
Oxygen-Conserving Techniques and Devices

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[Respir Care 2000;45(1):95–103] *Key words: oxygen conservation, continuous flow, transtracheal oxygen, reservoir cannula, intermittent flow, demand flow, equivalency.*

Introduction

Everyone breathes intermittently, why provide oxygen continuously?

Historically, oxygen has been given continuously because of the simplicity of the technique. Low-flow oxygen delivery to stable hypoxic patients started in the hospital, where oxygen distribution was not an issue, patients were on oxygen until they recovered, and then discharged. The cost of oxygen gas and delivery of oxygen within the hospital were not a concern, so options for lightweight, long-lasting, cost-effective technology were not investigated. With the movement toward a less expensive mode of health care, many patients have been discharged to home with long-term oxygen therapy (LTOT). Now, cost, availability, and capability of oxygen delivery systems are topics of debate for clinicians, providers, and payers of LTOT. Devices are being developed to improve the efficiency and effectiveness of oxygen therapy. Oxygen conservation has the potential to improve therapy, but must be monitored to ensure that patients are properly oxygenated at various activity levels. Saving oxygen without

meeting the patient's needs does not reduce cost, and defeats the purpose of LTOT.

History of Oxygen Conservation

Dr Shapiro identified the problem with oxygen therapy years ago, stating that “Although blood gas measurements give us the means of properly monitoring oxygen therapy, and advances in respiratory therapy have made it possible to administer oxygen properly, few physicians or allied health personnel thoroughly understand oxygen therapy”.¹

Dr Cotes first described an oxygen-conserving system; it required the patient to manually activate a control valve connected to the oxygen tubing leading to the face mask.² Dr Heimlich first described transtracheal catheters in 1982, explaining the effectiveness of transtracheal delivery of low-flow oxygen.³ This technique improved the efficiency of oxygen delivery by adding to the anatomical reservoir and reducing the flow requirements while maintaining adequate oxygen saturation. Reservoir cannulae were introduced in 1983, with the same objectives.^{4–6} Both of these techniques were effective, but are used infrequently in LTOT. Electronically-controlled intermittent-flow devices were introduced in 1984, with a conserving device built into a liquid oxygen (LOX) portable.⁷ This type of device senses the patient's inspiratory effort, delivers oxygen during inspiration, and stops the flow of oxygen during ex-

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halation. Even though intermittent-flow oxygen was technically feasible, it was rarely used.⁸

Prior to 1986, the Health Care Financing Administration (HCFA) reimbursed home oxygen providers for the amount of oxygen provided in packaged gas systems such as LOX and compressed gas cylinders, so there was financial incentive to provide as much oxygen as possible, which stimulated the growth of LOX systems. LOX systems provided excellent ambulatory oxygen for active patients, but increased the cost to distributors of home oxygen therapy because of the need to refill systems and the associated delivery costs. In 1986 HCFA introduced the 6-point plan that created a prospective payment for LTOT. This “modality neutral” approach changed the incentive for home oxygen providers, which started a move to lower the costs of operation, to control expense. LOX system availability declined. After several consensus conferences on LTOT,⁹ LOX made a slight comeback because physicians were encouraging patients to be mobile, technology had improved, and there was increased competition from home medical equipment suppliers.

In 1998 HCFA again reduced the amount of reimbursement for LTOT by 25%, and then by another 5% in 1999. The challenge to provide a lightweight ambulatory oxygen system without the cost associated with LOX focused attention on oxygen-conserving technology and lightweight cylinders. In 1994 it was estimated that there were 18,000 oxygen-conserving devices (OCDs) used in home care.¹⁰ In 1998 alone, approximately 80,000 OCDs were sold in the United States.¹¹

Clinical studies have indicated that each of the conserving techniques are effective,⁸ but intermittent flow has evolved as the technique of choice. The various intermittent-flow devices operate differently and should be tested at all activity levels for each patient. Most studies end with the comment that more long-term studies should be conducted,¹² but no long-term study has been done on intermittent-flow devices. “Reliable oxygen therapy becomes a matter of methodology and thorough understanding of oxygen delivery systems”.¹

Economics is driving the rapid growth of the OCD market, and clinicians are using products that have not had long-term clinical evaluations. OCDs are thought to be commodity products, but there are differences among the products, which need to be understood (Table 1),¹¹ and clinicians, patients, and home medical equipment suppliers have various misunderstandings about oxygen conservation (Table 2).

