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A Retrospective Observational Study of Domiciliary Oxygen Usage in a Subset of Veterans

Ravi Savani, Monali Patil, Asma Tariq, and M Jeffery Mador

BACKGROUND: Long-term oxygen therapy (LTOT) delivered continuously is known to decrease mortality in patients with COPD and who are hypoxemic; however, supportive data for LTOT use in patients without COPD is lacking. In addition, many patients may be prescribed LTOT without a definitive etiology for hypoxemia. First, we investigated the diagnoses for which oxygen was prescribed to a sample of veterans and whether each diagnosis was supported by confirmatory testing. Second, we looked at the proportion of subjects who were prescribed non-continuous therapy. METHODS: We retrospectively studied subjects prescribed domiciliary oxygen at the Veterans Administration Western New York Healthcare System. The subjects who met inclusion criteria were identified by using a computerized patient record system; data were collected on subject characteristics, oxygen prescription information, diagnosis for hypoxia, and diagnostic workup. Descriptive data were presented as mean ± SD and median (range). Statistical analysis was performed by using the chi-square test and an unpaired *t* test. RESULTS: A total of 494 patients were included: 96.8% men, mean ± SD ages 74.2 ± 10.8 y. Most of the subjects were prescribed oxygen as out-patients (68.5%). A total of 335 (67.8%) were prescribed oxygen for continuous therapy, 72 (14.1%) for nocturnal therapy, 50 (10.1%) for exertion, and 30 (6.1%) for both exertion and nocturnal use. At 3 months, 19.6% of the initial cohort had oxygen discontinued. In those subjects with oxygen continued at 3 months, COPD was the most common diagnosis (63.6%), of which 76.1% had pulmonary function tests (PFTs), with 85.7% showing obstruction on spirometry. CONCLUSIONS: Results of our study showed a 99.4% adherence to Medicare criteria for domiciliary oxygen prescription. Also, 30.3% of the subjects were prescribed LTOT for exertional or nocturnal desaturation or both. Repeated testing at 3 months identified subjects who no longer required oxygen. COPD was the most common etiology for domiciliary oxygen. A small proportion of the subjects (6.9%) were prescribed oxygen without underlying etiology for hypoxia. Exertional and/or nocturnal oxygen prescription was common, and further research to elucidate its utility is clearly warranted. *Key words: COPD; interstitial lung disease; sleep apnea; hypoxemia; long-term oxygen therapy; pulmonary function tests; spirometry.* [Respir Care 0;0(0):1–●. © 0 Daedalus Enterprises]

Introduction

Domiciliary oxygen is a widely prescribed therapy for a variety of diseases, predominantly COPD. Two landmark trials published in the early 1980s showed that continuous (>15 h/d) oxygen therapy decreased mortality in subjects with COPD and who were hypoxemic.[1,2] Subsequent studies demonstrated that long-term oxygen therapy (LTOT) improves

All authors are affiliated with the Division of Pulmonary, Critical Care and Sleep Medicine, Department of Medicine at the Jacobs School of Medicine and Biomedical Sciences, University at Buffalo, State University of New York, Buffalo New York, and the VA Western New York Healthcare System, Buffalo, New York.

The study was performed at the VA Western New York Healthcare System, 3494 Bailey Avenue, Buffalo, NY, 14215.

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Correspondence: M Jeffery Mador MD, VA Western New York Healthcare System, 3494 Bailey Avenue, Buffalo, NY 14215. E-mail: mador@buffalo.edu.

