



Current Concepts in Physiatric Pain Management

Managing Chronic Pain in Children and Adolescents: A Clinical Review

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Abstract

Chronic pain in children and adolescents can be difficult for a single provider to manage in a busy clinical setting. Part of this difficulty is that pediatric chronic pain not only impacts the child but also the families of these children. In this review article, we discuss etiology and pathophysiology of chronic pain, along with variables that impact the severity of chronic pain and functional loss. We review diagnosis and management of selected chronic pain conditions in pediatric patients, including headache, low back pain, hypermobility, chronic fatigue, postural orthostatic tachycardia syndrome, abdominal pain, fibromyalgia, and complex regional pain syndrome. For each condition, we create a road map that contains therapy prescriptions, exercise recommendations, and variables that may influence pain severity. Potential medications for these pain conditions and associated symptoms are reviewed. A multidisciplinary approach for managing children with these conditions, including pediatric pain rehabilitation programs, is emphasized. Lastly, we discuss psychological factors and interventions for pediatric chronic pain and potential complementary and alternative natural products and interventions.

Introduction

A clinical review of pediatric chronic pain requires an understanding of etiology, biology, and current clinical management perspectives in treating children and adolescents with variable presenting features associated with chronic pain. Even though the focus of this article is on the pediatric patient with chronic pain, there are limited empirical data related to the treatment of many chronic pain conditions in this population. Therefore, this review is not systematic but represents the clinical expertise of the authors, combined with the current available data when the greatest level of evidence was limited or extrapolated from the adult literature. The purpose of this review is to help guide the clinician in improving the pain and function of the pediatric patient with chronic pain. Emerging evidence regarding the lack of effectiveness in medication-based treatments alone emphasizes the role of a multidisciplinary approach and continues to expand our understanding of the challenges facing the management of chronic pain in children and adolescents.

Prevalence of Pain in Children

Pain is common in children and adolescents, with estimates ranging from 20% to 46% of children worldwide affected by varying types of chronic pain [2,3]. In adults, it is estimated that 19%, or 39.4 million, of Americans suffer from chronic pain, with two-thirds of those reporting their pain as “constantly present,” and 50% as “unbearable and excruciating” [4]. In children and adolescents, Mikkelsen et al [5] found that as many as one-third experience some manner of weekly musculoskeletal pain. The greatest risk of developing persistent pain was seen in individuals with day-time fatigue, headache, or those participating in vigorous activity and hence more likely to experience some sort of traumatic event [6].

The reason for any perceived or actual increase in the rate of childhood chronic pain is unclear but probably multifactorial. Increased pain identification, stress and anxiety, poor role-modeling, and maladaptive pain behaviors and attitudes are all areas of concern. The Institute of Medicine’s report in 2011 on chronic pain

proposed that, in many cases, chronic pain is a disease in its own right and therefore demands direct, appropriate treatment [7]. Perhaps a greater recognition of chronic pain syndromes by the public together with the development of new treatments is triggering families to seek potential solutions for conditions that historically were considered untreatable.

Impact of Pain on Children and Families

Many of these children experience significant physical, psychological, and social sequelae that affect not only themselves but also family and friends. There is a substantial financial burden on the individual and family, with direct and indirect costs of health care use and lost wages. The economic impact on society as a whole is large. A 2014 report estimation of total health care costs for adolescents with moderate-to-severe chronic pain to be around \$19.5 billion annually in the United States [8]. In comparison, estimates for adults with chronic pain reach upwards of \$500-600 billion annually [7]. In addition, childhood pain is not necessarily an isolated event of growth and development that improves with age. Convincing evidence exists that childhood chronic pain predisposes an individual, not only for continuation of pain, but also for development of new and different types of pain into adulthood [9].

Etiology and Pathophysiology of Chronic Pain

Various concepts have emerged that begin to explain the clinical presentation of chronic pain. There exists a complex interaction between primary afferent nerves, dorsal horn neurons, spinal glia, neurotransmitters, and other factors that propagate and perpetuate the symptoms of chronic pain. Many individuals present with chronic pain well after the damage from an acute injury has resolved. During an acute injury, damaged or inflamed tissues release growth factors and procytokines among other neuromediators. The release of similar mediators in the spinal cord is triggered, which then activates and up-regulates certain phenotypes of spinal glia, thus altering their activity and leading to an overall increase in excitability [10]. Central sensitization with wind-up phenomenon describes this state of dysregulated nociception with increased dorsal horn activity, which then triggers an exaggerated response to both painful (hyperpathia) and nonpainful (allodynia) stimuli over a wide anatomic field. This process may not only happen with direct physical injury but also after illness, significantly traumatic psychological events, uncontrolled stress, and even physical inactivity [11-14].

Changes in neurotransmitter function may play a role in chronic pain as increased levels of substance P and glutamate increase sensitivity to pain, whereas decreased levels of inhibitory serotonin and

noradrenaline seem to limit the body's ability to diminish the pain response [15-17]. Brain-derived neurotrophic factor is of potential interest because of its presence in and proposed impact on peripheral and central nervous systems. Brain-derived neurotrophic factor has been found to initiate neuronal repair but unfortunately also causes increased pain by both increasing the excitatory and reducing the inhibitory transmission in the dorsal horn [10]. Alterations in neurotransmitter regulation in the spinal cord appear to correlate with other changes along the hypothalamus-pituitary axis and are influenced, or affected by, stress, physical activity level, illness, sleep patterns, and more [13,16-20]. There are perhaps even epigenetic factors influencing an individual's response to stress and pain that are related to significant early life stressors or abuse [11,21].

Variables That Perpetuate Chronic Pain

In addition to the biology of chronic pain, there are psychological characteristics such as emotional, cognitive, and behavioral factors that also influence pain. The emotional and cognitive factors include fear and avoidance of pain, maladaptive strategies for coping with pain, and influences of anxiousness and depressive symptoms. Other potential confounders of chronic pain for children and adolescents are parental behaviors regarding pain and cultural expectations about pain (Figure 1).

Although some youth with chronic pain have pre-morbid anxiety and depression, many develop anxiety and depression as a result of their pain. When a child has chronic pain that prevents him or her from participating in preferred activities such as sports and extracurricular activities, the loss of activities can also lead to a loss of positive reinforcement, friendships, and lower self-esteem, which can result in depression. Similarly, youth who have missed school and social opportunities may develop anxiety related to the stress of returning to school and other activities.

Pediatric patients with chronic pain often have older relatives with chronic pain and thus learn the meaning of pain and acceptable coping strategies in part by watching family members' response to pain [22]. A teenager who watches a parent cope with his chronic migraines by resting, staying home from work, and complaining may develop a different understanding of pain than a teenager who observes his parent cope with pain by using strategies such as relaxation, moderation, and continuing responsibilities. In addition to modeling pain coping strategies, parents' own distress and cognitions regarding their child's pain as well as their reaction to their child's pain influences pain intensity, expression, and disability [22]. For example, parental solicitous responses increased sick-role and pain behaviors in youth with recurrent abdominal pain [23,24].

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