

St. Peter's Hospital, Neonatal Unit ECMO – When and how to refer a baby for treatment

Background

The Extra Corporeal Membrane Oxygenation (ECMO) trials showed that ECMO halved mortality in babies with reversible cardio-respiratory failure. There are four ECMO centres in the UK which work as a single coordinated service

1. GOSH, London (our local referral centre)
2. Glenfield Hospital, Leicester
3. Freeman Hospital, Newcastle-on-Tyne
4. Yorkhill Hospital, Glasgow

ECMO is a modification of conventional cardio-pulmonary bypass. Cannulae are placed in the neck vessels (arterio-venous or veno-venous) and a membrane oxygenator allows the heart and lungs to be rested, minimising barotrauma and oxygen toxicity.

Who and when to refer

The following conditions in neonates can benefit from ECMO:

- Persistent pulmonary hypertension
- Meconium aspiration syndrome
- Neonatal sepsis / pneumonia
- Respiratory distress syndrome
- Congenital Diaphragmatic Hernia
- Cardiac disease including cardiomyopathy, myocarditis, arrhythmias or post-cardiac surgery

The criteria for ECMO referral are:

- Gestational age >34 weeks
- Weight > 2 kg
- Reversible lung disease (<10 days high pressure ventilation – this is not absolute)
- Severe air leak syndrome
- No lethal congenital abnormalities
- No major intracranial haemorrhage
- No severe abnormal neurology
- Oxygenation index >25 (initiate referral)
- Oxygenation index >40 (ECMO)

Oxygenation index is calculated by
$$\frac{\text{Mean Airway Pressure} \times \% \text{ oxygen}}{\text{Postductal PaO}_2 \text{ (kPa)} \times 7.5}$$

This web-based calculator will open in a new window: [Oxygenation Index Calculator](#)

The neonatal consultant must be involved in any decision to refer for ECMO and will normally speak to the ECMO team.

How to refer

Telephone GOSH **0207 829 8652** (explain that it is an ECMO referral). You will be referred to a clinician to discuss the case and, once accepted, transfer will be arranged by the ECMO centre. If there is no bed at GOSH, they will organise a bed elsewhere as they work as a national coordinated service.

What you need to do in preparation

DOCUMENTATION

Ensure that Badgernet is complete, including parental information, contact details of GP – remember some of these babies will not survive, so accurate information is crucial

HISTORY

- Provide as much detail about antenatal history as possible
- Full resuscitation details
- Age, weight, gestation, diagnosis
- Any history of arrest or hypoxia/ischaemia, including duration

CLINICAL

- Clinical parameters
- Duration of ventilation, ventilatory type (conventional, HFOV) and settings.
- Oxygenation index
- Lowest pH/ worst ABG, most recent ABG and SpO2 (pre- and post-ductal)
- Other treatments tried (iNO, prostacyclin, sildenafil, magnesium)
- Cardiovascular drugs/ inotropes
- USS head
- Lab results (FBC, coagulation; renal and liver biochemistry; serum lactate)
- Information such as cardiac echo and CFM may be useful if available.

SAMPLES

- A sample of maternal blood will be required – don't leave this to the last minute. Cross-matched blood is not needed if the baby is going to GOS – for other ECMO centres ask
- Request CD of X-rays for receiving hospital clinicians

TRANSPORTATION

- Ensure the baby is ready for transfer – use the table below as a checklist
- Ensure paralysis and sedation are optimal

| Pre-Departure Checklist <i>Please tick</i> | | | | | | |
|---|----------|------------------------------|-----|--|-----------|-----|
| ETT secure | | Name bands | | Religious Rites | | |
| Lines secure | | Blood Spot Yes/No/Not known | | Photos | | |
| Mums blood | | Breast Milk | | Toys/Clothing | | |
| Notes | | X-Rays | | Ultrasound | | |
| Weight Chart | | Referring Unit Documentation | | Receiving Unit advised departing and ETA | | |
| Access | | | | | | |
| Position checked and secure | Cannulae | UVC | UAC | PAL | Long Line | NGT |
| Type & Number | | | | | | |

INFORMATION

Explain to the parents what the reason for transfer is and what is going to happen. Some information to guide discussion is given below

Survival to hospital discharge:

Meconium aspiration >90 %
PPHN/RDS/GBS sepsis 70-80 %
Pertussis 30 %
RSV or paediatric respiratory failure 60-70 %
CDH 50-60 %

Risks from ECMO:

Bleeding 5-10 %
Brain damage - Severe 5 % Mild to moderate 15-20 %
Infection 5-10 %

Emphasise that ECMO is a support only and not a treatment

Useful Links

Excellent information for parents and doctors

<http://www.gosh.nhs.uk/medical-conditions/procedures-and-treatments/ecmo/>

Information leaflet about the ECMO service for printing

<http://www.leicestershospitals.nhs.uk/EasysiteWeb/getresource.axd?AssetID=787&type=full&servicetype=Attachment>

References

1. The UK collaborative trial of Neonatal ECMO. Lancet 1996;348:75-82
2. The UK collaborative trial: follow-up to 1 year of age. Paediatrics 1998;101(4)
3. National ECMO Service for England information leaflet (in use 2009)
4. CATS ECMO guideline 2006
5. UCL/GOS ECMO guideline 2006

Guideline written by Dr. Peter Reynolds, Consultant Neonatal Paediatrician

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Next review 2021