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Children and adolescents undergoing surgical resection of brain tumors are prone to marked psychologic burden. Especially fear of surgery and its consequences like pain or neurologic sequelae is an important issue. Techniques of relaxation might reduce the intensity of the experienced anxiety and therefore might improve quality of life. In this study, we aimed at determining the effect of a standardized imagery story telling on experienced anxiety as quantified by the questionnaire KAT III and cardiac frequency (CF) before and after intervention at two time points (before and after surgery). 12 patients (age: 6-17 years) undergoing brain tumor resection were included in the study. KAT III-scores and CF were determined and compared before and after interventions using a dependent t-test. Mean KAT III-score before first intervention was 0.23 (SD: 0.23), while it was 0.15 (SD: 0.21) after ( $p = 0.11$ ). Mean KAT III-score before second intervention was 0.11 (SD: 0.13), after: 0.05 (SD: 0.9),  $p = 0.07$ . Mean CF before first intervention was 77.1 (SD: 10.3), after: 68.36 (SD: 6.8),  $p = 0.003$ . Mean CF before second intervention was 71.67 (SD: 9.57), after: 65 (SD: 8.72),  $p = 0.003$ . CF was significantly lower post-interventionally after the first and the second intervention. KAT III-score showed a trend to be lower post-interventionally after the second intervention. Hence, our study points at an efficacy of the deployed relaxation technique of imagery story telling in children and adolescents undergoing brain tumor surgery, although it was limited by a small patient number. Further studies with larger patient numbers and a comparison of randomized intervention vs. non-intervention groups are warranted.

#### QOL-13. IMPACT OF HEARING LOSS ON NEUROPSYCHOLOGICAL FUNCTIONING IN CHILDREN TREATED FOR MEDULLOBLASTOMA: A REPORT FROM THE CHILDREN'S ONCOLOGY GROUP (COG)

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**BACKGROUND/OBJECTIVE:** We prospectively examined neuro-psychological outcomes and ototoxicity in children with average-risk medulloblastoma. **METHODS:** Eligible patients included those treated on COG protocol ACNS0331 who completed audiograms at end of therapy or one-year off-therapy, and neuropsychological assessments between 2- and 5-years post-diagnosis. Conventional pure-tone audiometric evaluations (0.25-8kHz) were assigned an ototoxicity grade based on the International Society of Pediatric Oncology (SIOP) grading scale. Grade for the better hearing ear was used for analyses. Participants were divided into two groups: SIOP grade $\geq$ 3 hearing loss (HL) versus SIOP grade $<$ 3. Cutoff score of 60 on BASC-2 was used to dichotomize parent-reported anxiety and depression scores as 'low' or 'high'. **RESULTS:** Data were available for 113 children (66% male; 86% white), aged 3.0-18.5 at diagnosis (Mean=9.1). One-quarter (24.8%, n=28) had at least moderate HL ( $\geq$  SIOP grade 2), and 12.3% (n=14) had severe HL ( $\geq$  SIOP grade 3). After controlling for radiation exposure and age, children with severe HL showed significantly higher levels of anxiety (OR=5.9, 95%CI 1.3-26.0,  $p=0.0195$ ) and borderline differences in depression (OR=4.0, 95%CI 1.0-16.5,  $p=0.0563$ ), but no differences in cognitive functioning when compared to other participants. When moderate and severe HL were combined in exploratory analyses, significantly greater anxiety (OR=9.0, 95%CI 2.1-37.4,  $p=.0027$ ) and depression (OR=4.6, 95%CI 1.3-15.7,  $p=.0165$ ) were observed. **CONCLUSIONS:** Survivors of pediatric medulloblastoma with moderate to severe HL evidenced greater psychosocial, but not neurocognitive, difficulties compared to those with no or mild HL. It may be that modern treatment protocols generally preserve cognitive functioning such that associations between HL and cognitive impairment are no longer significant. It is also possible that neurocognitive risk associated with HL may not manifest until survivors are further from diagnosis. In contrast, survivors with HL may be at greater risk for negative psychosocial adjustment, suggesting that increased monitoring of mental health outcomes is warranted.

