Implications of a unique occupational therapy approach with a pediatric pain rehabilitation client: a case study

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Implications of a Unique Occupational Therapy Approach

with a Pediatric Pain Rehabilitation Client: A Case Study

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Note: This document describes a Capstone Dissemination project reflecting an individually planned experience conducted under faculty and site mentorship. The goal of the Capstone experience is to provide the occupational therapy doctoral student with a unique experience whereby he/she can demonstrate leadership and autonomous decision-making in preparation for enhanced future practice as an occupational therapist. As such, the Capstone Dissemination is not formal research.
Abstract

Children with Complex Regional Pain Syndrome (CRPS) are often underdiagnosed or misdiagnosed (Burton, 2004; Wilder et al., 1992). It is important these children seek appropriate treatment, which may include outpatient treatment or an inpatient pain program from multiple disciplines. Occupational therapy is important to help children with CRPS to restore function and return to their previous roles. When working with other disciplines such as physical therapy, recreational therapy, nursing, and psychology, the child gains the benefit of multi-disciplinary treatment and can gain improvements in all areas of life. This case study used a multi-disciplinary, rehabilitative approach to provide occupational therapy services to a child to increase sensory awareness and restore function during activities of daily living. The models used in this case study were the Cognitive Behavioral approach (Duncombe, 1998), along with the Biomechanical approach (Latham, 2008) and the Model of Human Occupation (Kielhofner, 2008). The Children’s Assessment of Participation and Enjoyment and Preferences for Activities of Children (CAPE/PAC) (King et al., 2004) as well as standardized range of motion and manual muscle tests were used for evaluation. Interventions focused on improving posture, endurance, muscle strength, sensory awareness in the affected extremity, and activities of daily living. Overall results of the case study showed significant improvements for the child in all intervention areas, as well as a return to prior roles in which the child engaged in before diagnosis.
Introduction

Children of all ages can suffer from chronic pain. Chronic pain can include headaches, migraines, abdominal pain, limb pain, musculoskeletal pain, and back pain. About 20-30% of children and adolescents are affected in some way by chronic pain (Roth-Isigkeit, Thyen, Stoven, Schwarzenberger, & Schmucker, 2005). Many of the diagnoses that children have that include chronic pain are fibromyalgia, chronic headaches, chronic abdominal pain, and complex regional pain syndrome.

Complex regional pain syndrome is a unique and challenging diagnosis in which coping is a difficult process for patients, families, and health care professionals. Complex regional pain syndrome (CRPS) has been referred to, in the past, as reflex sympathetic dystrophy (RSD), causalgia, and reflex neurovascular disease (RND). The current terminology used in the literature is complex regional pain syndrome (Stanton-Hicks et al., 1995). CRPS is a painful disorder that frequently can follow an injury of some kind. Typically, the pain described is not proportionate to the injury or event that caused it. According to the International Association for the Study of Pain (IASP), characteristics of CRPS for both children and adults include edema in the affected extremity, reduced blood flow in the affected extremity, spontaneous pain or allodynia, disruption of motor function due to pain, and changes in skin color, nail growth, or hair growth of the affected area (Stanton-Hicks et al., 1995; Cooper, 2008; Kasch & Walsh, 2006; Stanton-Hicks et al., 1998). It can be divided into two sub-types: CRPS Type I and CRPS Type II. Both have similar presentations, but Type I, formerly RSD, begins after an initiating event or trauma. Type II, formerly known as causalgia, typically begins after a nerve injury or lesion and is not limited to the area of the injured nerve.
The history of CRPS is not far reaching. Mitchell et al. (as cited in Pillemer & Micheli, 1988) first revealed symptoms similar to CRPS in gunshot wound victims of the Civil War. The syndrome was described as extreme swelling, dystrophic changes, and vasomotor changes in the extremities. Historically, this provides the first description of CRPS. It has rarely been described in children; however, Fermaglick (as cited in Pillemer & Micheli, 1988) described two known cases. He also noted six previous case studies that were known. In the 1970s, CRPS was again described in the pediatric population (Clinch & Eccleston, 2009) and remains a disorder that is underdiagnosed or misdiagnosed (Burton, 2004; Wilder et al., 1992). CRPS continues to be an area that is lacking in descriptive data (McCormack, 1988). In a statement by the American Pain Society (2008), pediatric chronic pain is an important area that lacks attention. It is important to refer the child through the proper treatment channels, which may include a pediatric pain program. Specifically, “treatment should address pain-related disability with the goal of maximizing functioning and improving quality of life” (American Pain Society, 2008, p. 1).

Much of the literature supports a series of characteristics common to pediatric patients with CRPS. Most children with CRPS tend to be preadolescent to adolescent females (Lee et al., 2002; Beck, 2009; Kachko, Efrat, Ben Ami, Mukamel, & Katz, 2008; Roth-Isigkei et al., 2005; Hunfeld et al., 2001; Perquin et al., 2000; Singh, Willen, Boswell, Janata, & Chelimsky, 2004; Morsy, 2006; Wilder et al., 1992; Sherry & Weisman, 1998; Bernstein et al., 1978; Low, Ward, & Wines, 2007; Maillard, Davies, Khubchandani, Woo, & Murray, 2004; Banez, 2010; Persson, Rivano-Fischer, & Eklund, 2004). Low et al. (2007) conducted a study on 20 children at a major children’s hospital diagnosed with CRPS. It was shown that 90% of the patients were adolescent or pre-adolescent girls with lower extremity injuries. Sherry and Weisman (1998) completed a study on 21 patients which examined at the psychological aspects of children and their families
with RND. Eighteen of the patients were female and it was found that most patients had characteristics of being compliant, were involved in extracurricular activities such as sports (Pillemer & Micheli, 1988), exhibited over-achieving behaviors, had high grades and came from a cohesive family, typically enmeshed with one parent. All of these characteristics have been shown to be common in pediatric pain patients with CRPS.

It has been shown that chronic pain conditions can be devastating to daily lives of those with CRPS, specifically children. Hunfeld et al. (2001) completed a study with 128 children who had chronic pain and examined its impact on the quality of life in adolescents and their families. It was found that chronic pain had a negative impact on their daily lives. The more pain an adolescent had, the poorer their psychological, physical, and functioning status. Other studies also supported this finding. In a study conducted by Roth-Isigkeit et al. (2005), it was found that children with pain tended to have increased problems in areas of daily living such as sleep, school, social lives, eating, and leisure time. Chalkiadis (2001) examined at the management of chronic pain in children before and after a pain program, including those with CRPS. Many children in the study were not attending school, participating in sports, or sleeping due to their pain. After attending a pain management program, most children attended school regularly without absences and 88% resumed sports and had improved sleep. In another study by Maillard, Davies, Khubchandani, Woo, & Murray (2004), eight four percent of children had full or almost full functional recovery after admission to a multi-disciplinary pain program. These studies demonstrate the need for improved and effective treatment programs for children with chronic pain.

The program at Cleveland Clinic Children’s Hospital for Rehabilitation is a three week program (two weeks inpatient with one week in the Day Hospital) for children and adolescents
with chronic pain conditions. Since its inception in 2007, the pain program at Cleveland Clinic has seen 190 children, ages 8-22 with a majority being adolescents. Out of the 190 children, 148 were female. Complex regional pain syndrome is the most commonly treated disorder, with other diagnoses including headaches, fibromyalgia, and abdominal pain. Half of the population that comes to the pediatric pain program resides in Ohio as the other half comes from 27 states in the U.S. (Banez, 2010). The major goals of the program are to assist children in learning to accept and manage their pain, as well as to improve performance in their daily activities. During week one and two of the program, children are seen and treated outside of their dysfunctional family life. In the third week of the program, children attend Day Hospital where they participate in the outpatient program and at the end of every day return back home with their parents. This assists parents and children with re-entry back into their home, school, and everyday lives. The program focuses on rehabilitation with physical therapy, occupational therapy, recreational therapy, psychological and behavioral therapies, as well as patient and family education. The team works to teach children strategies in coping with their pain and ways to improve their function.

