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Factors related to quality of life in patients receiving home mechanical ventilation

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KEYWORDS
Dyspnea;
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Summary
Objectives: The objective of this study was to evaluate factors associated with health-related quality of life (HRQOL) among patients receiving home mechanical ventilation (HMV).
Methods: Observational, cross-sectional study. Patients receiving HMV were recruited from hospital outpatients facilities at five participating centers; a single follow-up visit was scheduled. The Spanish version of the Severe Respiratory Insufficiency (SRI) Questionnaire was used and the following variables were collected: socio-demographic status, previous medical history (Charlson-Age Comorbidity Index), current symptoms, administration of questionnaires, pulmonary function tests (PFT), current ventilatory support, and oxygen therapy.
Results: One hundred and fifteen patients (57 males and 58 females, mean age 62±13 years) were investigated. The reasons for HMV were as follows: thoracic cage abnormalities (33 patients), obesity hypoventilation syndrome (37 patients), neuromuscular disorders (18 patients), sequelae of tuberculosis (12 patients), and chronic obstructive pulmonary disease (15 patients). In a bivariate approach, dyspnea, the number of hospitalizations, and the number of emergency room admissions in last year were the main predictors of each HRQOL dimension. Multivariate analysis showed that dyspnea, FEV_1/FVC, and the number of hospitalizations in the previous year were independently associated with HRQOL.

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Conclusions: HRQOL of patients receiving HMV is influenced by many factors, especially by dyspnea and the number of admissions. An obstructive pattern in the PFT also influences HRQOL. These findings may have therapeutic implications.
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Introduction

Health-related quality of life (HRQOL) is particularly useful as an outcome measure in studies of chronic disorders. In this setting, improvement of symptoms as well as patient well-being and functioning are among the main treatment goal achievements. Accordingly, interest in HRQOL of patients receiving home mechanical ventilation (HMV) has risen considerably in recent years.[1] In this regard, HMV may affect a variety of physical and psychological health domains, and HRQOL measures could provide a broad picture of this impact.

Besides the underlying etiology leading to HMV, patients in this group face unique challenges such as the dependence on external device for daily life, the number of hours spent on ventilation, limited possibilities to work/pursue daily activities, as well as subtle changes in disease progression among subjects with neuromuscular disorders. These factors are especially relevant to a chronic and impairing condition such as HMV. Thus far, however, little data are available on how these variables may affect HRQOL in this patient group.[2–4] In the past, the lack of reliable and valid patient-reported outcome instruments for HMV, including HRQOL instruments, has greatly complicated the clinical decision-making process. Indeed, no validated disease-specific measures were previously available to evaluate quality of life in HMV subjects. In recent years, however, the Severe Respiratory Insufficiency (SRI) Questionnaire, a specifically designed instrument which aims at assessing the effects of HMV on HRQOL, has become available[5] and has been previously translated and validated in the Spanish language.[6,7]

In this study, we sought to extend knowledge of the factors influencing HRQOL in HMV patients by using the Spanish version of the SRI Questionnaire. A better understanding of these issues is crucial to improve quality of care in this patient group and optimize clinical outcomes.

Methods

Participants

Five centers in Spain participated in this observational, cross-sectional study. The participating institutions were the Virgen del Rocío University Hospital, Seville (center 1), the Puerta del Mar University Hospital, Cádiz (center 2), the Virgen Macarena University Hospital, Sevilla (center 3), the San Pedro Alcántara University Hospital, Cáceres (center 4), and the Juan Ramón Jimenez Hospital, Huelva (center 5). Patients receiving HMV were recruited from hospital outpatient facilities at the participating centers. The study was approved by our Institutional Review Board and all participants gave written informed consent.

