REUE | Consensus Statement

Consensus and recommendations for the management of therapy in patients with exacerbated chronic obstructive pulmonary disease in the emergency services of Castile-Leon — a 2024 adaptation of the GOLD 2023 and GesEPOC 2021 guidelines

Recomendaciones y consenso en el manejo terapéutico del paciente con exacerbación de EPOC en los servicios de urgencias de Castilla y León (adaptación a 2024 de directrices de GOLD 2023 y GesEPOC 2021)

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Introduction

Chronic obstructive pulmonary disease (COPD), according to the World Health Organization (WHO), is the third leading cause of death worldwide, with a prevalence of 10.3%.[1-3] In Spain, it affects approximately 2.5 million people, with a high rate of underdiagnosis—estimated at 74.5% according to the EPISCAN II study.[4] The region of Castile and León is among the Spanish territories with the highest prevalence of COPD exacerbator patients (30.8%).[5]

COPD is characterized by the periodic occurrence of exacerbation episodes—acute worsening of respiratory symptoms such as dyspnea, cough, and sputum production—that require additional treatment. These are complex events caused by increased airway inflammation, mucus production, and marked air trapping.[6-8] They represent one of the most frequent causes of emergency department (ED) visits and hospital admissions,[9-11] with a high probability of adverse short-term events after discharge (readmission, cardiovascular complications, and/or death),[12-14] generating a substantial economic and health care burden.[15] Consequently, clinical practice guidelines aim to optimize both treatment and prevention of these exacerbations.[16-18]

COPD is preventable and treatable, especially in its early stages. However, population aging and increasing exposure to risk factors such as air pollution and tobacco use[19] suggest a significant rise in cases over the coming decades.[20] The EDs play a crucial role in the management of acute exacerbations of COPD (AECOPD),[17] undergoing changes that range from initial diagnostic strategies to therapeutic interventions and follow-up care.[6,21-23] Despite the available scientific evidence, management criteria for AECOPD remain heterogeneous across health care settings in Spain.

These circumstances led to the creation of the EPOC URG CyL Project (Castile and León), aimed at updating current knowledge of the disease and providing a consensus-based, high-quality approach to the care of patients with AECOPD in the SACYL Emergency Departments (Castile and León Health Service). The project also seeks to improve therapeutic management and implement organizational measures not only at the hospital level but also within Primary Care.

The present manuscript constitutes one of the main pillars of the project, aiming to establish therapeutic consensus recommendations for AECOPD management, facilitating disease control, preventing, delaying, and minimizing future exacerbations and readmissions, as well as reducing mortality associated with this condition.

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Material and methods

The EPOC URG CyL Project was designed following institutional team meetings and consultations with SACYL ED department heads in January 2022. A committee of experts was formed, representing both SACYL EDs and ICSCYL, along with all SACYL ED heads, who participated in selecting the research team members. The project was structured into 3 phases (Figure 1):

Phase I: Through retrospective studies, the variability and differences in the care of AECOPD patients in SACYL EDs during 2021 were analyzed.[24,25] Phase II: Based on the analysis from Phase I, the present consensus and therapeutic recommendations manuscript was developed. Phase III: A prospective multipurpose study will be conducted (currently under analysis).

For the development, update, and standardization of this document, the clinical practice guidelines from GOLD 2023 (Global Initiative for Chronic Obstructive Lung Disease)[16] and GesEPOC (Spanish COPD Guideline)[17] were used and adapted. A bibliographic search was conducted across PubMed, focusing on review articles published in the last five years, using the search terms: "síndrome agudización EPOC", "COPD exacerbations", "COPD emergency", "AECOPD treatment", and "COPD protocol".

The endpoints, sections to be developed, and therapeutic recommendations were established to achieve optimal and standardized management of AECOPD patients treated in SACYL EDs.

The general medical endpoints should include: symptom relief, accurate severity stratification and appropriate therapeutic measures for clinical improvement (including comorbidities), and management of deleterious consequences and instability, if present. To meet these general endpoints , the document is structured into the following sections: 1) AECOPD, phenotypes, and definitions; 2) Diagnosis and complementary tests in the ED; 3) Severity criteria; 4) Therapeutic measures; and 5) Recommendations.

1. AECOPD: definitions and phenotypes

According to GOLD 2023, an acute exacerbation of COPD (AECOPD) is defined as an event characterized by increased dyspnea and/or cough and sputum worsening within less than 14 days, which may be accompanied by tachypnea and/or tachycardia and is commonly associated with increased local and systemic inflammation caused by infection, pollution, or other airway injury. Traditionally, the severity classification of exacerbations has been based on the treatment administered[26,27] (Table 1).

However, this classification introduces substantial variability in diagnosing COPD exacerbations due to differences in access to care resources. Therefore, a comprehensive clinical assessment is recommended to confirm COPD and identify potential associated comorbidities, including alternative causes of symptoms and signs, such as pneumonia, heart failure, or pulmonary embolism.[28] The GOLD 2023 Report proposes the ABE classification (Figure 2) and outlines different initial therapeutic approaches, emphasizing a more proactive pharmacologic strategy.[18] Notably, triple inhalation therapy (BUD/GLI/FORM and FLU/UME/VIL) has been shown to reduce mortality in COPD patients vs dual bronchodilation, as demonstrated in the ETHOS[29] and IMPACT[30] studies.

The GesEPOC 2021 guideline defines AECOPD as a COPD Exacerbation Syndrome (CES)—a clinical instability episode in a COPD patient resulting from worsening airflow limitation or underlying inflammation, characterized by an acute deterioration of respiratory symptoms relative to the individual's baseline condition. It is a complex and heterogeneous event, with various alterations manifesting clinically similar symptoms in COPD patients. The guideline proposes baseline risk stratification (Figure 3) and the following clinical phenotypes,[31] alongside potential clinical situations (Table 1).

