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THE ROLE OF OCCUPATIONAL THERAPY IN PEDIATRIC ONCOLOGY

Laura Stimler, OTD, OTR/L, BCP, C/NDT
www.OccupationalTherapy.com

Objectives

- Identify common types of pediatric cancer diagnoses, treatment, and rehabilitation implications specific to OT throughout the continuum of care into survivorship

- Describe evidence-based evaluation and treatment techniques to improve participation in occupations and quality of life for pediatric oncology clients

- Recognize the need for further research on the effectiveness of OT services for pediatric oncology clients
OVERVIEW, DIAGNOSIS, INCIDENCE AND SURVIVAL RATES

What is Cancer?

“Cancer is the name given to a collection of related diseases. In all types of cancer, some of the body’s cells begin to divide without stopping and spread into surrounding tissues.”

(National Cancer Institute, 2017)
Pediatric Cancer Statistics

- Leading cause of death by disease between infancy through 14 years
- Second leading cause of death in children
- Estimated 10,270 new cases in the US are expected to occur in 2017 (between ages 0-14 years)

(American Cancer Society, 2017)

Diagnosis and Staging

- Fine needle aspiration (FNA)
- Ultrasound or CT scan
- Biopsy (needle, incision, or excision)
- MRI
- PET
- BMA

- TNM staging
  - Tumor
  - Regional lymph nodes
  - Distant metastases

(news.Vanderbilt.edu)
Common Cancers Among Children

- Leukemia 29%
- CNS 26%
- Neuroblastoma 6%
- Wilms Tumor 5%
- Non-Hodgkin lymphoma 5%
- Hodgkin lymphoma 3%
- Rhabdomyosarcoma 3%
- Osteosarcoma 2%
- Retinoblastoma 2%
- Ewing Sarcoma 1%

(Pediatric Survival Rates)

- Survival rates have dramatically improved!!
  - 5 year survival rate is currently over 83%

(American Cancer Society, 2017)
PEDIATRIC CANCER TREATMENT AND FUNCTIONAL IMPLICATIONS

Pediatric Cancer Treatment

- Chemotherapy
- Radiation Therapy
- Stem Cell Transplant
- Surgery
- Steroids
- Immunotherapy

(American Cancer Society, 2017)
Mediport

Side Effects of Cancer and Treatment

- General
  - Mucositis
  - Cardiopulmonary
  - Fatigue
  - Pain

(Steomberg, Asher, Bailey & Fu, 2015)
Side Effects of Cancer and Treatment

• Neurological dysfunction
  o Chemotherapy-induced peripheral neuropathy (CIPN)
  o Radiation fibrosis
  o Radiculopathy
  o Steroid myopathy
    (Lee, Arrillaga-Romany, & Wen, 2012; Stubblefield & O’Dell, 2009)

• Decreased functional performance
  o Decreased ADLs and decreased cognition
  o Decreased strength, flexibility, endurance, balance and decreased peer interaction, motivation, self-esteem, poor social outcomes
    (Ness et al., 2009; Steinberg, Asher, Bailey & Fu, 2015)

General Precautions

• HOLD patients receiving all blood products/platelets, chemo, ATG, and the first IVIG treatment
• Patient may be seen with IVIG if tolerated well
• Hgb and platelet considerations
• Isolation
• WB precautions and activity status
• Activity during chemotherapy
• Cardiac status
• Mediport restrictions
Evidence linked to precaution recommendations

- MSK retrospective study (manuscript under review): “Safety and Feasibility of Rehabilitation Interventions in Pediatric Hematopoietic Stem Cell Transplant Patients with Thrombocytopenia”
  - Analyzed relationship between platelet counts (<50K), intensities of PT and OT, and frequency of bleeding complications