Adult patients receiving non-invasive HMV who were both clinically stable and well adapted for at least 3 months met the inclusion criteria. Exclusion criteria were as follows: unwillingness to participate, history of exacerbation during the last 3 months, and invasive HMV with tracheostomy. A single follow-up visit was scheduled. During this consultation, we recorded medical and socio-demographic data. Additionally, we administered the Spanish version of the SRI Questionnaire. The set of socio-demographic factors included age, gender, level of education (no education, incomplete compulsory schooling, complete compulsory schooling, high school, and university), and employment status (housewife, pensioner, disabled, and others). The extent of smoking history was measured in pack years. The primary diagnosis and comorbidities were used to calculate the Charlson-Age Comorbidity Index,[8] a validated index used to predict 10-year mortality. The previous performance status was assessed according to the British Thoracic Society guidelines (normal activity without restriction; strenuous activity limited, can do light; limited activity but capable of self-care; limited activity, limited self-care; confined to bed/chair, no self-care; no record).[9] Dyspnea was measured using the British Medical Research Council Scale.[10]

Quality of life

The SRI Questionnaire is a 49-item self-administrated quality of life instrument which has been translated and validated in the Spanish language.[6,7] Patients rated, on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), their agreement with each of 49 statements. Subjects completed the SRI based upon their health status during the previous week. The SRI Questionnaire measures seven different health concepts related to chronic respiratory failure, namely 'Respiratory Complaints' (RC; 8 items), 'Physical Functioning' (PF; 6 items), 'Attendant Symptoms and Sleep' (AS; 7 items), 'Social Relationships' (SR; 6 items), 'Anxiety' (AX; 5 items), 'Psychosocial Well-Being' (WB; 9 items), and 'Social Functioning' (SF; 8 items). Each item belonged to a single scale.

After item recoding, a crude punctuation for each scale was calculated. The final punctuation (or Summary Scale, SS) was calculated as the arithmetic mean of the values in each scale. The final SS ranges from 0 to 100, higher scores reflecting a better HRQOL. After clearing doubts, if any, the patients were asked to fill in the SRI Questionnaire. Patients were told to be sincere and autonomous, and were encouraged to self-administer the questionnaire. For those who could not read or had trouble reading, the items were read out and the response recorded by the investigator.

Data analysis

Statistical computations were performed with the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL) version

14.0. For descriptive purposes, the mean ± SD was used for quantitative variables. The absolute and relative frequencies of each category were used for qualitative data, using the corrected values for lost data. Parametric tests were used for comparative analysis. To compare quantitative variables, the unpaired Student's *t*-test was used. Variance similitude was previously studied with the Levene test. To study quantitative differences with more than two categories, ANOVA test was used and completed with a post-hoc study using the Bonferroni's correction to detect intergroup differences. Qualitative variables were analyzed using the Chi-square test and Fisher's exact test when the expected frequency was <5. Pearson's coefficients were used to study correlations between quantitative variables.

In order to assess the relationships between HRQOL and other factors, multiple stepwise linear regression analysis was performed, where the dependent variable was each of the HRQOL dimensions. Variables either statistically ($p<0.10$) associated with each other or clinically relevant according to literature were selected for covariate control as independent variables. For the purpose of this analysis, ordered categorical variables were transformed into dichotomous dummy variables. An acceptable alpha error was set at 0.05.

Results

One hundred and fifteen patients (57 males and 58 females, mean age 62 ± 13 years) were investigated. The characteristics of the study population are shown in Tables 1–3. The reasons for HMV were as follows: thoracic cage abnormalities (33 patients), obesity hypoventilation syndrome (OHS) (37 patients), neuromuscular disorders (18 patients), sequelae of tuberculosis (TBS; 12 patients), and chronic obstructive pulmonary disease (COPD; 15 patients). Sixty-three (46.1%) patients required supplemental oxygen during ventilation (mean flow: 1.6 ± 0.6 L/min), whereas 13 (11.3%) participants were on long-term oxygen therapy (mean flow: 1.5 ± 0.5 L/min). All patients in this study were well adapted to HMV and all showed no or minor adverse effects. Pulmonary function tests (PFT) were different between diagnostic groups (Table 3). Those patients with an obstructive component (CODP and TBS) had a lower FEV_1 than the rest of the sample (obstructive 35 ± 13.9 vs. non-obstructive 46.2 ± 19.3; $p = 0.014$).

