RESEARCH PAPER

Factors that influence disease-specific quality of life or health status in patients with COPD: a systematic review and meta-analysis of Pearson correlations

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Abstract

Background: A major goal in the management of chronic obstructive pulmonary disease (COPD) is to ensure that the burden of the disease for patients with COPD is limited and that patients will have the best possible quality of life.**Aims:** To explore all the possible factors that could influence disease-specific quality of life and health status in patients with COPD.**Methods:** A systematic review of the literature and a meta-analysis were performed to explore the factors that could have a positive or negative effect on quality of life and/or health status in patients with COPD.**Results:** Quality of life and health status are determined by certain factors included gender, disease severity indices, lung function parameters, body mass index, smoking, symptoms, co-morbidity, depression, anxiety, and exacerbations. Factors such as dyspnoea, depression, anxiety and exercise tolerance were found to be more correlated with health status than the widely used spirometric values. Forced expiratory volume in one second had a weak to modest Pearson weighted correlation coefficient which ranged from -0.110 to -0.510 depending on the questionnaire used.**Conclusions:** The broad range of determining factors suggests that, in order to reach the management goals, health status should be measured in addition to lung function in patients with COPD.

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I Tsiligianni, et al. *Prim Care Respir J* 2011; 20(3): 257-268<http://dx.doi.org/10.4104/pcrj.2011.00029>**Keywords** chronic obstructive pulmonary disease, health status, quality of life, factor correlations, questionnaire, systematic review

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The full version of this paper, with online Appendix, is available at www.thepcrj.org

Introduction

Chronic obstructive pulmonary disease (COPD) is a prevalent disease in the general population and a considerable burden for patients with the disease. This burden differs between patient groups. Some patients can live their lives almost untouched by

the disease, while others are almost completely handicapped. The burden of the disease does not follow the classic Global Initiative for Chronic Obstructive Lung Disease (GOLD) severity grades based on spirometry, as postulated by the current guidelines.¹ It is widely accepted that the burden of the disease is determined by more than pulmonary function measured by the Tiffeneau index and forced expiratory volume in one second (FEV₁). One way to indicate the burden of the disease to patients is assessment of health-related quality of life (HRQoL) and health status. Quality of life (QoL) in general refers to the patient's ability to enjoy normal life activities (Webster's New World

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Medical Dictionary). HRQoL is more specific and is related to the part of the QoL that is determined by health. It may include dimensions such as general health status, mental, psychological and sleep status, ability to proceed with daily life, and social activities. Disease-specific QoL is that related to a certain disease. COPD-related QoL is considered to be the potential impact of COPD on HRQoL. Health status represents an overall evaluation of the state of the health of a person. When related to a specific disease, it is almost interchangeable with disease-specific QoL.

Health status measurement is becoming an important issue for the day-to-day management of COPD patients in both primary and secondary health care.²⁻⁹ Studies report that a shorter survival is related to worse health status/HRQoL.¹⁰⁻¹² Since health status is considered a major goal in managing the disease,¹³ physicians should be focused on improving it. The implementation of short instruments to measure health status has significantly improved their usage in daily clinical practice.¹⁴⁻²⁴ However, the currently available health status questionnaires have a number of differences in the concepts included, and various items are unique in some questionnaires.^{25,26}

The theoretical model of factors that potentially have an influence on health status includes factors such as age, gender, disease severity, lung function, body mass index (BMI), smoking status, symptoms, exercise capacity, co-morbidity, depression, anxiety, and exacerbations.²⁷⁻³⁸

The aim of the present review and meta-analysis is to present and discuss the published data of factors that could possibly play a role in COPD-related QoL or health status. The existing literature provides information on various factors that could be positively or negatively associated with COPD-related QoL although, to date, no literature exists that aggregates this knowledge in one report.

Methods

A systematic literature search was performed from 1984 to September 2009 in Pubmed, Embase and the Cochrane Collaboration for the keywords COPD, health status or quality of life, in conjunction with questionnaires, age, gender, BMI, smoking, COPD severity, FEV₁, symptoms, exercise capacity, co-morbidity, depression, anxiety, and exacerbations. Further articles were identified from the reference lists of the included articles.

