USE OF A PORTABLE OXYGEN CONCENTRATOR WITH A FIXED MINUTE VOLUME OXYGEN CONSERVING DEVICE TO DELIVER OXYGEN TO EXERCISING PULMONARY REHABILIATION PATIENTS

Reggie Case, RRT, Raymond Hausmann, RRT, Cardiopulmonary Rehabilitation, Lake Hospital System, Willoughby, Ohio

Background: The use of oxygen conserving devices (OCD) in conjunction with home long term oxygen therapy (LTOT) is an accepted standard of practice. Prior literature suggests there is significant variability in performance specifications among OCDs. Key OCD performance variables include trigger sensitivity, bolus volume and bolus flow/speed. Emphasis has been placed on the bolus volume, as OCDs can be more accurately described as oxygen dosing devices, each delivering a predetermined volume (dose) of O2 per setting. A common OCD dose range is 1 to 5 with the O2 dose per setting amounts, ranging from 6ml to 18ml. Many OCDs deliver a volume of O2 per minute based on a simple minute volume formula (RR x O2 dose). It has been suggested that this formula plays a major role in assuring effective OCD O2 delivery in the face of increasing respiratory rates (RR) and physiologic workloads. A new portable oxygen concentrator (POC) with an integrated OCD produces a fixed volume of O2 per setting (150ml/setting, 1-5 settings) and adjusts the bolus volume per breath to the RR. We tested the Inogen One™ POC (Inogen, Inc., Goleta, CA) on exercising patients in an outpatient pulmonary rehabilitation setting to determine if the fixed minute volume of O2 was clinically effective in the face of increased respiratory and physiologic demand among a group of LTOT patients. **Method:** Eight patients participating in a Phase III pulmonary rehabilitation maintenance program volunteered to participate in the device trial. Mean age 71 (range 60-80). Four male and 4 female. Six with COPD, 2 with IPF. Seven patients are prescribed continuous LTOT at home and all 8 are prescribed O2 with exercise. During the program patients exercise on a variety of devices, including treadmills, exercise bikes, steps, arm cranks, rowers and free weights to a target heart rate (HR) of 70-75% of their age predicted maximum and a target SpO2 of ≥90% (+/-3%). Patient HR, SpO2 and dyspnea scale scores are monitored pre, during and post exercise. Patients may stop exercising at anytime, for any reason. Baseline clinical data was collected over 4 previous sessions on the patient's usual continuous flow (CF) O2 prescription for crossover comparison. Each patient was titrated to a POC setting during exercise that yielded the target SpO2. **Results:** All patients clinically tolerated the POC during exercise. Data reported below represents mean results from all exercise activity during the 50-minute session:

Patient	Age	CF O2 Setting	CF SpO2	POC Setting	POC SpO2	SpO2 Δ
1	78	3.0	94%	5.0	89%	5%
2	64	5.0	92%	5.0	90%	3%
3	79	2.0	97%	4.0	95%	2%
4	80	5.0	92%	5.0	91%	1%
5	61	3.0	91%	4.0	90%	1%
6	62	4.0	96%	4.0	92%	4%
7	75	4.0	90%	5.0	90%	0%
8	60	5.5	93%	5.0	90%	4%
Mean (SD)		3.9 (1.3)	93% (2%)	4.7 (0.5)	91% (2%)	2% (2%)

Conclusion: All patients were able to tolerate the POC during all exercise activities as demonstrated by a mean SpO2 of 91% (range 89-95%). No patient had HR changes and none stopped exercising while using the POC. There was no appreciable clinical difference between the patient's SpO2 on CF vs. the POC (93% vs. 91%). This preliminary data suggests that appropriately evaluated and titrated LTOT patients can be effectively oxygenated during vigorous exercise using a POC with an integrated OCD and a fixed volume of oxygen production per minute.

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