FEP Medical Policy Manual

FEP 7.03.08 Heart/Lung Transplant

Annual Effective Policy Date: January 1, 2024

Original Policy Date: March 2012

Related Policies:

7.03.07 - Lung and Lobar Lung Transplant
7.03.09 - Heart Transplant

Heart/Lung Transplant

Description

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 1 or both lungs and heart from a single cadaver donor.

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.[2,]

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-, 5-, and 10-year patient survival rates for heart/lung transplants performed between 1982 and 2014 were estimated at 63%, 45%, and 32%, respectively.[3,]

In 2022, 42,889 transplants were performed in the United States procured from 36,421 deceased donors and 6468 living donors.[4,] Of these 42,889 transplants, 51 individuals received heart/lung transplants in the US in 2022 (total 1486 heart-lung transplants done to date in US). As of June 2023 , 36 patients were on the waiting list for heart/lung transplants.

OBJECTIVE

The objective of this evidence review is to determine whether heart/lung transplantation or retransplantation improves the net health outcome in patients with end-stage cardiac and pulmonary disease compared with standard management without transplantation or lung-only transplantation.

POLICY STATEMENT

Heart/lung transplantation may be considered **medically necessary** for carefully selected individuals 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 individuals who meet criteria for heart/lung transplantation.

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

POLICY GUIDELINES

General Criteria

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

- Known current malignancy, including metastatic cancer;
- Recent malignancy with high risk of recurrence;
- Untreated systemic infection making immunosuppression unsafe, including chronic infection;
- Other irreversible end-stage diseases not attributed to heart or lung disease;
- History of cancer with a moderate risk of recurrence;
- Systemic disease that could be exacerbated by immunosuppression;
- 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 "after the heart has been offered to all heart and heart-lung potential transplant recipients in allocation classifications 1 through 4". Candidates with allocation classifications 1 through 4 fall within adult status 1 or 2 or pediatric status 1A.

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. Individuals 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 (ie, 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, pulmonary arterial hypertension, and/or elevated pulmonary vascular resistance.

Additional criteria may be considered in pediatric individuals, 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 1-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 individuals, 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/).

Individuals who are considered temporarily unsuitable to receive a thoracic organ transplant may be assigned an inactive status.

BENEFIT APPLICATION

Experimental or investigational procedures, treatments, drugs, or devices are not covered (See General Exclusion Section of brochure).

FDA REGULATORY STATUS

Solid organ transplants are a surgical procedure and, as such, are 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. Solid organs used for transplantation are subject to these regulations.

RATIONALE

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. A 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 post-transplantation care is expected to worsen comorbid conditions significantly. The evidence is sufficient to determine that the technology results in an 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 an improvement in the net health outcome.

SUPPLEMENTAL INFORMATION

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

International Society for Heart and Lung Transplantation

In 2021, the International Society for Heart and Lung Transplantation updated its consensus-based guidelines on the selection of lung transplant recipients.[24,] These guidelines made the following statements about lung transplantation:

"Lung transplantation should be considered for adults with chronic, end-stage lung disease who meet all the following general criteria:

- High (>50%) risk of death from lung disease within 2 years if lung transplantation is not performed
- High (>80%) likelihood of 5-year post-transplant survival from a general medical perspective provided that there is adequate graft function."

For combined heart/lung transplant, the guidelines state:

"Candidates should meet the criteria for lung transplant listing and have significant dysfunction of one or more additional organs, or meet the listing criteria for a non-pulmonary organ transplant and have significant pulmonary dysfunction." The guideline goes on to state: "The primary indication for heart-lung transplant is pulmonary hypertension, either secondary to idiopathic pulmonary arterial hypertension or congenital heart disease (CHD)."

The guidelines also mentioned:"..candidates free from complex CHD or left ventricular compromise can achieve comparable outcomes with isolated bilateral lung transplant. Similarly, patients with advanced lung disease and cardiac pathology amenable to surgical repair may be candidates for lung transplant concurrent with the appropriate corrective cardiac procedure."

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

Heart/lung transplantation is covered under Medicare when performed in a facility approved by Medicare as meeting institutional coverage criteria.[25,] The Centers for Medicare & Medicaid Services has stated that, under certain limited cases, exceptions to the criteria may be warranted if there is justification and if the facility ensures safety and efficacy objectives.