In rehabilitation, the child gets to participate in three hours of activity everyday through physical therapy, occupational therapy, and aquatic therapy. A child’s chronic pain can affect his or her posture, weaken muscles and endurance, as well as increase his or her sensory awareness. The program is designed to address those areas of weakness. Children participate in a morning exercise group everyday focusing on stretching, endurance workouts, team building, as well as relaxation. The focus on treatment for children with CRPS includes de-sensitization, weight bearing through the affected extremity, posture and alignment, body awareness, self care skills, community reintegration, return to school, core strengthening, and endurance. In addition, the treatment regimen supports continued use of the affected extremity despite pain. A study
conducted by Ek et al. (2009), to determine the effects of continued use of a limb despite pain, showed functional improvements in the affected limb in 95 out of 106 patients. Patients were encouraged to use the limb despite pain and about half of the patients had a full functional recovery at the end of the study. A home exercise program is tailored for each child to complete during each day of the program. At the end of the program, an individualized home program specific to the child’s interests is developed to enhance success returning home.

Oerlemanns et al. (2000) conducted a study on physical and occupational therapies and found that both were clinically significant and had a therapeutic effect on the outcomes of the patients, specifically in ADLs. The role of occupational therapy in pediatric patients with CRPS is to take a “leading role in the functional restoration process” and role participation (Geertzen & Harden, 2006). Specific treatments that can be implemented are similar to those mentioned in the protocol for the Cleveland Clinic pediatric pain management program. Beck (2009) completed a case study on a child with CRPS which revealed that strategies such as weight bearing, stretching, endurance activities, and aquatic therapy were effective during three weeks of intensive therapy. Low et al. (2007), also completed a study of children with CRPS and a high number of the patients had favorable outcomes due to the non-invasive and rehabilitative treatments conducted in the study. Sherry, Wallace, Kelley, Kidder, and Sapp (1999) completed a study of short and long term outcomes on children with CRPS. Similar treatment strategies were used such as aquatic therapy, desensitization, and functional exercises. Outcomes demonstrated that 92% of the children initially were symptom free and after two years, 88% continued to be symptom free. It gives evidence that early treatment of CRPS is a good indicator of positive long term results. These studies provide evidence that such strategies can be employed and improve the potential for positive outcomes during the rehabilitation process for
children with CRPS. This current case study supports the need for future research to examine the effects of occupational therapy and a multidisciplinary approach on a patient with CRPS in a pediatric pain program.

Models of Practice

The patient in the current case study is a fifteen-year-old female with CRPS Type I who presents with decreased lower extremity function, increased sensitivity in the right foot, decreased strength, decreased endurance, decreased mobility, difficulty with transfers, as well as decreased ADLs/IADLs.

The main models of practice that were utilized in this case study were the Cognitive Behavioral (Duncombe, 1998), Biomechanical (Latham, 2008), and the Model of Human Occupation (Kielhofner, 2008). The main component utilized during therapy was the Cognitive Behavioral model of practice (Duncombe, 1998). One of the main principles of this Model includes developing specific ways of thinking and coping in relation to the disease. It also includes developing the ability to control and manage behaviors, feelings, and actions in order to balance life roles. Specific behaviors are managed through graded goals. The therapist encourages thoughts and behaviors of the patient that show successful adaptation, and this in turn, decreases the maladaptive behaviors (Solet, 2008). Skills to enhance coping strategies for pain management are also reinforced. Patients can use a variety of relaxation techniques to increase coping, such as progressive muscle relaxation, autogenic relaxation, and deep breathing (Engel, 2003). In a study by Engel (1992), children with headaches were trained to use relaxation techniques for intense pain. Out of the ten children, eight of them had a mean increase of 15% in headache free days. This study shows that early intervention and education can be a key in helping children ‘help themselves’. Progressive muscle relaxation involves the systematic
tensing and relaxing of muscles to encourage the patient to realize muscle tension and how to relieve it (Engel, 2006). Autogenic muscle relaxation is “the silent repetition of self-directed formulas that describe the psychophysiological aspects of relaxation” (Engel, 2006, p. 652) or using your mind to relax your body. Deep breathing involves learning specific ways to breathe (i.e. in through the nose and out through the mouth for 5 seconds each) to encourage relaxation. These self regulation strategies are another major part of increasing the patient’s insight and self awareness, as well as and promoting higher level reasoning. Perhaps it was best stated by Bruce and Borg (2002) that the cognitive behavioral model of practice suggests “intervention does not eliminate pathology but provides cognitive, affective, and behavioral learning experiences to teach skills, strategies, and methods of coping” (p. 183).

With intense chronic pain, other illnesses and symptoms can present themselves. In a study done by Monti, Herring, Schwartzman, & Marchese (1998), it was shown that psychological co-morbidity is likely to be present in those with intense chronic pain. Palermo, Fonareva, & Janosy (2008) tested the relationships among poorer sleep quality, increased activity limitations, and reduced health-related quality of life (HRQOL) in adolescents with and without chronic pain. Strong relationships were found indicating higher levels of depression, decreased sleep, and overall decrease in functioning in children with chronic pain. Another illness associated with patients with chronic pain is Pain-Associated Disability Syndrome (PADS). This syndrome refers to the inabilities to function normally secondary to pain. These patients are unable to attend school or work, have trouble interacting with friends or family, and tend to withdraw their participation from extra-curricular activities (Banez, in press). All of these illness and co-morbidities exist and need to be assessed with each individual patient.
Pain is an intense symptom that can include many psychosocial factors. There are studies which provide evidence for the use of cognitive behavioral therapy in children with pain diagnoses. In a study done by Kachko et al. (2008), files of fourteen children with CRPS were retrospectively analyzed. It was concluded that the children gained improved function and reduced pain from non-invasive treatments and cognitive behavioral treatment (CBT) with a multidisciplinary team. These study parameters were recommended for future studies. Another similar study (Lee et al. 2002) was conducted as a prospective, randomized, single-blind trial of physical therapy and CBT for children and adolescents with CRPS. Most of the children showed similar outcomes to the study completed by Kachko et al. (2008) and Beck (2009), including improved function and reduced pain over time with the non-invasive CBT approach.

The Cognitive Behavioral model (Duncombe, 1998) was the main component chosen for this case study because of the intense behavioral mechanisms that the symptom of pain can induce. The Cognitive Behavioral model of practice can help to build rapport with the patient, and encourage the patient to move, stretch, and strengthen the affected limb (Stanton-Hicks et al., 1998). The model gives the patient coping mechanisms and strategies to help alleviate the pain. The therapist uses this model to work with the child to reinforce the day’s educational goals such as relaxation, coping strategies, adjusting to a new lifestyle once home, and working to help the child adapt with pain (Suder, n.d.). Combined with the Biomechanical model of practice (Latham, 2008), they can help with the physical and psychosocial aspects that present with complex regional pain syndrome. The Biomechanical approach can be the external reinforcement for objectives worked on in the Cognitive Behavioral approach (Cole, 2005).

