

Chest Physiotherapy including Lung Volume Recruitment Techniques and Assisted Cough: Supporting Information Leaflet (6)

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Introduction

For many people with a neuromuscular disorder, muscle weakness can affect the breathing muscles. This means it is difficult to:

- Take in a large breath (inhalation)
- Mobilise secretions by taking long forced breaths out
- Get rid of secretions by coughing

This leaflet helps explain some of the Lung Volume Recruitment Techniques and Assisted Cough Techniques that your physiotherapist has taught you.

Lung Volume Recruitment

The term Lung Volume Recruitment (LVR) refers to the amount of air our lungs can take in (or recruit). In order to take a breath in and out, we use our respiratory muscles, diaphragm and abdominal (tummy) muscles. In some neuromuscular conditions, it is not only the muscles of the arms, legs and body that become weaker, but also the muscles that help us breathe (respiratory muscles).

If we have weak respiratory muscles, we are often not able to open up and expand our rib cage fully and take in a really deep (maximal) breath. If we are not able to take in a full breath, our lung volume is low and we therefore have less air to breathe out. This is generally not an issue when we are in a resting phase, breathing in and out quietly but it becomes problematic when we need to cough. In order to cough effectively we need to be able to take in a good volume of air so we can expel it forcefully in the form of a cough to remove any obstruction (e.g. mucous) from the airway.

Everyone's airways produce mucous that works to lubricate the airway and forms part of our natural defence system. When we have a cold or respiratory tract infection, our body produces more mucous to try and clear the infection. For example, we have to blow our noses more often, or perhaps feel the need to cough and clear our chest. This is a natural defence mechanism and works well to help us remain healthy. However, if our muscles are weak because of a muscle condition, this natural defence mechanism can cause problems.

When we start to produce more mucous, we do not have the same capacity to cough and clear it because we cannot take in a big deep breath, so we can forcibly exhale it in a cough, to take the excess mucous with it.

If we have mucous in our chest that we cannot get rid of, this mucous can become infected or cannot help us clear an already underlying infection as we cannot spit it out. This can lead to a chest infection or pneumonia. It is therefore important that we learn Lung Volume Recruitment and Assisted Cough techniques to help clear the infection. You may also need medical treatment and antibiotics.

The Cough Process

In order to cough effectively we need to have the four components of cough working together:

- Good inspiratory muscles to take air in
- A compliant chest wall (“springiness” in the rib cage)
- A strong glottis (voice box)
- Strong muscles (respiratory muscles and abdominal muscles) to force the air out

When we cough we automatically take a deep breath in, close the glottis at the back of our throat and tighten our tummy muscles. This action means that we build up pressure in our tummy which forces the air out of our lungs when we open our glottis (voice box).

In some neuromuscular conditions it can be difficult to fully close the glottis and if the air leaks through we are not building up the back pressure to cough out forcefully. Sometimes we have difficulty timing everything involved as coordinating this process requires muscle strength and control, and if our muscles are weak, then this can be tricky. This means the cough process will be weak and often ineffective.

If we are producing an ineffective cough, the respiratory muscles can fatigue as we need to cough more often to try and clear the secretions. The good news is there are ways in which we can assist a more effective cough. This primarily starts with taking a deep breath in using LVR techniques.

Lung Volume Recruitment (LVR)

We can help push more air into the lungs with the use of an **ambu bag**. There are various ways to do this and there is no “best” way as each person is different. The more you get used to doing this the better you become.

It may not always be the same person who helps you with this technique. Different people may have a slightly different way of assisting the air into your lungs. Some people may do it more quickly whilst others will push on the bag more slowly giving you the same amount of additional air over a longer period of time. This in itself can be a good thing as it mirrors the way we breathe naturally sometimes quickly, sometimes slowly, however, you will know the way that you prefer and always let the person who is working with you know if you want it done differently.

When you are getting used to this technique you may feel a little anxious but remember, it is you who is in control. Developing a good relationship with your caregiver or Personal Assistant (PA) is essential as it is only you who can say if you need the air to be assisted into your lungs at a faster or slower pace. It will also depend on how you feel as some days you may prefer it one way and other days you may prefer it slightly different. Always discuss this with your PA before you start the technique to make sure you both know what to expect.

