malnutrition, only 1 (3.7%) had an improvement in nutritional status and one child Stage IV Burkitt's lymphoma succumbed to sepsis.
Conclusion: A significant proportion of children with malignancy in the developing world start treatment with under nutrition. Children with mild and moderate malnutrition show improvement in nutritional status with nutritionist intervention. Children with severe under nutrition at the start of therapy continue to be a challenge in the developing world. Nutritional assessment by nutritionist throughout therapy for malignancy is essential for appropriate nutrition intervention.

TM_SC-1_V1.10
CYTOMEGALOVIRUS (CMV) VIRAEMIA AND DISEASE IN CHILDREN WITH HAEMATOLOGICAL MALIGNANCIES UNDERGOING CONVENTIONAL CHEMOTHERAPY: A LARGE STUDY FROM A REFERRAL CANCER CENTRE IN INDIA

Subramaniam Ramanathan [1], Tushar Idhate [1], Seema Gulia [1], Sanjay Biswas [2], Rohini Kelkar [2], Tushar Vora [1], Maya Prasad [1], Girish Chinnaswamy [1], Gaurav Narula [1], Brijesh Arora [1], Shripad Banavali [1]. [1] *Department of Medical Oncology (Pediatric), Tata Memorial Hospital, India;* [2] *Department of Microbiology, Tata Memorial Hospital, Mumbai, India*

Background: There is paucity of data on CMV infection in haematological malignancies in non-transplant settings, which is critical to plan timely therapy and reduce morbidity and mortality.
Methods: Between January 2008 and November 2015, we screened all children with haematolymphoid malignancies having unexplained fever, prolonged cytopenia, hemophagocytic lymphohistiocytosis (HLH) or clinical CMV disease, for CMV using RT-PCR. CMV-positive episodes were analysed for clinical features and response to treatment.
Results: Seventy children had CMV infection. Of them, 61 (87%) had CMV DNAemia and 9 (13%) had CMV disease. The primary diagnoses were ALL (n=59, 85%), AML (n=2), NHL (n=6), Hodgkin's lymphoma (HL, n=2), and CML (n=1). The median age was 12 years. For ALL patients, CMV DNAemia and disease occurred mostly during either consolidation (46%) or maintenance (36%) phase. The most common presenting feature of CMV infection was unexplained fever without focus (n=68, 97%). Of these, 37 (54.5%) had no associated cytopenias. All became afebrile at a median ganciclovir duration of 3 days (range, 2-7 days). The rest (n=31, 45.5%) had unexplained fever with cytopenia, and all recovered after a variable period of 3 to 28 days (median, 15 days). Two of them developed HLH and were treated with HLH protocol along with antiviral therapy. For patients with CMV viraemia, CMV titres became undetectable after a median period of 17 days (range 7-34 days). Five had relapse of CMV-viraemia: two had complete response and survived, while 3 died of primary malignancy during CMV therapy. For the 9 with CMV disease, their primary diagnoses were ALL (n=6), AML (n=1), HL (n=1), and Burkitt's Lymphoma (n=1). Disease sites were chorioretinitis (n=2), pneumonitis (n=3), gastrointestinal disease (n=2) and encephalitis (n=1). In addition, one patient had both GI infection and CMV encephalitis. After treatment with I.V. ganciclovir, 5 patients recovered fully, 2 died of CMV, one died of progressive primary disease and one was lost to follow up. Out of the 2 children with chorioretinitis, one had permanent visual deficits while the other recovered with normal vision.
Conclusion: CMV DNAemia and disease are common in children with haematological malignancies on standard-dose therapy. ALL patients were more commonly affected, usually during the consolidation phase of ALL therapy. Most presented with unexplained fever with or without prolonged cytopenias. Approximately 15% can progress to HLH or CMV disease if not detected in time. Timely detection and therapy with ganciclovir is curative in most children.

