Exacerbations of chronic obstructive pulmonary disease

An analysis of the care process in a regional hospital emergency department

Maria Jose Abadias Medrano, MD[a,b], Oriol Yuguero Torres, MD, PhD[a,b], Ignasi Bardés Robles, MD[c], Luis Fernando Casas-Méndez, MD[b,d], Ferran Barbé, MD, PhD[b,d], Jordi de Batlle, PhD[b,d,*]

Abstract

To describe the characteristics of patients visiting a Hospital Emergency Department (HED) due to chronic obstructive pulmonary disease (COPD) exacerbation (AECOPD) and to evaluate their management.

A cross-sectional study of the first 219 patients with AECOPD visiting the HED of the University Hospital Arnau de Vilanova, Lleida, Spain, was performed from January to May 2016. The data collected included the following: main patient characteristics, diagnostic tests, applied treatments, response times, discharge destination, need for hospital admission, and re-admissions and deaths at 90 days. Comparisons were made according to sex and need for hospitalization.

The patients consisted of 84% men, with a mean age (standard deviation [SD]) of 75.9 (11) years and a FEV_1/FVC of 56 (13)%; 63% were ex-smokers. The median time (P25–P75) in the HED was 6 (4–10) hours, with shorter waiting times for severe patients. Additionally, 74% of patients required hospital admission. The percentages of re-admissions and mortality at 90 days were 25% and 14%, respectively. Among female patients, 63% never consumed tobacco, and the most frequent clinical phenotype was asthma combined with COPD; female patients visited the family doctor sooner after AECOPD than men (4 vs 7 days). Overall, the following areas of improvement were identified: use of sputum culture (performed in 3% of patients); documentation of variables; patient care times; and reduction in the time until first medical check-up.

The overall quality of care provided to AECOPD patients was satisfactory and consistent with current clinical guidelines. Nevertheless, improving the quality of care at the HED requires establishing protocols that ensure that the necessary diagnostic tests are performed, optimize response times and guarantee that all relevant information is collected.

Abbreviations: AECOPD = chronic obstructive pulmonary disease exacerbation, COPD = chronic obstructive pulmonary disease, ECAP = primary care electronic medical record, GOLD = global initiative for chronic obstructive lung disease, HED = Hospital Emergency Department, HH = home hospitalization, mMRC = Modified Medical Research Council, PC = primary care, SD = standard deviation.

Keywords: care management, chronic obstructive pulmonary disease, chronic obstructive pulmonary disease exacerbation, emergencies

1. Introduction

Chronic obstructive pulmonary disease (COPD) is a progressive and debilitating respiratory condition that leads to significant burden in terms of hospital resources, generating more than 50,000 admissions per year with an average stay of 8.25 days.[1] In Spain, COPD accounts for 10% of all hospital admissions and 2% of all visits to hospital emergency departments (HEDs).[2] However, the quality of care provided in HEDs for COPD exacerbations (AECOPD) is not homogeneous, and usual practice is not always systematic or consistent with the recommendations of the clinical guidelines.[3]

The need for hospital admissions has been of increasing concern. In fact, a study conducted in a Spanish third-level hospital estimated that the rate of unjustified hospital admissions exceeded 17%, mainly due to organizational factors related to the care process.[4]

Different factors influencing the admission and management of COPD patients have been studied,[5] and tools such as the ADIEPOC,[6] that allows for assessment of whether an admission from the HED is needed, have been developed. Similarly, the efficient use of alternative routes to conventional hospitalization, such as home hospitalization programs (HH), has demonstrated a significant impact on hospital dynamics (bed availability) and costs associated with AECOPD while maintaining high patient care and satisfaction standards.[7] Finally, in the area of prevention of new AECOPD, coordination between the different

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areas of care (emergency department, primary care [PC], and specialized hospital care) has proven to be fundamental.[8] The recommendations of national and international guidelines indicate that the first contact with PC should occur within the first 30 days after discharge after AECOPD.[9,10]

