Preoperative Pain Neuroscience Education
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Upon completion of this educational session the participants will be able to:
1. Understand why a new bio-psycho-social approach was needed to address pain in orthopedic surgery
2. Understand the development and validation process of the preoperative neuroscience education program for orthopedic surgery
3. Be able to understand the content and delivery methods for the preoperative neuroscience educational program
4. Recognize why the preoperative neuroscience educational program produced superior results to the biomedical model utilized by US surgeons for orthopedic surgery
5. Apply the information from the educational session into clinical practice

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.

Spine Surgery in the US
Very prevalent and ever-increasing

Knee OA and TKA in the US
• OA affects more than 26 million people in North America
• In 2010 the United States Center for Disease Control reported that there were 719,000 TKA performed and it is expected these numbers will double by 2020
1 in 4 patients experience persistent pain and disability after orthopedic surgery


Riddles DL, Jomeska WA, Hayes CW. Use of a validated algorithm to judge the appropriateness of total knee arthroplasty in the United States: A Multicenter Longitudinal Cohort Study

Don’t worry...

Postoperative rehabilitation will help persistent pain and disability after surgery

Problem #1: Referral to PT

Patients are not readily referred to PT after lumbar surgery and TKA


Problem #2: Efficacy

Limited efficacy for postoperative rehabilitation for spine surgery and rehabilitation may not be needed for TKA


Problem #3: What should rehab consist of?

Very little information available on:

• Content
• Frequency
• Timing
• Intensity

Problem #4: Who needs rehab?

Being sent to PT after lumbar surgery was not correlated to higher levels of:

- Pain
- Disability
- Fear-Avoidance
- Pain Catastrophization


What about preoperative education?

ORTHOPEDICS

- Knee replacement (Daltroy, Morlino et al. 1998; Mansour, Stotsos et al. 2001; Beaupre, Liar et al. 2004; McDonald, Hetrick et al. 2004; Johansson, Nuutila et al. 2005)
- Handful of studies have been conducted on preoperative education for patients undergoing spinal surgery (Douglas, Mann et al. 1998; Knopp, Spanehl et al. 2000; LaMontagne, Hepworth et al. 2003; Johansson, Nuutila et al. 2005; Walters and Coad 2006)

Very little benefit…

Positive effect
- Preoperative anxiety levels
- Patient knowledge

No changes to postoperative outcomes
- Pain
- ROM
- Function
- Length of hospital stay


Why is it not helping?

- Procedural information
- Informed consent

Only one study, utilizing pain education was able to reduce postoperative pain


Surgeons use biomedical models to teach patients prior to surgery


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


Add to this...

- Surgeons underestimate their patients’ desire for preoperative information
- Patients in general satisfied with the care given to them preoperatively but not with the content of the information regarding the impending surgery
- Patients expect to be pain-free after surgery
- Patients want more information on pain, especially following surgery.

Central Sensitization...

Overall results suggest that, although peripheral mechanisms are involved in OA pain, hypersensitivity of the CNS plays a significant role in a subgroup of subjects within this population.

In Summary...

- Pain
- Disability
- High fear-avoidance
- Pain catastrophization
- Anxiety
- Biomedical explanation for pain
- Central sensitization
- Faulty cognitions and beliefs regarding surgery, recovery and pain

High levels of pain catastrophization, anxiety and fear-avoidance prior to surgery is powerfully linked to poor outcomes

- Spine surgery
- TKA

The general population has an ambivalent and slightly negative view of spine surgery


High levels of pain catastrophization, anxiety and fear-avoidance prior to surgery is powerfully linked to poor outcomes

- Spine surgery
- TKA


Pain is 100% produced by the brain...

Pain is produced by the brain based on perception of threat


How Dangerous is this?

This is dangerous
More information

Facilitation


Inhibition

How Dangerous is this?

This not dangerous
Less information

Inhibition


So What?

• Pain is based on PERCEPTION of threat
• Pain is a perception
• We can influence perception
  – Words
  – Images
  – Threat reappraisal
  • Therapeutic alliance

Example #1: “Bad Disc”

Patients who underwent discectomy and shown their “bad disc” material recovered significantly better than those who were not shown their excised disc material
  • Leg pain (91.5 vs. 80.4%; p<0.05)
  • Back pain (86.1 vs. 75.0%; p<0.05)
  • Limb weakness (90.5 vs. 56.3%; p<0.02)
  • Paraesthesia (88 vs. 61.9%; p<0.05)
  • Reduced analgesic use (92.1 vs. 69.4%; p<0.02)


Example #2: Sham Surgery in Orthopedics

Conclusion: Although care should be taken...sham surgery has been shown to be just as effective as actual surgery in reducing pain and disability.


The “ah-ha” moment...(for us)

The results of this updated systematic review of PNE for MSK pain provides strong evidence for PNE improving pain ratings, pain knowledge, disability, pain catastrophization, fear-avoidance, attitudes and behaviors regarding pain, physical movement and healthcare utilization.
1. What do patients want?
   - 76% of patients underwent surgery for pain
   - Although 97% of patients thought their preoperative education was beneficial
     - More than 1/3 felt they did not get enough education on pain
   - 50% of patients surveyed at 4 weeks postoperative was afraid pain will get worse

2. What constitutes “usual” preoperative LS education?
   - Anatomy 15.17%
   - Biomechanics 23.57%
   - Instrumentation 3.84%
   - Other 47.50%

3. What does the general population think about LS?

4. Is there any effective preoperative strategy that can be borrowed?
   - No changes to postoperative outcomes including pain, ROM, function or length of hospital stay.
   - Only one study, utilizing pain education was able to reduce postoperative pain.

