NICE National Institute for Health and Care Excellence

NICE guidance

# VA ECMO for extracorporeal cardiopulmonary resuscitation (ECPR) in adults with refractory cardiac arrest

HealthTech guidance

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www.nice.org.uk/guidance/htg765

# 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, and specifically any special arrangements relating to the introduction of new interventional procedures. 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.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

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. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

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.

# Contents

This guidance replaces IPG482 and IPG808.

# 1 Recommendations

## For refractory cardiac arrest with a shockable heart rhythm or reversible causes

1.1 Venoarterial extracorporeal membrane oxygenation (VA ECMO) for extracorporeal cardiopulmonary resuscitation (ECPR) can be used as an option to manage in-hospital and out-of-hospital refractory cardiac arrest in adults with a shockable heart rhythm or reversible causes.

## For refractory cardiac arrest with a non-shockable heart rhythm or irreversible causes

1.2 More research is needed on VA ECMO for ECPR to manage in-hospital and out-of-hospital refractory cardiac arrest in adults with a non-shockable heart rhythm or irreversible causes, before it can be used in the NHS.

1.3 This procedure should only be done as part of formal research and an NHS research ethics committee needs to have approved its use.

**What this means in practice**

**For refractory cardiac arrest with a shockable heart rhythm or reversible causes**

There is enough evidence on the safety and efficacy of this procedure for healthcare professionals to consider VA ECMO for ECPR as an option.

Healthcare professionals should discuss the available options with the person with refractory cardiac arrest (and their family members and carers as appropriate) before a joint decision is made, if possible (see NICE's page on shared decision making).

Hospital trusts will have their own policies on funding procedures and monitoring results. NHS England may also have policies on funding of procedures.

**For refractory cardiac arrest with a non-shockable heart rhythm or irreversible causes**

There is not enough evidence to know if this procedure is effective. VA ECMO for ECPR should only be done as part of formal research.

**For everyone having the procedure**

**Auditing of outcomes**

Healthcare professionals doing this procedure should collect data on safety and outcomes of the procedure. Enter details about everyone having this procedure into the Extracorporeal Life Support Organization registry and regularly review the data on outcomes and safety. Healthcare professionals are also encouraged to enter data into the National Cardiac Arrest Audit.

**Who should be involved in the procedure**

Patient selection should be done by a multidisciplinary team. The procedure should only be done in centres specialising in using VA ECMO for ECPR for refractory cardiac arrest and by healthcare professionals with specific training in this procedure.

### What research is needed

More research is needed on:

- patient selection
- survival
- neurological outcomes
- timing of the intervention.

## Why the committee made these recommendations

Clinical trial evidence suggests that, compared with conventional CPR, using VA ECMO for ECPR improves the likelihood of surviving with good brain function in adults with refractory cardiac arrest with a shockable heart rhythm or reversible causes. So, it can be used for this group.

Clinical trial evidence is inconsistent for VA ECMO for ECPR in adults with refractory cardiac arrest with a non-shockable heart rhythm or irreversible causes. So, it is uncertain who in this group could benefit from this intervention, and more research is needed.

# 2 Information about the procedure

2.1 Extracorporeal cardiopulmonary resuscitation (ECPR) is a type of CPR that uses a venoarterial extracorporeal membrane oxygenation (VA ECMO) machine to help people when conventional CPR does not work. The goal of ECPR is to restore circulation and gas exchange, and to allow time for other interventions.

2.2 In VA ECMO, blood is taken from the venous system (usually from the femoral vein or the right atrium) and pumped through an oxygenator, where oxygen and carbon dioxide are exchanged. It is then returned to the arterial system, usually through the femoral or axillary artery, or the ascending aorta. People are usually given a continuous infusion of an anticoagulant, usually heparin, to prevent blood clotting in the extracorporeal system. ECPR is used when conventional CPR is unable to restore spontaneous circulation.

