

(70308)

| | | | |
|-------------------------|-----|---|--------------------------------|
| Medical Benefit | | Effective Date: 04/01/14 | Next Review Date: 01/20 |
| Preauthorization | Yes | Review Dates: 01/10, 01/11, 01/12, 01/13, 01/14, 01/15, 01/16, 01/17, 01/18, 01/19 | |

Preauthorization is required and must be obtained through Case Management.

The following protocol contains medical necessity criteria that apply for this service. The criteria are also applicable to services provided in the local Medicare Advantage operating area for those members, unless separate Medicare Advantage criteria are indicated. If the criteria are not met, reimbursement will be denied and the patient cannot be billed. Please note that payment for covered services is subject to eligibility and the limitations noted in the patient’s contract at the time the services are rendered.

| Populations | Interventions | Comparators | Outcomes |
|---|---|---|--|
| Individuals: <ul style="list-style-type: none"> • With end-stage cardiac and pulmonary disease | Interventions of interest are: <ul style="list-style-type: none"> • Combined heart/lung transplant | Comparators of interest are: <ul style="list-style-type: none"> • Medical management • Double-lung transplant • Single-lung transplant | Relevant outcomes include: <ul style="list-style-type: none"> • Overall survival • Symptoms • Morbid events • Treatment-related mortality • Treatment-related morbidity |
| Individuals: <ul style="list-style-type: none"> • With a combined heart/lung transplant complicated by graft failure or severe dysfunction of the heart/lung | Interventions of interest are: <ul style="list-style-type: none"> • Combined heart/lung retransplant | Comparators of interest are: <ul style="list-style-type: none"> • Medical management • Double-lung transplant • Single-lung transplant | Relevant outcomes include: <ul style="list-style-type: none"> • Overall survival • Symptoms • Morbid events • Treatment-related mortality • Treatment-related morbidity |

DESCRIPTION

Heart/lung transplantation involves a coordinated triple operative procedure consisting of procurement of a donor heart/lung block, excision of the heart and lungs of the recipient, and implantation of the heart and lungs into the recipient. Heart/lung transplantation refers to the transplantation of one or both lungs and heart from a single cadaver donor.

SUMMARY OF EVIDENCE

For individuals who have end-stage cardiac and pulmonary disease who receive combined heart/lung transplant, the evidence includes case series and registry data. Relevant outcomes are overall survival, symptoms, morbid events, and treatment-related morbidity and mortality. The available literature reports on outcomes after heart/lung transplantation. Given the exceedingly poor expected survival rates without transplantation, this evidence is sufficient to demonstrate that heart/lung transplantation provides a survival benefit in appropriately selected patients. Transplant may be the only option for some patients with end-stage cardiopulmonary disease. Heart/lung transplant is contraindicated for patients in whom the procedure is expected to be futile due to comorbid disease or for whom posttransplantation care is expected to worsen comorbid conditions significantly. The

evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a combined heart/lung transplant complicated by graft failure or severe dysfunction of the heart/lung and who receive a combined heart/lung retransplant, the evidence includes case series and registry data. Relevant outcomes are overall survival, symptoms, morbid events, and treatment-related morbidity and mortality. A very limited amount of data has suggested that, after controlling for confounding variables, survival rates after primary and repeat heart/lung transplants are similar. Findings are inconclusive due to the small number of cases of repeat heart/lung transplants reported in the published literature. Repeat heart/lung transplantation is, however, likely to improve outcomes in patients with a prior failed transplant who meet the clinical criteria for heart/lung transplantation. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

POLICY

Heart/lung transplantation may be considered **medically necessary** for carefully selected patients with end-stage cardiac and pulmonary disease including, but not limited to, one of the following diagnoses:

- irreversible primary pulmonary hypertension with heart failure;
- nonspecific severe pulmonary fibrosis, with severe heart failure;
- Eisenmenger complex with irreversible pulmonary hypertension and heart failure;
- cystic fibrosis with severe heart failure;
- chronic obstructive pulmonary disease with heart failure;
- emphysema with severe heart failure;
- pulmonary fibrosis with uncontrollable pulmonary hypertension or heart failure.

