Influence of respiratory function parameters on the quality of life of COPD patients*

Influência dos parâmetros funcionais respiratórios na qualidade de vida de pacientes com DPOC

Eanes Delgado Barros Pereira, Renata Pinto, Marcelo Alcantara, Marta Medeiros, Rosa Maria Salani Mota

Abstract

Objective: To determine the quality of life of COPD patients by using the Medical Outcomes 36-item Short-Form Survey (SF-36) and the Saint George's Respiratory Questionnaire (SGRQ), correlating the scores with respiratory function parameters. **Methods:** This was a cross-sectional study involving 42 COPD patients. We used the SGRQ (a specific questionnaire) and the SF-36 (a general questionnaire), together with their component summaries, in order to determine the quality of life of these patients. The functional profile was assessed by means of spirometry, arterial blood gas analysis and the six-minute walk test. **Results:** Of the 42 patients, 30 (71.4%) were male and 12 (28.6%) were female. The mean age of the patients was 65.4 ± 8.0 years. The mean physical component summary and mean mental component summary scores were 37.05 ± 11.19 and 45.61 ± 15.65, respectively. The physical component summary correlated significantly with FEV_1 in L/s (r = 0.38; p = 0.012). There was a correlation between the SGRQ total score and FEV_1 (r = −0.50; p < 0.01). The SGRQ activity domain showed negative correlations with all respiratory function parameters. The multiple regression analysis showed that only FEV_1 correlated significantly with the SGRQ total score, as well as with the activity domain score (r= −0.32; p = 0.04 and r = −0.34; p = 0.03, respectively). **Conclusions:** In COPD patients, a decline in FEV_1 is associated with poorer quality of life, as evaluated using the SGRQ.

Keywords: Pulmonary disease, chronic obstructive; Quality of life; Respiratory function tests.

Resumo

Objetivo: Avaliar a qualidade de vida dos pacientes com DPOC através dos questionários *Medical Outcomes Study 36-item Short-Form Health Survey* (SF-36) e *Saint George's Respiratory Questionnaire* (SGRQ), correlacionando-os com parâmetros funcionais respiratórios. **Métodos:** Este foi um estudo transversal com 42 pacientes com DPOC. Foram utilizados um questionário específico (SGRQ) e um questionário geral (SF-36) e seus componentes sumarizados para a determinação da qualidade de vida desses pacientes. O quadro funcional foi avaliado pela espirometria, gasometria arterial e teste da caminhada de seis minutos. **Resultados:** Dos 42 pacientes, 30 (71,4%) eram do sexo masculino e 12 (28,6%) do sexo feminino. A média de idade foi de 65,4 ± 8,0 anos. O escore médio dos componentes físico e mental sumarizados foi 37,05 ± 11,19 e 45,61 ± 15,65, respectivamente. O componente físico sumarizado correlacionou-se significativamente com o valor médio do VEF_1 em L/s (r = 0,38; p = 0,012). O escore total do SGRQ correlacionou-se com o VEF_1 (r = −0,50; p < 0,01). O domínio atividade do SGRQ apresentou correlações negativas com todos os parâmetros funcionais. A análise de regressão múltipla mostrou que somente o VEF_1 associou-se significativamente com o escore total do SGRQ, assim como com o escore do domínio atividade (r = −0,32; p = 0,04 e r = −0,34; p = 0,03, respectivamente). **Conclusões:** Em pacientes portadores de DPOC, o declínio do VEF_1 está associado a uma pior qualidade de vida avaliada pelo SGRQ.

Descritores: Doença pulmonar obstrutiva crônica; Qualidade de vida; Testes de função respiratória.

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Introduction

Patients with chronic diseases often have a poor quality of life. In recent years, there has been a considerable effort to improve the instruments used to assess well-being and the quality of life in this population.[1] A World Health Organization working group, appointed to study this domain, defined quality of life as "an individual's perception of their position in life in the context of the culture and value system in which they live and in relation to their goals, expectations and standards and concerns".[2] In this definition, it is implicit that the concept of quality of life is subjective and multidimensional, as well as including positive and negative assessment elements.