Therefore, a precise characterization of the actual health care situation in each HED would allow for the identification of specific aspects to be improved and is thus necessary to achieve substantial improvements in the care provided to AECOPD patients. These improvements are especially important in HEDs located in low population density regions, which are usually under-studied and experience additional organizational difficulties arising from the large geographic area that needs to be covered. An example of such centers is the University Hospital Arnau de Vilanova de Lleida, Spain, the only referral hospital for >450,000 patients in an extensive territorial area (both urban and rural). Therefore, our objective was to identify the characteristics of the patients visiting the HED due to AECOPD and to evaluate the current management at the health care level, the necessity of hospital admission, and the use of HH and other alternatives to conventional hospitalization, all within the framework of a study to improve AECOPD care.

2. Methods

2.1. Study design and participants

A descriptive cross-sectional study of patients with a diagnosis of AECOPD treated at the University Hospital Arnau de Vilanova de Lleida, Spain, was performed between January 1st and May 31st, 2016. At the time of data collection, all the patients had either a spirometric confirmation of COPD according to the international guidelines or a COPD diagnosis with specific follow-up for COPD in PC or Respiratory department. In the latter case, inclusion required corroboration of the case by the research team based on the information available in the electronic clinical records of the hospital or PC. The exclusion criteria were: presence of any identifiable causes of worsening of symptoms (pneumonia, pneumothorax, decompensated or unrecognized arrhythmia, ischemic heart disease, pulmonary thromboembolism, and left heart failure); need for invasive mechanical ventilation (orotracheal intubation) at the time of first medical care (as patients requiring invasive mechanical ventilation upon arrival at the ED are transferred to the Intensive Care Unit and thus not managed in the ED); or monitoring and control by home care programs or palliative care units.

2.2. Measures

Based on the data available in the electronic medical records of each patient, the following variables were collected: sociodemographic and lifestyle data (age, sex, smoking, and alcohol consumption); comorbidities (age-modified Charlson index); baseline characteristics of COPD (degree of obstruction, basal dyspnea, history of exacerbations during the last 12 months, Global Initiative for Chronic Obstructive Lung Disease [GOLD] 2017 ABCD classification and usual treatment); and AECOPD-related variables (date of onset of symptoms, Anthonisen criteria, previous treatment received, vital signs, pulse oximetry oxygen saturation, inspired oxygen fraction, complementary tests, and pharmacological treatment). The following data were extracted from the Registry of Management of the HED: waiting times; triage category; and destination at discharge. The necessity of

hospital admission was evaluated using the ADIEPOC tool used in the Research on Results and Health Services (IRYSS) COPD project[6];this tool takes into account variables such as the partial pressure of oxygen and carbon dioxide in the arterial blood (PaO_2 and $PaCO_2$, respectively), degree of dyspnea, and level of consciousness. Finally, the following data were obtained from the information available in the primary care electronic medical record (ECAP): time to first PC assessment after AECOPD; number of readmissions at 30 and 90 days; and mortality at 30 and 90 days.

All data were collected by medical research personnel and entered into an anonymized database. The study was approved by the ethics committee of the University Hospital Arnau de Vilanova de Lleida (approval number: 10/2015).

2.3. Statistical analysis

Means (standard deviation [SD]) or medians (P25–P75) were used for continuous variables, whereas categorical variables were reported as the absolute number and percentage. Comparisons were performed between subjects who did and did not require hospitalization after care in the HED. The statistical significance of comparisons was assessed by Chi square test, Student t test, or Mann–Whitney U test, according to the characteristics of each variable. Additionally, stratified analyses according to sex were performed. All contrasts were bilateral, and a value of $P < .05$ was considered statistically significant. All analyses were performed using Stata 12.1 software (StataCorp, College Station, TX).

