



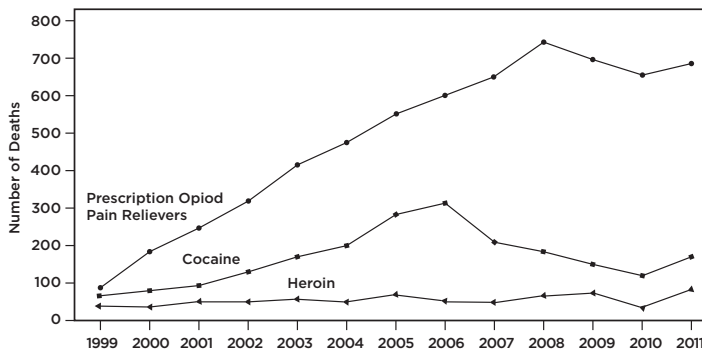
# Pain Neuroscience Education

**Adriaan Louw PT, PhD**



## Pain Epidemic

It is currently reported that 25.3 million adults in the United States (US) are suffering from daily chronic pain.<sup>1,2</sup> Furthermore, it is estimated that 126.1 million adults in the US experience some pain over a 3 month reporting period.<sup>1,2</sup> Even children and adolescents struggle with persistent pain with various studies reporting approximately one in six experiencing persistent pain.<sup>3-5</sup> Within these staggering prevalence numbers is the associated cost of persistent pain in the US which adds an economic burden of \$560-635 billion dollars annually.<sup>1,2</sup> Beyond the financial costs lies the psychological and social consequences for the individual and those closely connected to that person. In 2012 US healthcare providers wrote 259 million prescriptions for opioid pain medications.<sup>6</sup> Americans, constituting only 5% of the world's population, have



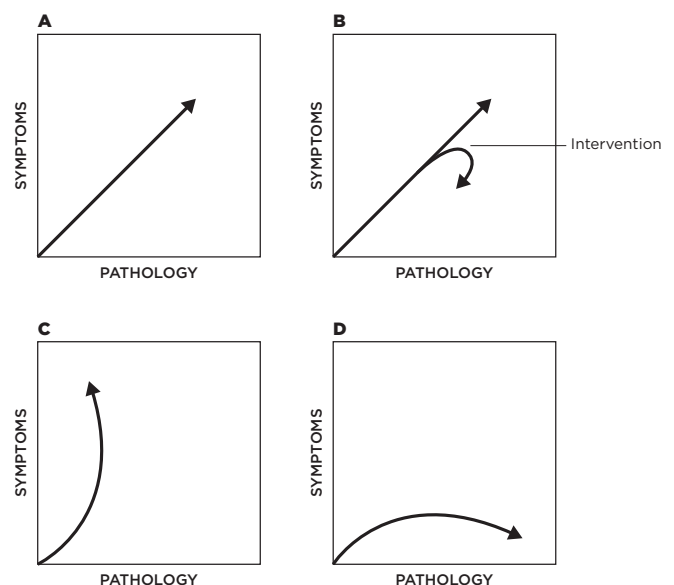
been consuming 80% of the global opioid supply, and 99% of the global hydrocodone supply<sup>7</sup> and the Centers for Disease Control (CDC) reports prescription opioids causing 3 times more annual fatalities than heroin and cocaine combined.<sup>8</sup> It is clear that something significant regarding pain must change in the US.

