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HOME OXYGEN THERAPY: PROFILE OF USERS ASSISTED BY THE *MELHOR EM CASA* PROGRAM

OXIGENOTERAPIA DOMICILIAR: PERFIL DOS USUÁRIOS ASSISTIDOS PELO PROGRAMA MELHOR EM CASA

OXIGENOTERAPIA EN EL HOGAR: PERFIL DE USUARIOS ASISTIDOS POR EL PROGRAMA *MELHOR EM CASA*

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Objective: to describe the profile of home oxygen therapy users assisted by the *Melhor em Casa* Program. Method: cross-sectional study with retrospective data collection and descriptive analysis of medical records of home oxygen therapy users in a municipality in the countryside of Rio Grande do Sul. Results: among the 59 users enrolled in the program for the use of home oxygen therapy, Patients with Chronic Obstructive Pulmonary Disease (n=35), palliative care (n=13) and other pathologies (n=11), mean age of 69.3 years, female gender (52.5%), intermittent oxygen therapy (57.6%), previous smoking (71.2%), current smoking (8.5%), mean time of oxygen therapy use of 17 months were identified. As an outcome, death (45.7%), discharge (11.9%) and oxygen therapy (40.7%) were identified. Conclusion: home oxygen therapy users assisted by the *Melhor em Casa* Program of the municipality studied had advanced age, female, ex-smokers, low schooling, chronic obstructive pulmonary disease as an underlying disease and care provided by family caregivers.

Descriptors: Oxygen Therapy. Home Care Services. Nursing Care. Primary Health Care. Chronic Obstructive Pulmonary Disease.

Objetivo: descrever o perfil dos usuários de oxigenoterapia domiciliar assistidos pelo Programa Melhor em Casa. Método: estudo transversal com coleta de dados retrospectiva e análise descritiva de prontuários dos usuários de oxigenoterapia domiciliar de um município do interior do Rio Grande do Sul. Resultados: dentre os 59 usuários cadastrados no programa para uso da oxigenoterapia domiciliar, identificaram-se portadores de Doença Pulmonar Obstrutiva Crônica (n=35), cuidados paliativos (n=13) e outras patologias (n=11), idade média de 69,3 anos, sexo feminino (52,5%), oxigenoterapia intermitente (57,6%), tabagismo pregresso (71,2%), tabagismo atual (8,5%), tempo médio de uso da oxigenoterapia de 17 meses. Como desfecho, foi identificado: morte (45,7%), alta (11,9%) e em uso

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de oxigenoterapia (40,7%). Conclusão: os usuários de oxigenoterapia domiciliar assistidos pelo Programa Melhor em Casa do município estudado apresentavam idade avançada, sexo feminino, ex-tabagistas, baixa escolaridade, doença pulmonar obstrutiva crônica como doença de base e cuidados prestados por cuidadores familiares.

Descritores: Oxigenoterapia. Serviços de Assistência Domiciliar. Cuidado de Enfermagem. Atenção Primária à Saúde. Doença Pulmonar Obstrutiva Crônica.

Objetivo: describir el perfil de los usuarios de oxigenoterapia domiciliaria asistidos por el Programa Melhor em Casa. Método: estudio transversal con recolección retrospectiva de datos y análisis descriptivo de registros médicos de usuarios domiciliarios de oxigenoterapia en un municipio del interior de Rio Grande do Sul. Resultados: entre los 59 usuarios inscritos en el programa para el uso de oxigenoterapia domiciliaria, se identificaron pacientes con Enfermedad Pulmonar Obstructiva Crónica (n=35), cuidados paliativos (n=13) y otras patologías (n=11), edad media de 69,3 años, sexo femenino (52,5%), oxigenoterapia intermitente (57,6%), tabaquismo previo (71,2%), tabaquismo actual (8,5%), tiempo medio de uso de oxigenoterapia de 17 meses. Como resultado, se identificaron la muerte (45,7%), el alta (11,9%) y la oxigenoterapia (40,7%). Conclusión: los usuarios de oxigenoterapia domiciliaria atendidos por el Programa Melhor em Casa del municipio estudiado fueron mujeres de edad avanzada, exfumadores, baja escolaridad, enfermedad pulmonar obstructiva crónica como enfermedad subyacente y atención brindada por cuidadores familiares.