For the purposes of this manuscript, we will use GOLD 2023's exacerbation definition and GesEPOC 2021's CESinterchangeably as AECOPD.

2. Diagnosis and additional tests in the emergency department

In general, for all patients, a comprehensive assessment must be performed, reviewing the following aspects:[16,17,32]

– Medical history:

• Confirmed diagnosis of COPD, or consider the pos-

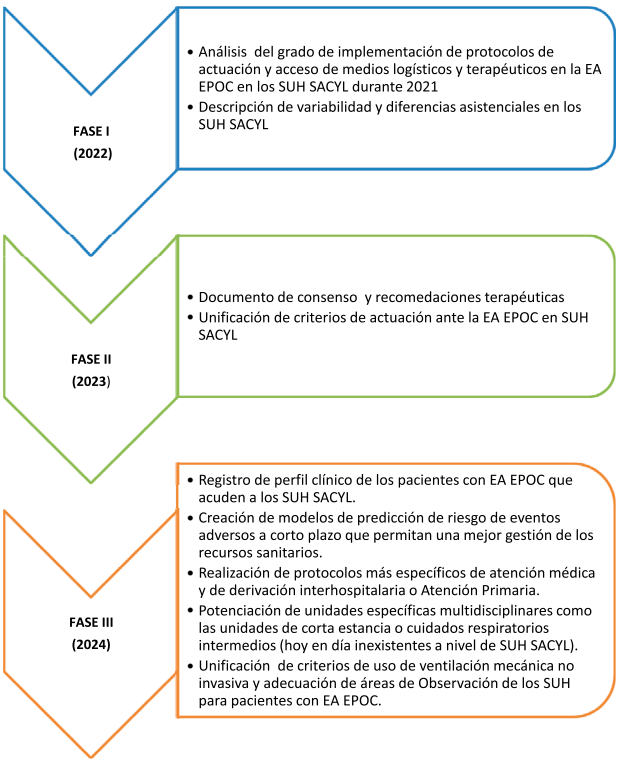

Figure 1. Phases and objectives of the EPOC URG CyL Project.

Table 1. Severity classification of AECOPD according to GOLD 2023 and phenotype classification according to GesEPOC, with possible clinical situations in CES[29]

GOLD 2023	
– Mild: treatment with short-acting β_2-agonists (SABA) or short-acting muscarinic antagonists (SAMA). – Moderate: treatment with SABA or SAMA and oral corticosteroids +/– antibiotics. – Severe: hospitalization or emergency department visit.	
GesEPOC 2021	
Eosinophilic exacerbator phenotype:	COPD patient with ≥ 2 moderate exacerbations or ≥ 1 severe exacerbation requiring hospital care in the previous year, and > 300 eosinophils/mm³ in peripheral blood.
Non-eosinophilic exacerbator phenotype:	COPD patient with ≥ 2 moderate exacerbations or ≥ 1 severe exacerbation requiring hospital care in the previous year, and < 300 eosinophils/mm³ in peripheral blood.
Non-exacerbator phenotype:	COPD patient with 0–1 moderate exacerbation in the previous year.
Therapeutic failure:	Symptomatic worsening during CES requiring additional treatment. Most patients recover after 2 weeks, but some may need 4 to 6 weeks.
Relapse:	Symptomatic worsening occurring between the end of CES treatment and within 4 weeks thereafter.
Recurrence:	New CES episode within 1 year of the previous one, associated with a period of relative good health. At least 4 weeks must have passed since completing treatment of the prior CES, or six weeks since symptom onset.

sibility of unconfirmed AECOPD (compatible clinical presentation associated with smoking habits or exposure to a polluted environment).

• Record the number and severity of previous exacerbations.

• Identify the patient's clinical phenotype and baseline risk status (review medical history for comorbidities or intercurrent conditions, especially cardiovascular, that may influence the acute episode).

• Smoking habit: quantify current consumption; if ex-smoker, include duration and previous consumption.

• Use of ventilatory support: oxygen therapy (hours/day), CPAP, or BiPAP.

• Inhaler use, adherence, and correct inhalation technique.

• Allergies and exposure to smoke or irritant agents.

– Physical examination and vital signs: temperature (T°), respiratory rate (RR), heart rate (HR), oxygen saturation (SpO_2), and cardiopulmonary auscultation (CPA):

• Alert criteria: T° ≥ 37.5 °C, RR ≥ 24 rpm, HR ≥ 95 bpm or ≥ 15% above baseline, SpO_2 ≤ 90–94%, and CPA showing pathological additional sounds such as rhonchi, wheezes, or crackles.

– Symptoms: worsening of at least 1 of the usual symptoms in COPD patients—dyspnea, cough, or sputum (with or without changes in volume or color, since purulent sputum implies a bacterial etiology as the triggering factor).[33,34]

