



A Non-Pharmacological Multidisciplinary Pain Program within a Hospital Wellness Program: A Mixed Methods Study

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Abstract

Background: Chronic pain is complex and often needs a multi-disciplinary approach focusing on changing cognition (education), movement, and strategies to calm down a hypervigilant nervous system. In the United States (US), multidisciplinary pain programs are expensive, have long waiting periods, not readily accessible and often heavily focused on pharmaceutical interventions and more imaging. Many healthcare systems provide wellness programs, accessible to communities and often inexpensive or free. The primary aim of this study was to determine if a non-pharmacological pain program, delivered by a multidisciplinary team in a wellness program yields positive results.

Methods: Over a 2-year span, data was collected on 35 participants in a hospital-based wellness program, focusing on pain neuroscience education (PNE), different forms of exercise and various strategies aimed to calm a hypervigilant nervous system (i.e., relaxation, mindfulness-based-stress reduction, coping skills, etc.). Prior to and immediately following the 4-week program, pain knowledge (Revised Neurophysiology of Pain Questionnaire – rNPQ), pain catastrophization (Pain Catastrophization Scale – PCS) and kinesiophobia (Tampa Scale of Kinesiophobia – TSK) was measured. At the completion of the program, patients were surveyed regarding their experience with the program.

Results: At the completion of the study, all formal measures increased significantly – rNPQ ($p < 0.001$), PCS ($p < 0.004$) and TSK ($p < 0.001$), with various patients moving below cut-off scores. Patients highly recommended the class (means score of $8.81 \pm 1.69/10$), citing learning more about pain and additional ways to treat their pain non-pharmacologically as key take-aways.

Conclusion and Relevance: A non-pharmacological, multi-disciplinary pain program, embedded in a wellness program of a healthcare system, yield positive shifts in pain knowledge, pain catastrophization and kinesiophobia, and patients value the program. Delivering such a pain program into existing wellness programs may allow for more local, evidence-based, affordable care for patients with chronic pain within their local communities.

Keywords: Pain Neuroscience Education; Multidisciplinary; Non-Pharmacological; Wellness Program; Chronic Pain

Abbreviations

MCID: Minimal Clinical Important Difference; MDC: Minimal Detectable Change; PCS: Pain Catastrophization Scale; PNE: Pain Neuroscience Education; PT: Physical Therapy; rNPQ: Revised Neurophysiology of Pain Questionnaire; TSK: Tampa Scale of Kinesiophobia; US: United States of America.

Introduction

Epidemiological data shows that approximately one in five people in the world suffer from some form of chronic pain, with nearly seventy percent tied to musculoskeletal disorders [1]. The prevalence of chronic pain is increasing, when compared to data thirty years ago [1,2]. Chronic pain leads to suffering, loss of productivity, disability, increased healthcare utilization, increased mental and behavioral health issues, and more [2]. To date, most of the data comes from developed countries, and it is anticipated as data emerges from developing countries and regions around the globe, the prevalence and impact of chronic pain may increase [3]. Specific to the United States (US), chronic pain led to the well-documented opioid epidemic, which highlighted the struggle to address chronic pain [4,5].

In lieu of the opioid epidemic, focus must shift to providing non-pharmacological treatments for chronic pain [6]. Current best-evidence non-pharmacological treatments for chronic pain centers around three distinct, yet intertwined treatment options. First, it's proposed that treatment must include a cognitive intervention to address maladaptive beliefs including fear-avoidance, pain catastrophizing and more [7]. These cognitive treatments may include pain neuroscience education (PNE), cognitive behavioral therapy, trauma informed care, positive psychology, acceptance and commitment therapy and more [8]. The primary aim of the cognitive intervention is usually center around reduced fear, fear-avoidance and pain catastrophizing, which allows people in pain to move more, which is the second key element of the best-evidence non-pharmacological treatment for chronic pain [7,8]. Increased movement can be achieved via traditional strategies such as aerobic exercise, resistance exercise, stretches, range of motion, isometric exercises and more [9,10]. Additionally, non-traditional movement strategies such as yoga, Pilates, Tai Chi, and more can be used to enhance and facilitate movement [11].

