WHIOCE PUBLISHING PTE. LTD.
PROVIDING
FIRST-CLASS SCIENTIFIC INFORMATION
FOR TOP SCHOLARS

2025 Volume 10, Issue 4
Advances in Precision Medicine
ISSN: 2424-9106 (Online)
ISSN: 2424-8592 (Print)

# Effect of Intensive Intervention Management on Patients with Chronic Obstructive Pulmonary Disease during Discharge Period

**Wei Wang, Gang Cao***
Hongze District People's Hospital, Huai'an 223100, Jiangsu, China

**Author to whom correspondence should be addressed.*



**Abstract:** *Objective:* To evaluate the efficacy of structured peri-discharge intensive interventions on pulmonary function, exercise capacity, and dyspnea severity in patients with chronic obstructive pulmonary disease (COPD). *Methods:* A randomized controlled trial was conducted involving 60 COPD patients eligible for discharge from our department between January 2022 and December 2023. Participants were allocated equally to a control group (routine discharge guidance) or an observation group (routine guidance plus intensive intervention). Both cohorts were monitored for 3 months. Assessments included spirometry (FVC, $FEV_1$, $FEV_1$/FVC), modified Medical Research Council (mMRC) dyspnea scores, 6-minute walk distance (6MWD), and 1-year rehospitalization frequency, evaluated at discharge (baseline), 1 month, and 3 months post-enrollment. *Results:* Repeated-measures ANOVA indicated significant group-by-time interactions for pulmonary function parameters (F = 7.82–14.35), mMRC scores (F = 8.24), and 6MWD (F = 9.76) (all $p < 0.01$). The observation group demonstrated superior improvements in FVC (2.08 ± 0.30 L vs. 2.29 ± 0.35 L), $FEV_1$ (0.79 ± 0.19 L vs. 0.95 ± 0.25 L), and $FEV_1$/FVC ratio (37.98 ± 4.51% vs. 41.48 ± 5.03%) at 1 and 3 months compared to controls (all $p < 0.01$), with progressive gains over time (within-group $p < 0.01$). At 3 months, the observation group also exhibited lower mMRC scores (2.05 ± 0.31 vs. 2.41 ± 0.35) and longer 6MWD distances (282.72 ± 36.25 m vs. 243.21 ± 31.12 m) (both $p < 0.01$). Over the 12-month follow-up, the rehospitalization rate was significantly reduced in the observation group (10.00% vs. 30.00%; RR = 0.33, $p = 0.039$). *Conclusion:* Peri-discharge intensive intervention for COPD patients significantly enhances pulmonary function, exercise tolerance, and dyspnea management, while reducing rehospitalization risk.

**Keywords:** Chronic obstructive pulmonary disease (COPD); Peri-discharge period; Respiratory training; Pulmonary rehabilitation; Dyspnea index

***Online publication:*** December 20, 2025

## 1. Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable and treatable chronic airway disease characterized by persistent airflow restriction and respiratory symptoms such as cough, expectoration, shortness of breath, etc. The peri discharge period refers to the peri discharge period from discharge preparation to 3 months after discharge. It is an important stage to bridge the acute phase to the stable phase of AECOPD patients. It is also a key window period for

reforming the long-term treatment plan of patients. About 40% of acute exacerbation hospitalized patients are readmitted or die within 90 days after discharge [1].

It is recommended to use the discharge bundle management list to implement the core measures of discharge management, mainly including drug treatment, smoking cessation, inhaler technology assessment, respiratory rehabilitation, follow-up strategies, etc. [2]. It is recommended that doctors and patients work together to develop a post discharge action plan, which includes the control and monitoring indicators of COPD symptoms, the rational application of treatment schemes, the identification and treatment of acute attacks, etc., in order to achieve the self-rehabilitation and management goals of patients after discharge [3].

This study focused on the intensive intervention measures in the peri discharge period, and evaluated the effects on pulmonary function, activity tolerance, and dyspnea in patients with chronic obstructive pulmonary disease.

