

# Follow-up of a cohort of patients with non-cystic fibrosis bronchiectasis for 1 year

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## Research article

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# Abstract

**Background:** Non-cystic fibrosis bronchiectasis (NCFB) leads to progressive damage that may limit a patient's daily activities and modify his/her quality of life. Our objective was to evaluate the quality of life of patients with bronchiectasis during a 1 year follow-up using the EQ-5D-3L questionnaire. **Methods:** A total of 100 patients with NCFB were recruited and followed-up with face-to-face visits or by telephone contact every three months for 1 year. At the time of recruiting and at the end of 1 year, the EQ-5D-3L questionnaire was applied to evaluate the patients' quality of life. Variables, such as exacerbation, emergency care, comorbidities, hemoptysis, colonization, and hospitalization were assessed. **Results:** Of the 100 patients, 99 patients completed the study and 72% were women. There were no marked limitations in the mobility and self-care domains during the follow-up. Thirty-two patients were extremely anxious or depressed at the end of the follow-up. The quality of life assessed using EQ-5D-3L had an initial mean score of 0.545 and of 0.589 after 1 year, which was statistically significant ( $p= 0.011$ ). **Conclusion:** Patients with NCFB have a poor quality of life and the EQ-5D-3L questionnaire may be a tool for monitoring patients with bronchiectasis.

## Background

Non-cystic fibrosis bronchiectasis (NCFB) is an irreversible disease, characterized by bronchial dilatation<sup>1,2</sup> resulting from the destruction of the elastic and muscular components of its walls<sup>3</sup>. In general, symptoms include a chronic cough, sputum with or without hemoptysis, dyspnea, intermittent respiratory infections<sup>4</sup> and fatigue<sup>5</sup>. Exacerbations are frequently observed in most bronchiectasis patients and have been associated with progressive loss of lung function, worsening of quality of life<sup>3,4</sup> and increased mortality<sup>2,5</sup>. These disorders lead to changes in a patient's daily life, and may restrict their usual activities. The worldwide epidemiological situation is unknown and varies according to the demographic area. The prevalence of NCFB in the American population is estimated at 139 cases per 100,000 individuals with an annual incidence of 29 cases per 100,000 Americans<sup>6</sup>. In Germany, the estimated proportion is 67 per 100,000 inhabitants<sup>4</sup>. It is estimated that the prevalence and incidence of bronchiectasis in Brazilian individuals is high because it is mainly related to pulmonary tuberculosis, which is highly prevalent in Brazil (coefficient of incidence of 33.5 cases per 100,000 inhabitants in 2017)<sup>7</sup> and that it results in bronchiectasis sequelae in many patients<sup>8</sup>. NCFB is also associated with inadequate control of respiratory infections during childhood, difficulty in accessing health resources, and low socioeconomic status<sup>9,10</sup>. There are several instruments that can be used to evaluate the health-related quality of life (HRQoL) in patients affected by numerous diseases. Among them is the EQ-5D-3L<sup>11</sup>, a simple, easy-to-understand, widely used instrument, available in multiple languages and with various modes of administration. The EQ-5D-3L questionnaire addresses five important dimensions or domains related to patient health. Measuring the quality of life can help guide individualized treatment and contribute to better care. Bronchiectasis is a disease characterized by a high morbidity and mortality<sup>12,13</sup>, and studies are needed to better understand the evolution of the disease and improve patient care. The objective of this study was to evaluate the quality of life of patients with bronchiectasis during a 1 year follow-up using the EQ-5D-3L questionnaire.

## Methods

### Subject and study design

A cohort study was carried out in a university hospital in the State of Rio de Janeiro, from January 2017 to May 2018. Patients over the age of eighteen were recruited from an outpatient clinic specializing in pulmonology. All patients underwent high resolution computed tomography (HRCT), which is considered the gold standard for the diagnosis of bronchiectasis. The Research Ethics Committee of the University Hospital Pedro Ernesto, Brazil approved the research (no. 1,823,665). The patients were individually interviewed, a structured questionnaire with demographic and clinical data was administered. Then, the Quality of Life Questionnaire (EQ-5D-3L), the Modified Medical Research Council (mMRC) scale and the pulmonary function test were scheduled. During the 12-month follow-up, the interviews were conducted by telephone or face-to-face contact before or after medical appointments, with an interval of three months. At the end of 1 year, the patients underwent a new spirometric test and responded to the EQ-5D-3L and the mMRC questionnaires.

## Outcome data

## Etiology

There are several factors that favor the development of bronchiectasis<sup>1,9,10</sup>. In this study, we considered the following groups: Idiopathic, Post-infectious by pulmonary tuberculosis (TB), Post-infectious non-TB, Primary immunodeficiency (common variable immunodeficiency), Kartagener's syndrome and "Undetermined". The cases in which the etiology was under investigation or was incomplete were classified as "undetermined" etiology.