### Why this problem with pain?

Although the solution to the pain epidemic is most likely multi-factorial, one potential part of the solution may be changing how people view pain.<sup>9,10</sup> Pain is a normal human experience and essential for survival.<sup>10</sup> It can be argued that pain cannot and should not be prevented, but what a person does when they experience pain, may be far more important than the pain experienced itself.<sup>9,11</sup> Numerous studies have shown that coping skills and coping behaviors powerfully predict persistent pain and disability.<sup>12,13</sup> It is intriguing to consider that seemingly similar people may experience a similar injury, yet recover very differently in terms of duration, pain intensity, progression and healthcare utilization.<sup>14,15</sup> When it comes to pain, however, a fundamental part of

copied with it relates to how much a person knows about pain.<sup>16</sup> Traditional pain education models have connected the health of tissues to pain, yet it is well documented that the health of tissues and pain do not necessarily correlate.<sup>17-19</sup> As long as patients, healthcare providers and the general population connect the health of tissues to how much pain someone will experience, it can increase fear-avoidance and pain catastrophization, which have been shown to be powerful predictors of persistent pain, culminating in a vicious cycle.<sup>20,21</sup>

In line with the commonly held belief that tissue health and pain are correlated, traditional educational models teaching people about pain have similarly focused on anatomical, pathoanatomical and biomechanical explanations.<sup>22</sup> In acute, sub-acute or perioperative conditions, these biomedical explanations may be helpful to explain the pathology and biomechanics of the injury portion of a pain experience to patients, but they fall short of explaining persistent pain.<sup>10,22</sup> Additionally, there is growing evidence that biomedical models used in explaining a pain experience may actually induce more fear and anxiety, which in turn have been linked to the development and maintenance of persistent pain.<sup>23,24</sup> It is within these traditional models that a clinical and potentially, societal, dichotomy exists that adds to the current pain epidemic.<sup>9,25</sup> This dichotomy refers to the poor correlation between the health of a person's tissues and the pain they may be experiencing.<sup>10,17</sup> Most traditional pain models have perpetuated a model whereby the level of tissue injury and pain and disability were seen as synonymous, which is contrary to emerging pain science research.<sup>18,19</sup>



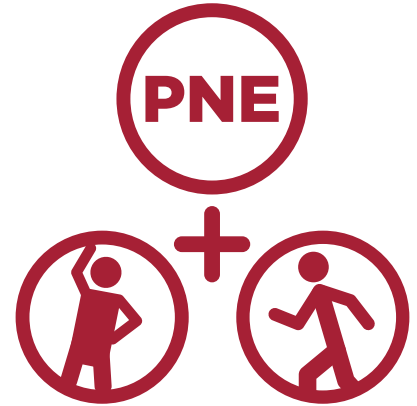
Some specific issues pertaining to Pain Neuroscience Education:



Delivered primarily by physical therapists as verbal one-on-one education with the use of metaphors, examples, pictures and books.<sup>28,33</sup>



Typically delivered in fifteen to thirty minute sessions once or twice a week for four to six weeks.<sup>34-37</sup>



PNE combined with movement and exercise is superior to education alone in decreasing pain and disability.<sup>28,33</sup>

**Guide to Abbreviations:**

**NNT:** The numbers needed to treat (NNT) refers to the effectiveness of a treatment. The lower the number, the more effective the treatment. For chronic pain the NNT refers to when patients experience a 50% reduction in pain or dysfunction. For example, the NNT for PNE shows that for every 3 people who receives PNE, one in three end up with a 50% reduction in pain. In comparison, when patients with chronic pain receive gabapentin, one in 6 end up with a pain reduction of 50% in a similar time frame.

**SSRI:** Selective Serotonin Reuptake Inhibitor. Examples include Celexa™, Lexapro™, Prozac™, Paxil™, and Zoloft™.





Patient has low back and leg pain.

**OLD APPROACH**



Patient consults with spine surgeon and decides to undergo low-back surgery. Surgeon gives patient 10-15 minutes of preoperative education regarding the surgery, procedures and recovery.

**NEW APPROACH**



- 1 visit
- 30 minutes
- \$3 booklet

Patient also visits a physical therapist for preoperative education regarding pain science and a booklet to take home.



Patient undergoes low-back surgery.



**Patient is tracked for one year after surgery.**



Patient doesn't understand how pain works and worries about post-operative pain. Patient undergoes additional imaging, tests and treatments.

Patient understands what pain is and how it works and has realistic expectations for post-operative pain. Patient undergoes standard follow-up.



