A Novel Scoring Tool for Neonatal Persistent Pulmonary Hypertension

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INTRODUCTION

- At birth, a decrease in pulmonary vascular resistance (PVR) is essential to facilitate pulmonary vascular perfusion as the infant establishes independent use of the lungs.
- When PVR fails to decrease, hypoxemic respiratory failure (HRF) and pulmonary hypertension (PH) ensues.
- A novel scoring tool was developed to characterize severity of HRF and PH in the setting of a critically ill newborn, accounting for level of hypoxemia and echocardiographic findings of PH.

Aim: Validate HRF/PH scoring tool as an accurate metric for severity of pulmonary hypertension using a single center retrospective analysis of infant outcomes

METHODS

Data Collection: Patient data for infants hospitalized in 2020 obtained from Epic Electronic Medical Record (EMR) and inputted to RedCAP database

Inclusion Criteria:

Infant ≥ 34 wks GA age 0-7 days admitted to NICU → Diagnosed with PPHN per ICD 9/10 codes → Completed echo within 7 days of birth

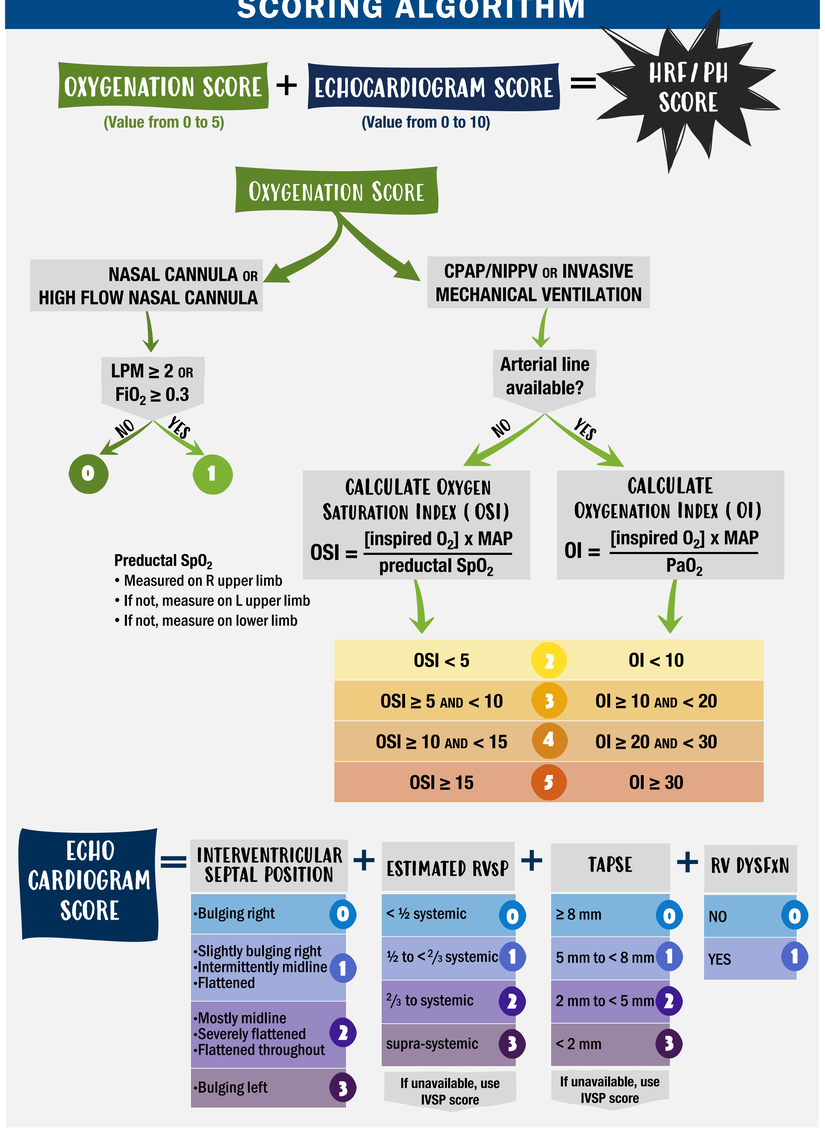
Exclusion criteria:

