Lung and Lobar Lung Transplant

Policy # 00414
Original Effective Date: 05/21/2014
Current Effective Date: 10/17/2018

Applies to all products administered or underwritten by Blue Cross and Blue Shield of Louisiana and its subsidiary, HMO Louisiana, Inc.(collectively referred to as the "Company"), unless otherwise provided in the applicable contract. Medical technology is constantly evolving, and we reserve the right to review and update Medical Policy periodically.

When Services Are Eligible for Coverage
Coverage for eligible medical treatments or procedures, drugs, devices or biological products may be provided only if:

- *Benefits are available in the member's contract/certificate, and*
- *Medical necessity criteria and guidelines are met.*

Based on review of available data, the Company may consider lung transplantation for carefully selected patients with irreversible, progressively disabling, end-stage pulmonary disease unresponsive to maximum medical therapy to be **eligible for coverage.**

Based on review of available data, the Company may consider a lobar lung transplant from a living or deceased donor for carefully selected patients with end-stage pulmonary disease to be **eligible for coverage.**

Based on review of available data, the Company may consider lung or lobar lung retransplantation after a failed lung or lobar lung transplant in patients who meet criteria for lung transplantation to be **eligible for coverage.**

When Services Are Considered Investigational
Coverage is not available for investigational medical treatments or procedures, drugs, devices or biological products.

Based on review of available data, the Company considers lung or lobar lung transplantation in all other situations to be **investigational.***

Policy Guidelines

CONTRAINDICATIONS
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 disease not attributed to 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

Policy specific:

- Coronary artery disease not amenable to percutaneous intervention or bypass grafting, or associated with significant impairment of left ventricular function[a]; or
- Colonization with highly resistant or highly virulent bacteria, fungi, or mycobacteria.

Some patients may be candidates for combined heart and lung transplantation.

Patients must meet United Network for Organ Sharing guidelines for a Lung Allocation Score greater than zero.

LUNG-SPECIFIC GUIDELINES

Bilateral lung transplantation is typically required when chronic lung infection and disease is present (i.e., associated with cystic fibrosis and bronchiectasis). Some, but not all, cases of pulmonary hypertension will require bilateral lung transplantation.

Bronchiolitis obliterans is associated with chronic lung transplant rejection, and thus may be the etiology of a request for lung retransplantation.

Background/Overview

END-STAGE LUNG DISEASE

End-stage lung disease may derive from different etiologies. The most common indications for lung transplantation are chronic obstructive pulmonary disease, idiopathic pulmonary fibrosis, cystic fibrosis, α_1-antitrypsin deficiency, and idiopathic pulmonary arterial hypertension.

Treatment

Before consideration for transplant, patients should be receiving maximal medical therapy, including oxygen supplementation, or surgical options, such as lung-volume reduction surgery for chronic obstructive pulmonary disease. Lung or lobar lung transplantation is an option for patients with end-stage lung disease despite these measures.

A lung transplant refers to single-lung or double-lung replacement. In a single-lung transplant, only 1 lung from a deceased donor is provided to the recipient. In a double-lung transplant, both the recipient's lungs are removed and replaced by the donor's lungs. In a lobar transplant, a lobe of the donor's lung is excised, sized appropriately for the recipient's thoracic dimensions, and transplanted. Donors for lobar transplant have primarily been living-related donors, with 1 lobe obtained from each of 2 donors (generally friends or family members) in cases for which bilateral transplantation is required. There are also cases of cadaver lobe transplants.

Since 2005, potential recipients have been ranked according to the Lung Allocation Score. Patients 12 years of age and older receive a score between 1 and 100 based on predicted survival after transplantation

reduced by predicted survival on the waiting list; the Lung Allocation Score takes into consideration the patient's disease and clinical parameters. In 2010, a simple priority system was implemented for children younger than age 12 years. Under this system, children younger than 12 years with respiratory lung failure and/or pulmonary hypertension who meet criteria are considered "priority 1" and all other candidates in the age group are considered "priority 2". A lung review board has the authority to adjust scores on appeal for adults and children.

FDA or Other Governmental Regulatory Approval

U.S. Food and Drug Administration (FDA)

Lung transplantation is a surgical procedure and, as such, is not subject to regulation by the U.S. FDA.