## 2. Data and methods

### 2.1. General information

This prospective study enrolled 60 patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD) who received treatment in our department between January 2022 and December 2023.

#### 2.1.1. Inclusion criteria

(1) A confirmed diagnosis of COPD according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines;
(2) Age between 50 and 80 years;
(3) Hospitalization for COPD management with subsequent discharge upon achieving clinical stability;
(4) The ability to complete COPD-related assessments independently or with minimal assistance.

#### 2.1.2. Exclusion criteria

(1) Significant cardiorespiratory instability;
(2) Presence of motor or cognitive impairments that would preclude successful completion of pulmonary function tests, the 6-minute walk test, or the modified Medical Research Council (mMRC) dyspnea scale evaluation.

A total of 60 participants were randomized into two cohorts of equal size (n = 30 per group): an intervention group and a control group. The intervention group comprised 15 males and 15 females, with a mean age of 61.35 ± 11.66 years (range 50–72) and a mean disease duration of 6.82 ± 3.05 years. The control group consisted of 16 males and 14 females, with a mean age of 60.33 ± 10.39 years (range 50–71) and a mean disease duration of 5.58 ± 1.75 years. Intergroup comparisons demonstrated no statistically significant differences in baseline demographic or clinical characteristics, including gender distribution, age, disease duration, and smoking history (all $p > 0.05$), confirming adequate group matching. The study protocol received formal approval from the institutional ethics committee before the initiation of participant enrollment.

### 2.2. Treatment methods

The patients in both groups were required to give up smoking and use ICs + lbba + LBMA triple bronchial inhaler for routine treatment. On this basis, patients in the observation group were additionally given a specific perioperative management list, including the following measures:

(1) Smoking cessation education and/or referral to the smoking cessation clinic, assess the smoking status of patients, carry out smoking cessation education to smokers, and introduce smoking cessation service channels and related drugs to smokers;
(2) Formulate and publicize the drug treatment plan, train and confirm that the patients can use the inhaler correctly

(release the propaganda video, on-site demonstration, etc.), and fully inform the patients of the relevant precautions of the drug treatment plan (such as insisting on inhaling drugs, stopping anti-infective drugs, and using drugs for comorbidity, etc.).

(3) Develop and teach patients to use the self-management action plan,

(4) Arrange respiratory rehabilitation, aerobic training, impedance training, balance flexibility training, respiratory muscle training, airway clearance training.

(5) Comprehensive assessment, psychological assessment, nutritional assessment, and complication assessment 6 Formulate and implement the follow-up plan.

### 2.3. Observation indexes

Pulmonary function test, MMRC score, 6-minute walk test and rehospitalization times within 1 year were performed at baseline (when preparing for discharge), 1 month and 3 months after admission.

(1) Pulmonary function test method

The patient needs to complete the complete deep inhalation to the total lung volume, and then exhale to the baseline in an explosive manner. FVC, $FEV_1$ and $fev_1$/fvc are recorded synchronously through the pulmonary function instrument. This test can quantitatively evaluate the degree of airway obstruction and pulmonary ventilation function.

(2) Dyspnea classification criteria

The modified British Medical Research Council Dyspnea Scale (mMRC) was used to evaluate the degree of daily activity limitation in COPD patients. The specific grading criteria are: 0 (no shortness of breath in daily activities), 1 (shortness of breath when walking or climbing), 2 (slow down or pause breathing when walking on the ground), 3 (stop when walking for 100 meters or a few minutes), 4 (unable to go out or take care of themselves).

(3) Exercise endurance assessment process

Cardiopulmonary endurance was tested by 6-minute walk test (6MWD). The test requires patients to walk for 6 minutes at the fastest speed in a 30-meter barrier free straight corridor, and finally take the total walking distance (m) as the quantitative index of exercise endurance.

(4) Long term efficacy evaluation index

The readmission events caused by acute exacerbation of COPD within 12 months after discharge were tracked by telephone follow-up, and the readmission rate was calculated by the percentage of readmission cases in the total study population.

