

KHC Pain Symposium

Dr. Laurence N Benz PT, DPT, OCS, MBA, MAPP

ProRehab Louisville/Confluent Health

Why is chronic pain such a big deal?

- Many reasons
 - Area we focus on: Our models our outdated, flawed and too biomedical; tying the health of tissue to pain is flawed.¹⁹⁻²³

Pain Neuroscience Education

- Born out of this dichotomy (tissues versus pain) – teach people more about pain.²⁴⁻²⁹
- PNE is an educational strategy used by physical therapists that focuses on teaching people in pain more about the biological and physiological processes involved in their pain experience^{25,30,31}
- Current best-evidence provides strong support for PNE to positively influence^{26,32}
 - Pain ratings
 - Dysfunction
 - Fear-avoidance
 - Pain catastrophization
 - Limitations in movement
 - Pain knowledge and healthcare utilization
- Some specific issues pertaining to PNE:
 - Delivered primarily by physical therapists^{26,32}
 - PNE is typically delivered in 15-30-minute sessions once or twice a week for 4-6 weeks³³⁻³⁶
 - The primary delivery method is verbal one-on-one education with the use of metaphors, examples, pictures and books^{28,33}
 - PNE as an educational intervention is combined with various physical and movement-based therapies including exercise, and current best-evidence indicate that PNE plus movement/exercise is superior to educational-alone approaches in decreasing pain and disability.^{28,33}
- Numbers needed to treat for PNE and chronic low back pain:²⁵
 - To improve function 2:1
 - To improve pain 3:1
 - In comparison Gabapentin's NNT is 6:1 for pain³⁷
 - SSRI's NNT for chronic pain: 7:1³⁸
 - ? Numbers needed to harm
 - ? Numbers needed to kill
 - Risk-benefit clearly favors PNE and PNE+ (movement)

Upstream PNE: ^{27,39}

- **Surgery**
 - Lumbar Surgery^{27,39,40}
 - Total Knee Arthroplasty
 - Shoulder Surgery
 - Improved patient satisfaction
 - Non-pharmacological calming of the nervous system preoperatively (similar to Gabapentin)
 - Significant reduction in healthcare cost 1 and 3 years later.^{27,39,40}
 - Despite having residual pain and disability, the PNE group spent 45% less on healthcare in the year following surgery compared to the non-PNE group.⁴¹ A key element of the preoperative PNE was that pain after lumbar surgery was to be expected, normal, and over time would calm down.³⁹ On average, the PNE group spent over \$2000 less seeking help for their persistent pain and disability. In 2012, there were over 600,000 discectomies in the US alone and if the cost-savings per patient were to be applied to each person undergoing a discectomy in the US it would account for an annual savings of \$1.2 billion.¹⁹ The results from the 1-year follow-up was sustained 2 years with publication of the 3-year outcome study.

- **Society: Middle school children**⁴²⁻⁴⁵
 - PNE program developed, tests and now trialed in 9 US states:
 - Increased knowledge of pain
 - Healthier beliefs about pain
 - Superior results to biomedical education (current school education)
 - Less provocative than biomedical education
 - 3rd grade to 8th grade
 - Reduced fear of physical activity in the event of a painful experience
 - Video as affective as live presentation
 - 6-months later kids who received PNE use significantly less pain medication than kids using receiving current school education on pain (paper in preparation)

- **Telehealth: PNE Virtual Reality**^{46,47}
 - Testing and trialing – showing similar results to non PNE VR but with the added advantage of being mobile, complete emersion, PNE+ includes breathing, mindfulness and biofeedback.