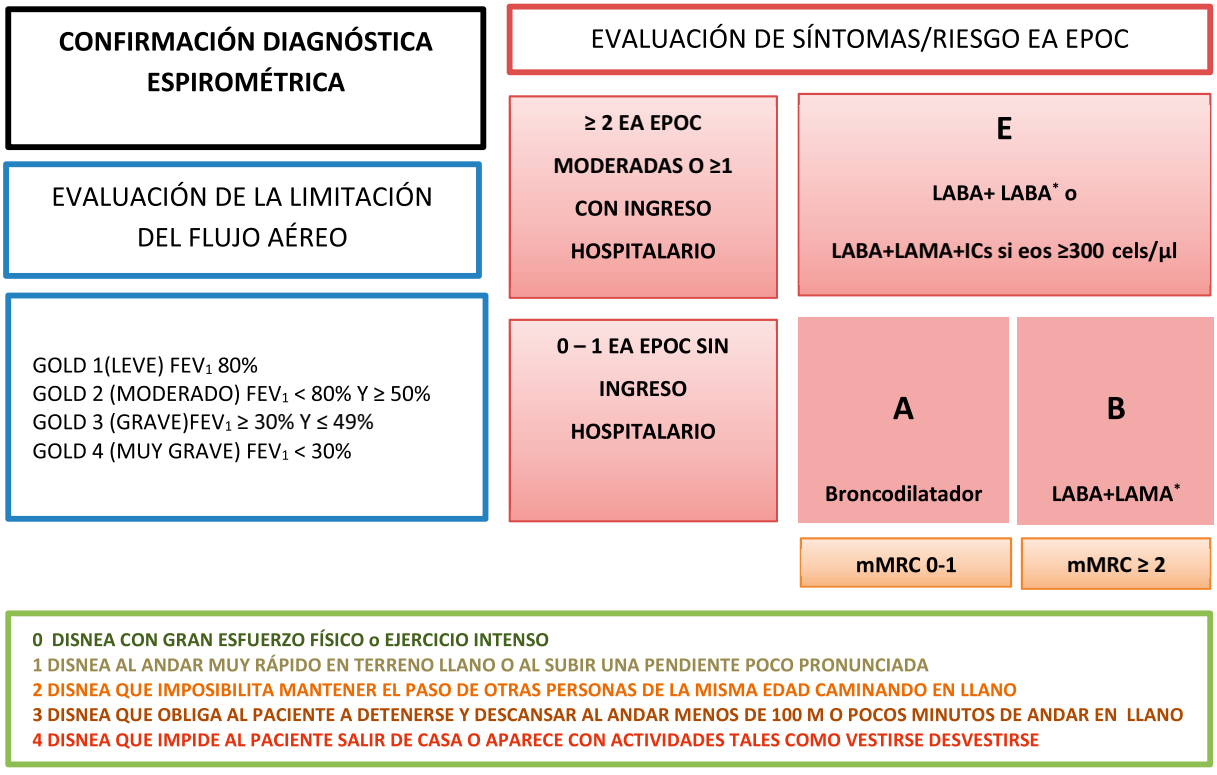

Figure 2. Initial assessment and treatment per GOLD 2023, ABE assessment tool. Translated and adapted from Figure 2.3 (p. 41) of GOLD 2023 "GOLD ABE Assessment tool."
FEV_1: forced expiratory volume in 1 second; LABA: long-acting β_2-agonist; LAMA: long-acting muscarinic antagonist; ICS: inhaled corticosteroids; Eos: eosinophils; mMRC: modified British Medical Research Council.
*A single-inhaler therapy is recommended over multiple devices.

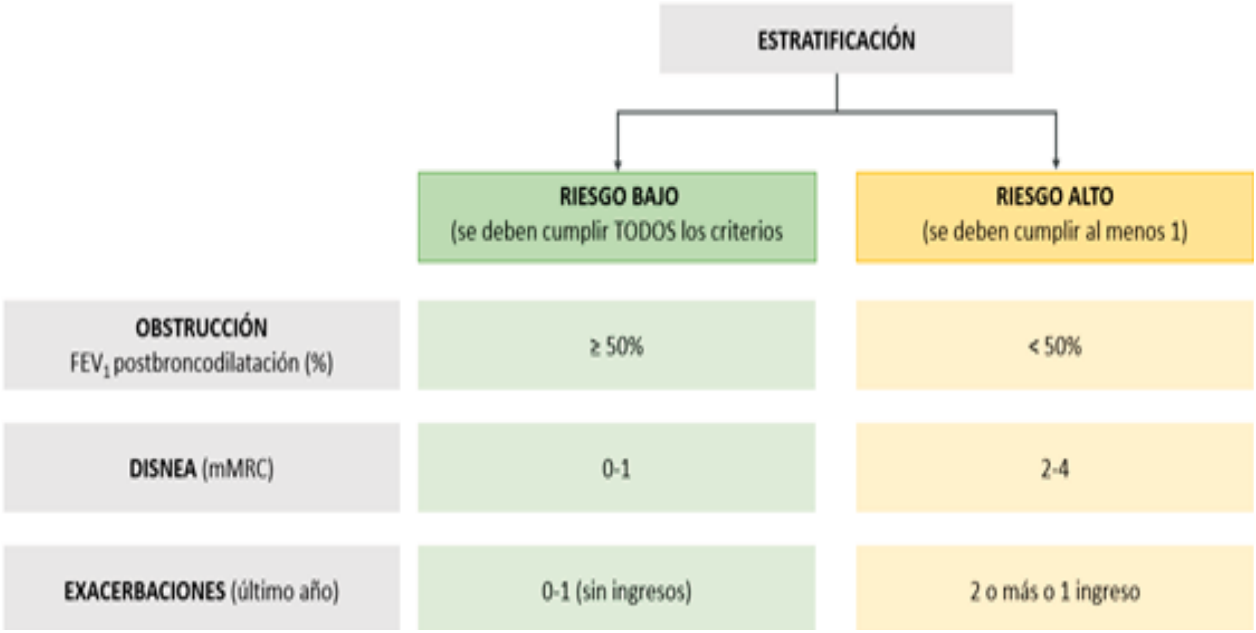

Figure 3. AECOPD risk stratification according to GesEPOC 2021. Based on Figure 1, p. 71, of GesEPOC Miravitlles *et al.*, 2022.[16]

– Complementary tests: Complete blood count/coagulation/biochemistry, including C-reactive protein (CRP) if bacterial infection or pneumonia is suspected[35,36] associated with procalcitonin if sepsis criteria are met; arterial blood gas analysis and chest X-ray; consider differential diagnosis with cardiovascular complications: NT-proBNP[37] for heart failure, D-dimer for pulmonary embolism,[38,39] and troponin in case of acute coronary syndrome, among others, as appropriate for differential diagnosis of other diseases. Additional tests should be considered based on treatable traits (Table 2).