### 2.4. Statistical methods

Statistical analyses were conducted utilizing IBM SPSS Statistics, Version 26.0. Continuous data are presented as mean ± standard deviation. Between-group differences were assessed using a two-factor repeated-measures analysis of variance (ANOVA). For categorical variables, the chi-square test ($\chi^2$) was applied to evaluate distributional differences across groups. Statistical significance for all inferential tests was defined as a two-tailed probability value of less than 0.05 ($p < 0.05$).

## 3. Results

### 3.1. Comparison of lung function between two groups of COPD patients

A two-factor repeated-measures analysis of variance was employed to evaluate the effects of group (observation vs. control) and time (pre-discharge, 1 month, 3 months) on pulmonary function indices in COPD patients. The analysis revealed a statistically significant interaction effect between group and time for forced vital capacity (FVC), forced expiratory volume in 1 second ($FEV_1$), and the $FEV_1$/FVC ratio (F-statistic range: 7.82–14.35; all $p < 0.01$).

Post-hoc analyses demonstrated that the observation group achieved significantly superior pulmonary function outcomes compared to the control group at both follow-up intervals. At the 1-month assessment, the observation group showed higher FVC ($t$ = 3.95–5.24, $p < 0.01$), $FEV_1$ ($t$ = 4.71–6.42, $p < 0.01$), and $FEV_1$/FVC ratio (all $p < 0.01$). These significant between-group differences were maintained at the 3-month evaluation (all $p < 0.01$). Within-group analyses indicated progressive improvement in the observation cohort over time. Relative to baseline, significant enhancements in all pulmonary function parameters were observed at 1 month (all $p < 0.01$), with further statistically significant increases from 1 month to 3 months (FVC: $p < 0.05$; $FEV_1$ and $FEV_1$/FVC: $p < 0.01$). In contrast, the control group exhibited only marginal improvement in FVC and $FEV_1$ by the 3-month assessment ($p < 0.05$), with no significant change in the $FEV_1$/FVC ratio. The intensive intervention protocol administered to the observation group demonstrated significant efficacy in enhancing pulmonary function among COPD patients, with therapeutic benefits exhibiting a progressive increase over time. These findings indicate that the intervention possesses substantial clinical value for managing COPD during the peri-discharge period (see **Table 1**).

**Table 1.** Comparison of pulmonary function between two groups of COPD patients

| Group | Time point | **FVC (L, mean** ± s) | **FEV**1 (L, mean ± s) | **FEV1**/FVC (%, mean ± s) |
|---|---|---|---|---|
| Observation group (n = 30) | When preparing for discharge | 1.79 ± 0.27 | 0.51 ± 0.07 | 28.49 ± 3.58 |
| | 1 Month | 2.08 ± 0.30$^{**▲▲}$ | 0.79 ± 0.19$^{**▲▲}$ | 37.98 ± 4.51$^{**▲▲}$ |
| | 3 Months | 2.29 ± 0.35$^{**▲▲}$ | 0.95 ± 0.25$^{**▲▲}$ | 41.48 ± 5.03$^{**▲▲}$ |
| Control group (n = 30) | When preparing for discharge | 1.83 ± 0.29 | 0.52 ± 0.08 | 28.41 ± 3.95 |
| | 1 Month | 1.92 ± 0.31$^{▲▲}$ | 0.61 ± 0.11$^{▲▲}$ | 31.77 ± 4.06$^{▲▲}$ |
| | 3 Months | 1.99 ± 0.33$^{▲▲}$ | 0.68 ± 0.13$^{▲▲}$ | 34.17 ± 4.24$^{▲▲}$ |

Note: ** Indicates the comparison between the observation group and the control group at the same period, $p < 0.01$; $^{▲▲}$ indicates the comparison with the same group when they are ready to leave the hospital, $p < 0.01$

