

Prognostic factors for mortality in patients with chronic obstructive pulmonary disease in intensive care

Factores pronósticos de mortalidad en pacientes con enfermedad pulmonar obstructiva crónica en cuidados intensivos

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ABSTRACT

Introduction: chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable progressive condition characterized by persistent airflow limitation.

Objective: to identify prognostic factors for mortality in patients with chronic obstructive pulmonary disease in the intensive care unit.

Method: a descriptive, longitudinal, prospective study was conducted from January 2023 to December 2024 at the “Abel Santamaría Cuadrado” General Teaching Hospital. The study population consisted of 43 patients admitted to the intensive care unit with a diagnosis of chronic obstructive pulmonary disease.

Results: higher incidence among those over 69 years of age, women, Caucasians, and smokers; 46,10 % had more than two previous hospitalizations; need for ventilatory support (76,74 %). Overall mortality of 53,48 %, high number of comorbidities, and low incidence of respiratory infection. High-risk stratification in 74,41 %, and assessment of acute episodes as severe or very severe in 53,48 %.

Conclusions: the multidimensional assessment of chronic obstructive pulmonary disease, including previous hospitalizations, age, comorbidities, need for ventilatory support, risk stratification, and severity assessment of the acute episode, is an indicator of the need for specialized care and mortality.

Keywords: Chronic Obstructive Pulmonary Disease; Risk Factors; Intensive Care.

RESUMEN

Introducción: la enfermedad pulmonar obstructiva crónica es un padecimiento frecuente, prevenible y tratable, progresivo, caracterizado por una limitación persistente del flujo aéreo.

Objetivo: identificar los factores pronósticos de mortalidad en pacientes con enfermedad pulmonar obstructiva crónica en cuidados intensivos.

Método: se realizó una investigación descriptiva, longitudinal, prospectiva de enero 2023 a diciembre 2024 en el Hospital General Docente “Abel Santamaría Cuadrado”. El universo corresponden a los 43 pacientes ingresados con diagnóstico de enfermedad pulmonar obstructiva crónica en cuidados intensivos.

Resultados: mayor incidencia en más de 69 años, mujeres, blanca, fumadores, el 46,10 % con más de 2 ingresos previos, necesidad de soporte ventilatorio (76,74 %). Mortalidad total de 53,48 %, elevado número de comorbilidades e infección respiratoria baja. Estratificación del alto riesgos en el 74,41 %, y valoración de episodio agudo en grave y muy grave en el 53,48 %.

Conclusiones: la valoración multidimensional de la enfermedad pulmonar obstructiva crónica, con requerimientos de ingresos previos, edad, comorbilidades, necesidad soporte ventilatorio, estratificación de riesgo y valoración de gravedad del episodio agudo, es un indicador de necesidad de cuidados especiales y mortalidad.

Palabras clave: Enfermedad Pulmonar Obstructiva Crónica; Factores de Riesgo; Cuidados Intensivos.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a complex, multicomponent, and underdiagnosed disease associated with high morbidity and mortality and represents a major public health problem.⁽¹⁾

Scientific advances in recent years have necessitated a continuous update of knowledge and scientific evidence regarding what we now call COPD because of its heterogeneous clinical presentation. This has led to new proposals regarding its definition and syndromic approach, severity classification, and the identification of various phenotypes with clinical, prognostic, and therapeutic implications, all of which are linked to increasingly personalized medicine.^(1,2)

The current recognition that exacerbation is a syndrome resulting from various etiopathogenic mechanisms, all with similar clinical manifestations, and the ongoing need to advance knowledge toward increasingly personalized medicine.^(2,3)

COPD is the respiratory condition with the highest prevalence and socioeconomic impact worldwide, despite being a preventable disease. Owing to its high prevalence, progressive clinical course, and healthcare requirements, it is among the leading causes of mortality globally and results in high consumption of healthcare resources.⁽⁴⁾

