



FACT OR MYTH: ALL HOME OXYGEN IS THE SAME

by *Kenneth A. Wyka, MS, RRT, FAARC*

I think most readers of the Focus Journal are familiar with the television series, "Myth Busters" featured on the cable and satellite network Discovery Channel. On the show, a team of "experts," headed by Adam Savage and Jamie Hyneman, spend time attempting to prove or disprove many myths in our society. The episode that really stands out, at least from the respiratory therapy point of view, is the one that featured what happens when a valve on a compressed gas cylinder is broken. You know, the unsecured oxygen tank that is accidentally knocked over. Their experiment demonstrated what we all thought and knew would happen; the cylinder became a torpedo and went through a concrete wall. In fact, almost two concrete walls. That show was very entertaining and demonstrated why high pressure cylinders are secured the way they are.

With that said, I would like to do a "myth buster" of my own for this issue of Focus. I have heard many physicians, RTs and nurses say that oxygen is oxygen and there is no difference in home oxygen systems. The only thing that matters is the service that comes with the oxygen. I agree. Service does matter. And yes, oxygen as an element supports life and combustion, has an atomic number of 8, an atomic weight of 16 and a molecular weight of 32. However, oxygen delivered in the home setting is quite a different story. So let's take this statement to task and find out if it is indeed fact or myth.

We all know that a cylinder of medical grade oxygen is 99.5%, liquid oxygen up to 99.9% purity and oxygen from a concentrator up to 97% when the unit is new and "right out of the box." However, oxygen from concentrators generally ranges from 91% to 95% depending on age of the unit, frequency of preventive maintenance and the viability of the sieve beds in the concentrator. In fact, in poorly maintained systems, the oxygen concentration can be 80% or less. Then again, not all concentrators come equipped with an oxygen sensing device (OSD) that measures and monitors the purity of the oxygen delivered to the patient. Many units do not and consequently there is no system in place to warn the patient or the home care provider that the oxygen concentration has potentially fallen to an unacceptable level that is not therapeutic. Patients may also place the tips of their nasal cannula in a glass of water and see bubbling. In their minds, the concentrator is working, they are receiving the prescribed level of oxygen and are feeling fine.

Just from these examples pertaining to oxygen purity and concentrator performance we can see that oxygen is not oxygen in the "purest" sense and that there are really differences in the types of systems prescribed for a homebound patient. It is probably good practice for oxygen concentrators placed in the home to have an OSD in place but this is not mandatory and remains at the discretion of the home care company. Units with this device do cost more and it is a safety measure that is essential to the well-being of many patients with chronic lung disease.

Another area where the myth of oxygen is oxygen can be disproved concerns oxygen conserving devices (OCDs). While flow meters are basically the same (except for the difference between uncompensated and back-pressure compensated varieties), OCDs can vary in the sensitivity of the system to patient inspiratory effort to trigger the device and the type of flow delivered during the inspiratory phase. Landmark work of McCoy

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(2000) and McCoy, Adams and Bliss (2004) published in Respiratory Care demonstrated the differences between demand flow, pulsed dose flow and hybrid systems in terms of the patient respiratory rate, inspiratory flow rate, flow pattern and the actual FIO₂ delivered in comparison to continuous flow oxygen (CFO) at 6 L/min. The study published in 2004 compared OCD performance at respiratory rates of 15 and 30 breaths per minute.

Some OCDs actually out-performed the 6 L/min CFO model in terms of FIO₂ at both respiratory rates. However, there were also considerable differences in terms of performance and oxygen delivery between the many OCDs that were studied and tested. This may be due, in part, to the fact that demand flow OCDs deliver oxygen at a lower flow rate throughout the entire inspiratory phase while pulsed dose units deliver oxygen at flow rates of 8 – 12 L/min only during the first part (0.2 – 0.3 seconds) of inspiration. Hybrid OCDs incorporate features of both demand flow and pulsed dose flow devices meaning there is a high flow initially followed by a diminishing flow rate throughout the entire inspiratory phase. It was noted that the models in the study demonstrated a higher FIO₂ at the lower respiratory rate of 15/minute rather than the one at 30/minute. These differences in OCD design, along with the respiratory rate, will affect the actual FIO₂ that a patient may receive.

Once again, patients will not be receiving the same amount of oxygen depending on what type of OCD they are set-up with. The only way of determining which type of home oxygen system or OCD a patient should be using is through a thorough and comprehensive patient assessment by an RT that employs pulse oximetry with the patient at rest and during ambulation using a variety of oxygen delivery devices. This may be labor intensive and time consuming but is the only method that will truly and objectively determine what device and flow rate a patient should be using. In most states, a prescription is required for this type of patient evaluation.

Besides the FIO₂ capability of a home oxygen system, there are many other factors that may come into play when selecting the proper stationary and portable oxygen system for a patient. Economically speaking, the home care company may opt for units that are inexpensive, somewhat maintenance free and do not require frequent deliveries, especially with gas prices approaching \$4.00 per gallon. From the patient's perspective, an oxygen system that is easy and safe to operate, quiet, light-weight and dependable is desirable. Other factors that must be looked at include a patient's condition, clinical and ambulatory needs, manual dexterity and vision, comprehension level, degree of family or caregiver support and amount of travel.

Home care providers need to take these concerns into consideration when providing appropriate home oxygen therapy. And it's not just the home care company that should think about what oxygen unit should be delivered but the onus is also on the referral source. Home oxygen currently has a three year capped rental and starting in January 2009, Medicare beneficiaries will begin owning their oxygen systems. Therefore, it is imperative for patients to obtain a system that will meet both their clinical needs and lifestyle.

It's not as simple or easy as it looks but it is certainly doable. One size does not fit all and oxygen is not oxygen, especially when it comes to home care. Let's forget about the myth and focus on the fact that there are recognizable differences in home oxygen delivery systems and that our patients who have a myriad of chronic pulmonary conditions will benefit more when these are taken into account and applied to good patient care.

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