The SRI scores in different domains were as follows: RC, 61.2 ± 22.1; PF, 43.2 ± 26.7; AS, 60.9 ± 21.6; SR, 76.7 ± 17.2; AX, 55.9 ± 24.8; WB, 58.3 ± 22.7; FS, 54.9 ± 25.8; and SS, 57.8 ± 18.5. Results of bivariate analyses for the main categorical variables are shown in Table 4. Psychometric scale values were not significantly different between genders (SRI-SS: 29 ± 19 in males vs. 56 ± 18 in females; p = n.s.), the only exceptions being SRI-RC (55 ± 22 in males vs. 67 ± 21 in females; $p = 0.005$) and SRI-AX (50 ± 23 in males vs. 62 ± 25 in females; $p = 0.012$). None of the scales had a significant association with either education level or employment status. No effect of mode of questionnaire administration was seen on scores of different scales. Age, Charlson-age index, BMI, and questionnaire administration time were not significantly different between scales. With regard to lung function tests, we observed no significant

Table 1 Characteristics of the study participants (categorical variables).

Variable	*N*	%
Male gender ($n = 115$)	57	49.6
Level of education* ($n = 111$)		
No education	12	10.8
Incomplete compulsory schooling	40	36
Complete compulsory schooling	42	37.8
High school	14	12.6
University	3	2.7
Employment status* ($n = 111$)		
Housewife	26	23.4
Pensioner	34	30.6
Disabled	45	40.5
Other	6	5.4
Smoking history ($n = 113$)		
Active smokers	5	4.4
Ex-smokers	39	34.5
Non-smokers	69	61.1
Performance status* ($n = 115$)		
Normal activity without restriction	20	17.4
Strenuous activity limited, can do light	41	35.7
Limited activity, but capable of self-care	21	18.3
Limited activity, limited self-care	19	16.5
Confined to bed/chair, no self-care	5	4.3
No record	9	7.8
Main diagnosis ($n = 115$)		
Thoracic cage abnormalities	33	28.7
Obesity hypoventilation syndrome (OHS)	37	32.2
Neuromuscular disorders	18	15.7
Sequelae of tuberculosis (ST)	12	10.4
Chronic obstructive pulmonary disease (COPD)	15	13.0
Participating center ($n = 115$)		
Center 1	11	9.6
Center 2	18	15.7
Center 3	33	28.7
Center 4	43	37.4
Center 5	10	8.7
Hospitalization in the last year ($n = 97$)		
No admission	65	67
One admission	16	16.5
More than one admission	16	16.5
Emergency room in the last year ($n = 97$)		
No attendance	74	76.3
One attendance	14	14.4
More than one attendance	9	9.3
Self-administration of the questionnaire ($n = 115$)	63	54.8
Morning headache ($n = 115$)	38	33
Daytime sleepiness ($n = 115$)	93	80.9
Type of mask ($n = 108$)		
Nasal	103	95.3
Oronasal	5	4.6
Type of ventilation ($n = 109$)		
Pressure	88	80.7
Volume	21	19.3
Long-term oxygen therapy ($n = 115$)	13	11.3
Oxygen during HMV ($n = 115$)	53	46.1

*As defined in the text. HMV, home mechanical ventilation.

effects of FVC, pH, and pO2. Compared to other centers, centers 1 and 4 obtained higher punctuations on the SRI-RC, SRI-SR, SRI-AX, SRI-FS, and SRI-SS ($p<0.05$) scales. However, these differences were likely to be non-influential in the multivariate model. Significant differences between diagnostics groups are represented in Figure 1. Dyspnea, the number of hospitalizations, and the number of emergency room admissions in last year were the main predictors of each HRQOL dimension (the only exception being admissions in the previous year and the WB subscale). Dyspnea correlated significantly with all the SRI components with correlation coefficients ranging from −0.2 to −0.5 ($p<0.05$ for all correlations).

The results of multivariate analysis for each HRQOL dimension are shown in Table 5. All seven dimensions of the HRQOL appeared to be similarly affected by dyspnea. The final model indicated that dyspnea, FEV_1/FVC, and the number of hospitalizations in the previous year were independent predictors of HRQOL in our study cohort.

Table 2 Characteristics of the study participants (continuous variables).