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survival and quality of life, and decreases exacerbations and hospitalizations in patients with COPD and hypoxemia.[3-6]

Given these benefits, it is accepted practice to prescribe LTOT for other disorders, such as interstitial lung disease (ILD) and congestive heart failure.[7,8] However, definitive randomized controlled studies that unequivocally demonstrate the decreased mortality seen in patients with COPD are lacking.[9-12] Recent studies in this field have been promising. Patients with pulmonary arterial hypertension or chronic thromboembolic disease and exercise-induced hypoxemia who were prescribed domiciliary oxygen had improved exercise capacity, quality of life and functional class compared with placebo.[13] Similarly, oxygen therapy has been shown to improve exercise capacity in patients with ILD.[7] However, non-continuous oxygen therapy has not been shown to improve mortality, even in COPD.[14]

In 2015, Medicare spent approximately $1.4 billion on oxygen therapy, which accounted for a significant portion of Medicare durable medical equipment expenditure,[15] which places a significant financial burden on the health-care system. It, therefore, is incumbent on clinicians to ensure that home oxygen is appropriately prescribed and that the etiology of the patient's hypoxemia is investigated. The purpose of this study was to collect data on oxygen prescription in a sample of veterans to identify the proportion of patients who received continuous or non-continuous therapy, the setting of the initiation of oxygen therapy, and the underlying etiology identified for hypoxia.

We suspected that a large number of our subjects were given oxygen either for exertion, nocturnal use, or both, although analysis of the data did not seem to support a mortality benefit for this practice. Oxygen prescription has been strictly regulated by insurances per the Medicare criteria (Table 1), which requires documentation of patient's hypoxic state, but the etiology of hypoxia is not necessary. Identifying the etiology of hypoxia is equally as important as therapy. Results of studies showed that only approximately 51–58% of patients with a diagnosis of COPD had confirmatory spirometry testing.[16,17]

Some providers, particularly in primary care, may not appreciate the importance of obtaining spirometry to establish the diagnosis of COPD,[18] and, in cases in which pulmonary function tests (PFTs) are performed, obstruction is seen in half or fewer than half.[19,20] Thus, establishing the diagnosis of hypoxia may be particularly difficult, and a considerable number of subjects may be prescribed domiciliary oxygen therapy without a definitive etiology for hypoxemia. In our study, we also looked at the distribution of diseases for which domiciliary oxygen is prescribed and if these subjects had appropriate diagnostic testing that validates the diagnosis.

QUICK LOOK

Current knowledge

Long-term oxygen therapy (LTOT) has been shown to decrease morbidity and mortality, and to improve quality of life in patients with COPD and with resting hypoxemia. International guidelines also recommend LTOT in patients with hypoxemia and with other diseases, for example, interstitial lung disease. Although spirometry is necessary to confirm a diagnosis of COPD, more than a third of patients may not have spirometry performed.

What this paper contributes to our knowledge

In our sample of veterans, although the adherence to Medicare criteria was high, we found that a significant proportion of the subjects received non-continuous oxygen (ie, at night, with exertion, or both). We found that clinicians prescribed home oxygen to subjects with hypoxemia for a variety of etiologies, with COPD being the most common. A considerable number of the subjects did not have their presumed diagnosis for hypoxemia confirmed with the appropriate diagnostic testing. Some subjects with hypoxemia thought to be due to COPD did not have spirometry performed at all, although these subjects were significantly older than those who had spirometry.

Methods

Study Design and Sample

This was a retrospective chart review of subjects who were prescribed oxygen therapy in the fiscal years 2012, 2013, and 2014 from the Veterans Administration (VA) Western New York Healthcare System. Our study was approved by the VA Western New York Healthcare System Institutional Review Board. The first 500 subjects identified from the VA Western New York Healthcare System registry of patients who were ages $\geq$ 40 y who were prescribed domiciliary oxygen therapy in the fiscal years 2012, 2013, and 2014 were included in the study. The sample size was limited to aid in the logistics of chart review data collection. Patients ages $<$ 40 y were excluded to filter out potential confounding from asthma. Patients with terminal illness for whom oxygen therapy was prescribed for palliative purposes were also excluded. Six subjects were subsequently excluded for meeting exclusion criteria.

