



ST GEORGE'S RESPIRATORY QUESTIONNAIRE FOR COPD PATIENTS (SGRQ-C)

MANUAL

**Professor Paul Jones
Division of Clinical Science
St George's, University of London
London SW17 0RE
UK**

Paul W. Jones
Yvonne Forde

Tel +44 (0) 208 725 5371
Fax +44 (0) 208 725 5955
Email: yforde@sgul.ac.uk

Version No.1.2
April 2012

CONTENTS

1. THE SGRQ	3
2. SGRQ-C: DIFFERENCES FROM THE SGRQ	3
3. STRUCTURE OF SGRQ	3
4. ADMINISTRATION	4
5. ITEM WEIGHTS.....	6
6. SCORING ALGORITHM.....	9
7. EXCEL-BASED SCORING SYSTEM	11
8. SGRQ SCORES IN HEALTHY SUBJECTS	11
9. CLINICALLY SIGNIFICANT DIFFERENCE IN SGRQ SCORE	11
10. LIST OF SGRQ-C TRANSLATIONS AVAILABLE FROM SGUL	12
11. LIST OF SGRQ TRANSLATIONS AVAILABLE FROM SGUL.....	13
12. SELECTED BIBLIOGRAPHY	15

1. THE SGRQ

The SGRQ-C was developed from the SGRQ which was designed to measure health impairment in patients with asthma and COPD. The SGRQ is also valid for use in bronchiectasis and post tuberculosis and has been used successfully in patients with kyphoscoliosis, sarcoidosis. It is not suitable for cystic fibrosis. It is in two parts. Part 1 produces the Symptoms score, and Part 2 the Activity and Impacts scores. A Total score is also produced.

2. SGRQ-C: DIFFERENCES FROM THE SGRQ

The SGRQ-C is a shorter version derived from the original version following detailed analysis of data from large studies in COPD. The intention was to remove the items with the weakest measurement properties in the original instrument, but at the same time ensure that its scores were directly comparable with the original SGRQ. A full description of this process and validation studies has been published in Chest (Meguro et al. Chest 2006;132: 456-463). The accompanying on-line supplement gives additional details concerning its development and the differences from the original). <http://chestjournal.chestpubs.org/content/132/2/456.full.html>

The SGRQ-C has been developed using COPD data only, so is valid for this disease. The validity for its use in other conditions has yet to be established, but it is unlikely to perform very differently from the SGRQ.

The principal differences are:

1. Smaller number of items (40 compared with the original 50).
2. In a small number of items there is a reduction in the number of response categories.
3. Change in the wording of Part 1. No specific recall period is used except for one item.

3. STRUCTURE OF SGRQ

Part 1 (Questions 1-7) addresses the frequency of respiratory symptoms. It is not designed to be a precise epidemiological tool, but to assess the patient's perception of their recent respiratory problems.

Part 2 (Questions 8-14) addresses the patient's current state (i.e. how they are these days). The Activity score measures disturbances to daily physical activity. The Impacts score covers a range of disturbances of psycho-social function. Validation studies for the original SGRQ showed that this component relates in part to respiratory symptoms, but it also correlates quite strongly with exercise performance (6-minute walking test), breathlessness in daily life (MRC breathlessness score) and disturbances of mood (anxiety and depression). The Impacts score is, therefore, the broadest component of the questionnaires, covering the whole range of disturbances that respiratory patients experience in their lives.

Note: the general scale on the front page is not part of the SGRQ or SGRQ-C, but some investigators find it useful as an additional global measure.

4. ADMINISTRATION

The questionnaire should be completed in a quiet area, free from distraction and the patient should ideally be sitting at a desk or table. Explain to the patient why they are completing it, and how important it is for clinicians and researchers to understand how their illness affects them and their daily life. Ask him or her to complete the questionnaire as honestly as they can and stress that there are no right or wrong answers, simply the answer that they feel best applies to them. Explain that they must answer every question and that someone will be close at hand to answer any queries about how to complete the questionnaire.

It is designed for supervised self-administration. This means that the patients should complete the questionnaire themselves, but someone should be available to give advice if required. It is designed to elicit the patient's opinion of his/her health, ***not*** someone else's opinion of it, so family, friends or members of staff should not influence the patient's responses. If the spouse or partner has accompanied the patient they should be asked to wait in a separate area. Similarly, do not allow patients to take the SGRQ-C home to be completed since you cannot be sure that it will be completed without the help of family or friends. A recent study of the use of surrogates to complete the questionnaire has shown small but significant differences in scores obtained from the patients themselves (Santiveri et al Respiratory Medicine (2007) 101, 439–445)

Once the patient has finished, it is very important that you check the questionnaire to make sure a response has been given to every question. If they have missed an item return it to the patient for completion, *before they leave*.