The Biomechanical model of practice (Latham, 2008) was also chosen as a component used in the current case study because behavioral aspects can be used to also restore function
(Cole, 2005). It can help to address limitations of a patient’s strength, ROM, and endurance in relation to functional activities (Flynn, Jackson, Gray, & Zemke, 2008). Specifically, it looked at how immobilization can affect and decrease a person’s range of motion and strength. When a limb is immobilized, the numbers of muscle fibers decrease, ligaments weaken, elasticity of the muscle decreases as the muscle itself shortens, and edema can increase without movement. These are some examples of the limitations caused by immobilization. Immobilization can also decrease the ability the limb has to weight bear. The strength, ROM, and endurance can decrease with immobilization which is a typical characteristic of CRPS patients. These overall changes can occur within 24 hours of non-movement. Compression, positioning, and movement through the full ROM are all treatments used in the Biomechanical approach (Latham, 2008) in relation to CRPS to decrease the effects of immobility of a limb. Occupation can be manipulated in order to increase the demands of strength, endurance, and range of motion during occupational therapy treatments (Flynn et al., 2008). Body mechanics and postural awareness are also major components of the biomechanical approach that can be addressed in the treatment of CRPS. Education in proper spinal alignment, proper posture during sitting or standing activities, and proper lifting techniques can decrease unbalanced posture and pain (Engel, 2006).

Evidence based literature supports the use of a rehabilitative multidisciplinary approach which will increase strength, endurance and posture in many patients with pain diagnoses, including complex regional pain syndrome. In one prospective case series, over 66% of patients found that the interdisciplinary program using rehabilitative techniques, including body mechanics and postural awareness, used in the biomechanical approach were very helpful (Singh et al., 2004). Many of the patients had significant functional gains even after the program was concluded. In another prospective randomized clinical trial, the study demonstrated that physical
therapy and occupational therapy were significant in reducing pain and improving the active
ROM for patients using a rehabilitative approach (Oerlemans, Oostendorp, de Boo, & Goris,
1999). In an evidence based review of the literature, Geertsen and Harden (2006) stated that the
best treatments for those with CRPS were encouraging active ROM, a stress loading program,
postural awareness, relaxation, desensitization, massage and physical modalities. There is a lack
of data in the field, but the data that has been presented supports the use of a rehabilitative
approach with a multidisciplinary team.

Overall, the Biomechanical model was chosen for the strong emphasis on body
mechanics, strength, endurance, and posture. These are major components used in the pain
program at Cleveland Clinic and, when combined with the cognitive behavioral model
(Duncombe, 1998), can help children to increase strength, use their affected limb, and cope with
their pain.

The last model of practice that was considered for this case study was the Model of
Human Occupation (Kielhofner, 2008). It focuses on helping the patient to engage in purposeful
and meaningful activities and occupations that support the patient in returning to a healthy
lifestyle. The evaluation of the patient looks specifically at which life roles the patient is having
problems fulfilling secondary to their deficits (Solet, 2008). The use of this model, with an
emphasis on meaningful and purposeful occupations, supports the return to the roles that embody
a healthy lifestyle for the patient such as student, friend, daughter, etc. The treatment provided
helps to “develop, remediate, or enhance performance” of the client (Solet, 2008).

The Model of Human Occupation (Kielhofner, 2008) was chosen as a good fit for this
case study because there is a major focus on shifting the child in the program from the “sick”
role to the “healthy” role and back to their life roles such as daughter, student, swimmer, etc.
Many of these life roles are absent, or put on hold, while CRPS is the main focus; therefore, the model of human occupation (Kielhofner, 2008) would be a beneficial addition to this case study.

In a study conducted on 54 patients with chronic spinal pain, a multidisciplinary rehabilitative approach was used to help the patient move from the “sick” role to the “healthy” role. The program’s success was measured by the patient’s activity levels and the ability to cope with the increased demands of work and home life after the program. After a year, only four patients required continued services (Flower, Naxon, Jones, & Mooney, 1981) suggesting that a program that focuses on psychosocial components would be beneficial for those experiencing pain.

Pain management for children is a very specific field and pain management clinics in pediatrics are rather unique in the field of occupational therapy. The Cleveland Clinic Pediatric Pain Rehabilitation Program is one of six inpatient multidisciplinary programs to address pediatric chronic pain. In the program, children make personal goals in the ‘Individualized Functioning Plan’ with support from the multidisciplinary team. These goals are then scored throughout each day by the team and child. At the end of each week, the child can see areas which need improvement and areas which are becoming strengths. Another aspect of this case study that demonstrates uniqueness and creativity is the manner in which the follow-up was conducted. Every child in the pain program either comes back to the Cleveland Clinic for a one day follow-up or a follow-up is conducted by phone, if travel is a concern. For this case study, follow-up consultations were conducted through a video conferencing program, Skype, via webcam every week from the time of discharge until a follow-up evaluation was done at the Cleveland Clinic. This is not a typical follow-up procedure, but was done to complement and enhance the existing follow-up procedure for the facility with this client.
Evaluation

The current case study was conducted at the Cleveland Clinic Children’s Hospital for Rehabilitation on a child in the pediatric pain rehabilitation program. The evaluation that was administered took both the patient’s and parent’s accounts into perspective. An interview was completed which asked about pain, patient perceptions of limitations, prior level of activity in both school and outside of school, perceived stressors in life, and desired goals to achieve prior to the end of the program (Suder, n.d.). Standard strength and range of motion tests were completed, as well as an assessment of posture. The program and its’ expectations were explained to the patient. The major focus of the program was discussed, emphasizing independent function and minimized pain.

The patient was a fifteen-year-old female, admitted to the program on February 1, 2010. Patient records revealed that she fell down the stairs in August of 2009 and broke her right talus. She was not placed in a cast for the fracture. For the next three months, she was placed in a walking boot, which she wore every day, and did not bear any weight on the affected leg. She began to have color changes with extreme pain in her right foot after the cast walking boot was removed. The patient began to go to physical therapy, as well as aquatic therapy, two times a week for three weeks. She went to a pain clinic at Colorado Children’s Hospital and had a series of lumbar blocks to decrease the pain; however, her back began to have pain and spasms. In school, she used a wheelchair to avoid using the affected leg. Physical therapy sessions continued one time per week with an emphasis on strengthening and home exercises. From December to January 2010, she was able to place up to 10 pounds of weight onto the right foot one time; however, during the evaluation the patient reported that she had not walked since August.
Her pain was described as “constant and daily”. She stated that heat, a TENS unit, and limited mobility helped to relieve pain. The patient lived at home with her mother, father, and three younger siblings. She lives in a two story house and her bedroom was located in the basement. The patient stated that she spent the previous month living on the first floor in the living room to avoid completing steps to her room. She was only completing half days of school and started online classes when she entered the pain program in an effort to stay on track with her classroom studies. At the time of the case study, the patient was a sophomore in high school who received good grades in school, was involved in school council and high school swimming prior to the injury. Upon entry into the pain rehab program she had missed, collectively, about 1 month of school due to pain and was not using her foot in an attempt to minimize her pain.

During the evaluation, many different assessments were completed to gather the overall “picture” of the patient. The evaluation included assessment of many different areas such as: past medical history, social history/home environment, the University of Alabama Birmingham Pain Scale (Richards, Nepomuceno, Riles, & Suer, 1982), patient appearance, upper extremity function, assessment of transitions/mobility, trunk control, sensory functioning, assessment of activities of daily living, and patient goals.

