



## Original Article

Age Group Analysis of Psychological, Physical and Functional Deterioration in Patients Hospitalized for Pneumonia<sup>☆</sup>Adelina Martín-Salvador,<sup>a</sup> Irene Torres-Sánchez,<sup>a</sup> Germán Sáez-Roca,<sup>b</sup> Isabel López-Torres,<sup>a</sup> Elisabeth Rodríguez-Alzuet,<sup>a</sup> Marie Carmen Valenza<sup>a,\*</sup><sup>a</sup> Departamento de Fisioterapia, Universidad de Granada, Granada, Spain<sup>b</sup> Servicio de Neumología, Hospital Virgen de las Nieves, Granada, Spain

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## ABSTRACT

**Introduction:** Hospital admissions due to pneumonia range from 1.1 to 4 per 1000 patients and this figure increases with age. Hospitalization causes a decline in functional status. Physical impairment impedes recovery and constitutes a higher risk of disability and mortality in elderly people.

The objective of this study is to assess the impact of hospital stay in patients with pneumonia related with age.

**Method:** A total of 116 patients with pneumonia were included in this study, and divided into two age groups: <75 years (n=68) and ≥75 years (n=48). Respiratory function, physical function and psychological and emotional profile were evaluated. Pneumonia severity, nutritional status, independence and comorbidities were also assessed.

**Results:** Statistical analyses revealed significant differences between both age groups in pneumonia severity and comorbidities. Significant improvements between admission and discharge were found in lung function in both groups ( $P<.05$ ), while a significant decrease ( $P<.05$ ) in strength assessed by dynamometer was found in the ≥75 years group.

**Conclusion:** Hospitalization leads to a significant physical impairment in patients admitted for pneumonia. This deterioration increases with age.

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## Estudio del deterioro psicofísico y funcional en pacientes ingresados con neumonía. Análisis por grupos de edad

## RESUMEN

**Introducción:** Los ingresos hospitalarios por neumonía oscilan entre el 1,1 y el 4 por 1.000 pacientes, aumentando con la edad. La hospitalización provoca un deterioro en el estado funcional. La falta de condición física resultante perjudica la recuperación y pone a los mayores en alto riesgo de discapacidad y de mortalidad.

El objetivo del estudio es evaluar la repercusión de la estancia hospitalaria en pacientes con neumonía en función de su edad.

**Método:** Se incluyeron 116 pacientes con neumonía, divididos en dos grupos de edad: <75 años (n=68) y ≥75 años (n=48). Se evaluó la función respiratoria, la función física y el perfil psicoemocional. Además se recogieron como variables la severidad de la neumonía, el estado nutricional, la independencia y las comorbilidades.

**Resultados:** Los análisis estadísticos revelaron diferencias significativas entre ambos grupos de edad en el grado de la severidad de la neumonía y la presencia de comorbilidades. Se encontraron mejoras

## Palabras clave:

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significativas ( $p < 0,05$ ) en la función respiratoria en ambos grupos del ingreso al egreso hospitalario. En el grupo  $\geq 75$  años se observó una disminución significativa de la fuerza evaluada mediante la dinamometría ( $p < 0,05$ ).

**Conclusión:** La hospitalización supone un deterioro físico significativo en pacientes ingresados por neumonía aumentando con la edad.

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## Introduction

Various studies<sup>1</sup> have shown that hospitalization poses a significant risk to the elderly. Many older patients are confined to their beds with little or no activity, resulting in a decline in their functional status that persists after discharge. Loss of physical form undermines recovery and exposes the elderly to a high risk of impairment and mortality.<sup>2</sup>

Respiratory diseases currently account for 15.4% of hospital admissions, followed by digestive diseases (12.3%) and cancer treatments (11.3%).<sup>3</sup>

Respiratory tract infections are very common processes that range from the common cold to pneumonia or pulmonary abscess. Pneumonia, occurring at an incidence of 5.16–6.11 cases per 1000 persons per year,<sup>3</sup> is the most common. Mortality rates are high and healthcare costs are elevated.<sup>4</sup> Clinical signs and symptoms tend to vary widely, and prognosis often depends on the patient's underlying diseases.

