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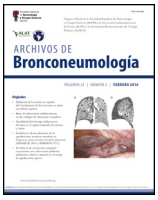

Original Article

# Feasibility of Home-based Functional Status Assessment of Chronic Obstructive Pulmonary Disease Patients Recovering from an Exacerbation☆

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ABSTRACT

*Introduction:* The Glittre Activities of Daily Living Test (ADL-Test) is a reliable functional status measurement for stable Chronic Obstructive Pulmonary Disease (COPD) patients in a laboratory setting. We aimed to adapt the test to the home setting (mADL-Test) and to follow-up the functional status recovery of post-exacerbation COPD patients included in a home hospitalization (HH) program.
*Method:* We assessed 17 exacerbated moderate-to-very-severe COPD patients in 3 home visits: at discharge to HH ($V_0$), 10 days ($V_{10post}$) and 1 month after discharge ($V_{30post}$). Patients completed the mADL-Test (laps, $VO_2$ and VE), COPD assessment test (CAT), London Chest ADL Test (LCADL), modified Medical Research Council (mMRC) and upper limb strength (handgrip).
*Results:* The number of laps of the mADL-Test (4, 5 and 5, $P$<.05), CAT (19, 12 and 12, $P$<.01), mMRC (2, 1.5 and 1, $P$<.01) and the self-care domain of the LCADL (6, 5 and 5, $P$<.01) improved during follow-up ($V_0$, $V_{10post}$ and $V_{30post}$, respectively). No significant changes were evidenced in $VO_2$, VE or handgrip.
*Conclusion:* Our results suggest that the mADL-Test can be performed in the home setting after a COPD exacerbation, and that functional status continues to improve 10 days after HH discharge.


## Viabilidad de la Evaluación Domiciliaria Del Estado Funcional de Pacientes Con Enfermedad Pulmonar Obstructiva Crónica en Fase de Recuperación de Una Exacerbación

*Palabras clave:*
Enfermedad pulmonar obstructiva crónica
Exacerbación
Hospitalización domiciliaria
Actividades de la vida diaria
Prueba de ejercicio

RESUMEN

*Introducción:* La prueba de actividades de la vida diaria de Glittre (prueba ADL) es, en un entorno de laboratorio, una medida fiable del estado funcional de los pacientes con enfermedad pulmonar obstructiva crónica (EPOC) estable. Nos propusimos adaptar la prueba para poder llevarla a cabo en el entorno domiciliario (Test ADLm) y supervisar la recuperación del estado funcional de pacientes con EPOC después de una exacerbación atendida en hospitalización domiciliaria (HD).

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*Método:* Evaluamos a 17 pacientes con EPOC de moderada a muy intensa y exacerbación en tres visitas domiciliarias: el día del alta de la HD ($V_0$), al cabo de 10 días ($V_{10post}$) y un mes después del alta ($V_{30post}$). Los pacientes realizaron la prueba ADLm (vueltas a un circuito, $VO_2$ y VE), la prueba de evaluación de la EPOC (CAT), el Cuestionario de ADL *London Chest* (LCADL), la Escala del *Medical Research Council* modificada (MRCm) y una dinamometría de las extremidades superiores (fuerza de prensión).
*Resultados:* el número de vueltas al circuito en la prueba ADLm (4, 5 y 5, $p < 0{,}05$), el CAT (19, 12 y 12, $p < 0{,}01$), la MRCm (2, 1,5 y 1, $p < 0{,}01$) y el dominio de cuidado personal del LCADL (6, 5 y 5, $p < 0{,}01$) mejoraron durante el seguimiento ($V_0$, $V_{10post}$ y $V_{30post}$, respectivamente). No se constataron cambios significativos en el $VO_2$, el VE o la fuerza de prensión.
*Conclusión:* Nuestros resultados indican que, tras una exacerbación de la EPOC, es factible realizar la prueba ADLm en el entorno domiciliario, y que el estado funcional continúa mejorando diez días después del alta de la HD.