Various studies have assessed quality of life and correlated it with respiratory function parameters. However, the results are discrepant. Although some studies showed a correlation between respiratory function parameters and quality of life,[3-5] others found no such correlation.[6-8] The discrepancies found in the literature can be explained by the methods used in the studies. Some studies assessed subgroups of patients with more severe disease,[3,4] others studied the influence of several disease-related parameters, such as body mass index[9] or age,[10] and some used dyspnea scales in the assessments.[6-8]

Another important factor to be explored is the choice of the instrument used to assess quality of life. Few studies have assessed the impact of respiratory function parameters on the quality of life of COPD patients by simultaneously using the Saint George's Respiratory Questionnaire (SGRQ) and the Medical Outcomes 36-item Short-Form Survey (SF-36), through its physical component summary (PCS) and its mental component summary (MCS).[4,5,11] In the present study, the SGRQ was selected because it is a specific questionnaire for respiratory diseases, and the SF-36 was selected to assess general aspects of the patient's life and allow future comparisons with other groups of patients.

Studies evaluating the relationship between respiratory function parameters and the quality of life of COPD patients who are functionally impaired are important to strengthen the role of spirometry in the strategies to improve the quality of life of such patients.

The objective of the present study was to determine how respiratory function parameters—as assessed by spirometry, arterial blood gas analysis and the six-minute walk test (6MWT)—correlate with the quality of life of COPD patients by using the SGRQ (a specific questionnaire), as well as the SF-36 (a general questionnaire) and its component summaries (PCS and MCS).

Methods

The study sample comprised patients diagnosed with COPD, according to the criteria established by the Global Initiative for Chronic Obstructive Disease (GOLD),[12] who were consecutively treated at the Respiratory Outpatient Clinic of the Messejana Hospital, located in the city of Fortaleza, Brazil, between October of 2005 and March of 2006. These patients were referred for specific follow-up treatment at a referral center by other physicians working within the public health care system.

The inclusion criteria were defined as no exacerbations and no respiratory infections or no changes in the controller medications within the four weeks before the study was initiated.

Patients were excluded from the study based on the following criteria: having verbally refused to participate; having failed to report to the hospital on the day scheduled for the interviews; having another disease that was more severe and incapacitating than COPD; and being unable to complete the questionnaires.

Table 1 - Clinical and laboratory characteristics of the COPD patients.

Variable	Mean ± SD	Range
Mean disease duration, years	7.2 ± 6.1	1-39
FEV_1, % of predicted	52 ± 21	22-85
FEV_1, L/s	1.28 ± 0.64	0.42-2.83
PaO_2, mmHg	75.0 ± 9.1	59.8-94.7
$PaCO_2$, mmHg	41.0 ± 5.1	32.8-63.4
SaO_2, %	95.0 ± 1.9	86.3-97.4
Six-minute walk test, m	303 ± 119	100-597
Smoking history, years	38 ± 14	1-65
Stage of COPD, %		
Mild	21.4	
Moderate	21.4	
Severe	38.1	
Extremely severe	19.0	

SaO_2: arterial oxygen saturation.

All patients were informed of the study procedures and gave written informed consent. The study was evaluated/approved by the Messejana Hospital Research Ethics Committee (Protocol no. 364/05) in May of 2005.

Sociodemographic and clinical data for all patients were collected in an interview. The quality-of-life questionnaires SGRQ and SF-36 were administered on the same day by the same interviewer. Both questionnaires have been translated and validated for use in Brazil.[13,14] Sociodemographic data, such as gender, age and marital status, were collected, as were clinical and laboratory data regarding the following: disease duration in years; functional class according to the GOLD criteria[12]; smoking history in years; comorbidities; arterial blood gas analysis; 6MWT in meters; and spirometry with a bronchodilator test.

Spirometry was performed before and after bronchodilator use (albuterol spray, 400 µg) in order to obtain values of FVC, FEV_1 and FEV_1/FVC, in accordance with the criteria for acceptance of curves established by the Brazilian Thoracic Association in their 2002 guidelines.[15] The tests were performed using a flow spirometer (Beatrice AT; EBEM, Recife, Brazil) together with the Pulmosoft PC program, version 4.1, and the spirometer was calibrated immediately before each test. Samples for blood gas analysis were collected on room air and sent to the OMNI S blood analyzer (Roche Diagnostics, Basel, Switzerland).

