



PULSE DOSE OXYGEN DELIVERY

Long-Term Oxygen Therapy

Oxygen use has extended from inpatient to outpatient settings for patients with COPD and other respiratory diseases.¹ Supplemental long-term oxygen therapy (LTOT) has been shown to improve survival time in patients with hypoxemic chronic obstructive pulmonary disease (COPD) when given for 15 h/day or more.²

More than 1.5 million adults in the United States use supplemental oxygen for a variety of respiratory disorders to improve their quality of life and prolong survival.⁴

Many patients find using portable oxygen concentrators, or POCs, to be helpful when needing supplemental oxygen away from home.⁴ Portable oxygen concentrators (POCs) are devices developed in response to demand for a lightweight, portable source of supplemental oxygen.⁵

Efficient Oxygen Delivery

To understand the mechanics of pulse dose therapy, knowing the meaning of a few key terms is helpful. An oxygen bolus is a single puff of air. The cycling phase is the moment between inhaling and exhaling. Pulse dose flow oxygen therapy provides earlier delivery of the oxygen bolus into the inspiratory cycle, for more efficient oxygen delivery⁷ (see figure 1).

An oxygen bolus delivered late in inspiration may be less effective in improving blood oxygen levels, as portions of the bolus may fall into the anatomical dead space.⁸

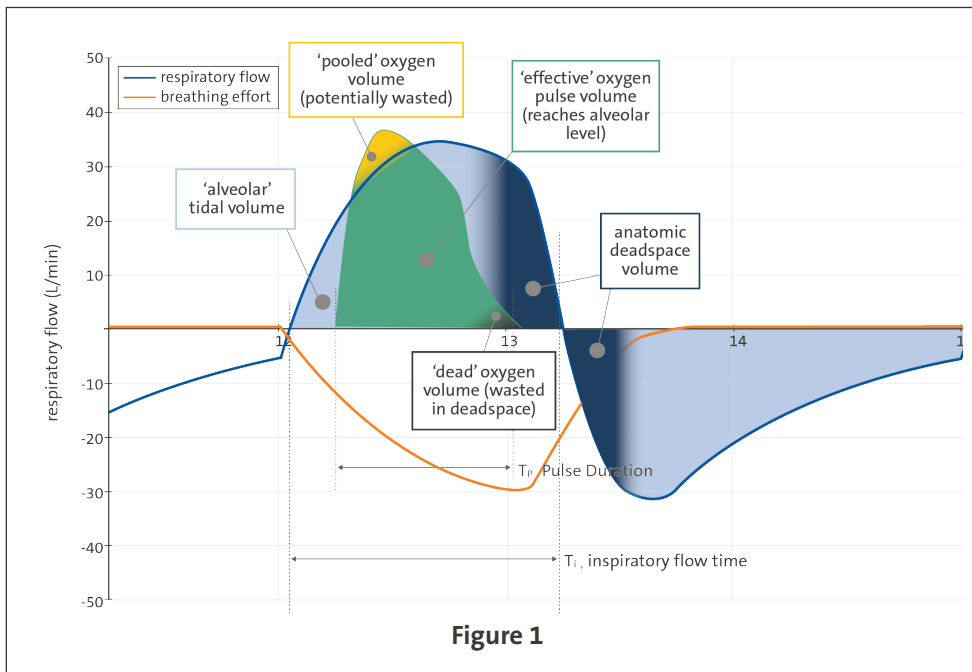


Figure 1

Continuous Flow Oxygen Delivery

The traditional home oxygen therapy is low-flow oxygen, comprising a **continuous oxygen flow** delivered from a stationary oxygen tank via nasal cannula.⁶ Continuous flow (CF) delivers oxygen at a constant adjustable rate, regardless of the user's breathing, measured in liters per minute.¹

This method of delivery is simple but inherently inefficient. The oxygen delivered throughout expiration is wasted, with the exception of any oxygen which may 'pool' for subsequent inhalation, and may still be potentially wasted. Also wasted is the oxygen flow during late inhalation, which reaches only the conduit airways rather than gas-exchanging lung units.⁶

Think of it like a water fountain: If an individual stands in front of a water fountain flowing at 1 liter per minute, they don't actually drink one full liter of water in a minute. The amount of water a person drinks is determined by the

number of sips and the size of the sip. The rest of the water is not consumed. The same applies to continuous flow oxygen; the net amount of oxygen inhaled is a combination of the flow rate, the number of breaths and the size of the breaths.