Telephone administration of the SGRQ has been validated (Anie et al J Clin Epidemiol 1996;49:653-6.), as has computer based presentation (Meguro and Jones, unpublished), but postal administration has not. It is recommended that patients have a copy of the SGRQ-C to hand by the telephone so that they can read it at the same time as they are interviewed.

Responding to a patient's queries regarding completion of the questionnaire

If a patient asks for help with a question, do not provide an answer for them. The questionnaire is designed to get an understanding of how the patient views his or her illness. It is appropriate to clarify a question but not to provide an answer. Questions may be read aloud if patients have difficulty with reading, but the responses must be theirs alone. If a patient gives an answer you disagree with it is not appropriate to challenge their response or to query it. It is their view of their condition we are interested in – no matter how strange the response!

The following are notes that may help you explain to patients what is required

1. In Part 1 of the questionnaire, emphasise to patients that you are interested in how much chest trouble they have recently. The exact period is not important. We are looking for an impression or perception of health.
2. An attack of chest trouble (Part 1, Question 5) is any episode of worse symptoms that constitutes an attack *in the patient's own judgement*. Not just severe attacks as judged by medical staff.

3. COPD can vary day-to-day. Part 2 is concerned with the patient's current state (i.e. on average over 'these days'), not necessarily just today.
4. For Part 1 Question 6, emphasise that you are interested in the number of good days that they have had.
5. In Part 2, Questions 8 and 14 require a single response, but Questions 9 to 13 require a response to every question. It may be worth emphasising this to the patient.
6. Many patients do not engage in physical activity. It is important to determine whether this is because they do not wish to (in which case the answer would be 'False') or cannot engage in these activities because of their chest trouble (in which case the answer would be 'True').
7. Responses to Questions 12 and 13 concern limitations due to breathing difficulties and not any other problems. If the patient does not engage in an activity for another reason, they should tick 'False'.

5. ITEM WEIGHTS

Each questionnaire response has a unique empirically derived 'weight' (Quirk et al Clin Sci 1990;79:17-21; Quirk et al Eur Respir J 1991;4:167-71). The lowest possible weight is zero and the highest is 100. Note that, in cases where the two response options to an item in the original SGRQ were combined in the SGRQ-C, the weight for the new response option was calculated from the mean of the two that were combined.

(Note: the wording is abbreviated from that used in the questionnaire.)

PART 1

Question 1: I cough:

Most days	80.6
Several days	46.3
With chest infections	28.1
Not at all	0.0

Question 2: I bring up phlegm (sputum):

Most days	76.8
Several days	47.0
With chest infections	30.2
Not at all	0.0

Question 3: I have shortness of breath:

Most days	87.2
Several days	50.3
Not at all	0.0

Question 4: I have attacks of wheezing:

Most days	86.2
Several days	71.0
A few days	45.6
With chest infection	36.4
Not at all	0.0

Question 5: How many attacks of chest trouble have you had

3 or more	80.1
1 or 2 attacks	52.3
None	0.0

Question 6: How often do you have good days (with little chest trouble)?

None	93.3
A few	76.6
Most are good	38.5
Every day	0.0

Question 7: If you have a wheeze, is it worse in the morning?

No	0.0
Yes	62.0

PART 2

Question 8: How would you describe your chest condition?

The most important problem I have	82.9
Causes me a few problems	34.6
Causes no problem	0.0

Question 9: Questions about what activities usually make you feel breathless.

Getting washed or dressed	82.8
Walking around the home	80.2
Walking outside on the level	81.4
Walking up a flight of stairs	76.1
Walking up hills	75.1

Question 10: More questions about your cough and breathlessness.

My cough hurts	81.1
My cough makes me tired	79.1
I get breathless when I talk	84.5
I get breathless when I bend over	76.8
My cough or breathing disturbs my sleep	87.9
I get exhausted easily	84.0

Question 11: Questions about other effects your chest trouble may have on you.

My cough or breathing is embarrassing in public	74.1
My chest trouble is a nuisance to my family, friends or neighbours	79.1
I get afraid or panic when I cannot get my breath	87.7
I feel that I am not in control of my chest problem	90.1
I have become frail or an invalid because of my chest	89.9
Exercise is not safe for me	75.7
Everything seems too much of an effort	84.5

Question 12: Questions about how activities may be affected by your breathing.