Heart/lung retransplantation after a failed primary heart/lung transplant may be considered **medically necessary** in patients who meet criteria for heart/lung transplantation.

Heart/lung transplantation is considered **investigational** in all other situations.

POLICY GUIDELINES

Individual transplant facilities may have their own additional requirements or protocols that must be met in order for the patient to be eligible for a transplant at their facility.

GENERAL CRITERIA

The factors below are potential contraindications subject to the judgment of the transplant center:

1. Known current malignancy, including metastatic cancer
2. Recent malignancy with high risk of recurrence
3. Untreated systemic infection making immunosuppression unsafe, including chronic infection
4. Other irreversible end-stage disease not attributed to heart or lung disease
5. History of cancer with a moderate risk of recurrence
6. Systemic disease that could be exacerbated by immunosuppression

7. Psychosocial conditions or chemical dependency affecting ability to adhere to therapy.

HEART/LUNG-SPECIFIC CRITERIA

When the candidate is eligible to receive a heart in accordance with United Network for Organ Sharing (UNOS) guidelines for cardiac transplantation, the lung(s) shall be allocated to the heart/lung candidate from the same donor. When the candidate is eligible to receive a lung in accordance with the UNOS Lung Allocation System the heart shall be allocated to the heart/lung candidate from the same donor “if no suitable Status 1A isolated heart candidates are eligible to receive the heart” (Organ Procurement and Transplantation Network [2018]).

Specific criteria for prioritizing donor thoracic organs for transplant are provided by the Organ Procurement and Transplantation Network (OPTN) and implemented through a contract with UNOS. Donor thoracic organs are prioritized by UNOS on the basis of recipient medical urgency, distance from donor hospital, and pediatric status. Patients who are most severely ill (Status 1A) are given highest priority.

The following factors are considered in assessing the severity of cardiac illness: reliance on continuous mechanical ventilation, infusion of intravenous inotropes, and/or dependency on mechanical circulatory support (i.e., total artificial heart, intra-aortic balloon pump, extracorporeal membrane oxygenator, ventricular assist device). Factors considered in assessing the severity of pulmonary illness include increased pulmonary artery systolic pressure (>60 mm Hg), pulmonary arterial hypertension, and/or elevated pulmonary vascular resistance.

Additional criteria may be considered in pediatric patients, including diagnosis of an OPTN-approved congenital heart disease diagnosis, presence of ductal dependent pulmonary or systemic circulation, and diagnosis of hypertrophic or restrictive cardiomyopathy while less than one year old. Of note, pediatric heart transplant candidates who remain on the waiting list at the time of their 18th birthday without receiving a transplant continue to qualify for medical urgency status based on the pediatric criteria.

In both adult and pediatric patients, isolated cardiac or pulmonary transplantations are preferred to combined heart/lung transplantation when medical or surgical management—other than organ transplantation—is available.

Full OPTN guidelines are available online (at <https://optn.transplant.hrsa.gov/governance/policies/>).

Status 7 patients are considered temporarily unsuitable to receive a thoracic organ transplant.

MEDICARE ADVANTAGE

If a transplant is needed, we arrange to have the Medicare–approved transplant center review and decide whether the patient is an appropriate candidate for the transplant.

BACKGROUND

HEART/LUNG CANDIDATES REQUIRING TRANSPLANTATION

Most heart/lung transplant recipients have Eisenmenger syndrome (37%), followed by idiopathic pulmonary artery hypertension (28%) and cystic fibrosis (14%). Eisenmenger syndrome is a form of congenital heart disease in which systemic-to-pulmonary shunting leads to pulmonary vascular resistance. It is possible that pulmonary hypertension could lead to a reversal of the intracardiac shunting and inadequate peripheral oxygenation or cyanosis.¹