Variables	Mean	SD
Sociodemographic		
Age ($n = 113$)	61.9	13.9
Medical history		
Smoking (pack-years, $n = 40$)	38.2	25.2
Charlson Age-Comorbidity Index* ($n = 115$)	3.6	1.3
Admissions ($n = 97$)	0.41	1.03
BMI ($n = 71$)	33.1	8.1
Mode of administration of the SRI Questionnaire		
Administration time (minutes, $n = 100$)	10.9	5.4
Symptoms		
Dyspnea by MRC scale ($n = 115$)	2.1	1.3
Pulmonary function tests		
FVC (mL) ($n = 75$)	1401	688
FVC (%) ($n = 81$)	48	17.8
FEV_1 (mL) ($n = 75$)	980	520
FEV_1 (%) ($n = 82$)	43	18.6
FEV_1/FVC (%) ($n = 80$)	68.6	14.8
pH ($n = 95$)	7.40	0.05
pO_2 (mmHg) ($n = 98$)	68.3	13.9
pCO_2 (mmHg) ($n = 98$)	46.7	7.9
Ventilation		
HMV (hours/day) ($n = 113$)	8.6	3.2
HMV (months) ($n = 114$)	55.3	49

*As defined in the text. SD, standard deviation; BMI, body mass index; admissions, number of admissions in the previous year; FVC, forced vital capacity; FEV_1, forced expiratory volume in one second; pO_2, partial pressure of oxygen in arterial blood; pCO_2, partial pressure of carbon dioxide in arterial blood; HMV, home mechanical ventilation.

Discussion

This study found that HRQOL is significantly impaired in HMV patients and that the most significant characteristics independently associated with HRQOL were dyspnea, an obstructive pattern on PFT, and the number of hospitalizations in the previous year.

Patients receiving HMV delivered non-invasively via a mask constitute a heterogeneous group by their underlying pathology. In this regard, it is well established that patients with chest wall deformity, neuromuscular disease, or COPD may benefit from this treatment.[11] In recent years, measuring the impact of HMV treatment on patient's HRQOL has become increasingly recognized as an important outcome measure.[4] Nonetheless, the majority of studies examining quality of life in HMV patients have used generic questionnaires such as the Short Form 36 (SF 36), or measures specifically designed for patients with COPD.[2,12] Few studies have been published to date with the use of HMV-specific HRQOL measures. Under these circumstances, the SRI Questionnaire has been developed as a multidimensional HMV-specific HRQOL assessment tool with robust psychometric properties.[5] In this regard, the original German version has been transculturally adapted and validated in the Spanish language.[6,7]

Numerous patients in our study (32.2%) had obesity hypoventilation syndrome. This observation might explain the high BMI as observed in our study. It is conceivable that most of our study variables could be influenced by the distribution of underlying diseases in our series. However, we are confident that the study group is representative of the population in our area, in keeping with the studies by de Lucas Ramos et al.[13] and López et al.[14]

Table 3 Functional parameters between diagnostic groups.

Parameter	Thoracic cage	OHS	Neuromuscular	Tuberculosis sequelae	COPD	Total
n (%)	33 (28.6%)	37 (32.1%)	18 (15.6%)	12 (10.4%)	15 (13.3%)	115 (100%)
FVC (%)	36±13	66±16	44±15	46±16	65±10	48±17
FEV_1 (%)	33±12	58±18	44±16	36±11	34±16	43±18
FEV_1/FVC	72±11	74±12	74±20	59±7	53±12	68±14
pH	7.39±0.04	7.41±0.04	7.42±0.08	7.40±0.02	7.36±0.02	7.40±0.05
pCO_2	47±8	45±7	43±6	47±6	52±11	47±8
pO_2	70±21	65±9	76±9	65±8	64±12	68±14

OHS, obesity hypoventilation syndrome; COPD, chronic obstructive pulmonary disease; HMV, home mechanical ventilation.

Table 4 Relationships between different SRI dimensions and categorical variables.