<table>
<thead>
<tr>
<th>Activity categories</th>
<th>Very light</th>
<th>Light</th>
<th>Moderate</th>
<th>Intensive</th>
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</thead>
<tbody>
<tr>
<td>AROM/AAROM</td>
<td>Transfers/transition</td>
<td>Dynamic balance on unstable surface</td>
<td>Stretching/elongation</td>
<td></td>
</tr>
<tr>
<td>ADLs sitting EOB</td>
<td>ADLs standing EOB</td>
<td>Reaching out of BOS on unstable surface</td>
<td>Climbing, negotiating uneven surfaces</td>
<td></td>
</tr>
<tr>
<td>Bed mobility</td>
<td>FM play in standing</td>
<td>Unlimited ambulation</td>
<td>Pulmonary toileting</td>
<td></td>
</tr>
<tr>
<td>Seated fine motor play</td>
<td>PROM</td>
<td>Endurance</td>
<td>Jumping, scooter</td>
<td></td>
</tr>
<tr>
<td>Seating reaching activities</td>
<td>Static balance on even surface</td>
<td>OOB ADLs</td>
<td>Progressive, resistive</td>
<td></td>
</tr>
</tbody>
</table>
Results

- No bleeding complications related to mobilization, PT, or OT regardless of platelet counts or intensity of therapy

CHEMOTHERAPY INDUCED PERIPHERAL NEUROPATHY (CIPN)
Chemotherapy-Induced Peripheral Neuropathy (CIPN)

- Dose dependent
- Highly toxic chemotherapy induces sensory and or motor neuropathy
- New effort to treat due to increasing survivorship
- Temporary or permanent

(Mora, Lavole Smith, Donohoe & Hertz, 2016)

Incidence of CIPN

- When treated with a single chemotherapy agent: 30-40%
- Varies based on type of medication, duration, and dose
- Pediatric patients: >50%

(plus.google.com)
Presentation of CIPN

• “Stocking-glove” distribution

Symptoms

Sensory

• Parasthesias
• Numbness, tingling
• Aching, burning
• Hypo-reflexia or areflexia
• Impaired discrimination and proprioception

Motor

• Muscle weakness
• Decreased coordination, balance
• Vestibular dysfunction
• Decreased fine motor
• Hearing loss
• Foot drop

(Mora, Lavoie Smith, Donohoe & Hertz, 2016)
Outcome Measures

• Total Neuropathy Scale (TNS)
  (Mora, Lavoie Smith, Donohoe & Hertz, 2016)

• Pediatric modified-Total Neuropathy Scale (ped-mTNS)
  o Adapted for school aged population (3-18 years)
  o Reliable
    • Acceptable internal consistency, test-retest reliability, and inter-rater reliability
  o Valid
    • Correlates well with functional measures of balance and manual dexterity
      (Gilchrist & Tanner, 2013)

Chemotherapeutic Agents Causing CIPN

<table>
<thead>
<tr>
<th>Chemotherapeutic Agents</th>
<th>Oxaliplatin</th>
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</thead>
<tbody>
<tr>
<td>Platinum-based agents</td>
<td>Carboplatin</td>
</tr>
<tr>
<td></td>
<td>Cisplatin</td>
</tr>
<tr>
<td>Taxanes</td>
<td>Paclitaxel</td>
</tr>
<tr>
<td></td>
<td>Docetaxel</td>
</tr>
<tr>
<td>Vinca alkaloids</td>
<td>Vincristine</td>
</tr>
<tr>
<td></td>
<td>Vinblastine</td>
</tr>
<tr>
<td></td>
<td>Vinorelbine</td>
</tr>
<tr>
<td>Other</td>
<td>Thalidomide</td>
</tr>
<tr>
<td></td>
<td>Bortezomib</td>
</tr>
<tr>
<td>Agent</td>
<td>Clinical Findings</td>
</tr>
<tr>
<td>----------</td>
<td>----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Bortezomib</td>
<td>• Sensory neuropathy</td>
</tr>
<tr>
<td>Cisplatin</td>
<td>• Large fiber sensory neuropathy • Ataxia • Residual neuropathic pain • Hearing loss</td>
</tr>
<tr>
<td>Oxaliplatin</td>
<td>• Acute neuropathy characterized by paraesthesia • Cold hypersensitivity • Allodynia involving the extremities, lips, and oropharyngeal area during or shortly after infusion • Chronic large fiber sensory neuropathy</td>
</tr>
<tr>
<td>Vincristine</td>
<td>• Sensorimotor neuropathy with small fiber involvement • Mononeuropathies and cranial nerve palsies • Autonomic neuropathy; most neurotoxic • Neuropathic pain</td>
</tr>
<tr>
<td>Paclitaxel</td>
<td>• Sensorimotor neuropathy involving small and large sensory fibers • Acute arthralgias and myalgias</td>
</tr>
<tr>
<td>Thalidomide</td>
<td>• Sensorimotor neuropathy</td>
</tr>
</tbody>
</table>

