



Characteristics of long-term home oxygen therapy users in the municipality of Curitiba, Brazil

Características dos usuários de oxigenoterapia domiciliar prolongada do município de Curitiba

Características de los usuarios de oxigenoterapia domiciliar prolongada del municipio de Curitiba

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Abstract

Introduction: Long-term home oxygen therapy (LTOT) can be successfully used in the treatment and prevention of chronic lung diseases, as it improves quality of life, increases survival, and reduces the length of hospital stays. However, to the authors' knowledge there are no descriptive studies with details of the

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clinical and social profile of patients using LTOT in the state of Paraná. **Objective:** To analyze the profile of LTOT users in the state of Paraná. **Method:** All patients registered in the LTOT program of the Curitiba Municipal Department of Health were recruited to the study. Participants answered a questionnaire with questions about their education level, family income, main diagnosis, comorbidities, hours/day of O₂ use, and hospitalizations in the previous year. **Results:** 386 patients (67 ± 20.4 years; 66% females) were interviewed. Chronic obstructive pulmonary disease (COPD) was the most common disease (58.5%); 60.6% were former smokers and 84.5% did not practice any kind of physical activity; dyspnea was the most common symptom (81.3%) and immobility was the most commonly reported inconvenience (33%); 55.7% used O₂ 24 hours a day; 53.6% had been hospitalized in the previous year; 33.9% had not completed primary school; 31.4% had an income of one minimum monthly wage or less. **Conclusion:** LTOT users in Curitiba are primarily elderly women with COPD, with low family income and limited schooling. It is extremely important that health professionals provide educational and preventive measures for this population, to minimize the impact of COPD in the community.

Keywords: Oxygen Inhalation Therapy. Health Profile. Lung Diseases.

Resumo

Introdução: No tratamento e prevenção de doenças pulmonares crônica, o uso da Oxigenoterapia Domiciliar Prolongada (ODP) mostra-se favorável, pois melhora a qualidade de vida, aumenta sobrevida e reduz períodos de hospitalização. No entanto, os autores desconhecem estudos descritivos que relate o perfil clínico e social dos pacientes que usam ODP no estado do Paraná. **Objetivo:** Analisar o perfil dos usuários do Programa de Oxigenoterapia Domiciliar Prolongada (ODP) no estado do Paraná. **Método:** Foram recrutados todos os indivíduos cadastrados no Programa de ODP da Secretaria Municipal de Saúde de Curitiba. Os participantes responderam a uma ficha estruturada, com questões relacionadas à escolaridade, renda familiar, diagnóstico principal, comorbidades, horas/dia de O₂, internamento no último ano. **Resultados:** Foram entrevistados 386 pacientes (67 ± 20,4 anos; 66% gênero feminino). A Doença Pulmonar Obstrutiva Crônica (DPOC) foi a doença mais prevalente (58,5%); 60,6% eram ex-tabagistas e 84,5% não praticavam nenhum tipo de atividade física; a dispneia foi o sintoma mais comum (81,3%) e o imobilismo foi o incômodo mais relatado (33%); 55,7% faziam uso de O₂ durante 24 horas; 53,6% necessitaram de internamento no último ano; 33,9% escolaridade até Ensino Fundamental Incompleto; 31,4% com renda de até 1 salário mínimo. **Conclusão:** Usuários de ODP em sua maioria são mulheres, idosas, com DPOC, apresentaram baixa renda familiar e baixo grau de escolaridade. É de extrema importância que os profissionais de saúde levem medidas educativas e preventivas para essa população, a fim de minimizar o impacto da DPOC na comunidade.

Palavras-chave: Oxigenoterapia. Perfil de Saúde. Pneumopatias.

Resumen

Introducción: En el tratamiento y prevención de enfermedades pulmonares crónicas, el uso de la Oxigenoterapia Domiciliar Prolongada (ODP) se muestra favorable, pues mejora la calidad de vida, aumenta la supervivencia y reduce períodos de hospitalización. Sin embargo, los autores desconocen estudios descriptivos que relatan el perfil clínico y social de los pacientes que usan ODP en el estado de Paraná. **Objetivo:** Analizar el perfil de los usuarios del ODP en el estado de Paraná. **Método:** Fueron reclutados todos los individuos registrados en el Programa de ODP de la Secretaría Municipal de Salud de Curitiba. Los participantes respondieron a una ficha con cuestiones relacionadas la escolaridad, ingreso familiar, diagnóstico principal, comorbilidades, horas/día O₂, internamiento en el último año. **Resultados:** Fueron entrevistados 386 pacientes (67 ± 20,4 años; 66% femenino). La enfermedad pulmonar obstructiva crónica (EPOC) fue la enfermedad más prevalente (58,5%); 60,6% eran ex tabaqueros y el 84,5% no practicaba ninguna actividad física; la disnea fue el síntoma más común (81,3%) y el inmovilismo fue el inconveniente más reportado (33%); 55,7% hacía uso de O₂ durante 24 horas;

