

Extracorporeal membrane oxygenation (ECMO) in adults

1 Guidance

- 1.1 Current evidence on the safety and efficacy of extracorporeal membrane oxygenation (ECMO) in adults does not appear adequate to support the use of this procedure without special arrangements for consent and for audit or research. Clinicians wishing to undertake ECMO in adults should inform the clinical governance leads in their Trusts. They should ensure that patients offered the procedure understand the uncertainty about its safety and efficacy and should provide them with clear written information. Use of the Institute's *Information for the Public* is recommended. Clinicians should ensure that appropriate arrangements are in place for research or audit. Publication of safety and efficacy outcomes will be useful in reducing the current uncertainty. NICE is not undertaking further investigation at present.
- 1.2 ECMO in adults is under evaluation in the Health Technology Assessment Programme's CESAR (Conventional Ventilation or Extracorporeal Membrane Oxygenation for Severe Adult Respiratory Failure) trial. Clinicians wishing to undertake this procedure are strongly advised to enter eligible patients into this trial.

2 The procedure

2.1 Indications

- 2.1.1 ECMO is used to treat respiratory or cardiac failure that is unresponsive to all other measures, but is considered to have a reversible cause. ECMO may also be used after heart surgery to assist the transition from cardiopulmonary bypass to ventilation.
- 2.1.2 Most people treated with ECMO are very ill and at risk of death. The causes of their respiratory and cardiac failure include pneumonia, septic shock, cardiomyopathy, severe burns and pulmonary haemorrhage.
- 2.1.3 Standard treatment is maximal intensive care support without ECMO.

2.2 Outline of the procedure

- 2.2.1 ECMO is a temporary life support technique. It involves connecting the patient's circulation to an external blood pump and artificial lung (oxygenator). A catheter placed in the right side of the heart carries blood to a pump, then to a membrane oxygenator, where exchange of oxygen and carbon dioxide takes place. The blood then passes through tubing back into either the venous or arterial circulation. An anticoagulant is used to prevent blood clotting in the external system.

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This guidance is written in the following context:

This guidance represents the view of the Institute which was arrived at after careful consideration of the available evidence. Health professionals are expected to take it fully into account when exercising their clinical judgement. This guidance does not, however, override the individual responsibility of health professionals to make appropriate decisions in the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

2.3 Efficacy

- 2.3.1 In comparative studies, survival rates ranged from 10% (4/42 patients) to 63% (63/100 patients). In a case series of 202 patients, 30-day survival was 38% and 5-year survival was 24%. For more details, refer to the 'Sources of evidence' (see below).
- 2.3.2 The Specialist Advisors considered that the efficacy of ECMO in adults was poor compared with results in children. They considered that efficacy in adults would remain uncertain until the results of the CESAR trial are published.

2.4 Safety

- 2.4.1 In a cohort study of 245 patients, with 62 patients receiving ECMO, rupture of the tubing system occurred in three patients and resulted in one death. Other complications reported in the studies included cannulation injuries, clots in the ECMO circuit and pump malfunction. Complications related to the underlying condition were also reported. For more details, refer to the 'Sources of evidence' (see below).
- 2.4.2 Although one Specialist Advisor identified bleeding caused by necessary heparinisation as a particular complication, the Specialist Advisors did not consider the procedure to have major safety risks. Most people treated with ECMO are very ill and many of the adverse effects associated with the procedure are as much inherent in the patient's underlying condition as caused by the procedure.

2.5 Other comments

- 2.5.1 The evidence relating to neonates cannot be generalised to adults, who have more heterogeneous indications for the procedure.

3 Further information

- 3.1.1 NICE has also issued interventional procedures guidance on ECMO in postneonatal children (available from www.nice.org.uk/IPG038guidance).

Andrew Dillon
Chief Executive
January 2004

Information for the Public

NICE has produced information describing its guidance on this procedure for patients, carers and those with a wider interest in healthcare. It explains the nature of the procedure and the decision made, and has been written with patient consent in mind. This information is available from www.nice.org.uk/IPG039publicinfoenglish and in English and Welsh from www.nice.org.uk/IPG030publicinfowelsh.

Sources of evidence

The evidence considered by the Interventional Procedures Advisory Committee is described in the following document.

Interventional procedures overview of extracorporeal membrane oxygenation in adults, December 2002

Available from:
www.nice.org.uk/pdf/ip/029overview.pdf

Ordering information

Copies of this guidance can be obtained from the NHS Response Line by telephoning 0870 1555 455 and quoting reference number N0424. *Information for the Public* can be obtained by quoting reference number N0425 for the English version and N0426 for a version in English and Welsh.

The distribution list for this guidance is available on the NICE website at URL www.nice.org.uk/IPG039distributionlist

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