

ECMO (extracorporeal membrane oxygenation) during the COVID-19 pandemic

This document provides the framework to support provision of ECMO during an escalating pandemic. It should be used to inform local policies and procedures which should be current and reviewed regularly.

Introduction

Extracorporeal membrane oxygenation (ECMO) is an advanced form of life support – targeted at the heart and lungs. It may be indicated in cases of acute severe cardiac or pulmonary failure that is both potentially reversible and unresponsive to conventional management. Usually delivered in an intensive care unit (ICU), there are two main types of ECMO – veno-venous and veno-arterial.

Both provide respiratory support, but only veno-arterial ECMO provides haemodynamic support. There are 38 adult intensive care units and three paediatric intensive care units in NSW providing services to a total population of 8 million people. NSW adult patients who require ECMO, can currently receive treatment at eight tertiary Adult ICUs in metropolitan Sydney and John Hunter Hospital. NSW has a well-established Adult ECMO retrieval service which has been operational for more than 10 years, supported by clinicians on a dedicated roster from Royal Prince Alfred and St Vincent's Hospitals.

In Victoria, a matrix is used to assist in decision-making for initiation of ECMO*. In NSW, the decision to initiate ECMO follows a multi-disciplinary discussion lead by an ECMO intensivist. In neonates and children all ECMO and other clinical discussions

are conducted through NETS (newborn and paediatric emergency transport service). Although there is consideration of baseline risk and comorbidities, a formal score is not calculated.

In the absence of evidence of proven benefit, in a pandemic, use of ECMO needs to take into consideration not only patient factors but workforce, available skill mix to provide safe care and current system capacity.

International experience

The World Health Organization currently recommends that patients with acute respiratory distress syndrome (ARDS) in settings with access to expertise in ECMO who have refractory hypoxaemia despite lung protective ventilation are referred for consideration of ECMO.

Data emerging from early cohort studies from China (although low numbers) report crude mortality of 50%. Early clinical impressions from Italy are that patients with ARDS from COVID19 are very responsive to conventional therapy and, in particular, prone ventilation.

The role of ECMO in the management of COVID-19 is unclear.

Considerations during COVID-19 pandemic in NSW

Complex ethical and clinical treatment issues can occur during a pandemic, especially when healthcare demand exceeds supply. It may be necessary at some point to begin prioritising limited critical care resources to those with a need for treatment and those who are most likely to survive. Such prioritisation decisions would need to take account all patients' probability of survival, as well as the availability of limited critical care resources,

- ECMO is contraindicated in patients with pre-existing conditions which are incompatible with recovery (severe cardiac or baseline respiratory disease or severe neurological injury, end stage malignancy).
- Patients should have optimised conventional therapy prior to consideration of ECMO. This includes neuromuscular blockade, judicious fluid management, maximal positive end expiratory pressure (PEEP), recruitment manoeuvres and most importantly prone ventilation. Hence, ECMO is not recommended as first-line therapy

As ECMO is a highly specialised service requiring higher ratios of skilled staff in initiation, maintenance and post treatment phases, its use during a pandemic should be carefully considered.

- With increased demands, adult patients requiring ECMO should be distributed across multiple centres, such that one or two hospitals are not overwhelmed when skilled staff may be limited.
- Lower volume ECMO capable hospitals with established resources could manage adult patients on ECMO with support from higher volume centres.

Recommendation

During the pandemic, all patients being considered for initiation of ECMO for COVID-19 has to be discussed with the ECMO consultant on call for the NSW ECMO Retrieval Service, or in the case of newborns and children, with NETS. This ensures careful collaborative decision making which considers the patient needs as well as current state capacity. This will also ensure an ability to collate whole of state data for the use of ECMO in COVID-19 pandemic allowing for ongoing evaluation of the appropriateness of ECMO in pandemic.

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