



Mobi™
Portable oxygen concentrator



Prescribing for target saturation: a look at pulse vs. continuous flow

COPD is one of the leading causes of death in the United States¹. One of the primary treatment options for patients with moderate and severe COPD is long-term oxygen therapy. Ambulatory oxygen devices have been shown to increase exercise tolerance² and improve compliance with oxygen therapy.³ Patients who perform some level of regular physical activity have a lower risk of both COPD admissions and mortality.⁴

Despite the benefits of ambulatory oxygen, challenges still exist to the adoption of POCs (portable oxygen concentrators). Continuous flow (CF), which is prescribed in liters per minute (L/min), is the most commonly used type of oxygen prescription. Although some portable devices provide continuous flow, the technology and mechanics required to operate continuous flow dictate that the device be larger and heavier than portable devices that provide oxygen in pulse doses.

Pulse dose devices deliver oxygen in millimeters per breath – different than the measured amount for continuous flow. Because the respiratory needs and breath rate can vary from patient to patient, there is no direct equivalent of pulse dose to continuous flow. Additionally, every pulse dose device does not perform equally at each setting nor do all pulse dose devices deliver the same amount of oxygen as a patient's respiratory rate changes.

Because of these differences, it is important to titrate patients, across varying activity levels, to ensure the patient is properly saturated. Physicians can ensure that this takes place by titrating the patient themselves or requesting on the script that the patient be titrated to maintain a specified saturation.



Differences between continuous flow and pulse dose delivery

Flow settings

Flow settings on a pulse dose device are calibrated in milliliters per breath – and the amount delivered per breath is known as a bolus. For most POCs this amount will vary depending on the device setting and patient's breath rate. The total number of milliliters provided per minute is known as the minute volume. For many POCs, the higher the setting the larger the minute volume. CF devices are calibrated to deliver flow in liters per minute (L/min), which does not reflect the amount of oxygen being received by the patient per breath. Because pulse dose delivers oxygen only on inhalation, a L/min amount does not have an equivalent in pulse dose and a large proportion of the oxygen which is provided by CF devices is wasted during patient exhalation.

Fixed bolus volume uses a predetermined bolus size that is calculated for each POC setting. Regardless of breath rate, the POC delivers the same size bolus per breath.

Fixed-minute volume, as with a CF device, establishes a predetermined volume of oxygen that will be produced for each POC setting over the course of a minute. Since the amount of oxygen produced for each minute remains steady as the breathing rate increases, the amount of oxygen delivered per breath becomes smaller. Conversely, as the breathing rate decreases, the bolus size gets larger.

FiO₂/flow relationship

With continuous flow, as a patient's minute ventilation increases, the FiO₂ delivered per breath decrease. Most pulse dose devices, however, are able to mitigate this because the volume of oxygen delivered per breath remains constant.

With CF devices, oxygen can be wasted in the “dead space” of each patient. Due to the technology in POC devices, this wasted oxygen is often minimized.

Pulse settings vary

The settings on POCs vary across manufacturers and depend on maximum output for each device. It is the volume of the pulse dose and not the pulse dose setting that determines the actual delivered oxygen dose. Because each device may deliver a different amount of oxygen, the maximum bolus size is not consistent across all manufacturers. Remember, with continuous flow, the oxygen output is prescribed in liters per minute. Therefore, variation in bolus volumes mean that 2 mL/min is not the equivalent of setting 2 on every POC.

Similarities between continuous flow and pulse dose oxygen delivery

Efficacy

Clinical studies have shown intermittent flow (IF) devices to be effective.² Today's POCs have become compact and lightweight enough that patients may be able to have a more active lifestyle while still receiving the necessary supplemental oxygen they need.

Conclusion

Many physicians agree that physical activity is beneficial for many COPD patients and may reduce the likelihood of exacerbations.⁴ For these reasons, physicians may find that portable oxygen concentrators, with their clinical benefits and low weight, are a viable solution for many of their patients.

Want to learn more?

Interested in learning more about how to prescribe for portable oxygen concentrators? Contact your ResMed representative to request a prescription pad or visit ResMed.com/OxygenLife. Don't know your representative? Contact ResMed customer service at **(800) 424-0737** and we'll gladly help you.

¹ World Health Organization. The top 10 causes of death: Fact sheet: N°310 (2014, May) Retrieved from: <http://www.who.int/mediacentre/factsheets/fs310/en/> (accessed October 7, 2015) ² Bradley JM, O'Neill BM. Short-term ambulatory oxygen for chronic obstructive pulmonary disease. Cochrane Database of Systematic Reviews 2005, Issue 4. Art. No.: CD004356. DOI: 10.1002/14651858.CD004356.pub3. ³ Ringbaek, T., et al. (1999). "Compliance with LTOT and consumption of mobile oxygen." *Respir Med* 93(5): 333-337. ⁴ Garcia-Aymerich J, Lange P, Benet M, et al. Regular physical activity reduces hospital admission and mortality in chronic obstructive pulmonary disease: a population based cohort study. *Thorax* 2006; 61: 772-778.