The U.S. 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. Lung transplants are included in these regulations.

Centers for Medicare and Medicaid Services (CMS)

Lung transplantation is covered under Medicare when performed in a facility that is approved by Medicare as meeting institutional coverage criteria. The CMS have stated that under certain limited cases, exceptions to the facility-related criteria may be warranted if there is justification and the facility ensures safety and efficacy objectives.

Rationale/Source

Evidence reviews assess the clinical evidence to determine whether the use of a technology improves the net health outcome. Broadly defined, health outcomes are length of life, quality of life, and ability to function—including benefits and harms. Every clinical condition has specific outcomes that are important to patients and to managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of a technology, 2 domains are examined: the relevance and the quality and credibility. To be relevant, studies must represent one or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

LUNG TRANSPLANTATION FOR END-STAGE PULMONARY DISEASE

Clinical Context and Test Purpose

The purpose of lung transplantation in patients who have end-stage pulmonary disease is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does lung transplantation improve the net health outcome in patients with end-stage pulmonary disease?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with end-stage pulmonary disease.

Interventions
The therapy being considered is a lung transplant.

Comparators
The following practice is currently being used to make decisions about reducing the risk of end-stage pulmonary disease: medical management.

Outcomes
The general outcomes of interest are overall survival and treatment-related adverse events (eg, immunosuppression, graft failure, surgical complications, infections, cardiovascular complications, malignancies). See the Potential Contraindications section for detailed discussion.

Timing
Short-term follow-up ranges from immediate postsurgery to 30 days posttransplantation; lifelong follow-up (out to at 10 years or more given current survival data) is necessary to due immunosuppression drugs and risk of graft failure.

Setting
Lung retransplantation is provided in a hospital setting with specialized staff and equipped to perform the surgical procedure and postsurgical intensive care.

Registry Studies

Paraskeva et al (2018) analyzed survival rates of adolescent lung transplant recipients using data from the International Society for Heart and Lung Transplantation Registry. Patients between 10 and 24 years old represented 9% of the registry data (n=2319) and they were compared with both old and young cohorts.

Overall survival in the adolescent cohort was 65% at 3 years, which was similar to that observed in adults between 50 and 65 years of age, but significantly lower than 3-year survival rate among the pediatric subgroup (73%; p=0.006) or adults 25 to 34 years old (75%; p<0.001) and 35 to 49 years old (71%; p<0.001). Within the adolescent group, patients between 15 and 19 years of age had the poorest survival rates at 3 years (59%) compared with 10- to 14-year old patients (73%) and 20- to 24-year old year patients (66%,) (both p<0.001). The registry study was biased toward inclusion of North American data and potential data entry errors or missing data. There were no data reported on the cause of mortality, differences in regimens, or rates of graft dysfunction between the groups.

One of the International Society for Heart and Lung Transplantation registries contained data from 49,453 adult recipients who received lung transplantation (including lung retransplantation) through June 30, 2015, at 134 transplant centers. A total of 55,795 lung transplants were performed, of which 53,522 (95.9%) were primary transplants and 2273 (4.1%) were retransplants. The overall median survival of patients who underwent lung transplantation was 5.8 years. Estimated unadjusted survival rates were 89% at 3 months, 80% at 1 year, 65% at 5 years, and 32% at 10 years. Patients who survived a year after primary transplantation had a median survival of 8.0 years. In the first 30 days after transplantation, the major reported causes of mortality were graft failure (24.5%) and non-cytomegalovirus (non-CMV) infections (19.1%) while non-CMV infections became the major cause of death for the remainder of the first year. Beyond the first year, the most commonly reported causes of mortality were obstructive bronchiolitis/bronchiolitis obliterans syndrome, graft failure, and non-CMV infections. Beyond 10 years posttransplant, the major causes of mortality were obstructive bronchiolitis/bronchiolitis obliterans syndrome (21.5%), non-CMV infection (16.5%), and nonlymphoma malignancy (13.7%).

Through 2014, another International Society for Heart and Lung Transplantation registry contained a total of 2229 pediatric lung transplants. Most transplants (73%) were done in children between the ages of 11 and 17 years. Median survival in children who underwent lung transplantation was 5.4 years, similar to survival in adults (mean survival, 5.7 years). However, median survival in children was lower (2.2 years) than in adults (5.6 years) for single-lung transplants.