Standardized assessment was completed for active and passive range of motion assessments, as well as manual muscle testing on the upper and lower extremities of the patient (Clarkson, 2000). All range of motion for assessing upper extremity function in the wrist, elbow, and shoulder were within functional limits. In looking at active range of motion for the right foot, the patient started in 10 degrees of plantar flexion and was able to move to 12 degrees plantar flexion. The patient was extremely hesitant to move the right lower extremity. She was able to stand and maintain 90 degrees plantar flexion with significantly decreased weight bearing on the
right foot. Passive range of motion for the right foot was within functional limits. The left lower extremity was within normal limits for all range of motion assessments. Manual muscle testing for the upper extremities was within normal limits. A small difference was noted between the right and left upper extremities, with the right stronger than the left upper extremity. However, this difference may be attributed to the fact that the client is right hand dominant. These assessments were conducted as part of the Biomechanical model of practice in order to assess strength, endurance, posture, and range.

One of the standardized assessments that were conducted during the evaluation included the Children’s Assessment of Participation and Enjoyment (CAPE) and its companion measure, Preferences for Activities of Children (PAC) (King et al., 2004). The CAPE and PAC have proven construct validity (King et al. 2006). The CAPE looks at six different areas of participation for children including diversity, intensity, where activities are completed, with whom activities are completed, what activities are preferred, and how much they enjoy these activities. It also looks at two categories of recreation and leisure activities: formal and informal activities, as well as five types of activities (recreational, active physical, social, skill-based and self-improvement). Ranges of scores for the CAPE can be 0-55 for diversity (low to high overall diversity), 1-7 for Intensity (low to high overall intensity), 1-6 for Where (home based-community based), 1-5 for With Whom (Solitary to Social), and 1-5 for Enjoyment (low to high overall enjoyment). For the PAC, the child can score activities from 1-3 (would not like to do at all to would really like to do). Each activity area can have a total score of 3.0, except for recreational activity score being a maximum of 2.5. These scores are summed and divided to give a total overall score which can be anywhere from .09 to .26. The higher the score, the more activities the patient would like to participate in.
This assessment was used to look at the overall lifestyle of the child in the pain program. It is important to know the daily habits related to occupations and enjoyment of these occupations in order to understand the motivation for the child to get back to normal life roles and functioning. This assessment was chosen to get an accurate assessment of the child’s daily life and activities of enjoyment. It also was chosen to help educate the child about her daily habits as part of the Cognitive Behavioral model of practice. The goal based on the Cognitive Behavioral model of practice was to show the child how she was spending her time. It was also used to change her behaviors in order to have a good balance of the different areas of participation in activities, as well as diversity in types of activities.

The patient’s scores on the CAPE are as follows: Diversity=35 out of 55, Intensity=3.09 out of 7, Whom=3.17 out of 5, Where= 3.48 out of 6, and Enjoyment= 4.08 out of 5. The patient’s preference scores on the PAC also included Recreational Activities=2, Physical Activities=2.5, Social Activities=2.8, Skill-based Activities=2.1, and Self-Improvement Activities=2.5. The total overall PAC score was .216. The patient’s scores on the CAPE/PAC (King et al., 2004) showed that she very much enjoyed participating in the activities she did on a daily basis. She participated in a good variety of activities and liked to do these activities with her friends, family and out in the community. However, the intensity score indicated that she was not participating in these activities very frequently and less than she would like. The PAC scores indicated that she enjoyed participating in physical activities (i.e. team sports, water sports, having a job), social activities (i.e. hanging out with friends, going out, entertaining), and self-improvement activities (i.e. writing, reading, volunteering, shopping). The patient indicated that she also liked doing some recreational and skill-based activities such as watching television, taking care of pets, completing crafts, swimming, or being in community organizations;
however, these were not her highest rated categories. Overall, the patient enjoyed many activities, but was not, at that time, participating in many activities that she actually enjoyed. It should be stated that, at the time of initial evaluation, verbal patient history taken revealed that she was not engaging in social interaction and leisure activities for the prior four months. These statements would not necessarily correlate with higher participation scores received on the CAPE/PAC (King et al., 2004).

Another assessment that was informally administered was the “Pie of Life” in which the child divided her day into areas of leisure, work, school, play as well as passive and active leisure activities. This Pie of Life is not a standardized assessment but it helped to give a visual picture of where the hours in the day are spent for the child. Specifically with children in the pain program, the hours in the day are typically not balanced and many include more than half of the day sleeping or in passive leisure without much school or other activities. The goal for this assessment is to help the child balance their daily schedule. Along with the CAPE and PAC, it will help the child decide which activities could be added or subtracted from her daily schedule to help ensure success with the program’s philosophy once discharged. In relation to the Model of Human Occupation (Kielhofner, 2002), it was a good way to help the child and therapist understand the child’s life roles and if her daily habits are in good occupational balance. The Pie of Life is filled out for the child’s life leading up to admission in the pain program. Things such as school, work, sleeping/napping, and homework are put into the 24 hour circle of the Pie of Life. Decreases in activities, and increases in others are looked at. Prior to the pain program, the patient was not sleeping throughout the night and was not attending full days of school. Passive leisure activity time was a significant part of the day. Active leisure time and school time was severely lacking in time throughout the day.
Finally, the University of Alabama Birmingham Pain Scale was also administered at evaluation (Richards et al., 1982). This pain scale assesses vocal complaints (verbal and non-verbal), the amount of downtime spent lying down due to pain, facial grimaces, standing posture, mobility, body language (rubbing, grabbing the affected area), use of visible support/equipment (TENS unit, brace), stationary movement, and use of medications. Each item can be given a score of 0 (no behaviors), \( \frac{1}{2} \) (occasional behaviors), and 1 (frequent behaviors). The patient demonstrated occasional verbal and non-verbal complaints as well as mild facial grimaces. She spent time everyday lying down due to pain. Her standing posture was mildly impaired and she showed a marked impairment with mobility. She demonstrated occasional rubbing and grabbing of her right foot and frequently utilized her cast shoe and crutches as supports. She did not use any medications during the evaluation and demonstrated stationary movement while sitting. The patient’s overall score was 4.5 out of 10 on the initial assessment. This assessment was selected because it complemented the principles of the Cognitive Behavioral model of practice (Duncombe, 1998).

Overall, other patient observations were made during the initial evaluation. The patient appeared to be attentive and compliant during the evaluation but was very hesitant to complete activities involving the affected lower extremity. The hair and nail growth on the affected extremity appeared to be within normal limits. However, the skin color was pink and had a mottled appearance with abnormal posturing. She also demonstrated hypersensitivity to any kind of touch. Per patient report, she typically would wear a “fuzzy” sock and cast shoe, in addition to the use of crutches. However, she did not have a fractured bone in her foot anymore. She guarded her affected leg with intensity during the evaluation. She was communicating verbally
without hesitation and made good eye contact. According to the patient, her dominant hand was her right hand. The patient was within normal or functional limits for many components.

Trunk control evaluation was completed in sitting and standing postures. The patient’s overall balance was within normal limits. While in a sitting position, observations of the patient’s posture included lateral trunk lean left, posterior pelvic tilt, head in a forward position, rounded shoulders, and increased kyphosis. When standing, the patient still had a lateral lean left with rounded shoulders which suggested poor overall sitting and standing posture.

Sensory functioning is a valuable part of the evaluation and allows the therapist to understand and test the various senses of the patient. The patient did not have any glasses or contacts and appeared to have vision within normal limits. Auditory and vestibular functioning also appeared to be within normal limits. No gross deficits were apparent in the areas of proprioception and kinesthetics. Physically, her right lower extremity was red and displayed pitting edema. Her sensory functioning, despite her right lower extremity, was intact. The patient was also experiencing allodynia, in which pain is provoked from a stimulus that typically does not give off a pain response (Stanton-Hicks, et al., 1988).