3. Severity, hospital admission, and intensive care criteria

The severity of AECOPD should be assessed based on level of consciousness, dyspnea, respiratory rate, and gas exchange. Both GesEPOC and GOLD 2023 (Rome Proposal)5 propose the same severity criteria (Figure 4).

The main criteria for evaluating hospital admission[40,41] and intensive care unit (ICU) admission[42] are summarized in Table 3.

Additional ICU admission criteria may include high-risk comorbidities (chronic renal failure, liver failure, malignancy, etc.), age > 65 years, and past medical history of prior AECOPD requiring intubation and mechanical ventilation.

4. Therapeutic measures

Approximately 70–80% of AECOPD cases are mild and treated on an outpatient basis in Primary Care,[43] using pharmacologic therapies including bronchodilators,[44] corticosteroids, and antibiotics.[45] The overall health care burden is considerable,[46] and underdiagnosis or inadequate treatment increases the risk of recurrence, hospitalization, and disease progression.[47] There is notable variability in outcomes worldwide in COPD management,[48] depending on organization and resources, and Castile and León is no exception.[24]

The most severe AECOPD cases are treated in hospitals, primarily in the ED. The main etiological agents include viruses: rhinovirus, metapneumovirus, influenza, and parainfluenza (most frequent),[49] bacteria: *Streptococcus pneumoniae, Haemophilus influenzae, Moraxella catarrhalis, Staphylococcus aureus, Pseudomonas aeruginosa,* and other non-fermenting Gram-negative bacteria distinct from Pseudomonas. In severe cases, consider bacterial superinfection following viral infection[50] and air pollution exposure,[51] among other factors. Pollution is closely linked to AECOPD,[52] increasing the likelihood of recurrence, adverse outcomes (mainly cardiovascular complications), mortality, and disease progression. Eosinophilia in blood suggests a possible viral origin and better corticosteroid response.[53]

Symptoms typically last 7–10 days, though up to 20% of cases do not fully recover within 8 weeks,[54] contributing to disease progression and slower recovery with each new exacerbation.[55] Patients with multiple comorbidities or polypathology have a higher risk of frequent exacerbations[56] and an estimated 50% 5-year mortality rate.[57] Ultimately, AECOPD treatment goals are to minimize the negative impact of the current episode and prevent future exacerbations.[58]

Treatment of AECOPD in the ED is primarily based on the use of bronchodilators, corticosteroids, and antibiotics (Table 4), along with oxygen therapy. No significant differences have been found in studies comparing SABA and/or LABA use in AECOPD.[59] Similarly, there are no significant differences between nebulization and pressurized metered-dose inhaler (pMDI) administration,[60] but pMDI use is preferred over nebulization (reserved for severe cases or

Table 2. Treatable traits according to GesEPOC

Treatable Traits	Biomarker	Treatment
Endotypic traits		
Bacterial infection	Sputum color; CRP ≥ 20 mg/L	Antibiotic
Type 2 inflammation	Peripheral eosinophilia ≥ 300 cells/mm³	Systemic corticosteroids
Ventricular dysfunction	NT-proBNP	Diuretics, beta-blockers, ARBs, ACE inhibitors
Myocardial ischemia	Troponin	Antiplatelet agents, beta-blockers
Functional traits		
Acute hypoxemic respiratory failure	PaO_2 inferior a 60 mmHg	Oxigenoterapia
Acute hypercapnic respiratory failure	$PaCO_2$ > 45 mmHg	Evitar sedantes
Respiratory acidosis	pH < 7.35	Considerar ventilación no invasiva
Imaging traits		
(Chest X-ray/Chest CT)		
Pneumonia	Pulmonary parenchymal infiltrate	Antibiotic
Pulmonary embolism	Vascular filling defect	Anticoagulation
Pulmonary hypertension	Pulmonary artery/aorta ratio > 1	Consider oxygen therapy
Infectious bronchiolitis	Tree-in-bud pattern	Consider antibiotic
Bronchiectasis	Bronchiectasis	Consider antibiotic
Lifestyle/Behavioral traits		
Poor therapeutic adherence	Adherence questionnaires (e.g., TAI)	Health education
Incorrect inhalation technique	Technique review (questionnaires)	Training
Social problems	Social and dependency assessment	Social support programs

Based on Table 6 from the GesEPOC 2021 guideline (Soler-Cataluña *et al.*, 2022).[29]

patients unable to self-inhale), and air-driven nebulization is preferred over oxygen-driven, to avoid CO_2 retention.[61] Methylxanthines should be avoided due to side effects,[62] except in severe cases with treatment failure to bronchodilators and corticosteroids. Use the maximum number of molecules within a single inhalation device to improve adherence, reduce recurrence, enhance recovery, and lower health care costs.[63]

Systemic corticosteroids improve recovery, lung function, oxygenation, reduce relapse risk, and shorten the length of stay.[64-66] At discharge, prescribe a 5-day course of prednisone 40 mg[67] or methylprednisolone, equally effective orally or intravenously.[68] Nebulized or inhaled budesonide is a suitable alternative for both initial and discharge therapy, offering similar benefits to IV routes.[69] Combined with inhaled formoterol, it has also shown efficacy.[70,71] Limit systemic corticosteroid use to significant or severe AECOPD, avoiding prolonged regimens to reduce medium- and long-term adverse events (pneumonia, sepsis, death).[72] Note that patients with low eosinophil counts may have a poorer corticosteroid response[53,72] (Algorithm 1).

Antibiotic administration should be based on the presence of purulent sputum,[73] given for 5 days,[74] improving sputum color and reducing mortality.[75] Normal or low CRP levels do not support antibiotic use,[76,77] and procalcitonin is not routinely recommended except in suspected sepsis.[78] The choice of antibiotic depends on suspected bacterial etiology and coexisting pathology (e.g., pneumonia), administered empirically unless sputum culture results are available[79,80] (Algorithm 2 and Table 5).