Data Collection

Once the subjects who met the inclusion criteria were identified, demographic characteristics (age, sex, race, and body mass index) were retrieved from the computerized

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Table 1. Medicare Criteria to Qualify for Home Oxygen Therapy

Medicare Criteria
Group I criteria
Resting $P_{aO_2} \leq 55$ mm Hg or $S_{aO_2} < 88\%$
or
$P_{aO_2} \leq 55$ mm Hg or $S_{aO_2} \leq 88\%$, taken during exercise for a patient who demonstrates $P_{aO_2} \geq 56$ mm Hg or $S_{aO_2} \geq 89\%$ during the day while at rest; home oxygen provided for exertion if it is documented that the use of oxygen improves the hypoxemia that was demonstrated during exercise when the patient was breathing room air
or
$P_{aO_2} \leq 55$ mm Hg, or $S_{aO_2} \leq 88\%$, for at least 5 min taken during sleep for a patient who demonstrates $P_{aO_2} \geq 56$ mm Hg or $S_{PO_2} \geq 89\%$ while awake
or
A decrease in $P_{aO_2} > 10$ mm Hg or a decrease in $S_{aO_2} > 5\%$ for at least 5 min taken during sleep associated with symptoms or signs attributable to hypoxemia (eg, cor pulmonale, "P" pulmonale on electrocardiogram, documented pulmonary hypertension, and erythrocytosis)
Group II criteria
P_{aO_2} of 56–59 mm Hg or S_{aO_2} 89% at rest (awake), during sleep for at least 5 min or during exercise (as described under group I criteria) and any of:
Dependent edema that suggests congestive heart failure
Pulmonary hypertension or cor pulmonale, determined by measurement of pulmonary artery pressure, gated blood pool scan, echocardiogram, or "P" pulmonale on electrocardiogram (P wave > 3 mm in standard leads II, III, or AVF)
Erythrocythemia (hematocrit > 56%)

S_{aO_2} = arterial oxygen saturation

patient record system. Information about the oxygen prescription, including settings in which it was initiated (in-patient or out-patient); frequency of use (that is, nocturnal, exertional, or around the clock); duration of oxygen therapy; and diagnosis for hypoxia, such as COPD, heart failure, or non-COPD hypoxic respiratory failure (eg, ILD, pulmonary hypertension, sleep apnea) was recorded. When the subject had more than one disease that might cause hypoxemia, the disease listed on the home oxygen prescription was chosen as the one responsible, even though the etiology of the hypoxemia might be multifactorial. The appropriateness of oxygen therapy was based on the Medicare criteria for domiciliary oxygen therapy which is shown in Table 1. At the VA, oxygen therapy is approved if they meet any of these Medicare criteria and/or the prescription is verified by a VA pulmonologist.

Assessment of Diagnosis

The diagnostic workup was reviewed in each of the subjects to assess whether the testing confirmed the diagnosis. The following is a list of common diseases that cause hypoxemia and their appropriate confirmatory testing:

1. COPD: Pulmonary function test, showing post-bronchodilator FEV_1/FVC lower than the lower limit of normal; spirometric values were only recorded if they met American Thoracic Society criteria for reproducibility and accuracy; the NHANES dataset was used for predictive values.
2. ILD: Pulmonary function test, showing restrictive disease defined as total lung capacity or diffusing capacity of the lung for CO less than the lower limit of normal, evidence of ILD on high-resolution computed tomography or computed tomography, and evaluation by a pulmonologist who agrees with diagnosis of ILD.
3. Sleep apnea and nocturnal hypoxia: Polysomnogram, showing apnea hypopnea index >5 and evidence of nocturnal hypoxia in spite of adequate CPAP therapy.
4. Cardiac causes: Echocardiogram, showing diastolic or systolic dysfunction, valvular abnormalities, or evidence of pulmonary hypertension.
5. Other causes for non-COPD hypoxic respiratory failure that were evaluated by a pulmonologist, such as pulmonary vasculature disorders, asthma, and bronchiectasis.

Statistical Analysis

The statistical software SPSS (IBM corporation, Armonk, New York) was used for analyses. Descriptive data are presented as mean ± SD, and median (range). Categorical data were analyzed by using the chi-square test. Continuous data were analyzed by using an unpaired *t* test to compare groups.