Multi-disciplinary care

- Typically for more complex conditions
 - Industry and LBP^{1,2}
 - Low Back Pain^{1,2 3,4}
 - Chronic neck pain⁵
 - Fibromyalgia^{6,7}
 - CRPS⁸
- Very common in Europe^{6,7,9}
- Limited use in the US¹⁰
- Long waiting lists^{11,12}
- Very expensive (in the US)³
 - “While these programs seem to be more effective than alternatives, the effects need to be balanced with their costs in terms of money, resources and time. Multidisciplinary treatment programs are often quite intensive and expensive...”
- Review of US Pain Clinics (North Carolina)¹⁰
 - There was marked heterogeneity among the clinics surveyed
 - 54% had an anesthesiologist
 - Other common physician = physiatrists and surgeons
 - Less than one third of sites had mental health providers (26%)
 - Only 26% employed physical therapists.
 - Forty-eight percent of sites offered exercise instruction.
 - Few clinics were multidisciplinary in nature.
 - Only 3 (7%) met the criteria of having a medical physician, registered nurse, physical therapist, and mental health specialist.

Current best-evidence for treating persistent pain:¹³⁻¹⁸

1. Identify patients with “red flags”
2. Educate the patient about the nature of the problem
3. Provide prognostication
4. Promote self-care
5. Get patients active and moving as early as possible and appropriately after injury
6. Decrease unnecessary fear related to movement, leisure and work activities
7. Help the patient experience success
8. Perform a skilled physical examination, and communicate results to the patient

9. Make any treatment strategy as closely linked to evidence of the biological nature of the problem rather than syndrome or geography
10. Use any measures possible to reduce pain
11. Minimize the number of treatments and contacts with medical personnel
12. Consider multidisciplinary management
13. Manage identified and relevant physical dysfunctions
14. Assess and assist recovery of general physical fitness
15. Assess the effects on the patient's creative outlets

References

1. Campello MA, Weiser SR, Nordin M, Hiebert R. Work retention and nonspecific low back pain. *Spine*. 2006;31(16):1850-1857.
2. Anema JR, Steenstra IA, Bongers PM, et al. Multidisciplinary rehabilitation for subacute low back pain: graded activity or workplace intervention or both? A randomized controlled trial. *Spine*. 2007;32(3):291-298; discussion 299-300.
3. Kamper SJ, Apeldoorn AT, Chiarotto A, et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. *BMJ*. 2015;350:h444.
4. Kamper SJ, Apeldoorn AT, Chiarotto A, et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain. *Cochrane Database Syst Rev*. 2014(9):CD000963.
5. Bono CM, Ghiselli G, Gilbert TJ, et al. An evidence-based clinical guideline for the diagnosis and treatment of cervical radiculopathy from degenerative disorders. *The spine journal : official journal of the North American Spine Society*. 2011;11(1):64-72.
6. Arnold LM, Bradley LA, Clauw DJ, Glass JM, Goldenberg DL. Multidisciplinary care and stepwise treatment for fibromyalgia. *The Journal of clinical psychiatry*. 2008;69(12):e35.
7. Bonifazi M, Suman AL, Cambiaggi C, et al. Changes in salivary cortisol and corticosteroid receptor-alpha mRNA expression following a 3-week multidisciplinary treatment program in patients with fibromyalgia. *Psychoneuroendocrinology*. 2006;31(9):1076-1086.
8. Bruhl S. Complex regional pain syndrome. *BMJ*. 2015;351:h2730.
9. Coudeyre E, Jardin C, Givron P, Ribinik P, Revel M, Rannou F. Could preoperative rehabilitation modify postoperative outcomes after total hip and knee arthroplasty? Elaboration of French clinical practice guidelines. *Ann Readapt Med Phys*. 2007;50(3):189-197.
10. Castel LD, Freburger JK, Holmes GM, Scheinman RP, Jackman AM, Carey TS. Spine and pain clinics serving North Carolina patients with back and neck pain: what do they do, and are they multidisciplinary? *Spine*. 2009;34(6):615-622.
11. Choiniere M, Dion D, Peng P, et al. The Canadian STOP-PAIN project - Part 1: Who are the patients on the waitlists of multidisciplinary pain treatment facilities? *Canadian journal of anaesthesia = Journal canadien d'anesthesie*. 2010;57(6):539-548.
12. Guerriere DN, Choiniere M, Dion D, et al. The Canadian STOP-PAIN project - Part 2: What is the cost of pain for patients on waitlists of multidisciplinary pain treatment facilities? *Canadian journal of anaesthesia = Journal canadien d'anesthesie*. 2010;57(6):549-558.
13. Louw A, Butler DS. Chronic Pain. In: S.B. B, Manske R, eds. *Clinical Orthopaedic Rehabilitation*. 3rd Edition ed. Philadelphia, PA: Elsevier; 2011.
14. Gifford L. *Aches and Pain*. Cornwall: Wordpress; 2014.