Upper Airways Anatomy

It is important to understand the factors that affect oxygen delivery and dilution. The upper airways, breathing patterns, and oxygen flow affect the fraction of inspired

oxygen (F_{IO_2}) (Fig. 1). Changes in breathing patterns can vary oxygen delivery. Consider the following example of a normal breathing pattern: tidal volume (V_T) 500 mL, V_T useful (2/3 of V_T) 350 mL, V_T dead space (1/3 of V_T) 150 mL, dead space time 0.5 seconds, respiratory rate 20 per minute, inspiratory time 1 second, expiratory time 2 seconds, anatomic reservoir 50 mL, end-expiratory pause 0.5 seconds. To calculate F_{IO_2} of 2 L/min flow delivered to this person, we use the following formula:

$$2 \text{ L/min} = 33 \text{ mL/s (2000 mL/60s)}$$

17 mL of 100% oxygen from the anatomic reservoir

$$(0.5 \text{ s end-expiratory pause} \times 33 \text{ mL/s})$$

17 mL of 100% oxygen during inspiration

$$(0.5 \text{ s } T_i - T_{\text{dead}} \times 33 \text{ mL/s})$$

316 mL of 21% oxygen (room air)

$$= 66 \text{ mL of 100% oxygen}$$

$$17 + 17 + 66 = 100 \text{ mL 100% oxygen}$$

$$F_{IO_2} = 100 \text{ mL oxygen} / 350 \text{ mL } V_{\text{useful}} = 28\%$$

With the above assumptions on V_T , respiratory rate and inspiratory time, Table 3 shows the expected F_{IO_2} at flow rates of 1–6 L/min. Of course, if any of the assumptions change, the F_{IO_2} will also change.

Breathing Patterns

Timing

“Timing is important when using a conserving device.”¹³ Gas inhaled in the first half of inspiration is delivered to the alveoli; gas inhaled in the second half of inspiration occupies dead space. Thus, the earlier the delivery of oxygen, the more likely the oxygen will reach the alveoli (Fig. 2).

Pooling

Higher F_{IO_2} delivered by continuous-flow oxygen (CFO) at the lower respiratory frequency is explained by the presence of the anatomic reservoir of the upper airways, allowing pooling of oxygen from the end of the last exhalation. Pooling also occurs with reservoir cannulas and transtracheal delivery of oxygen.

Dilution

With increasing respiratory rate, inspiratory time shortens and minute ventilation increases, diluting the oxygen

OXYGEN-CONSERVING TECHNIQUES AND DEVICES

Table 1. Comparison of Oxygen Delivery Devices

Device	Advantages	Disadvantages	Issues
Continuous flow (set appropriately)	No equipment required	Patient must set flow for activity level	This has always been a possibility, yet rarely done
Transtracheal delivery	Improved compliance with therapy Patient benefits	Surgical procedure No reimbursement for replacement catheters	Reimbursement would make this therapy more available
Reservoir cannula	Simple to use Low Cost	Esthetics	Proper education would improve utilization
Intermittent flow device	Readily available Simple to use	Wide variation of performance Cost of batteries	Misunderstanding of performance difference Perception of equivalency with continuous flow

Table 2. Concerns Associated with Oxygen Conservation

Physician	<ul style="list-style-type: none"> • There have been no long-term clinical studies of intermittent-flow OCDs. • Home medical equipment supplier might set up an OCD without informing the physician. • There has been positive experience with some devices and negative experience with others.
Patient	<ul style="list-style-type: none"> • Availability: many patients do not have access to devices (though they may learn about availability at lung clubs). • Ease of use: some devices are complicated to operate. • Training and education: patients need to know when a device is operating correctly or incorrectly.
Home Medical Equipment Supplier	<ul style="list-style-type: none"> • There is no reimbursement for an OCD. • Price and performance vary among devices; little information available on which product is the best value.

OCD = oxygen-conserving device.

dose from CFO. Room air mixes with oxygen, causing a lower F_{IO_2} .

Pulse Systems

Pulse systems (described further below) deliver oxygen early in the inspiratory effort, giving more oxygen in the effective portion of the breath so that more oxygen is delivered to the alveoli. Timing affects pulse systems, but pulse systems do not appear to be affected by dilution because of the early delivery of oxygen during inspiration.

Demand Systems

Demand flow is delivered through the entire inspiratory section of the breath. Demand system flow rates are not as high as with pulse systems, so the volume of oxygen delivered per breath to the alveoli is less. Demand systems are affected by timing and dilution.