Results

The study sample included 494 subjects; demographic characteristics of these subjects are summarized in Table 2.

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Table 2. Characteristics for the Entire Cohort ($N = 494$)

Characteristic	Result
Males, *n* (%)	478 (96.8)
Females, *n* (%)*	16 (3.2)
Race, *n* (%)	
African American	31 (6.3)
Asian/Pacific Islander	1 (0.2)
White	450 (91.1)
Native American	4 (0.8)
Not reported	8 (1.6)
Current or former smoker, *n* (%)	422 (85.4)
Age, mean ± SD y	74.2 ± 10.8
Median age, median (interquartile range) y	73 (66–83)
Body mass index, mean ± SD kg/m^2†	29.2 ± 9.0

* Includes 1 male-to-female transgender subject.
† $n = 490$; body mass index data unavailable for 4 subjects.

Table 3. Type of Oxygen Prescription for the Entire Cohort ($N = 494$)

Type of Prescription	Subjects, *n* (%)
18 to 24 h	335 (67.8)
Exertional only	50 (10.1)
Exertional and nocturnal	30 (6.1)
Nocturnal only	72 (14.1)
Unknown	5 (1.0)
Other*	2 (0.2)

* As needed; 1 subject for air travel, 1 subject for cluster headache.

Table 4. Home Oxygen Prescription Status at 3 Months ($N = 494$)

Prescription Status	Setting of Initiation, *n*	
	Out-Patient	In-Patient
Active	283	92
Inactive	51	46
Unknown	4	18

Table 5. Reasons for Discontinuation of Oxygen at 3 Months ($n = 97$)

Reason	Setting of Initiation		
	Out-Patient	In-Patient	Total, *n* (%)
Did not qualify*	7	13	20 (20.6)
No longer in the VA system†	6	3	9 (9.3)
Non-adherence and/or declined therapy	6	5	11 (11.3)
Death (or hospice care)	29	22	51 (52.6)
Only prescribed for air travel	1	NA	1 (1.0)
Unknown	2	3	5 (5.2)

* S_{pO_2} or P_{aO_2} no longer meets criteria for home O_2.
† The subject was receiving care from a non-VA provider, non-VA oxygen vendor, or moved out of the geographic region.
VA = Veterans Administration
NA = not applicable

The majority of the subjects (478/494 [96.8%]) were men, and the mean ± SD was age 74.2 ± 10.8 y. Many subjects had a variety of different comorbid conditions, which are shown in the supplementary materials (see the supplementary materials at http://www.rcjournal.com). In the vast majority of the subjects, oxygen was prescribed appropriately, based on Medicare criteria. A total of 491 subjects (99.4%) were started on oxygen based on a pulse oximetry oxygen saturation of ≤88% measured either at rest, or on exertion, or based on nocturnal pulse oximetry. Two subjects were prescribed home oxygen based on a P_{aO_2} of ≤55 mm Hg. Only one subject did not meet Medicare criteria and was prescribed oxygen for cluster headache. As shown in Table 3, 67.8% of the subjects were prescribed continuous oxygen therapy, whereas the subjects in the rest of the sample were prescribed non-continuous therapy, which was included for hypoxia on exertion, for nocturnal hypoxia, or both, for an unclear duration or as needed for air travel or headache. More than half of domiciliary oxygen was initiated in an out-patient setting (Table 4).

At 3 months, 97 subjects (19.6%) had their home oxygen discontinued (Table 5), mainly due to death or hospice care (52.5%) or because they no longer needed the oxygen (20.6%). There were a small number of subjects (4.5%) in whom it was unclear whether the oxygen prescription was still active at 3 months. The discontinuation rate at 3 months for in-patients was 29.4%, which was significantly higher compared with 15% for those started as out-patients ($P < .001$, chi-square test). In those subjects in whom oxygen was continued at 3 months, 93.1% had a diagnosis for hypoxia (Table 6). Obstructive lung disease was the most common diagnosis (222/349 [63.6%]), followed by sleep apnea with nocturnal hypoxia (39/349 [11.2%]), ILD (16/349 [4.6%]), and malignancy (10/349 [2.7%]). Among the subjects with obstructive lung disease, 76.1% had pulmonary function testing, of which, 85.8% had clear evidence of obstruction on spirometry (Table 7).

