



GUIDELINE

Extra Corporeal Membrane Oxygenation (ECMO) for the Neonate – Indications and Referral Process

Scope (Staff):	Nursing and Medical Staff
Scope (Area):	NICU KEMH, NICU PCH, NETS WA, PCC

Child Safe Organisation Statement of Commitment

CAHS commits to being a child safe organisation by applying the National Principles for Child Safe Organisations. This is a commitment to a strong culture supported by robust policies and procedures to reduce the likelihood of harm to children and young people.

This document should be read in conjunction with this [disclaimer](#)

Aim

To describe the indications, management and referral process for extra corporeal membrane oxygenation (ECMO) in the neonate.

Risk

Failure to follow this guideline may lead to adverse outcomes for the neonate.

Background

Extra Corporeal Membrane Oxygenation (ECMO) is a well-established treatment modality for neonatal patients with medically unresponsive cardio-respiratory failure. Survival is significantly higher in the group of neonates who are selected appropriately. However, as would be expected in this high risk situation, there are risks of serious complications and long term developmental sequelae associated with an ECMO run. Common reasons for the use of neonatal ECMO include: [meconium aspiration syndrome](#) (MAS); [congenital diaphragmatic hernia](#) (CDH); [persistent pulmonary hypertension of the newborn](#) (PPHN); and [sepsis](#). Survival rates are reported as: MAS 92%; PPHN 73%; Pneumonia 60%; CDH ~50%; sepsis 45%.

Importantly, early discussion is required for any patient who may be a candidate for ECMO with the ECMO service via a NETS WA conference call.

Neonatal entry criteria for consideration of ECMO

All criteria assume optimal support of respiratory and/or cardiovascular failure including mechanical ventilation, trial of nitric oxide (where appropriate) and appropriate inotropic support.

- Severe cardiac, pulmonary, or cardiopulmonary failure with a high likelihood of mortality and potentially reversible aetiology
- Acceptable quality of life expected if survival occurs.
- With ≥ 1 of the following:
 - $OI^* \geq 40$ for >30 mins
 - $OI^* > 20$ with lack of improvement despite prolonged (>24 hrs) maximal medical therapy or persistent episodes of decompensation.
 - Decompensation, with $PaO_2 < 40$ mmHg for >2 hrs unresponsive to intervention (non-cyanotic heart disease).
 - Metabolic acidosis and shock with $pH < 7.25$ (no respiratory component) for > 2 hrs with hypotension.
 - Progressive pulmonary hypertension with evidence of right ventricular dysfunction or continued high inotropic support requirement.

***Oxygenation index (OI) = (Mean Airway Pressure (MAP) x FiO_2) / PaO_2**

Absolute contraindications for ECMO

- Severe or lethal congenital malformation or chromosomal anomaly (includes trisomy 13, 18 but not 21).
- Major intracranial haemorrhage (including IVH \geq grade 3).
- Severe irreversible neurological injury.
- Uncontrollable bleeding.

Relative contraindications for ECMO

- Weight < 2 kg.
- Gestational age < 34 weeks.
- Irreversible organ damage.
- Disease state with high probability of a poor prognosis.

NB Any infant with an $OI > 25$ despite adequate medical management should be considered for transport to ECMO centre for ongoing management.

Referral Process for ECMO

- Referral for neonates is via NETS WA or with a cardiac MDT for neonates on 3B at PCH.
- Following referral to NETSWA and an initial discussion, a conference call will be set up with referring neonatologist/ paediatrician, PCH/ NETS neonatologist, PCC on duty consultant, on call cardiologist and the cardiothoracic surgeon.
- Likely outcomes from this conference call are:
 - 1) Definite decision **to go ahead** with ECMO.
 - 2) Definite decision **not to go ahead** with ECMO.
 - 3) Transport to 3B NICU PCH for further management/ assessment.
 - 4) Review decision at an agreed time.

During this discussion, a decision will be made upon timing of transport and where the patient will be admitted to (3B NICU or 3A PCC).

Transport considerations

- Newborns for ECMO consideration are the most complex and physiologically unstable babies that require retrieval.
- It should be accepted that some babies need to be transported in a less than optimal state or are too sick to move.
- In these circumstances there may need to be a conversation with parents on the risk of transport and/or that transport will be too risky to undertake.
- This conversation should be documented in the patients notes.
- Details on the preparation of transport for a baby for ECMO are beyond the scope of this guideline.

Preparation for ECMO (if patient at KEMH or PCH NICU)

1. Cross-match 2 units of packed red blood cells (PRBC) / 1 unit platelets and 1 unit FFP.
2. Send newborn blood spot screening (to be done prior to ECMO commencing and administration of PRBC). Note: this is the responsibility of KEMH and PCH NICU staff.


If time permits and doesn't hold up the transport of the infant perform:

3. An echocardiogram, head and renal ultrasound if not already done
4. Insert a NGT, and indwelling urinary catheter
5. Insert central lines:
 - Arterial line (UAC adequate) and Central vascular access (UVC adequate)

Related CAHS internal policies, procedures and guidelines
<p>Neonatology Guidelines</p> <p>NETS WA Guidelines</p>

References and related external legislation, policies, and guidelines
<p>Wild KT, Rintoul N, Kattan J, Gray B. Extracorporeal Life Support Organization (ELSO): Guidelines for Neonatal Respiratory Failure. ASAIO J. 2020;66:463-70 doi: 10.1097/MAT.0000000000001153 [published Online First: 2020/04/14].</p>

This document can be made available in alternative formats on request.

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