Options for Continuous-Flow Oxygen Conservation

Titrate to the Lowest Continuous-Flow Delivery Per Activity Level

“Continuous low-flow systems are used because of tradition, familiarity, patient comfort, economics, and avail-

Table 3. Expected Fraction of Inspired Oxygen

100% Oxygen Flow Rate	F_{IO_2} (%)
1 L/min	24
2 L/min	28
3 L/min	32
4 L/min	36
5 L/min	40
6 L/min	44

F_{IO_2} = fraction of inspired oxygen.
(Modified, from Reference 1.)

ability—not because of accuracy or dependability.”¹ In studies comparing demand oxygen delivery systems with CFO, the initial CFO setting might be titrated with little or no effort to optimize it. It is possible that in studies in which oxygen savings over CFO were reported, a small reduction in the CFO flow rate may have also realized oxygen savings without adverse effect on arterial oxygen saturation.¹¹

Many patients who need supplemental oxygen are prescribed 2 L/min oxygen. This is a standard starting point for low-flow oxygen, more than meeting the patient’s need. Oxygenation should be evaluated via blood gas analysis or

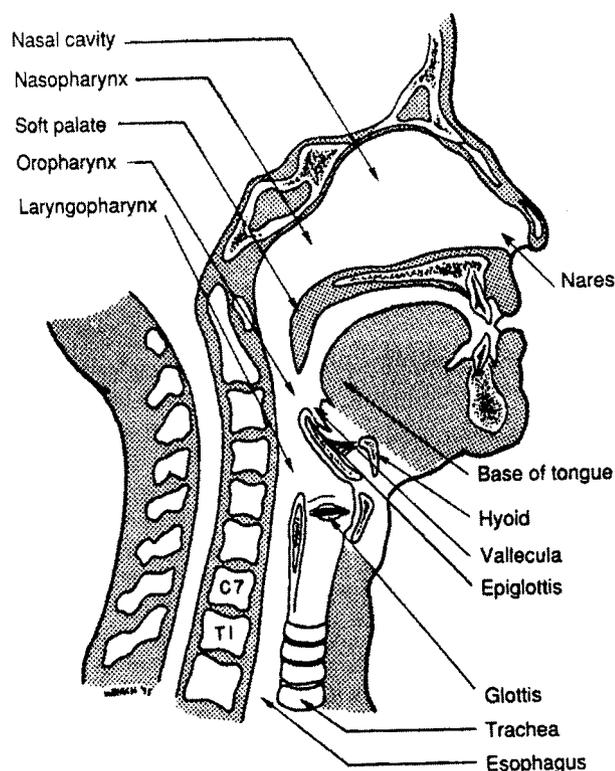


Fig. 1. Upper airways anatomy. The upper airways are ventilatory dead space. (From Caroline N, editor. Emergency care in the streets. Boston: Little, Brown. 1994. 63–112, with permission.)

oximetry for the lowest acceptable level of oxygen delivery for a given activity. A patient on 2 L/min might be properly oxygenated with only 1 L/min—a potential 50% savings. If this patient is on a home LOX system, a 50% reduction in delivery costs would also thus be achieved.

Setting Up the Continuous-Flow System

- Monitor the patient's oxygen level at rest, exercise, and sleep, then write a prescription for each activity level.
- Educate the patient on the need to set the flow at the correct setting for each activity.
- Reinforce the different prescription flow rates with the analogy that different quantities of pills are necessary for different needs.

Transtracheal Oxygen

Transtracheal oxygen devices are effective and have a lower flow requirement, which conserves oxygen (Fig. 3). The anatomical dead space acts as a reservoir, so flow can be reduced because there is increased pooling of oxygen between breaths. Advantages reported by patients include improved cosmetics (because the transtracheal system obviates the nasal cannula), reduced soreness on cheeks and ears (again, by virtue of eliminating the nasal cannula),

improved compliance with 24-hour therapy, and improved sense of taste and smell.¹⁴ Transtracheal oxygen has been shown to work well with intermittent-flow devices, and these combine to improve compliance and reduce oxygen waste.¹⁵

Setting Up the Transtracheal Oxygen System

- A transtracheal surgical procedure is performed by a qualified physician.
- Proper flows are prescribed for the various activity levels.
- The patient is instructed on the operation of the device and on changing and cleaning techniques.

Reservoir Devices

Reservoir devices add a 20-mL reservoir close to the airway. The pooling of gas between breaths allows a lower CFO setting to achieve the same F_{IO_2} .⁶ Reservoir devices come with either a moustache-type or a pendant-type reservoir (Fig. 4). The moustache-type reservoir sits under the nose, which is cosmetically displeasing to some patients, and they do not want to use this device in public. The pendant-type reservoir hangs in front of the chest and is therefore less noticeable. There are slight differences, related to dilution of oxygen, between the moustache-type and the pendant-type reservoirs, and these differences must be understood if the patient uses the devices interchangeably. The reservoir devices are simple, safe, and effective. Patients may be instructed to use the devices when not in a public place. The reservoir cannula might improve availability and ease of use when traveling, be used as a back up system at home, or any time the patient is alone.

