

# Mouthpiece Ventilation (MPV)



## What is MPV?

MPV can be used to provide daytime non-invasive respiratory support via a mouthpiece or straw. With MPV, patients intentionally generate a succession of disconnections (partial or complete) and reconnections to the ventilator. In other words, patients choose, with every inspiration, the amount of air which they want to inhale, adjusting the seal with their lips on the mouthpiece. An active, complete seal ensures an almost full tidal volume ( $\pm 100\%$ ) set in the volume-cycled ventilator, while a more relaxed, incomplete seal will ensure either partial or as little as no inhaled tidal volume (from 0 to 99%). Theoretically, leaks will not cause discomfort because they are decided and controlled by the patients. This statement is true for volume-cycled modes, but not for pressure-cycled modes. In pressure-cycled modes, leaks can cause discomfort due to uncontrollable leak compensation, leading, in turn, to difficult speaking and perilous swallowing during MPV.

## When to start MPV?

MPV should be considered in patients in the following situations<sup>1&2</sup>.

- Vital capacity < 30% predicted
- Mask ventilation  $\geq 12$  h/day
- Dyspnoea >2.5 on the Borg scale which is relieved by ventilatory support
- Weight loss
- Breathlessness with eating
- Breathlessness with talking and/or loss of voice strength
- Weaning from invasive ventilation
- Adaptation to any NIV
- Daytime hypercapnia, with normal overnight gas exchange on NIV

## Who should use MPV?

The evidence base for this technique is in individuals who have weak breathing muscles due to neuromuscular disease (e.g. ALS, SMA, muscular dystrophy) or spinal cord injury. There are a few reports showing that this technique can help wean patients from ICU ventilators or can be useful in aiding mobility in patients with COPD.

## What are the benefits of MPV?

Freedom from a mask in the day and therefore greater social interaction, improved speech quality and communication, swallowing. For those that use it to walk, increased walking distance.

## What are the pre-requisites for MPV?

Not all patients will be able to use MPV. Patients need an effective assisted cough peak flow capable of clearing secretions. Also have sufficient bulbar function in order to retain mouthpiece and achieve

an adequate seal in order to take the air in. Patients need to be capable of understanding tracheostomy MPV trade-off.

## How do clinicians set the Vivo for MPV?

Firstly choose Volume Ventilation<sup>1&2</sup>. Then MPV and activate by pushing “next”. Preferably use the Breas dedicated MPV circuit.

- Set the tidal volume to at least 800ml (may need between 1000-1500ml)
- Keep the breath rate to the default 0 (increase if the patient has trouble triggering or fatigues triggering the breath)
- Set the Ti to be slightly longer than their nighttime settings (1.0-1.5 seconds)
- Set the inspiratory trigger to be sensitive (setting 1-4)
- Set the rise time to OFF (if the patient feels it is too slow at the start of inspiration, lower the setting to increase the flow)
- Set the alarms as required

The patient is instructed to connect to the mouthpiece, trigger the breath and then let it fill up their lungs to the desired depth. Then to open their mouth and exhale around the mouthpiece. When they require the next breath in they restart the sequence.

## What about MPV-PCV?

Technologically, the use of pressure-cycled MPV typically results in a large volume overshoot during disconnection but minimizes the undershoot in delivered  $V_T$  at the reconnection to MPV circuit (Ogna *et al.*, *Chron. Respir*, 2016). MPV in MPV-PCV is possible but the patient needs to have good oral muscle strength, no need to breath stack and not be fully ventilatory dependent and maybe it is more useful in children than adults.

Firstly choose Pressure Ventilation. Then MPV and activate by pushing “next”. Preferably use the Breas dedicated MPV circuit.

- Set IPAP to the desired pressure
- Set the breath rate 0 and modify as above if needed
- Set a set Ti to be slightly longer than their nighttime settings (1.0-1.5 seconds)
- Set the inspiratory trigger to be sensitive (1- 4)
- Set the rise time to 3 and adjust according to patient comfort (1 Faster – 9 Slower)
- Set the alarms as required

## The bottom line:

MPV should be offered to patients who are able to seal around a mouthpiece and require ventilatory support in the day.

## Suggested reading:

Two recent publications provide in depth information about how to apply MPV <sup>1</sup>Chatwin *et al.*, *Neuromuscular Disorders*, 2020; <sup>2</sup>Toussaint *et al.*, *Respiratory Medicine*, 2021



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