Descriptores: Oxigenoterapia. Servicios de Atención Domiciliaria. Cuidados de Enfermería. Atención Primaria de Salud. Enfermedad Pulmonar Obstructiva Crónica.

Introduction

Home oxygen therapy, characterized as a ventilator support method, is generally prescribed to patients who have the chronicity of hypoxemia and are available to patients in Home Care (HC), who require oxygen supply in higher concentrations than that available in ambient air[1-2]. HC is a strategy adopted by the Ministry of Health (MH) to provide greater access to health care for users with chronic diseases. Its objectives are to reduce the rate of occupation of hospital beds, promote care adapted to the needs of users and also to ensure the patient's autonomy[3].

The supply of home oxygen therapy has become more effective with the implementation of HC, enabling the correction of clinical changes resulting from oxygen insufficiency in the blood and, consequently, improving the quality of life of users with chronic respiratory diseases[1]. Home oxygen therapy is most often prescribed to patients with chronic obstructive pulmonary disease (COPD), grade III and IV on the Global Initiative For Chronic Obstructive Lung Disease scale[2,4]. In addition, oxygen therapy allows the follow-up in the home of patients in palliative care who require this therapy[1,5].

The lack of guidance for the correct use of home oxygen therapy can result in serious and harmful consequences for the user's health[6]. The main risks of oxygen therapy can be classified as biological, physical and functional risks[2-3]. Biological risks are caused by fires and explosions; physical risks, due to catheter trauma or masks, and secretion dryness due to inadequate humidification[3]. Finally, functional risks cause several complications, such as CO_2 retention, atelectasis, increased systemic blood pressure, reduced cardiac output, increased blood pressure and toxicity risks, presented by cytotoxic manifestations of oxygen[3,6].

The *Melhor em Casa* Program, created by the Ministry of Health in 2011, is a Program of HC that includes actions and measures for prevention, treatment of diseases, rehabilitation, palliation and health promotion[3]. In the city where this study was conducted, it was implemented in 2011 and home oxygen therapy is provided by the Municipal Health Department. The Multidisciplinary Home Care Team (MHCT) is responsible for the installation, replacement and assistance to users using home oxygen

therapy, receiving support from the Family Health Strategies of the municipality.

Although home oxygen therapy has been part of the therapeutic resources offered by the Unified Health System (UHS) for over 10 years, little is known about the profile of patients who use it. Knowledge of the users' profile and needs is important for planning care and for developing health education activities of users and caregivers regarding the use of home oxygen therapy. Thus, the aim of this study is to describe the profile of home oxygen therapy users assisted by the *Melhor em Casa* Program.

Method

This is a cross-sectional study with retrospective data collection and descriptive data analysis[7-8]. Primary data extracted from the medical records of home oxygen therapy users assisted by the *Melhor em Casa* Program of a municipality located in the Metropolitan Region of Porto Alegre (RS) were used.

Data collection occurred between September and October 2020, at the MHCT headquarters of the municipality, in which the MHCT is composed of a physician, nurse, nursing technicians, physiotherapists and oxygen conductors/installers. These professionals provide care to patients with moderate complexity of care, from 7:00 am to 1:00 pm and from 3:00 pm to 9:00 pm, every day of the week. The municipality has a population of around 40,000 inhabitants, according to the 2019 estimate of the Brazilian Institute of Geography and Statistics (IBGE)[9].

The population studied was composed of all home oxygen therapy users assisted by the *Melhor em Casa* Program of the municipality, from December 2018 to January 2020. The choice of this period is related to the beginning of the records in the medical records by MHCT. Before December 2018, most users did not have medical records. After January 2020, there was an exchange of MHCT professionals, and they had difficulties to continue the records. Users whose medical records had incomplete data were excluded from the study.