Treatment

Combined heart/lung transplantation is intended to prolong survival and improve function in patients with end-stage cardiac and pulmonary diseases. Due to corrective surgical techniques and improved medical management

of pulmonary hypertension, the total number of patients with Eisenmenger syndrome has seen a decline in recent years. Additionally, heart/lung transplants have not increased appreciably, but for other indications, it has become more common to transplant a single or double lung and maximize medical therapy for heart failure, rather than perform a combined transplant. For those indications, patient survival rates following heart/lung transplantations are similar to lung transplant rates. Bronchiolitis obliterans syndrome is a major complication. One-, five-, and 10-year patient survival rates for heart/lung transplants performed between 1982 and 2014 were estimated at 63%, 45%, and 32%, respectively.²

In 2017, 29 individuals received heart/lung transplants in the United States. As of April 2018, 51 patients were on the waiting list for heart/lung transplants.³

REGULATORY STATUS

Heart/lung transplantation is a surgical procedure and, as such, is not subject to regulation by the U.S. Food and Drug Administration (FDA).

The FDA regulates human cells and tissues intended for implantation, transplantation, or infusion through the Center for Biologics Evaluation and Research, under Code of Federal Regulation title 21, parts 1270 and 1271. Heart/lung transplants are included in these regulations.

RELATED PROTOCOLS

Heart Transplant

Lung and Lobar Lung Transplant

Services that are the subject of a clinical trial do not meet our Technology Assessment Protocol criteria and are considered investigational. *For explanation of experimental and investigational, please refer to the Technology Assessment Protocol.*

It is expected that only appropriate and medically necessary services will be rendered. We reserve the right to conduct prepayment and postpayment reviews to assess the medical appropriateness of the above-referenced procedures. **Some of this protocol may not pertain to the patients you provide care to, as it may relate to products that are not available in your geographic area.**

REFERENCES

We are not responsible for the continuing viability of web site addresses that may be listed in any references below.

1. Christie JD, Edwards LB, Kucheryavaya AY, et al. The Registry of the International Society for Heart and Lung Transplantation: twenty-seventh official adult lung and heart-lung transplant report--2010. *J Heart Lung Transplant.* Oct 2010;29(10):1104-1118. PMID 20870165
2. Yusef RD, Edwards LB, Dipchand AI, et al. The Registry of the International Society for Heart and Lung Transplantation: Thirty-third Adult Lung and Heart-Lung Transplant Report-2016; Focus Theme: Primary Diagnostic Indications for Transplant. *J Heart Lung Transplant.* Oct 2016;35(10):1170-1184. PMID 27772669
3. Organ Procurement and Transplantation Network (OPTN). View Data Reports. n.d.; <https://optn.transplant.hrsa.gov/data/view-data-reports/>. Accessed July 16, 2018.

