WELCOME TO

BRONCHOSCOPIC LUNG VOLUME REDUCTION (BLVR) 101

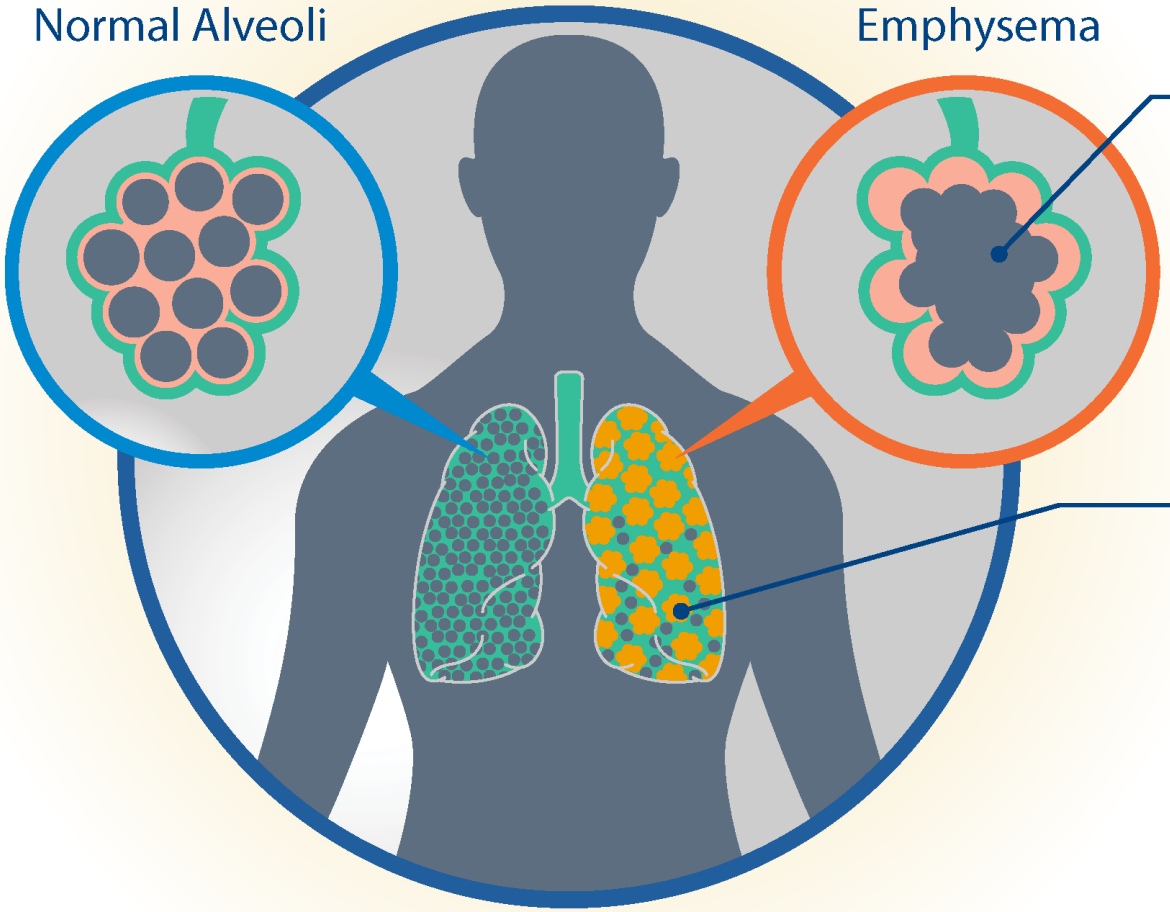
- Lung Volume Reduction Rationale
- Development of BLVR
- Patient Selection
- Outcomes
- Summary
- Additional Resources
- Patient Materials

101 LIBRARY

COPD FOUNDATION

Lung Volume Reduction Rationale

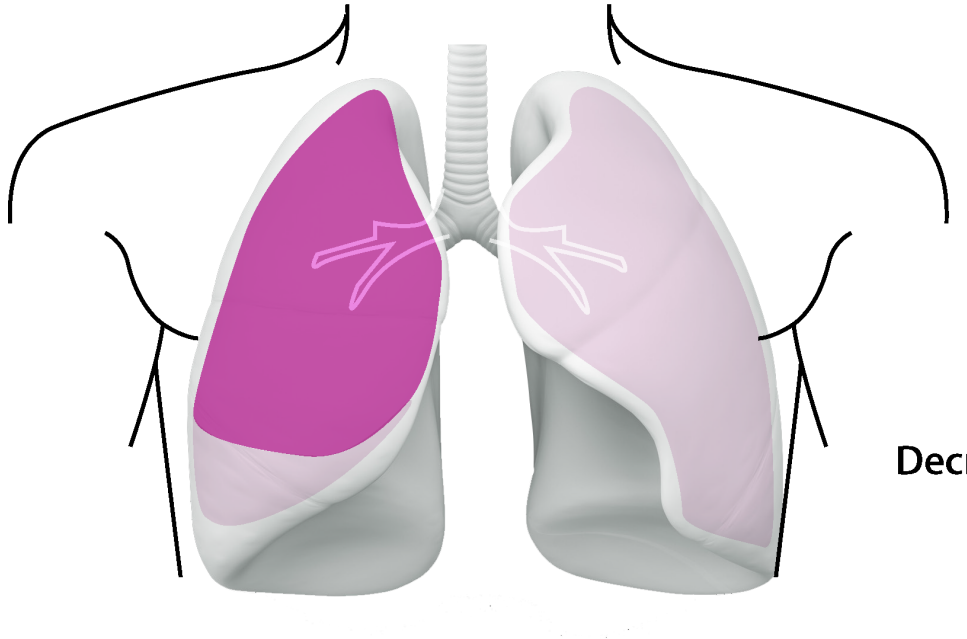
Pathophysiology of Emphysema[1]