The variables investigated were based on the indicators established by the MH[10] for the *Melhor em Casa* Program, such as: gender, age, schooling, color, marital status, basic pathology for indication of oxygen use, presence of other comorbidities, referral origin, smoking, alcohol consumption, mobility, caregivers, form of oxygen therapy use, average hours/day of intermittent oxygen use, mean length of hospital stay, type of oxygen source and outcome.

The data were collected in an instrument built in Microsoft Word® and tabulated in a Microsoft Excel® spreadsheet. The variables were presented as simple descriptive statistics, in absolute number and percentage.

The study was approved by the Research Ethics Committee (REC) of the Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA) with the Certificate of Presentation of Ethical Appreciation (CAAE) n. 35421720.6.0000.5345.

Results

In the period investigated, 64 users were registered for home oxygen therapy use. Of these, five were excluded from the study due to the absence of the variables investigated in the medical records. Therefore, the results of the study refer to 59 users.

Table 1 presents the sociodemographic characteristics of the users. There was an average age greater than 60 years, with a range from 1 to 93 years. The two users under the age of 30 years used oxygen therapy for severe congenital heart disease and infantile paralysis. There was a slight predominance of females, white color, elementary school education, married marital status, family as a caregiver, bed-restricted users or bedridden. Among the caregivers who were family members, the female gender predominated.

Table 1 – Sociodemographic characteristics of home oxygen therapy users. Municipality of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, Brazil – December 2018 to March 2020. (N=59)

Variables	n	%
Mean age (+Standard Deviation)		
All users (n = 59)	69.3 ±18.3	
With chronic obstructive pulmonary disease (n = 35)	76.4 ±9.1	
Palliative care (n = 13)	65.1 ±13.3	
Other pathologies (1) (n = 11)	56.9 ±25.3	
Sex		
Female	31.0	52.5
Male	28.0	47.4
Color		
White	54.0	91.5
Black	3.0	5.1
Brown	2.0	3.4
School level		
Not applicable(2)	2.0	4.4
Did not attend school – illiterate	4.0	6.8
Complete/Incomplete Elementary School	39.0	66.1
Complete/Incomplete High School	12.0	20.3
Complete/Incomplete College	2.0	3.4
Marital status		
Not applicable(2)	2.0	3.4
Single	4.0	6.8
Married	34.0	57.6
Divorced	4.0	6.8
Widowed	15.0	25.4
Caregivers		
None (self-care)	16.0	27.1
Hired caregivers	3.0	5.1
Long Stay Institution Caregiver	1.0	1.7
Nursing technician	1.0	1.7
Family member	38.0	64.4
Daughters	17.0	42.3
Wives	12.0	20.3

Source: Created by the authors.

(1) Other pathologies: tuberculosis sequelae (n=3), congestive heart failure (n=2), repetition bronchopneumonia (n=2), pulmonary hypertension (n=1), cerebral palsy (n=1), congenital heart disease (n=1) and peripheral vasculopathy (n=1).
(2) Not applicable: 11-month-old children, congenital cardiopathy (n=1), 13-year teenager with cerebral palsy (n=1).

As can be seen in Table 2, COPD was the main underlying disease for hypoxemia, followed by palliative care: lung cancer, brain cancer, head and neck cancer, and breast cancer. Other chronic diseases were identified in the investigated group, such as systemic arterial hypertension, diabetes mellitus, heart diseases and depression. The mean time of use of home oxygen therapy by users with COPD was 23 months. Among these, 16 remained in use. For users in palliative care, the mean time was 5 months, ranging from 2 to 10 months. Referral for the use of home oxygen therapy occurred predominantly from the hospital environment. The outcomes identified were: death, discharge and on oxygen therapy.