Transitions and mobility were also assessed to understand the safety and accuracy of the patient’s mobility. She was able to complete supine to sit and sit to supine transfers without difficulty; however, the patient was not demonstrating equal weight bearing and she used objects, such as the transfer mat, for support. She was at a modified independence level when completing transfers including bed mobility, toilet, and tub transfers. Increased time was also required to complete the transfers. Overall, the patient was able to complete most transfers, but had minor difficulties and required increased time and the use of a device.
During the assessment of activities of daily living, the patient reported complete independence with no difficulties when completing activities such as feeding, upper body dressing, lower body dressing, and toileting. However, she did mention some difficulty with overall modified independence when completing grooming and bathing. She stated that, when grooming, she had problems shaving her right lower extremity secondary to hypersensitivity and swelling. The last time she shaved was before her accident and possibly one time since her CRPS diagnosis. During bathing, the patient also stated she could not bear weight on her right lower extremity and, therefore, had to use the shower curtain rod to stand up in the shower and hold herself up. This led the therapist to believe grooming and bathing were areas that needed improvement.

Overall, observations from the evaluation indicated a sensory regimen, utilizing a sensory brush and towel, would be beneficial for the patient. Strengths included a motivation to return to prior level of functioning, good participation, as well as family support. Areas of concern for the patient included decreased strength, decreased sensory awareness, decreased mobility and transfers (specifically tub transfers), decreased endurance, and decreased ADLs/IADLs secondary to her diagnosis of CRPS.

Goal Setting

Throughout the goal setting process, the patient was very emotional. The patient appeared to have difficulty and showed poor insight into her own deficits and outcomes. Short term goals were easier to make than long term goals. It was difficult for the patient to see how she would be able to function in the future to be able to set long term goals. This could have been due to her limited function at the initial evaluation. One short term goal the patient revealed as important was to be able to shave her legs and complete other hygiene needs as well. A long term goal that
the patient desired to achieve was to complete a swim workout similar to what she would complete during her competitive swim season. At the end of the evaluation, the patient stated, “I want to be able to do things like I was able to before all of this started. I want to be able to go to school and be involved again in school council.” Overall, she was very adamant about being able to do things she was involved in before her diagnosis such as swimming, hanging out with friends, walking without support, and independence with ADLs.

**Long Term Goals**

Occupational therapy goals were also made for the patient based on her evaluation results. Eight long term goals were developed for the patient and five short term goals were developed for the patient. Long term goals were:

1. To increase endurance during leisure swimming activity, the patient will complete 15 laps of freestyle in the pool by the time of discharge.

2. To improve body mechanics during the school day, the patient will use correct lifting technique 85% of the time by the time of discharge as demonstrated during equipment clean-up during therapy sessions.

3. By the time of discharge, the patient will be able to demonstrate independence completing a home exercise program for 5 days when given written instructions.

4. The patient will return to prior leisure activity of writing for 45 minutes by demonstrating improved sitting and standing posture 100% of the time with minimal cues by the time of discharge.

5. The patient will identify and gather 2 leisure resources in the community by the 3rd week of the program.
6. The patient will identify 3 dimensions of activities that are in need of assistance by the time of discharge.

7. At the end of the program, the patient will identify 2 or more activities of interest in which to participate in the community.

8. The patient will participate in at least 1 identified leisure activity at minimum 1x/week for 60 minutes for 1 month by the time of follow-up.

The long term goals in relation to endurance and body mechanics applied to the Biomechanical model of practice (Latham, 2008). Her endurance was used as a goal in order to increase her swimming activity in which the patient stated she wanted to return. The goal related to body mechanics was utilized because the patient had poor posture during the evaluation which could increase her pain. Completing a home exercise program was part of the Cognitive Behavioral model of practice (Duncombe, 1998) to increase adherence to completing a home exercise program once the patient was discharged. The goal including posture and writing reflected an important component of the Model of Human Occupation (Kielhofner, 2008) and Biomechanical model (Latham, 2008). It was intended to help the patient get back to the role of a student and to increase endurance by having the patient sit for an increased length of time during school. The goals relating to leisure activities and participation of life activities were selected based on the results of the CAPE/PAC (King et al., 2004). The CAPE/PAC are used in the pain program to get a better understanding of the patients daily life and roles that were important to her as part of the Model of Human Occupation (Kielhofner, 2008).

**Short Term Goals**

Short term goals were also compiled with the patient that she would complete at the end of the first week of the program. Short term goals included:
1. The patient will increase sensory awareness by wearing a shoe and sock daily on both feet by the end of the first week of the program.

2. At the end of the first week of the program, the patient will weight bear on the R LE 75% during a leisure activity for 7 minutes.

3. The patient will complete a toilet transfer independently with equal LE weight bearing, without a device, and without safety concerns by the end of the first week of the program.

4. The patient will independently complete a sensory exercise program including brushing and toweling for 2 minutes each, every 2 hours, on the affected limb with appropriate pressure at the end of the first week of the program.

5. By the end of the first week of the program, the patient will wear flippers while completing 10 swim laps during pool group.

Short terms goals that addressed sensory awareness, a sensory exercise program, and wearing flippers during swimming were related to the Cognitive Behavioral model of practice (Duncombe, 1998) and were intended to help the patient increase sensory awareness to the right lower extremity. In order to help the patient return to swimming and the demands of pool water, goals were made to help the patient slowly adapt to water and increase sensory awareness. The goal made for toilet transfers with equal weight bearing and weight bearing on the right lower extremity was related to the Biomechanical model of practice (Latham, 2008) and intended to increase the patient’s ability to bear weight on the affected extremity in functional ways. The patient was having difficulties with grooming and bathing; therefore, starting with transfer goals and weight bearing in the bathroom was the first step towards supporting the ADLs. The patient’s roles include sister, daughter, student, swimmer, and friend. These are major roles in
her life at this time. She has a definite need to want to be independent so she does not have to be dependent on her mother to help her with ADLs or other activities. The relationship between the patient and her parents, specifically her mother, was strained throughout the program.

Throughout the program, the patient did not want her mother involved in her care. Efforts were made by the student and therapist to mediate the relationship and teach the patient and mother ways to cope through the process. If the mother was very involved, the patient had a difficult time participating and would become very emotional. Strong efforts were made to help the child become accountable for her own treatment and home exercises. These ideas were stressed to the mother with complete cooperation.

Throughout a day in the program, the patient sees the psychologist, physical therapist, occupational therapist, recreational therapist, physician or nurse practitioner and perhaps the dietician. There are also other subspecialists available to complete consultations including physicians of gastrointestinal disorders, pain management, and rheumatology. The program schedule is set everyday so the child has a structured eight hour day similar to a school day. The entire team meets once a week to discuss all patients and constant updates on patient status are communicated to the team. If there are specific occupational therapy goals that need to be worked on outside of therapy such as posture or weight bearing, these ideas are communicated to other team members, as well as the parents of the child. Short term goals for every week are made by the patient and members of the team to work on throughout the week. The goals for the first week included keeping pace with the group without using a supporting device, having a positive attitude, and walking with a heel-toe pattern. These goals were made with the therapist for the patient to work on during the first week of the program throughout the day with the multi-disciplinary team. Other goals the patient worked on with the team throughout the program also
included using coping strategies to talk about feelings, having good walking posture, using breathing techniques to control body, and being a positive role model. In order to address family and patient education needs, education was provided throughout the program to the patient and family. Areas of education included sensory stimulation, home exercise program, returning to prior activity level, and relaxation/coping.

