Recipient Selection for Lung Transplantation

Lung Transplantation Mini-Series #2

Lung transplantation is a treatment option for certain patients with advanced lung disease. It is mainly considered after other medical therapies have been exhausted. It is time to consider lung transplantation when your life expectancy is predicted to be only 1 to 2 years without the transplant, or when your lung symptoms have severely limited your quality of life.

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Good candidates for lung transplantation are people who do not have many other medical conditions (besides lung disease), carefully and regularly follow treatment plans devised with their health care providers, and have support from family and friends. Not everyone with severe lung disease will be a good candidate for a lung transplant. You may not qualify because of concerns about surviving a major surgery, being able to take care of the new lungs, or because of the risks from the medicines required after transplantation to prevent lung rejection. See Box 1 for additional information. These will be reviewed in detail when you have an evaluation by a lung transplant team.

How do I find out if a lung transplant is right for me?

If your health care provider thinks you may be a good candidate for lung transplantation, you will be referred to a lung transplant center. The lung transplant team does a full evaluation that starts with looking at why you need a lung transplant. This includes the type of lung disease you have, its severity, and what other treatments you have tried. For more information, see 'What is Lung Transplantation?' at www.thoracic.org/patients. The team will work with you to see if you have any potential contraindications (reasons not to proceed with the surgery) or barriers to transplantation. Some contraindications may be treated (for example, body weight that is too high or too low, or untreated medical conditions like diabetes or obesity) to improve your chances for a successful lung transplant.

If the lung transplant center decides you are a good candidate, you will be put on the waiting list and given a Lung Allocation Score (LAS). The LAS system gives priority to the sickest people who are in need of a lung transplant to reduce the number of people who die while waiting for new lungs. The LAS also considers patient factors (age, type of disease, and presence of certain other medical conditions) to minimize the number of people who die in the first year following transplantation. Thus, it aims to optimize the risk-benefit ratio.

Box 1: Contraindications to Lung Transplantation

Absolute contraindications (patients will very likely not be considered for a lung transplant):

- Recent history of cancer (in last 2-5 years, depending on the cancer)
- Untreatable advanced disease in other organs (for example, heart, liver, or kidney)
- Acute unstable medical problems (e.g., sepsis or major heart attack)
- Active tuberculosis
- Poorly controlled chronic infection (such as HIV or hepatitis B virus)
- Certain abnormalities of the chest wall or spine
- Inability to follow-up or follow through with medical therapies (based on your past history of care of your medical problems)
- An untreatable psychiatric or psychological condition that interferes with one's ability to follow medical therapy
- Absence of a reliable social support system
- Severely limited exercise capacity that does not allow the patient to do pulmonary rehabilitation
- Morbid obesity (BMI more than 35 kg/m^2)
- Substance abuse (for example, alcohol, tobacco, or drugs)

Relative contraindications (patients may still be considered for a lung transplant in special circumstances):

- Age older than 75 years
- Age older than 65 years AND a low capacity to exercise
- Obesity (BMI more than 30 kg/m2)
- Malnutrition that is severe (BMI less than or equal to 18 kg/m^2) or is getting worse
- Patients requiring mechanical ventilation or extracorporeal life support (ECLS)
- Significant prior surgery involving chest wall or lungs
- Colonization with highly resistant infectious organisms (e.g., Burkholderia or certain mycobacterial infections)
- Severe or symptomatic osteoporosis (bone mineral problems)
- Other medical conditions that are not yet optimally treated (for example, GERD, epilepsy, high blood pressure, or diabetes) that may pose a risk to surviving surgery, wound healing, and/or the new lungs after surgery

Abbreviations: HIV, human immunodeficiency virus; BMI, body mass index; GERD, gastro-esophageal reflux disease

Am J Respir Crit Care Med Vol. 193, P15-P17, 2016
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Timing of Referral and Transplantation

Lung transplantation is done for many lung diseases that have advanced to the point where no other therapy will be helpful. Common reasons for lung transplantation include chronic obstructive pulmonary disease (COPD), cystic fibrosis (CF), pulmonary fibrosis (PF) and pulmonary hypertension (PH). Other rare or uncommon lung diseases may be considered for lung transplantation as well. If you have an advanced lung disease not listed above, discuss with your health care provider whether referral for a lung transplant would be right for you.

The right timing of referral for a lung transplant and timing of placement on the waiting list depends on a number of factors that may be different for various lung diseases. The Online Supplement of this factsheet at www.thoracic.org/patients has some considerations based on the type of lung disease you may have. You can discuss these factors with your healthcare provider to see if it may be appropriate for you to consider lung transplantation.

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Rx *Action Steps*

- ✔ Work with your health care provider to manage your lung disease and do your best to follow your treatment plan
- ✔ Talk with your lung specialist about which, if any, criteria you meet to be considered for lung transplant evaluation
- ✔ Enlist the support of family and friends to help you
- ✔ Make a list of questions you want answered and consider the pros and cons of lung transplantation for you. Share these with the lung transplant team.