Table 2 – Clinical features of home oxygen therapy users. Municipality of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, Brazil – December 2018 to March 2020. (N=59) (continued)

Variables	n	%
Basic pathology for indication of the use of oxygen therapy		
Chronic obstructive pulmonary disease	35.0	59.3
Palliative care	13.0	22.0
Other pathologies(1)	11.0	18.6
Presence of other comorbidities		
Yes(2)	43.0	72.9
No	16.0	27.1
Referral origin		
Outpatient/pneumologist	12.0	20.3
Municipality hospital	22.0	37.3
Hospitals of other cities	20.0	33.9
Health Center	5.0	8.5
Smoking		
Current smoker	5.0	8.5
Smoker	42.0	71.2
Non-smoker	12.0	20.3
Alcohol consumption		
Current consumer	2.0	3.4
Ex-consumer	12.0	20.3
Non-consumer	45.0	76.3
Mobility		
Walk	26.0	44.1
Walk with aid	18.0	30.5
Restrict to bed	3.0	5.1
Bedridden	11.0	18.6
Not applicable(3)	1.0	1.7
Use of oxygen therapy		
Continuous (24h/day)	25.0	42.4
Intermittent	34.0	57.6
Average hours/day of use of intermittent oxygen therapy (+Standard Deviation)		
All users (n=34)	9.3 ±5.4	
Chronic obstructive disease (n=25)	10.2 ±5.8	
Palliative Care (n=3)	8.6 ±4.1	
Other pathologies(1) (n=6)	6.8 ±4.3	
Average time of use of domicile oxygen therapy (months) (+Standard Deviation)		
All users (n=59)	17.0 ±17.4	
Chronic obstructive disease (n=35)	23.0 ±19.5	
Palliative Care (n=13)	5.0 ±4.2	
Other pathologies (n=11)	11.0 ±5.9	
Type of Oxygen source		
Cylinder	40.0	67.8
Cylinder + aspiration valve	4.0	6.8
Cylinder + Concentrator	12.0	20.3
Concentrator	3.0	5.1
Outcome		
In use of oxygen therapy	24.0	40.7
Discharge	7.0	11.9

Table 2 – Clinical features of home oxygen therapy users. Municipality of the Metropolitan Region of Porto Alegre, Rio Grande do Sul, Brazil – December 2018 to March 2020. (N=59) (conclusion)

Variables	n	%
Outcome		
Change of municipality	1.0	1.7
Death	27.0	45.7
Users who remain in use of oxygen therapy		
Chronic obstructive disease	17.0	28.8
Palliative care	-	-
Other pathologies(1)	8.0	13.5
Users who died		
Chronic obstructive disease	13.0	22.0
Palliative care	13.0	20.0
Congestive heart failure	1.0	1.7

Source: Created by the authors.

Notes: Conventional sign used:
- Data numeric equal to zero not resulting from rounding.

(1) Other pathologies: tuberculosis sequelae (n=3), congestive heart failure (n=2), repetition bronchopneumonia (n=2), pulmonary hypertension (n=1), cerebral palsy (n=1), congenital heart disease (n=1) and peripheral vasculopathy (n=1).
(2) Systemic arterial hypertension, diabetes mellitus, heart disease and depression were the main diseases reported by patients.
(3) Not applicable: 11-month-old children, congenital cardiopathy (n=1), 13-year teenager with cerebral palsy (n=1).

Discussion

This study showed the profile of users in home oxygen therapy in a municipality in the metropolitan region of Rio Grande do Sul, generating sociodemographic and clinical information. It was possible to identify that the use of oxygen therapy is more frequent in users with chronic respiratory diseases, especially COPD, patients in palliative care and those with sequelae of tuberculosis.

Chronic diseases are characterized by slow and long-term progression. They are diseases that occur over time. The characteristics of the patients in this study, as demonstrated in other studies[11-12], pointed out that the majority of oxygen therapy users were 60 years or older, white and female.