The health burden of this disease is significant, not only in terms of fatalities but also in terms of the disability it causes, its impact on the quality of life of patients and their families, and the costs to individuals and the healthcare system.⁽⁵⁾

Estimates by the World Health Organization (WHO) indicate that by 2030, COPD will be the fourth leading cause of death worldwide and the seventh leading cause of years of life lost or lived with disability.⁽⁶⁾

In Cuba COPD was the seventh leading cause of death, with a total of 3558 deaths and a crude rate of 31,8 per 100 000 inhabitants in 2020; this figure rose to 5,207 deaths in 2021, with a crude rate of 46,5. A similar trend was observed in the province of Pinar del Río, where rates of 41,3 per 100 000 inhabitants were recorded at the end of 2021. This resulted in an average of 1,5 and 2,6 years of potential life lost per 1000 inhabitants in 2020 and 2021, respectively.⁽⁷⁾

The accuracy of the records could also be affected by the large number of underdiagnoses as well as diagnostic errors. The main reason for this is that a COPD diagnosis must be confirmed by spirometry, an objective method that demonstrates airflow obstruction and is still rarely available in many countries. ⁽⁵⁾ Approximately half of individuals with a previous diagnosis of COPD, chronic bronchitis, or emphysema had never undergone spirometry.⁽⁶⁾

Certainly, there are many aspects of this condition that require updating for healthcare personnel, a factor that sparks interest in understanding some fundamental generalities about the behavior of COPD and evaluating the prognostic factors that most influence the fatal course of the disease, as a starting point for timely strategic decisions to improve efficiency and decision-making in the comprehensive management of the disease in intensive care.

Therefore, the objective of this study was to identify the prognostic factors for mortality in patients with COPD in intensive care.

METHOD

An observational, descriptive, longitudinal, and prospective study was conducted on patients who were diagnosed with COPD and hospitalized in the intensive care unit of the “Abel Santamaría Cuadrado” General Teaching Hospital in the province of Pinar del Río from January 2023 to May 2024.

Data collection was established for the specified period; sequential sampling was performed, and all patients admitted to the intensive care units with a diagnosis of COPD were included. The study population consisted of 43 patients, all of whom were studied.

The variables studied were age, sex, comorbidities, risk factors (smoking, biomass combustion products), body mass index (BMI), degree of dyspnea (mMRC scale), exacerbations, infections, length of hospital stay, usual treatment, oxygen therapy, and ventilatory support.

The collected data were entered into a database created for this purpose. Descriptive statistics were used for data analysis.

Ethical standards for conducting health research were adhered to, ensuring respect, autonomy, beneficence, and justice in the research.

RESULTS

Table 1. Prognostic factors for mortality in patients with chronic obstructive pulmonary disease in intensive care. General characteristics

General characteristics			
No. of patients	43		
Age	X= 70,7	SD = 29,69	95 % CI
Gender			
Female	28	65,11 %	
Male.	15	34,88 %	
Skin color			
White	37	86,04 %	
Black	6	13,95 %	

The mean age of the 43 patients was 70,7 years; 65,11 % were female, and 86,04 % were white (table 1).

The data in table 2 show that the age group between 70 and 79 years is predominant, accounting for 39,53 % of the total, with 53,48 % of deaths occurring in this group.

Age group	Alive		Deceased		Total	
	No	%	No	%	No	%
40–59 years	3	6,97	1	2,32	4	9,30
60–69 years old	8	18,60	8	18,60	16	37,20
70–79 years	7	16,27	10	23,25	17	39,53
80 years or older	2	4,65	4	9,30	6	16,27
Total	20	46,51	23	53,48	43	100

As shown in table 3, in the study group, 72,09 % of the participants reported smoking as a factor in the onset and progression of the disease, with a low percentage of those who had quit smoking.

