

**PERFORMANCE AND WEIGHT COMPARISONS OF
PORTABLE OXYGEN SYSTEMS**

**Peter Bliss BME
Robert McCoy RRT**

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BACKGROUND

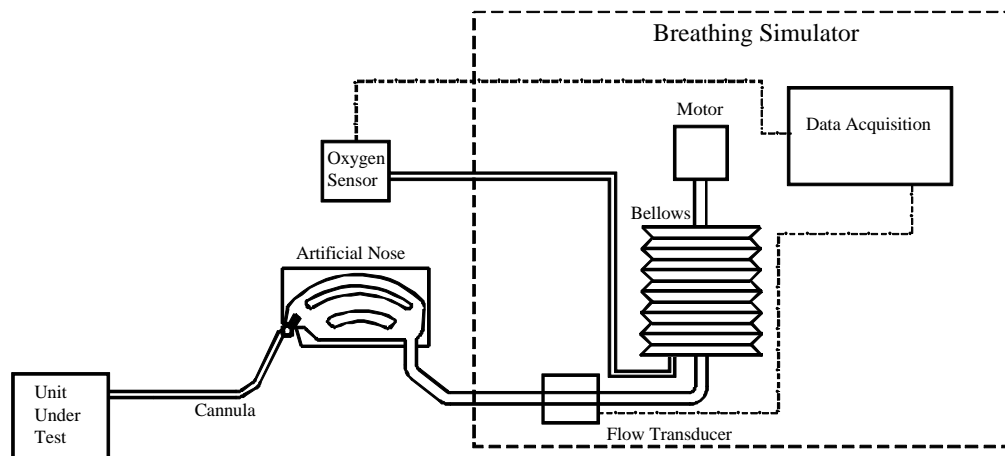
Recently, new systems for portable oxygen delivery have been introduced to allow long term oxygen therapy (LTOT) patients greater mobility. Much of the improvement in weight and use time comes through the use of Demand Oxygen Delivery Systems (DODS). Each model of device delivers oxygen in a different manner, and settings are not absolutely comparable to continuous flow oxygen (CFO) or to each other. We evaluated a measure of system portability, use time per unit weight, at comparable FIO_2 levels, using a mechanical lung simulator. Three newer systems were compared with two more traditional, CFO delivery systems.

METHODS

An apparatus was constructed to simulate the nares, conducting airways and an alveolar chamber with a machined 'nose', flex tube (150 ml of deadspace) and a spontaneous breathing simulator (Hans-Rudolph Series 1100). A simulated respiratory pattern ($VT=515$ mL, $f=20/min$, $I:E=1:2$, decelerating flow wave) was generated. The oxygen delivery setting of each device was adjusted up to its maximum and the resulting 'alveolar' oxygen concentration (FIO_2) measured with an oxygen analyzer (Douglas Scientific). Oxygen pulses from the DODS were measured by a mass flowmeter (Model 4040 - TSI). All units were weighed when full of oxygen, with any accessory straps or carrying cases. Use time per unit weight was calculated by dividing the use time observed full to empty by the weight, and charted vs resultant FIO_2 .

UNITS TESTED

- E Cylinder (weighed with continuous flow regulator and cart)
- Helios 300 - Puritan Bennett
- Oxylite 301 (Total O₂) - Chad Therapeutics
- Spirit (production prototype) - Caire Inc.
- Stroller 1.2 liter continuous flow- Caire Inc.