## Exacerbation

Exacerbation was defined as the care of the patient in an outpatient unit when not previously scheduled or in an emergency unit, with or without the need for antibiotic therapy intervention, with the at least three of the following four clinical data: increased dyspnea intensity; increased daily volume of sputum, altered secretion color or fever<sup>4,14</sup> (>37.5°C). Sputum was defined as mucoid (clear), mucopurulent (pale yellow/pale green) and purulent (dark yellow/dark green) by Murray et al<sup>15</sup>.

## "Wet" bronchiectasis

Patients who had a daily cough with a mucoid, mucopurulent or purulent sputum for at least three consecutive months in the 12-month period were considered as having "wet" bronchiectasis.

## Spirometry

Functional indices such as the pre- and post-bronchodilator forced expiratory volume in 1 second (FEV<sub>1</sub>), forced vital capacity (FVC) and FEV<sub>1</sub>/FVC ratio were evaluated at the initial consultation and after 12 months. Ventilatory disorders were defined according to the criteria published by the American Thoracic Society (ATS)/European Respiratory Society (ERS): normal, obstructive, restrictive and mixed<sup>16</sup>.

## Baseline and follow-up questionnaire

The baseline questionnaire contained the following data for collection: age, body mass index (BMI), number of exacerbations, emergency visits, hospitalizations, presence of fever (>37.5°C), increased dyspnea and sputum, change in sputum color and appearance, hemoptysis, degree of dyspnea (mMRC), therapeutic intervention with antibiotics, smoking (active, passive, ex-smokers and nonsmokers), spirometry, etiology, “wet bronchiectasis,” number of affected lobes (the lingula was considered a separate lobe), daily approximate volume of sputum, comorbidities, vaccines (influenza and pneumococcal), respiratory physical therapy, colonization with *Pseudomonas aeruginosa* (PA), *Aspergillus* and infections caused by non-tuberculous mycobacteria (NTM). Items monitored at follow-up: number of exacerbations, emergency visits, hospitalizations, presence of fever (>37.5°C), increased dyspnea and sputum, change in sputum color and appearance, hemoptysis, and antibiotic therapy.

## Quality of life questionnaire

The quality of life questionnaire is an instrument composed of the EQ-5D-3L questionnaire and the Visual Analogue Scale (VAS)<sup>11</sup>. The EQ-5D-3L jointly addresses physical functions (mobility, self-care and pain/discomfort domains), social functions (habitual activities domain), and mental functions (anxiety/depression domain). Each domain/dimension is related to three levels of severity (no problems, some problems and extreme problems)<sup>11</sup>. The VAS consists of a ruler numbered from zero (worst health state imaginable) to 100 (best health state imaginable)<sup>11</sup> and the patient records the value that best represents his/her health state at the time. The survey was registered in the EuroQol Research Foundation website and an authorization to apply the self-complete version of the EQ-5D-3L questionnaire and the face-to-face version of the EQ-5D-3L for patients with reading or writing difficulties was obtained. Ninety-seven (97%) patients did not need assistance in responding to the questionnaire, which was considered simple to understand and fast to fill out. A validated version of the questionnaire in Portuguese was used in the study, which assesses the specific health status of the Brazilian population (243 health states)<sup>11</sup>.

## Statistical analysis

For the sample calculation, a standard deviation of 0.5 was considered, requiring 50 patients to detect a 7% difference in the quality of life with 95% confidence and 80% power. Numerical data were presented using mean and standard deviation or median and interquartile range, and categorical data using percentage and absolute values. Student's T, Mann-Whitney, Kruskal Wallis, ANOVA, Chi-squared and Exact Fisher tests were used. For the elaboration of the graphs, the plotly package was used.

## Results

Of the 122 patients recruited, 1 patient withdrew the consent form, 21 were excluded because they did not present all the necessary variables and 1 patient was lost to follow-up. One hundred patients were included in the analysis (Fig. 1).

## Figure 1.

The general characteristics of the study population are expressed in *Table 1*. The patients were predominantly female (72%), non-smokers (81%), with a mean age of  $56.94 \pm 15.32$  years and a mean body mass index (BMI) of  $24.42 \pm 5.13$  kg/m<sup>2</sup>. Women were older and had a higher BMI than men. In the tomographic findings, 79 (79%) individuals had bronchiectasis in more than one pulmonary lobe. The etiological predominance was related to the sequelae of pulmonary tuberculosis in 53% of the cases. Of the 79 patients (79%) with an associated comorbidity, 29 (29%) had at least one aggravation and 50 (50%) had two or more associated aggravations. Based on the history of recurrent respiratory disease, 55 (55%) patients had rhinosinusitis and 53 (53%) had a previous pneumonia at least once. The most commonly reported comorbidities in descending order were: Systemic Arterial Hypertension (SAH 27.9%), Chronic Obstructive Pulmonary Disease (COPD 25.3%), Diabetes Mellitus (DM 21.5%) and Osteoarticular Diseases (16.5%).