After one year, both patients have the same outcome regarding back pain, leg pain, fear of work, fear of physical activity, pain catastrophization and function. Substantial differences are observed in average cost and level of satisfaction.

Patient is significantly less satisfied with surgery.

Avg. cost for imaging, tests and treatments:

**\$4,833**

Patient is significantly more satisfied with surgery.

Avg. cost for imaging, tests and treatments:

**\$2,678**  
(45% cost savings)

**600,000 discectomies** were performed in the US in 2012

If the cost savings per patient were applied, it would account for an annual savings of **\$1.2 billion**

## Pain Neuroscience Education

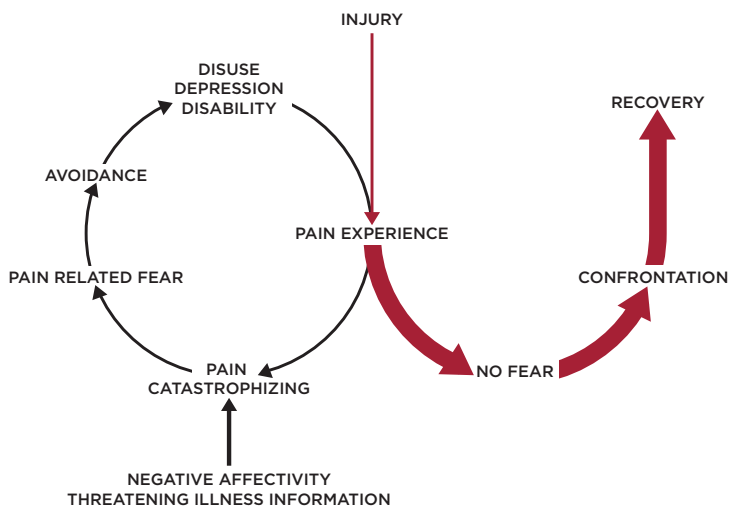
In recent years, born out of this dichotomy, clinicians and scientists explored the notion of teaching people more about pain.<sup>26,27</sup> This type of education is referred to as pain neuroscience education (PNE).<sup>11,28-30</sup> PNE is an educational strategy used by physical therapists that focuses on teaching people in pain more about the biological and physiological processes involved in their pain experience.<sup>27,31,32</sup> Current best-evidence provides strong support for PNE to positively influence pain ratings, dysfunctions, fear-avoidance, and pain catastrophization, limitations in movement, pain knowledge and healthcare utilization.<sup>28,33</sup>



## Preemptive Pain Neuroscience Education

In regards to prevention, PNE is now being explored in acute and perioperative studies.<sup>11,39</sup> It is hypothesized that by educating patients more about the biology and physiology of a pain experience, they actually change seeking behaviors related to healthcare utilization.<sup>11</sup> For example, a recently developed preoperative PNE program was tested in a multi-center randomized clinical trial with one and three year outcomes.<sup>11,39,40</sup> One year after surgery; the group that received PNE

had similar rates of pain and disability compared to the patients who did not receive PNE, but demonstrated a substantial reduction in postoperative medical utilization.<sup>11</sup> 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.<sup>24</sup> A key element of the preoperative PNE was that pain after lumbar surgery was to be expected, normal, and over time would calm down.<sup>39</sup> 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.<sup>9</sup> The results from the 1-year follow-up was sustained two years with publication of the 3-year outcome study. Upon completion of the preoperative PNE program for lumbar surgery, the same research team started trials on preoperative PNE for total knee arthroplasty and shoulder surgery.

