

**NATIONAL INSTITUTE FOR HEALTH AND CARE
EXCELLENCE**

HealthTech draft guidance

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

Cardiac arrest is when normal blood circulation suddenly stops because the heart does not contract properly. Cardiac arrest can lead to loss of consciousness, respiratory failure and death. Refractory cardiac arrest is when conventional CPR does not work.

Venoarterial extracorporeal membrane oxygenation (VA ECMO) is when blood is taken out of the body and put through an artificial lung located outside of the body (extracorporeal). The ECMO machine adds oxygen to the blood (oxygenation), removes carbon dioxide and pumps the blood around the body. This is done over days or weeks. Tubes take blood out of the major veins in the groin, neck, or both, and return it through tubes into a large artery (venoarterial).

Extracorporeal cardiopulmonary resuscitation (ECPR) is a type of CPR that uses an ECMO machine when conventional CPR does not work. The aim of ECPR is to restore circulation and blood gas exchange, and to allow time for other interventions.

Guidance development process

NICE interventional procedures guidance evaluates procedures used for treatment or diagnosis. It provides evidence-based recommendations about how safe and effective these procedures are. The guidance supports healthcare professionals and commissioners to ensure that patients get the best possible care. By reviewing clinical evidence and considering patient

IPCD - VA ECMO for ECPR in adults with refractory cardiac arrest

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outcomes, NICE aims to improve patient safety and treatment choices in the NHS.

Find out more on the [NICE webpage on interventional procedures guidance](#).

NICE is producing this guidance on VA ECMO in the NHS in England. The interventional procedures advisory committee has considered the evidence and the views of clinical and patient experts.

This document has been prepared for consultation with the stakeholders. It summarises the evidence and views that have been considered, and sets out the recommendations made by the committee. NICE invites comments from the stakeholders for this evaluation and the public. This document should be read along with the [evidence](#).

The committee is interested in receiving comments on the following:

- Has all of the relevant evidence been taken into account?
- Are the summaries of clinical effectiveness reasonable interpretations of the evidence?
- Are the recommendations sound and a suitable basis for guidance to the NHS?
- Are there any aspects of the recommendations that need particular consideration to ensure we avoid unlawful discrimination against any group of people on the grounds of age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex or sexual orientation?

After consultation:

- Based on the consultation comments received, the committee may meet again.
- If committee meets again it will consider the evidence, this evaluation consultation document and comments from stakeholders.
- The committee will then prepare the final draft guidance, which will go through a resolution process before the final guidance is agreed.

Note that this document is not NICE's final guidance on VA ECMO. The recommendations in section 1 may change after consultation.

More details are available in [NICE's interventional procedures programme manual](#).

Key dates:

Closing date for comments: 21 May 2025

Second committee meeting: 10 July 2025

1 Recommendations

For refractory cardiac arrest with a shockable heart rhythm

- 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.

For refractory cardiac arrest without a shockable heart rhythm

- 1.2 More research is needed on VA ECMO for ECPR to manage in-hospital and out-of-hospital refractory cardiac arrest in adults without a shockable heart rhythm, 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 research is needed

More research is needed on:

- patient selection
- survival
- neurological outcomes

- timing of the intervention.

What this means in practice

For refractory cardiac arrest with a shockable heart rhythm

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

Clinicians do not have to offer this procedure and should always discuss the available options before making a decision. You can find out more on our [webpage on making decisions about your care](#).

Hospital trusts will have their own policies on funding procedures and getting permission to do operations and monitoring results. NHS England may also have policies on funding of procedures.

For refractory cardiac arrest without a shockable heart rhythm

There is not enough evidence to know if this procedure is effective. VA ECMO for ECPR in adults without a shockable heart rhythm should only be done as part of formal research.

For everyone having the procedure

Auditing of outcomes

Clinicians 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.

Who should be involved in the procedure

Patient selection should be done by a multidisciplinary team with specific training in this procedure, in centres that specialise in using VA ECMO for ECPR.

Why the committee made these recommendations

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

Clinical trial evidence is inconsistent for people in refractory cardiac arrest without a shockable heart rhythm. 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 ascending aorta). People are 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 (VF), asystole, pulseless electrical activity, and pulseless ventricular tachycardia (VT). 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 VF and pulseless VT 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 detailed review of the evidence from 11 sources, which was discussed by the committee. The evidence included 8 systematic reviews, 1 long-term randomised controlled trial follow-up study, 1 retrospective registry study, and 1 single-centre retrospective propensity-score matched study. It is presented in the [summary of key evidence section in the](#)

[interventional procedures 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 specialised in using VA ECMO for ECPR in refractory cardiac arrest.
- 3.9 VA ECMO for ECPR in refractory cardiac arrest is only available in 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 committee noted that the recommendations in this guidance include the use of ECMO during pregnancy or in the post-partum period.

Equality considerations

- 3.15 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.
- 3.16 Acute heart failure in pregnancy is relatively uncommon. Women, trans men and non-binary people who are pregnant and have established chronic conditions such as diabetes or hypertension, or have congenital or acquired heart disease are at greater risk of heart failure. Pregnancy and maternity are protected characteristics under the Equality Act (2010).

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.

Jessica Wilcock and Helen Gallo

Technical leads

Alan Ashworth

Consultant clinical adviser

Corrina Purdue

Project manager

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Associate directors

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