Pain measurement and registration in non-verbal patients

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“If color was a sense, then red is pain. But how would you determine the color and the nuances if not by asking the patient”.
The Biopsychosocial Model

- Biochemical reactions do not translate directly into an **illness**
- Biological derangements do not shed light on the **meaning** of the symptoms in the patient
- Finding biology and treating patients require different **skill sets**
- Adopting a **sick role** does not require any biological derangement
- The success of biological treatments are **influenced** by
  - Psychosocial factors (including placebo/nocebo)
  - Adherence to treatment (therapeutic alliance)
  - Patients are influenced by their clinicians - and visaversa

Nociception

Pain experience

Adapted from Hume (1748)
Causation

if...

then
Correlation

if...

often
Pattern (in theory)

if...

then maybe

?
“When two things occur at the same time or within the same place we tend to believe that they are causal”

adapted from ‘An Enquiry Concerning Human Understanding’ by David Hume (1748)
Pain experience

Nociception?

Adapted from Hume (1748)
How this relates to pain

- Pain is not *caused* by nociception
  - because you can be in pain when there is no nociception
- Nociception does not *cause* pain
  - because you can have an injury and not feel it
- Pain *correlate* with nociception
  - experimental pain depends on a relationship between pain and nociception
- We have many excellent *theories* (patterns) regarding the relationship between pain and nociception (neurophysiology)
  - i.e. sensitisation and descending signals
- But current theories only seem to work if the stimulus is nociception
  - current theories are insufficient at explaining pain without nociception
What causes pain?

- No one knows!
- But we know that **tissue damage alone should not be a theory for pain** because it wrongly implies that
  - pain is causally related to tissue damage = tissue-damage-repair is the only sensible solution (and everything else is ‘psychogenic’ or ‘covering up’)
  - pain (and all it correlates with) must go away if the tissue is healed
  - more pain must mean more damage or be a sign of insufficient healing
  - there must be undiscovered tissue damage if pain continues

**Clinical implications**

- Understand the patient (‘patient-centred’)
- Focus on what pain does rather than what it is
- Understand mechanisms that may explain hyperalgesia (rule in/rule out)
Pain will most likely always:

- Attract you **attention**
- Be **aversive** or unpleasant
- Be experienced **in your body** (including phantoms)
- **Motivate** you to get away from it by
  - learning from the situation you are in (find patterns)
  - behave adequately according to the context you are in (social)
  - prioritise behaviours, thoughts and actions that are believed to be pain relieving
- **Influence** your well-being, mood and communication
- Reflect **changes** that you need to pay attention to
Is all pain equal?

Acute vs. Chronic Pain
Acute pain

- Intense and highly **motivating**
  - ‘Get away and learn to avoid it’
- Usually **acknowledged** by society and peers
  - ‘I have had it myself’ and ‘don’t worry you will get over it’ responses
- Usually highly **predictive**
  - ‘Give it a day or two and come back if it hasn’t changed, or if it gets worse’
- More **obstructive** than worrying for most people
  - ‘...but it’s just bad timing. I really don’t have time for this right now’
- Usually very **responsive** to treatments (any kind)
  - Why do you think that most treatments don’t show significant effect after 6-12 weeks (regarding NSLBP - check out Artus et al. 2010 and 2014)
- But acute pain **does not have to correlate with nociception**
Normal (acute?) pain

It hurts!!!

Like the last time…

I must remember to brush my teeth

I guess there must be bacteria in my teeth
Chronic pain

- Exhaustive and discouraging
- Unacknowledged by society and peers and HCPs
- Unpredictable stimulus-response (e.g. movement:pain)
- All absorbing: Is there a future?
- Often associated with mood changes and stress
- Loneliness: Social support becomes much more necessary
  - ‘who will believe me’, ‘what can I believe’, ‘who should I trust’??
- Life quality: The pain sensation becomes less of a problem than the effect on life
- Cure does occur but no treatment is known to be curative
Complex

It hurts

Should I be scared!

Will it go away?

Does my dentist know what’s going on with me?

What am I doing wrong?

They don’t believe me!

I should have never…

Never again will I…

Brush my teeth? How?!?

It’s in my teeth
PERCEPTION

- Expectations
- Placebo
- Nocebo
- Friends, beliefs and knowledge
- Attention
- Experience
- Genes
- Immune system
- Culture and social heritage
- and much more?

