lasts 1-2 days
- Sit < 60 minutes
- ODI = 34756595
- FABQ = State Record!
- Used to work out: Pilates and Yoga
- Unable to work (part-time office manager)

Physical Examination

- Flexion: 10 degrees = pain
- Extension: 10 degrees = pain
- SLR = sensitive at 45 degrees (L = R)
- Slump = leg pain with neck flexion
- Palpation: Tender C0 – L91
- Stabilization: Unable to perform a coordinated deep corset contraction
We know...

Exercise/Movement


But…PAIN

Afraid

Movement = Pain; Pain = movement

High Threat

PAIN

defend

Clinical Example

Traditional

TNE
### Why TNE for her?

**Central Sensitization**


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### So...

- Pain is normal
- Pain protects
- If we can change how she “sees pain,” it will help...
  - Patients are interested in pain
  - Patients can take on modern pain science


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### The Body’s Living Alarm System

<table>
<thead>
<tr>
<th>Normal electrical activity</th>
<th>Persistent pain</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Electrical activity “waking up”</em></td>
<td>End-Result</td>
</tr>
</tbody>
</table>

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Turning the alarm system down therapeutically

- Therapeutic Neuroscience Education
- Aerobic Exercise
- Manual Therapy
- Pacing
- Graded exposure
- Breathing, relaxation
- Modalities
- Etc.

After the 1st session (75 minutes later)

Reconceptualizing pain

After TNE: Tissues heal; tissues sensitive; sore and deconditioned

Threat smaller
Won’t hurt tissues

**Subsequent therapy**

- 2x/week – total of 8 visits
- Session 30-45 minutes
- Exercise
- Pacing and graded exposure
- Constant pain education – more in-depth
- Home Exercise Program
- Goal Setting

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**Subsequent sessions**

- Continued TNE
- Goals
- Physical treatment
- Pacing

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**Why such a big deal about “physical” treatments?**

**Pain science is NOT hands-off...**

In all but one of these studies did patients have statistically significant ($p<0.05$) decrease in pain ratings.

The other group: NONE

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**Our plan...**

1. **Clinical “step-by-step” of how to do it**
   - Application to pelvic pain
2. Pain education is only phase one
   - Behavior change
   - Application to pelvic pain
3. **Clinical application pearls**
“Despite the pain...”

So how do we get here?
- Goals
- Pacing
- Graded Exposure
- Hold their hand

TNE’s place... over time
Goal Setting

Most patients:
• No goals
• Poorly defined goals

You have to have a reason to get out of bed

Goal Setting/Pacing/Graded Exposure

• Functional
• Job
• Social

DEEP DESIRES

Example: Suzy's vacuuming
Goal Setting/Pacing/Graded Exposure

- Meals
- Laundry
- Sweeping floors
- Answering e-mails
- Weeding a garden
- Walking
- Sex
- Etc.

Goal Setting/Pacing/Graded Exposure

- Meals
- Laundry
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- Answering e-mails
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- Etc.

Sex: Pacing/Graded Exposure

The spider story...
Sex: Pacing/Graded Exposure

The spider story...

What did we do here?

Anything, including sex, works this way

This is where a pelvic pain therapist can help...

- Study:
  - Pain (sensitivity)
  - Sex
- Have goals
- Motor imagery
  - Positions
  - Activities
- Exposure program
  - Self versus another
  - Consider context, environment
- Other: relaxation, breathing, overall wellness
- TNE: Sore but safe; hurt does not equal harm...
Goals/Pacing/Graded Exposure

• Be specific: Put a stake in the ground
  – Charity walk
  – Gardening
  – Party

What is the goal?

• Start Easy Build Slowly
• Return to physical confidence
• Thoughtless, fearless movement
• Thoughtless, fearless activity

“Just go do it”

You HAVE TO hold their hand...
• Show them
• Have them do it
• Give feedback
• Make adjustments
• Discuss “sensations” and tie back to TNE
• Upon return – ask about HEP
• Let them (once again) show you; give feedback; adjust; coach
• Repeat
• Exercise and ADL’s – especially feared movements and tasks
Our plan…

1. **Clinical “step-by-step” of how to do it**
   - Application to pelvic pain

2. **Pain education is only phase one**
   - Behavior change
   - Application to pelvic pain

3. Clinical application pearls

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**Clinical Pearls for TNE: Top 10**

1. **You have to be smarter than your patient**


   What you need to know.

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2. **Education should be paced, just like any activity**

3. All you can do…is plant the seeds


4. Don’t force it…there’s usually a backdoor as well

5. Tethering


Patients don’t have fear, but lack safety – Johan Vlaeyen, PhD
6. Boundaries
   - Being on time
   - Missing appointments
   - Not doing homework

Squires A, Livsey B. Barriers of burnout. Physiotherapy. Jun 10
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Lehman J, Maher C, Refshauge K. The attitudes and beliefs of
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Wandling BJ, Smith BS. Burnout in orthopaedic physical therapists.
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7. Your patients are smarter than you think

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problem in chronic pain: the actual and perceived ability of
patients and health professionals to understand the

8. All pain is real

For H. The functional organisation of the brain in
chronic pain. In: Sandkühler J, Bromm B, Gebhart
GF, eds. Progress in Brain Research, Vol 129.
Amsterdam: Elsevier; 2000.
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physiology education: fMRI evaluation of a single
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Physiotherapy Theory and Practice. Oct
2015;31(7):668-668.
Clinical Pearls for TNE: Top 10

9. Written homework


Clinical Pearls for TNE: Top 10

10. Movement is the biggest pain killer on the planet

A six mile run stimulates endorphin release that is equivalent to 10mg of morphine


There are thresholds for both the intensity (>50% Vo(2)max) and duration (>10 min) of exercise required to elicit exercise analgesia


Our plan...

✓ Clinical “step-by-step” of how to do it
✓ Pain education is only phase one
✓ Clinical application pearls
Teaching People About Pain

- Pain is normal
- Living in pain is not
- There is A LOT PT can do for people in pain

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