NSW Spinal Outreach Service
& Rural Spinal Cord Injury Service

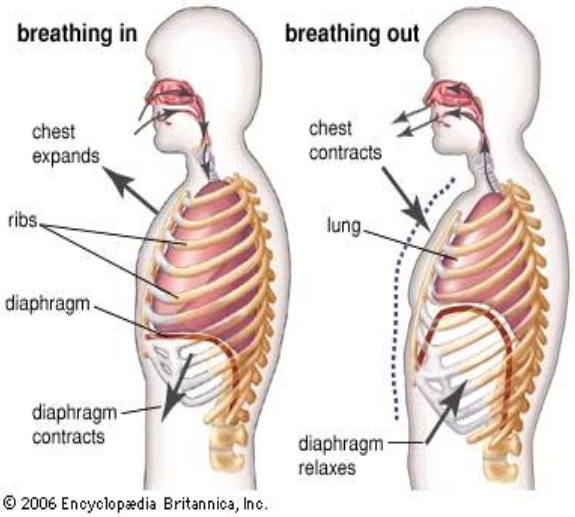
Respiratory Health

Respiratory System

The respiratory system (also known as pulmonary system) consists of two main parts; the windpipe and the lungs. The respiratory system has three primary functions:

- To bring oxygen into the body via the blood stream when a person inhales
- To eliminate carbon dioxide from the body when a person exhales
- To help maintain body fluids at a stable acid-base balance

To breathe a combination of four muscle groups are usually required. The diaphragm, a strong, dome-shaped muscle that separates the abdomen and chest cavity, is normally the main muscle when you inhale. The intercostals are located between your ribs and help expand your ribs as you inhale. The neck muscles help expand your upper chest. The abdominal muscles work together with these other muscle groups and enable you to cough.



After SCI

Respiratory changes and problems can arise after a spinal cord injury. This is due to the disruption of the signals sent from the brain to control the breathing muscles. The amount of control that is lost after a SCI depends on the level and completeness of injury. Individuals with complete cervical and also thoracic injuries are the most affected. Lumbar and sacral injuries do not directly affect respiration. The higher the level of injury, the greater the loss of inspiratory muscle control. Individuals with high cervical injuries will often be dependent on a ventilator or require some ventilatory support. Those with high thoracic injuries are usually able to breathe independently but due to decreased control of their abdomen and intercostals will need assistance to cough.

Respiratory Complications

Any loss of respiratory muscle control will weaken the pulmonary system, and decrease the lung capacity. If a part of the lung does not fill with air over a period of time, the little air sacs can collapse. This is called atelectasis and happens most commonly in the bases of the lungs due to shallow breathing. This means that less oxygen can cross into the blood stream or infection can develop.

The inability to cough effectively is also of major importance to a person with a spinal cord injury. If you are unable to remove dust, mucus or saliva from the lungs, bacteria will be able to grow and cause an infection. Respiratory complications are the leading cause of death for individuals with SCI and it is therefore important to know how to recognise the symptoms of respiratory complications such as pneumonia and to know what actions to take:

Signs and Symptoms	Actions to take
▪ Shortness of breath ▪ Fever ▪ Pale skin ▪ Increased phlegm/moist cough ▪ Changes in colour of secretions ▪ Feeling of tightness in the chest ▪ Weakness or fatigue ▪ Decreased appetite	▪ Contact you doctor early ▪ Regular deep breathing ▪ Avoid the build up of secretions in the lungs by doing frequent coughs (assisted if required) ▪ Flu vaccinations to prevent further infections

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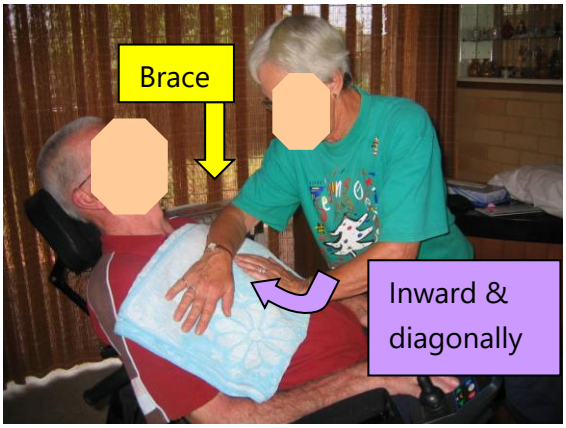
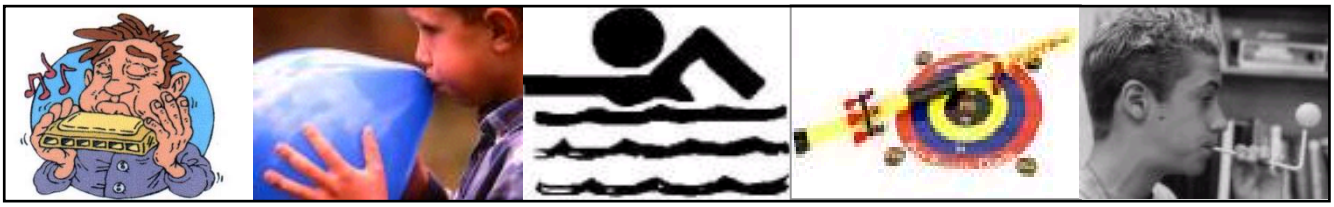
Assisted Cough Technique



- Tilt the powered wheelchair to approximately 45 or
- Lie the client down (best method).
- Place your forearm across the client's chest and the other hand approximately 10cm below the sternum into the belly.
- Keep your back straight and knees slightly bent.
- Ask the client to "Take as deep a breath as you can"
- And then direct say "and now cough" – time your actions of your hand and forearm with the client's effort to cough
- NB: Your lower hand (purple arrow) is to be directed in and diagonally upwards….if you push down into the belly this will cause discomfort and an ineffective cough.

Tips on staying healthy

1. **Cough Regularly.**
2. **Maintain good posture and mobility**. Sit up in your wheelchair everyday and turn regularly in bed to prevent build up of secretions
3. **Regular deep breathing**. Blow-darts, singing, blow bubbles, blow up balloons, play a wind instrument, use an incentive spirometer, or try lifting playing cards by sucking through a straw.
4. **Drink plenty of water.** This helps congestion from becoming thick and difficult to cough up.
5. **Do not smoke.** Smoking decreases the amount of oxygen in your blood, reduces your natural ability to clear secretions, destroys lung tissue and increases your risk of chest infections.
6. **Exercise.** Everybody benefits from exercise. Talk to your doctor or physiotherapist about exercise options that are right for you. Exercise helps improve strength and endurance, keeps your lungs well ventilated and generally makes you feel good. If you have a high level of injury, breathing exercises are just as good.
7. **Wear an abdominal binder.** This assists your abdominal muscles and helps keep your diaphragm in a more optimal position.



Obstructive Sleep Apnoea (OSA)

Sleep apnoea is a growing concern for people with spinal cord injury. Typically it is a stop in breathing during sleep. It appears that 40%-60% of tetraplegic individuals may suffer from sleep apnoea suggesting that people with respiratory muscle weakness may be prone to developing this condition. Male gender, increased age and increased weight are also risk factors.

Do you experience the following symptoms? Snoring/gasping Breathing stops, choke or struggle for breath Morning headaches Daytime drowsiness/difficulty concentrating	Use of overnight non-invasive ventilation – often called CPAP or BIPAP can help relieve the symptoms of OSA and improve your long-term respiratory and cardiac health! If you think you may have sleep apnoea talk to your doctor for advice on testing and management.