Setting Up the Reservoir Device System

- Monitor the patient for proper oxygenation at expected activity levels and prescribe proper flows.
- Instruct the patient on proper use of the device, with cleaning as necessary or monthly.

Intermittent-Flow Oxygen Conservation

There are many options for intermittent-flow OCDs (Fig. 5). This type of device has grown in popularity and there are many manufacturers. In 1984, when first introduced, the technology was used to increase the operating time and reduce the weight of a liquid oxygen ambulatory system. Providers were reimbursed for oxygen used, so there was little interest in conservation. Now, there is financial incentive for conservation, and home medical equipment suppliers see OCD use as an important means of maintaining profitability.

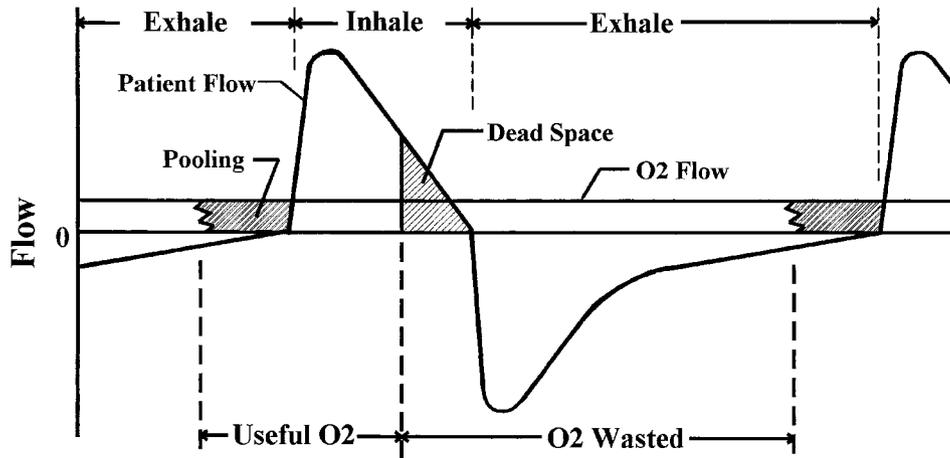


Fig. 2. A: Diagram of a respiratory flow cycle in relation to continuous-flow supplemental oxygen.

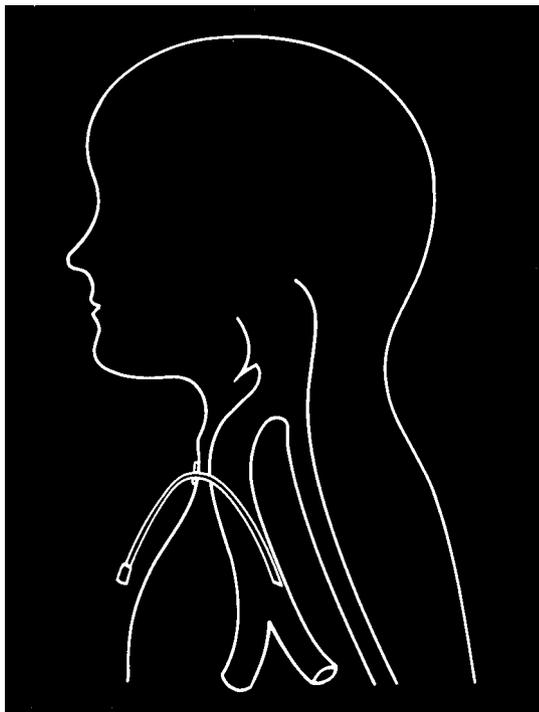


Fig. 3. Diagram of transtracheal catheter positioning.

Intermittent-flow OCDs are of three types: pulse, demand, and hybrid.¹¹ The difference between the types is how the oxygen flow is delivered (Fig. 6). With a pulse system, oxygen is delivered in a short burst at the beginning of the inspiratory cycle (at a flow rate higher than

CFO) and the oxygen shuts off prior to the end of the inspiratory cycle. A demand device delivers an equivalent flow to the corresponding CFO setting for most of the inspiratory cycle. A hybrid device uses a combination of the operating principles of the pulse and demand systems.

Intermittent-flow OCDs sense an inspiratory signal, which opens a valve to deliver oxygen. The device is either time-cycled or pressure-cycled. Flow and time are determined by the manufacturer, and devices vary in oxygen delivery. The devices are powered pneumatically or by batteries.