The 6MWT was performed in accordance with the American Thoracic Society guidelines.[16] The test was performed on 30-m long flat surface, and patients were encouraged to walk at their own pace for six minutes, stopping to rest, if necessary.

The specific questionnaire used was the SGRQ, which addresses aspects regarding three domains: symptoms; activity; and psychosocial impact of the respiratory disease. Each domain has a maximum possible score.

The SF-36 is composed of 36 items. There are 35 questions grouped in eight scales or components—physical functioning (10 items); role-physical (4 items); bodily pain (2 items); general health (5 items); vitality (4 items); social functioning (2 items); role-emotional (3 items) and mental health (5 items)—and an additional question comparing current health conditions with past-year health conditions (self-reported health transition). For each component, the final result is calculated using a scale ranging from 0 to 100, in which 0 corresponds to the worst health status and 100 corresponds to the best health status. After this questionnaire was administered, the initial components were transformed into two: PCS and MCS. The mean of these components is 50 with a SD of ±10. Originally, the authors of the SF-36 developed algorithms to calculate these two psychometric summary components.[17] The PCS and the MCS provide more precision and reduce the effects known as "ceiling" and "floor", according to which the result of the questionnaire tends to be scored within the normal range when the value is near normality and, in cases in which the disease is more severe, there is a disproportionate worsening of the score.

For the statistical analysis, the Shapiro-Wilk test was used to determine the normality of the quantitative variables. Linear correlations among the variables were analyzed using Pearson's correlation coefficient or Spearman's linear correlation coefficient, when indicated. In order to determine the relationship between the multiple variables of the patient and the quality-of-life

Table 2 - Quality-of-life parameters of the COPD patients studied (n = 42).

Variable	Mean ± SD	Range
SF-36		
Physical functioning	45.00 ± 28.94	0-100
Role-physical	36.30 ± 41.76	0-100
Bodily pain	65.70 ± 28.32	12-100
General health	46.60 ± 24.55	5-100
Vitality	52.10 ± 28.37	0-100
Social functioning	70.50 ± 31.93	0-100
Role-emotional	46.80 ± 43.58	0-100
Mental health	62.00 ± 31.51	0-100
Physical component summary	37.05 ± 11.19	17-66.7
Mental component summary	45.61 ± 15.65	13-72.2
SGRQ, %		
Total	54.00 ± 22.7	8.5-92.8
Symptoms	50.28 ± 25.6	6.6-100
Activity	63.45 ± 24.5	6.0-100
Impact	49.77 ± 25.00	3.9-96.9

SF-36: Medical Outcomes Study 36-item Short-Form Health Survey; and SGRQ: Saint George's Respiratory Questionnaire.

questionnaires, namely the SGRQ and SF-36, multiple regression analysis was performed. The level of statistical significance was set at 5%. The Stata program, version 7.0 (Stata Corp., College Station, TX, USA), was used.

Results

We interviewed 42 patients, most of whom (71.4%) were male. The mean age was 65.4 ± 8.0 years. The clinical and laboratory characteristics of the patients are shown in Table 1.

The results of the assessment performed using the SGRQ, shown in Table 2, revealed that the quality of life of the patients was extremely poor, with a mean overall score of 54.0 ± 22.7. In all domains—activity, symptoms and impact—the scores remained high, with mean values of 63.45 ± 24.51, 50.28 ± 25.60 and 49.77 ± 25.08, respectively.

The SF-36 domain results are also shown in Table 2. The most altered dimensions were the following: role-physical (36.3 ± 41.7); physical functioning (45.00 ± 28.94); general health (46.69 ± 24.55); role-emotional (46.81 ± 43.58); and vitality (52.14 ± 28.37).

The PCS and the MCS showed a statistically significant correlation with the SGRQ total score (r = –0.65; p = 0.001 and r = –0.37; p = 0.01, respectively).

When correlating the PCS with the respiratory function parameters (Table 3), only mean FEV_1 in L/s showed a statistically significant correlation (r = 0.385; p < 0.05). The other parameters did not show a significant correlation. The MCS did not correlate with any respiratory function parameter. Quality of life, as assessed using the SGRQ, showed a negative correlation with FEV_1 in L/s (r = –0.50; p < 0.01); that is, lower FEV_1 values translate to poorer quality of life. There was a negative correlation between PaO_2 in mmHg and the SGRQ total score (r = –0.382; p < 0.05). The analysis of the SGRQ domains revealed that the activity domain showed a negative correlation with all respiratory function parameters.