4. Kalogeropoulos AP, Georgiopoulou VV, Giamouzis G, et al. Utility of the Seattle Heart Failure Model in patients with advanced heart failure. *J Am Coll Cardiol*. Jan 27 2009;53(4):334-342. PMID 19161882
5. United Network for Organ Sharing (UNOS). Heart/Lung: Submitting LAS exception requests for candidates diagnosed with PH. 2018; <https://transplantpro.org/news/thoracic/submitting-las-exception-requests-forcandidates-diagnosed-with-ph-2/>. Accessed July 16, 2018.
6. Organ Procurement and Transplantation Network (OPTN). Organ Procurement and Transplantation Network Policies. 2018; https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf. Accessed July 13, 2018.
7. Spahr JE, West SC. Heart-lung transplantation: pediatric indications and outcomes. *J Thorac Dis*. Aug 2014; 6(8):1129-1137. PMID 25132980
8. Benden C, Edwards LB, Kucheryavaya AY, et al. The Registry of the International Society for Heart and Lung Transplantation: fifteenth pediatric lung and heart-lung transplantation report-2012. *J Heart Lung Transplant*. Oct 2012;31(10):1087-1095. PMID 22975098
9. Benden C, Goldfarb SB, Edwards LB, et al. The Registry of the International Society for Heart and Lung Transplantation: seventeenth official pediatric lung and heart-lung transplantation report--2014; focus theme: retransplantation. *J Heart Lung Transplant*. Oct 2014;33(10):1025-1033. PMID 25242126
10. Hill C, Maxwell B, Boulate D, et al. Heart-lung vs. double-lung transplantation for idiopathic pulmonary arterial hypertension. *Clin Transplant*. Dec 2015;29(12):1067-1075. PMID 26358537
11. Jayarajan SN, Taghavi S, Komaroff E, et al. Impact of extracorporeal membrane oxygenation or mechanical ventilation as bridge to combined heart-lung transplantation on short-term and long-term survival. *Transplantation*. Jan 15 2014;97(1):111-115. PMID 24056630
12. Goldfarb SB, Levvey BJ, Edwards LB, et al. The Registry of the International Society for Heart and Lung Transplantation: Nineteenth Pediatric Lung and Heart-Lung Transplantation Report-2016; Focus Theme: Primary Diagnostic Indications for Transplant. *J Heart Lung Transplant*. Oct 2016;35(10):1196-1205. PMID 27772671
13. Keeshan BC, Goldfarb SB, Lin KY, et al. Impact of congenital heart disease on outcomes of pediatric heart-lung transplantation. *Pediatr Transplant*. Mar 2014;18(2):204-210. PMID 24373099
14. Yusen RD, Edwards LB, Kucheryavaya AY, et al. The registry of the International Society for Heart and Lung Transplantation: thirty-first adult lung and heart-lung transplant report--2014; focus theme: retransplantation. *J Heart Lung Transplant*. Oct 2014;33(10):1009-1024. PMID 25242125
15. Shuhaiber JH, Kim JB, Gibbons RD. Repeat heart-lung transplantation outcome in the United States. *J Heart Lung Transplant*. Oct 2008;27(10):1122-1127. PMID 18926404
16. Mistiaen WP. Heart transplantation in patients with previous malignancy. An overview. *Acta Cardiol*. Apr 2015;70(2):123-130. PMID 26148371
17. Oliveira GH, Hardaway BW, Kucheryavaya AY, et al. Characteristics and survival of patients with chemotherapy induced cardiomyopathy undergoing heart transplantation. *J Heart Lung Transplant*. Aug 2012;31(8): 805-810. PMID 22551930
18. Sigurdardottir V, Bjortuft O, Eiskjaer H, et al. Long-term follow-up of lung and heart transplant recipients with pretransplant malignancies. *J Heart Lung Transplant*. Dec 2012;31(12):1276-1280. PMID 23089300
19. Yoosabai A, Mehta A, Kang W, et al. Pretransplant malignancy as a risk factor for posttransplant malignancy after heart transplantation. *Transplantation*. Feb 2015;99(2):345-350. PMID 25606783
20. Aguero F, Castel MA, Cocchi S, et al. An update on heart transplantation in human immunodeficiency virus infected patients. *Am J Transplant*. Jan 2016;16(1):21-28. PMID 26523614
21. Working Party of the British Transplantation Society. Kidney and Pancreas Transplantation in Patients with HIV. Second Edition (Revised). British Transplantation Society Guidelines. Macclesfield, UK: British Transplantation Society; 2017.
22. Weill D, Benden C, Corris PA, et al. A consensus document for the selection of lung transplant candidates: 2014--an update from the Pulmonary Transplantation Council of the International Society for Heart and Lung Transplantation. *J Heart Lung Transplant*. Jan 2015;34(1):1-15. PMID 25085497

23. Center for Medicare & Medicaid Services (CMS). Decision Memo for TRANSPLANT Centers: Re-Evaluation of Criteria for Medicare Approval (CAG-00061N). 2000; https://www.cms.gov/medicare-coveredatabase/details/nca-decision-memo.aspx?NCAId=75&NcaName=Transplant+Centers*3a%24+ReEvaluation+of+Criteria+for+Medicare+Approval&CoverageSelection=National&Keyword=transplant&KeywordLookup=Title&KeywordSearchType=And&bc=gAAAABAAEAAA&. Accessed July 16, 2018.