NICE National Institute for Health and Care Excellence

NICE guidance

VA ECMO for severe acute heart failure in adults

HealthTech guidance
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www.nice.org.uk/guidance/htg764

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.

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This guidance replaces IPG807.

1 Recommendations

As a bridge to recovery, heart transplant or implanted LVAD

1.1 Venoarterial extracorporeal membrane oxygenation (VA ECMO) can be used as an option for severe acute heart failure in adults as a bridge to recovery, a heart transplant or an implanted left ventricular assist device (LVAD).

When the potential for functional recovery is low or uncertain, and a heart transplant or implanted LVAD is unsuitable

1.2 More research is needed on VA ECMO for severe acute heart failure in adults when the potential for functional recovery is low or uncertain, and a heart transplant or an implanted LVAD is unsuitable, 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

As a bridge to recovery, a heart transplant or an implanted LVAD

There is enough evidence on the safety and efficacy of this procedure for healthcare professionals to consider VA ECMO as an option as a bridge to recovery, a heart transplant or an implanted LVAD.

Healthcare professionals should discuss the available options with the person with severe acute heart failure (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.

When the potential for functional recovery is low or uncertain, and a heart transplant or an implanted LVAD is unsuitable

There is not enough evidence to know if this procedure is efficacious when the potential for functional recovery is low or uncertain, and a heart transplant or an implanted LVAD is unsuitable. VA ECMO should only be done as part of formal research in this group.

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 cardiogenic shock module in the Intensive Care National Audit and Research Centre Case Mix Programme.

Who should be involved in the procedure

Patient selection should be done by a multidisciplinary team. The procedure could be done in centres specialising in managing severe acute heart failure and by healthcare professionals with specific training in this procedure.

What research is needed

More research is needed on:

- patient selection including:
  - age
  - comorbidities
  - cause of severe acute heart failure
  - predictors of recovery
- short- and long-term outcomes.

Why the committee made these recommendations

VA ECMO is not a treatment for severe acute heart failure. It is a short-term intervention that provides oxygenated blood to organs while a person's heart recovers, or before someone has a heart transplant or an implanted LVAD.

The prognosis for severe acute heart failure can depend on its causes, so recovery is more likely in some people, such as people with reversible causes. Evidence suggests that VA ECMO improves survival in these people while they recover, or before they have a heart transplant or an implanted LVAD.

For people with a low or uncertain chance of functional recovery who cannot have a heart transplant or an implanted LVAD, clinical trial evidence suggests that there is no benefit from VA ECMO. This may be because of the cause of their severe acute heart failure or because of their comorbidities. For this group, more research is needed on who might benefit from VA ECMO, so it should only be used in research.

2 Information about the procedure

2.1 Venoarterial extracorporeal membrane oxygenation (VA ECMO) can be used for adults with severe acute heart failure as a bridge to recovery, or to having a heart transplant or an implanted left ventricular assist device.

2.2 In VA ECMO, blood is taken from the venous system (usually from the femoral vein or directly from 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. For people with poor kidney function, a haemofiltration unit may be added to the circuit.

3 Committee discussion

The condition

3.1 Acute heart failure is a complex clinical syndrome of symptoms and signs that happen when the efficiency of the heart as a pump is impaired. It can lead to reduced blood flow to the body and increased filling pressures in the heart. Cardiogenic shock is the most severe form of acute heart failure, with short-term mortality between 30% and 50%. It can be caused by a heart attack, heart failure, inflammation of the heart muscle, drug overdoses and poisoning, and blood clots in the lungs. Severe acute heart failure in pregnancy is relatively uncommon but rates are increasing, particularly in the postpartum period.

Current practice

3.2 NICE has published recommendations on diagnosing and managing acute heart failure (see NICE's guideline on acute heart failure: diagnosis and management). Acute heart failure includes sudden significant deterioration in people with known cardiac dysfunction or the new onset of symptoms in people without previous cardiac dysfunction. Treatment involves medicines, including diuretics and inotropes, and invasive treatments such as:

- electrophysiological interventions such as pacemakers or implantable cardioverter-defibrillators
- revascularisation procedures such as percutaneous coronary intervention, valve replacement or repair
- temporary use of intra-aortic balloon pumps or ventricular assist devices.

Most acute heart failure can be managed with conventional treatment. Only a few people with severe acute heart failure will need venoarterial extracorporeal membrane oxygenation (VA ECMO).

Unmet need

3.3 VA ECMO is a form of extracorporeal life support. It provides cardiac and respiratory support for people with severe acute heart failure that has not responded to other forms of treatment. VA ECMO is used when people have the potential to recover, or as a bridge to having a heart transplant or an implanted left ventricular assist device. Unlike a heart–lung (cardiopulmonary) bypass machine, it tends to be used for days to weeks, not hours during open heart surgery. This allows the heart time to recover. The aim is to improve patient outcomes.

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 14 sources (16 publications), which was discussed by the committee. The evidence included 7 systematic reviews, 3 randomised controlled trials, 1 retrospective registry study, 2 single centre retrospective studies, and 1 review and case series. 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, restoration of organ function, and bridging to recovery, transplant or long-term support.

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

3.7 Patient commentary was sought but none was received.

Committee comments

3.8 VA ECMO could be done in centres specialised in managing severe acute heart failure and providing VA ECMO.

3.9 This is a short-term intervention to support people and provide a bridge to further treatment or decisions about their care. Some people will recover, and others will need a heart transplant or long-term mechanical support.

3.10 The committee was told that, for better outcomes, it is very important to start VA ECMO for managing severe acute heart failure as early as possible.

3.11 The committee was told that people:

- can be transferred to specialist centres for VA ECMO
- can potentially be transferred on VA ECMO to specialist centres.

3.12 The committee noted that there is a risk of limb ischaemia when the femoral artery is used. But it also noted that this risk has reduced since distal limb perfusion has been in use.

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

3.14 The committee was told that a high level of nursing expertise and input from a perfusionist are needed to support people on VA ECMO.

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 in the UK that specialise in managing severe acute heart failure and using VA ECMO. So, people in more rural areas may have to travel large distances or may not have time to access this intervention.

3.17 The prevalence of heart failure slowly increases with age until about 65 years, and then more quickly. Age is a protected characteristic under the Equality Act (2010).

3.18 Acute heart failure in pregnancy is relatively uncommon. Women, trans men and non-binary people who are pregnant are at greater risk of heart failure if they have:

- established chronic conditions such as diabetes or hypertension, or
- congenital or acquired heart disease.

Pregnancy and maternity are protected characteristics under the Equality Act (2010). Women, trans men and non-binary people with severe acute heart failure 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 consultant clinical adviser, a project manager and an associate director.

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Technical leads

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Update information

Minor changes since publication

January 2026: Interventional procedures guidance 807 has been migrated to HealthTech guidance 764. The recommendations and accompanying content remain unchanged.

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