Healthcare Provider's Contact Number:

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Resources

American Thoracic Society Patient Education Series
www.thoracic.org/patients

Who Needs A Lung Transplant. National Heart, Lung and Blood Institute
https://www.nhlbi.nih.gov/health/health-topics/topics/lungtxp/whoneeds

Lung Transplant Foundation Before Your Transplant. Lung Transplant Foundation
http://lungtransplantfoundation.org/patient-resources/before-you-transplant/

Questions and Answers for Transplant Candidates about Lung Allocation
https://www.unos.org/wp-content/uploads/unos/Lung_Patient.pdf

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Recipient Selection for Lung Transplantation: Disease Specific Factors Online Supplement

Chronic Obstructive Pulmonary Disease (COPD)

Your disease severity in COPD can be described by a scoring system called the BODE index. This score helps to predict which patients are most likely to die in the next 4 years as a result of their lung disease. A higher score is linked to a greater risk of death. It factors in your weight in relation to your height, the FEV1 result (air that is forcefully breathed out of the lungs in the first second) measured on spirometry (a breathing test), the level of shortness of breath you have, and your ability to exercise. The ability to exercise is defined using the 6-minute walk test (6MWT), which provides the distance a person can walk in six minutes under specific conditions. Higher BODE index scores are seen when you have more severe shortness of breath, low body weight, low FEV1, and/or low exercise ability. Patients with COPD should be referred for a lung transplant evaluation if they have the following:

- A BODE index score that predicts a risk of dying in the next 4 years of at least 40% (BODE score 5-6)
- Worsening disease despite using oxygen, doing pulmonary rehabilitation, and using prescribed medicines correctly
- Very severe COPD based on breathing tests (FEV1 < 25% of reference value)

Patients are often placed on the lung transplant waiting list when they meet at least 1 or more of the following criteria:

- A BODE index score that predicts a risk of dying in the next 4 years of at least 80% (BODE score 7-10)
- Three or more severe COPD exacerbations in the last year
- A history of being hospitalized for a COPD exacerbation that was associated with a high carbon dioxide (CO_2) level in the blood,
- Moderate to severe pulmonary hypertension (high blood pressure in the lungs)
- Very severe COPD based on breathing tests (FEV1 less than 20%)

For more information, see 'Chronic Obstructive Pulmonary Disease' and 'Pulmonary Function Testing' at www.thoracic.org/patients.

Cystic Fibrosis (CF)

A number of factors may be considered when referring a person with cystic fibrosis for lung transplant evaluation. A few factors that would prompt referral include:

- FEV1 measured on spirometry less than 30% or a rapid fall in FEV1, particularly in a female patient
- Increasing number of CF pulmonary exacerbations (flare-ups) and need for antibiotics, increasing number of infections resistant to available antibiotics, or poor recovery despite being adequately treated with antibiotics
- A severe CF pulmonary exacerbation that requires help from a ventilator
- Persistent or recurrent pneumothorax (air leak from the lung)
- Frequent or life-threatening hemoptysis (coughing up blood), especially that is not controlled by treatment
- Pulmonary hypertension (high blood pressure in the lungs)
- Continual drop in exercise capacity (6-minute walk distance less than 400 feet)
- Worsening nutritional status despite adequate intake of food and/or supplements

Being hospitalized often, having worsening oxygen requirements or increasing in carbon dioxide levels in blood, or requiring long-term assisted ventilation are often reasons to be listed for a transplant.

Many people with advanced lung disease in CF may be infected with bacteria that are resistant to commonly used antibiotics. This can be a concern in transplant as the resistant bacteria can get into the new transplanted lungs during and/or after surgery. Some of these infections may be a contraindication to transplant. Special testing is needed to identify these infections prior to the transplant and a plan for their treatment needs to be made.

Pulmonary Fibrosis (IPF)

Certain types of pulmonary fibrosis may have a more rapid decline and worse outcome than other types. For some people, the diagnosis of Idiopathic Pulmonary Fibrosis (IPF) may warrant immediate referral for lung transplant evaluation as they are at high risk for a rapid progression of the disease. Other factors that may be considered for referring a patient for lung transplant evaluation are:

- A forced vital capacity (the total amount of air breathed out on a breathing test) less than 80% or a DLCO (diffusing capacity) of less than 40%
- Any shortness of breath believed to be due to lung disease
- A decrease in oxygen saturation level to less than 88% while doing a 6-minute walk test (6MWT)
- Findings on a chest CT or lung biopsy that may suggest certain types of pulmonary fibrosis

Significant worsening of values on spirometry (either FVC or DLCO) during 6 months of followup, pulmonary hypertension (high blood pressure in the lungs), increasing oxygen requirements or decreasing distance walked on a 6-minute walk test (6MWT), or being hospitalized due to the lung disease are often reasons to be listed for a transplant.

Pulmonary Hypertension

If patients with pulmonary hypertension have been treated with a maximal medical regimen and continue to have severe symptoms, they may be referred and considered for lung transplantation. Some factors that may be considered for listing a patient for lung transplantation are:

- Severe shortness of breath with minimal activity or inability to carry out any physical activity at all, despite being on medication
- Low or declining distance walked on the 6-minute walk test (6MWT)
- Declining heart function as measured on cardiac catheterization
- Life-threatening symptoms such as syncope (passing out unexpectedly) or hemoptysis (coughing up blood)