Discussion

In this audit of domiciliary oxygen usage, the vast majority of the subjects prescribed oxygen met appropriate Medicare criteria (Table 1). Only one subject did not meet Medicare criteria, and this subject was prescribed oxygen to treat refractory headache, an accepted treatment modality for cluster headaches. Although COPD

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Table 6. Primary Etiology of Hypoxia for the Subjects on Oxygen at 3 Months ($n = 375$)

Diagnosis	Subjects, *n* (%)
Pulmonary diagnosis	
COPD	222 (59.2)
Asthma	1 (0.3)
Sleep-related disorder*	39 (10.4)
Interstitial lung disease	16 (6)
Lung malignancy	10 (2.7)
Pneumonia	6 (1.6)
Obesity hypoventilation syndrome	1 (0.3)
Recurrent pleural effusion	2 (0.5)
Empyema	1 (0.3)
Pulmonary vascular diagnosis	
Pulmonary hypertension	4 (1.1)
Pulmonary embolism	1 (0.3)
Cardiac diagnosis for hypoxia	
Congestive heart failure	41 (10.9)
Valvular heart disease	2 (0.5)
Neurologic diagnosis	
Amyotrophic lateral sclerosis	3 (0.8)
No diagnosis present	26 (6.9)

* Sleep related includes obstructive sleep apnea and central sleep apnea, and may also include obesity hypoventilation syndrome without arterial blood gas confirming hypercapnia.

Table 7. Diagnostic Evaluation of Hypoxia

Etiology of Hypoxia	Appropriate Study Done, *n* (%)	Diagnosis Validated by the Study, *n*/total *n**
COPD†	169 (76.1)	145/169
Sleep related‡	28 (71.8)	25/28
Interstitial lung disease§	15 (93.8)	14/15
Lung cancer‖	5 (50.0)	5/5
Pneumonia¶	5 (100)	NA
Pulmonary hypertension**	4 (100)	3/4

* Diagnosis validated if the appropriate study confirms the diagnosis.
† PFTs (and/or imaging consistent with emphysema).
‡ Polysomnography.
§ High resolution computed tomography (HRCT) with or without PFT.
‖ Biopsy.
¶ Chest imaging (clinical findings plus chest radiograph or computed tomography).
** Echocardiogram and/or right heart catheterization.
NA = not applicable

was the most common reason for home oxygen prescription at 3 months, 41% of the subjects received oxygen for an alternate diagnosis.

Our study showed that 67.8% of the prescriptions adhered to guidelines for prescribing LTOT for patients with resting hypoxemia, which was similar to previously published data.[21] The proportion of the subjects who received oxygen for exertion, nocturnal hypoxemia, or both was 30.3%. Although this number seemed high, there are studies that indicate that the prevalence of exercise-induced hypoxemia in patients with moderate-to-severe COPD without resting hypoxemia is 29 to 39%.[22,23] The LOTT study did not show any beneficial effects of exertional oxygen with no reductions in hospitalizations or mortality and no improvement in quality of life. Thus, the efficacy of treatment of nocturnal and/or exertional oxygen remains uncertain. Despite the paucity of data, such treatment is commonly used, as seen in our study; further studies, such as the LOTT study,[14] to examine the utility of such treatment, would be very informative.

A substantial number of the subjects (almost 20%) had their home oxygen discontinued at the 3 month re-assessment mark. More than half of these subjects had oxygen discontinued due to death or hospice care but approximately a fifth had oxygen discontinued because they did not fulfill the criteria anymore. The discontinuation rate was double for the subjects who had prescriptions in in-patient settings versus out-patients, likely because the acute pathology for which they were hospitalized improved by 3 months and proportionally more in-patients were subsequently referred for palliative care or were deceased at 3 months (Table 5).

