BC PROVINCIAL Pediatric Oncology Hematology Network

NEWSLETTER

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For the initial evaluation of a child or adolescent suspected of having a tumour, immediate referral to a paediatric oncologist at BC Children's Hospital is recommended. Accurate and timely diagnosis of childhood cancer is best facilitated by a specialized team providing the laboratory, radiological and surgical evaluation required for diagnosis. These patients have very specific needs which are best met by a team approach directed by the paediatric oncologist. For these reasons, the BC Cancer Agency and the Provincial Pediatric Oncology/Hematology Network (POHN) recommend that all patients under the age of 17 who are suspected of having or are diagnosed with cancer in BC should be referred directly to BC Children's Hospital for initial evaluation and therapy. A suspicion of cancer in these patients should prompt the surgeon to contact the paediatric oncologist before any further investigations or procedures are undertaken.

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Surgery of Bone and Soft Tissue Sarcomas in Children

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The role of surgery in the assessment and treatment of malignant bone and soft tissue tumors is two-fold. The first function is to sample the tumor (biopsy), which provides a diagnosis; and the second role of surgery is part of definitive local therapy to treat the sarcoma. In bone and soft tissue sarcomas, it is essential to complete all pre-operating staging studies prior to performing a biopsy. Typically this includes a CT scan of the chest, MRI of the lesion, and PET-CT. Staging studies such as MRI done after an operative procedure are difficult to interpret because the edema caused by the biopsy makes the tumor appear more extensive and it often masks the tumor mass itself.

For most pediatric tumors, open surgical biopsy is preferred over needle biopsy to obtain adequate amounts of tissue for diagnosis, biologic studies and frozen tissue for banking. The specimens should be sent from the operating room on a moistened saline sponge in a fresh state. About one cubic centimeter of viable tissue is required. Although needle biopsy may provide enough tissue for diagnosis, it may be difficult to obtain adequate tissue for all of the necessary studies by multiple passes with a needle. When needle or open biopsy is performed, it is important to make the approach in the line of the definitive surgical incision. Pre biopsy consultation should be made with the surgeon who will be performing the definitive surgical procedure. If a malignancy is suspected and you are not planning to do the definitive therapy, it is preferable that the patient be referred to a pediatric tumor center for staging studies and biopsy.

The most common malignant bone tumors in children are Ewing sarcoma and osteosarcoma. In most cases, the plain radiographs provide the best indication that the bone tumor is malignant. A poorly delineated transition zone from tumor to normal bone and an aggressive periosteal reaction with breaching of the cortical bone are worrisome signs of malignancy. In contrast, soft tissue sarcomas are difficult to characterize by pre-operative staging evaluations. Although soft tissue sarcomas are relatively rare in children compared to other benign lumps, deep sub-facial tumors greater than 5 cm. in size are best investigated by pre-operative imaging with MRI or at least an ultrasound prior to biopsy. It is always preferable to do an incisional biopsy rather than an excisional biopsy in order to avoid an "UPS" procedure (unplanned surgical excision).

Most pediatric malignant tumors are treated with neo-adjuvant chemotherapy which lasts about 12 weeks. After this time, the staging studies are repeated and definitive local therapy is performed. In some cases this will be surgery alone while in other patients, surgery is preceded or followed by radiotherapy.

The second role of surgery for most pediatric sarcomas is definitive local therapy. Ewing sarcoma and rhabdosarcoma can be treated by definitive radiotherapy alone but overall patient survival is improved when surgery is part of the treatment program. In most cases, the objective of surgery for sarcomas is to achieve a complete excision with negative pathologic margins. There are two parts to a definitive surgical procedure for malignant bone tumors. The first is complete removal of the tumor (the oncologic procedure) and the second part is the reconstructive procedure to maximize limb function.