- Congenital heart disease other than atrial septal defect, patent foramen ovale, patent ductus arteriosus or ventricular septal defect (< 2 mm)
- Congenital anomaly associated with high likelihood of death during infancy (ex. Trisomy 18 or 13)

Data Analysis:

- HRF/PH scores categorized into mild (0-5), moderate (6-9) and severe (10-15)
- Statistical analysis performed with linear regression and logistic regression models fitted in Stata for each outcome as dependent variables
- Statistical significance used to evaluate HRF/PH score validity for each outcome variable

SCORING ALGORITHM



CPAP: continuous positive airway pressure. NIPPV: non invasive positive pressure ventilation. LPM: liters per minute. MAP: mean arterial pressure. RVsP: right ventricular systolic pressure. TAPSE: tricuspid annular pansystolic excursion

RESULTS

- HRF/PH scores ranged 2-12 (mean 8.1)
- Among 18 infants, 11% mild PH, 56% moderate PH, 33% severe PH
- Meconium aspiration was most common etiology for PH (44% n=8)

Table 1. Mechanism of PH by HRF/PH Severity

	Mild n=2	Moderate n=10	Severe n=6	p-value
Meconium aspiration	0	4 (40%)	4 (67%)	0.44
Sepsis	0	0	1 (17%)	0.44
RDS	1 (50%)	2 (20%)	0	0.19
Maternal GBS	2 (100%)	0	3 (50%)	**0.01**

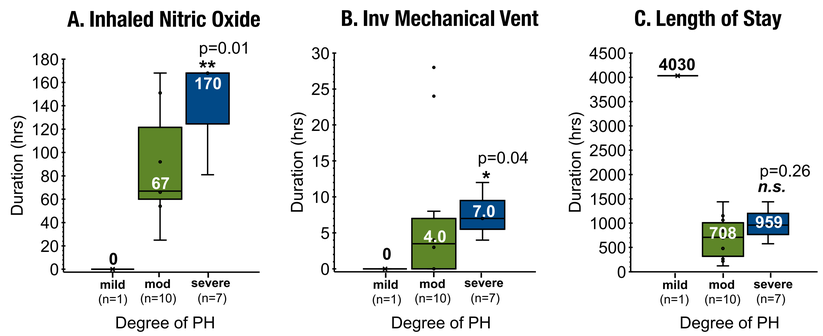
RDS: respiratory distress syndrome. GBS: group B streptococcus

Table 2. Outcomes by HRF/PH Severity

	Mild n=2	Moderate n=10	Severe n=6	p-value
Required iNO	0	7 (70%)	6 (100%)	**0.02**
Required ECLS	0	0	3 (50%)	**0.04**
Required IMV	1 (50%)	7 (70%)	6 (100%)	0.27
Died before discharge	1 (50%)	0	3 (50%)	**0.02**

iNO: inhaled nitric oxide. ECLS: extracorporeal life support. IMV: invasive mechanical ventilation

Figure 1. Outcomes for Survivors by HRF/PH Severity



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This project was approved by the UC Davis Investigational Review Board.

CONCLUSIONS

- Severe HRF/PH score significantly correlated with increased need for inhaled nitric oxide (iNO), increased need for extracorporeal life support (ECLS), and increased likelihood of death before discharge
- Severe HRF/PH score significantly correlated with increased duration of iNO (p=0.01) and increased duration of IMV (p=0.04) among survivors
- HRF/PH score did not correlate with length of stay
- These findings suggest that the HRF/PH score offers a promising representation of disease severity
- A multicenter prospective study of scoring variability and inter-rater reliability with respective infant outcomes is ongoing