



## Extracorporeal Membrane Oxygenation (ECMO)

LOB(s): <input checked="" type="checkbox"/> Commercial  <input checked="" type="checkbox"/> Medicare  <input checked="" type="checkbox"/> Medicaid	State(s): <input checked="" type="checkbox"/> Idaho <input checked="" type="checkbox"/> Montana <input checked="" type="checkbox"/> Oregon <input checked="" type="checkbox"/> Washington <input type="checkbox"/> Other:  <input checked="" type="checkbox"/> Oregon <input type="checkbox"/> Washington
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### Enterprise Policy

PacificSource is committed to assessing and applying current regulatory standards, widely-used treatment guidelines, and evidenced-based clinical literature when developing clinical criteria for coverage determination. Each policy contains a list of sources (references) that serves as the summary of evidence used in the development and adoption of the criteria. The evidence was considered to ensure the criteria provide clinical benefits that promote patient safety and/or access to appropriate care. Each clinical policy is reviewed, updated as needed, and readopted, at least annually, to reflect changes in regulation, new evidence, and advancements in healthcare.

Clinical Guidelines are written when necessary to provide guidance to providers and members in order to outline and clarify coverage criteria in accordance with the terms of the Member's policy. This Clinical Guideline only applies to PacificSource Health Plans, PacificSource Community Health Plans, and PacificSource Community Solutions in Idaho, Montana, Oregon, and Washington. Because of the changing nature of medicine, this list is subject to revision and update without notice. This document is designed for informational purposes only and is not an authorization or contract. Coverage determinations are made on a case-by-case basis and subject to the terms, conditions, limitations, and exclusions of the Member's policy. Member policies differ in benefits and to the extent a conflict exists between the Clinical Guideline and the Member's policy, the Member's policy language shall control. Clinical Guidelines do not constitute medical advice nor guarantee coverage.

### Background

Extracorporeal membrane oxygenation (ECMO) provides extracorporeal circulation and physiologic gas exchange for temporary cardiorespiratory support in cases of severe respiratory and cardiorespiratory failure. ECMO is used in clinical situations in which there is respiratory or cardiac failure, or both, in which death would be imminent unless medical interventions can immediately reverse the underlying disease process or physiologic functions can be supported for long enough that normal reparative processes or treatment can occur (e.g., resolution of acute respiratory distress syndrome (ARDS) or treatment of infection) or other life-saving intervention can be delivered (e.g., provision of transplant). ECMO may also be referred to as Extracorporeal Life Support (ECLS).

#### ECMO In Neonates

The technology is similar to cardiopulmonary bypass as used during cardiac surgery, only modified for prolonged use at the bedside intensive care unit. Extra-corporeal membrane oxygenation is capable of effectively and safely supporting respiration and circulation in neonates with severe reversible respiratory failure and a moribund clinical presentation.

#### ECMO in Children and Adults

ECMO is used in children and adults with irreversible heart or lung failure for prolonged (days to weeks) mechanical support. The goal of ECMO/ECLS for pediatric or adult patients is to provide lung rest from

the high levels of oxygen and higher airway pressures that are necessary to support oxygenation and ventilation.

## Criteria

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### Commercial

#### ECMO may be subject to post-service review

##### A. Extracorporeal Membrane Oxygenation (ECMO) for Neonates

PacificSource may consider ECMO to be medically necessary in neonates who meet **ALL** of the following criteria:

1. Diagnosis of **ONE** or more of the following:
  - a. Congenital diaphragmatic hernia
  - b. Hyaline membrane disease
  - c. Meconium aspiration
  - d. Persistent fetal circulation
  - e. Cardiac anomaly
  - f. Refractory neonatal septic shock
  - g. Respiratory distress syndrome
  - h. Uncontrollable air leak
2. Gestational age of at least 34 weeks
3. Birth weight of 2,000 grams or greater **AND**
4. Age less than 10 days.

##### B. Extracorporeal Membrane Oxygenation (ECMO) for Children and Adults

PacificSource may consider ECMO to be medically necessary for children and adults who have at least **ONE** of the following clinical situations:

1. Adult respiratory distress syndrome (ARDS)
2. As a short-term bridge (i.e., hours to a few days) to heart, lung, or heart-lung transplantation
3. As a short-term bridge to durable mechanical circulatory support (MCS) (e.g., ventricular assistive device (VAD), Intra-aortic balloon pump (IABP) and percutaneous MCS devices such as Thoratec pVAD, Centrimag, Tandem Heart and the Impella)
4. Following heart surgery to ease transition from cardiopulmonary bypass to ventilation
5. Non-necrotizing pneumonias
6. Primary graft failure after heart, lung, or heart-lung transplantation
7. Refractory pediatric septic shock
8. Smoke inhalation injury
9. Respiratory or cardiac failure (e.g., myocarditis, cardiogenic shock) that is unresponsive to all other measures

## Medicaid

PacificSource Community Solutions follows the general coverage requirements, limitations, and exclusions outlined in Oregon Administrative Rules (OAR) 410-120-1200 and 410-141-3820 through 3825 for coverage of Extracorporeal Membrane Oxygenation (ECMO).

