Overview of Oxygen Concentrators for use in Veterinary Anesthesia

Oxygen Concentrators are enjoying a huge surge in interest as a source of oxygen in both veterinary anesthesia and oxygen therapeutics. They are a FDA and UL regulated electronic device that is approved for 24/7 human health care use for supplemental oxygen. The concentrators take room air and deliver 90% medical grade oxygen from units delivering 5 to 10 liters of oxygen/minute at lower 5-20 PSI pressures.

JorVet first started marketing these concentrators 15 years ago in 2002. Now several thousand are in use in veterinary clinics across the country sold by a growing number of veterinary oriented companies. Oxygen concentrators provide economical medical oxygen in a portable system. Pressurized oxygen tanks continue to increase greatly in cost with skyrocketing handling and hazardous materials fees making concentrators an attractive investment for veterinary use.

Some misconceptions or misunderstandings still exist about oxygen concentrators and their use in veterinary medicine. These include:

**Board Certified Veterinary Anesthesiologists believe they are not safe**

A Google search on the safety of oxygen concentrators surprisingly reveals no such discussion on concentrators being dangerous for veterinary application. In fact, 3 recent veterinary anesthesia text books discuss concentrators are a viable source of oxygen. The text books and page references are on the website [www.jorvet.com](http://www.jorvet.com) under literature for the oxygen concentrator. Some do suggest a small pressurized tank as a backup in case of power failure. As with any new technique there will be some resistance to change and no doubt there are skeptics.
The FDA does not approve the use of oxygen concentrators for veterinary use

The FDA does not regulate veterinary medical devices of any type. For example, all the veterinary anesthesia machines on the US market are not approved or regulated by the FDA.

It follows that the FDA would not regulate concentrators for veterinary use either. However, concentrators are regulated by the FDA for human home health care use in supplemental oxygen. The concentrators sold into the veterinary market by Jorvet have the quality assurance of meeting those FDA strict guidelines and are also manufactured in the USA.

Human Hospitals do not use concentrators for oxygen in surgery

The oxygen demand in surgery and therapy for even the smallest human hospitals far exceed what a concentrator or a series of them can deliver over volume and distance. Human hospitals commonly use expensive liquid oxygen system that can deliver large volumes at a low cost. Human anesthesia standard practice uses ventilation or assisted breathing. Those ventilators require a pressurized system of 50 PSI ruling out concentrators at 5-20 PSI.

Some veterinary anesthesia companies do not recommend concentrators

Yes, some veterinary anesthesia companies are not accepting the use of concentrators. That number is quickly dwindling. The market and sales personnel of these companies were not involved with the initial design and engineering of the Precision vaporizers used in today’s veterinary surgery. The standard is the Tec III style vaporizer. It was first made over 40 years ago by the American Company that eventually evolved into Datex Ohmeda and the British company Cyprene. They were the pioneers in designing the initial manufacturer of the Tech III style. Jorvet has discussed this time-honored vaporizer with the design and engineering from both of these companies. These vaporizers were designed specifically to work via flow dependent not pressure dependent. This is the crux of why oxygen concentrators work so well with these vaporizers. Engineers from the oxygen concentrator company were also consulted on their use and safety with precision vaporizers. They thoroughly tested their equipment and confirmed it can safely and effectively be used in veterinary anesthesia at the lower PSI.
Oxygen concentrator use may present hidden subclinical changes or danger such as inadequate renal perfusion that would not show up until years later as kidney failure.

Today’s veterinary anesthesia standard of care requires the use of surgical monitors. These include a variety of options such as pulse oximetry, capnography, blood pressure monitoring, and EKG. These various monitors have been used on thousands of cases using oxygen from concentrators over a decade with no evidence or proof of any untoward effect of the use of low pressure concentrators.

50 PSI from pressurized tanks is the long time standard and any deviation from that in anesthesia is wrong. A pressurized tank has about 2000 PSI before stepped down to 50 PSI via a regulator. 50 PSI is necessary to run ventilators commonly used in human surgery. A human anesthesia machine does have alarms when oxygen pressure drops. 50 PSI is not needed to use or run a precision vaporizer. Precision vaporizers are again flow dependent not pressure dependent.

What about oxygen concentrator use in veterinary anesthesia in other countries

Oxygen concentrators are more commonly used throughout Europe. Bottle oxygen is very expensive and harder to obtain. The vast majority of anesthesia machines are sold with concentrators mounted on the anesthesia machine. This is the situation with many other countries throughout the world and why oxygen concentrators are gaining popularity so quickly with veterinarian’s world wide.

What are some of the limitation of oxygen concentrators?

Distance and flow rate. Demands of high flow rates above 8-10 liters/min. are the upper end for most concentrators. Many can only handle 4-5 liters/min. It would be very difficult for large clinics to meet their high oxygen demands unless more than one concentrators are employed. Long distances over 50ft. between the concentrator and anesthesia machine can lower the pressure by hose resistance to where concentrator will not work. “Bagging” technique with flush valve: it is not advised to use the flush valve to fill an anesthesia bag while connected to a patient. This can lead to barotrauma. In cases where emergency high volumes of oxygen may be needed a small “E” can be in stand by and toggled in for such
emergency use. Concentrators will also not work with ventilators. They require the 50 PSI pressure.

In summary, the use of oxygen concentrators in veterinary medicine has had a long successful track record across the globe. This will continue to grow as more companies recognize this demand and develop equipment to meet it.