In our review we included studies that used general health status questionnaires such as the Short Form Health Survey Questionnaire (SF-12) and SF-36, the Quality of Well Being scale (QWB), the Sickness Impact Profile scale (SIP), the Nottingham Health Profile scale (NHP), the European Quality of Life questionnaire (EuroQOL) and studies that used specific health status and QoL questionnaires such as the Chronic Respiratory Questionnaire (CRQ), the St George's Respiratory Questionnaire (SGRQ), the COPD Control Questionnaire (CCQ), the Quality of Life in Respiratory Illness Questionnaire (QoL-RIQ), and the

Airways Questionnaire 20 (AQ-20) for the assessment of COPD.

The number of potentially relevant studies identified and screened for retrieval was 2391 for COPD and factors relating to quality of life and 1497 for COPD and factors relating to health status. A total of 3717 studies were excluded because the title or abstract showed that they were not relevant or because of duplications in keyword searching. Those most frequently excluded were interventional studies that were not within the goals of this review. Studies that reported comparisons of QoL questionnaires but did not report information on factors relating to quality of life or health status were also excluded. A total of 171 studies were retrieved for evaluation and are included in this review; 66 studies reported Pearson or Spearman correlation coefficients and are included in the meta-analysis.

Statistical analysis

A meta-analysis was conducted only of the 66 studies for which Pearson or Spearman correlations were available. In some questionnaires a high score indicates a good health status while in others a high score indicates a bad health status. To enable a comparison to be made between the correlation coefficients of the different questionnaires, the correlation coefficients were multiplied by -1 when the direction of the scoring was from bad (low score) to good (high score) (figures 1 and 2). The following questionnaire scores were transformed: Chinese 35-Item Quality of Life Instrument, CRQ, EuroQoL, EuroQoL-Five-Dimension visual analogue scale (EQ-5D VAS), Mental Component Summary (MCS-12) and Physical Component Summary (PCS-12) of SF-12, Multidimensional Index of Quality of Life (MIQL), Perceived Quality of Life Scale (PQoL), QoL-RIQ, Quality of Life Scale (QoLS), QWB, and the Visual Simplified Respiratory Questionnaire (VSRQ). As a result, a high score on a questionnaire indicates much impairment/worse health status.

Pooled estimates of the correlation coefficients were calculated by transforming the correlation coefficients to Fisher's z values. The resulting values were weighted with the inverse of the variance of the correlation coefficients. The 95% confidence intervals of the pooled weighted Fisher's z values were also calculated, after which all the values were back-transformed to the metric of the correlation coefficients.³⁹

Results: factors that influence COPD HRQoL and health status

The factors presented here have been mentioned in the literature in relation to QoL and health status in patients with COPD. Pearson weighted correlations and confidence intervals between various factors and questionnaires are reported in Table 1. In order to make Table 1 readable, we only show the relations between questionnaires and factors when at least three studies reported on these outcomes. All Pearson weighted correlations are shown in the Appendix (available online at www.thepcrj.org). Figure 1 shows Pearson weighted

Table 1. Meta-analysis results of correlations from three or more studies showing Pearson weighted correlations between questionnaires and factors, upper and lower limits, total number of patients included in the meta-analysis and the lower and upper number of patients included in the studies

Questionnaire (no of studies)	Factor	Weighted Pearson	Weighted Pearson upper 95	Weighted Pearson lower 95	Total number of patients in studies (lower and upper numbers)
SGRQ total (n=29) ^{17,32,35,42,49,50,61,62,67,70,76,80,82,84,87,96,98,104,109,111,113,117-119,121,124,126,127,129}	FEV ₁	-0.285	-0.156	-0.404	5288 (30–751)
CCQ total (n=3) ^{19,75,79}	FEV ₁	-0.405	-0.285	-0.513	562 (58–329)
CRQ* (n=4) ^{105,114,116,129}	FEV ₁	-0.294	-0.023	-0.525	206 (44–62)
SGRQ total (n=5) ^{72,98-100,104}	BODE	0.441	0.572	0.289	583 (64–253)
SGRQ total (n=19) ^{17,35,42,49,53,58,61,67,70,76,87,96,104,109,111,113,117,121,124}	Dyspnoea	0.507	0.622	0.371	2510 (30–560)
SGRQ total (n=15) ^{35,50,58,61,70,76,84,104,109,111,113,117,121,127,144}	6MWD	-0.342	-0.221	-0.453	2454 (30–1217)
SGRQ total (n=5) ^{17,50,56,96,150}	HADS anxiety	0.462	0.610	0.283	574 (41–218)
SGRQ total (n=5) ^{17,50,56,96,150}	HADS depression	0.528	0.662	0.321	574 (41–218)

The numbers in parentheses are the total number of studies assessed.

