

demic success within families and the care team. While all the patients took applications, none of the patients completed the on-site interviews, finding them overwhelming. Even at the 3- and 6-month follow-ups following the first event, the survivors continued to be at varying levels of application completion; no one who was previously unemployed attained new employment. This improved after pre-event meetings were held with survivors to participate in resume building and interview preparation. Currently, two survivors obtained employment and are still employed at 1 year and five survivors were able to advocate for their disabilities services in college with help of a non-profit legal assistant.

#### QOL-36. USE OF CANNABINOIDS IN THE PEDIATRIC CENTRAL NERVOUS SYSTEM TUMOR POPULATION

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**BACKGROUND:** Cannabinoids, including cannabidiol (CBD) and tetrahydrocannabinol (THC), are a class of compounds found in marijuana. Numerous studies in adults have examined cannabinoid use in management of cancer-related symptoms such as nausea, anorexia, and pain. Less is known about the use in the pediatric oncology population. **METHODS:** A prospective observational study has been ongoing since 2016 at Children's Hospital Colorado to evaluate cannabinoids' impact using PedsQL™ modules on quality of life of pediatric patients with central nervous system (CNS) tumors who are 2–18 years old. Laboratory assessments of T-cell activity and pharmacokinetics of CBD, THC and associated metabolites are in process. Diaries with exploratory information on cannabinoid use patterns are being collected. **RESULTS:** Thirty-three patients (14:19; male:female) have been enrolled with a median age of 6.4 years (range, 2.9–17.7 years). The most common tumor type in enrolled patients is embryonal tumors (13/33; 39%). Nine (27%) patients have low-grade glial/glioneuronal tumors, and eight (24%) had high-grade/diffuse midline gliomas. The remaining patients had ependymoma or craniopharyngioma. The median time on cannabinoids is 9 months. Most (n=20) patients have used oral products with CBD and THC. One patient continues on cannabinoid therapy in follow up. Preliminary immune function analyses identified impaired neutrophil superoxide anion production and chemotaxis in patients taking cannabinoids at early time points on therapy. **CONCLUSIONS:** Families of children with various CNS tumors are pursuing cannabinoid therapy for both antitumor and supportive care purposes. Analysis of the impact of cannabinoids on patients' quality of life is ongoing.

#### QOL-37. USE OF COMPUTERIZED NEUROPSYCHOLOGICAL MEASURES TO ASSESS COGNITIVE MORBIDITY IN CHILDREN UNDERGOING ACTIVE RADIATION THERAPY

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Cognitive late effects of brain tumors and related treatments are well-established; however, limited information regarding changes in cognition during radiation therapy (RT) is available. Recent advances in computerized neuropsychological assessments for monitoring of acute and late treatment effects have been developed, though the feasibility of using these tools in a population undergoing active RT has limited empirical evidence. This study investigated performance of pediatric patients with brain tumors actively undergoing RT on the NIH Toolbox (N = 10; M age = 11.29 ± 3.35 years; 86% Caucasian; 86% female). Given significant individual variability, one-sample proportion tests were calculated to assess whether the proportion of patients with performances >1 standard deviation below the mean significantly differed from normative expectations. Of the 12 participants that were enrolled in the study, 10 completed the NIH Toolbox during active RT. Compared to normative expectations, a greater proportion of participants undergoing active RT exhibited deficits on measures of processing speed, working memory, and response inhibition (p<.01). Differences between participants and normative expectations were not seen on measures of visual memory and vocabulary (p>.05). Seventy-seven percent of recruited participants completed computerized assessment during active RT, suggesting reasonable feasibility within the small cohort recruited. Consistent with the literature regarding late effects of RT, performance on computerized measures of cognitive functioning mediated by processing speed and aspects of executive functioning were lower for patients undergoing active RT. Further investigation will focus on clarifying the trajectory of deficits across treat-

ment course and comparing computerized measures to traditional neuropsychological measures.

