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Challenges of Encountering Infant Delirium on ECMO

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CHALLENGES OF ENCOUNTERING INFANT DELIRIUM ON ECMO

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Describe role of Submitting/Presenting Trainee in this project (limit 150 words):

Case Review, Involved in patient's care.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background: Critically ill infants with organ dysfunction are at an increased risk of delirium. Delirium is defined as an acute and fluctuating change in awareness and cognition in the setting of medical illness. It is uncommonly recognized in the Neonatal ICU (NICU) and is associated with several adverse outcomes including increased unplanned extubations, longer duration of mechanical ventilation and prolonged hospital stays.

Case: A 27-week preterm infant with Bronchopulmonary Dysplasia was discharged home from the NICU at postmenstrual age (PMA) of 45 weeks on 0.1 LPM 100% FiO₂ nasal cannula. The patient was readmitted at PMA 48 weeks for respiratory distress secondary to Entero/Rhinovirus bronchiolitis. Six days later the patient continued to have progressive respiratory failure and was placed on VA ECMO. At that time, the patient was receiving morphine and midazolam infusions at 0.05 mg/kg/hr and 0.08 mg/kg/hr. On day 4 of ECMO there was worsening agitation with thrashing, purposeless movements despite multiple morphine and midazolam boluses. At this time the morphine and midazolam continuous infusions had been escalated to 0.16 mg/kg/hr and 0.2 mg/kg/hr respectively. The patient was hyperactive, "combative" and the sedative and analgesic requirement continued to escalate to a max of 0.24 mg/kg/hr without any improvement in agitation symptoms.

A broad-based work up was initiated to determine the etiology for lack of opioid and benzodiazepine response. Sepsis evaluation was negative. There was no evidence of hepatic or renal failure. No acute abnormalities were seen on head ultrasound. Clinical pharmacology was consulted due to the changes in drug pharmacokinetics on ECMO. After ruling out other

causes, delirium was then considered the most likely cause of these increased movements and agitation. It was recommended to wean morphine and midazolam aggressively to the lowest doses possible while maintaining adequate sedation and analgesia. Within 48 hours of rapid opiate and benzo weaning, significant improvement in symptoms of delirium was seen.

Conclusions: Infant delirium is uncommonly recognized in the NICU. It is a well-known and prevalent problem in adult and pediatric intensive care units. Possible cause of delirium include infections, acute electrolyte abnormalities, hepatic or renal failure, drug toxicity or drug withdrawal. Delirium is a neurobehavioral manifestation of alterations in neurotransmission as well as alterations in cerebral blood flow, along with disordered cellular homeostasis. The pharmacokinetics of drugs in infants is rapidly changing with development and the addition of an ECMO circuit further complicates an estimation of PK. These developmental and circuit-related pharmacologic changes may increase the risk of delirium in this population. Improved awareness and monitoring for infant delirium is necessary.