There are three types of surgical oncologic procedures to remove malignant tumors. The first is a wide excision with clear pathologic margins (R0 resection). The plane of dissection is within normal tissue. The acceptable width (mm.) of normal tissue is controversial. The second type of surgery is a marginal excision

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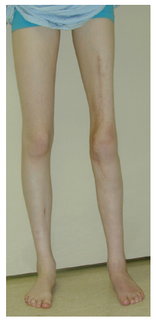
(R1 resection) which leaves microscopic residual tumor behind. In this procedure, the plane of dissection is within the tumor reactive zone just outside the tumor capsule. In most sarcomas, a marginal excision necessitates the use of adjuvant radiation therapy to decrease the chance of local relapse. The third type of tumor surgery is called an intralesional excision (R2 resection). The plane of dissection is within the tumor so gross tumor is left behind. Unfortunately this is a common sequelae of the "UPS procedure". An intralesional or de-bulking procedure is never acceptable for malignant tumors. In most cases, another surgery is needed to completely remove the tumor. Imaging done after an UPS procedure is difficult to interpret and it usually requires a more extensive procedure than if adequate imaging had been completed prior to excision.

For bone sarcomas, the second part of a definitive local control surgical procedure is limb reconstruction. In children, biological reconstruction is preferred. When choosing the best reconstruction for an individual child, the surgeon should consider the patient's desired sports activity level, the durability of the reconstruction, and future limb growth. In patients greater than 10 years of age, future growth may be best addressed by slowing the growth of the normal limb so that the affected limb can catch up.

Today most patients have limb salvage procedures instead of amputation. In some cases, the epiphysis of the joint with the articular surface can be spared and the bone segment filled with bone grafts. When these procedures are feasible, the patient has the best limb function possible with the greatest durability. Regular sports can often be resumed.

Endoprostheses are artificial joints which are much like total joint replacements in adults. Modification of activity levels in young people is needed to achieve long term durability. Impact sports will lead to early mechanical failures and require revision or amputation. Final function is dependent on the limb segment which is replaced and the remaining muscles that are available to provide joint movement. There are so called "growing" endoprostheses which are available for young children but there are several drawbacks. These prostheses are very expensive (about $40,000 each); they are prone to many complications and eventually have to be replaced by a definitive adult type endoprosthesis. "Growing endoprostheses" are best done in selected tumor centers and should be considered experimental.

Endoprosthesis radiograph



Endoprosthesis left leg

Joint allografts have the advantage of being biological. Unlike endoprostheses, the reconstructions are prone to many early complications such as infections, fractures, and non-unions. Treatment of these complications can delay resumption of chemotherapy. The results of allograft reconstructions do improve with time and the best results are in patients where both articular ends of the bone can be saved and joined together with an intercalary allograft. Osteo-articular allografts often fail because of difficulties maintaining cartilage viability and ligamentous stability. Size mismatch with the donor and recipient are also another problem resulting in poor results.

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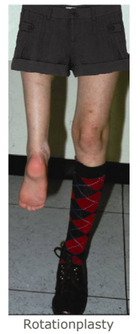
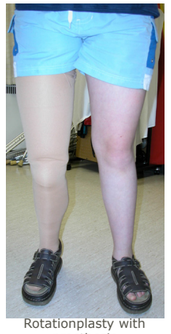
Rotationplasty has become a very successful reconstructive technique especially in young children. Rotationplasty was first described in a patient with tuberculosis who was treated in 1927, but it only began to be used in the treatment of malignant bone tumors in the late 1970s. In this procedure, the limb segment containing the bone tumor is removed (usually the distal femur or proximal tibia), the lower leg segment is rotated 180-degrees and reattached to the proximal femur. The rotated ankle and foot ends at the level of the opposite knee and functions as a knee joint. The patient becomes a functional below knee amputee.