#### QOL-38. USE OF COMPUTERIZED NEUROPSYCHOLOGICAL MEASURES TO ASSESS COGNITIVE MORBIDITY IN SURVIVORS OF CHILDHOOD BRAIN TUMORS

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Treatment of central nervous system (CNS) tumors in pediatric populations is associated with significant cognitive morbidity. Documentation of neuropsychological deficits is vital to treatment and educational planning. We investigated the feasibility and utility of a computerized neuropsychological measure (NIH Toolbox Cognitive Battery) in differentiating individuals who received tumor treatment from healthy controls. Participants included pediatric CNS tumor survivors (N = 85; Mean Age = 13.47; SD = 4.76) at least 1-year post-completion of treatment and healthy sibling controls (N = 20; Mean Age = 10.2; SD = 3.21) who completed the NIH Toolbox. Ninety-eight percent of the participants enrolled completed the computerized tasks. The overall logistical regression model, with NIH Toolbox tests as predictors, was statistically significant [ $\chi^2$  (7, N = 105) = 26.176; p < .001] and improved correct group classification from 81% to 82.9%. Picture Sequencing ( $\beta$  = -0.059; Wald = 6.942; p = .008) and Flanker ( $\beta$  = -0.083; Wald = 7.473; p = .006) were both statistically significant and negatively predictive of membership in the treatment group. For each 1 unit increase in standard score on measures of working memory and inhibition, odds of membership in the treatment group decreased by 6.2% and 8.7%, respectively. Consistent with the literature, worse performance on computerized measures of cognitive functioning mediated by executive functioning was correlated with a history of brain tumor treatment. Further investigation will focus on comparing computerized neuropsychological tools to traditional comprehensive neuropsychological evaluations and clarifying the trajectory of these deficits across recovery.

#### QOL-40. THE IMPACT OF TASK COMPLEXITY ON INFORMATION PROCESSING SPEED AND NEURAL COMMUNICATION IN PAEDIATRIC BRAIN TUMOUR SURVIVORS

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Paediatric brain tumour survivors (PBTS) experience slower information processing speed (IPS) that contributes to difficulty performing tasks of minimal (MC) and greater complexity (GC), and is related to aberrant neural communication. It is still unknown whether deficient IPS exists during increasing complexity. We aim to determine if PBTS experience deficient IPS and neural communication relative to typically developing children (TDC) during an increasingly complex visual-motor reaction time (RT) task. During magnetoencephalography recording, participants (n=58, 12.69 ± 3.24 years) pressed a button with their left or right thumb after an arrow pointing in the corresponding direction appeared on a screen. During two MC conditions, the arrow pointed in a single direction. During a GC condition, the arrow alternated direction randomly. Mean RT >3SD and signal artifacts were removed prior to analyses. The phase lag index (PLI) estimated neural communication between 90 cortical sources. Linear regression and Network Based Statistics assessed group differences in mean RT and the PLI. PBTS demonstrated increased RT relative to TDC during the GC condition (p=0.04, M<sub>PBTS</sub>=354.00s, M<sub>TDC</sub>=326.00s). Group differences in mean RT during MC conditions and the PLI during all conditions were not detected (p>0.05). These results suggest PBTS experience slower IPS during GC. Reduced IPS is thought to contribute to difficulty recruiting cognitive resources needed to perform more complex tasks. Subtle deficits in neural communication may underlie slower IPS. The weighted PLI is superior to the PLI when estimating small differences in neural communication. We will now use the weighted PLI to assess task-related neural communication.

#### QOL-41. CARDIAC DYSFUNCTION IN MEDULLOBLASTOMA SURVIVORS TREATED WITH PHOTON IRRADIATION

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**BACKGROUND:** Medulloblastoma is an aggressive central nervous system (CNS) tumor that occurs mostly in the pediatric population. Treat-