*The score was transformed so that a high score on a questionnaire indicates much impairment/worse health status.

BODE=body mass index (B), degree of airway obstruction (O), level of functional dyspnoea (D), and exercise capacity (E); CCQ=COPD Control Questionnaire; CRQ=Chronic Respiratory Questionnaire; FEV₁=forced expiratory volume in 1 second; HADS=Hospital Anxiety and Depression Scale; 6MWD=6-minute walk distance; SGRQ=St George's Respiratory Questionnaire.

correlations between FEV₁ and various QoL or health status questionnaires. Figure 2 shows the highest Pearson weighted correlations between different factors and questionnaires. Some factors such as gender and COPD severity are not included in Figures 1 and 2 or the Appendix because the studies did not provide correlations but only comparisons between groups ($p < 0.05$). Studies that used the SF-36 questionnaire were not included in Figures 1 and 2 or the Appendix because of the large number of different domains. However, their impact on health status is reported in the text.

1. Demographic and anthropometric factors

a) Age

The results relating to age are controversial. Higher age was reported as a negative predicting factor for the health status of patients with COPD in 17 studies.^{7,20,28,29-32,38,40-48} In eight studies we found no significant correlation between age and health status⁴⁹⁻⁵⁶ and, in another eight studies, it was reported that younger patients had worse health status.^{33,57-63} The meta-analysis includes only a small number of studies that reported correlations since the large majority of studies only reported comparisons between age groups. In the meta-analysis, age was found to be weakly associated with impairment of health status (Table 1, Figure 2).

b) Gender

In 18 studies female patients with COPD reported worse health status than male patients,^{7,29,30,33,35,37,38,41,43,48,51,64-70} both on total

scores and on physical condition scores as assessed by the SF36.^{29,35} Ten studies reported no gender differences in health status.^{40,50,52-55,71-74} Only one study reported the opposite – that is, worse health status in men.²⁸

c) Body weight and body mass index

Body weight and BMI are related to health status, with underweight patients having worse health status than patients of normal weight.^{28,43,53,75-79} Four studies reported that health status tends to be worse also in overweight patients.^{53,63,75,80} Some studies reported no correlation between health status and BMI.^{31,49,58} The Pearson weighted correlation ranged from weak to modest, depending also on the questionnaire used. The strongest correlations were reported with the SGRQ and CCQ (Figure 2). Low lean body mass abnormalities and a low fat free mass index have also been associated with activity impairment and worse health status.^{53,81} In one study, worse health status was associated with a smaller proportion of type I fibres in peripheral muscles.⁸⁰

2. Lifestyle parameters

a) Smoking status

Current smoking and a higher number of pack-years have a weak negative influence on health status.^{7,28,31,46,55,61,79,82-87} Some studies reported no correlation^{40,43,51,53} and one study found that smokers had a better health status.²⁹ Second-hand smoke was also reported to be associated with poorer health status in patients with COPD.⁸⁸

Figure 1. Pearson weighted correlations, FEV₁ and various health status/quality of life questionnaires.
 *The score was transformed so that a high score on a questionnaire indicates much impairment/worse health status. The numbers of studies are shown in parentheses^{17,32,35,42,49,50,61,62,67,70,76,80,82,84,87,96,98,104,109,111,113,117-119,121,124,126,127, 129}

b) Social class

Some studies reported a relation between socioeconomic status and health status,^{83,89} but others did not confirm this finding.^{40,52}

3. Disease-driven determinants

a) Severity of COPD (GOLD-ATS-BTS-Canadian staging, BODE index)

Most of the published studies suggest that COPD severity measured by recommendations from the ATS, BTS, GOLD, and the severity score is related to health status.^{8,29-31,38,40,43,46,67,75,90-102}

With minor exceptions, health status became more

significantly associated with disease severity as the disease passed to a more severe stage.^{8,29-31,38,40,43,46,67,75,90-102} Yeo et al.¹⁰³ reported no significant association between health status and GOLD stages. COPD severity assessed by the composite BODE index – body mass index (B), degree of airway obstruction (O), level of functional dyspnoea (D), and exercise capacity (E) – showed a better correlation with health status. This relation was stronger than the relation with pulmonary function parameters and GOLD stages (Table 1, Figure 2).^{72,98-100,104} A new composite index, the DOSE index – dyspnoea (D), airflow obstruction (O), smoking status (S), and exacerbation frequency (E) – showed a modest correlation with QoL in COPD patients.⁷⁹

b) Physiology (lung function values, PaO₂, PCO₂, exercise capacity)