Adapted from Moseley (2007)
What is it in this person that make her hurt in this context?
Hierarchy of Pain Assessment Techniques

Self-report

Search for Potential Causes of Pain

Observe Patient Behaviors

Surrogate Reporting (family members, parents, caregivers) of Pain and Behavior/Activity Changes

Attempt an Analgesic Trial

Adapted from Herr et al Pain Manag Nurs. 2006;7(2):44-52
Pain is complex - always...

- Daily functions
- Mood
- Stress
- Sleep
- Social support
- How effective the patient believes the treatment is
- How well the patient can work and be social
- NRS (0-10)
- NRS (0-100)
How are you today?

- **Mood** changes (including depression and anxiety)
- **Sleep** disturbances
- **Cardio-vascular** fitness (including metabolic syndrome)
- **Immune** responses
- **Muscular** responses (muscle dysfunction, sarcopenia-like effects)
- Reduced **self-confidence** and meta-cognitive capacity
- **Socio-economic** deroute (job, marriage, parental role…)
- **Perceived injustice** and insufficient support (HCPs, spouse, family, work…)
- **Feeling guilty** (medication abuse, not doing enough, receiving passive treatments…)
Patient reports
Evaluation of the pain intensity

**VAS**

0 1 2 3 4 5 6 7 8 9 10

**NRS**

Ingen smertes (0) - Milde smertes (1-3) - Moderate smertes (4-6) - Voldsomme smertes (4-7)

**VRS**

Ingen smertes (0) - Milde smertes (1-3) - Moderate smertes (4-6) - Voldsomme smertes (4-7)

Faces Pain Scale

Anbefales til ældre uden eller med mild demens
Pain drawing

Please mark the figures below with the letters that best describe the sensation or pain you are feeling. Please mark areas where pain radiates or spreads with a ↑, ↓, or ←, → arrow to indicate the direction of radiating pain.
(Include all affected areas)

A = Ache  B = Burning  R = Radiating Pain  D = Dull Pain
N = Numbness  S = Stabbing  P = Pins & Needles  O = Other

Please indicate how you would rate your pain

LOW: 0 1 2 3 4 5 6 7 8 9 10 (HIGH)

NAME: (please print)

How long have you experienced neck/back pain? ___ Years ___ Months ___ Weeks

Is this your first episode of neck/back pain? ___ YES ___ NO

SIGNATURE: ___________________________  DATE: ____________
Palpation
Patient Specific Functional Scale

<table>
<thead>
<tr>
<th>Pain provoking functions (disabilities)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Describe the function:</strong></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you rate your best, worst and average pain?</td>
<td></td>
</tr>
<tr>
<td>Does pain stop you from this activity?</td>
<td></td>
</tr>
<tr>
<td>How does the pain react to accumulation of activity?</td>
<td></td>
</tr>
<tr>
<td>How long does it take for the pain to reach baseline again?</td>
<td></td>
</tr>
<tr>
<td>0-100 (NRS) - best and worse during this activity?</td>
<td></td>
</tr>
</tbody>
</table>
#2: Search for potential causes of pain
NOCICEPTION

- Tissue damage
- High threshold stimuli
- Sensitisation (LTP)
- Genetics?
- Cognition?

PAIN

- Expectations
- Mood
- Sleep
- Social support
- Acceptance and understanding
- Health Care (providers, payers, law…)
- The attitudes of the dentists (and significant others)
- Genetics
Nociceptive Withdrawl Reflex

• ‘The Sherrington Reflex’

• Motor response to nociceptive (and other) stimuli

• No strong correlation with other nociceptive responses
The FLARE response

- axonal reflex
- not nociceptive specific
- possible correlation with skin irritants (including pain)
Acute tissue injury

Neural
- Axonal reflex
- Peptide exocitose
- CGRP
- Sub P
- Cytokine release
- NGF/GDNF release from Schwannske Celler

Vacular
- Vasoconstriction
- Vasodilation
- Increased permeability
- Chemotaxis of neutrophils, macrophages, plasma, T-Cells, mast cells etc.

Cellular
- Proteins released from injured cells
- Chemokines, bradykinin, serotonin, histamine, neutrophils, macrophages
- Destruction of bacteria and removal of debris
Is neuro imaging the answer we are looking for?
What’s causing the activity?

“The pain neuromatrix is dead and it is time for pain research to be more critical”

“Stimulus-specificity can be falsified”

Adapted from prof. Iannetti @ Wellcome Trust scientific congress, Cambridge 2015
Salience rather than nociception?

