

Extracorporeal Membrane Oxygenation (ECMO)

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Disclaimer

Highmark Health Options medical policy is intended to serve only as a general reference resource regarding coverage for the services described. This policy does not constitute medical advice and is not intended to govern or otherwise influence medical decisions.

POLICY PURPOSE/ STATEMENT

Extracorporeal membrane oxygenation (ECMO) provides extracorporeal circulation and physiologic gas exchange for temporary cardiorespiratory support in cases of severe respiratory and cardiorespiratory failure. ECMO can be used in clinical situations in which there is respiratory or cardiac failure 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.

DEFINITIONS

Extracorporeal Membrane Oxygenation (ECMO) – This is extracorporeal life support technique providing prolonged cardiac and respiratory support to persons whose heart and lungs are unable to provide an adequate amount of gas exchange or perfusion to sustain life.

Highmark Health Options (HHO) – Managed care organization serving vulnerable populations that have complex needs and qualify for Medicaid. Highmark Health Options members include individuals and families with low income, expecting mothers, children, and people with disabilities. Members pay nothing to very little for their health coverage. Highmark Health Options currently serves Delaware Medicaid: Delaware Healthy Children Program (DHCP) and Diamond State Health Plan and Health Plan Plus members.

POLICY PURPOSE

ECMO for Adults

The use of ECMO in adults may be considered medically necessary for the management of acute respiratory failure when ALL of the following criteria are met:

- Respiratory failure is due to a potentially reversible etiology; and
- Respiratory failure is severe, as determined by EITHER of the following:

- A standardized severity instrument such as the Murray score (see table attachment); or
- ONE of the following criteria for respiratory failure severity:
 - Uncompensated hypercapnia with a pH less than 7.2; or
 - $\text{PaO}_2/\text{FIO}_2$ of less than 100 mm Hg on fraction of inspired oxygen (FIO_2) greater than 90%; or
 - Inability to maintain airway plateau pressure (Pplat) less than 30 cm H₂O despite a tidal volume of four (4) to six (6) mL/kg ideal body weight; or
 - Oxygenation Index* greater than 30; or
 - CO₂ retention despite high Pplat (greater than 30 cm H₂O).

*Oxygenation Index = $\text{FIO}_2 \times 100 \times \text{MAP}/\text{PaO}_2$ mm Hg (where $\text{FIO}_2 \times 100 = \text{FIO}_2$ as percentage; MAP = mean airway pressure in cm H₂O; PaO₂ = partial pressure of oxygen in arterial blood).

AND NONE of the following contraindications is present:

- High ventilator pressure (peak inspiratory pressure greater than 30 cm H₂O) or high fraction of inspired oxygen (greater than 80%) ventilation for more than 168 hours; or
- Signs of intracranial bleeding; or
- Multisystem organ failure; or
- Prior (i.e., before onset of need for ECMO) diagnosis of a terminal condition with expected survival less than six (6) months; or
- A do-not-resuscitate directive; or
- Cardiac decompensation in an individual who has already been declined for ventricular assist device or transplant; or
- Known neurologic devastation without potential to recover meaningful function; or
- Determination of care futility**

**Assessment of ECMO futility:

Individuals undergoing ECMO treatment should be periodically reassessed for clinical improvement. ECMO should not be continued indefinitely if ANY of the following criteria are met:

- Neurologic devastation as defined by the following:
 - Consensus from two (2) attending physicians that there is no likelihood of an outcome better than persistent vegetative state at six (6) months; and
 - At least one of the attending physicians is an expert in neurologic disease and/or intensive care medicine; and
 - Determination made following studies including computed tomography, electroencephalography, and exam; or
- Inability to provide aerobic metabolism, defined by the following:
 - Refractory hypotension and/or hypoxemia; or
 - Evidence of profound tissue ischemia based on creatine phosphokinase or lactate levels, lactate-to-pyruvate ratio, or near-infrared spectroscopy; or
- Presumed end-stage cardiac or lung failure without "exit" plan (i.e., declined for assist device and/or transplantation).

The use of ECMO in adults may be considered medically necessary as a bridge to heart, lung, or combined heart-lung transplantation for the management of respiratory, cardiac, or combined cardiorespiratory failure refractory to optimal conventional therapy.

The use of ECMO in adults is considered experimental/investigational when the above criteria are not met, including but not limited to acute and refractory cardiogenic shock and as an adjunct to cardiopulmonary resuscitation.

ECMO for Children

The use of ECMO in children may be considered medically necessary for the management of acute cardiac and/or respiratory failure when ALL of the following criteria are met:

- The child is greater than 28 days old and less than 18 years old; and
- The child has ONE of the following:
 - Uncompensated hypercapnia with a pH less than 7.2; or
 - Severe Hypothermia with a temperature < 28 degrees Celsius
 - PaO₂/FIO₂ ratios less than 100; or
 - Oxygen index greater than 40; or
 - Lack of response to conventional mechanical ventilation and/or other forms of rescue therapy (e.g., high frequency oscillatory ventilation (HFOV), inhaled nitric oxide, prone positioning); or
 - Elevated ventilator pressures (e.g., plateau pressure > 35, mean airway pressure greater than 20-25 on conventional ventilation or greater than 30 on HFOV or evidence of iatrogenic barotrauma); or
 - Cardiac arrest not amenable to high-quality cardiopulmonary resuscitation as defined by the American Heart Association; or
 - Severe myocardial dysfunction refractory to inotropes or vasopressors and
- NONE of the following contraindications is present:
 - Lethal chromosomal disorder (includes trisomy 13, 18 or other lethal anomaly; trisomy 21 is not a contraindication to ECMO)
 - Irreversible brain damage; or
 - Uncontrolled bleeding; or
 - Acute intracranial hemorrhage.