Most studies showed a non-significant or weak association between FEV₁ and health status.^{28,30-31,33,35,42,43,45,47-49,53,56-59,61-64,67,68,70,76,82,84,87,89,98,104-127}

Some of the studies revealed a moderate association between health status and FEV₁.^{7,19,32,50,60,75,80,123,128-132} The differences in the strength of the correlation might be due to the different questionnaires used (Table 1, Figure 1). The strongest correlations were shown mainly with the QWB, CRQ dyspnoea and CCQ questionnaire while, in all other questionnaires, the correlations were rather weak.

Other lung function values investigated included the inspiratory to total lung capacity (IC/TLC) ratio,³⁵ forced expiratory volume in one second/forced vital capacity (FEV₁/FVC) ratio,^{31,42,80,105} FVC,^{33,42,61,64,107} vital capacity (VC),^{31,50,61,112,133} IC,^{67,114} and residual volume (RV)/TLC ratio,⁶³ most of which showed a weak association with health status. Maximal inspiratory respiratory muscle pressure (MIP),^{31,58,64} maximal expiratory respiratory muscle pressure (MEP),⁶⁴ and carbon monoxide diffusing capacity were also found to be weakly associated with health status.^{31,50,63,64,96,105} Arterial oxygen tension (PaO₂) was either not significantly associated or modestly positively associated.^{35,49,50,56,80,81,83,89,104,108,109,117,128,129,134} A weak negative association or a non-significant association was also reported with carbon dioxide tension (PCO₂).^{32,35,47,50,56,109}

4. Symptoms and exercise performance

The key symptom in COPD is dyspnoea. Dyspnoea, which is usually measured with the transitional dyspnoea index (TDI) or the baseline dyspnoea index (BDI), was found to be strongly negatively associated with health status and had the highest correlations with health status questionnaires (Table 1, Figure 2).^{20,28-30,35,42,45,48-53,57,58,60,61,63,65,67,70,75,76,79,81,87,93,94,96,97,101,104-114,117,123,124,131,133,135-141} Sputum production, chronic cough,^{29,102} wheezing,^{54,57} and fatigue^{58,110,139,142} were also negatively associated with health status.

Impairment of exercise performance tolerance was associated with impairment in health status and mainly with the functional status or activity domains. The most used instrument to assess the exercise tolerance was the 6-minute walk distance

Figure 2. Highest Pearson weighted correlations between various health status/quality of life questionnaires and factors that influence quality of life or health status. *The score was transformed so that a high score on a questionnaire indicates much impairment/worse health status. The numbers of studies are shown in parentheses

AQ20=Airways Questionnaire 20; BMI=body mass index; BODE index=body mass index (B), bronchial obstruction (O), dyspnoea (D), exercise (E); BPQ=Breathing Problems Questionnaire; CCQ=COPD Control Questionnaire; CRQ=Chronic Respiratory Questionnaire; EQ-5D-VAS=EuroQol-Five-Dimension Visual Analogue Scale; FEV₁=forced expiratory volume in one second; GOLD=Global Initiative for Chronic Obstructive Lung Disease; HADS=Hospital Anxiety and Depression Scale; 6MWD=6-minute walk distance; NHP=Nottingham Health Profile scale; PaCO₂, arterial carbon dioxide tension; PaO₂, arterial oxygen tension; QWB=Quality of Well Being scale; RQLQ=Modified Asthma Respiratory Quality of Life Questionnaire; SGRQ=St George's Respiratory Questionnaire; SIP=Sickness Impact Profile; TLCO, carbon monoxide diffusing capacity.

which was weakly to modestly correlated with health status measurement questionnaires (Table 1, Figure 2).^{35,50,52-54,58-61,64,70,73,76,81,83,84,87,104,105,109,111,113,114,116,117,121,127,133,138,143,144}

Only one study reported no association between health status and exercise capacity.¹⁴⁵

5. Co-morbidity: depression, anxiety

Co-morbidity influences the health status of patients with COPD.^{28,35,38,41,48,51,62,91,92,103,115,146,147} Heart disease, hypertension, locomotive disorders, diabetes, and sleep disturbances are among the most common co-morbidities reported to be

associated with impaired health status.^{38,41,51,87,92,103,146,147} In only two studies was co-morbidity not associated with impaired health status.^{53,99}

Depression and anxiety strongly impair health status and QoL in patients with COPD, as reported in several studies.^{17,34,50,56,61-63,67,73,83,89,92,96,103,113,115,131,133,138,148-154} Depression and anxiety were assessed in most of the studies by the Hospital Anxiety and Depression Scale (HADS) and the Beck Depression Inventory Scale (BDI) and Anxiety Scale (BAI). The meta-analysis showed that depression and anxiety had among the highest correlations with various questionnaires for the assessment of health status (Table 1, Figure 2).