53,6% necesitó de internamiento en el último año; 31,4% con renta de hasta 1 salario mínimo. **Conclusión:** Los usuarios de ODP en su mayoría son mujeres, ancianas, con EPOC, presentaron baja renta familiar y bajo grado de escolaridad. Es de extrema importancia que los profesionales de la salud lleven medidas educativas y preventivas para esa población, a fin de minimizar el impacto de la EPOC en la comunidad.

Palabras-clave: Oxigenoterapia. Perfil de Salud. Enfermedades Pulmonares.

Introduction

The use of Long-Term Oxygen Therapy (LTOT) in the treatment and prevention of chronic lung diseases is already well consolidated in the literature, as well as the control of cor pulmonale episodes, decreased polycythemia [1], and the increased tolerance to exercises, with a direct impact on the quality of life and chances of survival [1 - 3].

Another benefit reached is the reduced length of hospital stay and number of hospitalizations, thus decreasing costs for maintaining the treatment, with a consequent decrease in expenses by the Brazilian National Health System (Sistema Único de Saúde [SUS]). Furthermore, it allows for maintaining the patient in their residence together with their family, providing them more comfort [4].

The LTOT is generally prescribed for clinically stable patients with optimized medical therapy, showing $\text{PaO}_2 < 55$ mmHg or $\text{SaO}_2 < 88\%$ in environmental air; and for borderline patients concerning PaO_2 , who present at least one of the following conditions: polyglobulia, pulmonary hypotension, or falls in oxygen concentration during exercise [2, 5]. Thus, oxygen therapy fits into the context of resolving and preventing manifestations of tissue hypoxemia during everyday activities [6-11].

The LTOT program was created by SUS, benefiting patients with chronic hypoxemia who have not been indicated for hospitalization. According to information provided by the Municipal Health Secretariat (SMS), the LTOT program was implemented in 2011 in the State of Paraná, Brazil, and can currently be found in all regions of the state, attending about one thousand beneficiaries. The city of Curitiba is responsible for the loaning out and treatment maintenance for home oxygen therapy and provides a kit consisting of a cylinder, concentrator, extension and nasal catheter (SMS - 2015). The literature has reported on some

questions such as the social and clinical repercussions of LTOT in various countries [6, 12-14], as well as in some Brazilian cities [15-18]. However, the authors are unaware of descriptive studies reporting the clinical and social profiles of patients who use LTOT in the State of Paraná. They believe that descriptive studies concerning the profile of this population could contribute by providing information that would give a wider vision of their reality and offer subsidies for improved care planning, such as new evaluation and treatment strategies for these patients.

Thus, the objectives of this study were: 1) analyzing the clinical and socio-demographic profiles of patients attended by the LTOT program in the municipality of Curitiba; 2) identifying the number of comorbidities and the main symptoms and discomforts related to the use of LTOT.

Methods

This was a descriptive, observational study, carried out in the municipality of Curitiba/Paraná/Brazil from May to July 2015, after project approval by the Ethics Committee (No. 481.008/2013).

Regardless of age, gender, and disease, the inclusion criterion was that the individual should be registered in the Long-term Home Oxygen Therapy Program of the Municipal Health System (SMS) of Curitiba for the period mentioned and agree to participate in the study.

Patient profile characterization was carried out by a duly trained physical therapist, in a single telephone interview, using a form elaborated by the researchers, which included categorized information concerning: age, gender, education level, marital status, family income, main diagnosis, number of comorbidities, smoking history, if he/she carries out any physical activity, hospitalization in the last year due to disease exacerbation, main symptoms, amount of oxygen and

hours of use per day, catheter length and discomfort when using oxygen. The Charlson Comorbidities Index (CCI) was also calculated, as it is described as an important mortality indicator. Such index calculates the risk of patient morbidity, considering associated comorbidities, through a specific scoring system for each clinical condition, with weights varying from zero to six [19].