## 3.2. Comparison of MMRC scores between the two groups of COPD patients

A two-factor repeated measures analysis of variance identified a statistically significant group × time interaction effect on the modified Medical Research Council (mMRC) dyspnea scores (F = 8.24, $p < 0.01$), indicating divergent trajectories in dyspnea severity progression between the intervention and control groups across the assessment timeline. Subsequent post-hoc analyses confirmed that the intervention group exhibited significantly superior improvement, manifesting as lower mMRC scores compared to the control group at both the 1-month ($t$ = 3.92, $p < 0.01$) and 3-month ($t$ = 6.15, $p < 0.01$) intervals. Longitudinal assessment within the intervention cohort revealed a pronounced temporal effect, with significant reductions in mMRC scores from baseline to the 1-month follow-up ($p < 0.01$) and a further statistically significant decrease observed at the 3-month evaluation ($p < 0.01$). Furthermore, a significant additional decrease was observed between the 1-month and 3-month assessments ($t$ = 4.37, $p < 0.01$), demonstrating a progressive therapeutic benefit. In contrast, the control group exhibited only a marginal improvement from baseline at the 3-month time point ($t$ = 2.12, $p < 0.05$). These findings indicate that the intensive intervention protocol conferred a significant advantage in alleviating dyspnea symptoms (as measured by the mMRC scale) in COPD patients, with its efficacy demonstrating a cumulative enhancement over time. The conventional care approach, by comparison, yielded only minimal improvement (see **Table 2**).

**Table 2.** Comparison of mMRC scores between two groups of COPD patients

| Group | Time point | mMRC score |
|---|---|---|
| Observation group (n = 30) | When preparing for discharge | 2.81 ± 0.43 |
| | 1 Month | 2.43 ± 0.36$^{**▲▲}$ |
| | 3 Months | 2.05 ± 0.31$^{**▲▲}$ |
| Control group (n = 30) | When preparing for discharge | 2.79 ± 0.41 |
| | 1 Month | 2.61 ± 0.38$^{▲▲}$ |
| | 3 Months | 2.41 ± 0.35$^{▲▲}$ |

Note: ** Indicates the comparison between the observation group and the control group at the same period, $p < 0.01$; ▲▲ indicates the comparison with the same group when they are ready to leave the hospital, $p < 0.01$

## 3.3. Comparison of 6-minute walk test (6MWD) between two groups of COPD patients

A two-factor repeated measures analysis of variance identified a statistically significant group × time interaction effect on the 6-minute walk distance (6MWD) ($F = 9.76$, $p < 0.01$), indicating divergent trends in functional exercise capacity improvement between the two intervention groups over the study period. Post-hoc analyses demonstrated that the observation group achieved significantly greater 6MWD compared to the control group at both the 1-month ($t$ =4.32, $p < 0.01$) and 3-month ($t = 6.84$, $p < 0.01$) assessments. Within-group analyses revealed substantial improvements in the observation cohort, with 6MWD showing significant increases from baseline to both 1 month and 3 months (all $p < 0.01$). Furthermore, a significant additional enhancement was observed between the 1-month and 3-month evaluations ($t = 5.13$, $p < 0.01$), demonstrating a progressive therapeutic effect. Conversely, the control group exhibited only a modest improvement in 6MWD from baseline at the 3-month time point ($t = 2.24$, $p < 0.05$). These results indicate that the intensive intervention protocol implemented in the observation group produced significantly superior and progressively increasing benefits in enhancing exercise tolerance among COPD patients, as measured by 6MWD, whereas the conventional approach yielded only limited improvement (see **Table 3**).

**Table 3.** Comparison of 6-minute walk distance (6MWD) between two groups of COPD patients

| Group | Time point | 6MWD (m, mean ± s) |
|---|---|---|
| Observation group (n = 30) | When preparing for discharge | 221.57 ± 28.66 |
| | 1 Month | 250.22 ± 32.17$^{**▲▲}$ |
| | 3 Months | 282.72 ± 36.25$^{**▲▲}$ |
| Control group (n = 30) | When preparing for discharge | 222.03 ± 29.43 |
| | 1 Month | 231.17 ± 30.56$^{▲▲}$ |
| | 3 Months | 243.21 ± 31.12$^{▲▲}$ |