Thabut et al (2010) reported on a comparison between patients undergoing single- and double-lung transplantation for idiopathic pulmonary fibrosis. A retrospective review was conducted of 3327 patients with data in the United Network for Organ Sharing registry. More patients underwent single-lung transplant (64.5%) compared with double-lung transplant (35.5%). Median survival time was greater for the double-lung group at 5.2 years (95% confidence interval [CI], 4.3 to 6.7 years) than the single-lung group at 3.8 years (95% CI, 3.6 to 4.1 years; p<0.001). After adjusting for baseline differences, however, survival times did not differ statistically. The authors concluded that overall survival did not differ between the groups: single-lung transplants offered improved short-term survival but a reduced long-term benefit, whereas double-lung transplant increased short-term harm but was associated with a long-term survival benefit. Black et al (2014) reported on Lung Allocation Score (LAS) and single- vs double-lung transplant in 8778 patients (8050 had a LAS <75 vs 728 had a LAS ≥75). A significant decrease in survival was seen in single-

lung transplant patients with a high LAS compared with double-lung transplant patients with a high LAS, even though operative morbidity was higher (p<0.001).

Yusen et al (2010) reviewed the effect of the LAS on lung transplantation by comparing statistics for the period before and after its implementation in 2005. Other independent changes in clinical practice, which may affect outcomes over the same period of time, include variation in immunosuppressive regimens, an increased supply of donor lungs, changes in diagnostic mix, and increased consideration of older recipients. Deaths on the waiting list declined following implementation of the LAS system, from approximately 500 per 5000 patients to 300 per 5000 patients. However, it is expected that implementation of LAS affected patient characteristics of transplant applicants. One-year survival posttransplantation did not improve after implementation of the LAS system: patient survival data before and after were approximately 83%. Long-term survival data are not yet available. Shafii et al (2014) reported on a retrospective evaluation of the LAS and mortality in 537 adults wait-listed for lung transplantation and 426 who underwent primary lung transplantation between 2005 and 2010. Patients on the wait list who had a higher LAS had a higher mortality rate (p<0.001). In the highest quartile of LAS (range, 47-95), within 1 year of listing, there was a 75% mortality rate. Higher LAS was also associated with early posttransplant survival (p=0.05) but not late posttransplant survival (p=0.4). When other predictive factors of early mortality were taken into account, pretransplant LAS was not independently related to posttransplant mortality (p=0.12).

Section Summary: Lung Transplant for End-Stage Pulmonary Disease
International registry data on a large number of patients receiving lung transplantation (>50,000) found relatively high patient survival rates (89% at 3 months, 80% at 1 year, 65% at 5 years, 32% at 10 years). In patients who survived a year, median survival was 8 years. After adjusting for potential confounding factors, survival did not differ significantly after single- or double-lung transplant. A subgroup analysis of an international registry study found decreased survival for adolescent patients, especially between 15 and 19 years of age, who received lung transplantation but the study was limited by inclusion bias and lack of data on mortality, differences in treatment regimens, and rates of graft dysfunction.

LOBAR LUNG TRANSPLANTATION FOR END-STAGE PULMONARY DISEASE

Clinical Context and Test Purpose
The purpose of lobar lung transplantation in patients who have end-stage pulmonary disease is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does lobar lung transplantation improve the net health outcome in patients with end-stage pulmonary disease?
The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals with end-stage pulmonary disease.

Date (2011) stated that, as of 2011, approximately 400 living-donor lobar lung transplants had been performed worldwide. Procedures in the United States decreased after 2005 due to changes in the lung allocation system. Date (2011) reported that size matching between donor and recipient is important and that, to some extent, size mismatching (oversized or undersized grafts) can be overcome by adjusting surgical technique.

Interventions
The therapy being considered is a lobar lung transplant.

Comparators
The following practice is currently being used to make decisions about end-stage pulmonary disease: medical management.

Outcomes
The general outcomes of interest are overall survival and treatment-related adverse events (eg, immunosuppression, graft failure, surgical complications, infections, cardiovascular complications, malignancies). See the Potential Contraindications section for detailed discussion.