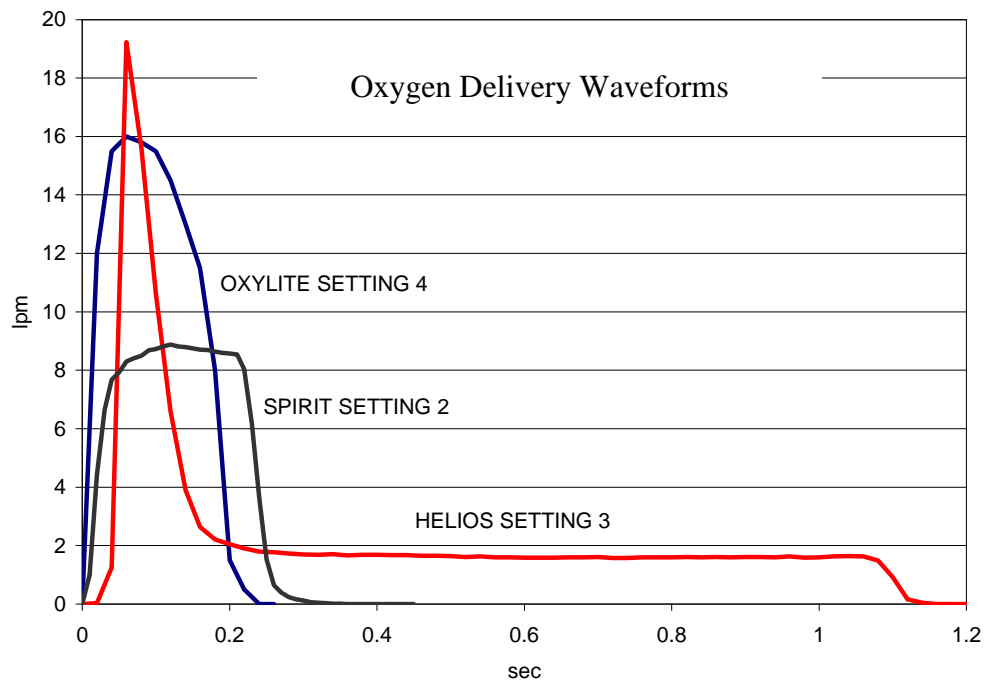
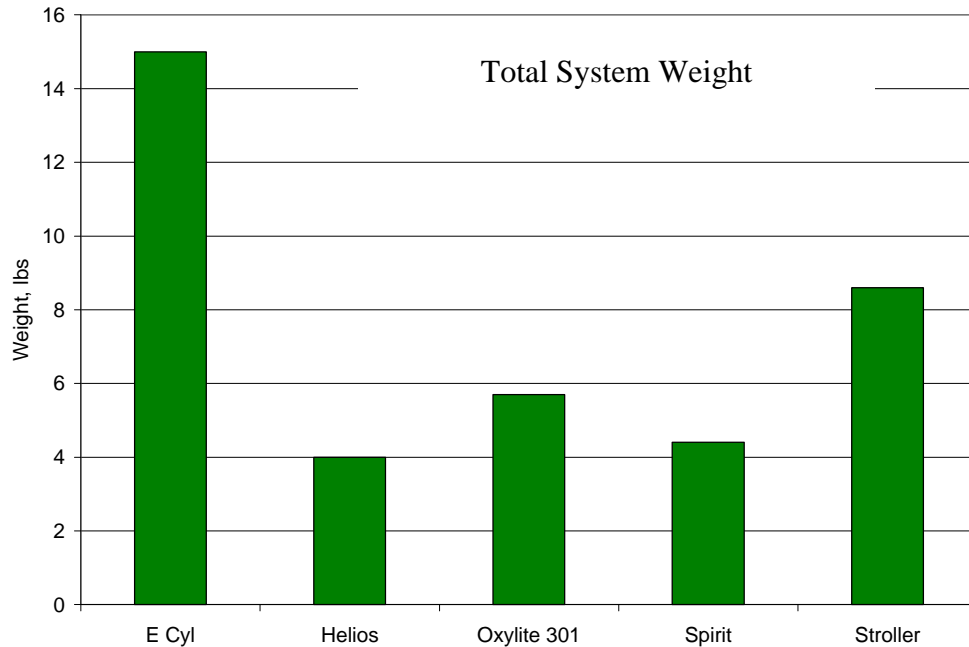