Despite the unusual appearance of the limb, there are several advantages for the patient. Future growth can be accommodated by adjustments of the length of the prosthetic extension which is attached to the rotated leg. The patient functions as a below knee amputee and has a very smooth gait. An advantage of a rotationplasty over a below knee amputee is that there are no phantom pains. The patient feels like their whole limb is present including the removed knee segment. With time, patients are not aware that their limb is rotated backwards. Flexion and extension of the rotated ankle and foot simulate the movement of the anatomic knee. This is a biological reconstruction with no mechanical parts to wear out so the patient is encouraged to participate in sports. Several studies have shown that the health related quality of life of patients with rotationplasty is better than children who have their limb reconstructed by joint endoprostheses.



Rotationplasty



Rotationplasty with prosthesis right leg

Vincristine Neuropathy - cont'd from page 2

binding on the intracellular tubulin of both the fast- and slow-conducting axons[3,5].

Symptoms/Classification

Vincristine used in the treatment of children with cancer impairs conduction in the entire peripheral nerve[3,13] and may also affect the autonomic nervous system (approximately 30% of patients)[3], resulting in orthostatic hypotension, constipation, paralytic ileus and bladder atony (that can lead to urinary retention)[4,14]. Recent studies report that there appears to be ethnic variation in the rate of vincristine induced neuropathy, and that there may be underlying genetic susceptibility in determining who develops this toxicity[8]. Rarely (less than 1.4%), patients develop varying degrees of unilateral or bilateral laryngeal paralysis which may present as swallowing dysfunction (repeated coughing or choking), airway symptoms (stridor and voice change), and may require tracheostomy, alternative feeding routes and/or mechanical ventilation[14].

Vincristine neuropathy can present as numbness or reduced sensation in a glove-like distribution of the hands and feet[2]. Paresthesia, dysesthesia, causalgia and allodynia may also occur. Usually, these symptoms will manifest within one to two weeks of initial drug administration[2,6]. Weakness of the wrists, hands, ankles and feet (usually the extensors are more symptomatic) may become progressively worse as dosage accumulates. Reported symptoms may include increased clumsiness resulting in falls, foot slap, toe walking, muscle cramping, and/or pain[6,15]. Children attending school may complain of difficulty completing written assignments, or poor penmanship[16]. Autonomic complications include orthostatic hypotension, severe constipation, bladder dysfunction, and altered heart rate. Cranial nerve palsies have also been reported[6,14].

Classification of peripheral neuropathy to determine severity is complicated by the use of various scaling systems. Assessment of subjective and objective information into broad grading systems presently used introduces a ceiling effect, limiting the ability of the different scales to sensitively measure small changes that may occur during or after treatment[17]. A school-aged pediatric tool to assess chemotherapy induced peripheral neuropathy (Ped-mTNS) developed by Gilchrest, Tanner and Hooke (2009) may be more sensitive to changes than other measures but requires further refinement. Additional research is required before normal and cut scores are meaningful to clinicians[18]. A tool capable of assessing younger children has yet to be published.

Painful Neuropathy

As vincristine affects both slow- and fast-conducting axons, it may well be associated with painful neuropathy[3]. Management of painful vincristine neuropathy includes drug therapies that are used for other complex pain conditions e.g. amitriptyline and/or gabapentin[19,20]. Caution must be used to avoid interactions with other drugs that the patient may be on, including the patient's chemotherapy regime.

Long-Term Clinical Complications

Ramchandren, et al., (2009) studied 37 survivors of acute lymphoblastic leukemia (ALL) more than two years after completion of treatment and found that very few children reported subjective complaints despite recorded nerve conduction abnormalities. This indicates that subjective complaints should not be relied upon to identify ongoing issues. In their study examining the prevalence of neuropathy in childhood survivors of acute lymphoblastic leukemia (ALL) they found that 30% of the survivors tested had abnormal nerve conduction velocities. They also reported no relationship between increasing dose of vincristine and the prevalence of neuropathy[21]. Lehtinen, et al., (2002) examined motor-evoked potentials (MEP) of 27 children five years after completion of treatment for ALL and reported that 33% of subjects continued to experience fine or gross motor difficulties. A subset of their subjects also reported ongoing difficulty participating in sports[13]. Harila-Sari, et al., (1998) described similar findings in a group of 31 children 3 years after therapy for ALL through the assessment of somatosensory evoked potentials (SEP). The authors report changes in the SEP score had persisted for 2 years post administration of either vincristine or methotrexate[22].