The Fallacy of Equivalency

All of the OCD devices are stated to be “equivalent” to continuous flow. However, each manufacturer has a different concept of equivalency, and devices differ in volume delivered at the same flow setting (Fig. 7). While demand oxygen delivery systems may function similar to CFO under the assumed conditions, they may deviate from equivalence with other breathing patterns. Thus, clinical studies have shown demand oxygen delivery systems to produce similar results to CFO,^{16–20} but there are studies that report differences.^{21–22} Many factors affect equivalency, including V_T , frequency, anatomy, and expiratory flow.

Manufacturers could use volume settings rather than CFO equivalency for OCDs, which would allow clinicians to better understand the oxygen delivery and to compare devices. But OCD manufacturers have been hesitant to

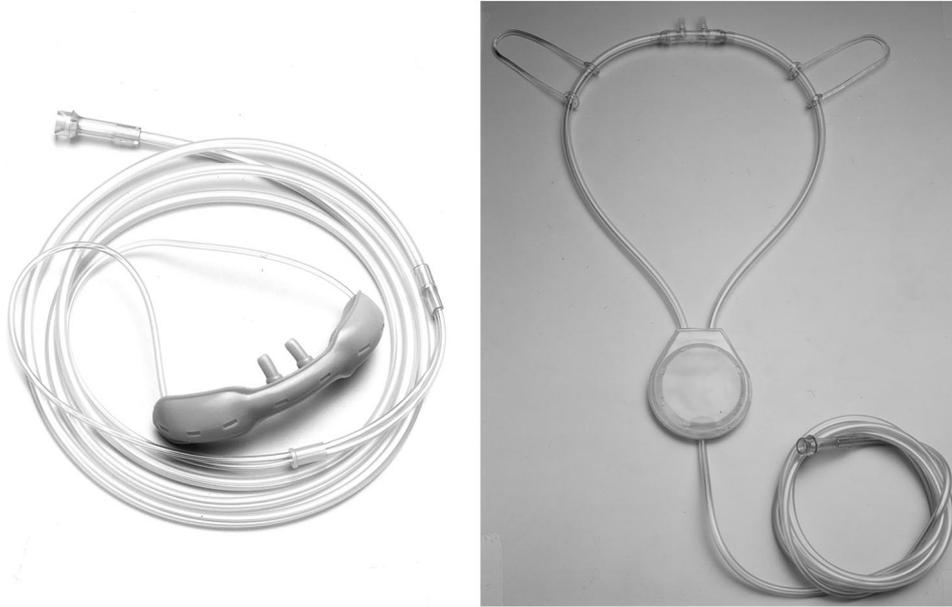


Fig. 4. Oxymizer oxygen reservoir devices: moustache-type (left) and pendant-type (right). (Photographs courtesy of Chad Therapeutics.)



Fig. 5. Intermittent-flow oxygen-conserving devices. Front row (left to right): EX-3000 (DeVilbiss, Somerset, Pennsylvania), EX-2000 (DeVilbiss), Impulse Select (AirSep, Buffalo, New York), CR-50 (Mallinckrodt, St Louis, Missouri) OxiClip (Mallinckrodt). Back row (left to right): O₂N Demand (Victor, Denton, Texas), O₂ Advantage (Western Medica, Westlake, Ohio), Venture (Invacare, Elyria, Ohio), DOC-2000 (Transtracheal Systems, Englewood, Colorado), Oxymatic 301 (Chad Therapeutics, Chatsworth, California).

change the flow settings on these devices for fear that this would be changing the prescription for LTOT; yet the equivalency setting has been shown to not be equivalent. If 2 L/min continuous flow was ordered, an OCD giving 33 mL of oxygen would give the clinician a better understanding of the volume of gas per breath and the differences and capabilities of the device. Settings for all low-flow oxygen delivery devices should be a reference point

and not an end point. Flows should be adjusted for the patient's needs and not left on one setting.