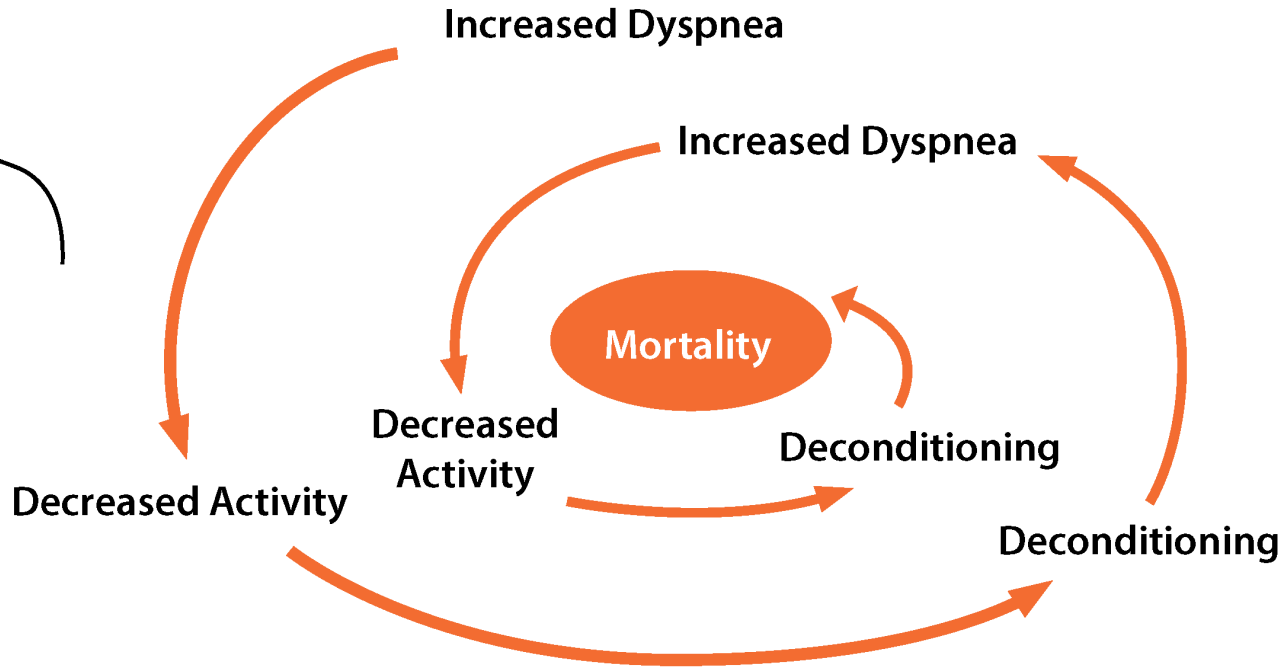


Enlarged alveoli with lower gas exchange ability

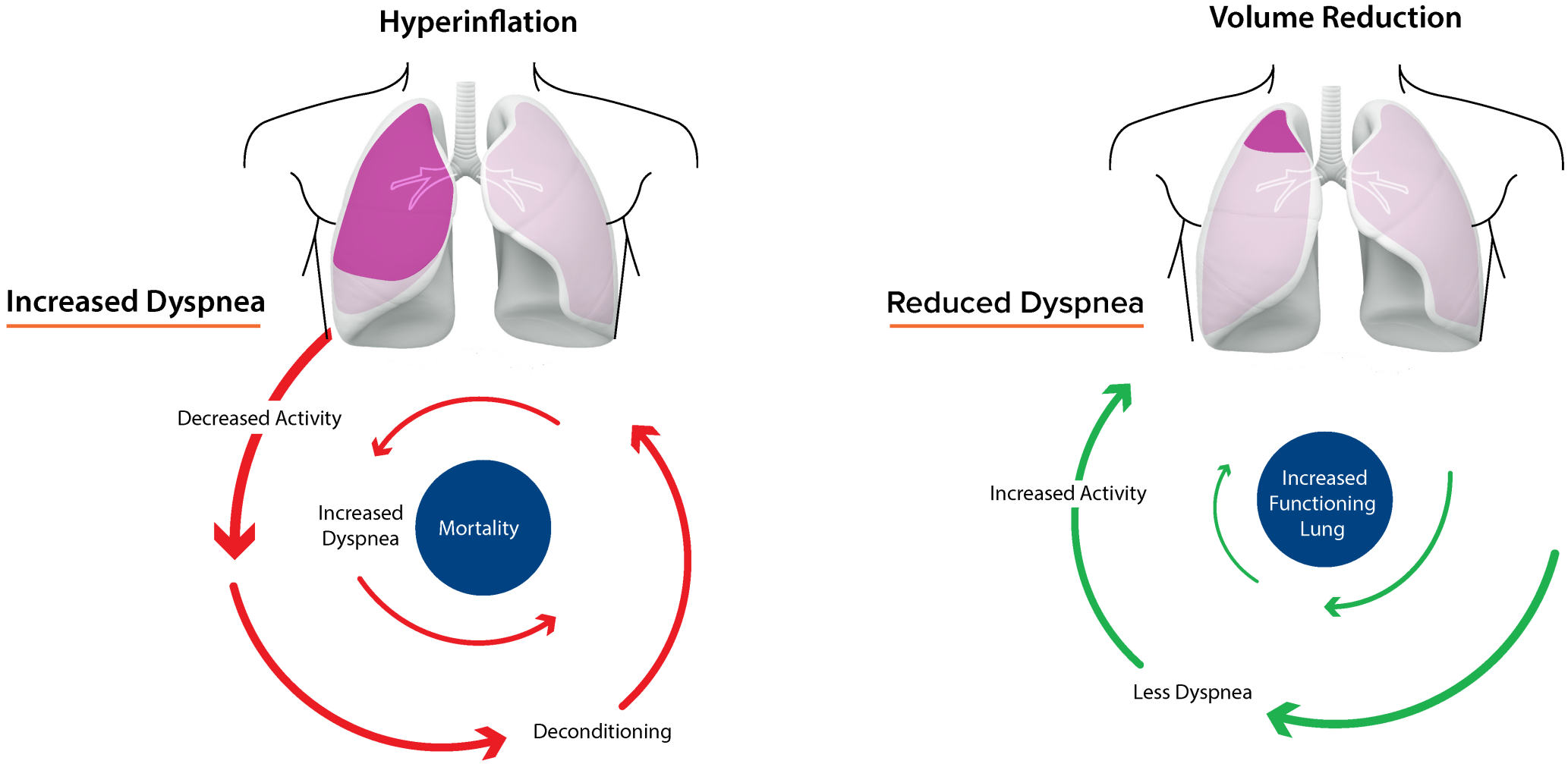
Compressed healthy units cannot expand normally, further limiting gas exchange

Hyperinflation





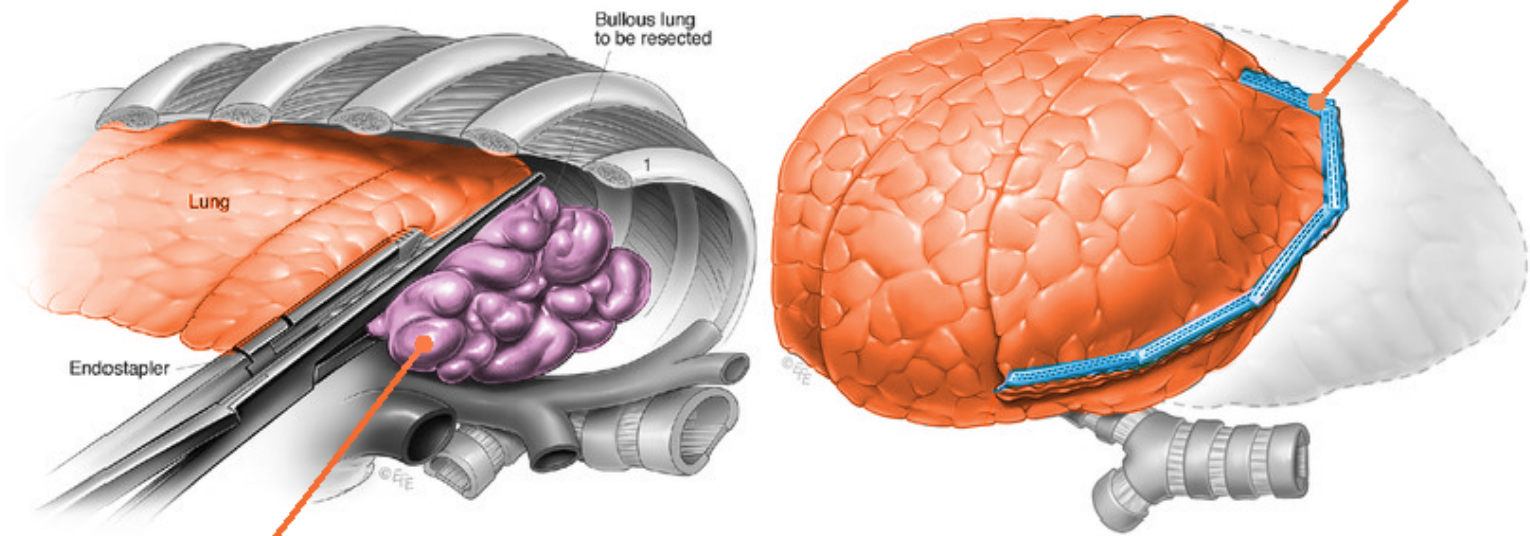
Hyperinflation/Volume Reduction



Lung Volume Reduction Surgery (LVRS)[2]

Median sternotomy or video-assisted thoracic surgery (VATS) technique

Staples placed to re-seal parenchyma



Benefits...