### ***Insert Table 1.***

The mean values of the pre- and post-bronchodilator spirometric data are described in *Table 2*. After 1 year, 3 patients were unable to undergo a new spirometric test due to the associated diseases. Pulmonary function assessments showed a predominance of an obstructive ventilatory disorder (OVD) at baseline (67%) and after 12 months (72.9%), *Table 3*.

### ***Insert Table 2.***

### ***Insert Table 3.***

In the course of 1 year, 21 (21%) patients were colonized by *Pseudomonas aeruginosa* and 2 (2%) by non-tuberculous mycobacteria (NTM). Three (3%) patients were previously colonized by fungi (*Aspergillus*).. At the beginning of the study, 21 (21%) subjects presented grade 3 dyspnea according to the mMRC scale and after 12 months of follow-up this categorization increased by 53% (32 subjects), *Table 3*. A comparison of the baseline data with the data obtained at subsequent interviews is shown in *Table 4*. Twenty-two patients (22%) had an exacerbation, 27 (27%) had two or more exacerbations and 50 (50%) experienced no exacerbations. Of the 49 (49%) individuals who experienced exacerbations, 5 required hospitalization, and 1 patient required two hospitalizations. Twenty (20%) patients sought the emergency unit or went to the clinic without prior appointment at least once, while 34 (34%) sought care two or more times. There were no deaths during the study. Therapeutic intervention with antibiotics was not necessary in more than 50% of the patients.

### ***Insert Table 4.***

The presence of limitations in relation to domains is detailed in *Table 5*. It was observed that no patient was confined in bed (mobility domain, level 3) or was unable to maintain their personal care (self-care domain, level 3) between the onset and after 12 months of follow-up. The habitual activities and pain/discomfort domains were statistically significant,  $p = 0.0078$  and  $p = 0.0097$ , respectively. An increase of 18.5% in the incidence of extreme anxiety/depression was observed. During the study, no patient presented extreme limitations in all the domains. The quality of life assessment had an average score of  $0.545 \pm 0.187$  and  $0.589 \pm 0.208$ , respectively (*Table 5*)

between the onset and after the 1 year follow up. There was statistical significance in the evaluation of HRQoL determined by EQ-5D-3L ( $p = 0.011$ ) and by VAS ( $p = 0.0018$ ).

## ***Insert Table 5.***

*Table 6* presents the mean value of the quality of life stratified by groups: with exacerbation and without exacerbation, with emergency unit care and those who did not require emergency care, with comorbidities and without comorbidities, and with hemoptysis and without hemoptysis. There was a statistically significant difference at the beginning and after 1 year of follow-up between the group with and without exacerbation ( $p = 0.002$  and  $p = 0.001$ , respectively) and the group with and without emergency unit care ( $p = 0.006$  and  $p = 0.011$ , respectively).

## ***Insert Table 6.***

## **Discussion**

The present work assessed the findings of a 1-year follow-up of the clinical profile of 100 patients with non-CF bronchiectasis who regularly had appointments in a tertiary care hospital. The health status of each individual was determined through the EQ-5D-3L tool. Similar to the findings of previous by Hill et al<sup>1</sup> (2019), Aksamit et al<sup>17</sup> (2017) and Bogossian et al<sup>9</sup> (1998), we found a higher incidence of bronchiectasis in females (72%) than in males (28%). The results also showed that the main etiology of bronchiectasis was related to the sequelae of pulmonary tuberculosis (52%). This cause is common in countries with a high number of tuberculosis cases<sup>18</sup>. This prevalence is also evident in Brazil (Bogossian et al<sup>9</sup>, 42.7%) and in China (Xu et al<sup>19</sup>, 31.1%), in contrast to the etiological findings of developed countries with about 40% of cases attributable to idiopathic bronchiectasis<sup>14</sup>. We noted a poor quality of life for these individuals, as assessed by the EQ-5D-3L questionnaire, which is used to measure and evaluate the health status of patients with bronchiectasis. The mobility and self-care domains were associated with a lesser effect on health status, whereas habitual activities and anxiety/depression contributed to a poorer health status, thus reducing the quality of life. The study also reported that exacerbation, emergency care, comorbidities, colonization and hospitalization had had a significant negative effect on health status. The results indicate that these variables contribute to the worsening of the quality of life of these individuals. In contrast, the quality of life among patients with hemoptysis compared to those without hemoptysis was similar. Patients with bronchiectasis tend to present with exacerbation frequently, resulting in the aggravation or appearance of clinical symptoms that may require hospitalization and inclusion of drug therapy involving antibiotics, corticosteroids and bronchodilators. Usually, the most severe patients have on average two or more exacerbations a year<sup>2</sup>. According to the study by Redondo et al<sup>4</sup>, the increase in the frequency of exacerbations was associated with factors such as colonization, mainly by PA, air pollution and comorbidities. Chang and Bilton<sup>20</sup> reported in their study that exacerbations result in lung function decline, a worsened quality of life, and hospital admissions. In our study we found that exacerbations were frequent at the 1 year of follow-up. Of the 49 patients who experienced exacerbations, 82% had comorbidities associated with bronchiectasis. Most exacerbations were marked by increased dyspnea and volume of sputum, sputum purulence, hemoptysis, and fever.