**CONTINUED**
LEUKEMIA

Leukemia

- Represents 29% of all cancer cases occurring in children younger than 15 years
- Approx 3,250 children diagnosed with leukemia each year in the US
- Survival rate: ~ 80%

Acute Lymphoblastic Leukemia (ALL) – 80% of all cases
Acute Myelogenous Leukemia (AML) – 15-20% of all cases
Chronic Myelogenous Leukemia (CML) – 2-5% of all cases
Childhood ALL Treatment Related Impairments

- White matter damage and proliferation defects in brain
- Cognitive impairment
- CIPN
- Endocrinopathies
- Obesity
- Avascular Necrosis
- Decreased bone mineral density
- Cataracts
- Pulmonary issues
- Cardiac issues including stroke
- Infertility

(supportindushospital.org)

Stem Cell Transplant

- Used to treat malignant and non-malignant disorders
  - Diseases affecting blood cell production
  - Hodgkin’s Disease and other lymphomas
  - Multiple Myeloma
  - Solid tumors

- Aplastic Anemia (AA)
  - Fanconi’s Anemia
  - Dyskeratosis Congenita
  - Diamond-Blackfan Syndrome
  - Schachman-Blackfan Syndrome

- Severe Combined Immunodeficiency Syndrome (SCID)

- Allogeneic vs Autologous

(American Cancer Society, 2017)
Allogeneic Stem Cell Transplant (SCT)

- Chemo and Total body irradiation (TBI) 1-2 weeks
- Infusion of donor stem cells
- Single infusion
- Engraftment (recovery) 2-6 weeks

(American Cancer Society, 2017)

SCT Treatment Related Complications

- Chemotherapy Induced Peripheral Neuropathy
- Fibrosis
- Mucositis
- Opportunistic Infections (Viral, Bacterial, Fungal)
- Organ Toxicity (Cardiopulmonary, Renal, Liver)
- Neurotoxicity (Seizures)
- Cataracts
- Musculoskeletal Issues
- Graft vs. Host Disease

(Chima, Abulebda, & Jodele, 2013; Jesuda et al., 2013; Kwon et al., 2013; American Cancer Society, 2017)
Acute (aGVHD) vs Chronic (cGVHD)

Organ involvement
- Skin
  - Rash
- Gastrointestinal (GI) tract
  - Diarrhea, intestinal bleeding
- Liver
  - Jaundice
  - Respiratory (cGVHD)
  - Musculoskeletal (cGVHD)

Grading
- I (mild)
- II (moderate)
- III (severe)
- IV (life threatening)

Treatment
- Important to monitor closely using timeline
- High dose corticosteroid therapy
- Fluid and electrolyte replacement, anti-diarrheal therapy, antibiotic/antifungal therapy, immunosuppression, nutritional support
Functional Implications

- Systematic Review on neurocognitive effects of chemotherapy in children diagnoses with ALL
  - Search: Medline
    - Terms: neurocognit*, cognit*, neuropsychol*, attention, executive, intellectual or intelligence combined with leukemia or cancer and child*
  - 21 studies met inclusion criteria
  - Results:
    - Attention, processing speed, executive functioning, memory, visuomotor function, visuospatial skills
    - Behavior and underperformance in school
    - Risk factors: age, sex, treatment intensity

(Buizer, de Sonneville, & Veerman, 2009)

Evidence for Intervention

- Randomized controlled trial: high and low intensity physical training compared to control
  - 235 participants diagnosed with cancer receiving chemotherapy
  - 6 weeks of structured supervised activity
    - Warm up, resistance, cardiovascular, relaxation, body awareness, restorative, massage
  - Results: significant improvement found in intervention group in areas of fatigue, general wellbeing including physical function, vitality, emotional, mental health, oxygen consumption, and muscular strength