Finally, non-pharmacological treatment should also include strategies to decrease sensitization of the nervous system, including breathing exercises, mindfulness-based stress reduction, nutrition, sleep hygiene training, relaxation and more [12,13]. Calming of the peripheral and central nervous system is currently a key focus in medicine and medical research with a heavy focus on pharmaceutical

options such as membrane stabilizers and low-dose anti-depressants [14]. The combination of cognitive treatment, movement and calming of the nervous system provides a comprehensive approach that allows clinicians to truly treat chronic pain from a biopsychosocial approach [15].

Chronic pain is complex, which implies its treatment is complex, and often includes various providers specializing in different aspects of the patient's pain experience, i.e., a multidisciplinary approach [15,16]. In the US, multidisciplinary care for chronic pain is significantly lacking, including long waiting lists, high cost, limited regional and local availability and heavily focused on interventional and pharmacological management and imaging [17-21].

In physical therapy (PT), PNE has emerged as a cognitive intervention for patients with chronic pain to educate patients more about the underlying biological and physiological aspects of their pain experience [22]. Various systematic reviews and meta-analyses have shown the positive effects of PNE for chronic pain including decreased self-reported pain, disability, fear-avoidance, pain catastrophizing, healthcare utilization and increased movement despite pain [23-27].

By combining PNE with various forms of movement (i.e., aerobic exercise, resistance exercises, etc.), as well as strategies proven to decrease sensitivity of the nervous system (i.e., mindfulness-based stress reduction, breathing, relaxation, etc.), it aligns with current best-evidence treatment for chronic pain, especially from a non-pharmacological perspective [28-30]. This PNE-approach has since been used as a springboard to educate more healthcare professionals regarding pain science, with the intent to increase pain knowledge and literacy, to allow for a unified approach to patients with chronic pain [31-33].

In healthcare, education is seen as a cornerstone in changing patient behaviors. To this end, numerous hospitals and healthcare institutions provide community education and classes on various healthcare topics [34,35]. This may, for example, include education on nutrition, exercise, fall risk, smoking cessation etc.

Many of these educational programs are often built and executed in a wellness program associated with the hospital or healthcare system. To date, very few of these wellness programs focus on pain, especially chronic pain. The primary aim of this study was to determine if a non-pharmacologically focused pain program, delivered by a multidisciplinary team in a wellness program yields positive results, allowing programs such as this to be scaled within wellness programs. A secondary aim was to gain patient perspectives following the program to determine patient preferences and value for such a program.

Methods

Design

This study was a retrospective, mixed-methods, quality improvement study.

Institutional Review and Ethics Approval

Froedtert Holy Family Memorial Medical Center in Wisconsin has a Holy Family Memorial Wellness Center. As patients enroll in various wellness programs, deidentified data is collected by the program prior to and after the various wellness classes to help with quality improvement. Data for this study was obtained from these quality improvement studies, and The Froedtert Health Compliance and Legal Departments and the Medical College of Wisconsin Institutional Review Board deemed this retrospective data collection to be a quality improvement project which is considered non-human subject research and not subject to institutional review board.

Intervention

A PT with advanced post-professional education in PNE developed the multidisciplinary pain program to be

delivered in the wellness clinic. The program was based on the current best-evidence for the non-pharmacological treatment of chronic pain [15,22]. The multidisciplinary team included a PT, a licensed counselor, dieticians, a psychologist, exercise physiologist, yoga instructor and personal trainer. Supplemental printed education materials were created by PTs, a nurse, and a dietician. The program consisted of seven sessions over 4 weeks, for a total of twelve hours of instruction (Figure 1). The program consisted of PNE, exercise, goal setting, sleep hygiene, breathing exercises, mindfulness/relaxation techniques, education on nutrition, yoga, and Tai Chi (Figure 1). Classes were held at Holy Family Memorial Wellness Center, part of Froedtert Holy Family Memorial. Education sessions were delivered in a small conference room, and the Tai Chi and yoga sessions were held in an exercise studio room. The PNE content used for this program has been used in various studies focusing on chronic pain [36,37]. The PNE centered around four key pillars of recovery – education (PNE), sleep (hygiene), movement and goal setting [22,38]. The PNE covered modern pain science including discussions of peripheral sensitization, central sensitization, biopsychosocial factors associated with pain, threat appraisal of the brain, nociception, stress, and endocrine responses in pain as well as various therapeutic endogenous strategies to ease pain [22,36-39].