#### QOL-14. LONG TERM NEUROCOGNITIVE AND PSYCHOSOCIAL OUTCOMES AMONG ADOLESCENTS AND YOUNG ADULTS SURVIVORS OF PAEDIATRIC BRAIN TUMOUR.

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**PURPOSE:** The aim of the study was to describe neurocognitive and psychological outcomes among adolescents and young adults (AYA) survivors of paediatric brain tumour (BT). **METHODS:** neurocognitive and psychological assessment of 45 AYA (M = 30; F = 15), treated for paediatric BT at our institution between 1978 and 2018, were retrospectively collected. Survivors received psychological and neurocognitive assessment at a mean age of 21.4 years (range 15.11-39.4) after a median of 120 months from diagnosis. The assessment was carried out using the following self-report questionnaires: Beck Depression Inventory, State-Trait Anxiety Inventory, Body Uneasiness Test, Multidimensional Fatigue Inventory, European Organization for the Research and Treatment of Cancer Quality of Life Questionnaire. Neurocognitive evaluation was carried out using Wechsler Adult Intelligence Scale. **RESULTS:** 18/45 survivors had received a diagnosis of germ cell tumor, 12 of low grades glioma, 10 of embryonal tumor, 3 of high-grade glioma, 2 of meninges and mesenchymal tumor. Thirty-four patients received neurosurgery, 34 patients chemotherapy, 44 patients cranial radiotherapy. Fatigue was reported in 56% of the patients, 15% of them also showed low level of QoL. The psychological assessment showed clinical levels of anxiety in 56% of AYA, depression in 41% and body image problems in 29%. Neurocognitive assessment showed that 73% has an average tIQ (tIQ  $\geq$  80). **CONCLUSIONS:** The psychological evaluation showed that 77% of our cohort had at least one clinically significant distress symptom as fatigue, depressive symptoms, anxiety and body image problems, compared to 23% who did not report any problem. Further analysis is needed to identify any possible psychopathological risk factors. It is essential to provide an accurate and comprehensive assessment and effective psychological support to these patients, to help them better manage the late effects of cancer and therapies at different levels: physical, psychological and neurocognitive.

#### QOL-15. LIFE HAPPENS WHEREVER YOU ARE! USE OF AVATAR AV1 TO ENHANCE HEALTH-RELATED QUALITY OF LIFE, SENSE OF BELONGING AND SOCIAL INCLUSION IN CHILDREN AND ADOLESCENTS WITH CHRONIC ILLNESSES

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**BACKGROUND:** Due to regular hospital check-ups, inpatient treatments, or a weakened immune system, children with brain tumors experience frequent and long absences from school and social activities. Returning to school presents a challenge for these patients, as they experience reduced health-related quality of life (HRQOL), decreased sense of belonging and a lack of social inclusion in class. To prevent social and emotional problems, telepresence systems such as the Avatar AV1 are described as promising approach for pediatric patients. **OBJECTIVES:** To sustainably improve social inclusion in times of illness-related absence for these patients, the first study in Austria investigating effects of the use of the Avatar is pursuing both, a qualitative and quantitative approach. **METHODS:** To examine effects on social inclusion, sense of belonging and HRQOL in pediatric patients, interviews were conducted with patients, their parents, teachers and classmates within the qualitative approach and questionnaires were administered at three times (before -, after 6 months Avatar-use and 3 months after returning the Avatar) within the quantitative approach. The sample consists of pediatric patients (6 to 18 years). **RESULTS:** Categories from n=24 interviews indicate that a positive attitude towards and identification with the Avatar as well as the patients' psychological condition and social inclusion into class before the illness play major roles. Preliminary findings from the ongoing longitudinal quantitative survey indicate that the Avatar has significant positive and stabilizing effects on HRQOL, sense of belonging and social inclusion of pediatric patients. **CONCLUSION:** This study is the first to describe the impact of Avatar use on social inclusion in children with brain tumors. To strengthen the sense of belonging in these children, the pedagogical-interactive component needs to be brought in focus. Through pedagogical-didactical adaptations, a routine handling of and a positive attitude towards the telepresence system, pediatric patients highly benefit from the Avatar.