Currently, despite the technological advances and the elaboration of guidelines, there are still difficulties and a lack of consensus in some of the approaches related to bronchiectasis. Little is known about the real risk factors that could lead to hospitalization. The study by Ringshausen et al<sup>21</sup> and Menéndez et al<sup>2</sup> reported that the average annual hospitalizations in the United States was 16.5 admissions per 100,000 inhabitants, while in Germany this value 9.4. In our study, there were 9 (9%) hospitalizations during the follow-up. Five individuals required hospitalization due to bronchiectasis, and 1 patient required a new hospitalization. These patients had different conditions associated with bronchiectasis. There were three hospitalizations due to other causes (one associated with cardiovascular diseases, one due to acute myocardial infarction and one for orthopedic surgery).

Hemoptysis is another complication that can affect bronchiectasis patients and may require immediate medical assistance and the administration of large blood volumes. There is no international classification system based on the volume of blood loss<sup>1</sup>. In their recent study, Bhalla et al<sup>22</sup> described the main etiologies of hemoptysis in patients who sought emergency care in India. Of the patients admitted, 65% had hemoptysis due to active pulmonary tuberculosis or its sequelae and 9.3% of cases were due to bronchiectasis. The study by Lundgren et al.<sup>23</sup> conducted in Brazil found that 38% of cases of hemoptysis were caused by bronchiectasis. In this study, of the 31 patients who reported small volumes of hemoptysis (less than 100 ml/24 hours) or blood streaks, 17 previously had pulmonary TB.

Bronchiectasis individuals are commonly colonized by the pathogens PA and *Haemophilus influenzae*. In this study, 21 (21%) patients were colonized by PA. Colonization by PA may involve 25% to 58% of cases and tends to lead to a more rapid lung function decline, frequent exacerbations and poorer quality of life<sup>24</sup>.

We identified 79 patients with comorbidities concurrent with bronchiectasis, with half of the subjects presenting multiple comorbidities (50 individuals). Hypertension, asthma, COPD, diabetes and osteoarticular diseases were the five most common comorbidities in our study. In our patients, we observed chronic airway diseases such as asthma (14%) and COPD (13%) concurrent with bronchiectasis. McDonnell et al.<sup>13</sup> confirmed that comorbidities are common in bronchiectasis and that these contribute significantly to morbidity and mortality, increased frequency of exacerbations, increased hospitalizations, and worsening of the quality of life. Gale et al.<sup>25</sup> suggested that certain comorbidities such as cardiovascular disorders, gastroesophageal reflux disease (GERD), psychological diseases and pulmonary hypertension are more likely to exist in conjunction with bronchiectasis.

The main limitations of this study are related to sample size and the follow-up period, with long-term studies being required. Another limitation of the study was the recruitment of volunteers from a single center specialized in bronchiectasis, representing a subgroup of patients who regularly attended medical appointments.

## Conclusions

In conclusion, our population had a high frequency of exacerbations, multiple comorbidities and airflow obstruction. Pulmonary tuberculosis is the most important factor associated with bronchiectasis. Patients with NCFB presented with marked impairment in HRQoL with moderate to extreme limitations of their daily activities. The quality of life tended to worsen in the presence of exacerbations, in individuals who sought emergency care, had comorbidities, colonization and hospitalization. The incorporation of a quality of life assessment in patients with bronchiectasis in the clinical practice is a necessary effort to be implemented, considering that this parameter may lead to an individualized treatment, thus, improving the outcomes for these patients.

## **Abbreviations**

**ATS - American Thoracic Society**

**BMI - body mass index**

**COPD - Chronic Obstructive Pulmonary Disease**

**DM - Diabetes Mellitus**

**EQ-5D-3L- Quality of Life Questionnaire**

**ERS - European Respiratory Society**

**FEV<sub>1</sub> - forced expiratory volume in 1 second**

**FVC - forced vital capacity**

**GERD - gastroesophageal reflux disease**

**HRCT - high resolution computed tomography**

**HRQoL - health-related quality of life**

**mMRC - Modified Medical Research Council**

**NCFB - Non-cystic fibrosis bronchiectasis**

**NTM - non-tuberculous mycobacteria**

**OVD - obstructive ventilatory disorder**

**PA - *Pseudomonas aeruginosa***

**SAH - Systemic Arterial Hypertension**

**TB—tuberculosis**

**VAS - Visual Analogue Scale**

**Declarations**

## **Ethics approval and consent to participate**

This study was approved by Research Ethics Committee of the University Hospital Pedro Ernesto, no. 1,823,665 and the written informed consent was obtained from all patients involved in this study.