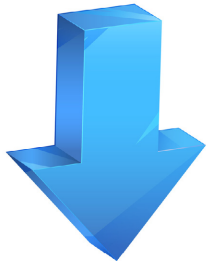
The National Emphysema Treatment Trial (NETT)[3] found that LVRS conferred clinically significant improvements vs. medical therapy:

Maximal Exercise Capacity

Health-Related Quality of Life

6-Minute Walk Distance

Survival (in certain subgroups)



Airflow Obstruction (in certain subgroups)

Improvements sustained over 24 months.
Greatest benefits seen in patients with upper lobe-predominant emphysema and low exercise capacity.

…And Risks[5]

Potential complications include:

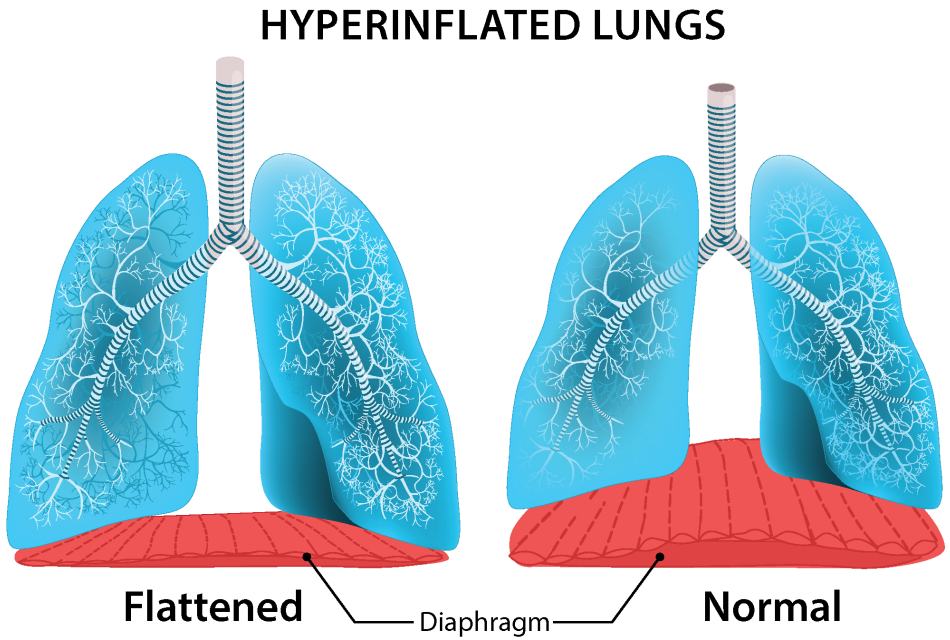
- Prolonged air leak leading to extended (5 or more days) inpatient admission (90% of patients)
- Pneumonia (18% of patients)
- Cardiac arrhythmia (22% of patients)
- Increased mortality in certain subgroups (28% of those with homogenous emphysema)

Development of Bronchoscopic Lung Volume Reduction

A Less-Invasive Procedure

BLVR aims to reduce hyperinflation without removal of tissue[5]

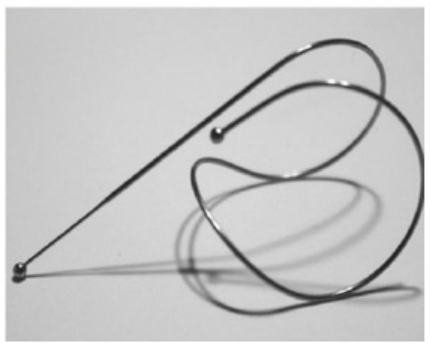
- Selective occlusion of airways leads to intentional atelectasis of target lobe
- Bronchoscopic technique requires no incision, reducing infection and complication risk
- Endobronchial valves are reversible if there are serious side effects



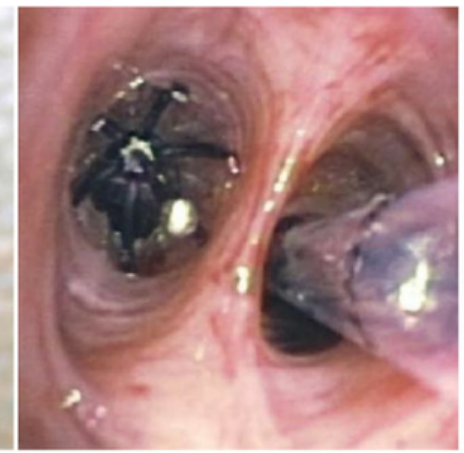
Normalizing lung volumes improves diagphragmatic expansion, potentially easing dyspnea

Types of BLVR

Several different methods of BLVR have been proposed, including:



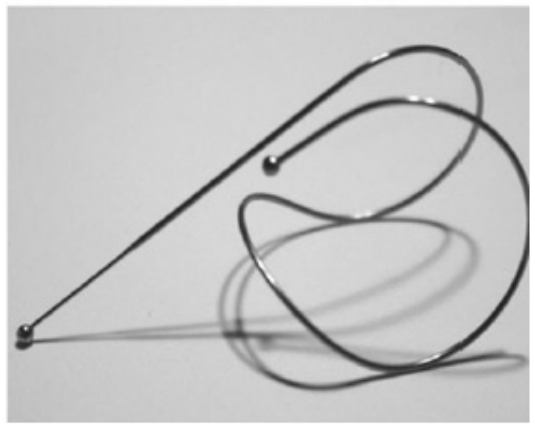
Restrictive Coils



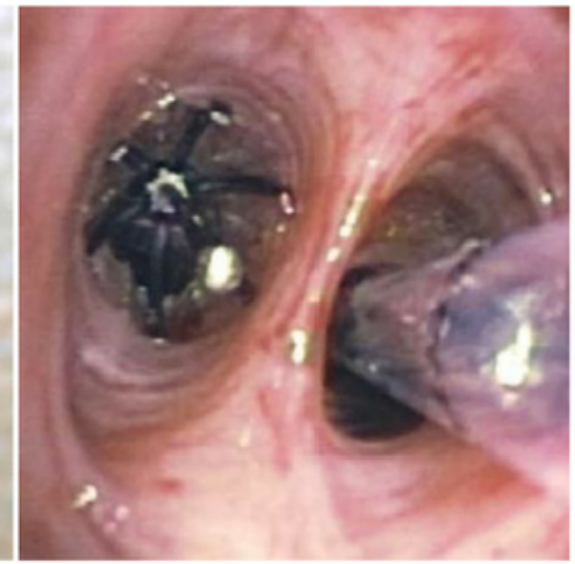
One-Way Valves

Airway Sealants

Current State of the Art



Restrictive Coils[7]
(Not approved in US)