#### QOL-16. A 6-YEAR LONGITUDINAL STUDY OF NEUROCOGNITION IN CHILDREN TREATED FOR A BRAIN TUMOUR

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Long-term neurocognitive difficulties in children treated for a brain tumor are well documented and known to be affected by treatment. However, longitudinal studies of these neurocognitive difficulties are scarce. In the present study, we investigated the impact of radiotherapy (RT) on the evolution of neurocognition between different consecutive time points after diagnosis, and throughout treatment and survivorship. This study included 69 children diagnosed with a brain tumor at the University Hospitals Leuven who completed a comprehensive neuropsychological test battery (intelligence, memory, visuomotor functioning, and QoL) on at least three consecutive time points (2-year interval). Of all patients, 40 completed the test battery at 4 time points. The first assessment was conducted at the earliest possible moment after diagnosis and before the start of any adjuvant therapy. Mean age at diagnosis and first assessment were 7.75 and 7.92 years, respectively. The most common diagnoses were pilocytic astrocytoma (n=33) and medulloblastoma (n=11). 29.0% of the children received local RT and 15.9% received craniospinal RT. A repeated measures analysis with cranial irradiation (no, focal, craniospinal) as between-subjects factor and age at diagnosis as covariate demonstrated a significant interaction effect between time and type of irradiation for both overall intelligence (p=0.007) and QoL (p=0.006) for children with three and four assessments. Children who received craniospinal irradiation demonstrated a significant decline in overall intelligence and a significant worsening of QoL. For the non-irradiated group, an improvement of QoL was observed. For processing speed, a significant time effect was found for children with three and four assessments (p<0.001), with a significant improvement for the overall group. The results of this longitudinal study demonstrated diverse longitudinal trajectories. Children who received craniospinal irradiation are most often confronted with intellectual decline and worsening of QoL.

#### QOL-17. NEUROCOGNITIVE OUTCOMES AFTER TREATMENT FOR MEDULLOBLASTOMA WITH REDUCED PRIMARY SITE TARGET VOLUME MARGINS

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**PURPOSE:** Children treated for medulloblastoma (MB) undergo intensive multimodality treatment compromising surgery, irradiation, and chemotherapy, which is associated with a significant risk of neurocognitive deficits. Successive multicenter frontline treatment protocols have introduced reduced posterior fossa boost margins for cranial irradiation for sparing collateral tissue and preserving function. This study examines neurocognitive outcomes in the setting of reduced primary site target volume margins in children treated for MB. **PATIENTS & METHODS:** Prospective longitudinal neurocognitive data were collected from newly diagnosed patients with MB (n = 372, ages 3-21 years) enrolled on one of two sequential multicenter clinical protocols between 1996 and 2012. The treatment regimen included surgery, risk-adapted craniospinal irradiation with a posterior fossa boost with restricted clinical target volume (CTV) margins (2 cm and 1 cm), and dose-intensive chemotherapy. Comparative analysis of neurocognitive outcomes was performed using linear mixed-effects models. **RESULTS:** Intelligence quotient (IQ) scores were better preserved in average-risk patients who received treatment using a clinical target volume with a lesser margin of 1 cm (p < 0.0099). Findings were consistent with prior studies on measures of academics including reading performance, mathematical reasoning, and spelling across both risk groups regardless of CTV. **CONCLUSION:** This study presents compelling evidence in favor of restricted CTVs for preserving IQ without sacrificing treatment efficacy in average childhood MBs.