Variables	SRI- RC	SRI-PF	SRI-AS	SRI-SR	SRI-AX	SRI-WB	SRI-FS	SRI-SS
Emergency room in the last year								
No attendance	65.5±21.8	50±27	63.2±20	82.1±15.7	61.9±25.5	65.2±22	62±25.6	63.8±17.8
One attendance	47.9±25.9	31.3±21.9	55.7±25.4	68.7±15.7	46.5±24.6	47±17.6	42.7±20	44.4±11.6
More than one attendance	53.9±19.9	26±19.2	50.4±23.1	69.8±19.4	44±23.2	40.7±23.4	36.2±22.8	40.5±13
p-value	0.012	0.001	0.086	0.003	0.011	<0.001	0.003	<0.001
Hospitalization in the last year								
No admission	63.2±23.4	47.2±27.3	62.9±20.3	80.9±16	60.8±26.3	61.7±23.3	59.9±26.4	61.9±17.9
One admission	46.1±20	29.4±22.7	48.3±24.5	65.3±19.1	35.7±20.7	48±23.9	38±22.7	40.7±15.6
More than one admission	61.4±18.8	35.6±26.6	55.1±27.5	76.1±17.4	54.4±14.8	53.3±23.3	48.2±16.6	56.9±19
p-value	0.049	0.053	0.068	0.010	0.003	ns	0.023	0.005

ICS, incomplete compulsory schooling; CCS, complete compulsory schooling; OHS, obesity hypoventilation syndrome; COPD, chronic obstructive pulmonary disease; ns, not significant; SRI, Severe Respiratory Insufficiency; RC, Respiratory Complaints; PF, Physical Functioning; AS, Attendant Symptoms and Sleep; SR, Social Relationships; AX, Anxiety; WB, Psychosocial Well-Being; SF, Social Functioning; SS, Summary Scale.

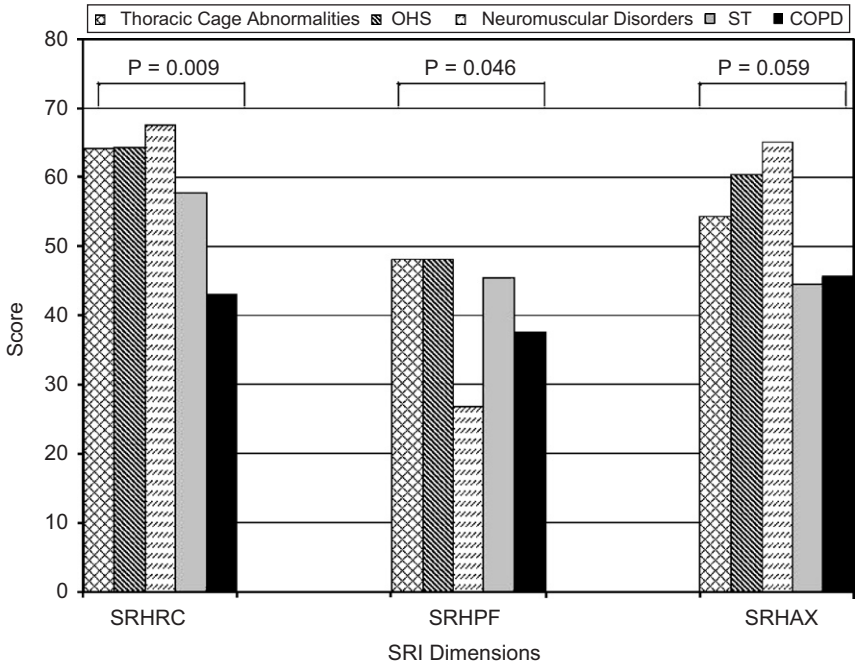

Figure 1 Mean score among diagnostic categories.

The association between dyspnea and worse HRQOL in all SRI scales is of major interest and is in keeping with previous data.[15,16] It has been already established that dyspnea is related to lung function and may explain exercise limitation.[17] However, limited exercise capacity may be present even in patients without severe functional impairment.[18] In this regard, other factors such as muscular and cardiovascular deconditioning may influence exercise capacity, dyspnea perception, and HRQOL.[19,20] It is thus posited that specific rehabilitation programs may have beneficial effects on HRQOL beyond those achieved by optimal medical therapy and ventilatory support.