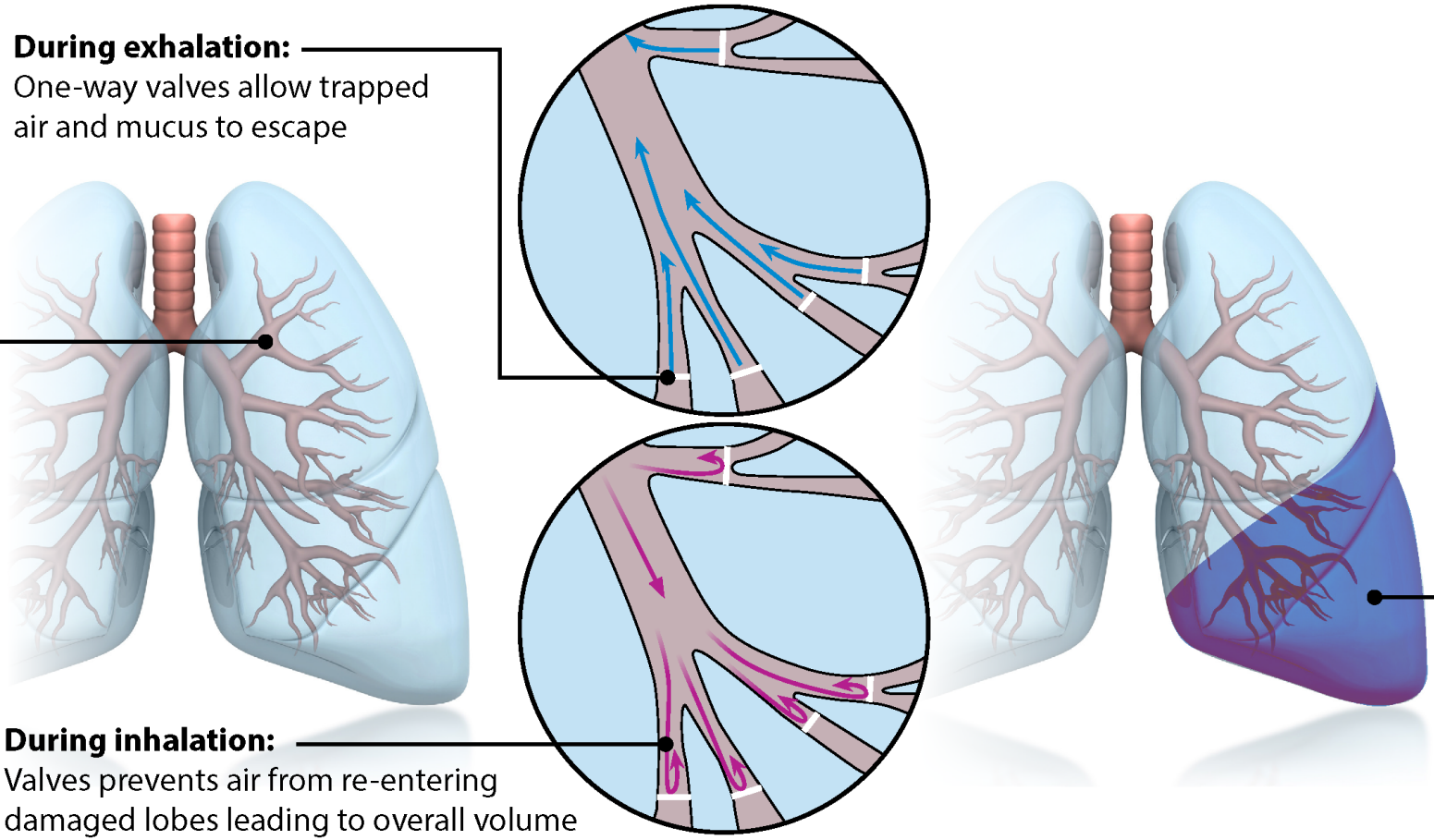
One-Way Valves[8]

Note: As BLVR coils are not approved for use in the United States, the remainder of this presentation will focus on endobronchial valves.

Endobronchial Valves

During exhalation:
One-way valves allow trapped air and mucus to escape

Approximately 3-5 valves are placed in airways leading to lung lobes with the most damage



Volume reduction

During inhalation:
Valves prevents air from re-entering damaged lobes leading to overall volume reduction

Patient Selection

Which Patients Can Benefit From BLVR Referral?

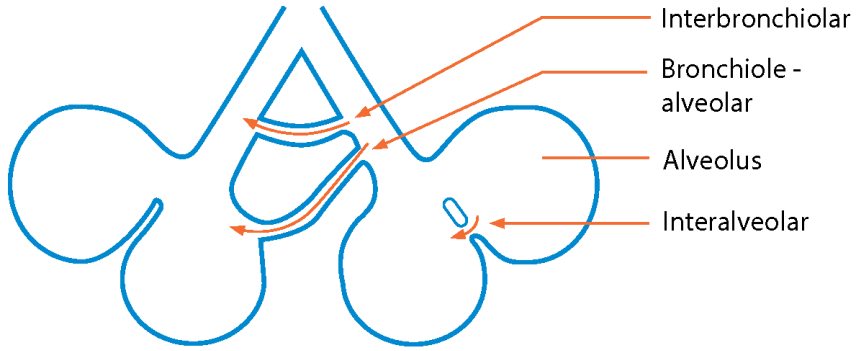
- Consider referring your patient to a BLVR treatment center if they have:
  - Spirometrically confirmed diagnosis of COPD
  - Severe airflow obstruction (FEV_1 < 45% but > 15% predicted)
  - Severe dyspnea despite optimized medical management
- Potential candidates will receive a thorough clinical workup to determine eligibility for valve placement

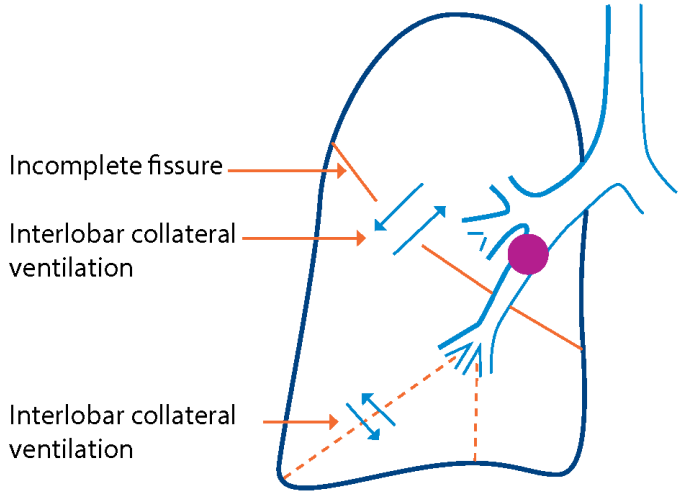
Clinical Testing for BLVR Selection[8]

- Forced Expiratory Volume in 1 Second (FEV_1) between **15% and 45%** predicted value
- Hyperinflation (either by CT imaging or pulmonary function test)
  - Residual volume (RV) ≥ **175%** predicted value on PFT
  - RV/Total lung capacity (TLC) ratio ≥ **0.58** on PFT
- COPD Assessment Test (CAT) score ≥ **10**
- Modified Medical Research Council (mMRC) dyspnea score ≥ **2**
- 6-Minute Walk Test (6MWT) distance between **100m and 450m**
- **Absence of significant collateral ventilation**

Collateral Ventilation

Many people have extrabronchial pathways that allow inhaled gas to bypass blockages. This is known as *collateral ventilation.*[9]





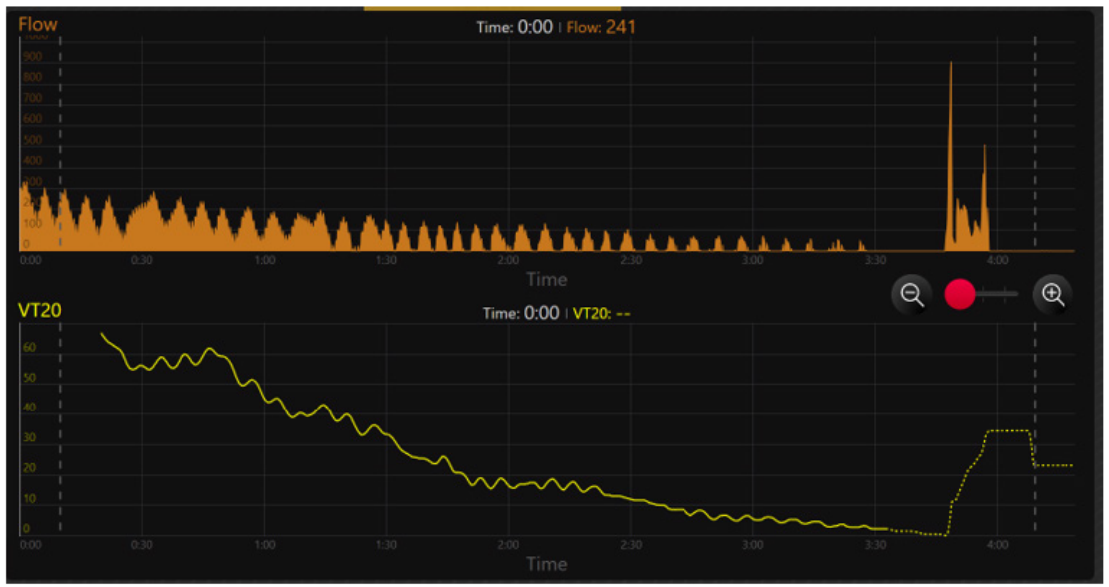
When the fissures between lung lobes are incomplete and collateral ventilation is present, treated lobes may reinflate. This may reduce or even prevent the effectiveness of endobronchial valves.