Information collected in the interviews was grouped into three dimensions, according to the structure proposed by WHO to describe the characteristics of chronic patients, including: 1) clinical characteristics of the LTOT users; 2) socio-demographic aspects and system-related factors; and 3) patients' monthly income.

Data analysis was carried out using the Windows SPSS statistical program software, version 22.0. The descriptive analysis of data was represented by the absolute and relative frequency, mean and standard deviation, median, and 25-75% percentiles.

Results

Of the 506 LTOT users in the period from May to June 2015, 120 (23%) did not carry out the interview, whereas some did not agree to participate in the study ($n = 19$), died ($n = 18$), were former users ($n = 8$) or hospitalized ($n = 5$), and some were not found ($n = 70$), totaling 386 users, as shown in Figure 1.

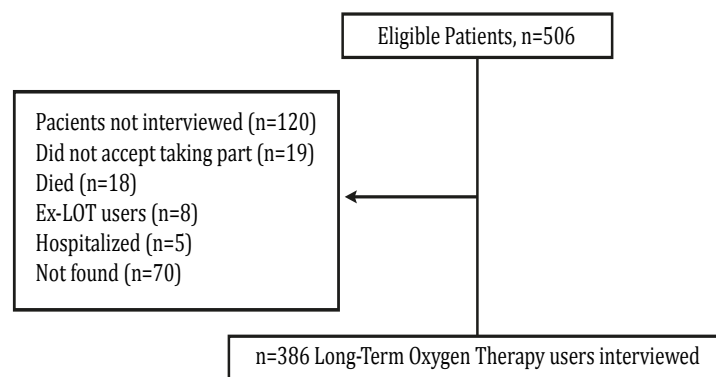


Figure 1 – Study flow diagram.

The most prevalent disease was chronic obstructive pulmonary disease (COPD) (58.5% of the population

evaluated), followed by pulmonary fibrosis (7.5%) and asthma (7.2%), as shown in Figure 2.

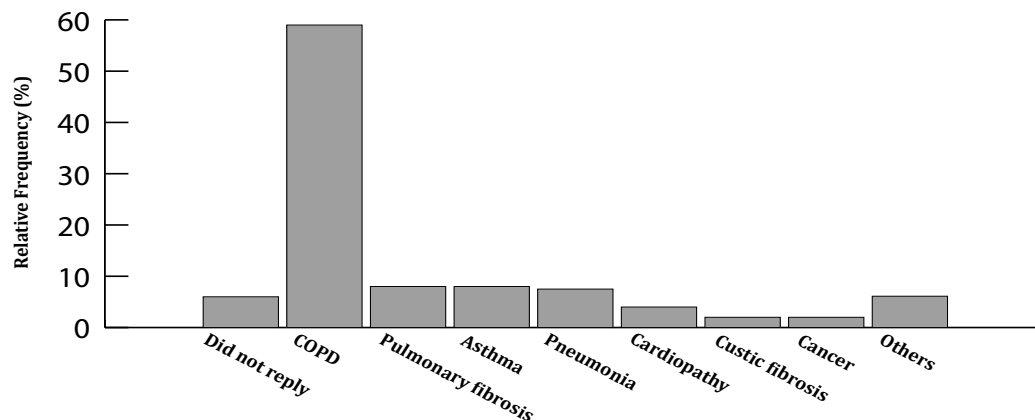


Figure 2 – Distribution of users according to their clinical diagnoses.

Tables 1 and 2 give detailed descriptions of the clinical and socio-demographic characteristics, respectively.

Table 1 – Clinical characteristics of the LTOT users

Characteristics	(n = 386)
Age, years	67 ± 20.4
Ex-smokers n (%)	234 (60.6)
Carry out physical activity n (%)	58 (15.5)
Time using O₂ /day n (%)	
24 hours	215 (55.7)
18 hours	4 (1)
Nocturnal	76 (19.7)
Intermittent*	77 (19.9)
Could not manage to inform	14 (3.6)
O ₂ flow rate, l/min	2.6 ± 1.2
Number of comorbidities (mean, SD)	2.36 ± 1.17
Charlson Index	2 [1-3]
Symptoms n (%)	
Dyspnea	314 (81.3)
Cough	226 (58.5)
Expectoration	198 (51.3)
“Chest rattle”	205 (46.9)
Discomfort in using LTOT n (%)	
Immobility	49 (13)
Drying out of nostrils	127 (33)
Absence of “annoyances”	151 (40)
Hospitalization in last year n (%)	206 (53.4)

Note: Mean ± Standard deviation; Median and [inter-quartile range].