Multiple regression analysis was performed. The SF-36 (PCS and MCS scores) as well as the SGRQ total score and its symptoms, activity and impact domain scores were used as dependent variables, and the respiratory function parameters were used as independent variables.

Table 3 - Correlation (Pearson's correlation test) of respiratory function parameters with the mental component summary and the physical component summary of the Medical Outcomes Study 36-item Short-Form Health Survey and with the Saint George's Respiratory Questionnaire total score and domain scores.

Variable	Respiratory function parameter				
	FEV_1, L	PaO_2	SaO_2	$PaCO_2$	6MWT, m
MCS	0.25	0.19	0.12	–0.13	0.12
PCS	0.38*	0.23	0.19	–0.19	0.14
SGRQ total	–0.50**	–0.38*	–0.30	0.28	–0.30
Symptoms	–0.27	–0.23	–0.20	0.21	–0.20
Activity	–0.46**	–0.39*	–0.41*	–0.33*	–0.32*
Impact	–0.35*	–0.34*	–0.26	0.22	–0.25

SaO_2: arterial oxygen saturation; 6MWT: six-minute walk test; MCS: mental component summary; PCS: physical component summary; and SGRQ: Saint George's Respiratory Questionnaire. *p < 0.05; **p < 0.01.

As shown in Table 4, FEV_1 was the parameter that best correlated with the SGRQ total score and the activity domain score (r = –0.32; p = 0.04 and r = –0.34; p = 0.03, respectively).

Discussion

A correlation was observed between the respiratory function parameters and the two instruments used to measure quality of life, namely the SF-36 and the SGRQ, through their components. The SGRQ activity domain was found to correlate with all respiratory function parameters. Finally, in the multiple regression analysis, only FEV_1 correlated significantly with the SGRQ.

Table 4 - Values of the multiple regression analysis using the Saint George's Respiratory Questionnaire and the respiratory function parameters of the COPD patients.

Dependent variable	Coefficient	SE	p	β
SGRQ (total)				
(Constant)	89.08975	239.3596	0.712	
FEV_1, L	–11.19735	5.442937	0.047*	–0.3295
SGRQ activity				
(Constant)	271.6205	257.4104	0.298	
FEV_1, L	–13.07802	5.853405	0.032**	–0.3466

SGRQ: Saint George's Respiratory Questionnaire; and SE: standard error. *p < 0.05; r^2 = 0.25; and **p < 0.05; r^2 = 0.30.

General and specific questionnaires are useful for assessing quality of life. In many studies, both types can be used.[4,5,11,18]

An advantage of general questionnaires over specific questionnaires is that the former can be administered to any population, whereas the latter evaluate only populations with a particular condition. The general questionnaires that are most commonly used in studies of respiratory diseases are the SF-36, which has proven validity[19]; the EuroQol Group 5 Dimension[20]; the Health Utilities Index, which is widely used in Canada and in Europe[21,22]; the Self-administered Quality of Well-Being Scale[23]; and the Fryback Index,[24] which has been used to estimate cost-effectiveness.

In Brazil, the SF-36 is the only general questionnaire used in COPD.[6] In one study,[6] the authors found a good correlation between the SF-36 and two specific questionnaires, the SGRQ and the Airways Questionnaire 20. In the present study, the SGRQ total score was found to correlate with the SF-36 PCS score and with the SF-36 MCS score ($r^2 = -0.65$, $p = 0.0001$ and $r^2 = -0.37$; $p = 0.01$, respectively).

In some studies, a multivariate analysis revealed the impact of respiratory function parameters on quality of life, as assessed using the SF-36.[4,5] In the multivariate analysis of the present study, FEV_1 was not found to be a predictor of quality of life, as assessed using the SF-36. This is in accordance with the findings of other studies[9,25] and reveals the low discriminatory power of general questionnaires. However, the SF-36 has been a useful questionnaire in COPD because it makes the comparison with other nonrespiratory diseases possible, as well as making it possible to assess the response to certain interventions, such as pulmonary rehabilitation.[5,26]

The specific questionnaires most commonly used in respiratory diseases, in addition to the SGRQ, are the Chronic Respiratory Questionnaire and the University of California, San Diego, Shortness of Breath Questionnaire. These questionnaires correlate mainly with variations in spirometry and the 6MWT, as well as showing sensitivity to therapeutic interventions.[27-29]

One group of authors,[30] in a study of 21 patients, found a correlation between the SGRQ activity domain and the 6MWT. In the present study, the SGRQ activity domain was found to correlate with FEV_1, blood gas variables and the 6MWT. This finding suggests that patients with impaired respiratory function are less capable of performing physical activities.