Considerable evidence has now accrued to suggest that rehabilitation programs may improve exercise capacity,

Table 5 Multivariate analysis of HRQOL dimensions.

Dimension	Model summary	Variables in the model	β (95% CI)	p-value
SRI-RC	$R^2 = 0.789$	Neuromuscular	7.1 (−16.4 to 30.4)	ns
	$p < 0.001$	COPD	4.6 (−11.1 to 20.4)	ns
		OHS	21.6 (3.1–40.1)	0.023
		ST	3.4 (−19.8 to 26.5)	ns
		Long-term oxygen therapy	−25.4 (−49.7 to −1.1)	0.041
		Dyspnea	−7.1 (−12.3 to −1.8)	0.010
		Pack-years	−0.3 (−0.5 to 0)	0.050
SRI- PF	$R^2 = 0.511$	Emergency room	−6.6 (−11.9 to −1.3)	0.017
	$p < 0.001$	Dyspnea	−8.8 (−13.6 to −4.0)	0.001
		FVC	0.3 (0.03–0.6)	0.032
		Oxygen while ventilation	−12.6 (−23.5 to −1.7)	0.024
		Admissions	8.6 (−0.5 to 17.8)	0.064
		Performance status	−3.9 (−8.7 to −0.8)	0.101
SRI-AS	$R^2 = 0.569$	Dyspnea	−7.8 (−11.9 to −3.7)	0.001
	$p < 0.001$	Long-term oxygen therapy	−21.7 (−41.9 to −1.4)	0.036
		Admissions	3.9 (0.3–7.4)	0.033
		Pack-years	−0.025 (−0.2 to 0.2)	0.810
SRI-SR	$R^2 = 0.480$	Dyspnea	−5.9 (−10.4 to −1.4)	0.012
	$p = 0.004$	Long-term oxygen therapy	19.7 (0.5–39)	0.045
		Age	0.5 (0.03–0.9)	0.037
		Emergency room in the last year	−12.3 (−20.6 to −3.9)	0.005
		Performance status	5.8 (0.6–11)	0.028
		Pack-years	−0.9 (−0.3 to 0.1)	0.344
SRI-AX	$R^2 = 0.348$	Dyspnea	−4.7 (−8.5 to −0.9)	0.014
	$p < 0.001$	FEV_1	0.4 (0.13–0.6)	0.003
		Gender	9.5 (0.3–18.7)	0.043
		Age	0.5 (0.04–0.9)	0.033
SRI-WB	$R^2 = 0.428$	Age	0.34 (−0.004 to 0.6)	0.053
	$p < 0.001$	Dyspnea	−6.3 (−9.6 to −2.9)	<0.001
		Oxygen during ventilation	–9.6 (–18.1 to −1.08)	0.028
		Time for SRI administration	−1.09 (−1.9 to −2.9)	0.008
		Emergency room visits	−8.11 (−12.5 to −3.6)	0.001
SRI-SF	$R^2 = 0.501$	Pack-years	−0.3 (−0.6 to −0.04)	0.027
	$p < 0.001$	Dyspnea	−8.5 (−13.4 to −3.6)	0.001
		Oxygen during ventilation	−13.1 (−27 to 0.7)	0.064
SRI-SS	$R^2 = 0.661$	Admissions in the previous year	4.6 (1.1–8.2)	0.015
	$p = 0.001$	Dyspnea	−8.5 (−13.3 to −3.7)	0.002
		FEV_1/FVC	0.5 (0.04–0.9)	0.036
		Pack-years	−0.040 (−0.4 to 0.3)	ns

RC, Respiratory Complaints; PF, Physical Functioning; AS, Attendant Symptoms and Sleep; SR, Social Relationships; AX, Anxiety; WB, Psychosocial Well-Being; SF, Social Functioning; SS, Summary Scale. R^2: determination coefficient; β: multiple correlation coefficient.

dyspnea, HRQOL and, possibly, survival time in selected patients with chronic lung disease.[21–23] Foglio et al. have previously shown that COPD patients undergoing repeated rehabilitation program do not show any significant worsening in exercise tolerance, dyspnea and HRQL along a period of 7 years.[24] It is thus tempting to speculate that training programs of subjects requiring HMV may improve HRQOL in this patient group. Although no published data are currently available in support to our hypothesis, the effects of a rehabilitation program in patients with kyphoscoliosis are currently under investigation in our institutions.[25] Although subject to future confirmation, we speculate that exercise capacity may significantly affect HRQOL in HMV patients.