In the municipality studied, it is estimated about 158.8 oxygen therapy users for 100,000 inhabitants. This prevalence can be very variable and may be associated with the prevalence of underlying diseases such as COPD and cancer. A study conducted in 16 European countries in 2001 and 2002 indicated a prevalence of 6.6 users per 100,000 inhabitants using home oxygen therapy, reaching 240 to 100,000 inhabitants in the United States[13].

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Exposure to tobacco smoke, air pollution, genetic factors, aging, female gender, bronchitis, history of frequent infections and socioeconomic status are risk factors for COPD[2,14]. Such factors may increase the frequency of COPD patients in Brazilian municipalities and, consequently, the use of home oxygen therapy.

The mobility analysis of oxygen therapy users showed that, for most of them, they were impaired, limiting them to bed. Given these data, most users of home oxygen therapy need caregivers. In this study, it was evidenced that women are caregivers in greater numbers. This predominance is also pointed out in other studies[13,15]. This fact is still due to the social construction that historically attributes to women the role of caregiver[16].

Poverty and low schooling are part of the risk factors for COPD, however, exposure to pollutants, inadequate nutrition, infections or other factors related to socioeconomic profile are not defined[2,17]. In a cohort study conducted in the United States[18], low income was related to greater severity of the disease and obstacle in the diagnosis and appropriate treatment. In this study, most users had a low level of education, corroborating the findings of the study conducted by the Federal University of São Paulo at the home oxygen therapy outpatient clinic, in which 63.7% of the users had elementary schooling[18].

In the users of this research, there was the presence of many chronic diseases concomitant with COPD, such as systemic arterial hypertension, diabetes mellitus, heart diseases and depression. The presence of other chronic diseases associated with COPD contributes to the increased morbidity and mortality of those users[2].

In this study, for users of intermittent oxygen therapy with COPD, the average was 10.2 hours per day, realizing that some users did not use the therapy effectively. For users with COPD, the use for 15 hours/day or more of oxygen therapy decreases mortality and improves quality of life[2,14].

According to the guidance of the MH, home oxygen therapy is indicated to patients with hypoxemia who meet the following criteria: not using tobacco, PAO2 below 55mmHg or SpO2 below 88%, or PaO2 between 55 and 59 mmHg or SpO2 below 89% and presence of pulmonary arterial hypertension[2,14]. In this study, previous smoking is present in most users with COPD, however, in some oxygen therapy users, smoking remains. This datum was also observed in the study developed in the city of Ribeirão Preto (SP), in which 30% of the users were smokers[12].

Smoking, in addition to being one of the main risk factors for COPD, significantly affects the quality of life of individuals with the disease. Smoking cessation is one of the criteria for the prescription of home oxygen therapy, because its use significantly reduces the benefit of therapy[2,6]. The MHCT advises users and caregivers on the importance of smoking cessation for patient improvement, oxygen therapy effectiveness, as well as clarifies that it is a prerequisite for receiving this therapeutic method. Nevertheless, not all patients follow these recommendations.

Dyspnea is reported by 65% of patients in palliative care in the weeks preceding death. In the case of terminally ill patients, home oxygen therapy allows them to be assisted at home[19]. This therapy, in palliative care, does not have as much efficacy as the use of opioids in the control of dyspnea; for this reason, it should be used only after attempting other therapeutic, pharmacological and non-pharmacological options[20]. Moreover, oxygen therapy is indicated in the final phase of life, in the following cases: in heart diseases, when presenting <88% saturation in the gait test; angina not treatable with optimized medical therapy; severe pulmonary hypertension; severe congestive heart failure; in patients with terminal neoplasm, if there is evidence of hypoxemia and life expectancy of less than six months[19,21].

Home oxygen therapy can be provided through concentrators that capture ambient air through molecular sieves and filter it, removing nitrogen and increasing oxygen concentration. These devices operate connected to the electricity grid[22]. They can also be supplied by cylinders that need to be recharged and do not rely on electricity. Regarding costs, a study indicates that the supply of oxygen by concentrators can lead to a 54% reduction in costs in relation to cylinders, and in this calculation, expenditures on electricity were not included[23]. It is important to clarify that there are initiatives that reduce the value of treatment, such as Interministerial Ordinance MME/GM n. 630, of 2011, which instituted the social tariff of electricity for low-income people[23-24].