6. Other factors

Previous exacerbations and hospital admissions have a weak negative impact on health status.^{11,33,35,40,42,43,46,49,57,62,123,124,126,133,155-168} Lower education and non-compliance with medication and medical interventions are associated with a worse health status,^{7,28,29,43,46,169} as well as an increased number of medications for controlling COPD^{42,77,132,170} and a longer disease duration.^{42,46,120} Living alone was associated with poorer QoL.¹³²

Seasonal variation in health status – with a better health status in spring/summer than in winter – has been reported.¹⁵⁷ In one study, a home temperature of at least 21°C for at least 9hrs/day was associated with better health status.¹⁷¹ There is also variability in health status between northern and southern countries and between urban and non-urban areas, with worse health status reported in southern countries and urban areas.^{28,42,172}

Finally, psychological and psychosocial factors, and coping strategies are associated with health status.^{33,48,52,120,173-175} The patient's illness perception is also associated with several domains of QoL.¹⁷⁵ One study found that the patient's coping strategies and health status were not significantly related.¹⁷⁶ Holm *et al.* reported that a poor quality family relationship was associated with more psychological distress and dyspnoea resulting in a worse QoL.¹⁷⁷ One study reported that employment status and, more specifically, COPD patients who were too disabled to work had worse QoL than paid workers.¹²⁵

Discussion

Health status in patients with COPD is influenced by many different factors. However, the level of influence on health status of each factor is difficult to estimate because of the many different questionnaires used and because some factors influence different parts or domains of the available questionnaires. This meta-analysis shows that the most significant factors that determine QoL/health status in COPD patients are dyspnoea, depression, anxiety, and exercise tolerance. Since almost all instruments used to assess health status include items directly related to the disease – such as dyspnoea or other symptoms – this will automatically result in these strong associations. This meta-analysis also

indicated that spirometry values are only weakly associated with health status. This finding supports the idea that health status should therefore be measured in addition to spirometry.

The results relating to age are controversial. Poorer health status was reported in both older and younger patients. Although the meta-analysis showed a trend for a worse health status in older COPD patients, the correlation was rather weak. The impairment of health status in older people is to be expected because ageing by itself leads to a deterioration in the health status of the general population and also impairs lung function.¹⁷⁸ The presence of significant co-morbidities and/or an increased number of medications taken by older people leads to a further deterioration in health status.^{7,59,67,77,92,103} The fact that in some studies younger people reported worse health status may be explained by a larger gap between the health status experienced and that expected.⁵⁹

Female patients with COPD report a poorer health status.^{7,29,30,33,35,37,38,41,43,48,51,64-70} Foy *et al.* investigated the effect of rehabilitation on health status in men and women and suggested that gender differences in physiological and psychological impairment explain the differences in health status.⁶⁶ Other suggestions are an increased burden of symptoms,⁶⁵ different coping mechanisms,³⁷ more intense restriction of activity,³³ an airway predominant phenotype,¹⁷⁹ or a greater psychosocial impairment⁶⁹ in women. Women are also known to be more susceptible to depression, a disease that results in a deterioration in health status in COPD patients.^{66,180}

Many studies assessed the effect of underweight on the health status in patients with COPD. Underweight patients have impaired health status mainly because of the deterioration in dyspnoea.⁵³ This is well known in COPD patients. Overweight patients also have impaired health status.^{53,75} Shoup *et al.* reported that overweight patients with COPD had increased dyspnoea and worse scores on both the impact and total domains.⁵³ Obesity leads to worse respiratory symptoms and less exercise capacity – factors that are impaired in patients with COPD.¹⁸¹

Smoking and pack-years are considered important factors for health status.^{7,31,106} Ex-smokers and smokers had significant differences in health status mainly because of the improvement in a range of respiratory symptoms after smoking cessation.^{29,85,86} Ferrer *et al.* reported that, in smokers, mainly the impact and symptoms scores were impaired.⁷ Only Wijnhoven *et al.* reported that current smoking was associated with better QoL.²⁹ The authors of that study suggested that this contradictory result could be due to confounding by severity. Patients in the study who continued to smoke were those with less severe disease.²⁹ Although we expected that smoking would be among the best predictors of health status, the correlation was only weak but the number of studies was too small to make firm conclusions.