Timing
Short-term follow-up ranges from immediate postsurgery to 30 days posttransplantation; lifelong follow-up (out to at 10 years or more given current survival data) is necessary to due immunosuppression drugs and risk of graft failure.

Setting
Lung retransplantation is provided in a hospital setting with specialized staff and equipped to perform the surgical procedure and postsurgical intensive care.

Systematic Reviews
Eberlein et al (2017) reported on a systematic review of studies on lobar lung transplantation from deceased donors. Reviewers identified 9 studies comparing outcomes after lobar lung or lung transplant, all of which were single-center retrospective cohort studies. Seven studies were conducted in Europe and one in Australia and one in North America. One-year survival reported in individual studies ranged from 50% to 100% after lobar lung transplant and from 72% to 88% after conventional lung transplant. In a pooled analysis of data from 8 studies, lobar lung transplant recipients (n=284) had a significantly higher risk of 1-year mortality than lung transplant recipients (n=2777) (relative risk, 1.85; 95% CI, 1.52 to 2.25; p<0.001; I^2=0%).

Case Series
Several studies have reported on lobar lung transplantation from living donors. For example, Barr et al (2005) reported on living-donor lobar lung transplants in the United States. Ninety patients were adults and

43 were children. The primary indication for transplantation (86%) was cystic fibrosis. At the time of transplantation, 67% of patients were hospitalized, and 20% were ventilator dependent. Overall recipient actuarial survival rates at 1, 3, and 5 years were 70%, 54%, and 45%, respectively. There was no statistically significant difference in actuarial survival between adults and children who underwent transplantation. Moreover, survival rates were similar to the general population of lung transplant recipients. The authors also reported that rates of postoperative pulmonary function in patients surviving more than 3 months posttransplant were comparable with rates in cadaveric lung transplant recipients.

Date et al (2015) reported on a retrospective study comparing 42 living-donor lobar lung transplants with 37 cadaveric lung transplants. Survival rates at 1 and 3 years did not differ significantly between groups (89.7% and 86.1% vs 88.3% and 83.1%, respectively, p=0.55), despite living-donor lobar lung transplant patients having poorer health status preoperatively. For a program in Japan, Date et al (2012) reported on 14 critically ill patients (10 children, 4 adults) who had undergone single living-donor lobar lung transplants. Patients were followed for a mean 45 months. The 3-year survival rate was 70%, and the 5-year survival was 56%. Severe graft dysfunction occurred in 4 patients. Mean forced vital capacity was lower in patients experiencing severe graft dysfunction (54.5%) than in the other patients (66.5%). The authors postulated that this suggested size mismatching in the patients with severe graft dysfunction.

Slama et al (2014) reported on a comparison of outcomes in 138 cadaveric lobar lung transplants (for size discrepancies) with 778 patients who received cadaveric whole-lung transplants, 239 of whom had downsizing by wedge resection of the right middle lobe and/or the left lingula. Survival rates in the lobar lung transplant group at 1 and 5 years were 65.1% and 54.9% vs 84.8% and 65.1% in the whole-lung and downsized by wedge resection group (p<0.001). The lobar lung transplantation group experienced significantly inferior early postoperative outcomes, but in patients who were successfully discharged, survival rates were similar to standard lung transplantation (p=0.168).

Section Summary: Lung Lobar Transplant for End-Stage Pulmonary Disease
There are less data on lung lobar transplants than on whole-lung transplants. The available data reported in case series have suggested reasonably similar survival outcomes, and lung lobar transplants may be the only option for patients unable to wait for a whole-lung. A 2017 systematic review found 1-year survival rates ranging from 50% to 100%.

LUNG OR LOBAR RETRANSPLANTATION WHEN MEETING CRITERIA FOR A LUNG TRANSPLANT

Clinical Context and Test Purpose
The purpose of lung retransplantation in patients who have had a prior lung or lobar transplant and who meet criteria for a lung transplant is to provide a treatment option that is an alternative to or an improvement on existing therapies.

The question addressed in this evidence review is: Does lung or lobar retransplantation improve the net health outcome in patients with a failed prior lung or lobar transplant?

The following PICOTS were used to select literature to inform this review.