Inadequate oxygen administration to users with hypoxemia-causing diseases may aggravate them over time. Among the symptoms, the following stand out: respiratory difficulty, paresthesia of the extremities of the body, restlessness, fatigue, dry cough, malaise and dizziness[18]. High oxygenation is among the

possible complications related to inadequate use of therapy in cases of exacerbated COPD, since, in an attempt to assist the patient, family members may offer the patient high volumes of O_2, aggravating respiratory acidosis and hypercapnia[15,24]. The latter occurs by increasing, in a decompensated way, the partial pressure of carbon dioxide (pCO_2). This may cause the individual to die or present risks of atelectasis[2,15,25]. Furthermore, there are risks of toxicity of traumas and explosions – in the case of smoking users –, in addition to drying secretion caused by inadequate humidification of O_2 and, also, waste, if the volume of this element is misused by the user[24].

Thus, guidance on the use of medications, volumes and time of oxygen prescribed by the doctor and awareness for smoking cessation are essential for the effectiveness of therapy. The cleaning and exchange of water from the humidifiers should be daily, as the volume of water must be within the levels shown in the product. Catheters and extensors should be replaced according to the type used, in order to avoid obstruction[6,19].

The cylinders must be fixed, using carts or chains, being necessary to pay attention to the measurement reported in the manometer, to avoid ending at times without the possibility of replacement[22]. As for the concentrators, the care comprises, mainly: the placement 15 cm from the wall, so that it can capture the ambient air; attention to the indication of filter change; equipment hygiene; and be connected to the appropriate power source[22].

In addition, the patient's pulse oximetry should often be checked, routine consultations with the doctor and nurse, to update the clinical picture, as well as to assess the need for changes in home oxygen therapy[15,18,24]. The guidelines on the care necessary for the correct use of home oxygen therapy are fundamental for patients and caregivers to effect therapy[19,25].

The limitation of the study is the fact that it was performed based on the medical records of patients on home oxygen therapy and some information could be incomplete. In addition, the sample consisted of a group of patients from a municipality in southern Brazil. Therefore, the data may not reflect the reality of other Brazilian municipalities.

In view of the above, the results of this study, associated with other epidemiological studies, are expected to allow understanding and recognizing the characteristics of caregivers and users of home oxygen therapy in the municipality studied, in order to collaborate for health education actions and prevention of risks related to therapy.

Conclusion

Among the main characteristics of home oxygen therapy users assisted by the *Melhor em Casa* Program of the municipality studied, advanced age, female gender, ex-smokers, low schooling, COPD as a basic disease and care provided by family caregivers predominated. The supply of oxygen therapy was predominantly done by means of cylinders.

The health service must know the profile of users, so that it can adapt to the reality experienced by them. Thus, the information presented in this study is important, so that the multidisciplinary team implements new actions or steps up others already performed, such as educational actions to prevent injuries related to risks and/or inadequate management of therapy, ensuring the effectiveness of treatment. For patients with COPD, health education for smoking cessation and guidance of time of use of oxygen therapy are still a challenge. For users in palliative care, patient and family comfort should be priorities in guidance.

Finally, there should be an analysis related to the costs, for the municipality, with the supply of therapy, mainly related to cylinders, which have a significantly higher cost, when compared to concentrators.

Collaborations:

1 – conception, design, analysis and interpretation of data: Lívia Krever de Souza, Alisia Helena Weis and Carine Raquel Blatt;

2 – writing of the article and relevant critical review of the intellectual content: Livia Krever de Souza, Alisia Helena Weis and Carine Raquel Blatt;

3 – final approval of the version to be published: Lívia Krever de Souza, Alisia Helena Weis and Carine Raquel Blatt.

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