Galea, Wright and Barr (2004) discussed the lack of sway in survivors of childhood leukemia. They postulated that there is interruption in the normal development of sensorimotor organization of balance

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Vincristine Neuropathy in Children Diagnosed with Cancer: The Role of Rehabilitation

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Introduction

Pediatric cancer is rare, affecting one child in 8,000 under the age of 14. There are approximately 130 new diagnoses of cancer annually in youth under the age of 15 in British Columbia; advances in the treatment of cancer in the pediatric population have resulted in a current survival rate over 80%[1]. This improvement in survival relates to the development of multimodal treatments, including chemotherapy, radiation therapy, and other targeted therapies. Neurological dysfunction associated with chemotherapy can be a determinant for stopping or limiting anti-tumor therapy and is related to cumulative dose or dose intensity[2,3,4,5,6]. The peripheral nervous system is more susceptible to chemotherapy than the central nervous system because of protection offered through the blood-brain barrier. The extent of possible damage during chemotherapy depends on the type of drug(s) used, dosage, dose intensity, cumulative dosage, route of administration, organ dysfunction affecting drug clearance, inherited differences in drug metabolism, preexisting neurological disorders, and age[4,7]. Genetic differences between individuals and drug interactions may also play crucial roles in drug toxicity[8]. Girls tend to deteriorate more during treatment but it is unclear if this relates to the fact that they are less active during treatment than boys[9]. Worsening of neuropathy after drug administration has stopped is referred to as "coasting"[3,4,5,6,10,11]. This paper will discuss the mechanism and effect of vincristine induced peripheral neuropathy (VIPN) on the child's long term functioning and the role of physical therapy.

Vincristine

Vincristine is classified as a "vinca alkaloid" and arrests cell division by inhibiting microtubule formation in the mitotic spindle[5]. Vincristine interferes with microtubule assembly, axonal transport and secretory functions resulting in primary axonal degeneration[3,4,5]. Vincristine is used in the treatment of hematological malignancies (leukemia, non-Hodgkin lymphoma) and solid tumors (Wilm's tumor, malignant mesenchymal tumors). It induces peripheral neuropathy by

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Vincristine Neuropathy - cont'd from page 3

control and that children adapt by adopting an "en bloc" strategy whereby they co-activate muscle agonists and antagonists to decrease the degrees of freedom within their available range, resulting in a reduction of their sway velocity. This is an inefficient method to gain balance control and would limit the ability to participate in more challenging (e.g., sporting) activities[23].

Hartman et al. (2006) evaluated motor performance with the Movement Assessment Battery for Children (M-ABC) in 128 children diagnosed with ALL, Wilms tumor, B-cell non-Hodgkin lymphoma and malignant mesenchymal tumors. Results indicated that 65% of the children tested scored below the 50th percentile[24]. Reindeers-Messelink et al. (2000) demonstrated that weakness of the lower extremities seemed more apparent in children (n = 17) than in adults and that sensory disturbances persisted for 6 months after their last vincristine dose. This would indicate the need for ongoing attention to safety[15].

Reinders-Messelink et al. (1996) examined the fine motor and handwriting capabilities of 18 children after completion of treatment for ALL. The findings indicated that 25% of this group of children demonstrated significant problems with written output (longer pauses during their written testing)[25]. In a later publication examining 11 participants during treatment for ALL, there was indication that the ALL group experienced worsening performance that appeared to be related to ongoing treatment and that slower drawing time and longer pause durations dissipated after 3 months[16]. Hartman et al (2007) examined the handwriting of 33 survivors of ALL, Wilms tumor, B non-Hodgkin lymphoma and malignant mesenchymal tumors and compared assessment findings with the results with matched controls in a blinded study using the BHK handwriting test[26]. Their findings contrast with Reinders-Messelink with no significance found between survivors and controls in writing speed or quality of handwriting.