*intermittent = discontinuous use of LTOT, use for short periods (1 to 2 hours), when feeling out of breath.

Regarding socio-demographic characteristics, most of the users were female, married or widowed, and educated up to complete primary education (Table 2).

Table 2 – Distribution of the LTOT users according to socio-demographic characteristics

Characteristics	n (%)
Gender	
Male	129 (33.4)
Female	257 (66.6)
Marital status	
Did not reply	16 (4.1)
Single	44 (11.4)
Stable union	3 (0.8)

(To be continued)

(Conclusion)

Characteristics	n (%)
Married	149 (38.6)
Divorced	25 (6.5)
Widowed	149 (38.6)
Educational level	
Did not reply	59 (15.3)
Illiterate	5 (1.3)
Complete primary education	81 (21)
Incomplete primary education	131 (33.9)
Complete secondary education	39 (10)
Incomplete secondary education	16 (4.1)
Complete higher education	27 (7)
Incomplete higher education	6 (1.5)
Others	22 (5.7)

The number of rooms in the patients’ homes were from 4 to 6 in 54.9% of the cases, and the length of the O₂ extension was on average 7.23 ± 2.37 meters, such that the number of rooms reached by the O₂ catheter was from 2 to 3 for 42.3% of the interviewees. Regarding income, 78.5% of the users earned from 1 to 3 minimum wages (Table 3).

Table 3 – Incomes and costs of the population using LTOT in Curitiba

Characteristics	n (%)
Income	
Did not reply	28 (7.3)
Up to 1 minimum wage	122 (31.6)
2 to 3 minimum wages	185 (47.9)
3 to 5 minimum wages	34 (8.8)
More than 5 minimum wages	15 (3.9)
Others	2 (0.5)
Electrical energy costs	
Did not reply	97 (25)
Up to 100 Reais	38 (9.8)
From 100 to 200 Reais	96 (24.9)
From 200 to 300 Reais	83 (21.5)
From 300 to 400 Reais	45 (11.7)
More than 400 Reais	27 (7)
Medication costs	
Did not reply	26 (6.7)
Up to 100 Reais	54 (14)
From 100 to 200 Reais	65 (16.8)
More than 200 Reais	241 (62.4)

Discussion

The results of this study provided a picture of the LTOT users' characteristics in the city of Curitiba/Parana/Brazil, generating potentially valuable information about their health state and social factors.

From this study, one can see that most LTOT users had been diagnosed with COPD. The presence of this disease can justify some of the characteristics shown by this study, such as an average age of 67 (± 20.4) and a high prevalence of ex-smokers who were physically inactive. In addition, since this is a disease more frequently found in older adults [15, 22, 23] and considering the increased life expectancy of Brazilian women in comparison with Brazilian men [24, 25], this justifies the fact that more than 60% of those interviewed were of the female gender and that a greater number of the LTOT users were older.

Although COPD was a disease traditionally more common in men, in recent years the COPD prevalence and mortality increased more rapidly in women than in men, apparently due to a change in smoking habits among women [26]. In addition, studies have shown that women with no history of smoking are 1.5 times more likely to be diagnosed with COPD than men [27, 28]. Pinkerton K.E. *et al.* stated that basic differences in anatomy and physiology between men and women undoubtedly influence both the course of respiratory infections caused by the disease as the response to treatment [29].

Of the individuals interviewed, 84.5% said they did not undertake any type of physical activity, corroborating the results shown in another study, in 2014, in the municipality of Botucatu, SP, Brazil, where a research group found a high prevalence of physical inactivity amongst the participants (98.1%) [30].

Regarding the use of O₂, most individuals interviewed in this study (55.7%) used an average of 2.6 l/min in a continuous way, similar to research carried out previously [6, 16, 18, 30]. However, other studies have shown the use of supplementary oxygen for shorter periods of time, such as 18 hours [13, 16], 9.8 hours [29], and 8 to 10 hours [18]. Such scenario shows the lack of standardization in the LTOT prescription, possibly due to the fact that many patients had not received a precise diagnosis or stratification of their clinical decompensation, making the oxygen use empirical since some of them used it continuously and others intermittently, with

no pre-established criterion or specific orientation by the person who prescribed it.