15. Linton SJ. The socioeconomic impact of chronic back pain: is anyone benefiting? *Pain*. 1998;75(2-3):163-168.
16. Linton SJ. Behavioural remediation of chronic pain: a status report. *Pain*. 1986;24:125-141.
17. Linton SJ, Nordin E. A 5-year follow-up evaluation of the health and economic consequences of an early cognitive behavioral intervention for back pain: a randomized, controlled trial. *Spine*. 2006;31(8):853-858.
18. Vlaeyen JW, Crombez G, Linton SJ. The fear-avoidance model of pain: We are not there yet. Comment on Wideman et al. "A prospective sequential analysis of the fear-avoidance model of pain" [Pain, 2009] and Nicholas "First things first: reduction in catastrophizing before fear of movement" [Pain, 2009]. *Pain*. 2009;146(1-2):222; author reply 222-223.
19. Louw A, Puentedura EJ, Zimney K, Schmidt S. Know Pain, Know Gain? A Perspective on Pain Neuroscience Education in Physical Therapy. *The Journal of orthopaedic and sports physical therapy*. 2016;46(3):131-134.
20. Moseley GL. Reconceptualising pain according to modern pain sciences. *Physical Therapy Reviews*. 2007;12:169-178.
21. Haldeman S. Presidential address, North American Spine Society: failure of the pathology model to predict back pain. *Spine*. 1990;15(7):718-724.
22. Spielmann AL, Forster BB, Kokan P, Hawkins RH, Janzen DL. Shoulder after rotator cuff repair: MR imaging findings in asymptomatic individuals--initial experience. *Radiology*. 1999;213(3):705-708.
23. Kjaer P, Leboeuf-Yde C, Korsholm L, Sorensen JS, Bendix T. Magnetic resonance imaging and low back pain in adults: a diagnostic imaging study of 40-year-old men and women. *Spine*. 2005;30(10):1173-1180.
24. Gifford L, Muncey H. Explaining Pain to Patients. Paper presented at: International Association on the Study of Pain 1999; Vienna, Austria.
25. Moseley L. Combined physiotherapy and education is efficacious for chronic low back pain. *Aust J Physiother*. 2002;48(4):297-302.
26. Louw A, Diener I, Butler DS, Puentedura EJ. The effect of neuroscience education on pain, disability, anxiety, and stress in chronic musculoskeletal pain. *Archives of physical medicine and rehabilitation*. 2011;92(12):2041-2056.
27. Louw A, Diener I, Landers MR, Puentedura EJ. Preoperative pain neuroscience education for lumbar radiculopathy: a multicenter randomized controlled trial with 1-year follow-up. *Spine*. 2014;39(18):1449-1457.
28. Nijs J, Van Houdenhove B, Oostendorp RA. Recognition of central sensitization in patients with musculoskeletal pain: Application of pain neurophysiology in manual therapy practice. *Manual therapy*. 2010;15(2):135-141.
29. Moseley GL, Butler DS. Fifteen Years of Explaining Pain: The Past, Present, and Future. *The journal of pain : official journal of the American Pain Society*. 2015.
30. Moseley GL, Hodges PW, Nicholas MK. A randomized controlled trial of intensive neurophysiology education in chronic low back pain. *Clinical Journal of Pain*. 2004;20:324-330.
31. Meeus M, Nijs J, Van Oosterwijck J, Van Alsenoy V, Truijzen S. Pain Physiology Education Improves Pain Beliefs in Patients With Chronic Fatigue Syndrome Compared With Pacing and Self-Management Education: A Double-Blind Randomized Controlled Trial. *Arch Phys Med Rehabil*. 2010;91(8):1153-1159.
32. Louw A, Zimney K, Puentedura EJ, Diener I. The efficacy of pain neuroscience education on musculoskeletal pain: A systematic review of the literature. *Physiotherapy Theory and Practice*. 2016:1-24.