In order to deliver a bigger breath we need the following equipment:



Your ambu bag will look something like this and will have either a face mask or mouthpiece for you to use. Whatever feels more comfortable for you.

When to use your ambu bag

If you have a weak cough, we recommend you use the ambu bag up to four times a day. Try to use it first thing in the morning to clear any secretions that may have gathered overnight and again last thing at night before you go to bed. We would also recommend you use the ambu bag before meals such as lunch and dinner.

You can use the Ambu bag more often if you need to cough or if you have a chest infection. However, make sure you have an adequate rest in between each cycle of breathing as you can become quite tired if you use it too often.

How to use the ambu bag

We recommend an ambu bag with a one way valve fitted. The ambu bag should be clearly marked with a notice, "Not to be used for resuscitation". Ambu bags for resuscitation will **NOT** have a one way valve.

You are best sitting up but you can use it lying down with your head slightly raised. Sitting up is usually easier to get rid of the secretions from your mouth. When sitting, support your head against the back of your wheelchair or bed. If you are in a wheelchair make sure your brakes are on or the chair is against a wall so it doesn't move when practising an assisted cough.

If you are good at holding your breath, the following technique may work well for you:

- Start by taking three normal (Tidal) breaths. This serves as getting you ready to take your big breath in.
- Next, take a deep breath in and hold.
- Immediately have your PA place the mouthpiece into your mouth and make sure there is a good seal. If you cannot use the mouthpiece, you can use a mask which the PA will place over your nose and mouth and hold firmly to prevent the air from escaping.
- Your PA will then gently squeeze the ambu bag and at the same time you can take a second breath in.
- Repeat again if possible. Keep breathing in until your lungs are full. You may feel a stretch in your chest and this is normal.
- Exhale or cough as desired.
- Maintain eye contact with your PA throughout the process so you can use your eyes to tell them if you want to stop and have a break.

If holding your breath or coordinating your breathing with your PA is tricky, you can do all your breaths by breathing in with the ambu bag rather than taking that first breath in and holding until the ambu bag is in place. This helps you achieve your full inhalation quicker. Experiment with it and find what works best for you.

This technique should not cause dizziness or chest discomfort – in the event of these symptoms occurring, stop treatment and take a rest.

When your lungs are full, you will be able to breathe out longer. This lets the secretions / mucous move into the upper airways, where you can cough or spit it out.

Each person has a different level of tolerance; some may feel they want three or four breaths with the ambu bag and others may need just one or two. After the long breaths out, try to cough. Once you have coughed effectively, complete the treatment with a few more breaths in.

Care of the ambu bag

Please do refer to your local hospitals policy on how to care for your ambu bag. In general we recommend the ambu bag is replaced at least every six months and the filter and mouthpiece / mask, every three months. If you have a chest infection, discard the bag once the chest infection has cleared and use a new one.

Rinse out and leave your mouthpiece / mask to dry overnight but do wash more often if required.

Assisted Cough Techniques

An effective cough is dependent on the force of the breath out. If your muscles are weak and you are unable to force the breath out quickly, you may want to ask a PA to help you.

After filling your lungs with as much air as you can, hold your breath. Your PA should place their hands on your side at the middle / lower end of your rib cage. Next cough out, and as you cough, your PA can support your sides with a gently push to help you cough the air out more quickly. Sometimes a double push is required if you are going to need two short coughs and the timing of this takes a little practice.

An alternative hand position is at the front of the chest with the PA's hands placed underneath the collarbone. Your physiotherapist will show your PA how to do this effectively. Alternating the hand position may be useful to avoid pressure on the same area, particularly if you have a chest infection and you are doing this assisted cough technique more often.

Conclusion

This information leaflet is intended to be used to remind you of the techniques your physiotherapist has taught you. If you have any questions or require further information please do contact your local respiratory or hospital physiotherapist. You can also get in touch by contacting

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