



# Introducing the new Hi-Ox™

THE ONLY OXYGEN MASK PROVEN TO DELIVER >80% OXYGEN, EVEN AT 8 LPM

EMERGENCY MEDICAL SERVICES



The Hi-Ox delivers solutions for treating and transporting patients with high-flow oxygen needs:

- **Delivering >90% oxygen** to severely hypoxic patients is simplified by the design and performance of the Hi-Ox.
- **Protects EMS personnel** transporting patients with respiratory infections.
- **Extends oxygen supplies** with oxygen being the first medical supply depleted in mass casualties, the Hi-Ox can extend the useful time of operation by 50 to 100%.
- **Reduces the need and cost** of taking an ambulance off the road to refill cylinders (cost of the driver, attendant, vehicle coverage, etc.)

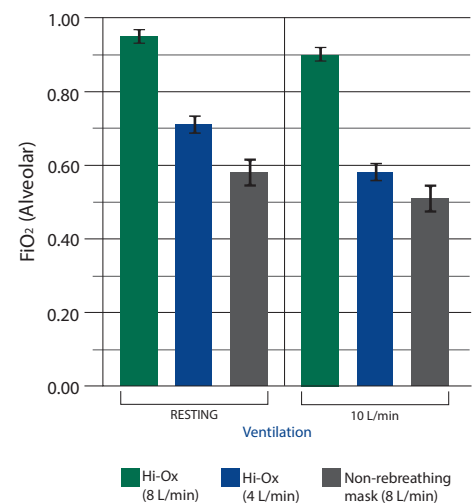
The simple fact is that conventional oxygen masks just can't deliver high FiO<sub>2</sub>'s to hypoxic patients. The Hi-Ox was developed to solve that problem.

The Hi-Ox delivers higher FiO<sub>2</sub>'s than ANY mask, at ANY flow. It's the only disposable mask proven to deliver >80% oxygen, even at 8 LPM.

Not a conventional mask, the Hi-Ox is a unique non-rebreathing, sequential dilution mask that delivers high FiO<sub>2</sub>'s at one-half to one-third the flow of other devices.

Finally, a simple, low-cost solution for emergency medical services and field applications, where oxygen resources are limited by flow requirements or tank availability.

Hi-Ox versus Non-Rebreathing Mask Performance Data



Data from: M Slessarev, R Somogyi, D Preiss, A Vesely, H Sasano, JA Fisher. Efficiency of oxygen administration: Sequential gas delivery versus "flow into a cone" methods. Crit Care Med; 34:829-834, 2006

# Finally, a mask with no limits

THE HI-OX — NEW TECHNOLOGY OXYGEN MASK FOR PATIENTS REQUIRING HIGH OXYGEN CONCENTRATIONS

## The limitations of conventional oxygen delivery

Conventional oxygen masks just can't deliver a high FiO<sub>2</sub> to hypoxic patients. Just sitting at rest, most adults have a peak inspiratory flow of 30 liters per minute. Add a little exertion from dyspnea where the patient's flow increases, and the limitations of these masks become even more significant.

Unless the flow from the oxygen mask meets the patient's inspiratory flow, 21% room air leaking in from around mask and in through the mask's exhalation holes during inspiration, will dilute the 100% oxygen and the patient won't get the >80% oxygen you want to deliver.

## Plugging the holes

The Hi-Ox starts with a soft vinyl facemask that seals to the face and has no holes in the mask for exhalation that would allow room air to enter. Dilution of the inspired oxygen is also limited by a better face seal assured by dual head straps (above and below the ears) and a more anatomic foam lined bridge for the nose that moves the mask down from around the eyes.

## Changing the delivery with sequential dilution

Gas flow is controlled by three low resistance valves. The 3-valve system separates the reservoir bag inspired oxygen from the exhalation path to the room. The Hi-Ox's third sequential dilution valve opens only once the reservoir bag is emptied, so that room air is sequentially added at the end of the inspired breath. Taking advantage of the patient's approximate 150 ml anatomic deadspace, which does not participate in gas exchange, the oxygen concentration of that gas in the airways becomes immaterial to the delivered FiO<sub>2</sub> to the alveoli. This means that high concentrations of oxygen can be delivered at relatively lower flowrates.

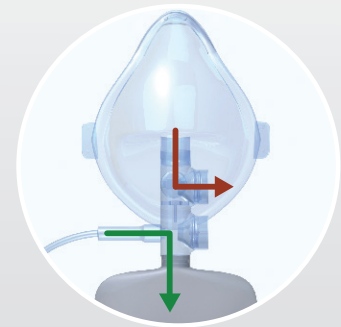
## Protecting EMTs and Medical Personnel

The deflector cover for the exhalation valve on the Hi-Ox can direct exhaled breath, from a patient with a potentially significant bacterial or viral load, away from EMT and medical personnel standing beside them. The Hi-Ox is the **only** oxygen delivery mask called out by name by the Ontario Ministry of Health (Canada) for use during pandemic response conditions.<sup>1,2</sup> It should be used when treating any patient who might have a respiratory infection.

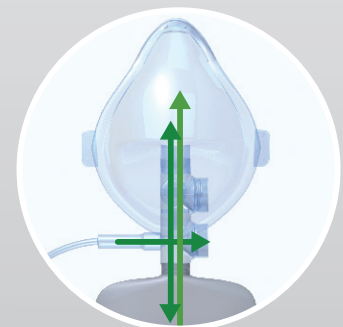
## Extending oxygen supplies

Emergency services have the greatest need for the Hi-Ox due to its oxygen conservation capabilities. While the Hi-Ox at 8 LPM can deliver >80% oxygen, at just 4 LPM it can deliver >50%. Considering the cost of taking an ambulance off the road to refill the cylinders, the savings from extending the useful time of operation are considerable.

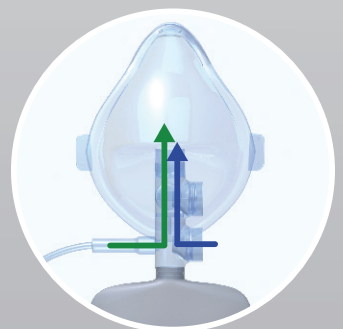
## How the Hi-Ox™ and Sequential Dilution Work



During exhalation, the patient's breath flows only out the exhalation valve. There are no holes in the mask for exhaled flow. During this time, the oxygen flow entering the Hi-Ox fills the inspiratory reservoir.



During the patient's inspiration, 100% oxygen entering the Hi-Ox and stored in the reservoir flow up through the inspiratory valve to the facemask without the dilution from holes in conventional masks. The oxygen source also applies closing pressure against the dilution valve.



If the patient's inspiratory demand exceeds the .75-liter reservoir (and the reservoir has emptied), the dilution valve will open and fill the patient's deadspace with room air. Filling non-gas exchange deadspace limits reductions in alveolar oxygen delivery.

<sup>1</sup> Directive to Ontario Health Care Facilities/Settings for High-Risk Aerosol Generating Procedures under Outbreak Conditions; Ontario Ministry of Health and Long-Term Care, Directive HR04-13, April 15, 2004

<sup>2</sup> Standard for all Ontario Health Care Facilities/Settings for High-Risk Respiratory Procedures under Non-Outbreak Conditions; Ontario Ministry of Health and Long-Term Care, April 15, 2004



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