PacificSource Community Solutions (PCS) follows EPSDT coverage requirements in OAR 410-151-0002 for members under the age of 21. Coverage of Extracorporeal Membrane Oxygenation is determined through case-by-case reviews for EPSDT Medical Necessity and EPSDT Medical Appropriateness defined in OAR 410-151-0001.

## Medicare

PacificSource Medicare follows CMS guidelines and criteria. In the absence of CMS guidelines and criteria, PacificSource Medicare will follow internal policy for determination of coverage and medical necessity.

## Experimental/investigational/Unproven

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PacificSource considers ECMO for neonates to be experimental, investigational, or unproven for any other indication than listed above

PacificSource considers ECMO for children and adults to be experimental, investigational, or unproven for any other indication than listed above

## Coding Information

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The following list of codes are for informational purposes only and may not be all-inclusive. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

- 33946 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; initiation, veno-venous
- 33947 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; daily management, each day, veno-venous
- 33948 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; daily management, each day, veno-venous
- 33949 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; daily management, each day, veno-arterial
- 33951 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of peripheral (arterial and/or venous) cannula(e), percutaneous, birth through 5 years of age (includes fluoroscopic guidance, when performed)
- 33952 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of peripheral (arterial and/or venous) cannula(e), percutaneous, 6 years and older (includes fluoroscopic guidance, when performed)
- 33953 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of peripheral (arterial and/or venous) cannula(e), open, birth through 5 years of age

- 33954 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of peripheral (arterial and/or venous) cannula(e), open, 6 years and older
- 33955 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of central cannula(e) by sternotomy or thoracotomy, birth through 5 years of age
- 33956 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of central cannula(e) by sternotomy or thoracotomy, 6 years and older
- 33957 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition peripheral (arterial and/or venous) cannula(e), percutaneous, birth through 5 years of age (includes fluoroscopic guidance, when performed)
- 33958 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition peripheral (arterial and/or venous) cannula(e), percutaneous, 6 years and older (includes fluoroscopic guidance, when performed)
- 33959 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition peripheral (arterial and/or venous) cannula(e), open, birth through 5 years of age (includes fluoroscopic guidance, when performed)
- 33962 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition peripheral (arterial and/or venous) cannula(e), open, 6 years and older (includes fluoroscopic guidance, when performed)
- 33963 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition of central cannula(e) by sternotomy or thoracotomy, birth through 5 years of age (includes fluoroscopic guidance, when performed)
- 33964 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; reposition central cannula(e) by sternotomy or thoracotomy, 6 years and older (includes fluoroscopic guidance, when performed)
- 33965 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; removal of peripheral (arterial and/or venous) cannula(e), percutaneous, birth through 5 years of age
- 33966 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; insertion of central cannula(e) by sternotomy or thoracotomy, 6 years and older
- 33969 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; removal of peripheral (arterial and/or venous) cannula(e), open, birth through 5 years of age
- 33984 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; removal of peripheral (arterial and/or venous) cannula(e), open, 6 years and older
- 33985 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; removal of central cannula(e) by sternotomy or thoracotomy, birth through 5 years of age
- 33986 Extracorporeal membrane oxygenation (ECMO)/extracorporeal life support (ECLS) provided by physician; removal of central cannula(e) by sternotomy or thoracotomy, 6 years and older

- 33987 Arterial exposure with creation of graft conduit (e.g., chimney graft) to facilitate arterial perfusion for ECMO/ECLS (List separately in addition to code for primary procedure)
- 33988 Insertion of left heart vent by thoracic incision (e.g., sternotomy, thoracotomy) for ECMO/ECLS
- 33989 Removal of left heart vent by thoracic incision (e.g., sternotomy, thoracotomy) for ECMO/ECLS

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HCPCS® codes, descriptions and materials are copyrighted by Centers for Medicare and Medicaid Services (CMS).

## Definitions

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**Extracorporeal Life Support (ECLS)** - a term used to describe prolonged (days to weeks) mechanical support for patients with reversible heart or lung failure. It may also be referred to as Extracorporeal Life Support (ECLS).

**Mechanical Circulatory Support** - a group of mechanical devices which can be added to the physiological circulation providing support or replacement of the heart and/or the lungs.

**Neonate** – an infant less than four weeks old.

**Ventricular assist device** – mechanical circulatory support device that pumps blood from lower chambers of the heart to different parts of the body.

## References

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Extracorporeal Life Support Organization (ELSO). (August 2017). General Guidelines for all ECLS Cases. Available at:

[https://www.else.org/Portals/0/ELSO%20Guidelines%20General%20All%20ECLS%20Version%201\\_4.pdf](https://www.else.org/Portals/0/ELSO%20Guidelines%20General%20All%20ECLS%20Version%201_4.pdf).