3. Results

Between January 1st and May 31st, 2016, 250 patients were treated in the studied HED with a diagnosis of AECOPD. Thirty-one patients were excluded (10 for having spirometry measures not compatible with the diagnosis of COPD and 21 because of the presence of a non-COPD predominant respiratory disease). The final sample consisted of 219 patients, 84% of whom were men, the mean age (SD) was 76 (11) years, and the mean (SD) Charlson index was 6.6 (2.1). In the final sample, 81% of patients had mild to moderate obstruction and 19% had severe to very severe obstruction. The mean (SD) number of exacerbations in the year prior to admission was 2.1 (1.7) for mild to moderate exacerbations and 0.9 (1.3) for severe exacerbations. One hundred sixty-one patients (74%) were hospitalized, and only 1% were in HH programs. According to the ADIEPOC tool, no unnecessary hospital admissions occurred, with 4% of admissions classified as doubtful and 96% as justified. The median time (P25–P75) in the HED was 6 (4–10) hours. Sputum culture was requested in only 3% of cases, and an electrocardiogram was performed in 50% of the cases.

Table 1 shows the main characteristics of AECOPD patients treated in the HED, the variables specific to AECOPD, treatment variables and care management depending on whether the patient required hospitalization. No significant differences were observed between the 2 groups regarding the rate of re-consultation at the HED, re-hospitalization, and mortality at 30 and 90 days. Age, FEV_1/FVC ratio, number of admissions in the previous year, and hypoxemia constituted the main differences between the patients who did and did not require hospitalization. Table 1 also shows the number of patients with complete data for each variable. It should be noted that although the registry was close to 100% for most variables, variables such as respiratory rate were recorded in only 50% of patients.

Table 1

Description of the main characteristics and care data of patients with COPD exacerbation depending on admission to the hospital.