# 3 Committee discussion

## The condition

3.1 Cardiac arrest is when normal blood circulation suddenly stops because the heart does not contract effectively. The underlying abnormal cardiac rhythms most associated with cardiac arrest are ventricular fibrillation, asystole, pulseless electrical activity, and pulseless ventricular tachycardia. Cardiac arrest leads to loss of consciousness, respiratory failure and, ultimately, death. Refractory cardiac arrest is defined as the lack of return of spontaneous circulation after 30 minutes of appropriate CPR, in the absence of hypothermia.

## Current practice

3.2 Treatment for cardiac arrest includes immediate CPR to restore the circulation and prevent subsequent brain injury. Defibrillation may be used to treat ventricular fibrillation and pulseless ventricular tachycardia rhythms. Standard care may also include mechanical ventilation, and medicines such as adrenaline and amiodarone. Resuscitation Council UK's 2021 resuscitation guidelines contain guidance on basic and advanced life support.

## Unmet need

3.3 Mortality remains high and neurological outcomes from cardiac arrest remain poor, despite advances in cardiac arrest management and post-resuscitation care. Data from NHS England indicates that the ambulance service responds to around 40,000 people needing resuscitation each year.

# The evidence

3.4 NICE did a rapid review of the published literature on the efficacy and safety of this procedure. This comprised a comprehensive literature search and a detailed review of the evidence from 13 sources, which was discussed by the committee. The evidence included 9 systematic reviews, 1 long-term randomised controlled trial follow-up study, 2 retrospective registry studies, and 1 single-centre retrospective study. It is presented in the summary of key evidence section in the overview. Other relevant literature is in the appendix of the overview.

3.5 The professional experts and the committee considered the key efficacy outcomes to be: survival with favourable neurological outcome and restoration of organ function.

3.6 The professional experts and the committee considered the key safety outcomes to be: bleeding, leg ischaemia, stroke, infection, renal failure and circuit-related complications.

3.7 Patient commentary was sought but none was received.

# Committee comments

3.8 VA ECMO for ECPR should only be done in centres specialising in using VA ECMO for ECPR in refractory cardiac arrest.

3.9 VA ECMO for ECPR in refractory cardiac arrest is available in only a few centres.

3.10 The committee was told that there is a significant resource use associated with VA ECMO for ECPR.

3.11 VA ECMO for ECPR in refractory cardiac arrest is primarily for people with ischaemic heart disease.

3.12 Clinical experts advised that a shorter time between cardiac arrest and starting VA ECMO was associated with better outcomes.

3.13 The committee was informed that outcomes were better in younger people with fewer comorbidities.

3.14 The recommendations in this guidance include the use of VA ECMO during pregnancy or in the postpartum period.

3.15 Some people who had VA ECMO have become organ donors, and their organs have been transplanted.

# Equality considerations

3.16 There are few centres that specialise in using VA ECMO for ECPR in the UK. So, people in more rural areas may not have access to this intervention.

3.17 Pregnancy and maternity are protected characteristics under the Equality Act (2010). Women, trans men and non-binary people with refractory cardiac arrest who are pregnant, or who have recently been pregnant, may need to access this intervention.

# 4 Committee members and NICE project team

This topic was considered by NICE's interventional procedures advisory committee, which is a standing advisory committee of NICE.

Committee members are asked to declare any interests in the technology to be evaluated. If it is considered there is a conflict of interest, the member is excluded from participating further in that evaluation.

The minutes of each committee meeting, which include the names of the members who attended and their declarations of interests, are posted on the NICE website.

## Chair

**Tom Clutton-Brock**
Chair, interventional procedures advisory committee

## NICE project team

Each evaluation is assigned to a team consisting of 1 or more health technology analysts (who act as technical leads for the evaluation), a technical adviser, a project manager and an associate director.

**Xia Li, Jessica Wilcock and Helen Gallo**
Technical leads

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# Update information

**Minor changes since publication**

**January 2026:** Interventional procedures guidance 808 has been migrated to HealthTech guidance 765. The recommendations and accompanying content remain unchanged.

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# Endorsing organisation

This guidance has been endorsed by Healthcare Improvement Scotland.