Variables	No	%	Deceased	%
Smoker				
YES	31	72,09	18	41,86
NO	12	27,90	5	11,62
Previous Income				
0 - 1	16	37,20	7	16,27
≥ 2	27	46,10	16	37,20
Length of stay				
< 5 days	9	20,93	4	9,30
5 to 10 days	18	41,86	9	20,93
>10 days	16	37,20	10	23,25
Ventilatory support				
YES	33	76,74	18	41,86
No	10	23,25	5	11,62

As shown in table 4, among the associated comorbidities, the most frequent was hypertension, with 27 cases representing 62,79 %, accounting for 46,51 % of deaths.

Comorbidities Associated	Total		Deaths	
	No	%	No	%
High blood pressure	27	62,79	20	46,51
Ischemic heart disease	11	25,58	9	20,93
Heart failure	9	38,70	7	16,27
Cardiac arrhythmias	5	11,62	4	9,30
Chronic cor pulmonale	4	9,30	3	6,97
Diabetes Mellitus	17	39,53	13	30,23
Malnutrition	21	48,83	17	39,53
CRF	7	16,27	5	11,62
Cancer	3	6,97	2	4,65

The data in table 5 show that among the causes related to admission and mortality, lower respiratory tract infection was predominant, accounting for 53,48 % of the study sample and being associated with 34,88 % of deaths.

Table 5. Causes related to admission and mortality				
Causes	Total	%	Deaths	%
Exacerbation	11	25,58	3	6,97
Lower respiratory tract infection	23	53,48	15	34,88
Cardiovascular	7	16,27	5	11,62
Other	2	4,65	0	0

With respect to risk stratification and mortality, 32 patients were in the high-risk group, accounting for the majority of deaths (18 patients) (figure 1).

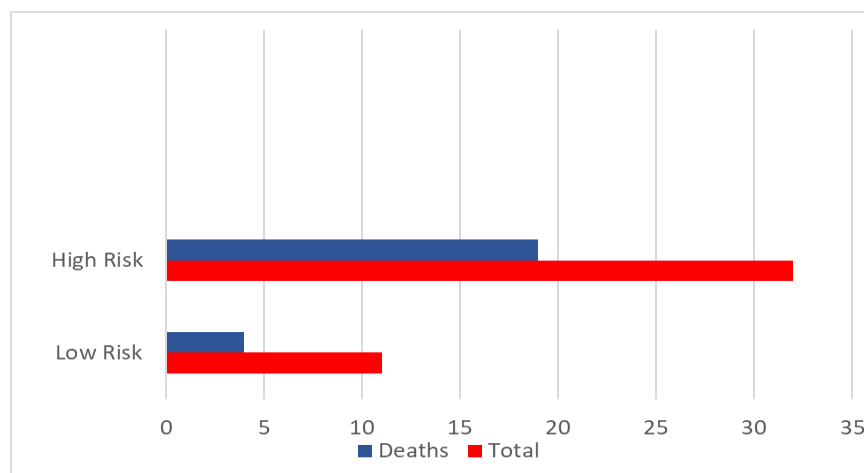


Figure 1. Baseline risk stratification and mortality

As shown in table 6, 53,48 % of the patients presented with a severe or very severe acute episode, all with a high baseline risk, reflecting the advanced stage of the disease, and of the 11 patients (25,58 %) assessed as low risk, 5 were admitted with a moderate acute episode.

Table 6. Correlation between baseline risk stratification and severity of acute episodes				
	Assessment of the acute episode			
	Dyspnea	Consciousness	Respiratory rate	Gases
Mild 11	< 2 6	Absent 6		SaO ₂ ≥ 95 % 6
Moderate 9	5/9	5/9	24–30 9	SaO ₂ 90,94 % 9
Severe 12	≥ 3 12	Drowsiness 10	> 30 12	PaO ₂ < 60 % SaO ₂ < 60 % 12
Very severe 11	≥ 3 11	Stupor, coma 11	> 30 11	pH < 7,30 PCO ₂ > 60 11