## **Consent for publication**

All authors consented the data obtained in the study to be published.

## **Availability of data and material**

The datasets used and/or analyzed during the current study available from the corresponding author on reasonable request.

## **Competing interests**

There is no conflict of interest by the authors.

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## **Authors' contributions**

RR takes responsibility for the content of the manuscript, including the data and analysis and is guarantor of this paper; RR, SPM and BRT contributed to the conception and design of this paper; RR, SPM and BRT contributed to the analysis and interpretation of the data; SPM, REBS, WC, CHC and AJL contributed to the acquisition of data;

all authors revised the manuscript for important intellectual content and provided final approval of the version to be published.

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## Tables

**Table 1.** Demographics and clinical characteristics of patients with non-fibrocystic bronchiectasis (n = 100)

Variables	n = 100	Male n=28	Female n=72	p value*
<b>Age, years</b>	56.94 ± 15.32	55 ± 15.31	57.69 ± 15.36	0.435
<b>Body mass index, kg/m<sup>2</sup></b>	24.42 ± 5.13	22.75 ± 3.44	25.07 ± 5.54	0.042
<b>Smoking status</b>				0.2498
Current smoker	4 (4.0)	1 (3.6)	3 (4.2)	
Former smoker	12 (12.0)	6 (21.4)	6 (8.3)	
Passive smoker	3 (3.0)	0	3 (4.2)	
Nonsmoker	81 (81.0)	21 (75.0)	60 (83.3)	
<b>Etiology</b>				0.6403
Idiopathic	15 (15.0)	4 (14.2)	11 (15.3)	
Post-infection tuberculosis	53 (53.0)	16 (57.2)	37 (51.4)	
Post-infection non-tuberculosis	23 (23.0)	7 (25.0)	16 (22.2)	
Kartagener Syndrome	2 (2.0)	1 (3.6)	1 (1.4)	
Primary Immunodeficiency	1 (1.0)	0	1 (1.4)	
Undetermined*	6 (6.0)	0	6 (8.3)	
<b>Moist bronchiectasis</b>	44 (44.0)	13 (46.4)	31 (43.1)	0.8243
<b>Number of affected lobes, n = 92</b>				0.5023
one lobe	13 (14.1)	2 (8.0)	11 (16.4)	
≥ 2 lobes	79 (85.9)	23 (92.0)	56 (83.6)	
<b>Approximately daily sputum volume</b>				0.4080
< 100 ml	47 (47.0)	16 (57.2)	31 (43.1)	
100 - 200 ml	23 (23.0)	6 (21.4)	17 (23.6)	
No sputum	30 (30.0)	6 (21.4)	24 (33.3)	
<b>Number comorbidities</b>				0.8020
No comorbidities	21 (21.0)	7 (25.0)	14 (19.5)	
one comorbidity	29 (29.0)	8 (28.6)	21 (29.2)	
≥ 2 comorbidities	50 (50.0)	13 (46.4)	37 (51.4)	
<b>Previous respiratory disease</b>				
Rhinosinusitis	55 (55.0)	16 (57.1)	39 (54.2)	0.8262
Tuberculosis	55 (55.0)	18 (64.9)	37 (51.9)	0.2710
Pneumonia	53 (53.0)	12 (42.9)	41 (56.9)	0.2656
<b>Comorbidities</b>	<b>n = 79</b>	<b>n = 21</b>	<b>n = 58</b>	
Systemic arterial hypertension	45 (57.0)	8 (38.1)	37 (63.8)	0.0704
Diabetes mellitus	17 (21.5)	5 (23.8)	12 (20.7)	0.7637
GERD	7 (8.9)	1 (4.8)	6 (10.3)	0.6680
Osteoarticular disease	13 (16.5)	1 (4.8)	12 (20.7)	0.1666
Neoplastic disease	8 (10.1)	3 (14.3)	5 (8.6)	0.4322
Cardiovascular disease	6 (7.6)	2 (9.5)	4 (6.9)	0.6538
HIV	2 (2.5)	1 (4.8)	1 (1.7)	0.4635
COPD	20 (25.3)	7 (33.3)	13 (22.4)	0.3836
Asthma*	22 (27.9)	7 (33.3)	15 (25.9)	0.5744
Pneumonectomy	3 (3.8)	0	3 (5.2)	0.5610
Lobectomy	5 (6.3)	3 (14.3)	2 (3.4)	0.1139
Depressive disorder	7 (8.9)	1 (4.8)	6 (10.3)	0.6696
Hypothyroidism	4 (5.1)	0	4 (6.9)	0.5687
Other comorbidities*	21 (26.6)	6 (28.6)	15 (25.9)	0.7816

Data are presented as number (%) or mean and standard deviation (SD); Abbreviations: BMI; Body mass index; Gastroesophageal reflux disease, COPD: Chronic obstructive pulmonary disease; HIV: Human Immunodeficiency Virus. Legend comorbidities\*: Psoriasis, Chronic renal failure, Alpha-1 anti-trypsin deficiency, Cor Pulmonale, Glaucoma, Sjögren Syn Malnutrition.