REFERENCES

1. Black CK, Termanini KM, Aguirre O, et al. Solid organ transplantation in the 21 st century. Ann Transl Med. Oct 2018; 6(20): 409. PMID 30498736
2. 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): 1104-18. PMID 20870165
3. Yusen 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
4. United Network for Organ Sharing (UNOS). Transplant trends. 2023; https://unos.org/data/ Accessed June 12, 2023.
5. 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): 334-42. PMID 19161882
6. United Network for Organ Sharing (UNOS). Heart/Lung: Submitting LAS exception requests for candidates diagnosed with PH. 2023; https://unos.org/news/submitting-las-exception-requests-for-candidates-diagnosed-with-ph/. Accessed June 13, 2023.
7. Organ Procurement and Transplantation Network (OPTN). Organ Procurement and Transplantation Network Policies. 2023; https://optn.transplant.hrsa.gov/media/1200/optn_policies.pdf. Accessed June 13, 2023.
8. Spahr JE, West SC. Heart-lung transplantation: pediatric indications and outcomes. J Thorac Dis. Aug 2014; 6(8): 1129-37. PMID 25132980
9. 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): 1087-95. PMID 22975098
10. 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): 1025-33. PMID 25242126
11. Sertic F, Han J, Diagne D, et al. Not All Septal Defects Are Equal: Outcomes of Bilateral Lung Transplant With Cardiac Defect Repair vs Combined Heart-Lung Transplant in Patients With Eisenmenger Syndrome in the United States. Chest. Nov 2020; 158(5): 2097-2106. PMID 32565271
12. 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): 1067-75. PMID 26358537
13. 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): 111-5. PMID 24056630
14. Riggs KW, Chapman JL, Schecter M, et al. Pediatric heart-lung transplantation: A contemporary analysis of outcomes. Pediatr Transplant. May 2020; 24(3): e13682. PMID 32067330
15. 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
16. 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): 1009-24. PMID 25242125
17. Shuhaiber JH, Kim JB, Gibbons RD. Repeat heart-lung transplantation outcome in the United States. J Heart Lung Transplant. Oct 2008; 27(10): 1122-7. PMID 18926404
18. Mistiaen WP. Heart transplantation in patients with previous malignancy. An overview. Acta Cardiol. Apr 2015; 70(2): 123-30. PMID 26148371
19. 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): 805-10. PMID 22551930
20. Sigurdardottir V, Bjortuft O, Eiskjr H, et al. Long-term follow-up of lung and heart transplant recipients with pre-transplant malignancies. J Heart Lung Transplant. Dec 2012; 31(12): 1276-80. PMID 23089300
21. 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): 345-50. PMID 25606783
22. Koval CE, Farr M, Krisl J, et al. Heart or lung transplant outcomes in HIV-infected recipients. J Heart Lung Transplant. Dec 2019; 38(12): 1296-1305. PMID 31636044
23. 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; Published 2015. Updated 2017. https://bts.org.uk/wp-content/uploads/2017/04/02_BTS_Kidney_Pancreas_HIV.pdf. Accessed June 13, 2023.
24. Leard LE, Holm AM, Valapour M, et al. Consensus document for the selection of lung transplant candidates: An update from the International Society for Heart and Lung Transplantation. J Heart Lung Transplant. Nov 2021; 40(11): 1349-1379. PMID 34419372
25. 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-coverage-database/view/ncacal-decision-memo.aspx?proposed=N&NCAId=75&fromdb=true Accessed June 13, 2023.

POLICY HISTORY - THIS POLICY WAS APPROVED BY THE FEP® PHARMACY AND MEDICAL POLICY COMMITTEE ACCORDING TO THE HISTORY BELOW:

Date	Action	Description
March 2012	New policy	
March 2013	Replace policy	Policy updated with literature search. No change to policy statement. Reference 6 added; other references renumbered or removed.
March 2014	Replace policy	Policy updated with literature search. Policy statement on retransplantation added and 1 stated that all other indications are considered investigational. References 5, 12 and 13 added; other references renumbered or removed.
March 2015	Replace policy	Policy updated with literature search, adding reference 4. No changes to the policy statement were made.
March 2016	Replace policy	Policy updated with literature review through October 6, 2015; references 6, 8, 14, and 18 added. Policy statements unchanged.
December 2018	Replace policy	Policy updated with literature review through July 10, 2017; references 1, 4, 12-15, 18-21, and 23 added. A summary section added for heart/lung retransplantation. Policy statements unchanged.
December 2019	Replace policy	Policy updated with literature review through June 10, 2019; no references added. Policy statements unchanged.
December 2020	Replace policy	Policy updated with literature review through June 30, 2020; references added. Policy statements unchanged.
December 2021	Replace policy	Policy updated with literature review through June 24, 2021; no references added. Policy statements unchanged.
December 2022	Replace policy	Policy updated with literature review through June 10, 2022; reference added. Minor editorial refinements to policy statements; intent unchanged.
December 2023	Replace policy	Policy updated with literature review through June 13, 2023; no references added. Policy statements unchanged.