The multivariate analysis of the present study revealed that only FEV_1 correlated with the SGRQ total score and with the SGRQ activity domain score ($r = -0.32$; $p = 0.04$ and $r = -0.34$; $p = 0.03$, respectively). The impact of variables such as FEV_1 on quality of life, as assessed using the SGRQ, has not been demonstrated in other studies that used multivariate analysis.[6,8]

We observed that 57.1% of the patients in the present study were classified as having severe or extremely severe COPD, and this fact might have affected the results. This correlation between severity of COPD and quality of life has been demonstrated in the literature. One group of authors,[3] in a sample of 218 patients, observed that FEV_1 had a significant influence on the SGRQ in the patients with severe COPD.

This high percentage of patients with severe or extremely severe disease in the sample studied can affect the extrapolation of the results to the general population of COPD patients. However, this does not invalidate the results, since this sample represents the profile of patients treated at a referral center.

Chief among the limitations of the present study is the sample size. The sample selected was the one that was most convenient for the authors of this study: the patients treated at the COPD outpatient clinic of a tertiary hospital. This sample size limitation has also been observed in other studies.[6,25,30]

The results of this study showed that the patients presenting a reduction in FEV_1 have an impaired quality of life. This relationship becomes evident when a specific questionnaire, such as the SGRQ, is used. This finding underscores the need to use specific instruments to assess the quality of life of COPD patients, especially those whose spirometry results reveal greater impairment of pulmonary function.

Evaluating the degree of functional impairment of COPD patients and relating it to their quality of life has become increasingly necessary so that the interventions in this group of patients can target the patient rather than the disease.