Extracorporeal Life Support Organization (ELSO). (May 2015). Ultrasound Guidance for Extracorporeal Membrane Oxygenation. Available at:

[https://www.else.org/Portals/0/Files/else\\_Ultrasoundguidance\\_vvecmo\\_guidelines\\_MAY2015.pdf](https://www.else.org/Portals/0/Files/else_Ultrasoundguidance_vvecmo_guidelines_MAY2015.pdf)

Hogen, R., Sedra, A. H., Motamed, A., & Emamaullee, J. (2021). The evolving role of ECMO in liver transplantation. *Current opinion in organ transplantation*, 26(3), 333–338.

<https://doi.org/10.1097/MOT.0000000000000874>

Hu, B. S., -Z Hu, M., Jiang, L. X., Yu, J., Chang, Y., Cao, Y., & Dai, Z. P. (2020). Extracorporeal membrane oxygenation (ECMO) in patients with COVID-19: a rapid systematic review of case studies. *European review for medical and pharmacological sciences*, 24(22), 11945–11952.

[https://doi.org/10.26355/eurrev\\_202011\\_23855](https://doi.org/10.26355/eurrev_202011_23855)

Li, Y., Yan, S., Gao, S., Liu, M., Lou, S., Liu, G., Ji, B., & Gao, B. (2019). Effect of an intra-aortic balloon pump with venoarterial extracorporeal membrane oxygenation on mortality of patients with cardiogenic shock: a systematic review and meta-analysis†. *European journal of cardio-thoracic surgery : official journal of the European Association for Cardio-thoracic Surgery*, 55(3), 395–404.

<https://doi.org/10.1093/ejcts/ezy304>

Maratta, C., Potera, R. M., van Leeuwen, G., Castillo Moya, A., Raman, L., & Annich, G. M. (2020). Extracorporeal Life Support Organization (ELSO): 2020 Pediatric Respiratory ELSO Guideline. ASAIO

journal (American Society for Artificial Internal Organs : 1992), 66(9), 975–979.

<https://doi.org/10.1097/MAT.0000000000001223>

Scott, J. H., Gordon, M., Vender, R., Pettigrew, S., Desai, P., Marchetti, N., Mamary, A. J., Panaro, J., Cohen, G., Bashir, R., Lakhter, V., Roth, S., Zhao, H., Toyoda, Y., Criner, G., Moores, L., & Rali, P. (2021). Venoarterial Extracorporeal Membrane Oxygenation in Massive Pulmonary Embolism-Related Cardiac Arrest: A Systematic Review. *Critical care medicine*, 49(5), 760–769.

<https://doi.org/10.1097/CCM.0000000000004828>

Tonna, J. E., Abrams, D., Brodie, D., Greenwood, J. C., Rubio Mateo-Sidron, J. A., Usman, A., & Fan, E. (2021). Management of Adult Patients Supported with Venovenous Extracorporeal Membrane Oxygenation (VV ECMO) *ASAIO journal (American Society for Artificial Internal Organs : 1992)*, 67(6), 601–610. <https://doi.org/10.1097/MAT.0000000000001432>.

Wild, K. T., Hedrick, H. L., & Rintoul, N. E. (2020). Reconsidering ECMO in Premature Neonates. *Fetal diagnosis and therapy*, 47(12), 927–932. <https://doi.org/10.1159/000509243>

Wild, K. T., Rintoul, N., Kattan, J., & Gray, B. (2020). Extracorporeal Life Support Organization (ELSO): Guidelines for Neonatal Respiratory Failure. *ASAIO journal (American Society for Artificial Internal Organs : 1992)*, 66(5), 463–470. <https://doi.org/10.1097/MAT.0000000000001153>

Wilson-Smith, A. R., Bogdanova, Y., Roydhouse, S., Phan, K., Tian, D. H., Yan, T. D., & Loforte, A. (2019). Outcomes of venoarterial extracorporeal membrane oxygenation for refractory cardiogenic shock: systematic review and meta-analysis. *Annals of cardiothoracic surgery*, 8(1), 1–8.

<https://doi.org/10.21037/acs.2018.11.09>

Ziogas, I. A., Johnson, W. R., Matsuoka, L. K., Rauf, M. A., Thurm, C., Hall, M., Bacchetta, M., Godown, J., & Alexopoulos, S. P. (2021). Extracorporeal Membrane Oxygenation in Pediatric Liver Transplantation: A Multicenter Linked Database Analysis and Systematic Review of the Literature. *Transplantation*, 105(7), 1539–1547. <https://doi.org/10.1097/TP.0000000000003414>

## Appendix

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**Policy Number:**

**Effective:** 9/1/2020

**Next review:** 10/1/2025

**Policy type:** Enterprise

**Author(s):**

**Depts:** Health Services

**Applicable regulation(s):** OARs 410-120-1200; 410-141-3820; 410-141-3825; 410-151-0001; 410-151-0002N/A

**Commercial Ops:** 9/2024

**Government Ops:** 8/2024