(Adamsen et al., 2009)
The Stoplight Program for Children and Adolescents with Acute Lymphoblastic Leukemia

Children’s Hospital and Clinics of Minnesota

<table>
<thead>
<tr>
<th>PT visit type</th>
<th>Inpatient evaluation</th>
<th>Outpatient evaluation</th>
<th>Initial discharge</th>
<th>Follow up outpatient evaluations</th>
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<tr>
<td>Day post diagnosis</td>
<td>Day 2-4</td>
<td>Weeks 6-8</td>
<td>Green criteria met</td>
<td>Every 6 months until 2 evaluations with no deficits</td>
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<tr>
<td>Chemotherapy Cycle</td>
<td>Induction</td>
<td>Consolidation</td>
<td>Typically Maintenance</td>
<td>Maintenance/Post Treatment</td>
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</table>

(www.childrensMN.org)

Table 1

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Outcome measurement</th>
<th>Red</th>
<th>Red Intervention</th>
<th>Yellow</th>
<th>Yellow Intervention</th>
<th>Green/Rehabilitation Criteria</th>
<th>Green Intervention</th>
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<tbody>
<tr>
<td></td>
<td>Balance Performance Scale / Functional Performance Scale</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Active ankle ROM</td>
<td>Goniometry</td>
<td>0°</td>
<td>Strengthening</td>
<td></td>
<td></td>
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<tr>
<td>Ankle strength</td>
<td>Manual muscle test</td>
<td>40°</td>
<td>Strengthening</td>
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<tr>
<td>Floor to stand</td>
<td>Balance to stand</td>
<td>10°</td>
<td>Strengthening</td>
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<tr>
<td>Gait</td>
<td>Timed Full Test</td>
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<tr>
<td>Balance</td>
<td>Timed Full Test</td>
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</tbody>
</table>

CNS TUMORS

CNS Tumors

• Brain tumors make up 20% of all malignancies in patients under 15 years of age
  • Astrocytomas/Giomas
  • Medulloblastoma
  • Ependymomas

(American Cancer Society, 2017)
Symptoms and Diagnosis

• Symptoms:
  o Seizures
  o Vision changes
  o Cognitive/behavioral changes
  o Weakness & hemiparesis
  o Vomiting
  o Headache

• CT scan or MRI

Treatment

• Maximal surgical resection
• Radiation to the entire central nervous system (CNS)
• Chemotherapy
  
  (De Braganca & Packer, 2013)
Functional Implications

- Cognitive/executive function deficits
- Neuromuscular deficits
- Decreased communication
- Hearing impairments
- Hemiparesis
- Decreased ADL performance

(De Braganca & Packer, 2013)

Constraint-Induced Movement Therapy for Children with a Brain Tumor: St. Jude

Objective – Feasibility Study
  Phase 1: Initial Assessment
  Phase 2: Three Week Intensive Intervention
  Phase 3: Follow up Assessment

<table>
<thead>
<tr>
<th>Inclusion Criteria</th>
<th>Exclusion Criteria</th>
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<tbody>
<tr>
<td>• Diagnosis of hemiplegia of an upper extremity</td>
<td>• Participants with severe active range of motion deficits</td>
</tr>
<tr>
<td>• Ages 2-12 years</td>
<td>• Uncontrolled seizures</td>
</tr>
<tr>
<td>• English Speaking</td>
<td>• Pain that significantly interferes with participation</td>
</tr>
<tr>
<td>• Child is willing to participate and parents provide informed consent.</td>
<td>• Currently receiving oral/IV chemo or RT</td>
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</table>
Outcome Measures

<table>
<thead>
<tr>
<th>Test</th>
<th>Baseline</th>
<th>During Intervention</th>
<th>End of intervention</th>
<th>Long Term Follow-up</th>
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<tr>
<td>PMAL</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>INMAP</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAFT</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CI Therapy Feasibility Scale</td>
<td>X</td>
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<td></td>
<td></td>
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<tr>
<td>PedsQL SF-15</td>
<td>X</td>
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<td></td>
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<tr>
<td>PedsQL Acute</td>
<td>X</td>
<td>X</td>
<td></td>
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</tbody>
</table>

