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Differences in change in coping styles between good responders, moderate responders and non-responders to pulmonary rehabilitation

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ABSTRACT

Introduction: Pulmonary rehabilitation (PR) improves exercise tolerance and health status in patients with chronic obstructive pulmonary disease (COPD). Data on the effects of PR on coping styles are limited. Aim of the present study was to compare changes in coping styles between patients who had a good, moderate and no improvement in either exercise tolerance or health status after PR.
Methods: Coping styles of 439 COPD patients undergoing PR were assessed by the Utrecht Coping List (UCL) at baseline and after PR. Patients' pulmonary function, six-minute walking distance (6MWD), St. George's Respiratory Questionnaire (SGRQ) and Hospital Anxiety and Depression Scale (HADS-A and HADS-D) were recorded. Good, moderate and non-responders were defined on the basis of minimally clinically important difference (MCID) for SGRQ total score and/or 6MWD.
Results: Overall, 54.0% of the patients fulfilled the criteria for good responders, while 22.1% were moderate responders. Change in *passive reaction pattern* coping style differed significantly between good responders and non-responders following PR ($p < 0.001$). Moreover, within the groups, changes in coping styles after PR occurred among the good responders, whereas the majority of moderate responders' and non-responders' coping styles were not significantly influenced by PR.
Conclusion: Good responders decreased their *passive reaction pattern* coping style in contrast to non-responders after PR. In general, PR did not change the coping among moderate and non-responders. Further research is warranted to determine whether including interventions targeting coping styles may modify coping behaviour of COPD patients, as well as improvement in exercise tolerance or health status after PR.

1. Introduction

Pulmonary rehabilitation (PR) is a comprehensive intervention, consisting of exercise training, education, nutritional intervention and psychosocial support [1]. It enables patients with respiratory diseases to improve their day-to-day activities and restore the highest level of independent functioning [2]. PR has been shown to improve dyspnoea, symptoms of anxiety and depression, exercise tolerance and health status in patients with chronic obstructive pulmonary disease (COPD) [3,4]. Nevertheless, individual responses to PR are variable. Previous research suggests that almost one-third of the patients, who followed a PR programme, were non-responders in terms of health status or exercise tolerance [5].

Adequate coping behaviour is needed in order for patients to successfully self-manage their COPD [6]. Among other goals, a comprehensive PR programme aims to modify patients' behavioural patterns and coping styles [7], which may lead to increased autonomy and active participation of COPD patients in the management of their disease. A recent study has shown that PR can change coping styles in patients with COPD [8]. Nonetheless, to date it remains unknown whether changes in coping styles are comparable for patients who respond very well with respect to

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exercise tolerance and/or disease-specific health status following PR and those patients with a moderate and/or without improvement in these outcomes.

Insight in coping styles of good responders, moderate responders and non-responders to PR may support in adapting the treatment programme of these patients to their needs with the aim of improving patients' benefit from PR. Therefore, the present study sought to compare changes in coping styles after PR between patients who had a very good response in exercise tolerance and/or disease-specific health status, patients with a moderate response and patients with no improvement in these two outcomes after PR.

2. Methods

2.1. Participants and study design

The study was conducted in patients with mild to very severe COPD admitted to CIRO, a centre of expertise for chronic organ failure (Horn, the Netherlands) for a comprehensive PR programme [9] in the period between January 2009 and December 2012. The diagnosis of COPD was based on the definition provided by the Global initiative for chronic Obstructive Lung Disease (GOLD) [10]. Part of the patients was included in previous studies concerning coping styles [8,11]. Ethical approval was not indicated because all of the tests were conducted as part of the clinical programme. All data were prospectively obtained and retrospectively analysed. Ethical approval was not indicated because all of the tests were done as part of the routine initial assessment [9] and analysed retrospectively. The Board of Directors of CIRO approved the use of de-identified patients' records.

2.2. The rehabilitation programme

The PR programme consisted of an 8-week inpatient or 14 week outpatient comprehensive programme [12]. PR included: exercise training, nutritional support; occupational therapy, exacerbation management, dyspnoea management, psychological counselling if indicated, and 20 group educational sessions of one hour, which were described elsewhere [8].

