Supplementary Table 1: Assignment of cardiac lesions from entire cohort

Complex cardiac lesion – Acyanotic

AV canal defects

- Complete balanced AV canal defect, ASD, VSD status post repair
- Slight R-sided prominent AV canal
- AV canal

Arch hypoplasia / stenosis

- Aortic stenosis / Shones Complex
- Aortic coarctation with aortic arch hypoplasia, moderate valvar aortic stenosis
- Arch hypoplasia, coarctation
- Critical coarctation of the aorta with acute cardiogenic shock (also with VSD, mitral valve stenosis)

Pulmonary atresia / stenosis and variants

- Pulmonary atresia, intact ventricular septum, and RV-dependent coronary circulation
- Pulmonary atresia, hypoplastic right ventricle, intact ventricular septum
- Pulmonary vein stenosis
- Right-sided congenital diaphragmatic hernia, as well as situs inversus totalis

Other

- Large inlet muscular VSD with outlet extension with bidirectional shunt, moderate dilatation of the right ventricle, moderate-size PDA with bidirectional shunt, aortic isthmus hypoplasia with no discrete coarctation, mild to moderate tricuspid valve regurgitation and cleft mitral valve without regurgitation

Complex cardiac lesion - Cyanotic

Transposition of the great arteries and variants

- D-TGA
- DORV, TGA with intact septum
- TGA with intact ventricular septum
- Tricuspid atresia, D-transposition of the great arteries and arch hypoplasia

Unbalanced AV Canal Defects

- Unbalanced right-dominant AV canal
- Unbalanced left-dominant AV canal, double-outlet right ventricle with d-malposed great arteries, severe pulmonary stenosis, restrictive outlet VSD, as well as severe left av valve regurgitation

HLHS and variants

- HLHS status post Norwood (n=2)
- Hypoplastic left heart syndrome (mitral and aortic atresia), anomalous origin of the right subclavian artery, anomalous origin of the right coronary artery from the pulmonary artery.
- Hypoplastic left heart syndrome, intact atrial septum
- HLHS (3)
- Hypoplastic left heart syndrome with tricuspid valve regurgitation
- HLHS status post stage I palliation, status post GLENN
- HLHS status post VAD and heart transplant
- Hypoplastic left heart variant with mitral and aortic valve stenosis and arch hypoplasia
- Hypoplastic left heart syndrome with mitral stenosis and aortic atresia with intramyocardial sinusoids in the left lateral wall
- Hypoplastic left heart syndrome and situs inversus totalis, mitral atresia, and aortic atresia

Complex single ventricle ventricle anatomy

- Dextrocardia double outlet right ventricle, pulmonary atresia, situs inversus totalis who has pulmonary ductal dependency
- Complex single ventricle cardiac anomaly consisting of tricuspid and pulmonary atresia with intact ventricular septum

- Large VSD with small left sided structures - moderate hypoplasia of the mitral valve and mild hypoplasia of the LV and ascending aorta
- Heterotaxy, double inlet left and double outlet right with single ventricle physiology
- Double inlet left ventricle and transported great vessels and aortic arch hypoplasia

Tetrology of Fallot and variants

- Tetralogy of Fallot and pulmonary atresia with multiple aortopulmonary collaterals
- Tetrology of Fallot, pulmonary atresia
- TOF, complete AV canal

Truncus arteriosus variants

- Truncus arteriosus, mitral atresia
- Truncus arteriosus status post truncal valvuloplasty, left-sided BT

Other complex cyanotic lesions

- TAPVR
- Heterotaxy, dextrocardia, ventricular inversion, right-dominant common AV canal, pulmonary atresia, obstructed infradiaphragmatic total anomalous pulmonary venous return.
- Double outlet right ventricle with subaortic VSD, normally related great vessels, hypoplastic Pulmonary outflow tract (TOF type), mitral-aortic discontinuity, a large outlet VSD (mostly right-to-left flow) and overriding aorta, hypoplastic pulmonary valve with antegrade blood flow
- Tricuspid Atresia (ductal dependent)
- Shunt, central PA reconstruction at OSH

Supplementary Table 2: Imaging coding as Mild vs. Moderate to Severe in infants with EEG during ECMO course

Mild	Moderate to Severe
• Expansion of the subarachnoid or extra-axial spaces • Simple subgaleal hematoma • Lenticulostriate vasculopathy • Mild white matter injury (single focus) • Single punctate hemorrhage • Single or mild T1/T2 changes without diffusion changes • Low grade intraventricular hemorrhage (including subependymal hemorrhage) • Mild delay of brain development (based on myelination and/or sulcation pattern) • Mild ventriculomegaly • Expected vascular changes associated with ligation of vessels after decannulation • Few microhemorrhages	• Diffuse cerebral edema • Intraparenchymal hemorrhage • Infarction (including subacute) • Deep white matter injury (including thalamic injury) • Subdural hematoma • Ventriculomegaly requiring shunt placement • Encephalomalacia • Global atrophy • Diffuse white matter injury • Midline shift • Dural Sinus Thrombosis • Moderate dilation of ventricles • Syndromic abnormality of the brain + other acute findings (periventricular leukomalacia, ventriculomegaly) • Diffuse asymmetric echogenicity consistent with infarction on HUS • >1 mild finding

Supplementary Table 3: Non congenital heart disease cardiac and pulmonary reasons for ECMO

Cardiac	Pulmonary
Arrhythmia Coronary arterial clot Cardiomyopathy Heart failure	Interstitial lung disease complicated by pulmonary hypertension Respiratory distress / failure Congenital pulmonary airway malformation status post lobectomy

Supplementary Figure 1: Number of infants initiated onto EMCO by year, highlighting those with EEG and electrographic seizure and those with EEG without electrographic seizure.