Using Oxygen-Conserving Devices

Titrate continuous flow correctly; this can be done in the hospital or home. Oximetry measurements during activity determine the appropriate prescription for a given

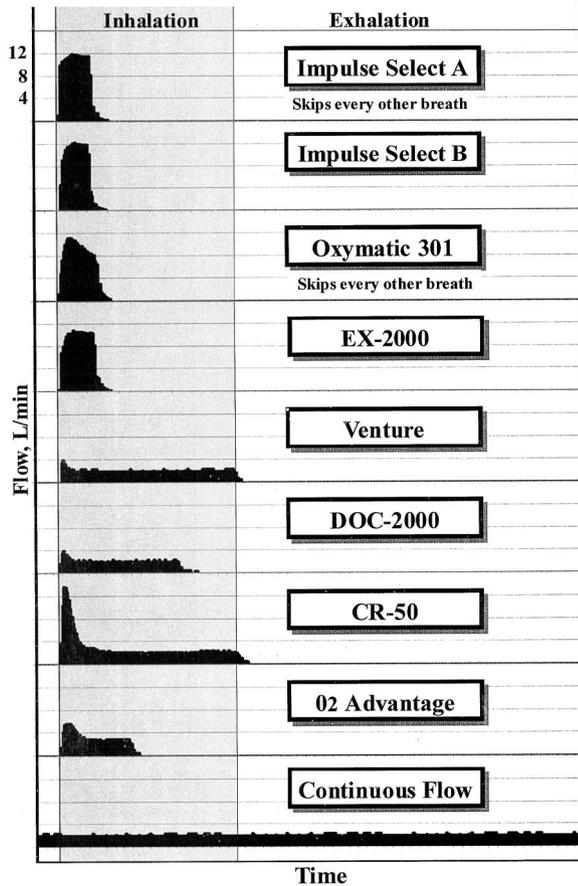


Fig. 6. Oxygen delivery flow profiles for selected oxygen delivery systems (measured at a setting of 2 L/min, respiratory rate of 20/min, and inspiratory-expiratory ratio of 1:2). (From Reference 11.)

activity level. The goal is to determine the proper setting for therapy, not the amount of oxygen that can be saved. All methods of oxygen conservation should save oxygen compared to CFO.

Choose the conserving technique. Each device has benefits that should be evaluated for each patient. The technique chosen should be explained to the patient. The clinician should know the capabilities and limitations of the device selected.

Monitor the patient with each device at different activity levels and adjust the oxygen setting appropriately.

Educate the patient on the proper operation of the device. Devices operate differently from each other and from CFO. If the patient feels the device is not working, check oxygen saturation. Some devices have alarms that indicate if an inspiratory signal has been missed, indicating a disconnected cannula or device malfunction.

Monitor operating duration of ambulatory systems. Respiratory rate affects operating duration, so the supply of oxygen should be checked frequently for the first few months of operation to determine the travel time of a portable and the required delivery schedule for replacement

cylinders. Flow rate and respiratory rate also affect battery life, so the patient should monitor battery life during the first few months of operation to determine operating times.

Sensitivity and Sleep

Little attention has been given to the sensitivity of OCDs. This is an important issue related to when oxygen is delivered in the respiratory cycle. Devices that are slow to respond to an inspiratory signal will deliver oxygen late in the inspiratory cycle and thus be less effective. This will be important in the case of the weak inspiratory signal associated with shallow breathing and sleep. There have been very few clinical studies testing OCDs during sleep. One study indicated that inspiratory signal sensitivity should be set for each individual patient during sleep, which in that study resulted in excellent device response for sleeping patients.¹⁵

New Systems

Oximetry-Driven Oxygen-Conserving Devices

A pulse-type OCD is currently being tested that adjusts the level of oxygen delivered based on an oximetry reading. This concept may eliminate the variability of oxygen delivery with existing systems. The first (unpublished) clinical study found better oxygenation than either CFO or a currently-available OCD. The device improved savings by reducing flow to the lowest acceptable setting and has the capability of stopping oxygen flow if oximetry indicates no oxygen is necessary. The reliability of the oximeter is an issue for this device because appropriate oxygen control depends on a correct oximetry reading. This device will cost more than traditional devices, but the oxygen savings will prove this product to have economic benefits. Historically, products that are not reimbursed by HCFA, even if clinically superior, do not fare well in the home care market. This product will need to be driven by clinicians if it is to be successful.

Concentrator Fills Cylinder

Chad Therapeutics (Chatsworth, California) and Invacare (Elyria, Ohio) have introduced systems that fill cylinders in the home from the output of an oxygen concentrator. Even though these systems do not require an OCD, patients can benefit from the use of smaller cylinders with an OCD with the home fill system.