ment includes surgical resection, craniospinal radiation (CSI) and chemotherapy. Children who receive standard photon radiation (RT) are at risk for cardiac toxicities. Potential late effects include coronary artery disease, left ventricular scarring and dysfunction, valvular damage and atherosclerosis. Current survivorship guidelines recommend routine ECHO surveillance for these patients but this comes at significant health care costs over a lifetime. We describe the experience of cardiac dysfunction in medulloblastoma survivors in a multi-institution study. **METHODS:** A retrospective chart review of medulloblastoma patients treated between 1980 and 2010 with radiation at Lurie Children's Hospital and Dana-Farber/ Boston Children's Hospital who had an echocardiogram done following completion of therapy. **RESULTS:** 168 patients were treated for medulloblastoma during the study time. Of whom, 80 patients had echocardiogram follow up and 76 received photon irradiation. The latter were included in the study. The mean age at CSI was 8.6 years (range 2.9- 20), and mean number of years post RT at echocardiogram 7.4 years (range 2-16). Mean ejection fraction (EF) was 60.03% and shortening fraction (SF) 33.8%. Four patients (5%) had abnormal results, all of which had EF<50%. **CONCLUSION:** Patients who received craniospinal irradiation for medulloblastoma therapy have relatively normal echocardiograms post treatment. Although RT may result in cardiac risks, echocardiograms may not be the most cost effective or efficacious mode to evaluate the risk in these survivors long term.

#### QOL-43. ENDOCRINE AND METABOLIC CHANGES IN CHILDREN TREATED FOR MEDULLOBLASTOMA

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We examined 63 patients (40 males/23 females) after complex treatment of medulloblastoma. Patients had a median age (range) of 11.3 (5.5 ÷ 17.9) years. The median time after the end of treatment was 3.7 (1.5 ÷ 11.6) years. Endocrine disorders were detected with the following frequency: growth hormone deficiency - 98.41% (62 of 63 patients), thyroid hormone deficiency - 69.8% (44/63), adrenal hormone deficiency - 17.4% (11/63). Three cases (4.7%) of premature sexual development were also detected. Lipids levels, beta-cell function and insulin resistance (IR) during 2-h oral glucose tolerance test were evaluated. A mono frequent bioelectrical impedance meter was used to measure body composition. Overweight (SDS BMI> 1) was observed only in 16 patients (3 girls and 13 boys), obesity (SDS BMI> 2) in 1 boy. Dyslipidemia was found in 34 patients (54%). All patients underwent oral glucose tolerance test. Insulin resistance (ISI Matsuda <2.5 and/or HOMA-IR> 3.2) was detected in 7 patients (11/1%), impaired glucose tolerance (120 min glucose ≥7.8 mmol / l) was observed in 2 patients with IR and in 2 patients without IR. At the same time, IR and impaired glucose tolerance were encountered in only 5 children with overweight and no one with obesity. All patients with impaired glucose tolerance had normal values of fasting glucose (4.3 ÷ 5.04 mmol / l) and HbA1c (4.8 ÷ 5.8%). A bioelectrical impedance meter was used to measure body composition in 49 cases, the percentage of adipose tissue was increased in 14 patients (28%) with normal BMI.

#### QOL-44. ASSESSMENT OF NEUROCOGNITIVE FUNCTION AND MRI PARAMETERS IN LONG-TERM SURVIVORS WITH POSTERIOR FOSSA TUMORS: A COMPARISON BETWEEN MEDULLOBLASTOMAS TREATED BY REDUCED-DOSE CRANIOSPINAL IRRADIATION AND OTHER TUMORS

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**BACKGROUND:** Children with medulloblastoma cannot avoid chemoradiotherapy including craniospinal radiation, although prognosis of medulloblastoma has improved and previous studies have reported a significant risk of intellectual disturbance by these treatments. We retrospectively analysed neurocognitive functions, clinical MRI parameters of patients with posterior fossa tumors, especially medulloblastomas. **MATERIALS AND METHODS:** Twenty-two patients (12 medulloblastomas, 5 ependymomas, 5 astrocytomas) treated in our institution were enrolled in this study. Mean age was 7.8 years and 6.5 years, percentage of hydrocephalus at onset was 66.7% and 60%, respectively in medulloblastoma group and in other tumor group (ependymoma and astrocytoma). Postoperative chemoradiotherapy including reduced-dose craniospinal irradiation (18Gy)

