

The Economic Costs of Chronic Pain Among a Cohort of Treatment-Seeking Adolescents in the United States

Cornelius B. Groenewald,^{*,†} Bonnie S. Essner,[†] Davene Wright,^{†,‡} Megan D. Fesinmeyer,[†] and Tonya M. Palermo^{*,†,‡,§}

Departments of ^{*}Anesthesiology and Pain Medicine, [‡]Pediatrics, and [§]Psychiatry, University of Washington School of Medicine, Seattle, Washington.

[†]Center for Child Health, Behavior, and Development, Seattle Children's Research Institute, Seattle, Washington.

Abstract: The aim of this study was to assess the economic cost of chronic pain among adolescents receiving interdisciplinary pain treatment. Information was gathered from 149 adolescents (ages 10–17) presenting for evaluation and treatment at interdisciplinary pain clinics in the United States. Parents completed a validated measure of family economic attributes, the Client Service Receipt Inventory, to report on health service use and productivity losses due to their child's chronic pain retrospectively over 12 months. Health care costs were calculated by multiplying reported utilization estimates by unit visit costs from the 2010 Medical Expenditure Panel Survey. The estimated mean and median costs per participant were \$11,787 and \$6,770, respectively. Costs were concentrated in a small group of participants; the top 5% of those patients incurring the highest costs accounted for 30% of total costs, whereas the lower 75% of participants accounted for only 34% of costs. Total costs to society for adolescents with moderate to severe chronic pain were extrapolated to \$19.5 billion annually in the United States. The cost of adolescent chronic pain presents a substantial economic burden to families and society. Future research should focus on predictors of increased health services use and costs in adolescents with chronic pain.

Perspective: This cost of illness study comprehensively estimates the economic costs of chronic pain in a cohort of treatment-seeking adolescents. The primary driver of costs was direct medical costs followed by productivity losses. Because of its economic impact, policy makers should invest resources in the prevention, diagnosis, and treatment of chronic pediatric pain.

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Key words: Chronic pain, adolescents, cost of illness, economic cost.

Moderate to severe chronic pain affects approximately 5% of children and adolescents.¹² As a group, children and adolescents with chronic pain seek more medical care, use more medications, miss more school, and report worse quality of life relative to their peers without pain.^{12,16} The societal economic costs of chronic pain are well established for adult populations. A recent Institute of Medicine report estimated the economic burden of chronic pain to

society from health care costs and lost work productivity to be more than \$600 billion annually.¹⁴ In contrast, the societal cost of pediatric chronic pain is not well defined, despite recognition that pediatric chronic pain frequently occurs and is associated with economic consequences on the health care system and on families (eg, parental lost work productivity). Because between 35% and 73% of children and adolescents with chronic pain are at risk for progressing into adulthood with chronic pain, it is important to consider the economic burden over a lifetime horizon.^{3,5,38}

Relatively little is known about the costs of chronic pain in childhood and adolescence, although economic factors have been identified as an important outcome domain to measure in pediatric chronic pain clinical trials.²⁰ Epidemiologic studies have reported increased rates of health services use by children with chronic pain in Europe and Asia.^{19,26,37} For example, Perquin et al found high rates of physician consultation (57%) and medication use (39%) in a community sample of

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Address reprint requests to Cornelius B. Groenewald, MB, ChB, Anesthesiology and Pain Medicine, Seattle Children's Hospital, M/S MB.11.500.3, 4800 Sand Point Way NE, Seattle, WA 98105. E-mail: Cornelius.groenewald@seattlechildrens.org
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children with chronic pain in The Netherlands.²⁶ Small single-site investigations have also reported on high rates of physician consultation. Toliver-Sokol et al found that in a sample of youth seeking care for chronic pain in an interdisciplinary U.S. pain clinic, 79.7% consulted health care providers, and 72.9% received prescribed medications for pain over the previous 6-month period. The mean number of health care visits over 6 months incurred by participants in this study was 19.63 (standard deviation [SD] = 16.87).³¹ Although these studies confirm high rates of health care use, they do not provide estimates of costs associated with health care use.