PMAL - Pediatric Motor Activity Log  
INMAP – Inventory of New Motor Activities and Programs  
PACS – Pre-School Activity Card Sort  
PAFT – Pediatric Arm Function Test  
CAPE- Children’s Assessment of Participation and Enjoyment  
PedsQL SF-15 & Acute – Pediatric Quality of Life Inventory Short form and Acute version

St. Jude CIMT

Patient Demographics

<table>
<thead>
<tr>
<th>Age Average</th>
<th>Ave yr from dx</th>
<th>Diagnosis</th>
<th>Treatment Received</th>
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<tbody>
<tr>
<td>7.3±3.6 years</td>
<td>4.2±3 years</td>
<td>Juvenile Pilocytic Astrocytoma</td>
<td>N=4</td>
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<tr>
<td></td>
<td></td>
<td>Anaplastic Astrocytoma</td>
<td>N=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Choroid Plexus Carcinoma</td>
<td>N=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Grade Glioma</td>
<td>N=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>High Grade Infantile</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gilioneuronal Tumor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Atypical Teratoid Rhabdoid Tumor</td>
<td>N=1</td>
</tr>
</tbody>
</table>

Resection  N=9  
Chemo-therapy  N=5  
Radiation Therapy  N=2
St. Jude CIMT

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>3-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Skills</td>
<td>2.28±0.75</td>
<td>1.48±0.78</td>
<td>1.46±0.91</td>
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<tr>
<td>ADL</td>
<td>2.40±0.78</td>
<td>1.46±0.91</td>
<td>1.46±0.91</td>
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</table>

INMAP Scores

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>3-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Skills</td>
<td>17.88±6.5</td>
<td>20.88±4.65</td>
<td>18.44±5.81</td>
</tr>
<tr>
<td>ADL</td>
<td>18.32±4.55</td>
<td>18.32±4.55</td>
<td>18.32±4.55</td>
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</table>

PAFT Scores

<table>
<thead>
<tr>
<th></th>
<th>Pre-intervention</th>
<th>Post-intervention</th>
<th>3-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount</td>
<td>39.04±20.73</td>
<td>32.88±13.12</td>
<td>38.5±6.57</td>
</tr>
<tr>
<td>Quality</td>
<td>77.88±27.96</td>
<td>63.9±27.13</td>
<td>63.9±27.13</td>
</tr>
</tbody>
</table>

NEUROBLASOMA
Neuroblastoma

- Most common solid extracranial tumors in children
- Average age 16 months
- 48% of patients have metastatic disease at time of diagnosis
- Adrenal region, extraadrenal retroperitoneum, and chest, pelvis, and neck
- About 600 cases per year
  
  (Brisse et al., 2011)

Treatment

- Surgery
- 3F8 Monoclonal Antibody Therapy
  
  (Memorial Sloan Kettering Cancer Center, 2017)

- Chemotherapy:
  - Vincristine
  - Cisplatin

(hopkinsmedicine.org)
Diagnosis and Imaging

- Bone marrow aspirate and biopsy
- MIBG (Methylisobenzyl guanidinium) scan
- Bone scan
- PET (Positron emission tomography)
- Magnetic resonance imaging (MRI) of primary tumor

(MSKCC, 2017)

Functional Implications

- 42% of patients experienced hearing loss and 28% had moderate to severe ototoxicity
  (Yancy et al., 2012)

- Decreased fine and gross motor coordination due to CIPN
  - Increased tripping and decreased balance
  - Delayed acquisition of developmental milestones
  - Muscle weakness
  (Gilchrist, L., 2012)
Sarcoma

- Rhabdomyosarcoma
- Retinoblastoma
- Ewing sarcoma
- Osteosarcoma

Rotationplasty video

Psychosocial Implications
Standards Specific to Pediatrics

• Youth diagnosed with cancer, including family members, should be assessed routinely for psychosocial needs throughout trajectory of care