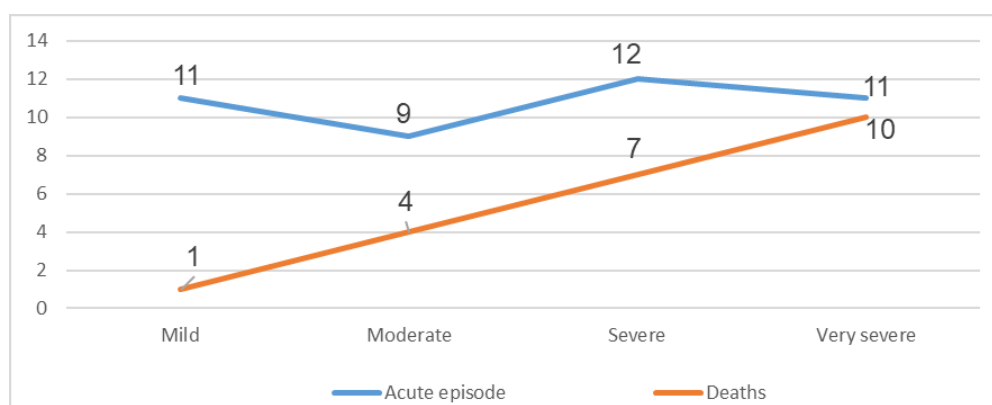


Figure 2. Severity of the acute episode and mortality

Among the 43 patients studied, the overall mortality rate was 53,48 %. On the basis of the severity of the acute episode, 23 patients were classified as severe or very severe; this group had the greatest number of deaths, with 17 patients. Among the remaining 20 patients, 11 were classified as having mild disease, with a single death, and 9 were classified as having moderate disease, with 4 deaths.

DISCUSSION

The prevalence of COPD depends on the geographic region and the diagnostic criteria used.^(8,9) The literature reflects a higher prevalence among men, contrary to our results where women predominated, a trend described in some studies as being due to increased smoking rates among women and greater exposure to biomass combustion products in developing countries.

Furthermore, this pattern is related to the predominance of females in the Cuban population, with a life expectancy at birth of 80,45 years compared with 76,50 years for males; similar results were reported by López Campos JL⁽¹⁰⁾ and Rodríguez-Pérez I⁽¹¹⁾ with a predominance of women in both studies of 61,80 % and 55,20 %, respectively.

The predominance of the white population in this study is not an unexpected finding, as a higher incidence of this disease has been demonstrated in the white population, and furthermore, the population of Pinar del Río is predominantly white.

Notably, as life expectancy increases, so does the prevalence of COPD, since it is a disease that typically manifests in older individuals.⁽¹²⁾

This could be linked to population aging, a greater association of risk factors, and the inherent frailty of older adults associated with a high burden of chronic and debilitating diseases, in addition to the specific characteristics of patients who meet the criteria for ICU admission and have a greater potential for complications and mortality.

In 2021, a total of 5207 deaths from chronic lower respiratory tract diseases were reported in Cuba, with an age-adjusted mortality rate of 46,5 per 100 000 inhabitants, which was higher than that reported in 2020. The overall mortality rate in the sample is high, at 53,48 %, because of its multidimensional nature associated with risk factors, stratification, and disease severity.⁽⁷⁾

A history of exacerbations in patients with COPD is highly important, especially if they are recurrent or lead to hospital admission. In addition to the heavy healthcare burden and high costs, they negatively impact patients' quality of life, contribute to disease progression, and influence prognosis—factors that contribute to patient risk stratification.⁽¹³⁾

In a study conducted by Jiménez Sellés P⁽¹⁴⁾, which included 1,210 COPD patients over the age of 40, 51,2 % experienced at least one exacerbation during the 2-year study period, with an average of 4 exacerbations per patient. According to these authors, the occurrence of exacerbations is associated with age, the presence of comorbidities, and the time elapsed since diagnosis.