I take a long time to get washed or dressed	74.2
I cannot take a bath or shower, or I take a long time	81.0
I walk more slowly than other people, or I stop for rests	71.7
Jobs such as housework take a long time, or I have to stop for rests	70.6
If I walk up one flight of stairs, I have to go slowly or stop	71.6
If I hurry or walk fast, I have to stop or slow down	72.3
My breathing makes it difficult to do things such as walk up hills, carry things up stairs, light gardening such as weeding, dance, play bowls or play golf	74.5
My breathing makes it difficult to do things such as carry heavy loads, dig the garden or shovel snow, jog or walk at 5 miles per hour, play tennis or swim	71.4

Question 13: We would like to know how your chest trouble usually affects your daily life.

I cannot play sports or games	64.8
I cannot go out for entertainment or recreation	79.8
I cannot go out of the house to do the shopping	81.0
I cannot do housework	79.1
I cannot move far from my bed or chair	94.0

Question 14: Tick the statement which you think best describes how your chest affects you.

It does not stop me doing anything I would like to do	0.0
It stops me doing one or two things I would like to do	42.0
It stops me doing most of the things I would like to do	84.2
It stops me doing everything I would like to do	96.7

6. SCORING ALGORITHM

A **Total** and three component scores are calculated: **Symptoms; Activity; Impacts.**

Each component of the questionnaire is scored separately:

6.1 *Sum the weights for all items with a positive response*

SYMPTOMS COMPONENT

This consists of all the questions in Part 1. The weights for Questions 1-7 are summed. A single response is required to each item. If multiple responses are given to an item, the weights for the multiple positive responses should be averaged then added to the sum. This is a better approach than losing the data set and this technique was for calculating scores used in the original validation studies for patients who gave multiple responses. (Clearly a better approach is to prevent such multiple responses occurring).

ACTIVITY COMPONENT

This is calculated from the summed weights for the positive responses to items Questions 9 and 12 in Part 2 of the questionnaire.

IMPACTS COMPONENT

This is calculated from Questions 8, 10, 11, 13, 14 in Part 2 of the questionnaire. The weights for all positive responses to items in Questions 10, 11, 13 are summed together with the responses to the single item that should have been checked (ticked) in Questions 8 and 14. In the case of multiple responses to either of these items, the average weight for the item should be calculated.

TOTAL SCORE

The Total score is calculated by summing the weights to all the positive responses in each component.

6.2 *Calculate the score*

The score for each component is calculated separately by dividing the summed weights by the maximum possible weight for that component and expressing the result as a percentage:

$$\text{Score} = 100 \times \frac{\text{Summed weights from all positive items in that component}}{\text{Sum of weights for all items in that component}}$$

The Total score is calculated in similar way:

$$\text{Score} = 100 \times \frac{\text{Summed weights from all positive items in the questionnaire}}{\text{Sum of weights for all items in the questionnaire}}$$

Sum of maximum possible weights for each component and Total:

Symptoms	566.2
----------	-------

Activity	982.9
Impacts	1652.8
Total (sum of maximum for all three components)	3201.9

(Note: these are the maximum possible weights that could be obtained for the worst possible state of the patient).

6.3 Handling missing items

It is better not to miss items and any missing items are the fault of the investigator, not the patient. We have examined the effect of missing items and recommend the following methods:

General rules

You can calculate a Total score in the presence of missing data, but only if the domains meet their 'missing items' rules (*see below*). If one domain exceeds its permitted number of missed items, then a total score cannot be calculated.

Part 1

A maximum of one missed item is permitted for this section.

Part 2

The following approach may be used. Items in Questions 9, 10, 11, 12, 13 all require a response of either 'True' or 'False'. If neither box is ticked, the item should be coded as 'missing'. The weight for that item should then be removed from the total possible for that component (and the total score). Based on an analysis of the effect of missing data on calculated scores in the original SGRQ, this method will be reliable for handling up to 3 missed items for the Activity component (items in Questions 9 and 12) and up to 5 items for the Impacts component (items in Questions 8, 10, 11, 13, 14).

6.4 When two responses have been given to one question

Add the weights of the two checked responses and divide by two. If more than three responses are checked, treat the item as missing.

6.5 Converting SGRQ-C scores to be comparable to SGRQ scores

Scores for SGRQ-C, calculated as described above, need a small arithmetic adjustment to make them directly comparable to those obtained with the SGRQ.