Identifying Fissure Integrity[11]

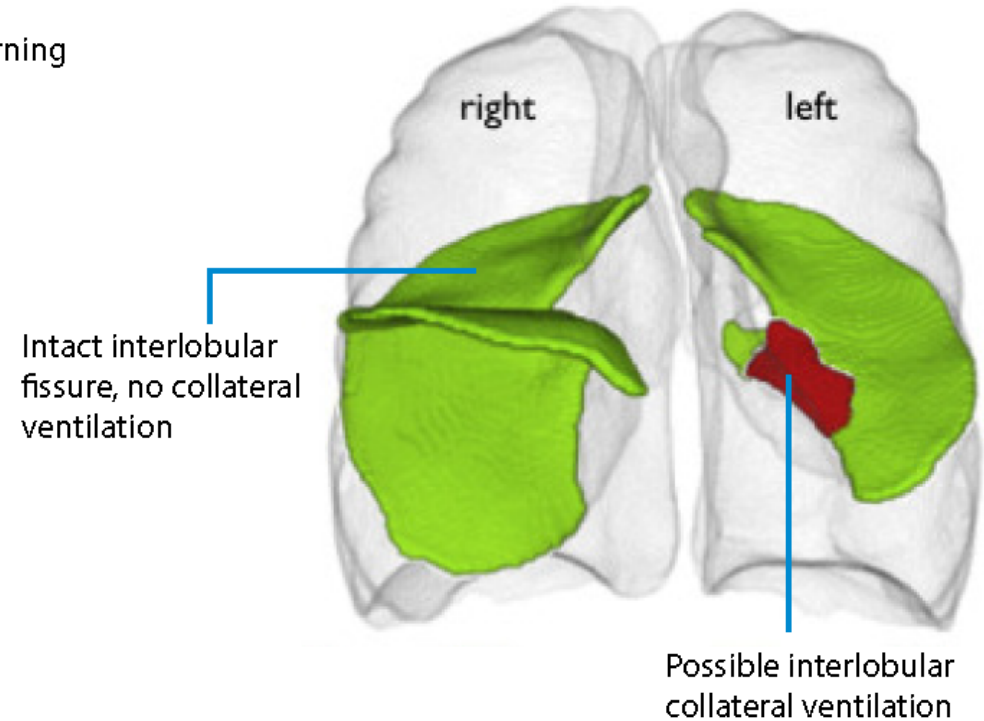
Direct Measurement

Airway occluded here

Airway reopened with flow returning



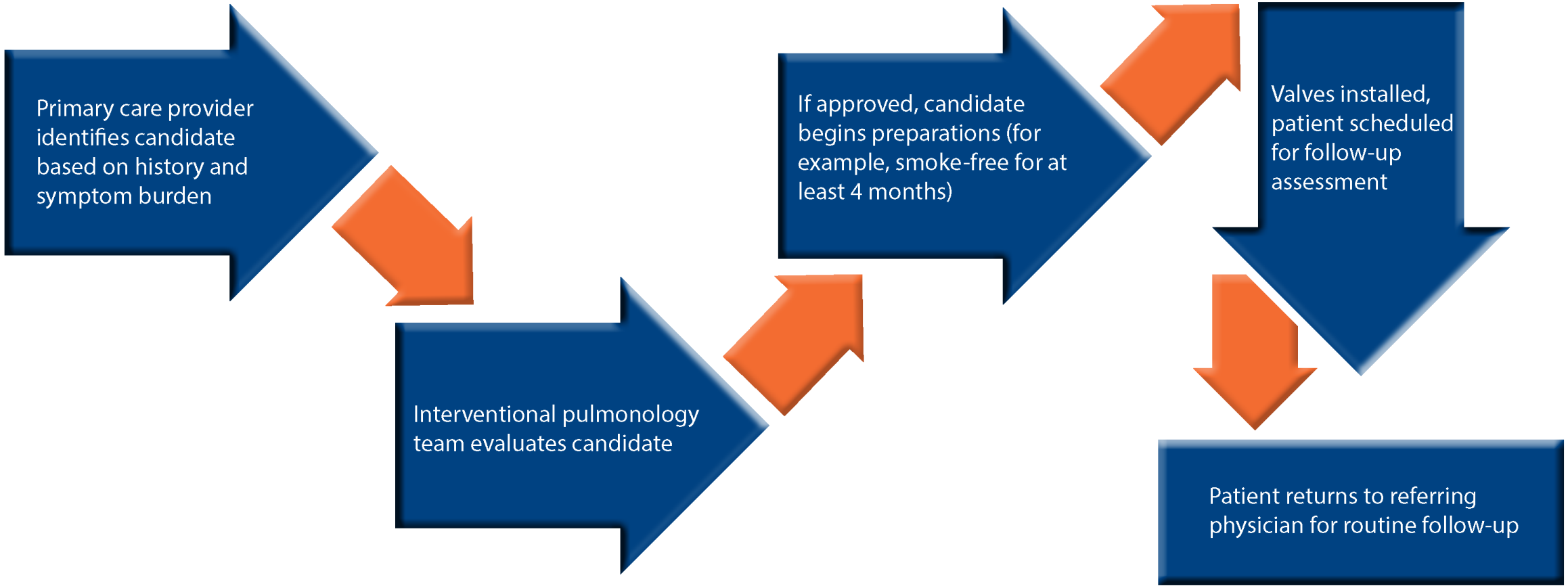
Quantitative Analysis of High-Resolution CT



Contraindications[12]

- Absence of sufficient hyperinflation to have a clinical impact
- Frequent COPD exacerbations
- Incomplete interlobular fissures
- Current smoking status
- Active infection
- Allergy to nitinol, nickel, titanium, or silicone
- Presence of giant bullae

Referral Process

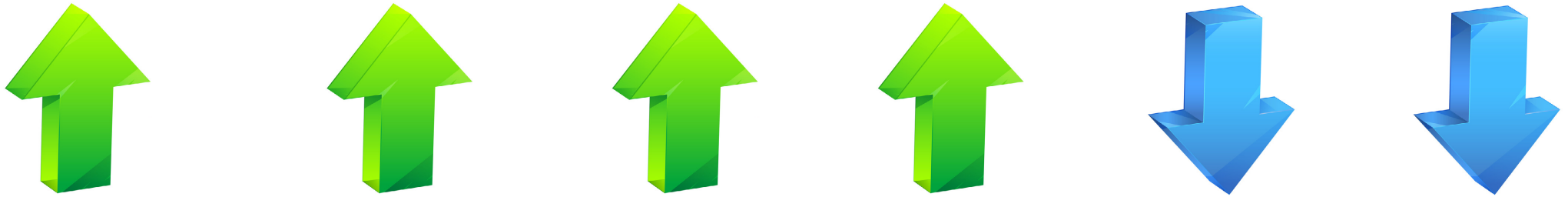


Please note: Process and eligibility criteria may vary depending on organizational policies.

