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## **NEUROLOGICAL PUPIL INDEX (NPI) MONITORING USING PUPILLOMETER AND OUTCOMES IN CRITICALLY ILL CHILDREN**

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### **Introduction**

Neurological Pupil Index (NPi) measured by automated pupillometry allows objective assessment of pupillary light reflex. NPi ranges from 0 (non-reactive) to 5 (normal). There is a growing literature on NPi in adult neurocritical care but there is a lack of sufficient data in children. Our study aimed at comparing outcomes in children admitted for neurologic injury with normal (NPi $\geq$ 3) versus abnormal (NPi $<$ 3) pupillometry measurements taken during their ICU stay.

### **Methods**

We conducted a retrospective chart review of children between 1 month to 18 years admitted to our pediatric intensive care unit (PICU) with diagnosis of neurologic injury between January 2019 and June 2022. We collected demographic, clinical, pupillometer, and outcome data, including mortality, Pediatric Cerebral Performance Category (PCPC), Pediatric Overall Performance Category (POPC), and Functional Status Score (FSS) at admission, at discharge, and at 3-6-month follow up. We defined abnormal pupil response as any NPi  $<$  3 at any point during the ICU stay. Using student t-test and chi-square test, we compared the short-term and long-term outcomes of children with abnormal NPi versus those with normal NPi.

### **Results**

Of all the children with neuro-injury admitted to our PICU during the study period, 31 had pupillometry data available for analysis. The mean (SD) GCS in the study cohort was 6 (4.5) and 20/31 (64.5%) had abnormal ( $<$ 3) NPi. Patients with an abnormal NPi had higher mortality compared to patients with normal NPi ( $p=0.004$ ). There was a significant worsening of neurologic and functional status ( $\Delta$ PCPC,  $\Delta$ POPC and  $\Delta$ FSS from admission to discharge) among children with abnormal NPi [mean (SD): 3.55(1.5), 3.45(1.43), 16.75(7.85),  $p< 0.001$ ] as compared to those with normal NPi [mean (SD): 1.45(0.93), 1.73(0.90), 3.55(2.07),  $p>0.05$ ]. At 3-6-month follow-up, though neurologic status ( $\Delta$ PCPC,  $\Delta$ POPC) was not significantly different between the two groups the functional status ( $\Delta$ FSS) remained significantly worse among children with abnormal NPi as compared to those with normal NPi.

### **Conclusions**

Children admitted to PICU for neuro injury and with abnormal NPi ( $<$  3) have a higher mortality, and worse outcomes compared to those with normal NPi ( $\geq$  3) measured during the PICU course.