Most of the studies mentioned that disease severity was associated with health status.^{8,29-31,38,40,43,46,67,75,90-102} Ferrer *et al.*

reported that HRQoL varied greatly within each stage of severity, even after stratification for co-morbidity.⁹² In the one study that reported no significant correlation between disease severity and health status, there was a trend towards higher scores in severe COPD which indicated a poorer quality of life.¹⁰³ The BODE index was found to have a stronger correlation with health status than FEV₁ (Table 1). This strong correlation is not surprising since the BODE index is composed of factors such as dyspnoea and exercise capacity that are domains of many health status questionnaires.

Although spirometry is traditionally seen as the most important determinant of the diagnosis and severity of COPD, this meta-analysis showed that the relation between health status and all spirometric values – mainly FEV₁ – is weak (Figure 1). This indicates that assessment of COPD severity in clinical practice could benefit from the additional measurement of health status.

Pearson weighted correlations from numerous studies revealed dyspnoea as a very important determinant of health status (Figure 2, Table 1, Appendix). The strong relation between dyspnoea and health status could in part be artificial because all reported questionnaires have questions or a domain about symptoms including dyspnoea. In a comparison of 11 instruments used for the assessment of health status in COPD, Stucki *et al.* reported that there was a large heterogeneity between questionnaires, but dyspnoea was the only factor present in all of them.²⁶

Co-morbidity – especially depression and anxiety – has one of the greatest influences on the impairment of health status.^{34,50,56,61-63,67,73,83,89,92,96,103,115,131,133,138,148-154} An increased number of chronic diseases is associated with a worse HRQoL in the general population.¹⁸² Few studies mentioned all the related co-morbidities in COPD patients with an impaired health status.^{38,41,51,92,103,146,147} Special attention has been given to depression and anxiety in a significant number of papers. Depression and anxiety have a significant impact on health status. All the questionnaires showed a good correlation with depression and anxiety questionnaires, but only the CCQ was reported to have a sufficiently good correlation to be used to predict depression and anxiety.³⁴ Anxiety significantly influences the health status of patients with COPD and is strongly dependent on dyspnoea.⁶¹ The high correlation with depression and anxiety found in this meta-analysis highlights their important role in health status impairment and underlines the need for their estimation in daily clinical practice.

Surprisingly, both emotional and rational coping strategies impaired health status.^{52,173} Osman *et al.* reported that younger patients suffered more because of the psychological impact of their disease.³³ Patients who deny their disease are less influenced by it.⁵² Those with positive beliefs and a less strong emotional reaction to the illness have better QoL.¹⁷⁵

Since improvement in health status is a pivotal treatment goal, physicians should be informed about a patient's individual health status. Since only a very small part of health status is determined

by spirometric values, the need for simultaneous assessment of health status by a proper instrument is crucial. However, it is difficult to select an instrument that is appropriate for use in clinical practice. Cazzola *et al.* (on behalf of the ATS/ERS task force on outcomes of COPD) suggested instruments for generic health status (SF-36, SIP, NHP), lung disease-specific health status and HRQoL (CRQ, SGRQ, QoL-RIQ), short disease-specific health status and HRQoL (CRQ-SAS, AQ-20, BPQ), disease-specific health status and HRQoL for patients with respiratory failure (Maugeri Foundation respiratory failure questionnaire) and the CCQ.²⁵ Only a few of these instruments – such as the CCQ and AQ-20 – are applicable in daily clinical practice. In the future, the newly developed COPD Assessment Test (CAT)¹⁸³ might be an alternative, although data comparing the psychometric properties with other questionnaires are too limited to include in this review.

Conclusions

Quality of life and health status are determined by a significant number of factors, the strongest of which are dyspnoea, depression, anxiety, and exercise tolerance. The results of this meta-analysis indicate that the health status of patients with COPD is only weakly associated with spirometric values. We consider it advisable to measure health status in addition to spirometry in order to be better informed about the influence of the disease on typical health status issues such as symptoms, impairment, and mental state.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding this paper.

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