Outcomes

BLVR Benefits (LIBERATE Trial)

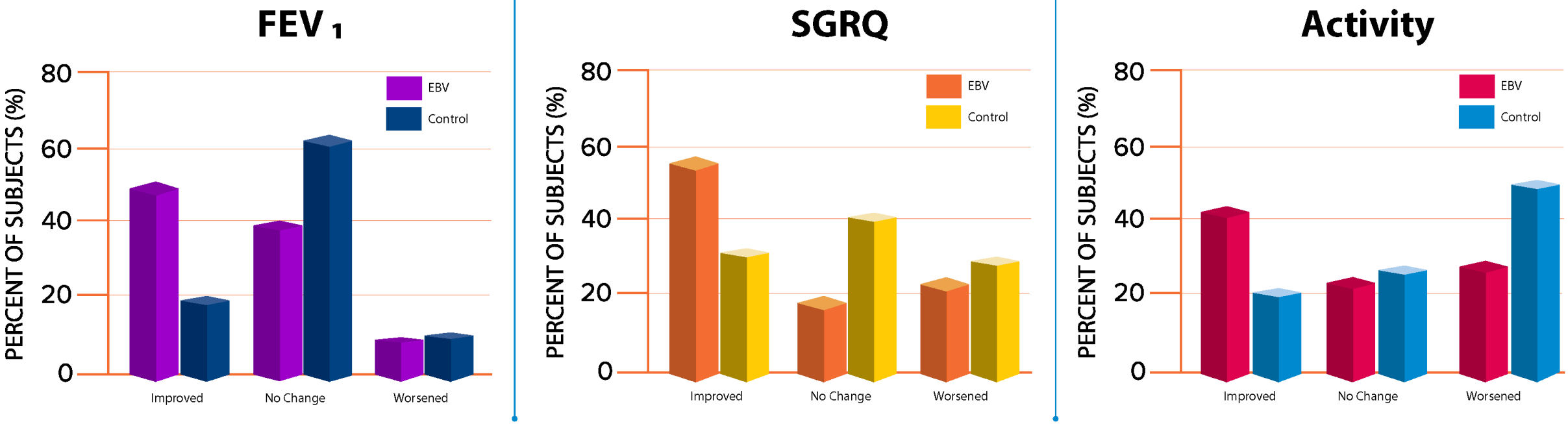
One of the first comprehensive, multicenter, randomized controlled trials to measure the safety and efficacy of endobronchial valves found that at 12 months, post-procedure subjects with valves placed generally experienced:



- Exercise Capacity
- Health-Related Quality of Life
- 6-Minute Walk Distance
- Survival[13]
- Airflow Obstruction
- Dyspnea

These outcomes are similar to those experienced by those having surgical lung volume reduction, but with fewer adverse events and lower health care utilization.[14]

LIBERATE Trial



Patients receiving endobronchial valves saw improvements in airflow as measured by FEV_1, subjective quality of life as measured by the St. George's Respiratory Questionnaire (SGRQ), and activity tolerance as measured by 6-minute walk test (6MWT).

Safety Profile

Patients with valve placement are at higher risk for pneumothorax, especially in the perioperative period.[14,15] Patients who do experience pneumothorax still see similar benefits at 12 months (after resolution) compared with patients who do not.

This risk can be managed with close observation for at least one night (potentially longer).

The most common other complications include:

- Pneumonia
- COPD exacerbation
- Respiratory failure
- Valve migration

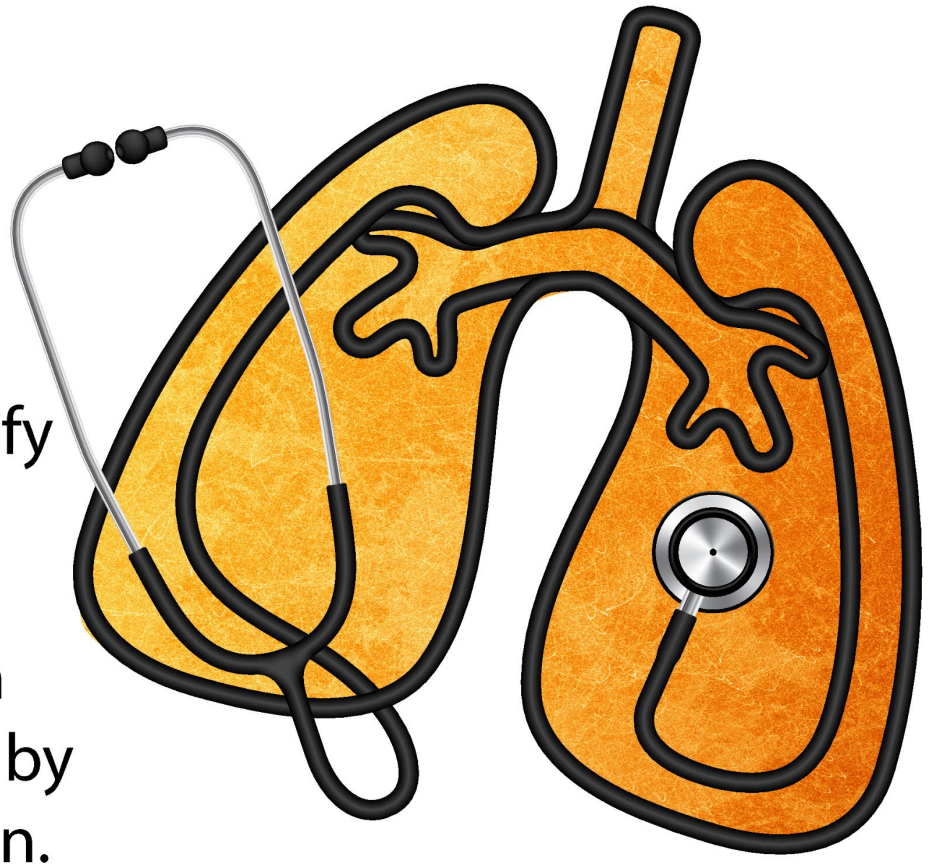
Endobronchial valves can be removed in the event of adverse reactions.

Summary

- Bronchoscopic lung volume reduction with endobronchial valves is a safe, effective alternative to surgical interventions.

- Patient selection is key, but a clinical workup at a BLVR treatment center will help determine identify those who may benefit from the procedure.

- Consider referral for BLVR for patients who are on maximal therapy for COPD but are still impacted by severe breathlessness secondary to hyperinflation.