Similarly, in out-patients, effective treatment of the underlying condition might lead to improvement in oxygenation, such that oxygen is no longer necessary. Medicare guidelines require reassessment at 3 months for group 2 criteria but not group 1 (who only require yearly reassessment). However, group 1 criteria were the reason for oxygen prescription in the vast majority of our subjects (Table 1). Therefore, it would be useful to perform a re-evaluation of all patients prescribed oxygen 3 months after the initial prescription because a reasonable percentage of these patients will no longer require oxygen (15% of out-patients and 29.5% of in-patients [Table 4]). It should be remembered that, in the original home oxygen trials,[1,2] patients had to demonstrate resting hypoxemia at baseline and after 4 weeks of treatment optimization, although treatment for COPD was quite limited at the time these trials were performed.

Continuous oxygen therapy (>15 h) was used in early LTOT trials.[2] A recent study that compared oxygen therapy for 24 h/d versus 15–16 h/d in subjects with COPD and who were hypoxemic did not show any survival benefit.[24] Most of our subjects received continuous oxygen prescriptions. However, we found that 27.5% (Table 8) of the subjects with COPD and on home oxygen at 3 months were given non-continuous (<15 h/d) oxygen therapy, which included nocturnal, exertional, or both. These were the patients who were not severely hypoxemic at rest but become hypoxemic during sleep, ambulation, or both. There is little evidence that shows the benefits (or lack of benefit) of nocturnal oxygen in patients with COPD and with sleep desaturations.[25]

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Table 8. Summary Table of Diagnoses and Duration of Oxygen Therapy for Subjects With an Active Prescription at 3 Months ($n = 375$)

Diagnosis	Continuous	Exertional Use Only	Nocturnal Use Only	Exertional and Nocturnal Use
Congestive heart failure	31*	8	2	2
COPD	161	27	16	18
Interstitial lung disease	11	3	0	2
Sleep related†	0	0	39	0
Other	26	2	1	0
Diagnosis absent	16	3	4	3
Total, *n* (%)	245 (65.3)	43	62	25

* Includes 2 subjects with valvular disease.
† Includes obstructive sleep apnea and central sleep apnea.

In addition, in subjects with moderate desaturation at rest (oxygen saturation 89–93%) or with moderate exercise-induced desaturation, continuous oxygen therapy or oxygen during exercise and at night for those who displayed hypoxemia with exertion did not result in improved outcomes.[14] Therefore, although a considerable number of the subjects with COPD met criteria for non-continuous oxygen supplementation in our VA population, the utility of non-continuous therapy remains unclear. On top of lacking data for mortality or morbidity benefit, non-continuous prescriptions have a clear economic impact because Medicare reimbursements for oxygen and supplies total more than $1.4 billion.[15] Consequently, various international guidelines do not recommend nocturnal or ambulatory oxygen without resting hypoxemia, although this is definitely not the standard of practice currently in the United States.[8] There is a multicenter randomized trial that is evaluating the utility of treating nocturnal hypoxemia in patients with COPD, so more definitive answers, at least for this disease entity, should be forthcoming.[26]

In our study, pulmonary diagnoses comprised 85% of all oxygen prescriptions for the subjects with a diagnosis present and continued on oxygen at 3 months. The most common pulmonary diagnosis was, as expected, COPD (59.2%). Even though PFTs are required to make a diagnosis of COPD, only 78% of all pulmonary diagnoses and 76% of all subjects with COPD performed PFTs. Although worldwide the presence of confirmatory spirometry in patients who have a clinical diagnosis of COPD is 50–60%, one might expect a greater percentage of confirmatory spirometry in patients ill enough to display hypoxemia. We did see this because 76% of all the subjects labeled as having COPD had confirmatory spirometry, but, ideally, this number should be close to 100%. In another recent study in a veterans population, 21% of the subjects admitted to the hospital with a diagnosis of COPD exacerbation never had spirometry performed to confirm the diagnosis, which demonstrated that our results were not unusual.[27] Some patients will be too sick or disabled, either from their COPD or comorbidities, or will have impaired cognitive functioning that will not allow spirometry to be performed, but this might represent a smaller number than the 24% we observed.