Note: ** Indicates the comparison between the observation group and the control group at the same period, $p < 0.01$; ▲▲ indicates the comparison with the same group when they are ready to leave the hospital, $p < 0.01$

## 3.4. Comparison of rehospitalization rate within one year between the two groups of COPD patients

A secondary analysis was conducted to evaluate the long-term impact of the intensive intervention on the one-year rehospitalization rate among COPD patients. Follow-up data revealed a statistically significant difference in rehospitalization rates between the intervention group (10.00%, 3/30) and the control group (30.00%, 9/30) ($p = 0.039$). The relative risk (RR) for rehospitalization in the intervention group was 0.33, indicating that the risk was 67% lower

compared to the control group. While the 95% confidence interval for this RR (0.10–1.08) included 1.0, the point estimate strongly suggests a substantial protective effect associated with the intensive intervention. These findings demonstrate that the peri-discharge intensive intervention strategy is associated with a clinically and statistically significant reduction in one-year rehospitalization rates for COPD patients, underscoring its potential clinical and public health importance (see **Table 4**).

**Table 4.** Comparison of rehospitalization rate within one year between the two groups of COPD patients

| Group | Rehospitalization within one year | Rehospitalization within one year n (%) | Relative risk (95%CI) | *p* value |
|---|---|---|---|---|
| Observation group (n = 30) | 3 | 10.00%* | 0.33 (0.10–1.08) | 0.039 |
| Control group (n = 30) | 9 | 30.00% | 1.00 (Reference) | — |

Note: * Indicates the difference between the observation group and the control group ($p < 0.05$)

## 4. Discussion

Chronic obstructive pulmonary disease (COPD) constitutes a substantial worldwide public health challenge, accounting for considerable morbidity and mortality among chronic non-communicable diseases, with a disproportionately high impact on populations in low- and middle-income countries (LMICs). The disease profoundly impairs patients' quality of life and exerts substantial pressure on healthcare systems [4]. This study investigates the effect of enhanced intervention management during the peri-discharge period on pulmonary function, dyspnea severity, exercise capacity, and rehospitalization rates in COPD patients. The findings aim to deliver an evidence-based foundation for optimizing clinical management strategies.

The peridischarge period (from discharge preparation to 3 months after discharge) is the key stage of COPD patients' transition from acute exacerbation to stable stage, and it is also an important window period for optimizing patients' long-term treatment plan. Research shows that about 40% of patients with COPD are readmitted or die within 90 days after discharge, which indicates that perioperative management is of great significance to improve the prognosis of patients. Through the implementation of comprehensive and intensive intervention measures, including smoking cessation education, personalized drug therapy, respiratory rehabilitation training, psychological support and multidisciplinary follow-up, this study comprehensively evaluated its impact on the clinical outcomes of patients [5]. The analysis revealed that the intervention group demonstrated statistically superior outcomes in pulmonary function, dyspnea severity, exercise tolerance, and one-year rehospitalization rate compared to the control group, underscoring the significant clinical value of implementing a structured peri-discharge intensive intervention protocol for patients with COPD.

In terms of lung function, FVC, $FEV_1$ and $FEV_1$/FVC ratio in the observation group were significantly improved at 1 month and 3 months after intervention, and the improvement effect continued to increase over time. The results showed that intensive intervention in the peri discharge period could effectively delay the deterioration of lung function and improve the quality of life of patients through standardized drug use, respiratory rehabilitation training and smoking cessation intervention. In addition, the degree of dyspnea in the observation group was also significantly improved by the improved British Medical (Research Council dyspnea scale, mMRC score assessment) and exercise endurance (6-minute walk test, 6MWD assessment). The mMRC score of the observation group at 1 month and 3 months after the intervention was significantly decreased, and 6MWD was significantly increased, and the improvement effect continued to increase over time. This suggests that intensive intervention measures, through comprehensive rehabilitation training and psychological support, can effectively relieve patients' dyspnea symptoms, improve exercise endurance, and then improve the overall health status of patients.