• Pediatric patients diagnosed with brain tumors and other high risk conditions should be tested throughout treatment for neuropsychological deficits

• Long term survivors of childhood and adolescent cancers should be screened annually for depression, distress, and anxiety

• Siblings of pediatric patients are considered to be an at-risk population and should be screened

(Weiner, et al. 2015)

Periods of Increased Vulnerability

• Treatment failure
• Recurrence
• Progression of disease
• Transition to survivorship

(Sheldon et al., 2012)

• Distress
• Depression
• Delirium
• Anxiety

(Jacobsen et al., 2012)
Pediatric Specific Burdens

• Patient issues
  o Limited understanding of life and death depending on developmental process
  o May lack verbal skills to describe feelings, pain
  o May protect others at own expense
  o Not legally competent

  o Adolescent issues
    o Physical health decline, fertility
    o Cognitive functioning, emotions
    o Restricted activities
    o Relationships, body image
      (Sodergren, 2017)

Pediatric Assessment Tools

• Pediatric Quality of Life Inventory (PedsQL)
  o Patient Report
  o Parent Report
    • Physical Health, Psychosocial Health, Total Health Related Quality of Life Score
      (Palmer, Meeske, Katz, Burwinkle, & Varni, 2007)

• Short Child Occupational Profile (SCOPE)
  (Boyer, et al., 2008)
Peds QL Psychosocial Health Summary

<table>
<thead>
<tr>
<th>How I Get Along With Others (problems with…)</th>
<th>Never</th>
<th>Almost Never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Almost Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I have trouble getting along with other kids</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>2. Other kids do not want to be my friend</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3. I cannot do things that other kids my age can do</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

(Palmer et al., 2007)

OT ASSESSMENT
Occupational Therapy Evaluation

- PMH and HPI
- MMT
- ROM and goniometry
- Sensory processing/sensation
- Balance/coordination
- Posture/alignment
- ADL participation
- Fine motor
- Visual motor integration
- Play
- Cognition/language
- Psychosocial

OT Standardized Assessments

- The Bruininks-Oseretsky Test of Motor Proficiency, Second Edition (BOT-2)
- Developmental Assessment of Young Children (DAYC)
- Alberta Infant Motor Scale (AIMS)
- Peabody Developmental Motor Scales Second Edition (PDMS)
- Canadian Occupational Performance Measure (COPM)
- Beery-Buktenica Developmental Test of Visual-Motor Integration, 6th Edition (BEERY™ VMI)
- Sensory Processing Measure (SPM)
- Pediatric Quality of Life Inventory (PedQL)
- Montreal Cognitive Assessment (MoCA)
Ped-mTNS Sensory Symptoms

Appendix A

Pediatric-modified oral somatosensory scales

Sensory Symptoms: ________ (record worst score of the three sensations)
"Do you have any parts of your body that are tingly, numb (can hardly feel), or hurt?"

0: None
1: Symptoms limited to fingers or toes
2: Symptoms extend to ankles or wrists
3: Symptoms extend to knees or elbows
4: Symptoms above knees or elbows

Functional Symptoms: ________ (record worst score of the three questions)
"Do you have trouble buttoning shirts or zipping zippers?"
"Do you have trouble walking such as tripping frequently?"
"Do you have trouble going up or down stairs?"

0: Not difficult
1: A little difficult
2: Somewhat difficult
3: I need help
4: I can't do that at all

Autonomic Symptoms: ________ (record worst score of the three questions)
"Do your hands or feet feel hotter or colder than normal?"

0: Never
1: A little bit
2: Sometimes
3: Very much
4: Always or always

Ped-mTNS Clinical Testing

Clinical Testing:

Light Touch Sensation: ________

<table>
<thead>
<tr>
<th>Semmes</th>
<th>Semmes</th>
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<tbody>
<tr>
<td>Toes R</td>
<td>Finger R</td>
</tr>
<tr>
<td>L</td>
<td>L</td>
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<tr>
<td>Med Mat R</td>
<td>Wrist R</td>
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<td>L</td>
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<tr>
<td>Knee R</td>
<td>Elbow R</td>
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<td>L</td>
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Standard Sensory Testing