The adjustment is:

Symptoms: SGRQ score = (SGRQ-C x 0.99) + 0.94 units

Activity: SGRQ score = (SGRQ-C x 0.87) + 7.01 units

Impacts: SGRQ score = (SGRQ-C x 0.88) + 2.18 units

Total: SGRQ score = (SGRQ-C x 0.90) + 3.10 units

7. EXCEL-BASED SCORING SYSTEM

For information on the calculator, send an email to:- sgrq@sgul.ac.uk

8. SGRQ SCORES IN HEALTHY SUBJECTS

Means (95% confidence intervals) for SGRQ scores in normal subjects with no history of respiratory disease

N	Age - years	FEV1 as % predicted	Symptoms Score	Activity Score	Impacts Score	Total Score
74	46 range 17-80	95 (91-99)	12 (9-15)	9 (7-12)	2 (1-3)	6 (5-7)

A full range of normative values for a general population studied in Spain can be found in Ferrer et al Eur Respir J 2002;19:405-413.

9. CLINICALLY SIGNIFICANT DIFFERENCE IN SGRQ SCORE

The threshold for a clinically significant difference between groups of patients and for changes within groups of patients is four units. Note this is an indicative value (the threshold is not 4.0). As with all measurements there is biological variation, sampling error and measurement error. Four units is an average value obtained in different groups of patients. Estimation of clinical thresholds, their use and implications are discussed in much greater detail in Jones P.W. Eur Respir J 2002;19:398-404 and Jones P.W. Journal of COPD 2005;2:75-79.

Note: A responder analysis using the 4 unit threshold may be suitable in some analyses. Such estimates, including the Number Needed to Treat (NNT), appear to be relatively insensitive to small differences in the value used for the threshold for clinical significance. (Jones P.W. Eur Respir J 2002;19:398-404 and Norman et al Med Care 2001;39:1039-47).

10. LIST OF SGRQ-C TRANSLATIONS AVAILABLE FROM SGUL

SGRQ-C translations have been produced as a result of collaboration between **St George's University of London and the following agencies:- (1) MAPI Research Institute * (www.mapi-institute.com) and (2) Oxford Outcomes ◇ (www.oxfordoutcomes.com)**

America English for USA ◇ Spanish for USA ◇	Hong Kong Cantonese*	Philippines English for Philippines*
Argentina Spanish for Argentina *	Hungary *	Poland *
Australia English for Australia *	India Bengali ◇ English for India * Gujarati ◇ Hindi * Kannada ◇ Malayalam ◇ Marathi ◇ Punjabi ◇ Tamil * Telugu * Urdu ◇	Portugal *
Belgium French for Belgium * Dutch for Belgium *		Romania *
Brazil Portuguese *		Russia ◇
Bulgaria ◇		Slovakia *
Canada French for Canada * ◇ English for Canada ◇	Indonesia*	Slovenia ◇
Chile Spanish for Chile ◇	Italy *	South Africa English for SA * Afrikaans*
China Mandarin for China*	Japan *	Spain ◇
Czech ◇	Korea *	Sweden *
Denmark ◇	Latvia Latvian * Russian for Latvia *	Taiwan Mandarin Chinese *
English	Lithuania Lithuanian * Russian for Lithuania *	Thailand *
Estonia Estonian ◇ Russian for Estonia ◇	Mexico Spanish for Mexico *	Turkey *
Finland Finnish * Swedish for Finland *	Netherlands Dutch for Netherlands ◇	Ukraine Ukrainian ◇ Russian for Ukraine ◇
France *	New Zealand English for NZ ◇	
Germany *	Norway ◇	
Greece *		

11. LIST OF SGRQ TRANSLATIONS AVAILABLE FROM SGUL - This list is given since where no SGRQ-C version is available, only a small amount of additional translation would be necessary.

Most of the translations have been produced as a result of collaboration between St George's University of London and the following agencies:- (1) MAPI Research Institute* (www.mapi-institute.com) (2) Health Research Associates* (www.hrainc.net) (3) × these translations have followed the backtranslation process but have not been through full international harmonisation (4) ◇ Translated and validated by Dr. Mohamed Metwally, MD, FCCP, Assistant Professor of Chest Diseases, Assiut University, Egypt