Pulmonary embolism (PE) prophylaxis with low-molecular-weight heparin (LMWH) should be considered, since approximately 6% of hospitalized AECOPD patients present with PE.[81,82]

Regarding ventilatory support (Table 6), the goal of supplemental oxygen is to maintain SpO_2 between 88–92%, avoiding worsening hypercapnia.[83] The use of high-flow nasal cannula in acute hypoxemia has been associated with improved outcomes.[84,85] Non-invasive mechanical ventilation (NIV) is prioritized over invasive ventilation (IMV), being effective and associated with good clinical outcomes.[86,87]

SITUACIÓN BASAL	VALORACIÓN DEL EPISODIO AGUDO				NIVEL DE GRAVEDAD	
Estratificación del riesgo basal	**DISNEA (según mMRC)**	**Alteración de nivel de conciencia**	**Frecuencia respiratoria**	**Saturación/Gasometría**		
Bajo riesgo	**≤ 2**	**Ausente**	**< 24**	**Sat. ≥ 95%**	**LEVE**	**Se deben cumplir todos los criterios**
Alto riesgo			**24-30**	**Sat. 90-94%**	**MODERADO**	**Cualquier criterio amarillo**
	≥ 3	**Somnolencia**	**≥ 30**	**pO_2< 60 mmHg o Sat. <90%**	**GRAVE**	**Cualquier criterio rojo con independencia de nivel de riesgo basal**
Cualquier valoración del riesgo		**Estupor/Coma**		**pH <7.30 o pCO_2 > 60 mmHg**	**MUY GRAVE**	**Cualquier criterio morado con independencia de nivel de riesgo basal**

Figure 4. AECOPD severity criteria by dyspnea, respiratory rate, level of consciousness, and gas exchange (Figure 2, p. 162), extracted from Soler Cataluña JJ *et al.*[15]

Table 3. Criteria for hospital admission and intensive care unit admission

Potential criteria for hospital admission	Criteria for intensive care unit admission
– Severe or very severe AECOPD. – Severe symptoms: worsening of resting dyspnea, increased respiratory rate, decreased oxygen saturation, confusion, or drowsiness. – Acute respiratory failure. – Appearance of new signs: cyanosis or peripheral edema. – Lack of response to initial exacerbation treatment. – Presence of severe comorbidities: heart failure, arrhythmias, etc. – Lack of home support.	• Severe dyspnea unresponsive to emergency therapy. • Changes in mental status: confusion, lethargy, or coma. • Persistent or worsening hypoxemia (PaO_2 < 40 mmHg) and/or severe acidosis (pH < 7.25) despite oxygen therapy and non-invasive ventilation. • Need for invasive mechanical ventilation. • Hemodynamic instability requiring vasopressors.

Adapted from Figures 5.3 and 5.6, pages 139 and 144, GOLD 2023.

Once the patient has been stabilized after initial treatment and discharged, maintenance therapy should be optimized for at least 15 days, with close follow-up by the Primary Care physician (Algorithm 3).

Following the COVID-19 pandemic, systematic reviews of observational studies found no increase in mortality among AECOPD patients and demonstrated that use of N95 (or surgical) masks, social distancing, and hand hygiene significantly reduced infection rates and hospital admissions.[88,89] Having COPD does not mean greater ease or predisposition to become infected with COVID-19, but a patient with AECOPD due to COVID-19 who has coexisting comorbidity will have a worse prognosis for favorable clinical evolution.[90] Although there are no changes in how an AECOPD from other causes is treated,[91] emphasis is placed on using an inhaler with spacer and pMDI rather than nebulization to avoid spreading infection via aerosols that generate droplets easily transmitted through the air.[92]

5. Recommendations

Below we detail a series of therapeutic recommendations for both initial (attack) treatment (Algorithm 4) and optimization at discharge, based on the sections above, on professional experience (subject to the particularities of each SACYL ED in Castile and León), and on availability and access to logistical and therapeutic resources. Our intention is for these recommendations to serve as the common foundation for therapeutic management in SACYL EDs, while respecting each ED's idiosyncrasy and each clinician's experience. Thus, teams can adapt these recommendations to their local needs by developing specific protocols that optimize treatments and devices.

We will seek the most efficient and simplified options for the patient: the fewest possible devices with the greatest number of necessary molecules. In an AECOPD in the ED, treatment should be intense and proactive until stabilization. If the ED physician discharges the patient after acute treatment, the maintenance regimen must be optimized to avoid relapse over the next 15 days, with close follow-up in Primary Care, where clinical evolution and response to the optimized treatment should be re-evaluated at 48–72 hours.

We recommend using the same device and molecule(s) for acute/attack therapy with LABA +/– LAMA +/– ICS, maintaining them during the ED stay and at hospital discharge as part of optimization. If this is not available, the initial attack treatment will be SABA +/– SAMA +/– ICS, but maintenance/optimization at discharge should be LABA +/– LAMA +/– ICS. In addition, we recommend:

– Start inhalations with a spacer chamber and pMDI (try to pair a spacer to ensure better adherence and efficacy).

– Unify as many molecules as possible in a single device, or use the fewest devices to improve adherence, and ensure that devices used for attack treatment in the ED are the same ones the patient will use and take home.

– Administer 2 actuations of each inhaler/device every 15–20 minutes within the first hour, depending on episode severity, tachypnea, intercostal retractions, and abnormal auscultation. Then 2 puffs every 2–4 hours within the first 24 hours according to clinical course—as maintenance if the patient remains in the ED (observation area or pre-admission). At discharge, optimize the outpatient maintenance regimen by adding long-acting bronchodilators not previously used that, when administered in the ED during the AECOPD, produced clinical improvement.