	n[*]	All (n=219)	No admission (n=58)	Admission (n=161)	P-value[†]
Sociodemographic variables					
Age, y	219	75.9 (11.1)	72.5 (11.4)	77.1 (10.8)	**.007**
Sex	219				.910
Men		184 (84%)	49 (84%)	135 (84%)	
Women		35 (16%)	9 (16%)	26 (16%)	
Comorbidity and lifestyle					
Tobacco	218				.227
Never		39 (18%)	11 (19%)	28 (18%)	
Current smoker		41 (19%)	15 (26%)	26 (16%)	
Ex-smoker		138 (63%)	32 (55%)	106 (66%)	
Alcohol (Units/d)	200	0 (0–2)	1 (0–2)	0 (0–1)	**.003**
Charlson index	219	6.6 (2.1)	6.3 (2.4)	6.6 (1.9)	.272
Baseline COPD variables					
Clinical phenotype	211				.665
Non-exacerbating		34 (16%)	9 (16%)	25 (16%)	
Exacerbating emphysema		61 (29%)	17 (30%)	44 (28%)	
Exacerbating chronic bronchitis		80 (38%)	18 (32%)	62 (40%)	
Asthma/COPD		36 (17%)	12 (21%)	24 (15%)	
Clinical category (GOLD 2017)	204				.667
A		54 (27%)	15 (28%)	39 (26%)	
B		4 (2%)	0 (0%)	4 (3%)	
C		113 (55%)	30 (57%)	83 (55%)	
D		33 (16%)	8 (15%)	25 (16%)	
Bronchiectasis	209	51 (24%)	12 (22%)	39 (25%)	.603
Dyspnea, MRC score	213				.286
0/1		51 (24%)	18 (33%)	33 (21%)	
2		124 (58%)	28 (51%)	96 (61%)	
3		36 (17%)	9 (16%)	27 (17%)	
4		2 (1%)	0 (0%)	2 (1%)	
FVC (% provided)	184	61.1 (18.3)	62.9 (19.7)	60.4 (17.9)	.426
FEV_1 (% provided)	184	48.2 (19.8)	51.9 (21.9)	46.9 (18.9)	.133
FEV_1/FVC (%)	184	56.2 (12.7)	59.5 (13.2)	55.1 (12.4)	**.040**
Mild/moderate exacerbations 12 months	216	2.1 (1.7)	2.1 (1.4)	2.1 (1.8)	.963
Severe exacerbations 12 months	211	0.9 (1.3)	0.6 (1.2)	1 (1.4)	.053
COPD exacerbation variables					
Anthonisen criteria	219				
Dyspnea		215 (98%)	57 (98%)	158 (98%)	.946
Expectoration		150 (68%)	41 (71%)	109 (68%)	.674
Sputum purulence		61 (28%)	17 (29%)	44 (27%)	.773
Arterial blood gas analysis	215	183 (85%)	33 (60%)	150 (94%)	**<.001**
Thorax x-ray performed	217	212 (98%)	53 (93%)	159 (99%)	**.006**
Sputum culture performed	214	6 (3%)	1 (2%)	5 (3%)	.591
Blood test performed	219	206 (94%)	47 (81%)	159 (99%)	**<.001**
ECG performed	203	102 (50%)	18 (35%)	84 (55%)	**.014**
Respiratory rate	109	27 (8)	24.8 (8.1)	28.1 (7.7)	.066
Heart rate	194	95 (19)	91.1 (19.5)	96.5 (18.6)	.082
Systolic blood pressure	192	137 (28)	134.4 (22.6)	137.6 (29.6)	.481
Diastolic blood pressure	192	74 (13)	74.6 (11.7)	73.4 (13.4)	.554
SpO_2	193	92 (6)	94.4 (4.3)	90.5 (5.9)	**<.001**
Exacerbation treatment					
Oxygen therapy	162	149 (92%)	33 (83%)	116 (95%)	**.011**
VMNI	87	20 (23%)	0 (0%)	20 (32%)	**.002**
Inhaled therapy	160	160 (96%)	38 (86%)	122 (99%)	**<.001**
Antibiotic	111	70 (63%)	10 (38%)	60 (71%)	**.003**
Corticoids	130	104 (80%)	17 (55%)	87 (88%)	**<.001**
Care management					
Time spent in ER	219	6 (4.3–9.7)	6 (4.2–8)	5.9 (4.3–12)	.254
Destination after discharge	219				**<.001**
Home		53 (24%)	53 (91%)	0 (0%)	
Pneumology		27 (12%)	0 (0%)	27 (17%)	
Internal medicine		97 (44%)	0 (0%)	97 (60%)	
Geriatrics		35 (16%)	0 (0%)	35 (22%)	
Home hospitalization		2 (1%)	1 (2%)	1 (1%)	
Nursing home		3 (1%)	2 (3%)	1 (1%)	

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	n[*]	All (n=219)	No admission (n=58)	Admission (n=161)	P-value[†]
Deceased		2 (1%)	2 (3%)	0 (0%)	
Case revision					
Appropriateness of admission	136				
Justified				131 (96%)	
Doubtful				5 (4%)	
Unjustified				0 (0%)	
Time until next emergency <72 hours	209	8 (4%)	4 (7%)	4 (3%)	.131
Time until next emergency	209				.528
<30 days		46 (22%)	14 (25%)	32 (21%)	
≥30 days		163 (78%)	42 (75%)	121 (79%)	
Re-entry at 30 days	213	35 (16%)	9 (16%)	26 (17%)	.932
Re-entry at 90 days	213	53 (25%)	11 (20%)	42 (27%)	.309
Deceased at 30 days	219	21 (10%)	5 (9%)	16 (10%)	.770
Deceased at 90 days	219	30 (14%)	6 (11%)	24 (15%)	.401
Days of hospitalization	161	7.2 (4.7)	0 (0)	7.2 (4.7)	
Days until first medical control	198	6.3 (7.8)	7.3 (8)	6 (7.8)	.313

n (%)/median (SD)/median (P25–P75) as appropriate.

[*] Subjects with available information (no missing data).

[†] Chi-squared test, Student t test, Mann–Whitney U test, as appropriate.