Interventions

Throughout the pain rehabilitation program, many occupational forms are utilized in order to help each child be successful. First, the therapist is a part of the occupational form and aids in assisting and supporting the patient throughout the rehabilitation process. There is a large collaborative effort made between the occupational therapist, patient, and parent. Many of the interventions focus on balance and coordination, posture and spinal alignment, back pack safety, endurance, sensory awareness, strengthening and stretching as well as positive mental attitudes. With the patient, weight bearing and strengthening were worked on with therapy ball activities and a Bosu ball. When working on back pack safety, the patient demonstrated correct backpack use throughout the day and was able to articulate important back pack safety principles. Other interventions focused on ADLs such as tub transfers and toilet transfers in the bathroom as well as shaving the patient’s legs independently. To encourage sensory awareness, the patient wore regular cotton socks and tennis shoes on both feet throughout the day. Aquatic therapy also worked on the above areas using swimming noodles, jumping platforms, flippers, diving rings, and weighted balls everyday during the program. The pool was a typical therapy pool about 20 feet in length, 10 feet in width, and about 5 feet in depth. There was a diving platform in the water, as well as steps that lead into the water, and a ladder at the other end of the pool. The water temperature was 92 degrees. Other patients, as well as therapist and recreational therapist,
were in the pool at the same time the patient was completing her laps. There was also another therapist supervising on deck due to protocol. All occupational forms were the same or similar throughout all therapy sessions.

The aquatic therapy sessions were of particular importance to help increase the patient’s sensory threshold, weight bearing, and use of the extremity. It was a great way to see change in the patient’s occupational performance throughout the program. One of the goals for the patient was to swim 15 laps by discharge. It was also very meaningful and purposeful to the patient. The patient enjoyed swimming as an extracurricular high school activity and swam competitively on high school and summer league swim teams. The patient stated that she mainly swam freestyle and backstroke as well as the individual medley event in swimming which included butterfly, backstroke, breaststroke, and freestyle. However, since the diagnosis, the patient was unable to participate and she did not have high hopes on ever returning to the occupation of swimming. Therefore, since aquatic therapy was a part of the pain program at Cleveland Clinic, the occupational therapy provider and the student collaboratively decided that a few of her short term and long term goals would focus on lap swimming. The goals would also include proper reciprocal kicking technique which is commonly used in the different strokes such as freestyle and backstroke.

One of her short term goals was to be able to swim ten laps. During lap swimming, the patient used flippers to swim laps. At first, she was able to put the flippers on with minimal cueing due to increased sensitivity of the right foot. In the beginning of the aquatic therapy sessions, the patient was able to swim using her lower extremities to kick, but did not demonstrate a reciprocal kicking pattern. It was also noted that the patient did not push off the pool wall when touching the wall to turn around. The patient did not complete the standard flip
turn that she would do in competitive swimming as a quicker way to continue on with the laps, but she instead touched the wall with her hands and turned around to continue.

The patient compensated with her left lower extremity while swimming in order to have a strong stroke and continue lap swimming. It was observed by the therapist that when swimming freestyle, the patient did not directly move the right lower extremity in a proper kicking pattern. Instead, she kicked harder with the left foot to compensate for the decreased movement of the right foot. It was also noted that when pushing off of the wall the patient used her left foot while her right foot barely grazed the wall surface which prevented full and equal weight bearing when pushing off the wall.

The occupation of swimming was very meaningful and purposeful to the patient. She displayed many types of purpose and meaning. Intrinsic purpose was shown by the patient because this is something she wanted to do herself. The patient displayed many types of meaning such as affective, perceptual, and symbolic meaning. Affective meaning was displayed when the patient was tearful about returning to swimming in a conversation about goals and long term expectations. The patient displayed perceptual meaning by interacting with the objects and water around her, all a part of the occupational form. The entire occupation was also symbolic to the patient since it represented a part of her life before the diagnosis. Being able to participate in the occupation of swimming again with proper technique and the ability to tolerate the sensory aspects of the water would be symbolic of independence in completing activities she was able to do before the diagnosis.

Changes that were made in the occupation included a few different approaches. First, to improve reciprocal kicking pattern, the patient was told to use a kick board when completing laps. This was to focus on strengthening the lower extremities and to help the patient increase the
use of the right lower extremity when kicking. Another change was to practice completing turns on the wall. The patient practiced pushing off of the wall with the therapist as a separate component outside of the context of lap swimming. After these techniques were practiced for a few sessions, the patient swam laps as she did before and demonstrated a more equal and reciprocal kicking pattern. In assessing push-offs from the wall, the patient was able to push off the wall with more equal weight bearing during push off. As her weight bearing abilities increased during therapy sessions, the patient was able to increase her weight bearing and reciprocal kicking skills in the pool. There was still room for improvement and she was not at the competitive level she was prior to diagnosis, but she had made great improvements.

Re-synthesizing the occupation would include having the patient complete an individual medley with flip turns. The reasoning for this selected occupation would be to test her skills in other swim strokes while simulating an activity in which she wanted to return. Doing flip turns would also simulate swimming in a competitive way. Since she was improving on her push offs from the wall, the next step would be to have her complete it in a simulated flip turn. Before discharge, the patient did, in fact, do these occupations. She was able to complete all four swim strokes, but had increased difficulty with the butterfly. She was able to push off during a flip turn with almost full weight bearing capability as observed by the therapist. She required minimal cueing and some instruction on technique, but she was able to complete this occupation before discharge.

Outcomes

Week 1 Outcomes

Listed below are the short term goals and the outcomes of each goal as a result of interventions provided. Short term goals included:
STG 1: The patient will increase sensory awareness by wearing a shoe and sock daily on both feet by the end of the first week of the program.

This goal was met during the first week of the program. By the end of Week 1 the patient was able to wear a shoe and sock during all daily therapy activities without cueing.

STG 2: At the end of the first week of the program, the patient will weight bear on the R LE 75% during a leisure activity for 7 minutes.

This goal was in progress until Week 3. The patient was able to weight bear on a scale on the R LE at about 55% of her total body weight for 4 minutes and 7 minutes consecutively while completing an upper extremity strengthening exercise. During week 2, the patient was able to weight bear on the R LE about 60% of her total body weight for 4 minutes and 5 minutes during an upper extremity strengthening activity. In the last week of the program, the patient met this goal and was able to weight bear 75% of her total body weight for 8.5 minutes while completing a standing activity.

STG 3: The patient will complete a toilet transfer independently with equal LE weight bearing, without a device, and without safety concerns by the end of the first week of the program.

This goal was met in the first week of the program. The patient was able to independently complete a toilet transfer with symmetrical weight bearing, without any device or other safety concerns.

STG 4: The patient will independently complete a sensory exercise program including brushing and toweling for 2 minutes each every 2 hours on the affected limb with appropriate pressure at the end of the first week of the program.
During the first week of the program, the patient was able to independently complete the sensory exercise program set up for her. She only required minimal cueing to initiate the program during therapy sessions, but per patient report, she was able to complete independently outside of therapy sessions.

STG 5: By the end of the first week of the program, the patient will wear flippers while completing 10 swim laps during pool group.

The patient was able to complete 10 full laps of swimming during pool group without a break while wearing flippers during the first week of the program. However, it was noted that the patient was not using a reciprocal kicking pattern or fully pushing off of the wall when completing her lap swimming.

Week 2 Outcomes

Other goals were compiled for the patient throughout the program that demonstrated overall outcomes as a result of the interventions provided. The goals below were the focus of on for Week 2. Week 2 goals and their outcomes were:

STG 1: Patient will use correct lifting technique 75% of the time as demonstrated during equipment clean-up during therapy sessions.