Ness et al., (2012) reported on the neuromuscular impairments in a group of adult survivors of childhood ALL. Their findings indicate that survivors of ALL continue to experience absent ankle reflexes; decreased ankle range of motion; weakness of the lower extremities and altered sensation as well as diminished walking efficiency. Balance continued to be impaired with scores lower than expected. These findings indicate that while less than 50% of survivors have long-term lower extremity impairments, those that experience ongoing issues have their physical performance adversely affected. This study's findings may not apply to current populations because of changes in treatment regimens[27].

Physical Therapy Management

Physical therapy assessment should include the upper and lower extremity ROM, muscle strength, sensation, reflex testing, flexibility of diarthrodial muscles, and gait, as well as functional tests such as tying shoes, picking up a pencil/pen, writing a sentence, doing up buttons and other age-appropriate activities of daily living. Ideally, a baseline assessment will have been completed at the initiation of treatment for cancer; ongoing assessment throughout treatment and again at completion is needed[2] to determine the degree of neuropathy and to detect coasting. Gait abnormalities commonly seen are related to a decrease in passive range of ankle dorsiflexion and/or weakness of the ankle dorsiflexors[9,28]. This can present as knee hyperextension, out toeing, and/or early heel rise during stance phase. Heel strike may be absent if the child has progressed to a toe walking gait or audible foot slap at heel strike if the child is unable to control eccentrically the descent of the foot to the floor[9]. Treatment of a child with vincristine neuropathy is dependent on severity. Initial contact with the patient and family should include education regarding signs and symptoms, skin protection, possible loss of ankle range of motion and safety in the home[6,9,13,29]. Education of patients and family should include the use of non-slip shoes within the house, inspection of the skin, removal of trip hazards, reinstallation of baby gates for younger children, use of night lights, bath safety (non-slip mats) including adjustment of the water heater, protection from cold, and purchase of lighter shoes with good arch support. With increased severity, a home exercise program of stretches to the wrist/fingers and ankles/toes may be taught to prevent contractures of tendons[9]. In more severe cases, referral to an occupational therapist may be indicated for fine motor and handwriting assessment, which could provide information to family and community schools on the individual effects of chemotherapy on the child's written performance both during and after completion of treatment[16]. This may allow the child academic accommodations, such as longer time for written work and use of computer within the school classroom. The occupational therapist may provide adaptive aids or night resting splints for the ankles[28]. In severe cases where ankle function is impaired, articulated ankle foot orthoses may be prescribed[13].

In a systematic review White, Pritchard and Turner-Stokes (2011) concluded that there was no evidence to support strengthening exercise for individuals with peripheral neuropathy; however this may be reflective of the relatively short periods of strengthening prior to testing within the included studies and that many of the studies examined more central muscles e.g. quadriceps and hip muscles[30]. Balance exercises may be useful in a rehabilitation program when age-appropriate[23,27,31].

Gohar, Marches and Comito (2010) in a retrospective review of all children diagnosed with ALL in a one year period at Penn State Children's Hospital, examined physician referral frequency for physical therapy. They found that referral to physical therapy was initiated in only 10 children (the most common reason for referral was decreased functional mobility) with indications within the chart that the other 15 had musculoskeletal complications at some time during their treatment[32].

Conclusion

As more children survive a cancer diagnosis, it is becoming apparent that physical therapists can play an instrumental role in reintegration of this patient group back into the community. It is paramount that treating therapists have some familiarity with the chemotherapy agents that the child received, and their associated side-effects. This paper has dealt only with VIPN, and other potential treatment side-effects are not discussed. There is presently a need for standardized assessment procedure and the ability to target the most "at risk" group of patients in order to "target" referral and treatment. Treatment should focus upon increasing flexibility of tight muscles, strengthening of weakened muscles secondary to deconditioning, and, if required, provision of adaptive aids and balance retraining. Further research is required to create or refine tools to measure small changes that may occur with VIPN for school-aged and younger children and to allow for a more in depth comparison of VIPN sub-groups to better target interventions. Research should also focus on the effectiveness of specific physical therapy interventions for "at risk" populations examining the best time to intervene and most effective treatments.