Prospective studies have found that pneumonia is more common in men and in subjects at either end of the age spectrum. It occurs most often during the winter and the risk is exacerbated by factors such as alcohol and tobacco use, malnutrition, uremia, or chronic obstructive pulmonary disease (COPD).<sup>5</sup>

Advanced age is also recognized as a risk factor for pneumonia,<sup>6</sup> and the number of hospital admissions in patients older than 75 years of age is double that of the population aged between 65 and 74.<sup>7</sup>

Patients admitted for pneumonia have higher mortality during the year following discharge than those admitted for other reasons, and it has been suggested that inflammation plays a major role in this process. Moreover, some authors, such as Bordon et al.,<sup>8</sup> have identified factors such as dementia, liver disease and cancer as predictors of mortality in patients admitted for pneumonia.

The impact of hospitalization<sup>9</sup> on the course of various diseases has been studied, but no studies focusing on the effect of hospitalization in pneumonia patients have been identified.

Studies performed in patients with respiratory infection<sup>9</sup> have addressed the incidence and causes of the disease, treatments and mortality rates,<sup>6</sup> but the impact of hospitalization on these patients has not been assessed.

The aim of this study was to evaluate the impact of hospitalization on patients with pneumonia, depending on their age.

## Methods

This was a prospective study of 116 patients admitted consecutively for pneumonia to the Respiratory Medicine Departments of the Hospital Virgen de las Nieves and the Hospital San Cecilio de Granada between January and May 2014.

Patients with severe cognitive impairment, pleural effusion, pneumothorax or hemoptysis, those who could not perform physical or lung function tests, and isolated patients were excluded. With regard to the type of isolation, patients in airborne isolation units

were excluded. The reason for this exclusion was that access to these patients is restricted to prevent contagion and propagation of microbes throughout the hospital.

All patients gave informed consent before inclusion and the study protocol was approved by the ethics committee of both hospitals. The design and objective of this study were registered in the worldwide human clinical studies database, clinicaltrials.gov, under the number NCT02047383.

Subjects received standard medical treatment during the course of the study, in accordance to medical prescription, consisting of oxygen therapy and intravenous antibiotics. They were evaluated on admission and on discharge.

At the start of the study, sociodemographic and anthropometric data were obtained, and pneumonia severity was graded using the CRB-65 scale.<sup>10,11</sup> Nutritional status was evaluated using the Mini Nutritional Assessment (MNA) scale,<sup>12</sup> dependency according to the Barthel index,<sup>13</sup> and co-morbidities using the Charlson index.<sup>14</sup>

Lung function parameters were also determined, and a physical examination and psychoemotional profiling were performed.

Spirometric testing<sup>15</sup> (CareFusion portable spirometer, Micro Spirometer, Basingstoke, UK)<sup>16</sup> was used to assess lung function, and respiratory pressures were determined.

Maximum inspiratory pressure and maximum expiratory pressure were used to measure respiratory muscle strength. Maximum inspiratory pressure is the maximum pressure produced by a patient when trying to inhale through a blocked mouthpiece after maximum expiration, and maximum expiratory pressure is the maximum pressure exerted against a blocked mouthpiece, measured during forced expiration after full inspiration<sup>17</sup> (Micro-MPM; Sensor-Medico, Yorba Linda, CA, US).

Respiratory symptoms were evaluated using the modified Borg Scale,<sup>18</sup> the Leicester Cough Questionnaire and the St. George's Respiratory Questionnaire.

The St. George's Respiratory Questionnaire<sup>19</sup> evaluates patient-perceived impact of respiratory tract disease on health status and wellbeing.<sup>20</sup>

The Leicester Cough Questionnaire evaluates the relationship of cough with quality of life in the previous 24 h.<sup>21</sup> Total score is from 3 to 21, with a higher score indicating a better quality of life.<sup>22</sup>

The sit-to-stand test and hand-grip and quadriceps dynamometry were used to determine physical function.

The sit-to-stand test, developed from a previously published protocol,<sup>23</sup> records the time taken by the subject to move from a sitting position to standing without using support.<sup>23</sup> It has been used in patients with respiratory diseases.<sup>23</sup>

Muscle tone and hand-grip strength were determined using a dynamometer (TEC-60, Technical Products, Clifton, New Jersey).<sup>24</sup>

Dynamometry has been used in patients with respiratory diseases.<sup>24</sup>

Isometric quadriceps strength was measured using a TTK5401 GRIP-D dynamometer. Both legs were evaluated at rest with a knee bend of 60°. Leg dynamometry has been previously used in patients with respiratory diseases.<sup>25</sup>

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