TM_SC-1_V1.11
PROCEDURAL SEDATION IN PEDIATRIC ONCOLOGY – A RANDOMIZED COMPARATIVE TRIAL OF KETAMINE – MIDAZOLAM COMBINATION VS PROPOFOL

C. Varsha, Manas Kalra, Anita S. Bakshi, Geeta Mandhani, Amita Mahajan. *Apollo Center for Advanced Pediatrics, Indraprastha Apollo Hospitals, Delhi, India*

Background: Procedural pain is a significant quality of life issue in children undergoing treatment for childhood cancer. Painful procedures are therefore done under sedation wherever feasible. Ideal sedation should be safe, effective, have prompt induction and smooth recovery. Both ketamine-midazolam and propofol are frequently used in this setting and have been reported to be efficacious. However, there are no published prospective, randomized comparative trials (RCT) directly comparing these two groups when performed by non- anesthesiologists.
Objective: To compare ketamine+midazolam (Group A) and propofol (Group B) as sedative agents for intrathecal chemotherapy with regards to efficacy, side effect profile, time to induction, time to recovery and smoothness of recovery.
Methods: A partially-blinded, RCT was conducted over a period of one year between July 2015-July 2016 after institutional ethics committee approval. Children aged 1-12 years requiring intravenous sedation for intrathecal chemotherapy were included. Children with known cardiovascular or respiratory disturbances, presence of neurological abnormalities and hepatic/renal failure were excluded. Patients were allocated to the two treatment arms using computer generated randomization tables after obtaining written, informed consent. The initial doses used were, ketamine at 2mg/kg, midazolam at 0.2 mg/kg and propofol at 2.5mg/kg as per standard recommendations. The patient, parents and the person analyzing the data were blinded. Time to sedation, dose required for effective sedation, depth of sedation (using Modified Ramsey scale), vital parameters intra-procedure, time to recovery, smoothness of recovery and emergence phenomenon were documented.
Results: One hundred and five patients were enrolled (Group A: 53, Group B: 52). Seven patients had failure of sedation (all were in Group B). 9 patients in group A and 35 patients in group B required top up over and above the initial administered doses. Mean time to sedation in group B was shorter than in group A **(p=0.001).** Mean heart rate in group A was higher than in group B **(p=0.000).** Transient drop in saturation was noted in 9 patients in group A and in 14 patients in group B. Mean depth of sedation in group A was greater than in group B **(p=0.001).** Mean time to recovery in group B was shorter than in group A **(p=0.000).** Emergence symptoms were experienced by 29 patients in group A and 5 patients in group B **(p=0.000)**
Conclusion: Ketamine-Midazolam combination appears to be safer and more effective. However, propofol has a significantly faster onset, quicker recovery with a smoother emergence from sedation, but at the recommended initial doses it provides inadequate sedation.

TM_SC-1_V1.12
AN AUDIT OF CENTRAL VENOUS ACCESS DEVICES (CVADS) IN PEDIATRIC ONCOLOGY

Deepankar Bhattacharya, Shalini Mishra, Sandeep Jain, Gauri Kapoor. *Rajiv Gandhi Cancer Institute and Research Centre, New Delhi, India*

Background: Central Venous access devices (CVADs) usage comprises an integral component for management of childhood malignancies. The purpose of this study was to evaluate our experience of CVADs with regard to their feasibility, safety, and complications.
Material and methods: A retrospective analysis of all CVADs [peripherally inserted central catheter (PICCs), chemoports (port-a-cath) and Hickman catheters]placed in Pediatric Oncology department of our institute from June 2015 to May 2016, was done. All procedures were performed under ultrasound guidance ± image intensifier. Information was collected regarding demographic details, catheter life (number of catheter days), and adverse events (AE) [namelyinfection, blockage, extrusion, port-tip migration and exit site skin excoriation]. Risk factors for AE were analysed which included underlying disease, age of patient, type of CVAD and number of catheter days.
Results: During the study interval, 147 CVADs were placed in 138 patients with a median age of 7.5 years (range 10 months -18 years) and a male: female ratio of 100:38. The CVADs included 117 PICCs, 23 chemoports and 7 Hickman catheters. Three patients who came only for PICC insertion were excluded from analysis. The remaining 135 patients had a follow-up of 151 median catheter days (range 8 – 375 days). Overall incidence of AE was 0.828/1000 catheter days (19/22,924 catheter days).None of the