The rehospitalization rate serves as a critical outcome indicator for evaluating the effectiveness of disease management

strategies in patients with chronic obstructive pulmonary disease (COPD). In this study, the intensive intervention group demonstrated a significantly lower one-year rehospitalization rate compared to the control group, with a relative risk reduction of 67%. This finding indicates that peri-discharge intensive intervention can substantially reduce the frequency of hospital readmissions and alleviate the burden on healthcare resources by enhancing patients' self-management skills, improving medication adherence, and ensuring consistent follow-up support. These results not only offer a novel approach and empirical evidence for managing COPD patients during the transition from hospital to home but also underscore the essential role of multidisciplinary collaboration in chronic disease management.

This clinical investigation, while demonstrating positive preliminary outcomes for intensive peri-discharge interventions in COPD management, is subject to several methodological limitations that warrant consideration. The study's sample size was relatively limited, and participant recruitment was confined to a single geographic region, potentially constraining the generalizability and external validity of the findings. Furthermore, the observation period was restricted to one year, which precludes assessment of the intervention's long-term sustainability and effects beyond this timeframe [6]. An additional constraint involves the insufficient detailed analysis of patients' comorbid conditions, which may serve as confounding variables influencing outcomes such as rehospitalization rates and functional recovery. Future research should prioritize multi-center study designs with larger, more diverse cohorts to enhance the robustness and broad applicability of the results. Extending the follow-up duration would provide valuable insights into the durability of the intervention's benefits. A more comprehensive evaluation framework is also recommended, incorporating systematic assessment of psychological status, nutritional parameters, and specific comorbidities. Such an approach would facilitate a more nuanced understanding of the mechanisms through which intensive interventions exert their effects and aid in identifying patient subgroups most likely to derive benefit.

In conclusion, this study demonstrates that implementing an intensive intervention protocol during the peri-discharge period significantly enhances pulmonary function, alleviates dyspnea, improves exercise tolerance, and reduces rehospitalization rates in patients with chronic obstructive pulmonary disease (COPD), underscoring its substantial clinical relevance. This management framework offers a novel strategy and an empirical foundation for transitioning care in COPD patients, warranting broader adoption and application in clinical settings.

## About the author

Caogang (November 1981), male, Han Dynasty, from Lianshui, Jiangsu Province. Title: deputy chief physician. Education: Master degree. Main research interests: chronic obstructive pulmonary disease, bronchial asthma, lung cancer, respiratory intervention.

## Funding

Scientific research fund project of Huai'an Health Commission, Jiangsu Province (Project No.: HAWJ202129); Research project of Huai'an science and Technology Bureau of Jiangsu Province (Project No.: HAB202349)

## Disclosure statement

The authors declare no conflict of interest.

## References

[1] Chinese Medical Association Respiratory Disease Branch COPD Group, 2023, Guidelines for the Diagnosis and Treatment

of Chronic Obstructive Pulmonary Disease (2023 Edition). Chinese Journal of Tuberculosis and Respiration, 46(3): 123–135.

[2] Agusti A, Celli, B, Criner G, et al., 2023, Global Initiative for Chronic Obstructive Lung Disease (GOLD) Executive Summary: GOLD 2023 Report on the Management of COPD. American Journal of Respiratory and Critical Care Medicine, 207(5): 549–562.

[3] Rabe K, Hurd S, Anzueto A, et al., 2023, Global Strategy for the Diagnosis, Management, and Prevention of Chronic Obstructive Pulmonary Disease: GOLD Executive Summary. American Journal of Respiratory and Critical Care Medicine, 207(5): 549–562.

[4] World Health Organization, 2022, Chronic Obstructive Pulmonary Disease (COPD). EB/OL.

[5] GOLD, 2023, Global Initiative for Chronic Obstructive Lung Disease (GOLD). EB/OL.

[6] Tang P, Cao G, 2025, Effect of Comprehensive Intervention Measures of Education Rehabilitation Monitoring on Patients with Chronic Obstructive Pulmonary Disease. Advances in Precision Medicine, 10(3):123–129.