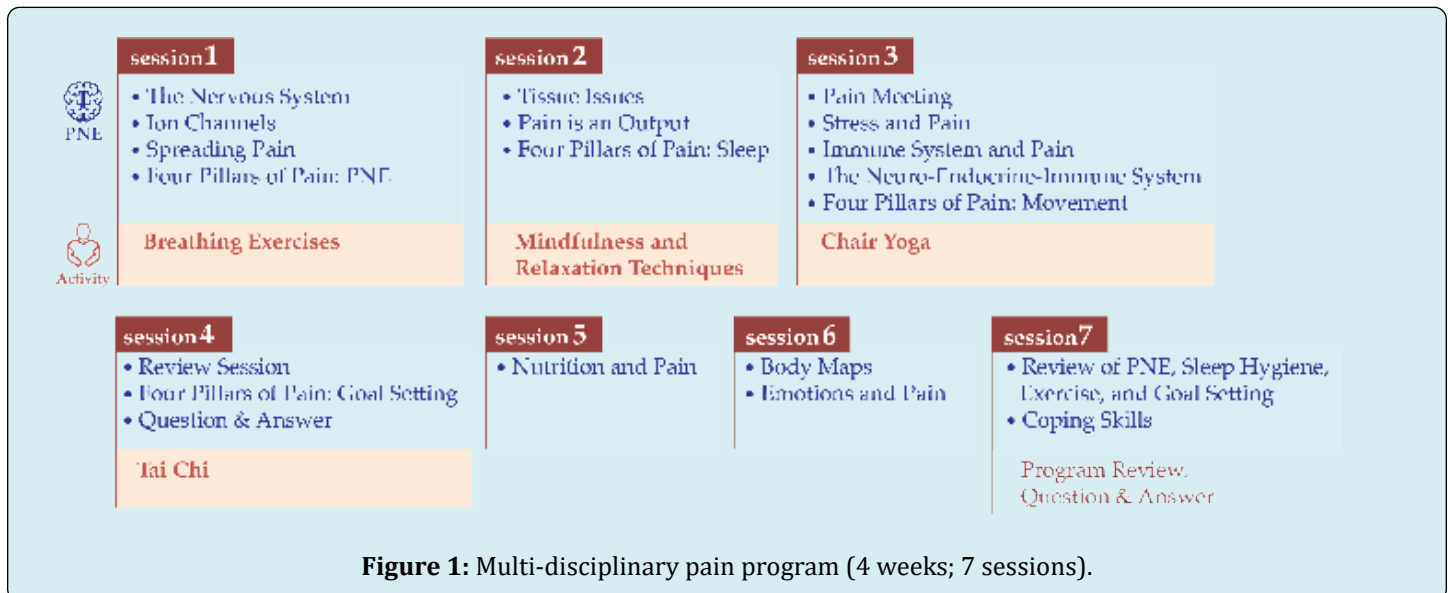


Figure 1: Multi-disciplinary pain program (4 weeks; 7 sessions).

Participants

Between February 1, 2022, and March 7, 2024, seven cohorts of the class were completed with a convenience sample of 41 participants starting the program. Of the 41 participants that started the program, 35 participants (28 identifying as female, 7 male) provided complete data sets. The average age of participants with complete data sets was 67.57 years (range 52-85 years). Participants were gathered

through advertising via social media, signage within the facility, and through facility newsletters, as well as through verbal recommendations from Wellness Center Staff and health care Providers. Participation in this program was completely voluntary. To sign up, participants reviewed and signed a waiver and release for the Wellness Center if they were not already a Wellness Center Member, which included informed consent for the use of their image, likeness, and voice. There were no exclusion criteria for participation in

the class. However, participants identified as either a person living with chronic pain or as a family member of someone living with chronic pain. The program (4 weeks; 12 hours) was provided for a fee of \$75. Participants had the option of applying for subsidization of this fee through a Wellness Fund, if they cited a financial hardship.