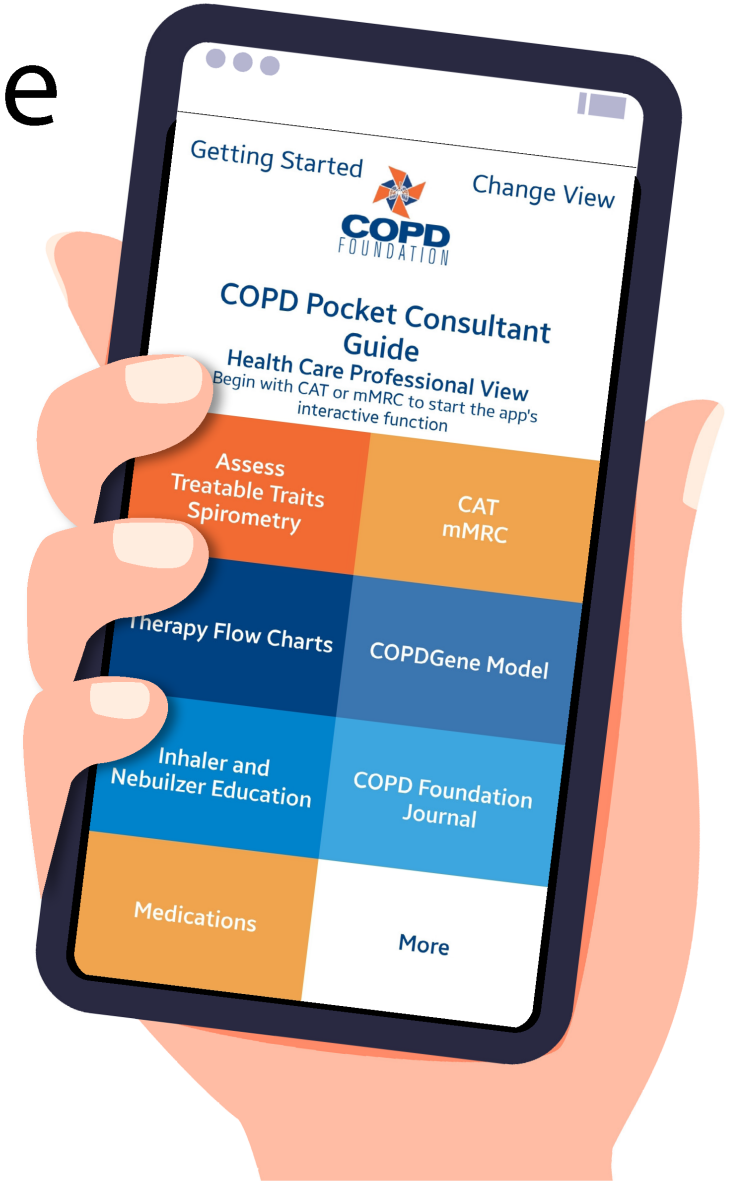


Additional Resources

COPD Pocket Consultant Guide

- Free
- Available for ***iOS*** and ***Android***
- Contains both Provider View & Patient/ Caregiver View to facilitate communication

Evaluation for Bronchoscopic Lung Volume Reduction is built into the Emphysema Therapy Flow Chart



Gold Strategy Report

- The Global Initiative for Chronic Obstructive Lung Disease (GOLD) publishes an annual report with the latest research updates and therapy recommendations.

- ***https://www.goldcopd.org***

Evidence for Bronchoscopic Lung Volume Reduction is rated "A" by the GOLD Scientific Committee

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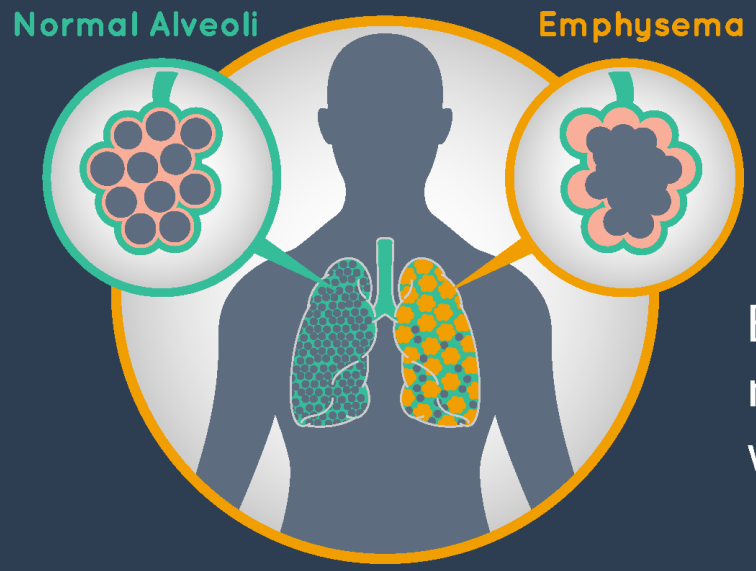
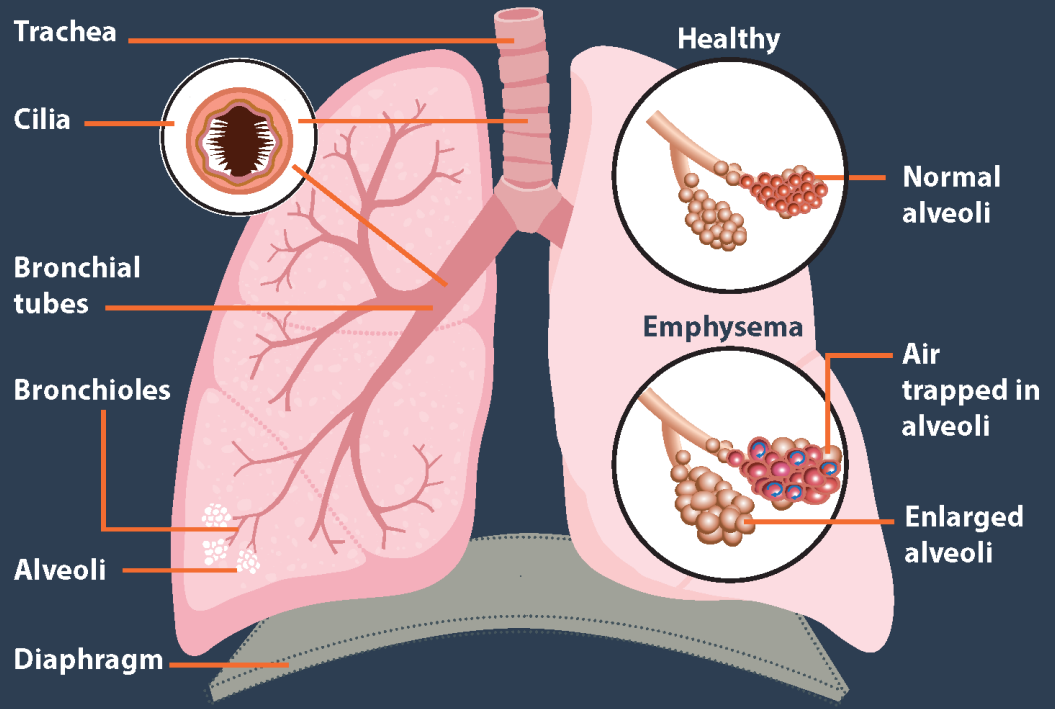
Patient Materials

What Is Emphysema?

Many people with COPD have emphysema. Emphysema is a condition where the air sacs in your lungs become damaged and do not move oxygen and carbon dioxide in and out of the blood.





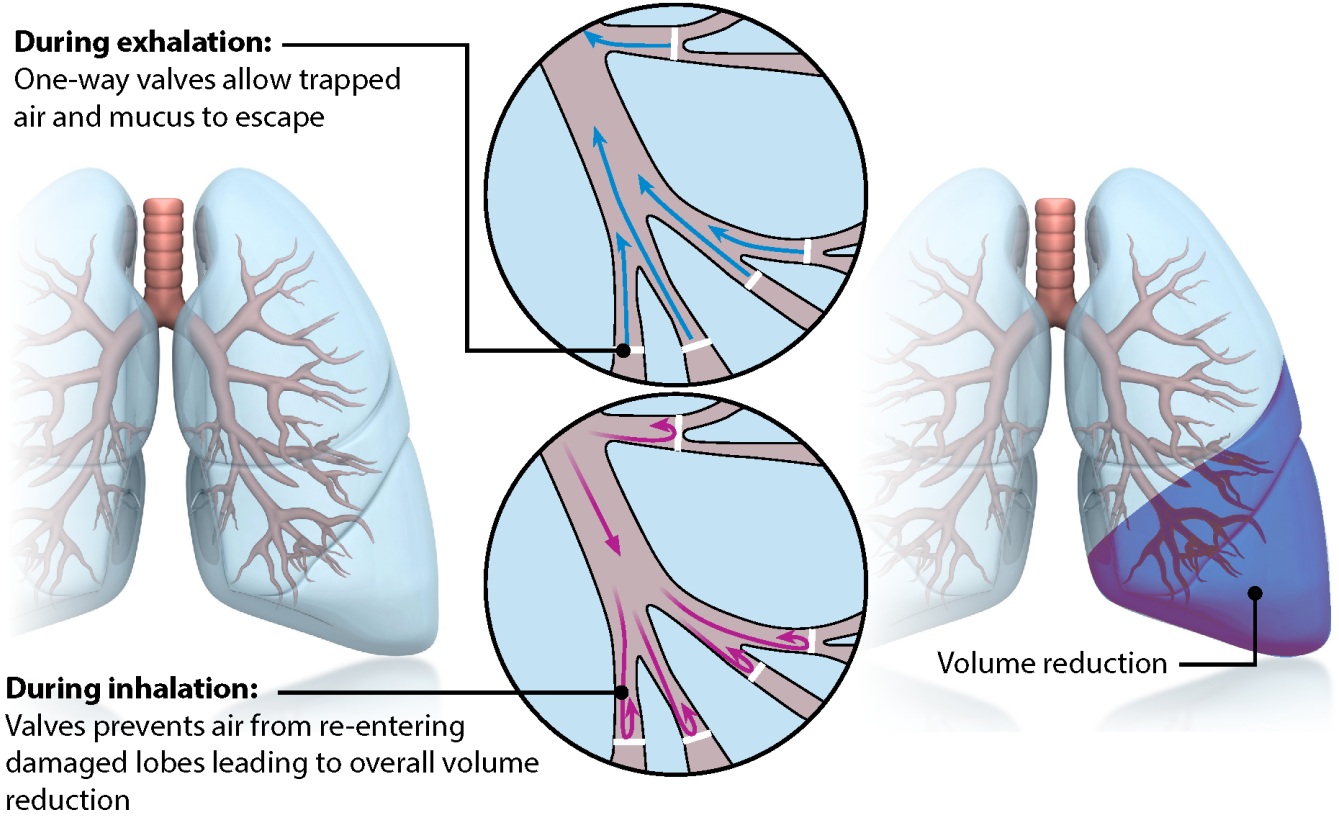
Emphysema can also make your lungs over-expand, which makes it harder for the still-healthy parts of your lung to work properly. This can make you feel very short of breath.