*Oxygenation Index = FIO₂ x 100 x MAP/PaO₂ mm Hg (where FIO₂ x 100 = FIO₂ as percentage; MAP = mean airway pressure in cm H₂O; PaO₂ = partial pressure of oxygen in arterial blood).

The use of ECMO in children may be considered medically necessary as a bridge to heart, lung, or combined heart-lung transplantation for the management of respiratory, cardiac, or combined cardiorespiratory failure refractory to optimal conventional therapy respectively.

The use of ECMO in children is considered experimental/investigational and therefore noncovered when the above criteria are not due to lack of supporting scientific evidence.

Assessment of ECMO futility

Individuals undergoing ECMO treatment should be periodically reassessed for clinical improvement. ECMO should not be continued indefinitely if ANY of the following criteria are met:

- Neurologic devastation as defined by the following:
 - Consensus from two (2) attending physicians that there is no likelihood of an outcome better than persistent vegetative state at six (6) months; and
 - At least one of the attending physicians is an expert in neurologic disease and/or intensive care medicine; and
 - Determination made following studies including computed tomography, electroencephalography, and exam; or
- Inability to provide aerobic metabolism, defined by the following:
 - Refractory hypotension and/or hypoxemia; or
 - Evidence of profound tissue ischemia based on creatine phosphokinase or lactate levels, lactate-to-pyruvate ratio, or near-infrared spectroscopy; or

- Presumed end-stage cardiac or lung failure without “exit” plan (i.e., declined for assist device and/or transplantation).

ECMO for Neonates

The use of ECMO in neonates may be considered medically necessary for the management of acute cardiac and/or respiratory failure when ALL of the following criteria are met:

- ONE of the following conditions:
 - Congenital diaphragmatic hernia; or
 - Meconium aspiration syndrome; or
 - Persistent pulmonary hypertension; or
 - Sepsis; or
 - Respiratory distress syndrome; or
 - Lack of response to conventional mechanical ventilation and/or other forms of rescue therapy (e.g., high frequency oscillatory ventilation (HFOV), inhaled nitric oxide, prone positioning); or
 - Severe myocardial dysfunction refractory to inotropes or vasopressors: and
- ONE of the following:
 - Oxygenation Index* greater than 40 for greater than four (4) hours; or
 - Failure to wean from 100% oxygen despite prolonged (greater than 48 hours) maximal medical therapy or persistent episodes of decompensation; or
 - Severe hypoxic respiratory failure with acute decompensation (PaO₂ less than 40) unresponsive to intervention; or
 - Severe pulmonary hypertension with evidence of right ventricular dysfunction and/or left ventricular dysfunction; or
 - Pressor resistant hypotension.

Contraindications include:

- Lethal chromosomal disorder (includes trisomy 13, 18 or other lethal anomaly; trisomy 21 is not a contraindication to ECMO)
- Irreversible brain disease
- Uncontrolled bleeding
- Grade III or greater intraventricular hemorrhage.

Relative contraindications include:

- Irreversible organ damage (unless considered for organ transplant)
- Weight less than 2 Kg
- Post-menstrual of age less than 34 weeks, because of the increased incidence of increased intracranial hemorrhage

*Oxygenation Index = FIO₂ x 100 x MAP/postductal PaO₂ mm Hg (where FIO₂ x 100 = FIO₂ as percentage; MAP = mean airway pressure in cm H₂O; PaO₂ = partial pressure of oxygen in arterial blood).

The use of ECMO in neonates is considered experimental/investigational and therefore noncovered when the above criteria are not met due to lack of supporting scientific evidence.

PROCEDURE CODES

33946	Extracorporeal Membrane Oxygenation (ecmo)/extracorporeal Life Support (ecls) Provided By Physician; Initiation, Venovenous.
33947	Extracorporeal Membrane Oxygenation (ecmo)/extracorporeal Life Support (ecls) Provided By Physician; Initiation, Venovenous.
33948	Extracorporeal Membrane Oxygenation (ecmo)/extracorporeal Life Support (ecls) Provided By Physician; Daily Management, Each Day, Venovenous.
33949	Extracorporeal Membrane Oxygenation (ecmo)/extracorporeal Life Support (ecls) Provided By Physician; Daily Management, Each Day, Venovenous.
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	Prolonged Service In The Office Or Other Outpatient Setting Requiring Direct Patient Contact Beyond The Usual Service; First Hour (List Separately In Addition To Code For Office Or Other Outpatient Evaluation And Management Service).
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 Fluourosopic Guidance, When Performed).
33964	Extracorporeal Membrane Oxygenation (ecmo)/extracorporeal Life Support (ecls) Provided By Physician; Reposition Of Central Cannula(e) By Sternotomy Or Thoracotomy, 6 Years And Older (includes Fluourosopic 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; Removal Of Peripheral (arterial And/or Venous) Cannula(e) ,Percutaneous, 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 Grafy Conduit (eg, 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 (eg, Sternotomy, Thoracotomy) For Ecmo/ecls.
33989	Removal Of Left Heart Vent By Thoracic Incision (eg, Sternotomy, Thoracotomy) For Ecmo/ecls.

Eligible Diagnosis Codes for Procedure Codes: 33946, 33947, 33948, 33949, 33951, 33952, 33953, 33954, 33955, 33956, 33957, 33958, 33959, 33962, 33963, 33964, 33965, 33966, 33969, 33984, 33985, 33986, 33987, 33988, 33989

J80	J95.821	J96.00	J96.01	J96.02
P22.0				

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