Background: Nutritional requirements in severe sepsis is dynamic varying from hypermetabolic to a hypometabolic state. We planned to study the energy balance using indirect calorimetry (IC) in critically ill children with severe sepsis.

Methods: Single center, prospective cohort study of children aged 5-12 years admitted with severe sepsis to tertiary care pediatric ICU of Advanced Pediatric Center, PGIMER, India from May 2016 to June 2017. Patients with active air leak, ventilator circuit leak >10%, on FiO2>60% or on high frequency oscillatory ventilation were excluded. Demographic, anthropometric and nutritional data were collected. Resting energy expenditure (mREE) was measured once daily with portable metabolic cart (Quark RMR, COSMED) till 7 days or till PICU discharge whichever was earlier.

Results: A total of 40 patients (24 boys) with median age of 7 (5.2, 10) years and mean weight of 23 ± 8 kg were included. Tropical infections contributed majority of diagnosis with acute CNS infections in 18 (45%), severe pneumonia in 7 (17.5%), scrub typhus in 5 (12.5%), disseminated staphylococcal sepsis in 4 (10%) and dengue shock syndrome in 3 (7.5%). Mean PRISM III score was 19 ± 7 with calculated risk of mortality of 30%. All patients received enteral nutrition with a median time of initiation of feeds of 12 hours. 35 patients (87.5%) received inotropic support with median day 1 vasoactive inotropic score (VIS) of 28. Median ventilation free days was 19 days and 4 children died (10%). Total of 176 IC measurements were obtained with an average of 4 per patient. The mean mREE for the cohort was 1123 ± 310 Kcal (51 ± 17 Kcal/kg) and the mean respiratory quotient was 0.77 ± 0.07. There was persistent negative energy balance from day 1 to 7 and a negative nitrogen balance which improved by day 7 to positive balance. There was poor agreement of predicted REE (using Schofield, Harris Benedict equation and FAO/WHO/UNU equations) with mREE. There was no significant correlation of PRISM III score at 24 hours, daily SOFA score and daily VIS with mean mREE.

Conclusion: Consistent negative calorie and protein balance exist during acute phase of illness. There was poor agreement of predicted REE with mREE and no significant correlation with severity of illness scores.