Test Setup

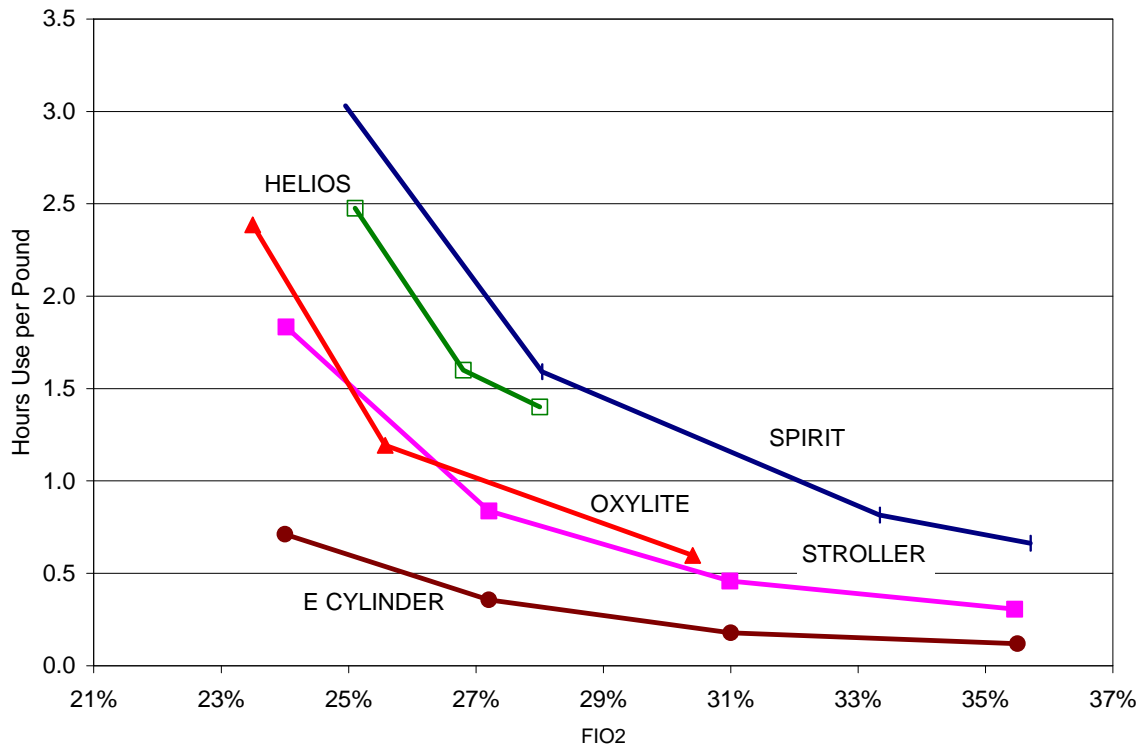
RESULTS

Tabulated measured hours use time and FIO2:

	1		2		3		4		5		6	
	Hrs	FIO2	Hrs	FIO2	Hrs	FIO2	Hrs	FIO2	Hrs	FIO2	Hrs	FIO2
E Cyl	10.7	24.0%	5.3	27.2%			2.7	31.0%			1.8	35.5%
Helios			9.9	25.1%	6.4	26.8%	5.6	28.0%				
Oxylite 301	13.6	23.5%	6.8	25.6%			3.4	30.4%				
Spirit	13.3	25.0%	7.0	28.0%			3.6	33.3%	2.9	35.7%		
Stroller	15.8	24.0%	7.2	27.2%			3.9	31.0%			2.6	35.5%



Mileage
Hours of Use per Pound of System Weight



CONCLUSION

New options for LTOT patients can provide significantly lighter oxygen systems with the comparable use times.

The longest use time at a particular setting (not FIO₂) and lightest weight were observed on the Helios system, but its oxygen delivery capabilities are limited, relative to other systems.

Same setting FIO₂ varies between models, so settings must be selected to meet therapeutic goals