Table 2 presents the same data according to sex. The majority of women who visited the HED had never consumed tobacco (63%), and their most frequent clinical phenotype was asthma/COPD overlap. In addition, women visited their family doctor 3 days earlier after AECOPD onset than men (3.8 vs 6.8 days, P-value = .048).

Finally, Table 3 shows the patients' attendance times and triage levels. The median (P25–P75) time elapsed between arrival to the HED and the triage was 7 (4–11) minutes, and the time between triage and the beginning of the medical care was 38 (15–82) minutes. The waiting times were shorter for more severe patients.

4. Discussion

In this study, which included 219 patients treated for AECOPD in the HED of the University Hospital Arnau de Vilanova de Lleida, multiple facets of the health care situation were described in detail, including: characteristics of the patients; performed diagnostic tests; applied treatments; main care management characteristics including response times, destination at discharge, and need of hospital admission; and finally, a review of the case at 30 and 90 days to evaluate possible re-admissions and deaths. This systematic evaluation has allowed us to identify areas for improvement in the care provided in the HED and will be the basis for a program providing structured care for AECOPD.

4.1. Clinical aspects

In contrast to other studies,[4] no unnecessary admissions were detected. As expected, patients who required hospital admission were older and had more intense hypoxemia, a higher number of exacerbations in the previous year and worse control of symptoms at baseline (determined by the modified Medical Research Council [mMRC] dyspnea scale) than patients who were not admitted. The use of noninvasive ventilation was reserved for severe cases, and all of those patients required hospitalization. However, a number of potential areas of improvement were detected, including the low documentation of relevant variables such as the respiratory rate; the low utilization of complementary studies such as sputum culture (only 3% of patients); and the under-recording of electrocardiography, which according to NICE 2010 guidelines should be performed in all patients to exclude comorbidities.[11] In this sense, appropriate use of complementary tests according to the individual patient's characteristics (risk factors, recurrent exacerbations) and the exacerbation characteristics (suspicion of complex microorganisms) should be encouraged as it favors accurate decision-making.

4.2. AECOPD and sex influences

The volume of female patients evaluated in our HED was similar to that reported in previous studies.[12] However, some of the characteristics are worth noting; first, there was a high proportion of women who had never smoked (63%), and asthma/COPD overlap was the most usual phenotype. Although no significant differences were found between men and women in terms of systematic care (diagnostic tests, treatments applied, response times, admission adequacy, re-admissions, and deaths), a significant difference was found in the time elapsed between discharge and the first medical control visit to PC. While men exhibited a median of 7 days until their first visit, in women, this time was reduced to 4 days. This difference suggests the need for focused actions directed towards men to reduce the time until the first PC control visit.

4.3. Care management

One of the priorities of our project was to identify areas for improvement that could reduce patient care times. Patients with AECOPD exhibited an average of 38 minutes between the assessment by the nursing staff in triage and the beginning of medical care. To date, no relevant study has evaluated the attendance times for AECOPD. However, according to the recommendations of the Catalan Health Institute,[13] the mean waiting time of patients with a triage degree of II–III should not exceed 45 minutes. One possibility for improving attendance times might be to incorporate an advanced triage system, in which nursing staff has the ability to initiate the necessary diagnostic tests after the usual prioritization of patients but prior to the first contact with HED physicians. This type of methodology would allow for the efficient use of patients' waiting time, making the results of key diagnostic tests available to emergency physicians from the moment that they evaluate the patient. Advanced triage systems have previously been used for medical problems such as thoracic and abdominal pain,

Table 2

Description of main characteristics and care data of patients with COPD exacerbation depending on patient sex.

