DETERMINATION OF AN APPROPRIATE NOCTURNAL SETTING FOR A PORTABLE OXYGEN CONCENTRATOR WITH PULSE-DOSED DELIVERY

J Stegmaier, RRT-NPS, RPFT, CCM[1], R Chatburn, BS, RRT-NPS, FAARC[2],
J Lewarski, BS, RRT, FAARC[3]
[1]Cardinal Home Respiratory, Cleveland, OH, [2]Chatburn Consulting, Cleveland, OH,
[3]Inogen, Inc., Goleta, CA

Introduction: Expert recommendations suggest titration of long-term oxygen therapy (LTOT) settings to the patient's activity level. However, clinicians in the US routinely specify a continuous flow (CF) oxygen prescription (i.e., 2 L/min) and employ this prescription during all activities of daily living (ADL), including sleep. New portable oxygen concentrators (POC) that operate using an integrated and real-time pulse-dosed oxygen delivery (PDOD) device are now readily available. There are published data supporting the safe and effective use of appropriately titrated oxygen using a PDOD at all activity levels, including sleep. The purpose of this study was to determine if a single titration of oxygen using a POC during exercise would provide an appropriate setting for nocturnal use.

Methods: We selected the Inogen One™ POC (Inogen, Inc., Goleta, CA) because: (1) it is FDA 510(k) cleared for use as described, (2) it is the only POC currently recognized by Medicare as both a stationary and portable O_2 device and (3) it incorporates modern PDOD technology specifically designed for use at night. Eleven (11) oxygen patients were randomly selected from a mix of newly referred and existing home LTOT patients. Additional selection criteria included a CF prescription of $\leq$ 4 L/min, a diagnosis of COPD, age range 55-80 years and no known evidence of obstructive sleep apnea. All patients signed an informed consent prior to enrollment in the study and all had valid prescriptions for O_2, PDOD and clinical assessment/oximetry. Patients were titrated by a respiratory therapist to a POC setting that produced a SpO_2 of > 90% during a 3-minute walk/ADL challenge. For sleep, patients were instructed to select the "sensitive" PDOD setting and the highest oxygen setting used during the walk/ADL assessment. All patients underwent a single overnight pulse oximetry study while using the POC. Clinically significant nocturnal oxygen desaturation (NOD) was defined as $\geq$ 20 cumulative minutes below a SpO_2 of 88% or $\geq$ 5% of their total sleep time below 88%. Patients were returned to their original oxygen device upon completion of the study.

Results: No patients experience clinically significant oxygen desaturation during sleep. Mean (standard deviation) clinical evaluation results are reported:

POC Setting	Nocturnal SpO_2	Cumulative minutes NOD	% Sleep time NOD
2.6 (0.5)	92% (1%)	3.3 (2.6)	1.3% (0.8%)

Conclusion: Nocturnal POC oxygen setting selection based on daytime ADL/ambulation appears to produce effective nocturnal oxygen therapy as evidenced by a mean sleeping SpO_2 of 92% and no clinically significant NOD. These results suggest that a single, one-step clinical evaluation and titration of oxygen setting with one brand of POC/PDOD device can produce effective oxygenation at rest, with ADL/ambulation and during sleep. Because of differences in design, signal sensitivity, and pulse volume, these results cannot be generalized to all POC and PDOD devices.

Original Publication
Respiratory Care
November 2006;51(11): 1305