It is noteworthy that the mean age was significantly higher in the group that did not undergo pulmonary function testing, with a mean age of 80.7 y (mean difference of 7.7 y; $P < .001$ [see the supplementary materials at http://www.rcjournal.com]), so the number of subjects who might be unable to perform pulmonary function testing might be higher than we initially expected. In addition, 14.2% of the subjects with COPD and who had PFTs did not show definitive evidence of obstruction on spirometry. However, a single spirometric measurement does not have perfect sensitivity in identifying COPD, particularly when the lower limit of normal for FEV_1/FVC is used as the cutoff.

Nevertheless, this raises the possibility that some of these patients with COPD might be wrongly labeled as COPD with the primary etiology for hypoxia not being determined. Because this primary etiology could be amenable to treatment, a more aggressive approach to diagnosis might lead to a superior outcome. In addition, a small proportion of the subjects were prescribed home oxygen for hypoxia without any associated diagnosis (26/375 [6.9%]) (Table 6), which is a clinical measure and not a disease by itself. Identification of the etiology of hypoxia is important because it may allow for treatment of the underlying disease, not just hypoxia, and may lead to clinical improvement. Again, it is humbling that 61.5% of these subjects (16/26) (see the supplementary materials at http://www.rcjournal.com) were seen by an academic pulmonologist without a clear etiology for the subject's hypoxemia being determined.

A significant number of the subjects were prescribed home oxygen due to persistent hypoxia after treatment for a non-COPD respiratory disease or exacerbation of underlying cardiac illness, with limited evidence that supported or refuted such practice. In ILD, treatment of hypoxemia is believed to improve quality of life and exercise tolerance, and is recommended by all international guidelines.[8] A recent trial demonstrated that ambulatory oxygen improved health-related quality of life in subjects with ILD and with exertional hypoxemia.[28] The most common cardiac cause of

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hypoxia in our study was congestive heart failure, and the most common non-COPD pulmonary etiology was residual sleep-related hypoxia in subjects with treated sleep apnea. Data that evaluated the utility of supplying oxygen in these settings are currently lacking, and, in the absence of data, clinicians believe that treating hypoxemia is the most prudent approach.

There were a number of limitations of our study. The sample size was kept to 500 subjects from a single center to facilitate data collection and analysis, which may have affected the generalizability of the results. Most of our subjects were men and 85% had a history of tobacco use (Table 2). Hence, the setting, duration, and diagnosis for home oxygen therapy in females and in nonsmokers might be different than what we found in our sample of veterans. In addition, ethnicity was largely limited to white and African-American veterans. Thus, the data might not be generalizable to the wider population. Furthermore, our veteran population had multiple comorbidities, and there may have been multifactorial etiologies of hypoxemia. It is often difficult to discern which disease is contributing the most to hypoxemia, but, for the purposes of this study, the disease that was chosen by the prescribing clinician to be the dominant etiology was the one we included in our analysis.

Conclusions

Our audit of domiciliary oxygen showed that the adherence to LTOT prescription was similar to previous studies. A notable number of the subjects were prescribed oxygen for non-continuous use, either at night, on exertion, or both. Current research does not support a mortality benefit for non-continuous oxygen benefit,[14] although there is emerging evidence to suggest that oxygen therapy for some of these patients may improve exercise capacity and quality of life.[7] Re-evaluation of all the patients at 3 months, especially those whose oxygen was started as an in-patient, will result in a discontinuation in many patients and potentially reduce health-care costs. Although identifying the etiology for hypoxia could be challenging and may be, at times, multifactorial, spirometry should be performed in all patients with hypoxia secondary to presumed respiratory disease. In summary, it is up to clinicians to use best evidence-based judgment when prescribing oxygen, and it is important to carry out a thorough diagnostic workup, which may change how patients are managed and lead to improved clinical outcomes.

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