patients had clinically significant complications at the time of insertion.
Of 114PICCs analyzed in 106 children, median age was 7.5years (range 1-18yrs); haematological malignancies constituted 78.3% (83/106).The median catheter life was 155.5days with a total of 17,941 catheter days.Elective removal was done in 57% (65/114).Another 34 (29.8%).patients are currently on therapy.Five patients (4.4%) were lost to follow up.Incidence of AE was 0.725 per 1,000 catheter days. Removal due to AE was required in 8.8% (10/114). AE included suspected infection (5/13), documented line infection (3/13; gram negative=2, gram positive =1), accidental extrusion (2/13), exit site skin necrosis (3/13) with AE incidence of 0.279, 0.167, 0.111 and 0.167per 1000 catheter days respectively.
Among 30 surgically implanted CVADs in 30 children, the median age was 6 years (10 months – 18 years).Solid tumors, hematological malignancies and benign haematological diseases constituted 66.6% (20/30),16.7% (5/30) and16.7% (5/30) respectively. All Hickman catheters were inserted in patients undergoing bone marrow transplant. Median CVAD life was 147 days with a total of 4983 CVAD days. Elective removal was done in 26.6% (8/30), treatment is ongoing in 56.6% (17/30).AE rate was 1.204 per 1,000 catheter days (6/30) which included catheter tip migration in a left IJV chemoport managed without removal. Reasons for catheter removal were suspected infection (3/5), tunnel track infection in Hickman (1/5) and partial port extrusion (1/5) with AE rates of 0.602,0.201 and 0.201per 1000 catheter days respectively.None of the catheter tip cultures yielded any organisms.
Age, diagnosis and type of catheter were not statistically significant but number of catheter days was a statistically significant predictor of AE (P=0.0063).
Conclusion: CVADs are a safe and a reliable method of securing vascular access in children with malignancies.Tunnelled catheters have more complications compared to PICC albeit with an acceptable and manageable incidence.

TM_SC-1_V1.13
SPECTRUM OF RESPIRATORY VIRAL INFECTIONS IN CHILDREN WITH CANCERS: EXPERIENCE FROM A TERTIARY CANCER CENTRE IN EASTERN INDIA

Arpita Bhattacharyya, Anirban Das, Manash Gogoi, Shekhar Krishnan, Anusha Harishankar, Gaurav Goel, R. Bhalachandra, Vaskar Saha, Sanjay Bhattacharya. *Tata Medical Center, Kolkatta, India*

Objectives: Pattern of respiratory viral infections (RVI) in children with cancers is not well characterized in India. We conducted this study to determine the spectrum, incidence of fever-neutropenia, need for hospital admission, economic burden, and outcome (concomitant bacterial infections, need for ICU care, and death) of RVI in our pediatric-oncology unit.
Methods: Data was collected retrospectively from July 2015-April 2016. All children (<18-years) with symptoms of an upper respiratory tract infection (fever/cough/rhinorrhea) were included. Nasal and throat swabs were collected in Hi-Viral transport medium and analyzed using duplex Real Time PCR with Taqman Probes-Vi. Children with Influenza A/B received oseltamivir; those with symptomatic Respiratory Syncitial Virus (RSV) received ribavirin. All children with fever-neutropenia received intravenous antibiotics as per unit protocol.
Results: 104 viral isolates were identified in 89 patients. Median age was 5.5-years (range: 1.4-17.8); 65% were males. Majority of the episodes (91%) were in haemato-lymphoid malignancies. For children on treatment for ALL, 35 (42%) were in intensive and 48 (58%) in non-intensive phase of chemotherapy. Clinical features included: fever (89.5%), cough (71%), rhinorrhea (25%), chest-signs (25%), vomiting (12.5%), diarrhea (5.5%), rash (2%). Commonest isolate was Influenza-A (36.5%) followed by RSV (22.1%), Coronavirus (9.6%), Metapneumovirus (8.7%), Parainfluenza (8.7%), Influenza-B (6.7%), Adenovirus (1.9%) and Rhinovirus (1.9%). Multiple viruses were found in 4 (3.8%). Hematological parameters at presentation included: hemoglobin (median:9.9g%, IQR 8.7;11.1), platelet (median:1,41,605/mm^3, IQR 60,000;1,95,750), neutrophil count (median:1962/mm^3; IQR 390;2446), lymphocyte count (median:1277/mm^3, IQR 300;1155), Neutrophil:lymphocyte ratio (NLR) (median:3.5; IQR0.3-4.2).
Overall, 50% of episodes warranted admission; majority (88.5%) with fever-neutropenia. Concomitant bacterial infection was documented in 11 (10.5%) episodes, with *Pseudomonas* (5;45%) being the commonest isolate. One died (0.9%) following *Acinetobacter* sepsis with RSV infection. Twenty-five (54%) required empirical escalation of antibiotics due to persistent fever-neutropenia; 7 (28%) had a proven bacterial isolate. Six/104 (5.7%) children needed ICU admission; 5 (83%) had concomitant bacteremia (p<0.001).Median duration of neutropenia was 12-days (range:1-47). Median duration of hospital-stay was 8-days (range:1-35).Median cost of admission was INR 22,466 (range:2,176-1,15,160).Cost and duration of stay was significantly more in children with concomitant bacteremia (p=0.002). Median cost for children with RVI and no bacteremia, whose antibiotics were escalated empirically (median INR 60,217, IQR 41,131; 1,24,037), was significantly higher than those who stayed on 1st-line antibiotics (median INR 11,503, IQR 2,699;24,868) (p<0.001).
On univariate analysis, significant predictor of bacteremia in RVI was low hemoglobin (p=0.01). Median hemoglobin in children with bacteremia (8.4g%, IQR 6.6;9.8) was significantly lower than those without bacteremia (10g%; IQR 9;11.3; p=0.06). Age (p=0.8), gender (p=0.5), underlying malignancy (p=0.6), intensive chemotherapy (p=0.1), neutrophil count (p=0.1), duration of neutropenia (p=0.72), lymphocyte count (p=0.9), platelet count (p=0.1) and NLR (p=0.1), failed to predict bacteremia.
Conclusion: Documented RVI in children with cancers does not preclude bacteremia. However, cost of care gets significantly increased for children with RVI and persistent fever-neutropenia, even with no bacteremia, when empirically escalated to higher antibiotics as per protocol (p<0.001). A prospective study is needed to analyze whether the protocol for antibiotic-escalation can be better rationalized in this cohort.