Measures

Participants were assigned a 6-digit code for use when completing outcomes forms, so that no personal information was gathered or shared with the research team. Formal measurements included:

Pain knowledge: Pain knowledge was measured using the revised Neurophysiology of Pain Questionnaire (rNPQ). The rNPQ is based on a current pain science text and was used in previous studies measuring the neurophysiology knowledge of patients and health care personnel [40,41]. The rNPQ is a 12-item test requesting “true,” “false,” or “not sure” answers to statements, with higher scores indicating more correct answers. The questionnaire was adapted similar to a previous study to make it easier for patients to understand (i.e., “nociception” was replaced with “danger messages”). No data is available in patients or healthy controls as to what constitutes a meaningful shift in rNPQ scores. Previous patient studies have reported a mean post-PNE shift of approximately 20-30% [40].

Pain Catastrophization: Pain catastrophization was measured using the Pain Catastrophization Scale (PCS) [42]. The PCS is a self-report questionnaire that assesses inappropriate coping strategies and catastrophic thinking about pain and injury. The PCS has been used in previous pain science studies and demonstrated strong construct validity, reliability and stability [43]. The PCS utilizes a 13-item, 5-point Likert scale with higher scores indicating elevated levels of catastrophizing. Previous studies utilizing the PCS have shown a median score of 18 in healthy individuals, and in patients with pain, the PCS is generally higher [42]. A score of more than 30 out of 52 has been reported as a cut-off score for high levels of catastrophization. In patients with musculoskeletal pain, the minimal detectable change (MDC) is reported as 9.1, and the minimal clinical important difference (MCID) has not been established [42,43].

Fear of Movement: To evaluate the participant’s pain-related fear of movement and (re)injury the original 17-item Tampa Scale of Kinesiophobia (TSK) was used [44]. Each item is scored on a four-point Likert-type scale that ranges from strongly agree [1] to strongly disagree [4]. Total scores range from 17 to 68, and higher scores indicate more fear of movement and/or (re)injury. In patients with musculoskeletal pain, the MDC for the TSK is reported to be 5.6, and the MCID has not been established [44]. A cut-off score of >37 has been

reported as a high level of kinesiophobia.

Participants completed the rNPQ, PCS and TSK prior to the start of class session 1. The outcome measures were completed again, immediately following the conclusion of the last class, session 7, four weeks later. In addition, participants completed a Wellness Center Class Feedback Survey upon completion of the course in week 4, which included open-ended questions requesting write-in answers, closed-ended questions, and a Likert scale question regarding the likelihood of referring friends or family to the program.

Statistical Analysis

The survey data was extracted and entered into Excel spreadsheet. The results of the study were evaluated using SPSS (version 22.0, IBM Corporation). Descriptive statistics of means, standard deviations, and percentages were reported on student group characteristics. Within-group repeated measures and between-group analyses for pain knowledge, pain catastrophizing and kinesiophobia were done using a two-way mixed ANOVA on complete-case analysis. The level of significance was set at $p < 0.05$. Qualitative data was constructed around the main themes. The primary authors analyzed the individual responses to each question and determined the main themes. Each reviewer’s main themes were combined by two reviewers.

Results

Pain Knowledge

Prior to the wellness program the mean score for the rNPQ was 5.57 (46.4%), and post-program, mean rNPQ scores were 7.91 (65.9%) for an increase of 19.5% ($p < 0.001$) (Figure 2).

Pain Catastrophization

Prior to the wellness program the mean score for the PCS was 18.21, and post-program, mean PCS scores were 13.63 ($p < 0.004$) (Figure 2). The mean change did not meet the MDC for the PCS. Prior to the program, 8 patients (22.9%) exceeded the cut-off score for a high PCS score (>30), whereas 5 exceeded the cut-off at the conclusion of the program (14.3%).