– Maintain the optimized inhaled treatment after discharge for at least 15 days.

– Reserve nebulization for the most severe and/or life-threatening cases, or for patients unable to self-administer inhalations (especially dependent patients). Use air rather than O_2 to avoid hypercapnia, and apply an appropriate particle filter to prevent aerosols that facilitate viral spread.

– If systemic corticosteroids are indicated in moderate/severe cases or with a high eosinophilic profile, and no IV access is available, prescribe prednisone 40 mg PO or methylprednisolone 40 mg PO interchangeably.

Table 4. Treatment of acute exacerbation chronic obstructive pulmonary disease in the emergency department

Bronchodilators	Corticosteroids	Antibiotics
1.- Start with *SABA +/– **SAMA; continue and discharge with 'LABA +/– ''LAMA. 2.- #pMDI with/without spacer or nebulization: 2–3 doses in the first hour, then every 2–4 hours depending on patient response. 3.- Prefer nebulization with air rather than O_2.	1.- Prednisone 40 mg orally or Methylprednisolone 40 mg orally or intravenously. Prescribe for 5 days at discharge. 2.- Inhaled budesonide (160 mcg) or nebulized (2 mg) at high doses as an alternative to oral or intravenous treatment and/or in combination with bronchodilators if needed.	1.- Indicated in moderate/severe AECOPD. 2.- AECOPD with dyspnea and/or ↑ cough + purulent sputum or elevated CRP ≥ 20 mg/dL. 3.- Patients with respiratory failure or requiring invasive or non-invasive mechanical ventilation.

*SABA: short-acting β_2-agonist; **SAMA: short-acting muscarinic antagonist; 'LABA:' long-acting β_2-agonist; ''LAMA: long-acting muscarinic antagonist; #pMDI: pressurized metered-dose inhaler.

Table 5. Antibiotic treatment guidelines for acute exacerbation chronic obstructive pulmonary disease

AECOPD Severity	*Pseudomona aeruginosa*	*Haemophilus influenzae*	*Staphylococcus aureus*	MRSA	Non-fermenting Gram-negative bacilli
Mild/Moderate (5 days, up to 10 if pneumonia)	First choice: Ciprofloxacin 750 mg every 12 hours orally	First choice: Amoxicillin/clavulanate 875/125 mg every 8 h PO	First choice: Cloxacillin 500–1000 mg every 6 h PO	First choice: Linezolid 600 mg every 12 h PO	*S. maltophilia:* First choice: Cotrimoxazole 800/160 mg every 12 h PO
	Alternative: Levofloxacin 500 mg every 12 hours orally or 750 mg every 24 hours orally Duration: 2–3 weeks (depending on clinical improvement and tolerance)	Alternatives: Amoxicillin 1–2 g every 8 h PO; Ciprofloxacin 750 mg every 12 h PO; Azithromycin 500 mg every 24 h PO; Cefditoren 400 mg every 12 h PO. Duration: 10–14 days (Azithromycin 6 days; Cefditoren 10 days)	Alternatives: Amoxicillin/clavulanate 875 mg every 8 h PO; Cotrimoxazole 160/800 mg every 12 h PO. Duration: 2 weeks	Alternatives: Cotrimoxazole 160/800 mg every 12 h PO; Clindamycin 300–450 mg every 6–8 h PO	Alternative: Levofloxacin 500 mg every 12 h PO *A. baumannii:* Imipenem 0.5–1 g every 6–8 h IV
Severe/Very severe (involves hospitalization and hospital-use antibiotics in most cases, for 14–21 days depending on clinical evolution)	First choice: Ceftazidime 2 g every 8 hours IV Tobramycin 5–10 mg/kg every 24 hours IV	First choice: Amoxicillin/clavulanate 1–2 g every 8 h IV	First choice: Cloxacillin 1–2 g every 4–6 h IV	First choice: Linezolid 600 mg every 12 h IV	S. maltophilia: First choice: Cotrimoxazole 800/160 mg every 12 h IV
	Alternatives: Imipenem 1 g every 8 hours IV or Piperacillin/Tazobactam 4 g every 6–8 hours IV or Aztreonam 2 g every 8 hours IV or Cefepime 1–2 g every 8 hours IV or Meropenem 2 g every 8 hours IV or Ciprofloxacin 400 mg every 12 hours IV or Ceftolozane/Tazobactam 1–2 g every 8 hours IV or Ceftazidime/Avibactam 3 g every 8 hours IV Amikacin 15–20 mg/kg every 24 hours IV or Gentamicin 5–7 mg/kg every 24 hours IV	Alternative: Ceftriaxone 2 g every 24 h IV. Duration: 10–14 days (start IV, switch to oral when clinically stable)	Alternatives: Amoxicillin/clavulanate 1–2 g every 8 h IV; Vancomycin (dose adjusted for weight and renal function)	Alternatives: Vancomycin (dose adjusted for weight and renal function); Ceftaroline 600 mg every 8 h IV; Ceftobiprole medocaril 500 mg every 8 h IV	Alternative: Levofloxacin 500 mg every 12 h IV *A. baumannii:* Imipenem 0.5–1 g every 6–8 h IV

• If IV access is available, use methylprednisolone 40 mg IV.

• At discharge, either prednisone 40 mg PO or methylprednisolone 40 mg PO for 5 days are equally valid.

• If an antibiotic is prescribed at discharge, use 5 days (up to 7–10 days in pneumonia—reassess corticosteroid therapy in these cases).

• Indicate antibiotics for purulent sputum, in severe cases, and in frequent exacerbators who have ≥ 1 admission/year due to AECOPD.

• Begin empirically, according to clinical suspicion and prior episodes.