In our study, the number of hospitalizations or emergency room attendance was associated with a lower score in several HRQOL dimensions. Thus far, this relationship has been poorly explored. In this regard, Rebollo et al.[26] have previously shown that a higher number of admission was related to worse HRQOL scores in hemodialysis patients, even after allowance for potential confounders. Additionally, Soler et al.[27] have suggested that the use of a simple program—comprising an educational schema and regular

clinical monitoring—in selected COPD patients with a history of frequent exacerbations, may produce a significant reduction in the number of hospital admissions, as well as in an improvement of HRQL and prognosis.

Previous findings in the literature support the notion that PFT are not associated with HRQOL in patients with chronic respiratory disease.[28] Accordingly, a study in patients with pulmonary fibrosis has clearly demonstrated that none of the quality of life dimensions was significantly related to the lung function parameters.[29] In our study, however, an obstructive pattern on PFT was an independent predictor influencing HRQOL of patients receiving HMV. This finding is in keeping with Euteneuer et al.[1] who found better HRQOL scores in patients with restrictive respiratory diseases than in those with obstructive diseases. Moreover, our data support the growing idea that the degree of impairment in quality of life is different in obstructive (COPD and TBS) vs. restrictive lung disease.[30]

It is well known that several HMV patients may have difficulty tolerating nasal masks due to nasal airway problems, mouth leak, and general discomfort from the mask and headgear. These limitations may be overcome by an oronasal mask. Besides, the overall number of hours of ventilation may be related to the severity and the underlying cause of respiratory failure. In this regard, neuromuscular patients may require prolonged mechanical ventilation compared to HMV patients with different etiologies. Although the type of mask and the overall number of hours of ventilation were significantly associated with HRQOL in bivariate analysis, these associations disappeared after allowance for potential confounders. This could be explained by the adoption of coping strategies that may eventually help the patients to overcome the overall burden, as described by Janssens et al.[31]

Long-term oxygen therapy has previously been shown to be associated with HRQL in COPD patients.[16] In our study, bivariate analysis showed that patients receiving this treatment experienced an impaired HRQL. Interestingly, long-term oxygen therapy was found to be independently associated with the SRI-RC, SRI-AS, and SRI-SR scales in multivariate analysis. Additionally, an association between the use of oxygen during ventilation and the SRI-PF, SRI-WB, and SRI-SF scales was evident. This association has not been previously described and deserves further investigation.

There has been considerable debate on the reliability of self-administered questionnaires and a consensus has not been achieved. In their classical study, Cook et al.[32] found that self-administered tools showed systematically greater HRQOL impairment compared to interviewer-administered questionnaires. In contrast, Miller et al.[33] have recently suggested that more favorable measures of self-reported functional status and well-being may be expected from clinic administrations of rating instruments. In our present study, the HRQOL instruments were administered in a clinical setting, but about half of the SRI questionnaires were self-rated. The mode of administration did not influence the measures of HRQOL status obtained from the SRI questionnaires, as demonstrated using bivariate and multivariate analyses.

Taken together, our findings demonstrate that dyspnea, an obstructive pattern on PFT, and the number of hospitalizations in the previous year are the main factors influencing HRQOL of patients receiving HMV. These findings may have implications in the clinical management of this patient group and may be useful for the design of specific therapeutic targets for these patients such as rehabilitation programs.

Conflict of interest statement

The authors of the present manuscript declare not to have any potential conflict of interest regarding this manuscript. None of the authors have any financial relationship with any commercial entity that has an interest in the subject of this manuscript, such as employment, consultancy, stock ownership, honoraria or paid expert testimony, patent applications/registrations, and grants or other funding, as well as other forms of conflict of interest, including personal, academic and intellectual issues.

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