

# Airway Clearance Techniques

Colleen Stevens

Physiotherapist

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Health New Zealand  
Te Whatu Ora

# Airway Clearance Techniques (ACT)

- Taught to help those with excessive airway secretions
  - Aims to unclog the airways and reduce symptoms
  - Reduces the frequency of exacerbations / chest infections
  - Adjunct to treating chest infections \*\*\*\*

# Conditions in which it is commonly taught

- Bronchiectasis
- Cystic Fibrosis
- COPD
- Bronchitis
- Pneumonia
- Sometimes Asthma

# Airway Clearance Techniques

- Acute in the in-patient setting
  - Usually done by a physiotherapist
- Outpatient setting\*\*\*
  - Physiotherapist not always available
  - Chronic Respiratory condition
  - The patient is taught how to do AC independently
  - Self-management plan is given

# What makes us think that this person needs to be taught AC?

- Chronic sputum production with repeated infections
- Cough and sputum causing distress and impacting on QOL
- Radiological evidence of mucus retention and/or plugging with associated risks of disease progression.

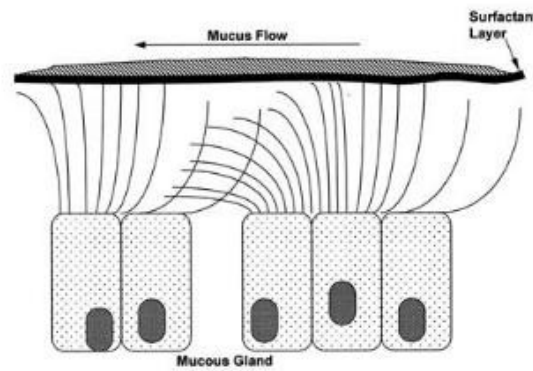
**Effective airway clearance is about  
mucus flow!**



# Muco-ciliary clearance

Mucus layer  
97% H<sub>2</sub>O. Salt  
mucins and protein

Cell Layer



Periciliary layer –  
efficient lubricating  
layer for ciliary  
beating.

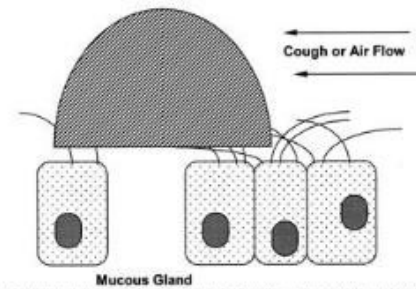


FIG. 1. CILIARY CLEARANCE VERSUS COUGH CLEARANCE. TOP: AIRWAY EPITHELIUM, CILIA AND SURFACTANT AND MUCUS LAYER DURING NORMAL OPERATION OF CILIA. BOTTOM: HYPERSECRETION AND COUGH CLEARANCE IN THE PRESENCE OF CILIARY DYSFUNCTION.

**Slide 7**

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**CS1**

Colleen Stevens, 15/04/2026



Cilia in the airway



Coral Reef



# Key Mucus changes in disease

- Dehydrates making it more viscous
- More mucin therefore more gel like
- More DNA and neutrophil debris from chronic inflammation
- More bacteria with biofilms like pseudomonas

**It is more sticky!**



# Components to consider for airway clearance

- Volume and quality of the mucus
- Cough Strength
  - Relates to lung volume and muscle strength and tone
- Air Flow
  - Airway diameter and airway compliance
- Duration
  - Fatigue, time available
- Adherence
  - What is the patient actually doing. Probably only 10% have good technique?

# Cough

- A cough is divided into four distinct phases:
- **Inspiratory**, deep inspiration.
- **Compressive**, closure of the glottis, contraction of expiratory muscles.
- **Expiratory**, glottic opening.
- **Relaxation**, relaxation of intercostal and abdominal muscles.
- *A cough reduces in strength with each cough during a bout of coughing*

# What techniques can we use?

- Cough
  - Need cough PEF of around 220 litres per minute
  - FVC of at least 1 litre
- Breathing exercises and huff technique
  - Adjuncts
    - Equipment
    - Positioning
    - Manual techniques
- Humidification
  - Hydrate, hydrate, hydrate!
- Activity / Exercise