	Men (n = 184)	Women (n = 35)	P-value*
Sociodemographic variables			
Age, y	76 (11)	75.2 (11.8)	.700
Comorbidity and lifestyle			
Tobacco			<.001
Never	17 (9%)	22 (63%)	
Current smoker	36 (20%)	5 (14%)	
Ex-smoker	130 (71%)	8 (23%)	
Alcohol (Units/d)	0 (0–2)	0 (0–0)	**.002**
Charlson index	6.6 (2.1)	6.4 (2)	.524
Baseline COPD variables			
Clinical phenotype			<.001
Non-exacerbating	28 (16%)	6 (18%)	
Exacerbating emphysema	59 (33%)	2 (6%)	
Exacerbating chronic bronchitis	71 (40%)	9 (27%)	
Asthma/COPD	20 (11%)	16 (48%)	
Clinical category (GOLD 2017)			.536
A	44 (26%)	10 (32%)	
B	4 (2%)	0 (0%)	
C	95 (55%)	18 (58%)	
D	30 (17%)	3 (10%)	
Bronchiectasis	46 (26%)	5 (15%)	.150
Dyspnea, MRC score			.611
0/1	44 (25%)	7 (21%)	
2	101 (56%)	23 (68%)	
3	32 (18%)	4 (12%)	
4	2 (1%)	0 (0%)	
FVC (% provided)	60.3 (17.7)	64.8 (21.4)	.220
FEV_1 (% provided)	46.7 (18.9)	56 (22.3)	**.017**
FEV_1/FVC (%)	55.3 (12.9)	60.7 (10.6)	**.034**
Mild/moderate exacerbations 12 months	2.1 (1.7)	2.5 (1.9)	.228
Severe exacerbations 12 months	0.9 (1.3)	0.6 (1.3)	.258
COPD exacerbation variables			
Anthonisen criteria			
Dyspnea	181 (98%)	34 (97%)	.619
Expectoration	127 (69%)	23 (66%)	.699
Sputum purulence	52 (28%)	9 (26%)	.758
Arterial blood gas analysis	156 (86%)	27 (79%)	.308
Thorax x-ray performed	179 (98%)	33 (94%)	.142
Sputum culture performed	5 (3%)	1 (3%)	.958
Blood test performed	175 (95%)	31 (89%)	.134
ECG performed	83 (49%)	19 (58%)	.357
Respiratory rate	27.5 (7.7)	26.8 (8.4)	.706
Heart rate	95.5 (20)	93.4 (13.4)	.562
Systolic blood pressure	136.6 (28.6)	137.4 (24.7)	.885
Diastolic blood pressure	73.6 (13.2)	73.9 (12.1)	.899
SpO_2	91.7 (5.2)	90.9 (7.9)	.443
Exacerbation treatment			
Oxygen therapy	122 (91%)	27 (96%)	.340
VMNI	17 (22%)	3 (33%)	.436
Inhaled therapy	131 (95%)	29 (100%)	.215
Antibiotics	60 (65%)	10 (53%)	.301
Corticoids	84 (79%)	20 (87%)	.358
Care management			
Time spent in ER	6 (4.3–9.6)	5.6 (4.3–9.9)	.983
Destination after discharge			.368
Home	45 (24%)	8 (23%)	
Pneumology	21 (11%)	6 (17%)	
Internal medicine	80 (43%)	17 (49%)	
Geriatrics	33 (18%)	2 (6%)	
Home hospitalization	1 (1%)	1 (3%)	
Nursing home	2 (1%)	1 (3%)	
Deceased	2 (1%)	0 (0%)	

	Men (n = 184)	Women (n = 35)	P-value*
Case revision			
Appropriateness of admission			.294
Justified	137 (90%)	24 (83%)	
Doubtful	16 (10%)	5 (17%)	
Unjustified	0 (0%)	0 (0%)	
Time until next emergency <72 hours	31 (17%)	4 (12%)	.423
Time until next emergency	47 (26%)	6 (18%)	.317
<30 days	17 (9%)	4 (11%)	.687
≥30 days	25 (14%)	5 (15%)	.871
Re-entry at 30 days	7.4 (5)	6.3 (2.5)	.265
Re-entry at 90 days	6.8 (8.2)	3.8 (4.7)	**.048**

n (%)/median (SD)/median (P25–P75) as appropriate. COPD = chronic obstructive pulmonary disease.
* Chi-squared test, Student's T-test, Mann-Whitney U test, as appropriate.