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Physical Activity in Pediatric Cancer Survivors

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There are approximately 130 new diagnoses of cancer annually in youth under the age of 15 in British Columbia. Effective treatments available today for children, who have been diagnosed with cancer, have meant that the 5-year survival rate of childhood cancer is presently approximately 80% (BC Children's Hospital 2011). Treatment may include surgical procedures, chemotherapy, and radiotherapy. There are known side effects of these treatments, some of which improve over time. After treatment, survivors of childhood cancer return to their pre-cancer lives. However, physical limitations and barriers to exercise can interfere with participation and performance in physical activity and activities of daily living.

"Late effects" are complications that emerge after completion of treatment and are caused by the treatment of the original tumor[3,11], and have been reported to affect up to 92% of a studied cohort of childhood cancer survivors[3]. These can involve the endocrine, neurological, renal and hepatic, orthopaedic, and audiological systems[3,11]. Late effects affecting physical functioning include: neuromuscular defects, cardiovascular abnormalities, osteoporosis / osteopenia, secondary malignancy and obesity[1,3,6,13,14].

Several reports have examined the impact of late effects on participation restrictions and activity limitations in survivors of childhood cancer. The Childhood Cancer Survivor Study[14] examined performance limitations and participation restrictions in a long term follow up

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study of 11,481 survivors and 3839 siblings. The study identified that 19.6% of survivors were twice as likely to report performance limitations when compared with siblings. Participation restrictions were less common. In particular, survivors of brain cancer and bone cancer were the most likely to report limitations in personal care activities or routine activities, and that poor health prevented them from attending school or work. In another study investigating the late effects of childhood cancer on participation and quality of life, Berg et al (2009) reported that 64% of participants reported significant chronic lower extremity pain or numbness, and that only 54% reported participation in vigorous leisure activities. Fatigue in 24% of participants was reported to be so severe that it altered their ability to participate in physical education class, sports, walking and running, and carrying a backpack.

Other studies have looked at the fitness levels of childhood cancer survivors. A systematic review of whether physical fitness is reduced in survivors of acute lymphoblastic leukemia (ALL) found that VO2peak (an indicator of aerobic physical fitness) tended to be reduced in survivors when compared to healthy controls[16]. In addition to deficits in aerobic capacity, lower anaerobic capacity and significant problems in hand-eye co-ordination have also been identified in children 5-6 years after completing treatment for ALL[15]. Adult survivors of childhood ALL have also been found to have higher adiposity, reduced leg strength and poorer mobility than comparable adults in the general population[12].

There is little research available on the benefits of exercise on fatigue and quality of life in children. However, there are benefits associated with ongoing physical activity in healthy children. Many of the late effects of treatment for cancer that have been identified[6,8] could potentially be mediated by exercise. Individual exercise programs focusing on muscle strength, aerobic capacity as well as balance may improve the quality of life of paediatric cancer survivors[7]. In numerous studies childhood cancer survivors have been identified as complaining of ongoing fatigue that interferes with activity[2,3]. Regular physical activity has been shown to be beneficial in adult cancer survivors and has been shown to improve cancer related mental and physical fatigue in adults[4]. Community based exercise programs aimed at children and adolescents with cancer have also demonstrated benefits to participants with reported lower levels of fatigue, improvements in physical and psychological health, and overall quality of life[17, 9].

Recently, the American Physical Therapy Association (APTA) Section on Pediatrics identified and summarized guidelines that can be utilized by physical therapists when implementing treatment or establishing fitness programs. The recommendations for overall health and wellness indicate that children should participate in 60 minutes of physical activity (PA) every day (including moderate to vigorous aerobic activity) and within that time frame, some form of muscle and bone strength building activity/exercise 3 times per week[5].