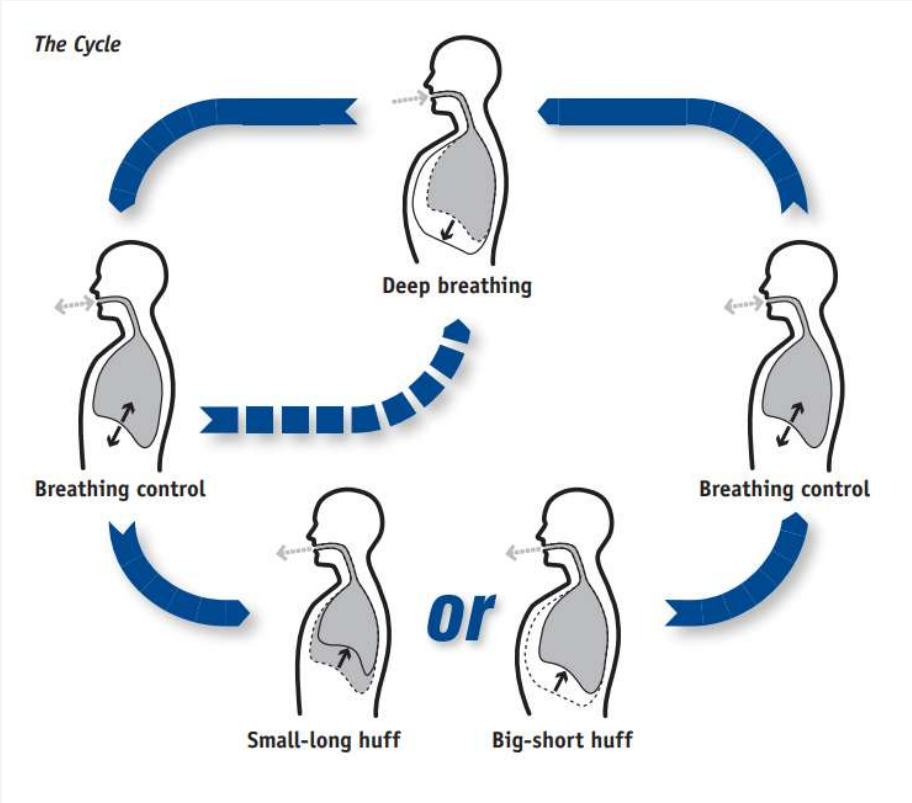
Airway clearance is taught as self management