Kinesiophobia

Prior to the wellness program the mean score for the TSK was 39.34, and post-program, mean TSK scores were 35.73 ($p < 0.001$) (Figure 2). The mean change did not meet the MDC for the TSK. Prior to the program, 20 patients (57.1%) exceeded the cut-off score for a high TSK score (>37), whereas 12 exceeded the cut-off at the conclusion of the program (34.3%).

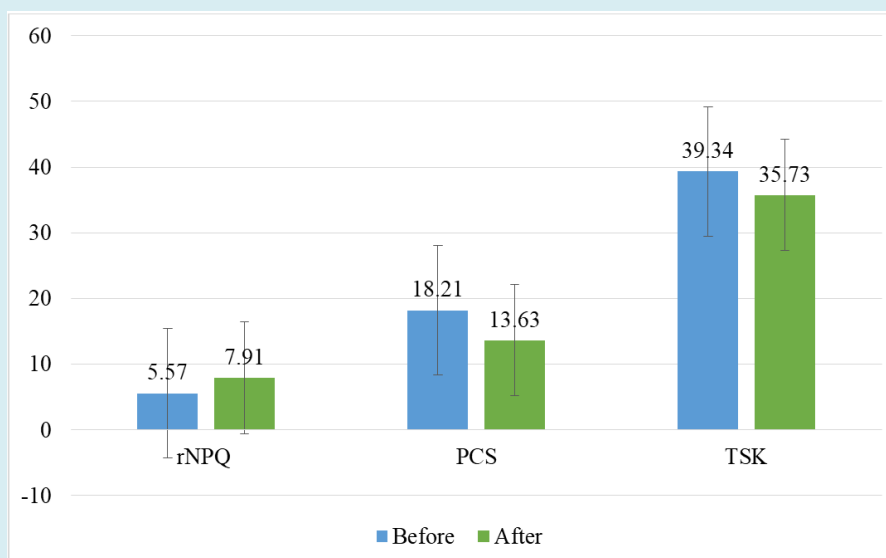


Figure 2: Pre-and post-program scores for pain knowledge (rNPQ), pain catastrophization (PCS) and kinesiophobia (TSK).

Patient Experience

On a Likert scale (0 not likely at all, 10 very likely) of how likely they are to recommend this class to a friend or family member, patients reported a means score of 8.81 (\pm 1.69).

All patients ($n = 35$) reported that the pace of the material was “appropriate” (100%) and the amount of material was “appropriate” (100%). Table 1 showcases the main themes extracted from patient feedback at completion of the program.

Biggest take-away from the program?
The importance of exercise and movement with graded exposure and pacing
Learning more about how pain works and increasing understanding of pain
Lots of ways to help pain, i.e., sleep, exercise, nutrition
Topics and/or activities they found most beneficial?
Diet, nutrition and pain
Lots of ways to help pain, including the 4 pillars
Everything – a lot of good information
Tai Chi and Chair yoga
What topics and/or activities did they not like and why?
Chair yoga
Sitting a lot
If they were to recommend this class to a friend, what would they say to them?
You learn a lot about pain
Lots of things you can do for your pain
Was very helpful and gives hope
How can we improve your experience?
Keep as is – not too many changes
Shorter classes
Add information on medications

Table 1: Patient feedback after completion of the program.

Discussion

The results from this study show that a non-pharmacological, multi-disciplinary pain program, embedded in a wellness program, yield positive shifts in pain knowledge, pain catastrophization and kinesiophobia. From a patient perspective, the program was seen of value, allowing increased knowledge and understanding of pain, as well as non-pharmacological ways to help their pain and disability.