To our knowledge, only 2 published studies have reported on the economic costs of pediatric chronic pain. In a small cohort of 52 youths with both inflammatory-type (arthritis) and noninflammatory-type chronic pain, Slead et al estimated the mean annual cost per adolescent with chronic pain for the United Kingdom's National Health System at approximately \$16,400 (2012 dollars).^{21,30} In another small cohort study, Ho et al reported that children being treated with chronic pain in one interdisciplinary clinic incurred health care charges of \$1,760 for outpatient visits and \$7,020 for inpatient admissions over a previous 3-month period.¹¹ These 2 studies were limited by their small sample sizes and inclusion of youths at a single pain clinic, which limits generalizability to other youths with pain in the U.S. health care system.

To address these limitations in prior research, we aimed to conduct a cost of illness study with a larger, heterogeneous sample of adolescents with chronic pain being evaluated and treated at interdisciplinary pain clinics from across the United States. The goal of this study was to identify and describe the economic costs incurred by families of adolescents with idiopathic chronic pain. We sought to capture the main components of economic costs to society due to pain: 1) direct medical costs incurred by adolescents, 2) out-of-pocket costs incurred by parents, and 3) work productivity losses incurred by parents. We hypothesized that costs would be comparable to those incurred by youths with other chronic medical conditions. In addition, similar to findings in adults with chronic pain, we expected that a minority of patients would account for a large proportion of the total costs.²⁸

Methods

This study was approved by the Institutional Review Board at Seattle Children's Hospital. Families were recruited as part of an ongoing randomized controlled trial investigating the efficacy of a web-based cognitive behavioral therapy program for chronic pain (clinicaltrials.gov: NC01316471).²² Participants were a convenience sample who presented for initial evaluation and treatment of chronic pain to 1 of 11 collaborating pediatric pain treatment centers located in the United States. All of these 11 pediatric pain treatment centers provided adolescents with coordinated and comprehensive pain evaluation and management that would meet the International Association for the Study of Pain's definition of interdisciplinary/multidisciplinary pain centers.¹³ Participants received an interdisciplinary evaluation

consisting of at least an evaluation by a pain physician, psychologist, and physical therapist and also sometimes including nursing, rehabilitation medicine, social work, and psychiatry. Baseline data obtained prior to randomization to treatment conditions are included in this report.

Participants

Participants included adolescents who 1) were ages 10 to 17, 2) had idiopathic chronic pain of at least 3 months' duration, 3) had pain occurring at least 1 time per week that interfered with daily functioning, and 4) did not have serious comorbid conditions (eg, arthritis, cancer, diabetes). Idiopathic chronic pain was defined as chronic pain not associated with an identifiable underlying disorder that could reasonably explain their symptoms (eg, we excluded participants with chronic pain due to arthritis, cancer, and sickle cell disease). Study participation required completion of web-based questionnaires in English for both adolescents and parents, and thus participants were also excluded if they 1) were non-English speaking, 2) had no Internet access, or 3) had developmental disabilities. One hundred ninety-four families were eligible for enrollment; however, 45 declined, resulting in an overall enrollment rate of 77%.

Procedure

After the adolescent's initial evaluation in the pain clinic, providers (physicians, psychologists, and nurses) at collaborating centers used a web-based system to submit referrals of potentially eligible and interested families. The study coordinator screened potential participants by phone for eligibility. Written consent was obtained from parents, and written assent from adolescents. Following receipt of consent, the study coordinator then set up password-protected access for participants to the web-based program for data collection. Adolescents completed a daily pain diary for 7 days. Parents completed measures about family sociodemographics and health services use. Participants were compensated for their time with gift cards following the completed assessment.

Measures

Sociodemographic Characteristics

Parents completed a background questionnaire assessing participants' age, gender, racial and ethnic background, annual household income, caregiver educational level, and family structure. We used Rural-Urban Continuum Codes from the U.S. Department of Agriculture to determine the degree of urbanization of participant's primary residences (metropolitan vs nonmetropolitan area) and Census Regions from the U.S. Census Bureau to determine which geographical area participants resided in.^{34,35}

Pain Characteristics

Adolescents prospectively reported daily pain intensity on an 11-point numeric rating scale with anchors of 0 reflecting no pain and 10 reflecting worst possible pain using a 7-day online diary. Mean pain intensity over 7 days

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