

Clinical Outcomes Associated with Different Treatment Modalities for Persistent Pulmonary Hypertension in the Full Term Newborn

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Objective: To describe the variation of treatment modalities for persistent pulmonary hypertension (PPHN) and their relationship to length of hospital stay and clinical outcomes.

Background: PPHN can be associated with long hospitalization and high morbidity. The optimal approach for the treatment of PPHN is unclear. Although extracorporeal membrane oxygenation (ECMO) has increased the survival of infants with PPHN, it involves an intensive process, has significant risk factors, and is expensive. In recent years, inhaled nitric oxide (iNO) has been used to treat PPHN. Clinical outcomes of PPHN after treatment with iNO, ECMO, or both are not well studied.

Methods: Data was collected retrospectively from the clinical database for all patients managed by Paidos Health Management Services from 9/98-8/00. Included for study were all patients with PPHN treated with iNO, ECMO, or both therapies, excluding those infants < 37 weeks, or those infants with cardiac defects, surgical needs or congenital anomalies. Management of the infant was decided at the hospital and physician level. Measured data on included infants was: length of hospital stay (days), the # of ventilator and oxygen days, and the # of days to reach full PO feeds. Medications, the need for durable medical equipment, and other medical needs at discharge were also assessed. Clinical data was analyzed for all patients surviving to discharge.

Results: A total of 8483 infants were managed by Paidos during this time frame, and 43 infants met criteria for study inclusion. Mean birth weight for these infants was 3420 grams \pm 657 (range 1961-4630) and mean gestational age was 39.42 weeks \pm 1.43 (range 37-42). Studied patients were 49% male, 51% female; and 51% Caucasian, 33% African American, 9% Hispanic, and 7% other. Primary respiratory diagnosis for studied infants was: 22 (51.2%) Meconium Aspiration, 8 (18.6%) Primary Pulmonary Hypertension; 7 (16.3%) Pneumonia; and 6 (13.9%) Respiratory Distress Syndrome. In the studied infants, 25 infants were treated with iNO therapy, 12 infants were treated with ECMO, and 6 infants were treated with iNO and ECMO (iNO/ECMO). There were 2 deaths (4.7%) in the ECMO group, none in the other treatment groups. Significant differences existed between treatment groups with respect to length of hospital stay, as well as the duration of mechanical ventilation and oxygen therapy. The time to reach full PO feeds did not differ between treatment groups. 4 (67%) infants in the iNO/ECMO group were discharged home with ongoing medical needs, including medication management for chronic lung disease, compared to 2 (20%) treated with ECMO and 6 (24%) treated with iNO.

	iNO tx (n=25)	ECMO tx (n=10)	iNO/ECMO tx (n=6)	Significance
Ventilation Days	7.24 \pm 4.99	10.7 \pm 3.62	15.33 \pm 10.63	<0.05
Oxygen Days	14.28 \pm 7.06	15.5 \pm 4.86	25.17 \pm 11.79	<0.01
Days to Full PO feeds	15.96 \pm 8.58	18.1 \pm 5.20	20.33 \pm 2.80	0.39 NS
Length of Stay	19.84 \pm 8.73	27.5 \pm 11.62	35.67 \pm 18.86	<0.01

Conclusions: Term patients who are treated with both iNO and ECMO for PPHN appear to be at risk for longer lengths of hospital stay, a prolonged convalescent period, and a high incidence of ongoing medical needs at discharge, compared to patients not treated with both modalities. This finding is likely due to higher severity of illness in the iNO/ECMO group. Patients treated with iNO and ECMO merit close long term follow-up. Further research is necessary to study clinical outcomes with treatment variations.