33. Meeus M, Nijs J, Van Oosterwijck J, Van Alsenoy V, Truijen S. Pain physiology education improves pain beliefs in patients with chronic fatigue syndrome compared with pacing and self-management education: a double-blind randomized controlled trial. *Archives of physical medicine and rehabilitation*. 2010;91(8):1153-1159.
34. Louw A, Diener I, Landers MR, Puentedura EJ. Preoperative Pain Neuroscience Education for Lumbar Radiculopathy: A Multicenter Randomized Controlled Trial With 1-Year Follow-up. *Spine*. 2014;39(18):1449-1457.
35. Téllez-García M, de-la-Llave-Rincón AI, Salom-Moreno J, Palacios-Ceña M, Ortega-Santiago R, Fernández-de-las-Peñas C. Neuroscience education in addition to trigger point dry needling for the management of patients with mechanical chronic low back pain: A preliminary clinical trial. *J Bodyw Mov Ther*. 2014;19(3):464-472.
36. Van Oosterwijck J, Meeus M, Paul L, et al. Pain physiology education improves health status and endogenous pain inhibition in fibromyalgia: a double-blind randomized controlled trial. *The Clinical journal of pain*. 2013;29(10):873-882.
37. Moore RA, Wiffen PJ, Derry S, Toelle T, Rice AS. Gabapentin for chronic neuropathic pain and fibromyalgia in adults. *The Cochrane database of systematic reviews*. 2014;4:CD007938.
38. Lynch ME, Watson CP. The pharmacotherapy of chronic pain: a review. *Pain Res Manag*. 2006;11(1):11-38.
39. Louw A, Butler DS, Diener I, Puentedura EJ. Development of a preoperative neuroscience educational program for patients with lumbar radiculopathy. *American journal of physical medicine & rehabilitation / Association of Academic Physiatrists*. 2013;92(5):446-452.
40. Louw A, Diener I, Landers M, Zimney K, Puentedura E. Three-year follow-up of an RCT comparing preoperative pain neuroscience education for patients undergoing surgery for lumbar radiculopathy. *Journal of Spine Surgery*. 2017 - accepted for publication.
41. Louw A, Diener I, Puentedura E. Comparison of Terminology in Patient Education Booklets for Lumbar Surgery. *International Journal of Health Sciences*. 2014;2(3):47-56.
42. Podolak J, Louw A, Benz P, Kruse A, Louw C, Zimney K. A Randomized Trial of Live versus Video Delivery of Pain Neuroscience Education for Middle School Children. *Psychological Disorders and Distress*. 2019;2(2):1-10.
43. Louw A, Podolak J, Benz P, et al. A Randomized controlled trial of different single pain education sessions in middle school students: Immediate effects. *Journal of the Physiotherapy Pain Association*. 2019;Summer(47):14-24.
44. Louw A, Benz P, Podolak J, Zimney K, Wassinger CA. Pain Neuroscience Education for Middle School Kids and Fear of Physical Activity. *Physiotherapy* 2017 - Submitted for Publication.
45. Louw A, Podolak J, Zimney K, Schmidt S, Puentedura E. Life Skills 101: Pain Neuroscience Education for Middle School Students. *Physiotherapy Theory and Practice*. 2016.
46. Louw A, Louw C, Flynn T. Case Report: Pain Neuroscience Education using Virtual Reality. *Pain and Rehabilitation*. 2019;Winter 2019(46):4-7.
47. Boyce DA, Meehan K, Patel R, Simpson J, Walsh A, Smith G. Pain Neuroscience Education Using Virtual Reality & Traditional Physical Therapy in the Treatment of Patients with Chronic Low Back Pain. American Physical Therapy Association Combined Sections Meeting; 2020; Denver, CO.