This goal was met at the end of week 2. The patient was able to use correct lifting techniques demonstrating good spinal alignment and back support, with minimal cueing.

Week 3 Outcomes

STG 1: Patient will complete 12 swim laps with flippers and a reciprocal kicking pattern during pool group.

This goal was partially met during week 2. The patient was able to complete 12 swim laps with flippers while using a reciprocal kicking pattern. However, this was not done
consistently during lap swimming. The patient required cueing to complete consistently. The patient was able to complete 15 laps during week 3 with flippers as well as using a reciprocal kicking pattern with different strokes.

**STG 2:** Patient will complete tub transfer independently with equal lower extremity weight bearing without device and safety concerns.

This goal was partially met during week 2. The patient was able to transfer into the tub independently but required cueing to complete safely and did not complete with equal weight bearing at this time. During week 3, the patient met this goal and completed a tub transfer correctly using proper safety precautions and equal weight bearing.

**STG 3:** The patient will participate in a chosen leisure activity for at least 20 minutes while standing with equal weight bearing without a device.

This goal was in progress during week 2. The patient was able to stand for about 10 minutes without a device, but she still required cueing to stand with equal weight bearing on the lower extremities. During week 3, the patient was able to stand for about 40 minutes without a device using equal weight bearing with minimal cueing. She completed a scrapbooking activity while standing with the therapist.

**STG 4:** To increase endurance, the patient will swim eight laps and demonstrate four different stroke patterns (freestyle, backstroke, butterfly, and breaststroke) using a kick board and reciprocal kicking pattern.

This goal was introduced during week 3. The patient met this goal and was able to demonstrate all four strokes using a kickboard while kicking. Her kicking pattern had improved to more of a continuous pattern. She could also demonstrate freestyle, backstroke, and
breaststroke without a kickboard. The patient had difficulty completing the butterfly stroke without a kickboard. But the patient had greatly improved since week 1.

Listed below are the eight long term goals that were developed for the patient and the outcomes as a result of interventions provided. Long term goals were:

LTG 1: To increase endurance during leisure swimming activity, the patient will complete 15 laps of freestyle in the pool by the time of discharge.

This goal was met during the third week of the program. The patient was able to swim laps but did not show proper kicking pattern until week three when she was able to fully complete 15 laps without flippers, or other pool devices, such as a kickboard.

LTG 2: To improve body mechanics during the school day, the patient will use correct lifting technique 85% of the time by the time of discharge as demonstrated during equipment clean-up during therapy sessions.

The patient was able to demonstrate and verbally explain proper body mechanics and lifting techniques. She was able to demonstrate it with minimal prompting required less than 10 percent of the time and at all times during equipment clean-up at therapy sessions.

LTG 3: By the time of discharge, the patient will be able to demonstrate independence completing a home exercise program for 5 days when given written instructions.

At discharge, the patient was able to demonstrate competency completing her home exercise program independently without written instructions.

LTG 4: The patient will return to prior leisure activity of writing for 45 minutes by demonstrating improved sitting and standing posture 100% of the time with minimal cues by the time of discharge.
The patient was able to sit up 60 minutes with little to no prompting during sitting activities and minimal prompting during walking and standing activities. She was able to meet the goal by discharge and accurately describe proper posture to the therapist as well.

LTG 5: By the time of discharge, the patient will identify and gather 2 leisure resources in the community by the 3rd week of the program.

The patient identified a school and a local recreation center that the family can attend as areas in which she can use as resources for leisure activities.

LTG 6: The patient will identify 3 dimensions of activities that are in need of assistance by the time of discharge.

The patient was able to identify these three dimensions when going over the CAPE/PAC (King et al., 2004) scores with the therapist. The three dimensions that were identified were Diversity, Intensity, and With Whom. This implies that there is not a wide variety of activities in which the patient participates. The Intensity refers to the fact that the patient does not participate in activities in which she enjoys frequently enough and she does not participate in these activities with a wide variety of people. She participates in activities primarily with her family or she completes them alone. These are areas that could use continued improvement.

LTG 7: At the end of the program, the patient will identify 2 or more activities of interest in which to participate in the community.

The patient identified the possibility of participating in a summer swim league, a yoga class, and returning to school council.

LTG 8: The patient will participate in at least 1 identified leisure activity at minimum 1x/week for 60 minutes for 1 month by the time of follow-up.
Goal Met. The patient has been able to participate in swimming and walking every week since discharge for a minimum of 5 days a week for about 45 minutes.

Overall, the patient had full active range of motion in her R LE at the time of discharge. In terms of her strength, the patient displayed strength that was within normal limits for upper and lower extremities. The CAPE/PAC assessments (King et al, 2004) were not administered at discharge, but will be administered at follow-up. Daily University of Alabama Birmingham Pain Scale (Richards et al., 1982) assessments were conducted. The patient’s scores were highest at the beginning of the program with scores of 5/10. At the end of the program, the patient had a score of 1/10 on the UAB Pain Scale, demonstrating improvement in pain presentation and symptoms. Functional tests were administered during exercise group every week. The patient scores from each week are listed below in Table 1.

Table 1

*Functional Test Results for Weeks 1-3*

<table>
<thead>
<tr>
<th>Test</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jump rope in one  minute</td>
<td>8</td>
<td>N/A</td>
<td>28</td>
</tr>
<tr>
<td>Crunches in one  minute</td>
<td>45</td>
<td>52</td>
<td>54</td>
</tr>
<tr>
<td>Push-ups in one  minute</td>
<td>33</td>
<td>43</td>
<td>37</td>
</tr>
<tr>
<td>Prone extension</td>
<td>1 minute 7 seconds</td>
<td>1 minute 32 seconds</td>
<td>58 seconds</td>
</tr>
</tbody>
</table>
Supine extension 2 minutes 2 minutes 2 minutes

Note: The patient appeared to improve on most scores from Week 1 to Week 2; however, the patient was not feeling well during Week 3 due to an IV infusion and her scores appeared lower as well.

Overall, improvements were seen in every test. During the last week, the patient stated she was in an increased amount of pain during the last day of functional tests, which may explain why some of her scores were lower. But overall, she was able to improve core strength, upper body strength, and balance/coordination.

Based on the patient’s progress and outcomes due to interventions, the patient did well overall and made excellent progress since her admission into the program. Upon discharge, she was independent in completing her sensory activities including brushing, lotion massage, toweling, vibration, and shaving cream. During pool group, the patient used flippers and kickboards to accomplish her short and long term goals and demonstrated improved endurance, kick, and stroke, since coming into the program. She also successfully completed all short and long term goals showing independence in overall endurance activities, sensory program, posture, strength, transfers, as well as activities of daily living that were observed as being difficult on admission. She did well increasing her ability to bear weight on the R LE and demonstrate equal weight bearing during leisure activities. The patient became a leader of the patient group and led the group many times to different group locations and during group activities. She interacted very well with other participants and helped to support and motivate other patients. Overall, she was able to accomplish her goals and use the education she received to assist with her transition to home. Additional follow-up sessions were also conducted through the Internet video site, Skype, which will be further discussed later in the study.
Inferred meanings for the patient include the patient wanting to be more independent. Throughout the program, the patient was frustrated and did not believe that she could complete her own self identified goals. She had difficulty accepting the fact that she would in fact, with use of the tools she was taught at the program, decrease her pain, increase her activities and start living her life again. The patient was frustrated and nervous about returning home and continuing on with the tools she was educated with during her stay. It was very symbolic to the patient to return home and become independent again in the roles she had fulfilled every day. She was emotional at times, which further describes how symbolic the return to independence was for her. During follow-up Skype sessions, the patient mentioned that the pain program has been able to help her to return to school and give her structure during her day.