Concentrator Fills Liquid Oxygen Portable

IN-X Corporation (Denver, Colorado) is developing a system to fill LOX portables from a concentrator. Again, an OCD is not required, but a small LOX portable with a

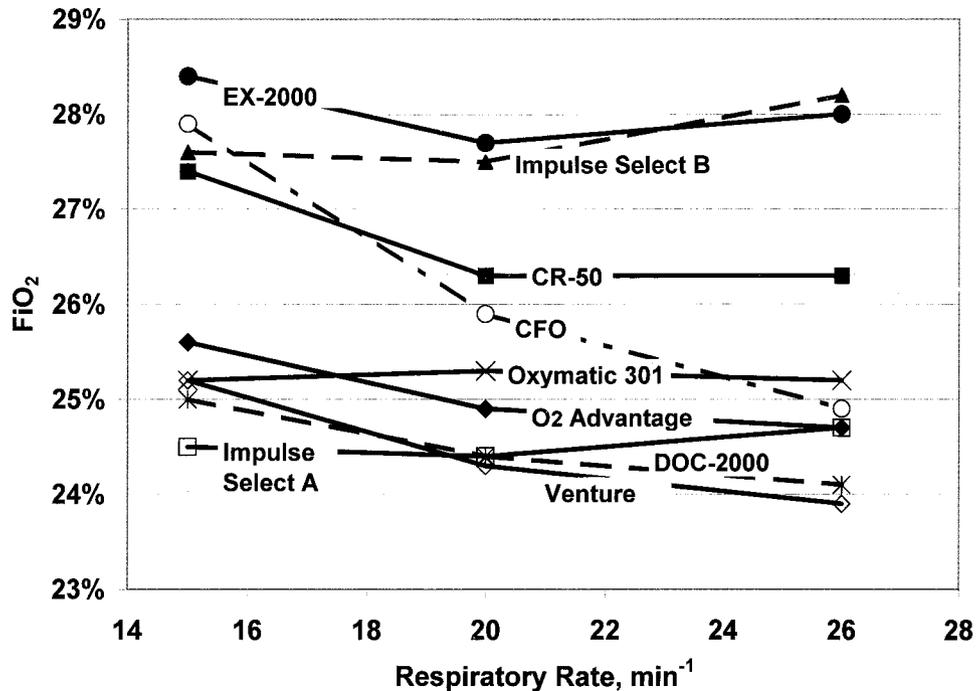


Fig. 7. Fraction of inspired oxygen (F_{iO_2}) measured for demand oxygen delivery systems (model names and manufacturers as in Figure 5), in comparison with continuous-flow oxygen (CFO), during three breathing patterns. Both the continuous-flow oxygen and the demand oxygen delivery systems were set at 2 L/min. (From Reference 11.)

conserving device would be lighter and last longer than a CFO system.

Portable Concentrator

Several manufacturers are developing portable concentrators. Such a device would require an OCD in order to reduce the size and weight of the system and thus make a 10-pound ambulatory concentrator possible.

Nitric Oxide Delivery

OCDs can be used for other gas-delivery applications. Nitric oxide has been reported to be delivered via OCD, making ambulatory nitric oxide possible.²³

Economics of Oxygen Conservation

Oxygen gas is relatively inexpensive. Oxygen containers and packaging and delivering oxygen are the expensive components of home LTOT. CFO may waste 60–85% of the oxygen supplied to the patient. This waste requires more frequent filling of packaged gas systems (LOX and cylinders) and additional home deliveries. The use of an OCD reduces the number of deliveries or the number of cylinders required for an ambulatory patient. Consider these examples of potential oxygen savings. With a LOX system that has been receiving weekly deliveries at \$35 (estimat-

ednational average), installation of an OCD that provides 3:1 oxygen savings over a CFO system would eliminate 2 deliveries out of 3, a \$93 monthly savings. Likewise, a system that uses 6 E-size cylinders per week and requires weekly deliveries at \$35 would, if installed with a 3:1 savings OCD, require 2 out of 3 fewer deliveries (again, a savings of \$93/mo).

Current Situation

Intermittent-flow OCDs are being used on cylinders as an ambulatory source. LOX capital investment costs and delivery costs are perceived to be too expensive, so home-medical equipment suppliers prefer cylinders for ambulatory patients and concentrators for stationary oxygen. To be competitive, home medical equipment suppliers must provide ambulatory systems, but, because OCDs are not reimbursed, some home medical equipment suppliers look for the OCD that offers the greatest oxygen savings at the lowest cost, which could negatively affect patient oxygenation. The lack of understanding of OCDs and the rapid growth of this market are creating confusion as to the operation, effectiveness, safety, and application of OCDs.

The Future of Oxygen-Conserving Devices

More manufacturers are bringing new OCDs to market, which is similar to the rapid growth of oxygen concentra-

tors in the mid-1980s. There are approximately 12 OCD manufacturers in the United States, with 3 of these having 70% of the market. Foreign manufacturers are developing products and looking at the United States as a growing market and a potential for expanding their market. The OCD market should continue to grow for the next 5 years because of reimbursement cuts in LTOT and the shift to cylinders as the preferred ambulatory modality. OCDs will become better understood, and appropriate prescribing for LTOT will evolve through experience and education. Prices will drop and features will improve, as has happened with most products used in home care.