Patient preference is always considered

# Cough Peak Flow

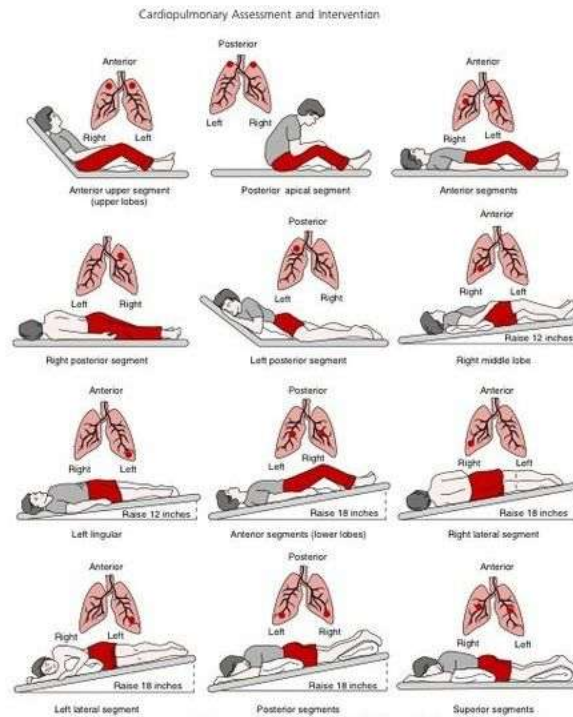


# Active Cycle of Breathing - ACB



# Postural Drainage and Positioning

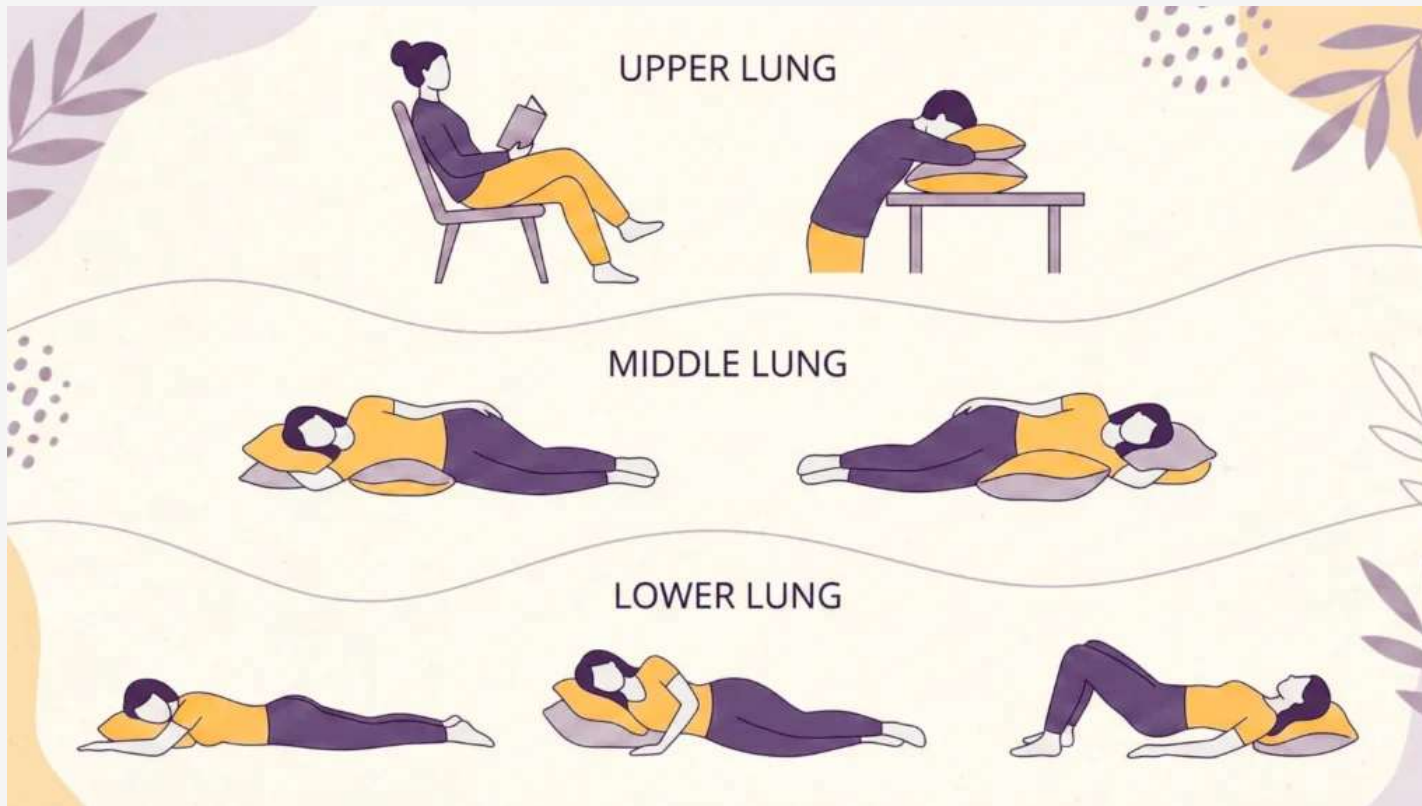
## Patient Positions for Postural Drainage



Patient positions for postural drainage. (Modified from Potter PA, Perry AG: Fundamentals of nursing: concepts, process and practice, ed 4, St Louis, 1997, Mosby. In Wilkins RL. Egan's fundamentals of Respiratory Care, ed 9. St. Louis, 2009, Mosby).

[www.study.pk.com](http://www.study.pk.com)

# Positioning



# Adjuncts and Equipment



# Devices



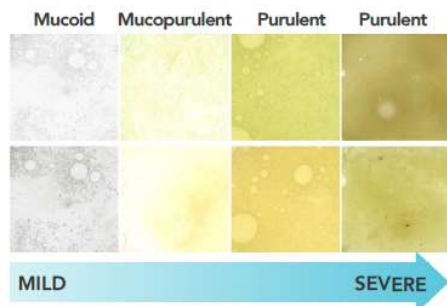
# Oscillating Positive Expiratory Pressure (O-PEP)

- The positive pressure in the airways holds the airway open to allow mucus flow.
- Air can get behind mucus plugs and push them towards larger central airways
- The on/off pressure or oscillations shake or loosen the mucus from the airways wall
- These oscillations help reduce the viscoelasticity of the mucus

# Stepwise approach to teaching Airway Clearance

- Keep it simple!
- Is the patient drinking enough fluids to keep well hydrated?
- Start with ACBT
  - Check technique
  - Stress they do this twice a day for at least **10 minutes**
- Add O-PEP if sputum sticky and difficult to shift
  - Check technique
- Add saline nebs (isotonic vs hypertonic saline?)
  - Must use breathing exercises taught while on the nebulizer
- \*\*\*Heated humidification such as high flow?

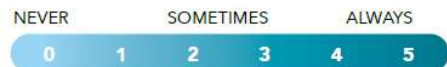
## Sputum colour chart



## Breathlessness score (mMRC)

- 0 I only get breathless with strenuous exercise.
- 1 I get short of breath when hurrying on the level or walking up a slight hill.
- 2 I walk slower than people of the same age on the level because of breathlessness or have to stop for breath when walking at my own pace on the level.
- 3 I stop for breath after walking about 100 metres or after a few minutes on the level.
- 4 I am too breathless to leave the house or I am breathless when dressing.

## Tiredness level score



## Tips for managing your breathlessness

Scan this QR code to link to the ARFNZ website for tips on managing your breathlessness.