- Light touch discrimination
- Sharp/dull discrimination
- Temperature discrimination
- Stereognosis
- Proprioception
- Monofilament testing

OT INTERVENTION
Preventative programming PI Project

• Need to continue to develop fine and gross motor skills during treatment

• Under-recognized need for rehab on pediatric oncology unit in acute care oncology setting

Screen-generated referrals vs MD-generated referrals over time

(Miale, Stimler & Riedel, 2013)
PT vs OT

• During initial 6 months:
  o 34.5% of PT referrals and 56.6% of OT referrals were generated by medical team
  o Therapists requested 65.5% of PT referrals and 43.4% of OT referrals

• After 3 years:
  o 80% of PT and OT referrals were generated by the medical team
  o 20% of PT and OT referrals were generated by using the screening tool

(Miale, Stilmler & Riedel, 2013)

General CIPN Education

• Instruct clients to report signs and symptoms of peripheral neuropathy to primary health care provider (NP, MD).

• General education is essential for:
  o Compensation and modification to improve safety with functional mobility and B/IADL
  o Importance of foot care and supportive shoes
  o Falls prevention
  o Prevention of ischemic and thermal injuries

*AOTA CE on CD - Occupational Therapy's Unique Contributions to Cancer Rehabilitation
Evidence-Based Interventions for CIPN

- Case report: manual therapy (massage)
  - Effleuage followed by deeper massage to each extremity
    3x/week for 6 weeks resulted in decreased numbness and tingling
      (Cunningham et al., 2011)

- Reiki, yoga, or meditation randomized pilot study
  - Yoga and meditation reduced psychological distress
  - Increased quality of life noted in all interventions
  - Reduced neurotoxicity in intervention groups and noted a
    significant increase in control group
      (Clark, Cortese-Jimenez & Cohen, 2012)

Prosthetics & Orthotics

- Splints for hand and wrist alignment
- Amputee care
Play-based therapy

- Pilot study to investigate effects of play-based OT on two hospitalized children diagnosed with ALL
  - 9-year-old boy
  - 7-year-old girl
- Results: reported pain, anxiety, and fatigue levels decreased for both participants
  (Mohammadi, Mehraban & Damavandi, 2017)

Occupational Therapy Evidence for Intervention

- Descriptive study on clients’ experience of participating in an occupational therapy-led relaxation program
- Breathing exercises, guided visualization, muscular relaxation
  - Retrospective approach
  - 4 themes identified
  (Cooper, 2014)
School liaison Program

- Qualitative study explored the effectiveness of a school liaison program
  - 19 semi-structured interviews
    - 9 families
    - 8 teachers
    - 1 school liaison
    - 1 clinic nurse
  - Themes
    - Establish realistic expectations
    - Develop plan for realistic expectations
    - Advocating for support to address expectations

(Bruce, Newcombe, & Chapman, 2012)

Transition to survivorship

- Establish realistic expectations
- Develop plan for realistic expectations
- Advocating for support to address expectations

(Bruee et al., 2012)

(huffingtonpost.com)
Survivorship Issues

• 2005 childhood cancer survivor cohort study
• Results:
  o Decreased performance of personal care skills
  o Decreased performance of routine activities
  o Decreased ability to attend work or school

• Long term survivors are at risk for functional limitations in physical performance and ADL

(Ness et al., 2009)

Participation Restrictions

(Ness et al., 2009)
OT and Oncology Resources

• Oncology Fact Sheets
  • Role of Occupational Therapy in Oncology
  • Role of Occupational Therapy in Palliative Care

• OT Connections
  • Oncology
  • Oncology Rehab OT

• AOTA CE on CD - Occupational Therapy's Unique Contributions to Cancer Rehabilitation
• AOTA Cancer Rehabilitation Digital Badge Program

Summary

• Occupational therapists play an important role in improving function and quality of life for pediatric oncology clients.
• Functional and psychosocial implications of cancer treatment directly effect the quality of life for pediatric oncology clients.
• Occupational therapy-based evidence on evaluation and intervention is limited in the emerging practice area of pediatric oncology rehabilitation.
Questions?

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