

# LUNG VOLUME RECRUITMENT FAQs

## WHAT IS LUNG VOLUME RECRUITMENT (LVR)?

Lung volume recruitment (LVR) is a technique used to improve Peak Cough Flow (PCF) by inflating the lungs to their maximal insufflation (inhaling) capacity (MIC) (i.e. taking in as much air as physically possible). LVR is commonly called breath-stacking.

## WHAT IS THE LVR KIT?

The LVR kit is a modified manual resuscitation bag with an extension and a one-way valve. An LVR kit is used to assist with breath-stacking.

The LVR kit is **NOT** an emergency resuscitation device. If used for resuscitation in a closed circuit environment, the LVR kit one-way valve will **NOT** allow the individual to exhale and may cause a tension pneumothorax.

## WHO BENEFITS FROM LVR?

Individuals with weak inspiratory and expiratory muscles and decreased lung volume usually benefit from routine use of a lung volume recruitment (LVR) kit. Weak inspiratory and expiratory muscles are associated with neuromuscular diseases (e.g., amyotrophic lateral sclerosis, muscular dystrophy, post-polio syndrome, spinal cord injury or muscular skeletal conditions (e.g., kyphoscoliosis). The individual must be alert, cooperative and able to communicate.

## WHY WOULD YOU PERFORM LVR?

- Increase lung volume;
- Improve cough effectiveness and secretion clearance;
- Increase mechanical compliance and thoracic range of motion;
- Decrease atelectasis; and
- Increase speech volume.

## WHEN DO YOU PERFORM LVR?

In the absence of contraindications, the LVR kit should be introduced when the Peak Cough Flow (PCF) is < 270 L/min (Normal is above 400 L/Min). The LVR kit should be used routinely as part of daily living: at least 2-3 times per day with 3-5 maximum insufflations (lung stretches) per session.

## WHEN SHOULD YOU NOT PERFORM LVR?

Use of the LVR kit is not recommended in the presence of hemoptysis, recent or current barotrauma, bullous emphysema, severe obstructive pulmonary diseases, hypotension. Do **NOT** use the LVR kit if the individual has an inflated tracheostomy cuff or endotracheal tube.

## CLINICAL CONSIDERATIONS

- Nose clips are not always needed
- Always coordinate gentle LVR kit compression with individual inspiratory effort.
- Ensure there are no leaks.
- The LVR kit should be used with an individual initiated spontaneous maximal inspiration, however starting from a more relaxed lung volume such as functional residual capacity (FRC), or end of normal exhalation is sometimes easier when the individual is first learning the technique.
- Encourage the individual to accept as much air as possible; the added volume should not cause dizziness.
- Some individuals experience lung and slight chest wall discomfort with the LVR kit technique due to over stretching of soft tissues, this is normal.
- During the MIC breath-hold period, an individual with quadriplegia and diminished muscle tone may develop low blood pressure particularly if upright in a chair. An abdominal binder may be helpful to prevent this. Some individuals may need to be treated in a more recumbent position. The abdominal binder may also increase the effect on the chest wall (thoracic range of motion) by limiting diaphragm descent.
- Change the interface when mouth leak persists. However, if using a full-face mask, LVR kit therapy becomes a closed system; the LVR kit one-way valve will not allow the individual to exhale and may cause a tension pneumothorax; be attentive to the individual signal that will identify when MIC has been reached.

# LUNG VOLUME RECRUITMENT FAQS

## HOW DO YOU PERFORM THE LVR KIT WITH A TRACHEOSTOMY?

Use of the LVR kit is possible with a cuffless or cuff deflated tracheostomy provided there is adequate patency around the tracheostomy and the stoma is tight to the tracheostomy tube shaft. It is best to cork the tracheostomy and introduce the technique by mouth. The LVR kit may be introduced directly through the cuffless or cuff deflated tracheostomy tube if the vocal cords are functional and the individual is able to hold the augmented lung volume.



### GLOSSARY

**Atelectasis** - A complete or partial collapse of a lung or lobe of a lung develops when the tiny air sacs (alveoli) within the lung become deflated.

**Barotrauma** - Injury from over pressure.

**Bullous Emphysema** - A form of emphysema that is characterized by damaged alveoli that distend to form exceptionally large weak air spaces.

**Functional Residual Capacity (FRC)** - Is the volume of air present in the lungs at the end of passive expiration. This is where gas exchange takes place.

**Hemoptysis** - Coughing up blood

**Hypotension** - Low blood pressure

**Maximal Insufflation (Inhaling) Capacity (MIC)** - Maximum amount of inhaled air.

**Peak Cough Flow (PCF)** - Measurement of the patient's ability to cough.

**Quadriplegia** - Partial or total loss of use of all four limbs and torso.

**Tension Pneumothorax** - The progressive build-up of air within the chest, usually due to air leaking from a damaged lung.

# LVR FAQS