**Table 2.** Spirometric test results

Data	Bronchodilator	Baseline (n = 100)	1 <sup>st</sup> year (n = 96)	p value
FEV <sub>1</sub> L	PreBD	1.35 ± 0.60	1.32 ± 0.61	0.1099
	PostBD	1.38 ± 0.61	1.37 ± 0.62	0.3555
FVC L	PreBD	2.34 ± 2.93	2.05 ± 0.78	0.4013
	PostBD	2.07 ± 0.73	2.09 ± 0.80	0.6854
FEV <sub>1</sub> /FVC %	PreBD	64.36 ± 13.40	64.16 ± 13.73	0.9310
	PostBD	66.05 ± 13.97	65.69 ± 13.77	0.5893

Abbreviations: VEF<sub>1</sub> = forced expiratory volume in one second; FVC = forced vital capacity; PreBD/postBD = pre-bronchodilation/post-bronchodilation.

**Table 3.** Comparison between the baseline characteristics and the first year of follow-up

Characteristics	Baseline n = 100	1 <sup>st</sup> Year n = 99	p value*
<b>Dyspnea (mMRC), n (%)</b>			
Grade 0	15 (15.0)	12 (12.1)	0.1582
Grade 1	44 (44.0)	31 (31.3)	
Grade 2	20 (20.0)	24 (24.2)	
Grade 3	21 (21.0)	32 (32.3)	
<b>Spirometry, n (%)</b>		<b>n = 96</b>	
OVD	67 (67.0)	70 (72.9)	0.8049
RVD	15 (15.0)	13 (13.5)	
MVD	3 (3.0)	2 (2.1)	
Normal	15 (15.0)	11 (11.5)	
<b>Colonization by <i>Pseudomonas aeruginosa</i>, n (%)</b>	11 (11.0)	18 (18.2)	0.1649
<b>NTM detected, n (%)</b>	2 (2.0)	2 (2.0)	1.0000
<b>Aspergillus isolates, n (%)</b>	3 (3.0)	0	0.2462
<b>Vaccination, n (%)</b>			
Influenza vaccine	81 (81.0)	87 (87.9)	0.2408
Pneumococcal vaccine	36 (36.0)	48 (48.5)	0.0858
<b>Respiratory Physiotherapy Program, n (%)</b>	8 (8.0)	10 (10.1)	0.6306

Abbreviations: mMRC = Modified Medical Research Council; OVD = Obstructive ventilatory disorder, RVD = Restrictive v disorder, MVD = Mixed ventilatory disorder; NTM = Non-Tuberculous Mycobacterium.

**Table 4.** Clinical follow-up of bronchiectasis patients for 1 year

	Initial data n = 100	3 months n = 100	p1 value*	6 months n = 99*	p2 value*	9 months n = 99	p3 value*	12months n = 99	p4 value*
Loss of contact, n (%)	24 (24.0)	18 (18.0)	0.3856	18 (18.2)	0.3856	15 (15.1)	0.1528	18 (18.2)	0.3856
Emergency visits, n (%)			0.6926		0.5161		0.1798		0.6787
Emergency visit	73 (73.0)	79 (79.0)		77 (77.8)		83 (83.9)		76 (76.8)	
Emergency visits	19 (19.0)	13 (13.0)		15 (15.1)		12 (12.1)		15 (15.1)	
Emergency visits	3 (3.0)	3 (3.0)		5 (5.1)		3 (3.0)		5 (5.1)	
Emergency visits	5 (5.0)	5 (5.0)		2 (2.0)		1 (1.0)		3 (3.0)	
Respiratory problems, n (%)			0.2462		1.0000		0.1225		0.6212
Respiratory problems	3 (3.0)	0 (0)		2 (2.0)		0 (0)		1 (1.0)	
Causes	0 (0)	0 (0)		1 (1.0)		2 (2.0)		0 (0)	
Loss of contact, n (%)	0 (0)	0 (0)		0 (0)		0 (0)		0 (0)	
Temperature >37.5°C, n (%)	24 (24.0)	26 (26.0)	0.8704	28 (28.3)	0.5218	19 (19.2)	0.4915	18 (18.2)	0.3856
Dyspnea, n (%)	38 (38.0)	35 (35.0)	0.7691	34 (34.3)	0.6587	36 (36.4)	0.8836	45 (45.5)	0.3159
Sputum, n (%)	35 (35.0)	41 (41.0)	0.6949	40 (40.4)	0.7292	42 (42.4)	0.4968	39 (39.4)	0.8197
Color change, n (%)	43 (43.0)	43 (43.0)	0.8740	46 (46.5)	0.8865	43 (43.4)	1.0000	49 (49.5)	0.6251
Characteristics of sputum, n (%)			0.6625		0.5579		0.4104		0.0064
Sputum	30 (30.0)	27 (27.0)		28 (28.3)		29 (29.3)		28 (28.3)	
Viscous	30 (30.0)	31 (31.0)		29 (29.3)		29 (29.3)		25 (25.3)	
Purulent	7 (7.0)	12 (12.0)		13 (13.1)		14 (14.1)		24 (24.2)	
Amount	33 (33.0)	30 (30.0)		29 (29.3)		27 (27.3)		22 (22.2)	
Exacerbations, n (%)	10 (10.0)	12 (12.0)	0.8217	18 (18.2)	0.1070	9 (9.1)	1.0000	16 (16.2)	0.2139
Antibiotic use, n (%)			0.9914		0.9794		0.2492		0.6455
Antibiotics	21 (21.0)	21 (21.0)		19 (19.2)		11 (11.1)		15 (15.1)	
Antilactics	18 (18.0)	17 (17.0)		20 (20.2)		20 (20.2)		21 (21.2)	
Antilactics and exacerbation	8 (8.0)	7 (7.0)		8 (8.1)		12 (12.1)		6 (6.1)	
Antibiotic	53 (53.0)	55 (55.0)		52 (52.5)		56 (56.6)		57 (57.6)	