There are many barriers to exercise and physical activity in the childhood cancer survivor population. Some of the most common of these among a group of adolescent and young adult survivors have been reported as, "being too tired", "too busy", or "not belonging to a gym"[2]. The impact of social support on engagement in physical activity has also been examined. Adolescents who identify a friend that exercises or who have parents that encourage physical activity have been found to have significantly higher level of vigorous and moderate physical activity[10]. Survivors of childhood cancers should be encouraged to participate in regular physical activity and should avoid a sedentary lifestyle[8].

The role of the physical therapist can be to provide direction in the design of individualized exercise and activity programs that target specific deficits and outcomes, in addition to providing participation alternatives and adaptations that accommodate physical limitations and individual interests. It is the role of the entire health care team, however, to promote, support and foster an active lifestyle for children and families, for good health and improved quality of life.

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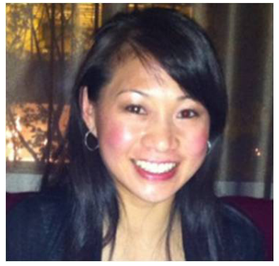
From Hospital to Home: The Role of Occupational Therapy in Pediatric Oncology



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"So this is what occupational therapy is!" a mother exclaims as I mould and shape a splint over a toddler's arm. Given the excitement and satisfaction in her voice, I resist explaining that splinting is only a small part of what an occupational therapist (OT) does and may be only the beginning of the occupational therapy process. Looking back on the event however, this may have been the perfect starting point to describe some of the many other ways I also help children.

Parents are not the only ones uncertain of what occupational therapy has to offer in a pediatric oncology setting. Members of the health care team may struggle to identify when to call upon the OT for assistance. This is not surprising. In pediatric oncology, the role of occupational therapy is vast and varied. While the oncology OT may be called upon to fabricate custom foot drop splints for the ankles or resting hand splints to reduce the risk of contractures in a child experiencing vincristine-induced peripheral neuropathy, the same therapist may also assess the swallowing function of this child. The OT may also consider: fine motor function and its impact on activities of daily living (ADLs); ADL retraining and safety; management of household activities; modifications and adaptations to school activities; equipment needs and physical accessibility of the home, school, and community environment in which the child is returning to. In short, occupational therapy takes on a holistic approach to looking at the impact and many facets of a disease on a child's daily activities. Working alongside the patient and their family, the therapeutic goal is to maximize functional independence from the beginning while in the hospital, to transferring skills to the home and into the community.

What exactly does the occupational therapy process look like? Let us follow an example. It is common for OTs to splint upper and lower extremities related to peripheral neuropathies, but splinting for bone tumors, soft tissue tumors, and nerve injury following orthopedic surgery also arise. Some bone tumors require bone grafting and the use of an Ilizarov external fixator frame, which circumferentially wraps around the limb like an external skeleton. There are many considerations when providing an Ilizarov frame. Education to families regarding the maintenance of range of motion (ROM) at the joint and management of swelling through proper positioning is important. As part of the rehabilitation process, the OT encourages participation in daily activities, making recommendations and modifying activities as needed. ADLs such as dressing, toileting, and bathing must accommodate for a lower extremity Ilizarov frame. Modified techniques and strategies to ensure safety with these activities while maximizing independence are practiced with the patient while in hospital. Endurance and tolerance for activity is developed over each session. Even everyday clothing requires adaptations to accommodate for the Ilizarov frame. The OT shows parents how to modify pants with extra material and Velcro. Equipment may be recommended for safe transfers within the home, such as a bath transfer bench or raised toilet seat. The wheelchair needs of the child will be assessed, and a wheelchair prescribed for safe mobility and longer distances around the community will be provided.

