

Acappella is a handheld device that combines the resistive features of a positive expiratory pressure (PEP) device with oscillations. The physiologic rationale is that by exhaling against resistance we slow down our expiratory phase of breathing. This slower exhalation against resistance or positive pressure generates a back pressure which in turn splints or stents open the more peripheral airways and moves the equal pressure or choke point more central and so lessens airway collapse distally. This prolonged exhalation time also allows for collateral ventilation to occur. So, that with the assist of the pores of Kohn, canals of Lambert and channels of Martin, mucus can be mobilized from the distal or peripheral airways to the larger more central airways and thereby enhances secretion clearance. However, the patient or individual must be able to generate adequate air flow to use this device.

A counterweighted plug and magnet directs exhaled air through a pivoting cone that generates airflow vibrations between 0 to 30 HZ. There is a knob at the distal end which adjusts the proximity of the magnet and the counterweighted plug and thus, the adjustment of the frequency, amplitude and mean pressure.

The device consists of a mouthpiece though a mask is an option, the patient end on which the mouthpiece is attached, a one way inspiratory valve and a dial to adjust the expiratory resistance/frequency. At the distal end, there is a 22 mm fitting to which nebulizer treatments can be placed in line with the device.

There are 2 devices available. The **green or high flow device** suitable for most patients. The expiratory flow of the patient must be 15 lpm or greater for 3 seconds. The **blue or low flow device** if for those patients who have low expired lung volumes/ less than 15 lpm for 3 seconds.

Technique consists of the following:

- the patient is in a relaxed or comfortable sitting position or in a postural drainage position. The Acapella is not gravity dependent.
- The patient inhales deeply with a 3 to 4 second breath hold. This is alternated with normal breathing.
- The inspiratory to expiratory ratio is 1:3 to 1:4.
- After 5-10 exhalations of alternating regular/deep breaths, the patient is asked to huff/or cough.
- This is repeated about 4 to 6 times for a 10 to 20 minute treatment.

Key points:

- The inspiratory phase is followed by a slow prolonged exhalation.
- Device is not gravity dependent and can be performed in conjunction with postural drainage
- Device can be used in line with aerosol/nebulizer treatments.
- No caregiver is needed once technique is mastered and independence promoted.
- Young children can use.

Research:Acappella vs. Flutter

Volsko et al in 2003 Respiratory Care article compared the Flutter to the Acapella device. Pressure, amplitude and frequency were looked at over clinical relevant ranges of flows.

Flows of the Flutter were measured at 5 Hz increments between 5 and 30 Hz at different angles of tilt: 0, 20 and 40 degrees to correspond to low, medium and high PEP. For the Acapella, low PEP was the dial set at full counter clockwise position, medium PEP was set at mid dial and high PEP was set at full clock wise position. The lab flow rates were validated by simulating oscillating PEP with 3 Pediatric patients with CF (mild to severe disease) and who demonstrated an average flow rate of 13-24 L/min. One NORMAL adult volunteer demonstrated an expiratory flow rate of 18-37 L/min. This study did not attempt to make clinical judgment based on their data.

There was a significant different between the devices in terms of mean pressure; but not important clinically. The Acapella demonstrated higher amplitudes at medium and high settings but not at the low setting.

Acapella device did show a more stable wave form and slightly wider range of PEP than the Flutter. The lower expiratory flow rates allowed it to be used in patients with more severe disease (the blue model).

Also, the Acapella is not gravity dependent and can be combined with postural drainage.

How to Use the Acappella

1. Sit in a comfortable position. (You can also use a postural drainage position if you wish.)
2. The purpose is to breath out against a resistance (positive pressure) with the added benefit of vibrations (oscillations).
3. This resistance will be set by the therapist for you. There is a dial at the wide end of the device. The dial is turned clockwise to increase the resistance from low to high. It is set so that you can comfortably breathe out 3 to 4 x longer than breathing in.
4. You should do 5 regular size breaths and alternate with 5 long slow deep breaths.
5. You need to focus on breathing out slow and easy. Remember your exhalation (breathing out) should be 3 to 4 x longer than breathing in.
6. At the end of breathing out each time, gently hold your breath for 2 to 3 seconds. Do not strain.
7. **After 5 to 6 efforts, you should try to cough or huff if you have not had to before now.**
8. Treatment should last 10-20 minutes.
9. You can combine this with your inhaled meds by connecting to the nebulizer cup.

Acappella Cleaning Instructions

1. No less than once weekly, please clean your Acapella device.

2. There are 4 parts to the device and it comes apart easily.
3. Remove mouthpiece.
4. Lift cover by pressing forefinger and thumb along ribbed surfaces by mouthpiece.
It opens to a 90 degree angle.
5. Gently remove cover from base.
6. Lift out “rocker assembly” which is white. This is one piece.
7. You should now have 4 individual parts.
8. Soak in warm soapy water.
9. Rinse thoroughly.
10. Air Dry all 4 parts.

When at home, you may also clean in your dishwasher or by boiling in hot water.

If you have any questions, please talk to your respiratory or physical therapist.