## Introduction

Functional status refers to the ability of patients to cope with their Activities of Daily Living (ADL). Chronic Obstructive Pulmonary Disease[1] (COPD) affects the capacity of patients to perform their ADL.[2] Moreover, a poor functional status is a risk factor for exacerbations.[3] After an exacerbation, functional status may not return to the previous level, and this can cause patients to enter a negative cycle where the more exacerbations they suffer, the worse their functional status becomes.[4] The result is an eventual increase in mortality and health care burden.[5] Despite their importance, recovery patterns of functional status after a COPD exacerbation have been poorly studied.[6]

Home-based programs, such as home hospitalization (HH),[7] are successful care services for COPD patients. However, functional capacity assessment outside the hospital or laboratory setting has been rarely studied.[8] The home setting is unsuitable for most of the standard exercise field tests, such as the Six Minute Walking Test (6MWT)[9]; however, some performance tests for small settings have been suggested in recent years. Puhan et al.[10] found that the results of the sit-to-stand test are associated with mortality in stable COPD patients. Jones et al.[11] found the five-repetition sit-to-stand test to be a practical functional measurement, even at the bedside. And the Chester step-test may also be a suitable method.[12] Even so, those tests could underestimate the daily functional limitations of patients, because they rely mostly on the use of lower limbs, whereas most of the common ADLs combine both extremeties.[13] The ideal test would be one in which the patients have to reproduce the most common ADLs in their own environment.

The Glittre ADL-Test[14] (ADL-Test) was specifically developed for valid and reliable functional status assessment of COPD patients in terms of both performance and capacity.[8] It reproduces the 5 most common ADLs in a 10-m long corridor, and requires the use of both extremities.[14] In stable COPD patients, the ADL-Test induces a sub-maximal steady-state physiological response,[15,16] it discriminates the functional capacity of COPD patients from healthy people,[17] and it is also reproducible[16] and responsive to pulmonary rehabilitation.[14] However, the ADL-Test has not been tested in COPD patients recovering from an exacerbation or in the home setting.

Our research group had already tested the ADL-Test in stable COPD patients in a hospital setting.[18] In this study, we first aimed to determine whether it was also suitable for the home setting, and then attempted to follow-up ADL-Test performance during the early recovery phase of a COPD exacerbation. We achieved these objectives by studying post-exacerbation COPD patients included in an HH program.

## Methods

We conducted a prospective observational feasibility study. Subjects were consecutively recruited in the HH unit of the Hospital Clinic in Barcelona (Spain) between March and June 2011. The study protocol was approved by the independent Hospital's Ethics Committee, and all participating patients signed the consent form.

### *Population*

During the study period, all COPD patients admitted to the HH[19] program due to an exacerbation were invited to take part in the study. We were not able to calculate a sample size due to the exploratory nature of the research.

No changes were made to the existing HH care protocol.[19] Briefly, patients were admitted to the HH program if they did not meet criteria for imperative hospitalization (such as need for mechanical ventilation) or had been admitted to the hospital for less than 48 hours. HH exclusion criteria included: not domiciled in the healthcare area or admitted from a nursing home; lung cancer and other advanced neoplasm; extremely poor social conditions; severe neurological or cardiac comorbidities; and no phone at home. During HH, patients were visited daily by a skilled respiratory nurse. Standard pharmacological treatment was given, following national guidelines[20] in force at the time of the study, and the comprehensive therapeutic approach was adapted to the needs of each patient. Discharge visit ($V_0$) was scheduled and carried out by both the nurse and the medical staff.

Specific inclusion criteria for this study were: (1) COPD diagnosis following GOLD criteria[1] and (2) COPD exacerbation as the sole admission diagnosis. We excluded patients with muscular, skeletal, cardiac or cognitive conditions that could impede performance of the ADL-Test or compromise the safety of the test.

### *Protocol*

Patients were assessed by a respiratory physiotherapist during 3 home visits: at the time of discharge to HH ($V_0$), 10 days post-discharge ($V_{10post}$) and 1 month post-discharge ($V_{30post}$). To ensure the well-being of the patients, $V_0$ measurements were obtained over 2 consecutive days. The day before the planned discharge, we performed the clinical assessment (questionnaires). We explained the test, and the patients were invited to simulate 1 lap of the test to minimize the learning effect. On the day of discharge, patients performed the functional status assessment under supervision of the medical staff, to ensure their safety. The following $V_{10post}$ and $V_{30post}$ visits were carried out fully in one day each one.

### *Functional Status Assessment*

Functional status was assessed using a modified version of the original Glittre ADL-Test[14] (mADL-Test) (Fig. 1). We introduced 2 changes: first, the original outcome goal of 5 laps[14] was replaced