gynecological symptoms, or fever in pediatric patients, and have significantly reduced patient waiting times.[14]

Additionally, it is vital to reduce the number of hospital readmissions. The current guidelines for COPD recommend early follow-up after discharge as an effective measure because, among other benefits, early follow-up allows for a comprehensive review and modification of the treatment when necessary.[8] In our study, patients took a median of 6 days to perform the first medical checkup after discharge. Ensuring that the control visit occurs and reducing the time elapsed until the visit are 2 of the objectives identified for the future program of improvement of the care of AECOPD patients.

Finally, this study identified deficiencies in the collection and recording of data from patients, both in the computerized medical records (hospital and PC) and in internal HED records, as shown by the lack of respiratory rate data (recorded in only 50% of patients). Therefore, it is imperative to establish working codes and algorithms that allow for satisfactory collection of data from AECOPD patients to ensure excellence in the management of this pathology in emergency medicine.

4.4. Strengths and weaknesses

The main strengths of this study are as follows: the extensive description of the AECOPD care process, including a detailed description of the patient characteristics, diagnostic tests, applied treatments, response times, need for hospital admission, and re-admissions and deaths at 30 and 90 days and the territorial scope of the studied HED, which provides care for patients in urban and rural areas and covers a large territory with a low population density. The main limitation was the difficulty to obtain complete data from the different sources of information used (electronic medical records, HED management records, and PC clinical history). Additionally, no data on passive smoking, occupational exposures, or exposure to biomass fuels were available. Finally, it must be acknowledged that this is a single-institution cross-sectional study.

5. Conclusions

The quality of care provided to AECOPD patients in the HED was satisfactory and consistent with current clinical guidelines. However, the following potential areas of improvement were identified: realization of sputum cultures when required; documentation of variables; patient care times; and time to first PC medical follow-up. Therefore, the improvement in quality of care involves establishing protocols at the HED level to ensure

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Table 3

Description of elapsed time in emergency room for COPD patients with exacerbation according to the triage score.

	Time (min)			
	Entrance–triage	Triage–assistance	Entrance–assistance	Entrance–discharge
All	7 (4–11)	38 (15–82)	49 (21–98)	346 (245–533)
Triage				
2—Emergency	6 (3–9)	31 (9–59)	40 (17–68)	410 (272–696)
3—Urgency	7 (4–12)	37 (16–80)	49 (27–98)	330 (214–464)
4—less urgent	9 (6–14)	79 (50–156)	92 (60–170)	335 (219–448)
5—non-urgent	8 (7–16)	54 (21–111)	64 (26–130)	376 (153–584)

Median (P25–P75).
COPD = chronic obstructive pulmonary disease.

that the necessary diagnostic tests are performed, optimize response times, and ensure the correct documentation of all information. Likewise, the need to establish more effective coordination mechanisms between the HED and PC to ensure appropriate post-discharge follow-up and to prevent future exacerbations was evident.

Author contributions

Conceptualization: Maria José Abadías Medrano, Ignasi Bardés Robles, Ferran Barbé, Jordi de Batlle.
Data curation: Jordi de Batlle.
Formal analysis: Jordi de Batlle.
Investigation: Oriol Yuguero Torres, Luis Fernando Casas-Méndez.
Project administration: Maria José Abadias Medrano, Luis-Fernando Casas-Méndez, Ferran Barbé.
Writing – original draft: Maria José Abadias Medrano, Oriol Yuguero Torres.
Writing – review and editing: Maria José Abadias Medrano, Oriol Yuguero Torres, Luis Fernando Casas-Méndez, Ignasi Bardés Robles, Ferran Barbé, Jordi de Batlle.

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