The patient has acknowledged, during therapy sessions and follow-up Skype sessions, that she feels like she has definitely made improvements in her ADLs, IADLs, posture, balance/coordination, weight bearing ability, as well as sensory awareness. She stated that the therapy services and pain program is the reason she has been able to return back to school and assume some of the roles in which she could not previously fully participate. The patient stated in follow-up Skype sessions that, “It’s going better than I expected” when referring to being home and returning back to school.

The patient also commented on some of her original self-identified goals. Originally, the patient wanted to be able to swim again as she would have prior to diagnosis, shave her legs, return to school, and participate in extra-curriculars like school council. During our follow-up Skype sessions, the patient commented that she has been able to complete swim practices with proper technique. She is still working on the distance and the speed she is swimming, but the patient is very excited that she is able to swim again. Despite being nervous, the patient was able
to shave independently. Presently, she does not complete the activity often; however, she has been able to complete it since returning home. The patient is also very excited to return to school and she recently stated in a Skype session that she is running for vice-president of her high school class for the next school year. Overall, she has acknowledged that she has been able to complete most of her self-identified goals in the beginning of the program. I also think that the patient has been able to become a more positive leader and role model throughout the program. This was not a formal goal, but from observation, the patient was very social and took other patients “under her wing”. She was a positive leader throughout the program and learned how to express her feelings about her CRPS in a more effective way.

Follow-Up Skype Sessions

Due to the unique qualities of this case study, additional follow-up consultations were conducted through Skype with the patient. Sessions were conducted one time per week from the time of discharge until a follow-up evaluation was conducted at the Cleveland Clinic. The patient gave updates on weekly progress, asked questions she had, and talked about life roles and adjustments being back home. Informal goals were made for the patient to continue with education and tools she received in the pain program. Goals were made to increase her swim workout and to work on flip turns during lap swimming in order to facilitate her progress to swimming a full competitive workout. Because of the progress, the goal was revised to work on dissecting the flip turn to work on push offs from the pool wall so she would not swim deep after pushing off of the wall. Another goal was made concerning shaving prior to a planned vacation. The patient still had reservations about shaving, but agreed to try it at home before her vacation. She also continued to drink water every day with encouragement. Lastly, another major goal reviewed was sensory awareness at home. This included the patient being able to give herself a
minipedicure including a lotion massage. The patient had hesitations, but reported she was able to overcome this barrier and complete the massage and pedicure. The patient continued to complete sensory exercises, but required encouragement towards the end of the sessions to include different modalities such as shaving cream. Overall, the patient was doing well with implementing the education she received during her time at the Cleveland Clinic. She continued to require encouragement, but was completing activities, such as shaving, more freely than she would have during the pain program. These follow-up Skype sessions were consultative in nature and results were reported from the patient. Intentions were to give the patient additional services that went beyond the traditional pain program and follow-up evaluation.

Conclusions

At the end of the pain program, the multi-disciplinary team agreed that the patient did not require further time at the pain program and discharge could be planned. The patient was able to successfully attain all of her goals and was educated on how to use the tools she learned at the pain program in order to continue progressing at home. In relation to occupational therapy services provided, the patient required no further occupational therapy services at the time of discharge. A home exercise program including endurance and strength exercises, stretches, relaxation techniques, sensory exercises, as well as a swim program, was given to the patient at discharge. A school re-entry meeting was also conducted with the entire multi-disciplinary team, parents, child, and school administrators via phone conferencing. Each team member reported on the patient’s progress as well as any recommendations for the student to return back to school. Occupational therapy recommendations included a second set of books for home use in order for the patient to decrease weight in the backpack, using a water bottle throughout the day, having extra time to get to class, as well as allowing the student to walk or stretch in a designated area
periodically for reduction of pain for no more than two times a day for 10-15 minutes. The patient was discharged to return home and back to school part time for that school quarter before returning full time in the last quarter of the school year. A follow-up evaluation was recommended to be completed about one month after discharge with the entire pain management team. Additional follow-up consultations were provided at no charge to the patient and as an additional part of this case study.

The patient was unable to return to the Cleveland Clinic for a follow-up. At the time of case study was ending, a follow-up phone interview was not yet scheduled. Follow-up Skype sessions continue to be conducted with the patient throughout the end of this case study.

This case was done on a very specific population. The lack of research and the improved outcomes of the patient signify that there is a need for more research. The results of the case study presented here complement the findings of other studies. The patient was female, sociable, very interactive and engaged in school and other activities (Sherry & Weisman, 1998). It also showed the benefits of using the cognitive behavioral approach (Duncombe, 1998), in addition to the biomechanical (Latham, 2008) and model of human occupation (Kielhofner, 2008).

Implications of this case study reveal that it may be beneficial to further explore the benefits of occupational therapy in children with CRPS using the Cognitive behavioral approach in a pain program. This approach may be useful to support continued positive outcomes for the patients and give parents hope that there is an option to educate and improve the status of children with this diagnosis.

More studies such as the one presented here should be completed to add to the field of knowledge for patients, parents, and clinicians. Additional case studies that examines the effectiveness of the cognitive behavioral approach through occupational therapy interventions or
with a multidisciplinary pain program approach should be completed. Also, long term studies should be completed to identify improvements in function, return to daily roles, as well as adherence to home programs. Pediatric chronic pain, specifically CRPS, and the relation to occupational therapy are two areas which are lacking in research. These are both important areas in which research should be conducted and as part of an effort to improve pain programs, as well as bring more attention and funding to the field of occupational therapy in pediatric chronic pain.

The current case study has demonstrated unique and innovative qualities throughout the study. The case study was conducted on a specific population in which there is a lack of research concerning occupational therapy and treatment techniques. Many therapists are not very familiar with pain diagnoses or complex regional pain syndrome as it pertains to children. In a study conducted on four classes of university occupational therapy students, many students “made the most errors in believing that visible signs validate the existence of pain (42% correct) and that malingering is common (46% correct)” (Rochman, 2006). That study supported the idea that increased education is needed for pain management for occupational therapists and students.

The current case study demonstrates how important occupational therapy can be in the support and improvement of a patient’s condition concerning sensory awareness, independence with ADLs, posture, balance and coordination and strength and endurance in a pediatric pain rehabilitation client. The current case study also supports other statistics at the pediatric chronic pain program at the Cleveland Clinic. Preliminary results of outcomes for the pediatric pain program show that 44% of children show improvement in physical functioning at post-treatment and 62% show improvement at a 1-month follow-up. Thirty-six percent of those same patients also had an improvement in pain specific anxiety, while it increased to 52% at one-month follow-up (Banez, 2010). This case study also showed the effectiveness of the pain management
program at Cleveland Clinic Children’s Hospital for rehabilitation. Follow-up services given were also provided in addition to the typical follow-up services provided to patients in the pain program. Being a participant in the case study, the patient received additional consultative follow-up sessions conducted weekly through the Internet video messaging program, Skype. This is not typical follow-up for patients and is not frequently used during the therapy process to address follow-up and consultations. Live online meetings were a way to continue education with the patient and to assess the patient’s meanings, purposes, roles and feelings pertaining to the pain program, her improvements, and returning home and to school. It was stated by the patient and her mother that the occupational therapy, in addition to the other disciplines at the pain program, helped to improve the patient’s overall well being. The additional services provided also helped to keep the patient consistent with her home exercise program and goals until her follow-up evaluation.

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References