In this study, the results related to pain knowledge, pain catastrophization and kinesiophobia mirror previous PNE study results [36,37,40,45,46]. A growing number of studies show that patients, in different clinical settings and dealing with different chronic pain diagnoses, increase their knowledge of pain after receiving PNE. The 19% increase in pain knowledge is in line with other studies [40]. This increase in pain knowledge has been postulated to be a key part of the reconceptualization of pain in patients, allowing for a decrease in fear, especially related to movement, as well as provide hope, which is reflected in a decrease in catastrophization [46]. Both these shifts were also observed in this study, which underscores the fact that a non-pharmacological, PNE-based, multi-disciplinary study can be a viable addition to healthcare systems wellness programs. The quantitative results from this study are supported by the qualitative data, whereby patients reported the increase understanding of pain as the primary benefit of the program. It is well documented that high levels of fear, fear-avoidance and kinesiophobia powerfully predict pain behaviors, including limiting much-needed movement [7]. The current evidence strongly favors various forms of movement and exercise as a key part of improving disability, self-efficacy and pain relief. High levels of fear, fear-avoidance and kinesiophobia hinder a patient's willingness to move, and normalizing these maladaptive cognitions are often needed prior to, or in combination of movement-based therapies [15,45]. In this study, the combination of education and various movement strategies were key to the different results. In addition to altering cognitions and increased movement, additional strategies of the program (i.e., nutrition, coping skills, breathing, relaxation, mindfulness-based stress reduction), provided the much-needed third component of a comprehensive pain program – strategies to calm down a hypervigilant nervous system [12]. Adding these strategies not only aligned with current best evidence but were also valued by patients to teach them ways to help their pain, thus increasing self-efficacy.

In the current rehabilitation environment in the US, group-therapy remains a struggle, primarily due to reimbursement. In outpatient, orthopedic and private practice, reimbursement is tied to fee for service and heavily

weighted towards one-on-one care, with limited ability to develop, implement and delivery group therapy, including group therapy sessions for chronic pain. Most group therapy sessions for chronic pain are often found in federally funded systems (i.e., Department of Veteran's Affairs, Department of Defense) [47,48], or large healthcare systems that add pain programs which can be offset financially with funded procedural medical interventions (i.e., injections, nerve-ablations), and imaging studies. In the US multi-disciplinary care programs for chronic pain are expensive, limited in availability, not readily available in local communities and often have long waiting lists [17-21]. The results of this pilot study show that a community-based program can be developed, implemented and meet patient needs when placed within already-available programs, such as wellness programs. Given the global epidemic of chronic pain, it is time for hospitals and healthcare systems to expand wellness programs to not only address well-known and well-understood issues such as obesity, smoking cessation and fall risk, but also chronic pain. In this study, the most a patient would have paid was \$75 for the 7-session program, averaging just over \$10/session, which is significantly less than the current average outpatient physical therapy co-pay of nearly \$40/visit [49], thus alleviating an additional burden for patients and access to a much-needed, non-pharmacological program for chronic pain. With approximately 70-80 million American suffering from chronic pain [18], and the vast healthcare system in the US, adding a multi-disciplinary, non-pharmacological program that serves the local community and is cost-effective, to existing wellness programs, may be a powerful way to meet patient needs.

The study contains various limitations. First, as a retrospective, quality control study, various potentially key data sets were missing and would have added to the study, i.e., self-reported pain ratings, disability, patient demographic information, etc. Tracking self-reported pain and disability would have allowed insight to determine if the changes in pain knowledge, pain catastrophization and kinesiophobia were correlated to shifting those two key variables which typically are used to determine success of musculoskeletal interventions. Second, the results obtained for this study were only gathered at the conclusion of the study, with no longer-term follow-up available. Various behavioral studies have shown that true behavioral change occurs after six months, and future studies should at minimum track post-intervention data for 6 months.

Conclusion

A non-pharmacological, multi-disciplinary pain program, embedded in a wellness program of a healthcare system, yield positive shifts in pain knowledge, pain catastrophization and kinesiophobia and patients valued the program to learn

more about pain and find additional, non-pharmacological strategies to ease their pain. Building and executing such a pain program into existing wellness programs may allow for more local, evidence-based, affordable care for patients with chronic pain within their local communities.

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