America English for USA* Spanish for USA*	Finnish* Finnish* Swedish for Finland*	Malaysia Malay* Mandarin Chinese*
Arabic ◇ PDF only	French*	Netherlands Dutch*
Australia English for Australia*	German*	New Zealand English for NZ*
Austria German*	Greek*	Norwegian*
Belgium Dutch for Belgium* French for Belgium* Flemish	Hungarian*	Philippines Cebuano* Tagalog/Filipino – see <i>footnote</i>
Brazil Portuguese*	Icelandic*	Polish*
Bulgarian*	India Bengali* English for India* Gujarati* Hindi* Kannada* Malayalam◇ * Marathi* Punjabi* Tamil◇ * Telugu* Urdu*	Portuguese*
Canada French for Canada* English for Canada*	Indonesian <i>Hard copy only</i>	Romanian*
Chinese Mandarin* Hong Kong*	Israel Hebrew* Russian for Israel* Arabic for Israel*	Russian*
Croatian*	Italian*	Serbian*
Czech*	Japanese*	Singapore Mandarin Chinese*
Danish*	Korean*	Slovakian*
English (UK)	Latvia Latvian* Russian for Latvia*	Slovenian*
Estonia Estonian* Russian for Estonia*	Lithuanian*	South Africa Afrikaans* English for SA*
Farsi × PDF only		Spanish for Argentina* Chile* Colombia* Guatemala* Mexico* Peru* Spain*

Swedish*

Switzerland

German for
Switzerland*

Taiwan

Mandarin Chinese*

Thailand*

Turkish*

Ukraine

Ukrainian*

Russian for Ukraine*

Vietnamese*

Footnote re Tagalog/Filipino SGRQ – this translation is covered by the following copyright:-

St. George's Respiratory Questionnaire Filipino Translation revised edition copyright 2009 by Francisco N.A., Balanag Jr V.M., Naval S.S., & Zaldivar Jr C.A. under Philippine Copyright Law & International Treaty/Republic Act 8293. All rights reserved. This document is protected by copyright. No part of it may be reproduced, printed, published, distributed, translated, made into any version, exhibited, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or any other use or disposition, without written permission from the copyright owners c/o Department of Research & Development, Lung Center of the Philippines, Quezon Avenue, Quezon City 1100, Philippines. Tel +63 (2) 924 6101 extension #s 235 & 221 / Fax +63 (2) 925 2021. Email: nobetmd@yahoo.com; ymbalanag@yahoo.com; sulliannaival@yahoo.com.

12. SELECTED BIBLIOGRAPHY

Major source references

1. Jones PW, Quirk FH, Baveystock CM. The St George's Respiratory Questionnaire. *Respir Med* 1991;85(Suppl B):25-31.
2. Jones PW, Quirk FH, Baveystock CM, Littlejohns P. A self-complete measure for chronic airflow limitation - the St George's Respiratory Questionnaire. *Am Rev Respir Dis* 1992;145:1321-7.
3. Meguro M, Barley EA, Spencer S, Jones PW. Development and validation of an improved COPD-specific version of the St George's Respiratory Questionnaire. *Chest* 2006;132: 456-463.

Other references

4. Quirk FH, Jones PW. Patients' perception of distress due to symptoms and effects of asthma on daily living and an investigation of possible influential factors. *Clin Sci* 1990;79:17-21.
5. Quirk FH, Baveystock CM, Wilson RC, Jones PW. Influence of demographic and disease related factors on the degree of distress associated with symptoms and restrictions on daily living due to asthma in six countries. *Eur Respir J* 1991;4:167-71.
6. Jones PW, the Nedocromil Sodium Quality of Life Study Group. Quality of Life, symptoms and pulmonary function in asthma: long-term treatment with nedocromil sodium examined in a controlled multicentre trial. *Eur Respir J* 1994;7:55-62.
7. Anie KA, Jones PW, Hilton SR, Anderson HR. A computer-assisted telephone interview technique for assessment of asthma morbidity and drug use in adult asthma. *J Clin Epidemiol* 1996;49:653-6.
8. Ketelaars CAJ, Sclösser MAG, Mostert R, Huyer Abu-Saad H, Halfens RJG, Wouters EFM. Determinants of health-related quality of life in patients with chronic obstructive pulmonary disease. *Thorax* 1996;51:39-43.
9. Okubadejo AA, Jones PW, Wedzicha JA. Quality of life in patients with chronic obstructive pulmonary disease and severe hypoxaemia. *Thorax* 1996;51(1):44-7.
10. Renwick DS, Connolly MJ. Impact of obstructive airways disease on quality of life in older adults. *Thorax* 1996;51:520-5.
11. Jones PW, Bosh TK. Changes in quality of life in COPD patients treated with salmeterol. *Am J Respir Crit Care Med* 1997;155:1283-9.
12. Wilson CB, Jones PW, O'Leary CJ, Cole PJ, Wilson R. Validation of the St George's Respiratory Questionnaire in Bronchiectasis. *AJRCCM* 1997;156:536-41.
13. Osman LM, Godden DJ, Friend JAR, Legge JS, Douglas JG. Quality of life and hospital re-admission in patients with chronic obstructive pulmonary disease. *Thorax* 1997;52:67-71.
14. Hajiro T, Nishimura K, Tsukino M, Ikeda A, Koyama H, Izumi T. Comparison of discriminative properties among disease-specific questionnaires for measuring health-related quality of life in patients with chronic obstructive pulmonary disease. *American Journal of Respiratory & Critical Care Medicine* 1998;157(3 Pt 1):785-90.
15. Seemungal TAR, Donaldson GC, Paul EA, Bestall JC, Jefferies DJ, Wedzicha JA. Effect of exacerbation on quality of life in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 1998;157:1418-22.
16. Wijkstra PJ, Jones PW. Quality of life in patients with chronic obstructive pulmonary disease. *Eur Respir Monogr* 1998;3(7):235-46.