TM_SC-1_V1.14
METABOLIC SYNDROME IN CHILDHOOD CANCER – SINGLE CENTRE EXPERIENCE

Santhini Thanga Tamilselvan [1], Julius Scott [2], Dr. Dhivyalakshmi [3], Dr. M.S. Latha [4]. [1] *Department of Paediatrics, Sri Ramachandra University, India;* [2] *Division-Paediatric Haemato Oncology, Sri Ramachandra University, India;* [3] *Division of Endocrinology, Sri Ramachandra University, India;* [4] *Paediatric Haemato Oncology, Sri Ramachandra University, India*

Introduction: Reavan in 1988 noted that several risk factors for cardiovascular diseases commonly cluster together, and he recognised them as a disease, named syndrome X, currently known as metabolic syndrome.Metabolic syndrome is a group of disorders related to insulin resistance, characterized clinically by central obesity, hyperglycemia, dyslipidemia and hypertension. There is a growing body of evidence indicating that pediatric cancer survivors are at a greater risk of developing metabolic syndrome. We studied the prevalence of metabolic syndrome in children with cancer who completed their treatment and on follow up.
Methodology: All relevant past medical data (of the disease, treatment and all events) were collected from the medical records.Tanner staging was perfomred, Height was measured using a Harpenden stadiometer. Weight/WAIST circumference were measured. The body mass index (BMI) was calculated as weight (kg)/(height $(m)^2$).BMI $\geq 90^{th}$ centile as per CDC chart was taken as abnormal. Blood pressure was measured on the right arm of the patient. Presence of family history of diabetes, cardiovascular diseases and hypercholesterolemia were taken. Fasting Blood sugar, insulin, HbA1C, lipid profile were done. We used IDF (International diabetes federation) criteria to assess the metabolic syndrome among cancer survivors. This study was approved by our university ethics comittee.
Results: Seventy five children who fulfilled the inclusion criteria were included in this study. Out of which 48 were males and 27 were females. Among these, majority of children are treated for acute lymphoblastic leukemia. 8.25% of total population satisfied the criteria of metabolic syndrome. Age, gender, diagnosis, modality of treatment were not to be of statistical significance, however majority of children with metabolic syndrome are in adolescent group.
Conclusion: With the better care committed to children with cancer even in developing country, the survival rates are greatly improving and so metabolic syndrome is becoming the major target for intervention in the follow up of cancer survivors. As metabolic syndrome cannot treated by a single drug therapy, it is necessary to have cancer survivors follow up screening.