## Additional tips for staying well

- Your other health conditions are well-controlled
- Your vaccines are up-to-date
- Have a 'back pocket prescription' of antibiotics at home for a chest infection
- Stop smoking and/or vaping
- Eat healthy meals.

Plan prepared by	<input type="text"/>
Next review date	<input type="text"/>
Signature	<input type="text"/>



# Bronchiectasis (pūkahukahu hauā) Action Plan



PRODUCED BY

The Thoracic Society of  
Australia & New Zealand and  
Asthma and Respiratory Foundation NZ

info@asthmaandrespiratory.org.nz

asthmaandrespiratory.org.nz

This Bronchiectasis Action Plan belongs to:

**Better breathing, better living.**

Name

Healthcare practitioner

Date of plan

Healthcare practice phone

**Know your symptoms...**

**NORMAL FOR ME**

**When I am well my 'normal' is:**

- Cough: (every/most/some days)
- Sputum (phlegm) colour
- Sputum amount
- Breathlessness score  mMRC
- Tiredness level
- Last sputum test

**Know when and how to take your medicine...**

**My daily plan is to:**

- Do my breathing exercises for sputum clearance  times a day
- Take my usual medicines
- Be active every day
- Keep well hydrated
- Monitor my symptoms (cough, sputum, tiredness, breathing)

**I AM UNWELL**

**These signs suggest my bronchiectasis is worse:**

- I am coughing more
- My sputum colour is darker
- My sputum is more sticky
- My sputum amount is more than normal
- I am more tired and breathless
- I feel unwell
- I may have a fever
- I may have chest pain

**What should I do?**

- Increase my sputum clearance exercises
- Keep as active as you can
- Book an appointment to see my Healthcare team within five days. Talk to them about sending a sputum sample for testing
- Start antibiotics if I have a chest infection:  
Antibiotic name  dose   
 times per day for  days

**I AM VERY UNWELL**

**I am becoming more unwell despite treatment:**

- I am feeling worse despite starting antibiotics and increasing my sputum clearance

OR

- I am extremely unwell

**What should I do?**

- Use tips for managing your breathlessness on the [Breathlessness Quick Reference guide](#)
- Book an urgent appointment with my Healthcare team
- Dial 111 for an ambulance

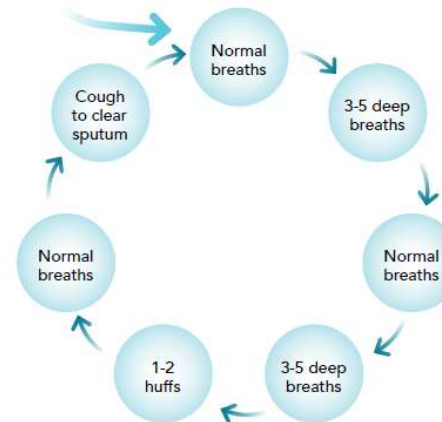
**MY PLAN**

**Breathing exercises for sputum clearance**

Every day do your breathing exercises for sputum clearance. This will help to control your symptoms and reduce chest infections. This is an example of a technique you could use:

1. Normal gentle breathing for a few breaths (breathe gently in and out through your nose, relaxing your upper chest).
2. Take a DEEP breath in till you are full, then breathe out. Do this three to five times.
3. Repeat step one and two.
4. Do one to two huffs.  
(Huff - take a normal breath in, then with an 'O' shaped mouth do a long blow out. Imagine that you are steaming up a mirror).
5. Do some normal gentle breathing.
6. Do a big double cough to clear the sputum.
7. Repeat these steps for 5-10 minutes.

Go to [bronchiectasis.com.au](http://bronchiectasis.com.au) to watch a video on sputum clearance.



# My Goals for every patient I see

- To establish effective clearance with the least amount of work to prevent fatigue and improve compliance
- Stress that AC is a fundamental treatment for reduction of symptoms and needs to be done **every day**
- Watch them demonstrate their technique
- Check every time they come to clinic. What are you doing, how often, how much?
- Provide a written plan

- Pryor JA, Webber BA, Hodson ME, Batten JC. (1979) Evaluation of the Forced Expiration Technique as an Adjunct to Postural Drainage in Treatment of Cystic Fibrosis. *Brit Med J* 2; 417 418.
- Caroline H. H. Nicolson, Robert G. Stirling, Bridgette M. Borg, Brenda M. Button, et al. (2011) The long term effect of inhaled hypertonic saline 6% in non-cystic fibrosis bronchiectasis, Science Direct 19 February 2012
- Guidelines for the physiotherapy management of the adult , medical spontaneously breathing patient. (2009) On behalf of the British Thoracic Society Physiotherapy Guideline Development Group, a subgroup of the British Thoracic Society Standards of Care Committee, and the Association of Chartered Physiotherapists in Respiratory Care, a clinical interest subgroup of the Chartered Society of Physiotherapy