Why Should I Get Bronchoscopic Lung Volume Reduction (BLVR)?

This procedure can close off the over-inflated parts of your lung, allowing the healthier parts to expand more normally. In the US, this is done by placing one-way valves in some of your airways.

Once those sections expand, you may feel less short of breath and be able to do more activity.

People who have BLVR procedures have been shown to have more exercise capacity and improved quality of life.



What Will Happen During the Procedure?

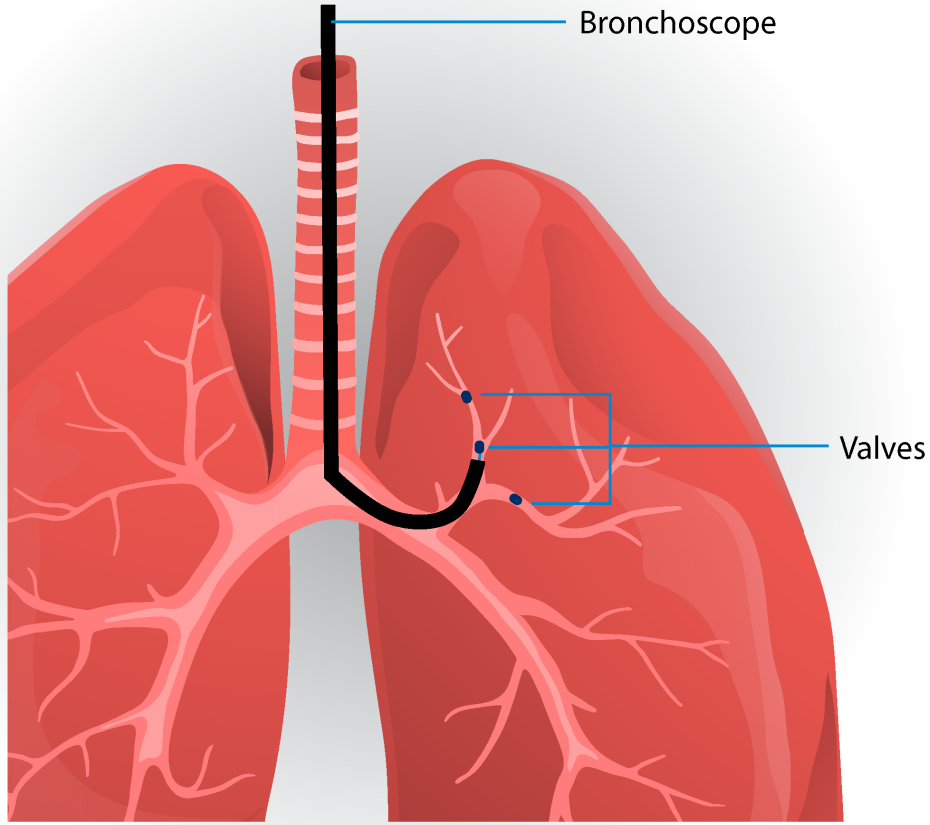
- In the hospital, you'll be given medicine to make you fall asleep. Once asleep, a tube will be placed in your throat and you will be put on a machine to help you breathe.

- A small tube called a bronchoscope will be pushed down the breathing tube to different parts of your lungs. In the appropriate places, your doctor will use the bronchoscope to install a valve.

- You will have somewhere between 3 and 5 valves placed.

- You will have to spend at least one night in the hospital.

- The valves are designed to be permanent but may be removed if necessary.



How Will I Know If I Qualify?

Your doctor will have you undergo a series of tests, including

- Pulmonary function testing (PFT)
- High-resolution CT scan
- Arterial blood gas (ABG) sampling
- 6-Minute Walk Test (how far you can walk in 6 minutes)

You must have quit smoking for several months before the procedure!

Your doctor may also have other requirements.

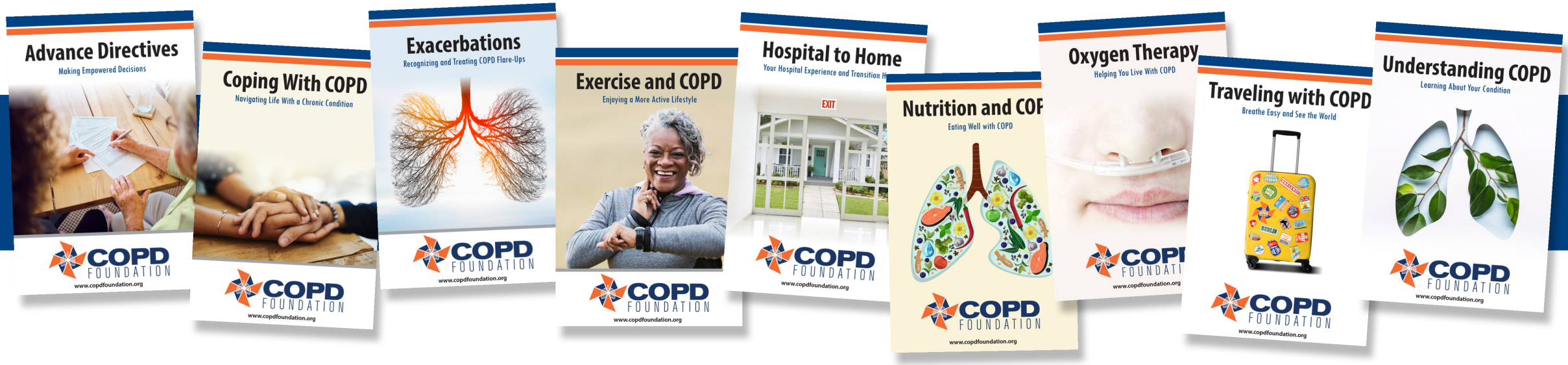
Additional Resources

The COPD Foundation invites you to check out our resources to help you learn more about COPD!

Guides for Better Living: Learn about different aspects about COPD, including how to cope with symptoms, therapies to improve your quality of life, and how to recognize flare-ups. *http://copdf.co/education-materials*

COPD360social: Connect with others on the COPD journey, share thoughts and ideas, and ask questions to both peers and clinical experts in our specialized online community. *http://copdf.co/COPD360social*

Download our COPD Pocket Consultant Guide app (free for both *Android* and *iOS*) to develop an individual COPD action plan, get prompts and reminders for your next office visit, and much more.



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