References

1. Fleck MP, Leal OF, Louzada S, Xavier M, Chachamovich E, Vieira G, et al. Desenvolvimento da versão em português do instrumento de avaliação de qualidade de vida da OMS (WHOQOL-100). Rev Bras Psiquiatr. 1999;21(1):19-28.
2. Fleck MP. O instrumento de avaliação de qualidade de vida da Organização Mundial da Saúde (WHOQOL-100): características e perspectivas. Ciênc Saúde Coletiva. 2000;5(1):33-8.
3. Hajiro T, Nishimura K, Tsukino M, Ikeda A, Oga T. Stages of disease severity and factors that affect the health status of patients with chronic obstructive pulmonary disease. Respir Med. 2000;94(9):841-6.
4. Ståhl E, Lindberg A, Jansson SA, Rönmark E, Svensson K, Andersson F, et al. Health-related quality of life is related to COPD disease severity. Health Qual Life Outcomes. 2005;3:56.
5. Kaplan RM, Ries AL, Reilly J, Mohsenifar Z. Measurement of health-related quality of life in the national emphysema treatment trial. Chest. 2004;126(3):781-9.
6. Camelier A, Rosa FW, Nascimento OA, Fernandes AL, Jardim JR. Discriminative properties and validity of a health status questionnaire in obstructive airway disease patients: the Airway Questionnaire 20 [Article in Spanish]. Arch Bronconeumol. 2007;43(12):662-8.
7. Mahler DA, Faryniarz K, Tomlinson D, Colice GL, Robins AG, Olmstead EM, et al. Impact of dyspnea and physiologic function on general health status in patients with chronic obstructive pulmonary disease. Chest. 1992;102(2):395-401.
8. Sanchez FF, Faganello MM, Tanni SE, Lucheta PA, Padovani CR, Godoy I. Relationship between disease severity and quality of life in patients with chronic obstructive pulmonary disease. Braz J Med Biol Res. 2008;41(10):860-5.
9. Katsura H, Yamada K, Kida K. Both generic and disease specific health-related quality of life are deteriorated in patients with underweight COPD. Respir Med. 2005;99(5):624-30.
10. Tsukino M, Nishimura K, Ikeda A, Koyama H, Mishima M, Izumi T. Physiologic factors that determine the health-related quality of life in patients with COPD. Chest. 1996;110(4):896-903.
11. Mineo TC, Ambrogi V, Pompeo E, Elia S, Mineo D, Bollero P, Nofroni I. Impact of lung volume reduction surgery versus rehabilitation on quality of life. Eur Respir J. 2004;23(2):275-80.
12. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease updated 2005. Geneva: NHLBI/WHO Workshop; 2005.
13. Sousa, TC, Jardim JR, Jones P. Validação do Questionário do Hospital Saint George na Doença Respiratória (SGRQ) em pacientes portadores de doença pulmonar obstrutiva crônica no Brasil. J Pneumol. 2000;26(3):119-28.
14. Ciconelli RM, Ferraz MB, Santos WS, Meinão IM, Quaresma MR. Tradução para a língua portuguesa e validação do questionário genérico de avaliação de qualidade de vida SF-36 (Brasil SF-36). Rev Bras Reumatol. 1999;39(3):143-50.
15. Sociedade Brasileira de Pneumologia e Tisiologia. Diretrizes para testes de função pulmonar. J Pneumol. 2002;28(3):S1-S238.
16. ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories. ATS statement: guidelines for the six-minute walk test. Am J Respir Crit Care Med. 2002;166(1):111-7.
17. Ware JE; New England Medical Center Hospital. Health Institute SF-36 physical and mental health summary scales: a user's manual. Boston: The Health Institute, New England Medical Center; 1994.
18. Engström CP, Persson LO, Larsson S, Sullivan M. Health-related quality of life in COPD: why both disease-specific and generic measures should be used. Eur Respir J. 2001;18(1):69-76.
19. Scott-Lennox JA, Wu AW, Boyer JG, Ware JE Jr. Reliability and validity of French, German, Italian, Dutch, and UK English translations of the Medical Outcomes Study HIV Health Survey. Med Care. 1999;37(9):908-25.
20. Gudex C, Dolan P, Kind P, Williams A. Health state valuations from the general public using the visual analogue scale. Qual Life Res. 1996;5(6):521-31.
21. Feeny D, Furlong W, Mulhern RK, Barr RD, Hudson M. A framework for assessing health-related quality of life among children with cancer. Int J Cancer Suppl. 1999;12:2-9.
22. Feeny D, Furlong W, Boyle M, Torrance GW. Multi-attribute health status classification systems. Health Utilities Index. Pharmacoeconomics. 1995;7(6):490-502.
23. Kaplan RM, Atkins CJ, Timms R. Validity of a quality of well-being scale as an outcome measure in chronic obstructive pulmonary disease. J Chronic Dis. 1984;37(2):85-95.
24. Fryback DG, Lawrence WF, Martin PA, Klein R, Klein BE. Predicting Quality of Well-being scores from the SF-36: results from the Beaver Dam Health Outcomes Study. Med Decis Making. 1997;17(1):1-9.
25. Mahler DA, Mackowiak JI. Evaluation of the short-form 36-item questionnaire to measure health-related quality of life in patients with COPD. Chest. 1995;107(6):1585-9.
26. Boueri FM, Bucher-Bartelson BL, Glenn KA, Make BJ. Quality of life measured with a generic instrument (Short Form-36) improves following pulmonary rehabilitation in patients with COPD. Chest. 2001;119(1):77-84.
27. Guyatt GH, Berman LB, Townsend M, Pugsley SO, Chambers LW. A measure of quality of life for clinical trials in chronic lung disease. Thorax. 1987;42(10):773-8.
28. Jones PW, Quirk FH, Baveystock CM. The St George's Respiratory Questionnaire. Respir Med. 1991;85 Suppl B:25-31; discussion 33-7.
29. Eakin EG, Resnikoff PM, Prewitt LM, Ries AL, Kaplan RM. Validation of a new dyspnea measure: the UCSD Shortness of Breath Questionnaire. University of California, San Diego. Chest. 1998;113(3):619-24.
30. Dourado VZ, Antunes LC, Carvalho LR, Godoy I. Influência de características gerais na qualidade de vida de pacientes com doença pulmonar obstrutiva crônica. J Pneumol. 2004;30(3) 207-14.

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