• If Pseudomonas aeruginosa is suspected (prior sputum, colonization, bronchiectasis, etc.), the best options are quinolones such as levofloxacin or ciprofloxacin; for Gram-positive organisms, choose a β-lactam such as amoxicillin +/– clavulanic acid or cefditoren (Table 5).

• Ventilatory support with nasal cannula in hypoxemia should be low-flow/low-pressure, aiming to ensure adequate SpO_2 and avoid hypercapnia.

• NIV should be the first-line in moderate/severe cases (with respiratory acidosis, hypercapnia, or hypoventilation), before IMV whenever the clinical situation allows.

• Bemiparin 3500 IU or enoxaparin 40 IU SC for venous thromboembolism prophylaxis.

• In parallel, optimize treatment of patients with high comorbidity whose chronic disease has worsened and is worsening the AECOPD (arrhythmias, hypertension, renal failure, heart failure, etc.).

• At hospital discharge, Primary Care should review evolution and treatment at 48–72 hours, with periodic checks every 48–72 hours in cases with good progress until complete improvement.

• In severe cases and at discharge, in addition to Primary Care follow-up, a Specialist review is recommended within 2–4 weeks.

6. Conclusions

We propose a set of therapeutic changes to optimize time and resources, act early and decisively, and avoid underdiagnosis and undertreatment, especially in the most severe cases. Our aim is to unify criteria and therapeutic

Table 6. Ventilatory support in acute exacerbation chronic obstructive pulmonary disease

	Oxygen Therapy	High-flow nasal oxygen therapy (HFNC)	NIMV (First-line option)	IMV
Indications	– Hypoxemia.	– Hypoxemia. – Acute hypercapnia. – Chronic hypercapnia	– Respiratory acidosis with $PaCO_2$ > 6.0 kPa (45 mmHg) and arterial pH < 7.35. – Severe dyspnea with signs of respiratory muscle fatigue. – Persistent hypoxemia despite oxygen therapy.	– Failure or intolerance to NIMV. – Severe hypoxemia not tolerating NIMV. – Post–cardiac or respiratory arrest. – Massive aspiration or persistent vomiting. – Inability to clear secretions. – Hemodynamic instability unresponsive to fluids or vasopressors. – Severe ventricular or supraventricular arrhythmias.
Objetive	– Maintain oxygen saturation at 88–92% without CO_2 retention.	– Decrease respiratory rate (RR). – Reduce respiratory effort and work of breathing. – Improve gas exchange. – Improve lung volume, dynamic compliance, and transpulmonary pressures. – Improve oxygenation and ventilation. – Reduce hypercapnia.	– Improve oxygenation. – Reduce RR and work of breathing. – Improve acidosis. – Decrease dyspnea severity. – Reduce mortality rates compared to IMV.	– Improve hypoxemia. – Improve hypercapnia. – Improve acidosis.
Complications	– Hipercapnia.	– Therapeutic failure.	– Poor adaptation or tolerance by the patient.	– Pneumonia. – Barotrauma. – Volutrauma. – Prolonged ventilation requirement. – Tracheostomy.

NIMV: non-invasive mechanical ventilation; IMV: invasive mechanical ventilation; RR: respiratory rate.

recommendations that translate into better care for patients with AECOPD.

In the emergency setting, immediate initiation of treatment is necessary—without skimping on therapeutic effort-saccording to the presumed severity. At discharge, treatment should be optimized for at least 15 days to avoid relapse or clinical deterioration, with close follow-up by Primary Care and Specialist services.

Phase III remains to be completed, which will open the door to multidisciplinary work with other health care areas.

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ADDENDUM

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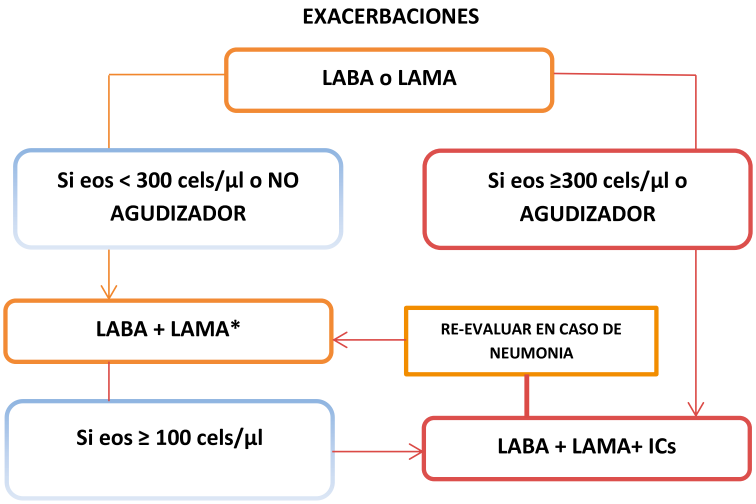
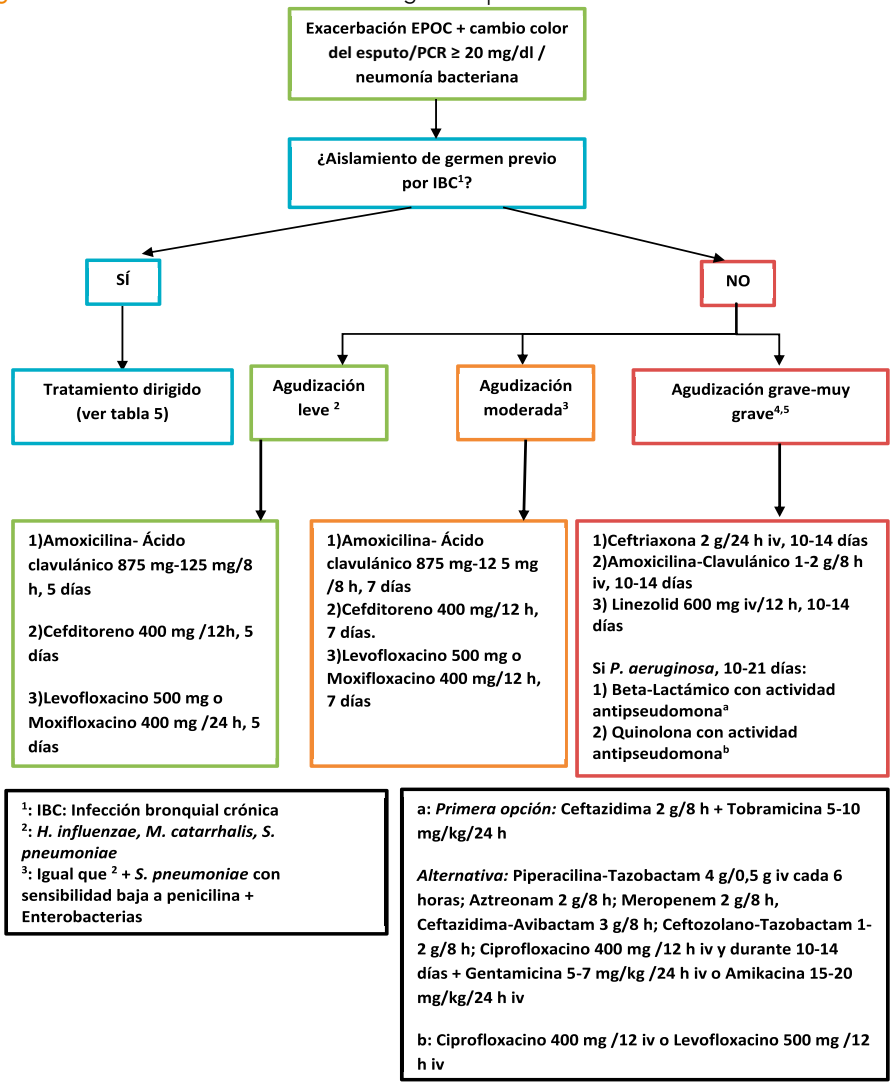
Algorithm 1. Inhaled treatment escalation in AECOPD. Adapted from the GOLD 2023 Report.