If instead, the oxygen is delivered only intermittently, at those times productive for gas exchange, oxygen is conserved⁶ and

patients get the oxygen they need, when they need it.

Pulse Dose Oxygen Delivery

Pulse dose mechanisms utilize an oxygen converter and other technology to deliver oxygen to the patient based on breathing rate and other factors. The sensor determines when

the patient begins inhaling and delivers the oxygen pulse/bolus at that moment, which is most productive⁷, meaning the patient gets the oxygen they need, when they need it.



Pulse dosing is more akin to drinking water from a glass with a straw instead of a fountain. The intake will be based purely on the amount and intensity of sips. The bolus of pulse dose oxygen is measured in milliliters per breath, rather than liters per minute.⁸

Inogen's Intelligent Delivery Technology

Inogen® POCs feature proprietary Intelligent Delivery Technology, a reliable pulse-dose based algorithm designed to minimize missed breaths. Inogen's Intelligent Delivery Technology is designed to deliver oxygen effectively and efficiently whether you are sleeping, at rest, or exerting yourself. With patented conserver technology, an Inogen® portable oxygen concentrator ensures oxygen

is delivered within the first 250 milliseconds of inspiration, where oxygen has the most effect on lung gas exchange.

Portability of Pulse Dose Oxygen

Pulse dose oxygen can be delivered using a lightweight, battery powered oxygen concentrator which delivers an oxygen pulse only when an inhalation is detected. These portable devices provide a mobile oxygen source resulting in up to 12 hours of continuous use, depending on the model.¹

Conclusion

Oxygen use has extended from inpatient to outpatient settings for patients with chronic pulmonary diseases and complications of hypoxemia. Pulse delivery of oxygen, such as that delivered by POCs, can provide prescribed oxygen needs in lightweight systems.

The sensor determines when the patient begins inhaling and delivers the oxygen pulse/bolus at that moment, which is most productive⁷, meaning the patient gets the oxygen they need, when they need it.

Additionally, Inogen® oxygen concentrators may offer the patient one single solution* for long term oxygen therapy.

*Single solution encompasses both portable and stationary oxygen concentrators provided together.

References

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⁷Questions about Portable Oxygen Concentrators COPD Foundation
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Inogen, Inc.
859 Ward Drive
Suite 200
Goleta, CA 93111

www.inogen.com

PM230503 EN_EX_USA

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859 Ward Drive, Suite 200, Goleta, CA 93111

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USES: The Inogen Portable Oxygen Concentrator provides a high concentration of supplemental oxygen to patients requiring respiratory therapy on a prescriptive basis. It may be used in home, institution, vehicle, and various mobile environments. **DO NOT USE IF:** This device is not intended to be used in any way other than described in the indications for use. Do not use in parallel or series with other oxygen concentrators or oxygen therapy devices. This device is to be used as an oxygen supplement and is not intended to be life sustaining or life supporting. **ONLY** use this product if the patient is capable of spontaneous breath, able to inhale and exhale without the use of a machine. The conserving, or pulse dose, oxygen delivery technique used by this device is contraindicated in persons whose breathing during normal resting would be unable to trigger the device. Proper device

triggering, setup and operation must be confirmed by an experienced clinician or other respiratory professional. Not for pediatric use. Not for use by tracheotomized patients. **WARNINGS:** The device produces enriched oxygen gas, which accelerates combustion. Do not allow smoking or open flames within 2m (6.56ft) of this device while in use. If you feel ill or uncomfortable, or if the concentrator does not signal an oxygen pulse and you are unable to hear and/or feel the oxygen pulse, consult your equipment provider and/or your physician immediately. If you are unable to communicate discomfort, you may require additional monitoring and/or a distributed alarm system to convey the information about the discomfort and/or the medical urgency to your responsible caregiver to avoid harm. Use only spare parts recommended by the manufacturer to ensure proper function and to avoid the risk of fire and burns. To avoid danger of choking or strangulation hazard, keep cords away from children and pets. **TALK TO YOUR HEALTH CARE PROVIDER:** The oxygen flow setting must be determined and recorded for each patient individually by the prescriber, including the configuration of the device, its parts, and the accessories. It is the responsibility of the patient to periodically reassess the setting(s) of the therapy for effectiveness. The proper placement and positioning of the prongs of the nasal cannula in the nose is critical for oxygen to be delivered.