5. Is there any other effective strategy that can be borrowed from chronic LBP?
   - The results of this updated systematic review of PNE for MSK pain provides strong evidence for PNE improving pain ratings, pain knowledge, disability, pain catastrophization, fear-avoidance, attitudes and behaviors regarding pain, physical movement and healthcare utilization.
5. Is there any other effective strategy that can be borrowed from chronic LBP?


5. Is there any other effective strategy that can be borrowed from chronic LBP?


“Education to behavior change is like throwing wet spaghetti at a brick”


6. What happens when a “surgical” brain understands more?


Conclusion: Although care should be taken...sham surgery has been shown to be just as effective as actual surgery in reducing pain and disability.

Clinical Application

- Physical therapist
- One-on-one verbal format
- Pictures, examples, metaphors and drawings
- Conversational and personal approach rather than a lecture format.
- Standardized PNE program: checklist
- The educational sessions averaged 30 min.
- PNE book: Read at least one time before and one time after their surgery.


1. Decision to have surgery...

SECTION 1:
YOUR DECISION TO HAVE BACK SURGERY

1. Decision to have surgery

2. The nervous system’s physiology and pathways

Normal electrical activity
Take care of the issue

Electrical activity “waking up”
Nerves calm down

3. Peripheral nerve sensitization

4. Surgical experiences and environmental issues effects on nerve sensitivity

5. Calming the nervous system

6. Recovery after LS
Does it work?

1. Who does it best?
2. Comparative Language
3. Case Series – Immediate effect
4. Brain changes – fMRI
5. RCT 1 year
6. PT after RCT
7. RCT 3 years

2. Comparative Language: Some Background

ISSLS Prize Winner: Function After Spinal Treatment, Exercise, and Rehabilitation (FASTER)


3. Case Series – Immediate effect

• 10 Patients scheduled for Surgery for L-Radiculopathy
  – Ave. age 47 years; 7 females
  – Ave. duration of leg pain 7 months
  – Ave. time till surgery 5.5 days
  – Ave. LBP rating 4.6/10
  – Ave. leg pain 4.1/10
  – Ave. Oswestry 40.8%
  – Pain Catastrophization Scale: 25.4
  – FABQ-W: 15.6
  – FABQ-PA: 18.7
  – Pain knowledge: 12/19
  – SLR: 50 degrees
  – Active trunk flexion 21cm
  – Numerous poor beliefs about surgery


1. Who does it best?

Other therapists

5 years clinical experience
NPQ > 90%
PNET > 90%
Go through tutorial of PN
Have taken 15h CEU on TNE

2. Comparative Language:

• Booklet A had almost 3 times as many provocative terms as Booklet B.
• Booklet A had an average of 67.2 provocative terms per reviewer compared to only 22.6 terms for Booklet B.


3. Case Series – Immediate effect

### 3. Case Series – Immediate effect


- **Physical Measurements (after education only):**
  - Passive SLR increased 9 degrees
  - Active trunk flexion increased 5cm

### 4. Brain changes – fMRI


- Immediately following PNE straight leg raise increased by 7° and forward flexion by 8 cm

Resting Scan

Painful Task

Same Painful Task after 20 minute PNE session

5. RCT - 1 Year

No statistical significance:
- Back Pain
- Leg Pain
- Catastrophization
- Fear Avoidance
- Pain Knowledge

But...

5. RCT - 1 Year

45% less on medical tests and treatments...


5. RCT - 1 Year

Surgical Experience

600,000 discectomies were performed in the US in 2012

6. PT After LS

- Back pain
- Leg pain
- Disability
- Fear-avoidance,
- Pain catastrophization
- Pain knowledge
- Various LS beliefs and experiences

None of these predicted who attended PT after LS for radiculopathy

7. 3-year Outcomes

- Experimental
- Control

37% healthcare savings at 3 years

- 3 years - PPA
- 3 years - ITT

What we're working on right now...

PNE: 30 minute group session

Immediate Effects of Preoperative Neuroscience Education for Patients Undergoing Total Knee Arthroplasty: a case series

Immediate Effects of Preoperative Neuroscience Education for Patients Undergoing Total Knee Arthroplasty: a case series


122 patients undergoing TKA

**RCT: Preoperative PNE for TKA**

- Pain
- Function
- Pain Medication use
- Blood pressure and Heart Rate
- Length of Hospital stay
- Knee ROM
- Satisfaction with surgery
- Healthcare utilization

Louw, Reed, Zimney, Puentedura, Grimm and Landers – submitted for publication 2017

**Kinesiophobia**

- Pre
- 1 Month
- 3 Months
- 6 Months

**Pain Catastrophization**

- Pre
- 1 Month
- 3 Months
- 6 Months

Louw, Reed, Zimney, Puentedura, Grimm and Landers – submitted for publication 2017

**Preoperative PNE for TKA**

- Patient Experience
  - Glad
  - Fully Prep
  - Prep Well
  - Do Again
  - Met Expectation

Louw, Reed, Zimney, Puentedura, Grimm and Landers – submitted for publication 2017

Louw, Langerwerf and Cox – Study in progress 2017

Next...
Patients want to know...

1. What is wrong with me?
2. How long will it take?
3. What can I (the patient) do for it?
4. What can you (the clinician) do for it?


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