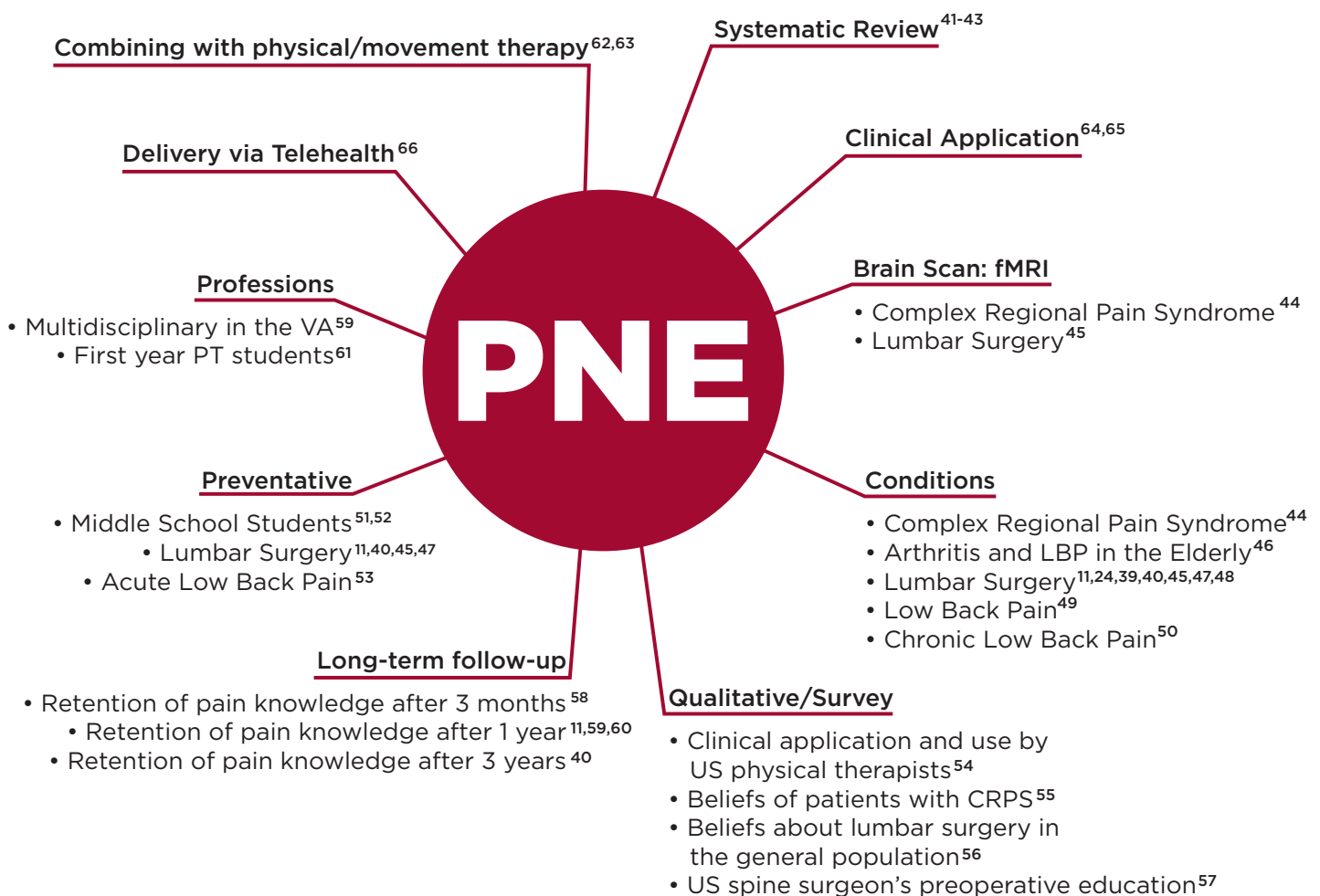


## Pain Neuroscience Education and International Spine and Pain Institute

The following series of studies pertaining to PNE has been conducted by the ISPI research team:

- » Adriaan Louw PT, PhD
- » Emilio “Louie” Puentedura PT, DPT, PhD
- » Ina Diener PT, PhD
- » Kory Zimney PT, DPT, PhD (c)
- » Terry Cox PT, DPT, PhD (c)
- » Stephen G. Schmidt PT, MSc (physio)

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