#### QOL-18. NEUROPSYCHOLOGICAL SCREENING IN A PEDIATRIC NEURO-ONCOLOGY MULTIDISCIPLINARY CLINIC.

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**BACKGROUND:** The purpose of this project was to examine the usefulness of neuropsychological screening in a multidisciplinary clinic for neuro-oncology populations and determine whether a brief evaluation can adequately screen children for cognitive dysfunction or psychiatric comorbidities. **METHODS:** Thirty-one children or young adults with a history of CNS tumor had neuropsychological screening as part of their multidisciplinary clinic visit. This screening evaluation consisted of clinical interview, neuropsychological testing, and the completion of emotional/behavioral checklists. Our neuropsychological test battery included the Kaufman Brief Intelligence Test-Second Edition (KBIT-2) and the NIH Toolbox Fluid Cognition Composite, which consists of 6 subtests - flanker task, working memory, processing speed, oral reading, card sort, and memory. **RESULTS:** Over a 15-month period 31 children, adolescents, and young adults with

CNS tumors were seen in our neuropsychology screening clinic. Females made up 39% of the sample. The average age was 12.7 years (range=5-24 years). The average time to complete neuropsychological testing was 60.3 minutes. Thirty-six percent did not have any new neuropsychological diagnoses, 42% had one *new* diagnosis, 19% had two *new* diagnoses, and 3% had three *new* diagnoses. The most common new diagnoses were mild or major neurocognitive disorder (mild=29%, major=6%), anxiety (32%), ADHD (10%), and mood disorder (13%). Neurocognitive test scores were mostly in the average range (Verbal-IQ=97.7; Nonverbal-IQ=95.3; Total IQ=96.2; Flanker T-Score=46.1; Working Memory T-Score=44.0; Card Sort T-Score=43.7; Picture Memory T-Score=48.5). Processing speed and fluid cognition composite scores for the group were in the low-average range (Processing Speed T-Score=42.7; Fluid Cognition Composite T-Score=41.4). Behavioral health recommendations were needed for 71% of this sample. Educational recommendations were needed for 58%. **CONCLUSIONS:** Brief neuropsychological screening completed as part of multidisciplinary clinics for pediatric neuro-oncology patients was efficient and useful in identifying neuropsychological diagnoses in children and assisted with informing necessary behavioral health and academic interventions.

#### QOL-19. POST-INTENSIVE-CARE SYNDROME – PEDIATRIC (PICS-P) AMONG PATIENTS WITH BRAIN TUMORS – THERAPEUTIC STRATEGIES AND PREVENTIVE RECOMMENDATIONS

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**BACKGROUND:** Patients with brain tumors needed in intensive care unit (ICU) stay due to tumors symptoms or neurosurgery, experience a complex of physical, psychological, and cognitive symptoms. This constellation of signs and symptoms has been named Post-Intensive-Care Syndrome – pediatric (PICS-p). An interesting problem emerging from this research and requires a deeper exploration are the differences between PICS-p symptoms and primary tumors effects or side effects of treatment e.g. irradiation. **METHOD:** Psychological repeated testing and long-term observation was performed in 350 childhood brain tumor survivors (various types and localizations of tumor) to determine PICS-p symptoms. Age at psychological diagnosis ranged from 6 to 20 years. Full psychological outcome included assessment of psychophysical, cognitive and affective problems. The patients were examined using battery of neuropsychological methods and psychological interview. Analysis of medical history was also performed. The next level of the study was distinguished between PICS-p symptoms and the effects of tumor localization and oncology treatment, including radiotherapy. **RESULTS:** In our sample patients presents low scores in the all PICS-p domains: physical, cognitive and mental. Low level of motor skills, impairing daily living activities are characteristic. In this group lower IQ scores, poorer visual motor integration, learning disabilities, memory and language problems persisted. Typical problems in mental area are depressive symptoms, anxiety with intrusive memories, emotional and behavioural disruptions, socialization problems with significantly low level of social contacts. **CONCLUSIONS:** The results of this study suggest that PICS-p well describes and explains the psychosocial problems of these patients. It allows prepare an individual psychological interventions and rehabilitative program for particular patient as well as therapeutic strategies for whole group of patients. Draft recommendations for diagnosis of PICS-p specific for patients with brain tumors, risk factors and preventive procedures will be presented and discussed.

#### QOL-20. POST-INTENSIVE-CARE SYNDROME – PEDIATRIC (PICS-P) AMONG PATIENTS WITH BRAIN TUMORS – THERAPEUTIC STRATEGIES AND PREVENTIVE RECOMMENDATIONS

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