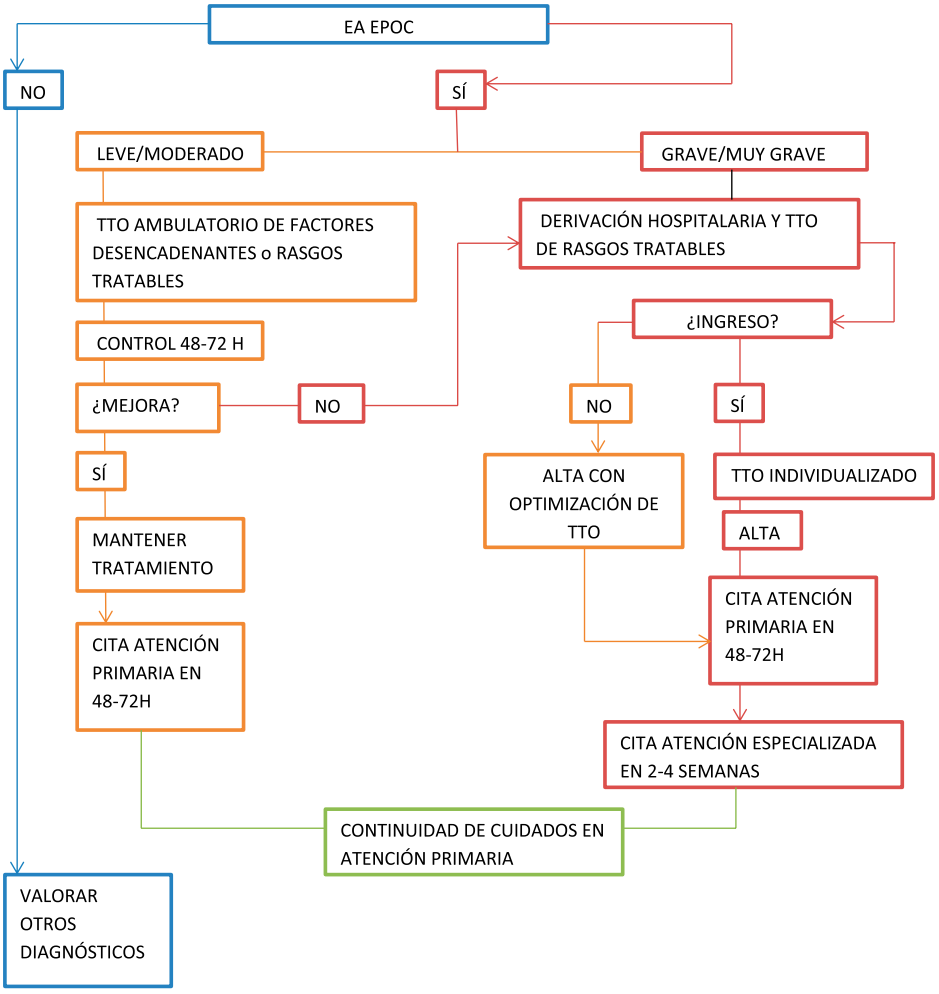


*Prioritize a single inhaler device containing multiple molecules (preferably pMDI) rather than the use of different devices; the use of a spacer is recommended.
eos: eosinophil count; LABA: long-acting β2 bronchodilators; LAMA: long-acting muscarinic antagonists; ICS: inhaled corticosteroids.

Algorithm 2. Antibiotic selection according to suspected bacterial involvement in AECOPD.



Algorithm 3. Referral at discharge from the ED. Adapted from Ginel Mendoza *et al.*[31].



Algorithm 4. Initial (bailout) treatment for AECOPD.