Summary

OCDs are available and their use is growing in the home care market because of economic factors associated with LTOT, but this trend has evolved with little clinical research. There is great variability among the oxygen control systems, and physicians need to test patients on each device, at each activity level the patient is capable of in the home, and to write a prescription for each activity level. OCDs should be used because of the patient benefits of improved activity and compliance with a 24-hour prescription, and the economic benefit associated with reduced delivery of oxygen. Clinicians and patients need to be thoroughly familiar with the oxygen system they are using and to understand its capabilities and limitations. More research is required to evaluate the application and effectiveness of and the differences between products and outcomes of OCDs used in home care. Equivalency between CFO and OCDs should not be necessary because of the differences between these delivery methods and the great variability of products.

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Discussion

Spratt:* One real concern I have here, and I think both presenters did a great job, but it's very interesting that when we've looked at oxygen therapy, we've looked at it entirely in terms of a technology, and we've really not addressed it as a level of care. I find it very interesting that at an American Association for Respiratory Care-sponsored event, we've spent very little time talking about the care that needs to go along with this technology, and as the technology increases, what's going to happen is that the cost to deliver care is going to come down. Reimbursement is going to continue to come down with that, and as that happens, care is going to come down with it. I think as a clinical community, it is contingent upon us to address that issue and talk about the care that needs to go with the technology, and the need for education, the need for proper titration, and the need to monitor and assess the patient. All of these are issues that are very important to oxygen care in the home and, really, we've spent very little time discussing them.

Dunne: In somewhat of a different vein, I think Bob has raised the bar in terms of the importance of having physicians prescribe oxygen-conserving devices appropriately, and essentially reject the perception that oxygen conserving technology is the same for all devices currently available. I find the diverse technology absolutely increasing the responsibilities of the home care providers, especially in the selection of the device to be used and the manner by which titration occurs. So I don't think we're abrogating the patient care component as much as we are illuminating some of the practices

that have become ingrained strictly because of opinion or poorly-thought-out processes. I have one other comment. In addition to the prescription for the portable system and for the stationary system, the Joint Commission now requires a separate and distinct prescription when an oxygen conserving device is being used. They obviously recognize that a lot of oxygen-conserving technology probably has not been used in the most appropriate manner.

O'Donohue: At a time when we're talking about more physician involvement, we have to realize that the new HCFA Form 484 takes away the prescribing possibility for the physician so that a prescription must be written separately from that form; as Pat has implied, maybe even multiple prescriptions. But certainly HCFA and Medicare have not made it easier for the physician. I would also like to reiterate your point about the conserving devices. Two liters is not equivalent to two liters from one delivery system to another, but there are still significant savings from the use of oxygen conserving devices. Every patient needs to be titrated as to the dose that they need, not only at rest but also with exercise, because there are marked differences between rest and exercise oxygen flows needed to correct hypoxemia with many of the conserving devices that are much greater than they are with continuous flow by nasal cannula.

Johnson:* What I see lacking in this industry, at least, is that there's really no standard. You can't compare it to continuous flow and there's no one device that has stood out, really, above any others to prove that they're functional for patients in all settings and all conditions.

McCoy: I agree. The standard is something that if we had an American Society for Testing and Materials standard for oxygen conservation, everyone would be following that, but right now, whoever is the market leader is followed. I think how that happened was that the patents are driving the development of technology. If someone owns a patent and another company comes out with a device, they can't copy that unless they license it. So they have to come up with something that's different to have a device that doesn't infringe on existing patent.

Johnson: I'd like to say also that in talking with dealers of durable medical equipment, they're the ones who are driving which device is used—not the doctors, at all.

McCoy: Right. I agree with that.

Dunne: I certainly agree with what was said earlier, but I think what this Journal conference will do is to strengthen the link between the clinical application of oxygen conserving technology and the oxygen requirements of the patients. You mentioned the shake-out in the market that's going to occur much like concentrator technology did 10 years ago, where there were a dozen or so different manufacturers, and I believe there are 5 left today. The same is probably going to happen with oxygen conserving devices. Hopefully, what will happen is that the devices that really do offer the best flexibility in terms of meeting the patient's individual needs will survive. At least I hope that's what we'll see.

McCoy: That's only if clinicians get involved, because price is driving the market right now. I've surveyed home care companies, and the number one issue, when you ask how they decide which conserving device to buy, is price. That's the first thing they say.

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