The main symptom reported by the interviewees was dyspnea (81.3%), corroborating the results of a survey carried out in the city of São Paulo, Brazil, in which 66.6% of LTOT users reported the same symptom [30]. Even higher levels of dyspnea (91%) were described in a study carried out in Japan [6]. The authors emphasize the fact that, although the literature describes the use of supplementary oxygen as being inversely proportional to the presence of the dyspnea sensation [6, 31], it appears this is not observed in clinical practice.

The main LTOT treatment-related discomforts reported by the patients were dry nostrils (33%) and immobility (13%), but 40% reported no discomfort during treatment. In another survey carried out in Goiânia, Brazil, the authors found lower percentages of discomfort, with 8.1% reporting dry nostrils and 6.3% immobility [16], a difference that could be explained by the climate disparity between the two cities.

Regarding the number of hospitalizations due to exacerbation of the clinical condition, 53.4% of the participants reported at least one hospitalization per year and, of these, 27.9% required 3-month hospitalization prior to the research.

As to the presence of comorbidities, this study found a lower value for the Charlson Comorbidity Index (CCI) [19-21] than that reported by Santos *et al.* (2.36 versus 5.2) [30]. Marti *et al.* [32] demonstrated that the risk of death for respiratory causes among patients with COPD was three to five times higher for a CCI ≥ 2 and concluded that, for those COPD patients using long-term home oxygen therapy, non-respiratory variables such as the body mass index (BMI) $< 25 \text{ kg/m}^2$ and comorbidities were factors leading to a prognosis of mortality due to respiratory causes or otherwise.

Since the information shows a close relationship between BMI and mortality in these patients, the fact this information was not obtained in this research must be considered as a limitation of the study. Furthermore, other limitations are the lack of information concerning the medical follow-up time for the use of LTOT, adherence to the time of use, and used/prescribed O₂ flow.

On average, the length of the extension used by the patients was 7 meters, contrary to that reported by other studies (2 meters) [16, 30]. The authors believe

that an evaluation of the O₂ extension is very relevant since it represents an important determinant of patient locomotion within their residence. Although the number of rooms reported in the residences was from 4 to 6, the number of rooms reached by the O₂ catheter would be from 2 to 3.

With respect to marital status, the sample used in this study consisted mostly of married and/or widowed individuals, in agreement with other national studies [15, 30]. The importance of investigating marital status was due to the fact there is an association between social support and greater levels of physical activity and involvement with pulmonary rehabilitation in adults with COPD [33].

Individuals' education level is also a relevant data for discussion since it is directly related to their self-care capacity and quality of life, with direct repercussions on the evolution of chronic diseases [15, 34, 35]. Thus, as in many other studies [15, 18], the education level most commonly observed was incomplete primary education (33.9%), suggesting that both self-care and quality of life could be harmed among these individuals.

The sample included 47.9% of individuals with incomes from 2 to 3 minimum salaries, a mean slightly higher than that found in other states such as São Paulo [15, 30] and Fortaleza [17]. Income is also considered to be a determinant factor in the treatment of chronic patients, considering that low incomes are associated with more frequent exacerbations and increased COPD risks [36]. According to Kawachi & Kennedy (1999), income can be used as a powerful predictor of mortality; the lower the income, the greater the risk of death and the worse the self-reported quality of health [37].

One of the limitations of this study was the lack of a clinical and functional evaluation. The limited resources for locomotion to the patients' residences and the fact that most of them encountered difficulty in going to the locations to carry out the tests due to the heavy equipment, as well as the high cost of recharging the oxygen cylinders, made an in-person evaluation impossible. Nevertheless, this study provided initial information on which future research could be based, aimed at confirming and/or establishing clinical and functional diagnoses for these individuals, so that they can receive pulmonary rehabilitation according to their needs.

Knowing the profiles of LTOT patients is of paramount importance for providing subsidies to

professionals of the Home Health Care Program, aimed at elaborating a plan for interdisciplinary action with preventative and curative strategies, favoring adherence to the proposed services and strategies and, consequently, an improvement in the population health [38].

Conclusion

Patients of the LTOT program in the municipality of Curitiba were mainly elderly women with COPD, who used O₂ continuously, frequently reporting dyspnea, presenting low family income and education levels. This study provided evidence on the importance of health professionals taking educational and preventative measures aimed at this population, to minimize the impact of COPD in the community and to provide information for planning necessary measures, leading to benefits and an improvement of domiciliary health care.

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