Patients
The relevant population of interest is individuals receiving a lung retransplant after failing a prior lung or lobar transplant and who would be eligible for a lung transplant.

Interventions
The therapy being considered is lung or lobar retransplantation.

Comparators
The following practice is currently being used to make decisions about treating those whose lung or lobar transplant has failed and would still be considered as meeting eligibility criteria for an initial transplant: medical management.

Outcomes
The general outcomes of interest are overall survival and treatment-related adverse events (eg, immunosuppression, graft failure, surgical complications, infections, cardiovascular complications, malignancies). See the Potential Contraindications section for detailed discussion.

Timing
Short-term follow-up ranges from immediate postsurgery to 30 days posttransplantation; lifelong follow-up (out to at 10 years or more given current survival data) is necessary to due immunosuppression drugs and risk of graft failure.

Setting
Lung retransplantation is provided in a hospital setting with specialized staff and equipped to perform the surgical procedure and postsurgical intensive care.

Case Series
Registry data and case series have demonstrated favorable outcomes with lung retransplantation in certain populations, such as in patients who meet criteria for initial lung transplantation.

Biswas Roy et al (2018) published a single-center retrospective study comparing survival outcomes in 29 patients who received retransplantation for chronic lung allograft dysfunction with 390 patients receiving a primary lung transplant at the same center. Patients receiving retransplantation had significantly higher use of extracorporeal membrane oxygenation support for severe primary graft dysfunction (p=0.019) and underwent cardiopulmonary bypass and re-exploration for bleeding (p=0.019) more frequently than patients

receiving primary transplantation (p=0.029). At 1-year follow-up, 89.7% of primary transplant patients were living, as were 89.2% of retransplantation patients. At 5-year follow-up, a greater percentage of the retransplantation group had survived, compared with the primary transplantation group (64.3% vs 58.2%), although the difference was not statistically significant. While high LAS and extended hospital length of stay were both identified as independent mortality risk factors, retransplantation was not (hazard ratio, 1.58; 95% CI, 0.31 to 8.08; p=0.58). Study limitations included its single-center, retrospective design, the potential selection bias for younger patients, and the small size of the retransplantation group. Further, follow-up data at 3 and 5 years were incomplete for some patients and patients who were refused retransplantation were not considered in the analyses. However, for appropriately selected patients, retransplantation after chronic lung allograft dysfunction resulted in 1- and 5-year survival rates comparable to those seen after primary lung transplantation.

Registry Studies
The Organ Procurement and Transplantation Network has reported data on lung transplants performed between 2008 and 2015. Patient survival rates after repeat transplants were lower than primary transplants, but a substantial number of patients survived. For example, 1-year patient survival was 87.9% (95% CI, 87.2% to 88.7%) after a primary lung transplant and 76% (95% CI, 70.9% to 80.2%) after a repeat transplant. Five-year patient survival rates were 55.9% (54.7% to 57.2%) after a primary lung transplant and 33.8% (28.5 to 39.1%) after repeat transplant.

The International Society for Heart and Lung Transplantation Registry contained data on 2273 retransplantation patients performed through June 2015 (4.4% of lung transplantations). The major causes of death in the first 30 days after retransplantation were graft failure and non-CMV infection, followed by multiorgan failure, cardiovascular causes, and technical factors related to the transplant procedure. Beyond the first year, the most commonly reported causes of mortality were obstructive bronchiolitis/bronchiolitis obliterans, graft failure, and non-CMV infections.

Section Summary: Lung or Lobar Retransplant When Meeting Criteria for a Lung Transplant
Data from registries and case series have found favorable outcomes with lung retransplantation in patients who meet criteria for initial lung transplantation. Given the exceedingly poor survival without retransplantation of patients who have exhausted other treatments, evidence of a moderate level of posttransplant survival is sufficient to suggest treatment efficacy in this patient population.

POTENTIAL CONTRAINDICATIONS (APPLIES TO ALL INDICATIONS ABOVE)

Malignancy
Malignancies are common after lung transplantation, with 21% and 40% of patients reporting 1 or more malignancies at 5 and 10 years posttransplantation, respectively. Skin cancer occurred most frequently, and lymphoproliferative disorders were the malignancies most associated with morbidity posttransplantation.