Legrain et al. (2011)
Can pain be a conditioned (learned) response?

Edwards RR et al. (2011)
Placebo mechanisms

Benedetti F (2010)
Fear and learning

J. Zaman et al. / Neuroscience and Biobehavioral Reviews 51 (2015) 118–125

[Diagram showing the relationship between fear and learning across different pain states: no pain, acute pain, and chronic pain. The diagram illustrates how the intensity of bodily sensation and duration of exposure to conditioned stimuli (CS) relate to the perception of pain.]

- **NO PAIN**: CS
- **ACUTE PAIN**: CS
- **CHRONIC PAIN**: CS
- **PERCEPTION OF BODILY SENSATION**

**INTENSITY OF BODILY SENSATION**

**DURATION**

**PAIN**

**US**

The diagram highlights the progression of fear and learning in response to different pain states, emphasizing the role of bodily sensations and duration in modulating pain perception.
Stress and pain

Fear/anxiety related pain (nocebo)
- Stressor (e.g. context)
- Pain (via CCK)
- Attention

Stress-induced analgesia
- Stressor (e.g. context)
- Pain (inhibition through endogenous opioids)
- Attention

Adapted from Benedetti (2011) Oxford Press
Could pain be pain-reducing?
Modulation is all about balance

Think about modulation as a way for the body to get just the right amount of response in any given situation. And remember that it is plastic!

**PRO-NOCICEPTIVE MECHANISMS**

**ANTI-NOCICEPTIVE MECHANISMS**
The tool box

Skills needed in ‘BPS’ practice

• patient-education (teaching)
• tools of motivation and negotiating
• awareness to non-verbal communications
• indirect data collection and influence via significant others
• task-specific qualifications (e.g. dental surgery)
E.M.P.A.T.H.Y.

Eye contact

Facial muscles

Posture
Affective states

Dominance  Submission  Happiness  Sadness  Worry
Tone of your voice

10% of conflicts is due to difference in opinion.

90% is due to wrong tone of voice.
E.M.P.A.T.H.Y.

Hearing the whole patient and seeing the context
E.M.P.A.T.H.Y.

**KEEP CALM AND BE PROFESSIONAL**

*Your response*

*affective vs cognitive empathy!*

Riess & Kraft-Todd, Academic Medicine, Vol. 89, No. 8 / August 2014
#3: Observe patient behaviours
Observations

- Grimassing
- Behaviour
- Verbalising
What **signs** would you look for in the face of a patient to support your hypothesis of **pain**?
Bemærk musklerne omkring øjne, øjenbryn og næsen
Verbalising & behaviour

• Sighing
• Moaning
• ‘Growling’ and ‘Grunting’
• Shouting
• Loud respirations or irregular respiration
• Asking for help or attention
• Agression (words, gestures or behaviour)

• Rigidity
• Tension
• Protective gestures or behaviors
• Rocking movement
• Reduced ROM or other (sudden) changes in mobility
#4: Surrogate reporting

- Self-report
- Search for Potential Causes of Pain
- Observe Patient Behaviors
- Surrogate Reporting (family members, parents, caregivers) of Pain and Behavior/Activity Changes
- Attempt an Analgesic Trial
Possible data sources

• Significant others (spouse, partner, child/parent)
• Friends and other family
• Caregivers and GP
• Colleagues, neighbors and business partners
PERCEPTION

- Expectations
- Placebo
- Nocebo
- Friends, beliefs and knowledge
- Attention
- Experience
- Genes
- Immune system
- Culture and social heritage
- and much more?

Adapted from Moseley (2007)
Educate

- Sharing knowledge that gives you confidence in the benign nature of the condition
- Make sure the patient knows why you think it is valid for them (not for ‘someone like them’)
  - What’s wrong with me?
  - What will happen to me?
  - How do I explain this (once I buy it)
- Share and exercise explanations, diagnosis and narratives
- Focus on the role of the spouse/family if the patient is cognitively impaired
#5: Attempt analgesic trial
Pharma

- Local anesthetics
- Non-opioids
  - Paracetamol
  - NSAIDs
- Opioids
- Anti-depressants
- Anti-convulsants

Although mechanism-based it will rely heavily on probability if you don’t have patient reports.
Thank you for your attention
you may find pdf of the slides at:

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