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Attending school is also considered a part of the rehabilitation process. As the child begins to increase their capacity to weight bear, they will increase their walking around the school environment. The OT may independently, or in partnership with a community OT, assess for any safety risks and recommend modifications to school activities as necessary and appropriate for the child. For example, a child in elementary school may need close supervision on the playground at recess time for poor balance. They may even need to stay in for recess if the weather is bad and they are at increased risk for falls on slippery terrain. For an adolescent in high school, it may be recommended that the child be allowed to leave classes five minutes early to have more time to get to their next class and avoid having to navigate the busy, crowded hallways at the bell. They may also be assigned a buddy to help carry books and provide missed notes when leaving class early. The OT assesses and advocates for these accommodations.

Following this example, it is clear that occupational therapy goes beyond provision of a splint or assessing swallowing safety; OTs look at the entire picture and consider how even a simple splint may impact a child in various aspects of their daily activities. OTs work with the team including physicians, nurses, physiotherapists, social workers, dieticians, parents, and school or daycare staff to reduce the impact of illness and support young people in returning to the occupations that fabricate their lives!

Upcoming Conferences

Care of the Adolescent with Cancer
Too Young, Too Old, Where Do I Fit In?

Thursday, May 10, 2012 - Evening session
Friday, May 11, 2012 - Full day session
Chan Centre for Family Health Education, BC Children's Hospital, Vancouver, BC

The Division of Oncology/Hematology/BMT, Department of Pediatrics, University of British Columbia presents a multidisplinary conference on Care of the Adolescent with Cancer. This conference will include discussions on ethical considerations, strategies and interventions to improve the care for this population through the trajectory of illness and survivorship. We will hear from health care professionals with expertise in this field and learn from the adolescents themselves.

Agenda:
- Post Traumatic Stress Disorder in Adolescents with Chronic Illness
- Adolescent Brain Development
- Ethics and Decision-Making in Adolescent Care
- Sexuality and Fertility Preservation
- "Does the Journey Ever End…Through Our Eyes" – adolescents' and parents' perspective on recovery and challenges of survivorship
- "Let Me Help You Help Me Better" – adolescents' insights on how to improve care to adolescents
- "A Funny Thing Happened to Me on the Way to Chemotherapy" – Dr. Dan Shapiro

For more information and to register, please go to the UBC Continuing Professional Development website
http://www.ubccpd.ca/Events/CPD_Conferences/Pediatric_Oncology_Hematology_Education_Day.htm

Fifth International Nursing Conference on Child and Adolescent Cancer Survivorship

June 6-7, 2012
Colonial Williamsburg Resort, Williamsburg, Virginia, USA

This conference is designed to meet the educational, research and networking needs of nurses and other health care professionals working with survivors of childhood and adolescent cancer. The conference provides an oportunity for international networking.

For more information visit the Children's Hospital of Philadelphia website http://www.chop.edu/export/download/pdfs/articles/cme/adolescent-cancer-2012.pdf

15th International Symposium on Pediatric Neuro-Oncology (ISPNO)

June 24-27, 2012
Sheraton Centre Hotel, Toronto, ON

ISPNO has become the premier event in the paediatric neuro-oncology community. This symposium is a special meeting at which new information and results can be shared and new collaborations can be established for health care professionals involved in the care of children and adolescents with central nervous system tumours. The program will feature plenary and poster sessions, as well as an Education Day and a Family day.

For more information visit the ISPNO 2012 website http://www.ispno2012.com/home

The Provincial Pediatric Oncology/ Hematology Network

The Network is an interdisciplinary organization whose goal is to ensure appropriate diagnosis, management, follow-up, and end-of-life care for pediatric patients with malignancies and blood disorders.

The Network supports community hospitals and practitioners, and develops partnerships with other health care facilities to enable seamless and integrated care for patients and families on treatment and off treatment.

It will further develop and enhance the research programs of basic, translational, and clinical research to better childhood cancer control and improve outcomes for these patients and their families.

For More Information

To learn more about the Provincial Pediatric Oncology/Hematology Network, or to submit articles or stories to this newsletter, please contact:

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