HIV Infection
Current Organ Procurement and Transplantation Network policy permits HIV-positive transplant candidates.

The British HIV Association and the British Transplantation Society (2017) updated their guidelines on kidney transplantation in patients with HIV disease. These criteria may be extrapolated to other organs:

- Adherent with treatment, particularly antiretroviral therapy
- Cluster of Differentiation 4 count greater than 100 cells/mL (ideally >200 cells/mL) for at least 3 months
- Undetectable HIV viremia (<50 HIV-1 RNA copies/mL) for at least 6 months
- No opportunistic infections for at least 6 months
- No history of progressive multifocal leukoencephalopathy, chronic intestinal cryptosporidiosis, or lymphoma.

Other Infections
Infection with *Burkholderia cenocepacia* is associated with increased mortality in some transplant centers. A factor that may be considered when evaluating overall risk for transplant survival. Two articles have evaluated the impact of infection with various species of *Burkholderia* on outcomes for lung transplantation for cystic fibrosis. In a study by Murray et al (2008), multivariate Cox survival models assessing hazard ratios were applied to 1026 lung transplant candidates and 528 transplant recipients. Of the transplant recipients, 88 were infected with *Burkholderia*. Among transplant recipients infected with *B. cenocepacia,* only those infected with nonepidemic strains (n=11) had significantly greater posttransplant mortality than uninfected patients (hazard ratio, 2.52; 95% CI, 1.04 to 6.12; p=0.04). Transplant recipients infected with *Burkholderia gladioli* (n=14) also had significantly greater posttransplant mortality than uninfected patients (hazard ratio, 2.23; 95% CI, 1.05 to 4.74; p=0.04). When adjustments for specific species or strains were included, The LAS of *Burkholderia multivorans*-infected transplant candidates were comparable with uninfected candidate scores, and scores for patients infected with nonepidemic *B. cenocepacia* or *B. gladioli* were lower. In a smaller study of 22 patients colonized with *Burkholderia cepacia* complex who underwent lung transplantation in 2 French centers, Boussaud et al (2008) reported that the risk of death by univariate analysis was significantly higher for the 8 patients infected with *B. cenocepacia* than for the other 14 colonized patients (11 of whom had *B. multivorans*).
An analysis of international registry data by Yusen et al (2016) found that non-CMV infection is a major cause of mortality within 30 days of a lung transplant in adults. A total of 655 (19%) of 3424 deaths after transplants between 1990 and 2015 were due to non-CMV infection. Only 3 (0.1%) of the deaths were due to CMV infection.

SUMMARY OF EVIDENCE
For individuals who have end-stage pulmonary disease who receive a lung transplant, the evidence includes case series and registry studies. Relevant outcomes are overall survival, change in disease status, and treatment-related mortality and morbidity. International registry data on a large number of patients receiving lung transplantation (>50,000) found relatively high patient survival rates, especially among those

who survived the first year posttransplant. After adjusting for potential confounding factors, survival did not differ significantly after single- or double-lung transplant. Lung transplantation may be the only option for some patients with end-stage lung disease. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have end-stage pulmonary disease who receive a lobar lung transplant, the evidence includes case series and systematic reviews. Relevant outcomes are overall survival, change in disease status, and treatment-related mortality and morbidity. There are less data on lung lobar transplants than on whole-lung transplants, but several case series have reported reasonably similar survival outcomes between the procedures, and lung lobar transplants may be the only option for patients unable to wait for a whole-lung transplant. A 2017 systematic review found 1-year survival rates in available published studies ranging from 50% to 100%. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

For individuals who have a prior lung or lobar transplant who meet criteria for a lung transplant who receive a lung or lobar lung retransplant, the evidence includes case series and registry studies. Relevant outcomes are overall survival, change in disease status, treatment-related mortality and morbidity. Data from registries and case series have found favorable outcomes with lung retransplantation in patients who meet criteria for initial lung transplantation. Given the exceedingly poor survival prognosis without retransplantation of patients who have exhausted other treatments, the evidence of a moderate level of posttransplant survival may be considered sufficient in this patient population. The evidence is sufficient to determine that the technology results in a meaningful improvement in the net health outcome.

