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Original Report

Children With Chronic Pain: Response Trajectories After Intensive Pain Rehabilitation Treatment

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Abstract: **Intensive pain rehabilitation programs for children with chronic pain are effective for many patients. However, characteristics associated with treatment response have not been well documented. In this article we report trajectories of pain and functional impairment in patients with chronic pain up to 1 year after intensive pain rehabilitation and examine baseline factors associated with treatment response. Patients (n = 253) with chronic pain and functional disability were assessed at 5 time points (admission, discharge, 1-month, 4-month, and 12-month follow-ups). Individual trajectories were empirically grouped using SAS PROC TRAJ. For functional disability, 2 groups emerged: treatment responders (88%) and nonresponders (12%). Using a binomial logistic regression model to predict disability trajectory group, no baseline variables were significant predictors for the disability trajectory group. For pain, 3 groups emerged: early treatment responders (35%), late treatment responders (38%), and nonresponders (27%). Using multinomial regression analyses to predict pain trajectory group, older age, higher pain scores, fewer social difficulties, higher anxiety levels, and lower readiness to change were characteristics that distinguished nonresponders from responders; no significant predictors distinguished the late responders from the early responders. These results provide key information on the baseline factors that influence intensive pain rehabilitation outcomes, including risk factors that predict treatment nonresponse. Our findings have implications for developing more targeted treatment interventions.**

Perspective: ***Deriving groups of individuals with differing treatment response trajectories stimulates new thinking regarding potential mechanisms that may be driving these outcomes.***

Key words: *Chronic pain, child and adolescent, treatment response, intensive rehabilitation.*

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Recent studies provide evidence supporting an intensive pain rehabilitative approach to the management of complex pediatric chronic pain.[12,19,29] This approach encompasses daily physical, occupational, and psychological therapy focused on helping children return to premorbid levels of functioning through progressively engaging in previously avoided activities and taking a self-management approach to pain. Intensive pain rehabilitation is time-intensive, costly (>$30,000),[6] and often the last hope for families who have not experienced success in outpatient treatment. Because of these constraints, identifying patients most likely to benefit as well as having an understanding of anticipated outcomes over time within the context of this treatment approach is imperative. In evaluating pain treatment success, functional disability as well as pain intensity are considered key outcome measures.[23]

Few studies have examined trajectories of pain and disability over time among youth engaged in intensive pain rehabilitation. One study examined stability of treatment response from 3- to 12-month follow-ups and qualitatively categorized patients into 4 groups: stable long-term improvers (46%), late improvers (14%), short-term improvers (19%), and unsuccessful treatment/nonresponders (22%).[13] In examining group differences according to baseline characteristics, no difference according to age or pain diagnosis was observed, but some differences according to psychosocial variables emerged. Stable long-term improvers had significantly more school absences compared with nonresponders and short-term improvers had higher levels of generalized anxiety and depression than stable long-term improvers. A second study examined 24 to 42 month outcomes of intensive pain rehabilitation and identified 2 trajectories of treatment response for pain: patients with initially high pain ratings reporting large reductions in pain and patients with initially lower pain ratings showing smaller reductions.[1] Both response groups had similar rates of improvement in child school days missed, parent work days missed, and days hospitalized. Although these studies provide initial data characterizing trajectories of treatment response among patients who completed intensive pain rehabilitation, further work is needed. In addition to including previously examined factors of age, pain diagnosis, school functioning, anxiety, and depression, it is important to examine other known and influential variables. Higher levels of pain-related fear at admission to intensive pain rehabilitation has been associated with less improvement in functional disability during treatment,[26] and greater child readiness to change at baseline (higher contemplation scores) has been associated with greater improvement in functional disability during treatment.[20] Beyond these findings, recent theoretical models such as the resilience-risk model for pediatric chronic pain[4] provide a framework for examining a number of key influences such as social functioning,[27] parent protective behavior,[17,28] and pain catastrophizing[2,34] that have not yet been examined in this context and were thus considered important for inclusion in the current study.

The aim of the current study was to investigate trajectories of functional impairment and pain symptoms across and up to 1 year after intensive pain rehabilitation, and to identify characteristics at baseline that predict long-term success or nonresponse using this treatment approach. Because previous work has yielded 2 to 4 trajectories of treatment response, we took a parsimonious approach and hypothesized that for disability as well as for pain there would be at least 2 groups derived: treatment "responders" and "nonresponders." On the basis of previous work for baseline differences, we anticipated that the nonresponder group would, at baseline, have higher levels of pain-related distress (catastrophizing, fear), worse social functioning, higher levels of generalized distress (anxiety, depression), lower levels of readiness to change, and higher levels of protective parenting behavior.

Methods

Setting and Participants

Participants were 280 children and adolescents who completed an intensive interdisciplinary pediatric pain rehabilitation day program from July 2009 to March 2014. In total, 301 patients enrolled in the program during that time period. Patients not included in the analysis did not consent to participate (n = 9), were not approached because of a developmental delay (n = 5), were immediately discharged from the program because of psychological or medical reasons (n = 4), or left the program against medical advice (n = 3). The pain rehabilitation program has historically targeted patients, ages 8 to 18 years, with persistent extremity pain with neuropathic features and significant impairment of mobility and limb use (eg, complex regional pain syndrome [CRPS]), although more recently the patients served has expanded (as can be observed in Table 1). Program eligibility included failure to progress using conventional outpatient physical and cognitive behavioral therapies. Although many patients had psychological challenges, those with active suicidality, psychosis, or an eating disorder before enrollment were not eligible for admission. All patients were evaluated through our multidisciplinary outpatient pain treatment clinic before admission.

Treatment Interventions

Program Overview

When these data were collected the rehabilitation program entailed intensive daily physical, occupational, and psychological therapies 8 hours per day, 5 days per week for an average length of stay of 3 to 4 weeks. A typical treatment day began with three 1-hour blocks of individual physical therapy (PT), occupational therapy (OT), and psychological therapy (1 hour each) followed by a 2-hour period for studying and lunch. The subsequent 2 hours consisted of a 1-hour session of group PT or OT and a 1-hour session of group psychological therapy. For the final hour of the day, patients participated in either family psychotherapy (twice per week) or parent-observed individual PT or OT sessions (3 times per week). A physician