There are conditions or circumstances that increase the risk of prolonged hospital stays in patients with COPD, including prolonged hospitalization prior to ICU admission, age, parameters related to prior poor general health, comorbidities, the need for ventilatory support, and both community-acquired and nosocomial infections.⁽¹⁵⁾

Patients with COPD have a higher incidence of comorbidities than the general population without COPD does. It is considered a “systemic” disorder and not a disease that affects only the lungs. Cardiovascular disease is the most significant comorbidity of COPD; its association increases mortality. These chronic conditions tend to be associated with a significant increase in cardiovascular risk factors, along with an increase in the combined incidence of ischemic heart disease and heart failure.⁽¹⁶⁾

There is a close link between respiratory function and the nutritional status of critically ill patients. Malnutrition and muscle dysfunction are two key determinants of the clinical severity and prognosis of chronic obstructive pulmonary disease. The close relationship between weight loss or malnutrition and mortality has been known for years.⁽¹⁷⁾

Findings from various studies confirm that multiple clinical factors contribute to impaired physical performance in patients with COPD. In particular, frequent exacerbations can accelerate the decline in lung function by 25 %.⁽¹⁶⁾

Among the most recognized triggers in the literature are respiratory infections, both viral and bacterial. The SAE describes theories supporting higher concentrations of pathogens that typically colonize the lungs during the stable phase. This increase in bacterial density leads to heightened inflammatory responses; sometimes, this process is triggered by an infection, but in other cases, the cause is noninfectious.⁽¹⁸⁾

The following groups are at higher risk of exacerbations and mortality: patients with severe or very severe COPD according to the GOLD classification; those with grade 2 dyspnea or higher if receiving treatment; and those who have had two or more moderate exacerbations or a hospital admission due to an exacerbation in the previous year. Both indices are strongly correlated and have similar prognostic capacities for mortality.⁽¹⁹⁾

Patients with COPD are estimated to experience an average of 1 to 4 exacerbations per year. However, there is significant interindividual variability, such that some patients suffer recurrent exacerbations, while others do not.⁽²⁰⁾

The severity of COPD is associated with exacerbations, particularly mortality, when these exacerbations are severe.⁽²⁰⁾ This is relevant because not all exacerbations affect mortality to the same extent. The severity of COPD is determined not only by the characteristics of the exacerbation itself but also very directly by the patient's baseline severity.

Santeliz J⁽²¹⁾ in their comparative study of the staging of patients with COPD, classified according to GOLD 2007, 2011, and 2019, and using the results obtained with the GOLD 2019 classification—which separates functional categorization (airflow limitation) from clinical classification (degree of dyspnea and history of exacerbations)—which is particularly relevant in our cohort, where owing to limited availability, we do not have airflow obstruction measurements—we can see that the results by group are very similar to our own, with groups C and D predominating and accounting for the greatest number of deaths.

Moreno A *et al.*⁽²²⁾, in their study titled “Causes of death in Patients with Severe COPD,” which included a sample of 203 patients with severe COPD at a Pulmonology Day Hospital, reported a similar mortality rate of 53,7 %, incorporating severity classification

based on spirometry values into their study. A total of 18,7 % of patients required admission to the intensive care unit, which constituted an independent factor associated with increased mortality.

When the severity of acute episodes is correlated with mortality, a direct relationship can be observed between the most severe forms of presentation and increased mortality.

CONCLUSIONS

COPD is a progressive inflammatory lung disease that requires personalized, multidisciplinary, and dynamic intervention. Smoking is the most commonly identified causal factor. Previous hospitalizations, the need for ventilatory support, and longer hospital stays were correlated with higher mortality. The comorbidities and their combinations most relevant to disease severity were hypertension, malnutrition, diabetes mellitus, and heart disease. Clinical assessments based on dyspnea level, number of exacerbations, and evaluation of the intensity of the acute episode in the multidimensional assessment of COPD grouped the largest number of patients into the high-risk stratum

FINANCING

None.

CONFLICT OF INTEREST

None.

AUTHORSHIP CONTRIBUTIONS

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