Legends: p1\* = baseline vs 3 months; p2\* = baseline vs 6 months; p3\* = baseline vs 9 months; p4\* = baseline vs 12 months; n = 99\*, loss of contact with a patient after the sixth month of follow-up.

**Table 5.** Frequency of each level in the 5 domains of the EQ-5D-3L and the values of quality of life at baseline and after 1<sup>st</sup> year for patients with non-fibrocystic bronchiectasis

<b>Domains</b>	<b>Level response</b>	<b>Baseline</b> n = 100	<b>1st year</b> n = 99	<b>p value</b>	
<b>Mobility</b>	No problems	38 (38.0)	47 (47.5)	0.1985	
	Some problems	62 (62.0)	52 (52.5)		
	Extreme problems	0 (0)	0 (0)		
<b>Self-Care</b>	No problems	61 (61.0)	69 (69.7)	0.2339	
	Some problems	39 (39.0)	30 (30.3)		
	Extreme problems	0 (0)	0 (0)		
<b>Usual Activities</b>	No problems	28 (28.0)	32 (32.3)	0.0078	
	Some problems	71 (71.0)	57 (57.6)		
	Extreme problems	1 (1.0)	10 (10.1)		
<b>Pain/discomfort</b>	No problems	18 (18.0)	36 (36.4)	0.0097	
	Some problems	63 (63.0)	52 (52.5)		
	Extreme problems	19 (19.0)	11 (11.1)		
<b>Anxiety/depression</b>	No problems	22 (22.0)	29 (29.3)	0.2014	
	Some problems	51 (51.0)	38 (38.4)		
	Extreme problems	27 (27.0)	32 (32.3)		
<b>EQ-5D-3L, mean ± SD</b>		-	0.545 ± 0.187	0.589 ± 0.208	0.011
<b>EQ-VAS, mean ± SD</b>		-	64.60 ± 20.86	64.60 ± 20.86	0.0018