2.3. Measurements

The following patient characteristics were measured at baseline and after completion of PR according to recommended procedures: demographics; current smoking status; use of long-term oxygen therapy (LTOT); pulmonary function (forced expiratory volume in the first second (FEV_1) and forced vital capacity (FVC)), body-mass index (BMI) and Medical Research Council (MRC) dyspnoea scale [13].

Functional exercise capacity was measured at baseline by using two six-minute walking distance (6MWD) tests performed on two consecutive days [14,15]. In addition, the 6MWD test was performed after PR and the change between this test and the best baseline 6MWD was recorded [14,15].

Disease-specific health status was examined using the St. George's Respiratory Questionnaire (SGRQ) at baseline and after PR [16]. SGRQ provides three domain scores (symptoms; activities; and impact) and a total score, ranging from 0 (optimal) to 100 points (worst) [16].

Symptoms of anxiety and depression were evaluated using the validated Dutch version of the Hospital Anxiety and Depression Scale (HADS) at baseline and after PR [17]. The HADS is divided into an anxiety subscale (HADS-A) and a depression subscale (HADS-D). Scores for both subscales range from 0 (optimal) to 21 (worst) points [18].

Coping styles were assessed with the Utrecht Coping List (UCL) at baseline and after PR [19]. The UCL consists of 47 items, divided into seven coping subscales: *active confronting coping* (confronting problems and employing purposeful strategies); *palliative reaction* (distracting one's attention from the problems); *avoidance* (waiting and keeping clear of the problem); *seeking social support* (seeking comfort and help from others); *passive reaction pattern* (rumination and drawing back); *expression of emotions* (showing annoyance or anger; releasing tension); and *fostering reassuring thoughts* (self-encouragement). Patients were asked to rate how often they used certain coping behaviours. Four response options for each item were offered: 'seldom or never' (1 point), 'sometimes' (2 points), 'often' (3 points) and 'very often' (4 points). Mean total scores are calculated for every subscale. A higher score indicates an increased tendency towards using that specific coping style [19].

2.4. Good responders, moderate responders and non-responders

Since improvement in either SGRQ and/or 6MWD is beneficial, and because changes in these two variables after PR are not strongly correlated, a composite measure of response was used in the present study [5]. Accordingly, good responders were defined arbitrarily as experiencing an improvement of twice the minimal clinically important difference (MCID) in SGRQ total score (decrease of $\geq$ 8 points) [20] and/or 6MWD (increase of $\geq$ 50 m) [21]. Moderate responders were defined arbitrarily as patients with improvement of once the MCID in SGRQ (decrease of $\geq$ 4 to < 8 points) [20] and/or 6MWD (increase of $\geq$ 25 to < 50 m) [21] scores. Non-responders were defined arbitrarily as experiencing no improvement of one time MCID in either of the two aforementioned outcomes: decrease of < 4 points in SGRQ [20] and/or increase of < 25 m in 6MWD [21]. Twice the generally accepted MCID improvement was used before in studies examining surgical interventions in patients with severe emphysema [22,23].

2.5. Statistical analysis

Data analysis was performed using SPSS 23.0 statistical analysis software (SPSS Inc. Chicago, IL). Categorical variables are represented as proportions. Continuous variables are represented as means ± standard deviation (SD), unless otherwise indicated. Baseline characteristics and changes in HADS, BMI, and UCL domain scores were compared between the good responders, moderate responders and non-responders using one-way analysis of variance (ANOVA) followed by the Bonferroni *post hoc* comparisons. In addition, to evaluate the nominal variables χ^2 tests were used. Paired samples *t*-tests were used to assess the changes after PR stratified for good, moderate and non-responders. To examine a possible relationship between dyspnoea and coping styles, bivariate correlations were carried out. A two-tailed value of $p < 0.05$ was considered statistically significant.

3. Results

3.1. Patient characteristics

In total, 439 patients (169 (38.5%) inpatients and 270 (61.5%) outpatients) with complete data on relevant variables were included in this study. Patients had on average severe systemic airflow limitation, impaired exercise tolerance and an impaired disease-specific health status (Table 1). After PR, the total group showed significant improvements in SGRQ total score, 6MWD, MRC dyspnoea scale, HADS-A scores and HADS-D scores (Table 1). An improvement of twice the MCID was reported by 186 patients (42.4%) on SGRQ total score and by 135 patients (30.8%) on 6MWD.