

Extracorporeal membrane oxygenation (ECMO) in postneonatal children

Interventional procedures guidance

Published: 28 January 2004

www.nice.org.uk/guidance/ipg38

Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account. However, the guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental

impact of implementing NICE recommendations wherever possible.

1 Guidance

- 1.1 Current evidence on the safety and efficacy of extracorporeal membrane oxygenation in postneonatal children appears adequate to support the use of this procedure, provided that the normal arrangements are in place for consent, audit and clinical governance.
- 1.2 All children undergoing this treatment, including those treated after cardiopulmonary bypass, should be entered onto the international registry of the Extracorporeal Life Support Organization (ELSO), based at the University of Michigan, USA.

2 The procedure

2.1 Indications

- 2.1.1 Extracorporeal membrane oxygenation (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 be used following heart surgery in postneonatal children to ease the transition from cardiopulmonary bypass. Postneonatal children are at least one month old.
- 2.1.2 Most children treated with ECMO are very ill and at risk of death. The causes of respiratory and cardiac failure in children include: pneumonia; septic shock; congenital heart disease; 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 internal circulation to an external blood pump and artificial lung.

A catheter placed in the right side of the heart carries blood to a pump, then to a membrane oxygenator (artificial lung), where gas exchange of oxygen and carbon dioxide takes place. The blood then passes through tubing back into either the venous or arterial circulation. Patients are given an anticoagulant to prevent blood clotting in the external system.

2.3 Efficacy

- 2.3.1 Most of the evidence reviewed comprised case series from the ELSO database, and these ranged in size from 67 to 763 patients. Survival rates ranged from 40% (27/67 patients) to 71% (91/128 patients). The largest case series of 763 patients reported a 57% survival rate. For more details, refer to the 'Sources of evidence' section.
- 2.3.2 The Specialist Advisors considered that the efficacy of ECMO in providing cardiorespiratory support in postneonatal children is proven. They considered that survival in this group of patients is reasonably well known from the worldwide ELSO database.

2.4 Safety

- 2.4.1 From the studies, the most common complications included bleeding (with an incidence between 40% [27/67] and 58% [137/237]) and renal failure (the largest case series reported this at 45% [343/763]). Other, less frequent complications included seizures and haemolysis. For more details, refer to the 'Sources of evidence' section.
- 2.4.2 The Specialist Advisors considered that the incidence of complications associated with ECMO was low. They listed infection, bleeding, neurological damage and technical problems with the ECMO circuit as potential complications. However, they considered that the procedure was sufficiently well-established in the centres in which it was used and was delivered by trained specialists in a manner designed to minimise risks.

2.5 Other comments

- 2.5.1 The Health Technology Assessment Programme's CESAR trial (Conventional Ventilation or Extracorporeal Membrane Oxygenation for Severe Adult Respiratory Failure) will provide additional evidence about the use of the procedure in adults.

Andrew Dillon
Chief Executive
January 2004

3 Further information

Sources of evidence

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

'Interventional procedure overview of extracorporeal membrane oxygenation for postneonatal children', December 2002.

Information for patients

NICE has produced information on this procedure for patients and carers. It explains the nature of the procedure and the guidance issued by NICE, and has been written with patient consent in mind.

4 About this guidance

NICE interventional procedure guidance makes recommendations on the safety and efficacy of the procedure. It does not cover whether or not the NHS should fund a procedure. Funding decisions are taken by local NHS bodies after considering the clinical effectiveness of the procedure and whether it represents value for money for the NHS. It is for healthcare professionals and people using the NHS in England, Wales, Scotland and Northern Ireland, and is endorsed by Healthcare Improvement Scotland for implementation

by NHSScotland.

This guidance was developed using the NICE [interventional procedure guidance](#) process.

We have produced a [summary of this guidance for patients and carers](#). Information about the evidence it is based on is also [available](#).

Changes since publication

30 January 2012: minor maintenance.

Your responsibility

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

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way which would be inconsistent with compliance with those duties.

Copyright

© National Institute for Health and Clinical Excellence 2004. All rights reserved. NICE copyright material can be downloaded for private research and study, and may be reproduced for educational and not-for-profit purposes. No reproduction by or for commercial organisations, or for commercial purposes, is allowed without the written permission of NICE.

Contact NICE

National Institute for Health and Clinical Excellence

Level 1A, City Tower, Piccadilly Plaza, Manchester M1 4BT

www.nice.org.uk

nice@nice.org.uk

0845 033 7780

Endorsing organisation

This guidance has been endorsed by [Healthcare Improvement Scotland](#).