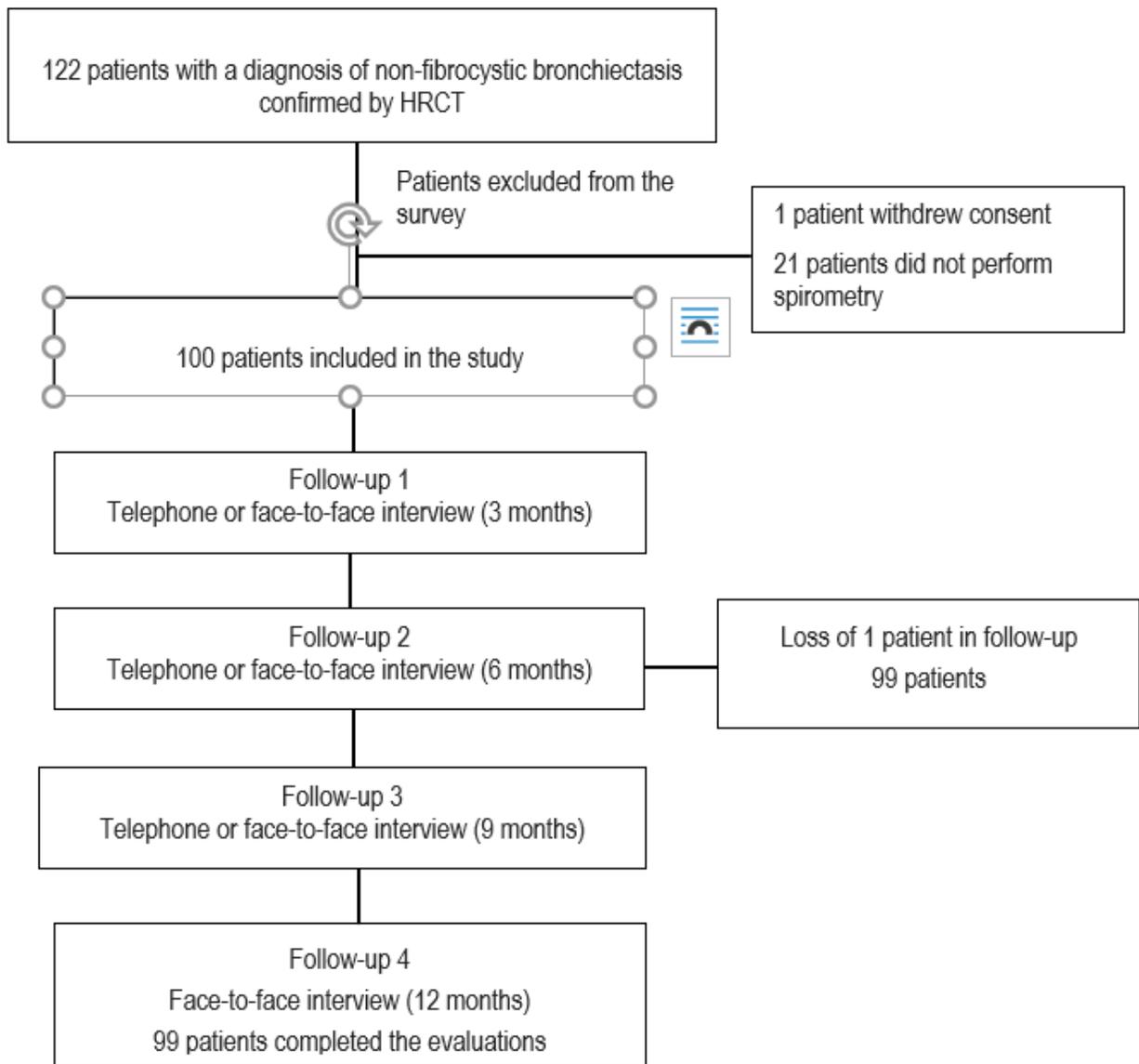
Obs. Data are expressed as n (%). Abbreviation: VAS = Visual Analogue Scale.

**Table 6.** Quality of life stratified by groups at baseline and after 1 year

Groups	EQ-5D-3L	<i>p</i> value <sup>1</sup>	EQ-5D-3L	<i>p</i> value <sup>2</sup>
	Baseline		1 <sup>ST</sup> year	
Exacerbation <sup>1</sup>	0.487 ± 0.139	0.002	0.521 ± 0.190	0.001
Non-exacerbation	0.601 ± 0.210		0.656 ± 0.204	
Visit to emergency unit <sup>2</sup>	0.499 ± 0.158	0.006	0.551 ± 0.195	0.011
No visit to the emergency unit	0.599 ± 0.204		0.651 ± 0.200	
One comorbidity <sup>3</sup>	0.564 ± 0.161	0.147	0.632 ± 0.199	0.050
≥ 2 comorbidities	0.511 ± 0.196		0.539 ± 0.207	
No comorbidities	0.601 ± 0.189		0.650 ± 0.200	
Hemoptysis <sup>4</sup>	0.537 ± 0.169	0.768	0.576 ± 0.204	0.664
No hemoptysis	0.549 ± 0.195		0.595 ± 0.211	
Colonized <sup>5</sup>	0.463 ± 0.155	0.165	0.508 ± 0.181	0.112
Non-colonized	0.555 ± 0.189		0.605 ± 0.211	
Hospitalized due to respiratory problems <sup>6</sup>	0.387 ± 0.182	0.181	0.405 ± 0.165	0.461
Hospitalized due to other causes	-		0.396 ± 0.111	
Not hospitalized	0.550 ± 0.186		0.601 ± 0.207	

Obs. Data are expressed as mean and SD. Legends: Group<sup>1</sup> = exacerbation vs non-exacerbation; Group<sup>2</sup> = visit to emergency unit vs no visit to emergency unit; Group<sup>3</sup> = one comorbidity vs ≥ 2 comorbidities vs non-comorbidities; Group<sup>4</sup> = hemoptysis vs non-hemoptysis; Group<sup>5</sup> = colonized vs non-colonized; Group<sup>6</sup> = hospitalized due to respiratory problems vs hospitalized due to other causes vs not hospitalized p<sup>1</sup> = baseline; p<sup>2</sup> = 1<sup>ST</sup> year.

## Figures



**Figure 1**

Flowchart of the population in the study

## Supplementary Files

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- [STROBEchecklistcohort.doc](#)