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Policy History

Original Effective Date: 05/21/2014
Current Effective Date: 10/17/2018

05/01/2014	Medical Policy Committee review
05/21/2014	Medical Policy Implementation Committee approval. New policy.
08/06/2015	Medical Policy Committee review

08/19/2015 Medical Policy Implementation Committee approval. No change to coverage.
08/04/2016 Medical Policy Committee review
08/17/2016 Medical Policy Implementation Committee approval. No change to coverage.
01/01/2017 Coding update: Removing ICD-9 Diagnosis Codes
08/03/2017 Medical Policy Committee review
08/23/2017 Medical Policy Implementation Committee approval. No change to coverage.
10/04/2018 Medical Policy Committee review
10/17/2018 Medical Policy Implementation Committee approval. No change to coverage. Policy reformatted.
Next Scheduled Review Date: 10/2019

Coding

The five character codes included in the Blue Cross Blue Shield of Louisiana Medical Policy Coverage Guidelines are obtained from Current Procedural Terminology (CPT®)‡, copyright 2017 by the American Medical Association (AMA). CPT is developed by the AMA as a listing of descriptive terms and five character identifying codes and modifiers for reporting medical services and procedures performed by physician.

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Codes used to identify services associated with this policy may include (but may not be limited to) the following:

Code Type	Code			
CPT	32850, 32851, 32852, 32853, 32854, 32855, 32856			
HCPCS	S2060, S2061			
ICD-10 Diagnosis	A15.0	C96.5-C96.6	D86.0-D86.3	D86.81-D86.89
	D86.9	E71.39	E80.3	E84.0
	E84.11	E84.19	E84.8-E84.9	E88.01
	E88.89	E88.9	I26.01-I26.09	I26.90-I26.99
	I27.0-I27.2	I27.82-I27.89	J41.8	J43.0-J43.9
	J44.0-J44.9	J47.0-J47.9	J60	J62.0-J62.8
	J63.0-J63.6	J64	J65	J66.0-J66.2
	J66.8	J68.4	J84.10	J84.111-J84.112

	J84.14	J84.81-J84.89	J98.2-J98.3	J99
	M32.13	M33.01	M33.11	M33.21
	M33.91	M34.0-M34.2	M34.81-M34.89	M34.9
	M35.02	P27.0-P27.9	Q21.0	T80.0XXA
	T81.718A	T81.72XA	T81.818A	Z48.24
	Z48.280	Z94.2-Z94.3		

*****Investigational – A medical treatment, procedure, drug, device, or biological product is Investigational if the effectiveness has not been clearly tested and it has not been incorporated into standard medical practice. Any determination we make that a medical treatment, procedure, drug, device, or biological product is Investigational will be based on a consideration of the following:

A. Whether the medical treatment, procedure, drug, device, or biological product can be lawfully marketed without approval of the U.S. FDA and whether such approval has been granted at the time the medical treatment, procedure, drug, device, or biological product is sought to be furnished; or
B. Whether the medical treatment, procedure, drug, device, or biological product requires further studies or clinical trials to determine its maximum tolerated dose, toxicity, safety, effectiveness, or effectiveness as compared with the standard means of treatment or diagnosis, must improve health outcomes, according to the consensus of opinion among experts as shown by reliable evidence, including:
    1. Consultation with the Blue Cross and Blue Shield Association technology assessment program (TEC) or other nonaffiliated technology evaluation center(s);
    2. Credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community; or
    3. Reference to federal regulations.

**Medically Necessary (or “Medical Necessity”) - Health care services, treatment, procedures, equipment, drugs, devices, items or supplies that a Provider, exercising prudent clinical judgment, would provide to a patient for the purpose of preventing, evaluating, diagnosing or treating an illness, injury, disease or its symptoms, and that are:

A. In accordance with nationally accepted standards of medical practice;
B. Clinically appropriate, in terms of type, frequency, extent, level of care, site and duration, and considered effective for the patient's illness, injury or disease; and
C. Not primarily for the personal comfort or convenience of the patient, physician or other health care provider, and not more costly than an alternative service or sequence of services at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of that patient's illness, injury or disease.

For these purposes, “nationally accepted standards of medical practice” means standards that are based on credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community, Physician Specialty Society recommendations and the views of Physicians practicing in relevant clinical areas and any other relevant factors.

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