was done for medulloblastoma group and local radiation or operation only was done for other group. Version 3 or 4 of Wechsler Intelligent Scale for Children (WISC) was used by neurocognitive function analysis. Ventricular size, white matter volume and other parameters were also estimated based on MRI. Follow-up duration was 6-17 years (mean: 10.5 years). **RESULTS:** Evaluations of neurocognitive functions based on WISC pointed out lower performance IQ than verbal IQ in long term survivor of both group, especially working memory (P=0.05). Both hydrocephalus and cranial nerve complications was influenced lower scores of WISC, but age at onset did not influence WISC scores. Comparison between both group showed there was no significant difference about cognitive function and white matter volume. **SUMMARY:** Chemoradiotherapy including reduced-dose craniospinal irradiation and for medulloblastomas did not have significant risk increasing neurocognitive dysfunction. But long-term follow-up and assessment of health-related quality of life are further needed.

#### QOL-46. LATE EFFECTS CARE FOR CHILDHOOD BRAIN TUMOUR SURVIVORS: A QUALITY IMPROVEMENT PROJECT

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**BACKGROUND:** Childhood and adolescent brain tumor survivors are at risk for considerable late morbidity and mortality from their disease and the treatment they receive. Surgery, chemotherapy, radiation therapy and tumor location all have the potential to impact the physical, psychological, functional and social health of these survivors. Comprehensive late effects care may mitigate these risks, but the necessary elements of this care model is unclear. We describe a quality-improvement initiative to improve the long-term follow-up (LTFU) care provided to brain tumour survivors at the McMaster Children's Hospital. **METHODS:** An anonymous needs assessment circulated to health providers was used to evaluate the LTFU practices. Utilizing this feedback as well as the LTFU guidelines from the Children's Oncology Group a care plan was made for these survivors. **RESULTS:** 17 of 33 (52%) health care staff responded to the survey, this included 70% physicians or nurse practitioners, and 30% nurses and allied health staff. Improvements suggested included consistent inclusion of additional care providers (i.e. social work, dietitians, endocrinology) reported by 76%, as well as a need for improved patient education and surveillance for late effects of therapy. **CONCLUSION:** Treatment summaries with surveillance care plans and LTFU resources were created for all survivors of childhood brain tumours at risk of treatment-related complications. Late effects counselling with distribution of these materials is ongoing as part of this quality improvement initiative. To provide comprehensive management, a neuro-oncology specific late effects programs with multi-disciplinary support is essential for the care of brain tumour survivors.

#### QOL-48. INTERDISCIPLINARY SPIRITUAL CARE TRAINING IN PEDIATRIC NEURO-ONCOLOGY

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**INTRODUCTION:** Pediatric neuro-oncology requires attention to not only cancer biology and therapeutics, but also to the suffering of the patient. In addressing patient suffering, consensus guidelines direct attention to the spiritual distress and resources of patients and families. A lack of training has been a key barrier to integrating this aspect of health into patient care. **METHODS:** A neuro-oncologist and a chaplain participated in a train the trainer for the Interprofessional Spiritual Care Education Curriculum (ISPEC) through the George Washington University's Institute for Spirituality and Health. After the train the trainer, the online curriculum was offered to interdepartmental team members, combined with in-person discussion groups, which met weekly for six sessions. A survey was given before and after the training, and Likert scores were analyzed using the Wilcoxon rank-sum non-parametric test. **OUTCOMES:** 17 interdisciplinary members participated in the training. These members included neuro-oncologists, neuro-surgeons, rehabilitation physicians, nurse practitioners, nurses, physical therapists, music therapists, a child life specialist, a school liaison, and a patient experience specialist. The training resulted in multiple improvements, including increased ability to identify spiritual issues (p=.0278) and increased ability to respond to these issues (p=.0056). **CONCLUSION:** ISPEC addressed a key barrier to providing generalist spiritual care to patients with pediatric brain tumors. Diverse disciplines were repre-