Acute neurological illnesses constitute about one third of emergency visits and 25-30% of intensive care admissions. Primary neurological and neurological complications of systemic illnesses are commonly encountered in PICU; in fact one quarter of children admitted to PICU either have or are at risk for acute neurological injury. The burden of neurological illnesses in developing economies is also substantially high. In a study from a tertiary care referral centre, acute CNS infections constituted 60% cases of non-traumatic coma in children aged 2 months to 12 years.

Not only do the neurocritical illnesses occupy a sizeable number of ICU beds, they also contribute to higher morbidity and mortality; the latter from developing economics reported to the tune of 30-60%. Data on acute CNS infections from our country has reported a mortality rate of 9% to 31% despite potent antibiotics with approximately one-third of all deaths in CNS infections occurring in the first 24-48 hours of hospital admission. This is because the mortality and morbidity in acute CNS infection is related to intracranial hypertension which develops especially in the first 48 hours of hospital admission.

Intracranial hypertension has been reported in 69% of patients with viral encephalitis and 86% of patients with bacterial meningitis, especially in children with a coma score of 8 or less. Delayed recognition and treatment of complications such as raised ICP, seizures leads to poor outcome.

The bright side of the story however is that critically ill children with neurological illnesses have a great potential for recovery. Timely treatment can reduce mortality, minimise primary brain injury and prevent secondary brain injury, and result in good functional recovery. Regardless of the primary diagnosis, the quality of life in children who survive a critical illness is mainly determined by the degree of neurological recovery. Thus the thrust is more on quality of survival rather than survival alone. To achieve this goal there is a pressing need for a multidisciplinary team along with specialised equipment to provide high quality neurocritical care. The key objective of such an intensive care team is to anticipate, prevent and treat secondary physiological insults to the brain. This ‘neuroprotective strategy’ as it is aptly called requires a structured protocolised approach that focuses chiefly on preventing cerebral hypoxia, ischemia, and avoidance of raised intracranial pressure, systemic hypoxia, hypotension, hypocarbia and hypoglycemia. In short it is a tight rope act in which the cerebral and systemic targets are to be balanced diligently.

How do we deliver and monitor these targeted therapeutic interventions? Neurological examination to detect dysfunctions is almost defunct and meaningless in a critical care setting where children are sedated or paralysed. It is clear that we have evolved from an era of simple neurological examination to invasive and non-invasive monitoring of cerebral oxygenation and function. ICP monitoring, cerebral oxygenation monitoring, EEG monitoring, changes in cerebral blood flow by thermodilution, transcranial Doppler and regional cerebral tissue oxygenation by Near-
infrared spectroscopy (NIRS) and others have now become an integral component of neuroprotective strategies.

Specialised neurocritical care services are cost prohibitive and hence their need has to be justified by demonstrating improved patient outcomes and cost benefit analysis. Therefore the questions we ask are - Does specialised neurocritical care improve outcome? Do we have evidence to support it? Coma, raised intracranial pressure, status epilepticus, shock and respiratory depression, the important predictors of death and morbidity in any acute neurological illness, if managed in an intensive care set up leads to improved outcomes.

Initial guidelines for intracranial pressure monitoring in children were derived from data in Traumatic brain injury (TBI) where improved clinical outcomes were demonstrated with successful control of intracranial hypertension and CPP targets between 40 and 65 mm Hg. Our team for the first time demonstrated the feasibility, utility and potential for improved outcomes with CPP targeted therapy using ICP monitoring and, in children with acute CNS infections. This was followed by a large RCT comparing CPP targeted therapy vs ICP targeted therapy in acute CNS infections that found significantly lower 90-day mortality, improved coma scores at 72 hours, reduced duration of coma and length of PICU stay, lower hearing deficit and neurodisability on followup at 90 days after PICU discharge in the CPP group. Based on these evidence, cerebral perfusion targeted therapy has become the standard of care for management of intracranial hypertension in children with TBI and acute CNS infections. In places where ICP monitoring is not available, application of this principle, by raising blood pressure to 90th-95th centile can improve the outcomes. There is compelling evidence that high quality neurocritical care with delivery of targeted therapeutic interventions not only improves survival but also the quality of survival.

Does that mean that every intensive care unit in India should have a fully equipped neurocritical care set up? Ideally yes but till we realise this piped dream we all must “Cut our coat according to our cloth” - the most effective model therefore would be the one designed to match our needs, with the resources. For all units whether specialised in neurocritical care or not the primary focus should be on getting the initial resuscitation and stabilisation right in every patient! As major chunk of neurological insults stems from non-neurological disorders or multisystem illness, neurocritical care needs to be deeply integrated into general paediatric critical care delivery. Early recognition, time sensitive goal directed protocol akin to ‘golden hour therapy’ for septic shock is essential for all acutely ill neurological patients to decrease secondary injury, morbidity and mortality.

In this issue of the Journal we have put together some of the above issues in perspective and their application within our settings. We have also tried to picture the horizon and the journey ahead that we must undertake to salvage as many young brains as we can. As of now taking small baby steps of getting our basics right as in any other sick child should help us achieve our targets better till our dream of setting up specialised neurocritical care services in every critical care unit in our country is realised.

Conflict of Interest: None Source of Funding: None

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