17. Barley EA, Jones PW. A comparison of global questions versus health status questionnaires as measures of the severity and impact of asthma. *European Respiratory Journal* 1999;14(3):591-6.
18. Carone M, Bertolotti G, Anchisi F, Zotti AM, Donner PW, Jones PW. Analysis of factors that characterize health impairment in patients with chronic respiratory failure. *Eur Respir J* 1999;13:1293-300.
19. Jones PW. Health status in chronic obstructive pulmonary disease. *Eur Respir Rev* 1999;9:169-72.
20. Burge PS, Calverley PMA, Jones PW, Spencer PW, Anderson JA, Maslen TK. Randomised, double blind, placebo controlled study of fluticasone propionate in patients with moderate to severe chronic obstructive pulmonary disease. *BMJ* 2000;320:1297-303.
21. Griffiths TL, Burr ML, Campbell IA, Lewis-Jenkins V, Mullins J, Shiels K, et al. Results at 1 year of outpatient multidisciplinary pulmonary rehabilitation: a randomised controlled trial. *Lancet* 2000;355(9201):362-8.
22. Jones PW. Impact of lower respiratory tract infections on health status. *Seminars in Respiratory and Critical Medicine* 2000;21:107-11.
23. Spencer S, Calverley PMA, Burge PS and Jones PW. Health status deterioration in patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2001;163:122-8.
24. Jones PW. Health status measurement in chronic obstructive pulmonary disease. *Thorax* 2001;56:880-7.
25. Jones PW. Interpreting thresholds for a clinically significant changes in health status in asthma and COPD. *Eur Respir J* 2002;19:398-404.
26. Ferrer M, Villasante C, Alonso J, Sobradillo V, Gabriel R, Vilagut G, et al. Interpretation of quality of life scores from the St. George's Respiratory Questionnaire. *Eur Respir J* 2002;19:405-413.
27. Domingo-Salvany A, Lamarca R, Ferrer M, Garcia-Aymerich J, Alonso J, Félez M, et al. Health-related quality of life and mortality in male patients with chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2002;166:680-685.
28. Oga T, Nishimura K, Tsukino M, Sato S, Hajiro T. Analysis of the factors related to mortality in chronic obstructive pulmonary disease. *Am J Respir Crit Care Med* 2003;167:544-549.
29. Stolk J, Ng WH, Bakker ME, Reiber JHC, Rabe KF, Putter H, Stoel BC. Correlation between annual change in health status and computer tomography derived lung density in subjects with alpha₁-antitrypsin deficiency. *Thorax* 2003, 58: 1027-30
30. Gudmundsson G, Gislason T, Janson C, Lindberg E, Hallin R, Ulrik CS, Brøndum E, Nieminen MM, Aine T and Bakke P. Risk factors for rehospitalisation in COPD: role of health status, anxiety and depression. *Eur Respir J* 2005; 26: 414–419
31. Jones PW. St George's Respiratory Questionnaire: MCID. *Journal of COPD* 2005;2:75-79.
32. Broekhuizen, R. Wouters EFM, Creutzberg E.C. Schols A.M.W.J. Raised CRP levels mark metabolic and functional impairment in advanced COPD. *Thorax* 2006; 61: 17-22
33. Santiveri C, Espinalt M, Carrasco FXD, Marin A, Miguel E, Jones PW. Evaluation of male COPD patients' health status by proxies. *Respir Med*;101:439-445.