

CONSENSUS DOCUMENT

Referral recommendations for adult emergency department patients with exacerbated asthma

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This consensus paper’s purpose is to provide a tool for managing emergency asthma exacerbations that require a decision to admit or discharge the patient. The paper also addresses where to refer the discharged patient for follow-up. A multidisciplinary team of 3 emergency physicians, 3 specialists in respiratory medicine, and 3 allergy specialists were charged with drafting a list of clinical questions to answer by consulting practice guidelines and other resources in the literature. The specialists held a face-to-face meeting to distribute tasks and topics to working groups. The groups shared their reports, which provided the basis for drafting the final paper. The recommendations and flow charts included in the paper provide guidance for identifying and correctly diagnosing asthma exacerbations in the emergency department. Criteria for admission or discharge are incorporated. Treatment protocols and recommendations for referring discharged patients to specialists are addressed, along with criteria for priority referrals. The final consensus paper has been endorsed by the Spanish Society of Pulmonology and Thoracic Surgery (SEPAR), the Spanish Society of Allergology and Clinical Immunology (SEAIC), and the Spanish Society of Emergency Medicine (SEMES).

**Keywords:** Asthma. Exacerbations. Emergency department. Diagnosis. Hospitalization. Discharge. Treatment. Referral and consultation.

Recomendaciones de derivación del paciente adulto con crisis de asma desde el servicio de urgencias

El presente documento de consenso se ha desarrollado con el fin de proporcionar una herramienta útil para el manejo del paciente asmático que acude al servicio de urgencias (SU) con una crisis asmática. Incluye recomendaciones para tomar la decisión de alta o ingreso, así como indicaciones de derivación para el posterior seguimiento. Un equipo multidisciplinar, constituido por tres especialistas en medicina de urgencias, tres especialistas en neumología y tres especialistas en alergología, se encargó de elaborar una lista de preguntas clínicas que respondieron mediante la ayuda tanto de guías de práctica clínica, como de literatura disponible. Los contenidos y el reparto de tareas en diferentes grupos de trabajo se consensuaron en una reunión presencial. Los materiales resultantes se pusieron en común y sirvieron para la preparación del manuscrito final. Las recomendaciones y los algoritmos incluidos en el mismo van dirigidos a identificar y diagnosticar correctamente las exacerbaciones asmáticas en el SU y a establecer los criterios de hospitalización o alta. Se incluyen también las pautas para el tratamiento de los pacientes y para su derivación al ámbito de atención especializada en caso de alta, incluyendo los criterios de priorización para dicha derivación. El documento ha sido avalado por la Sociedad Española de Neumología y Cirugía Torácica (SEPAR), Sociedad Española de Alergología e Inmunología Clínica (SEAIC), y la Siedad Española de Urgencias y Emergencias (SEMES).

**Palabras clave:** Asma. Exacerbaciones. Servicio de urgencias. Diagnóstico. Hospitalización. Alta. Tratamiento. Derivación.

Introduction

Asthma is the most common chronic respiratory disease worldwide<sup>1</sup>, with a prevalence in Spain estimated at around 5% for the adult population and around 10% for children<sup>2</sup>. Despite better control treatments, new molecules and easier to use inhalation devices, asthma is still not controlled in more than 50% of pa-

tients<sup>3</sup>. Furthermore, among those considered to be controlled, 80% show symptoms<sup>4</sup>. Any patient with asthma, regardless of the severity and degree of control, can suffer an exacerbation. This consists of a worsening of asthma symptoms and lung function, which requires increased medication and, in its severe forms, requires the use of systemic steroids, emergency department (ED) visits or hospitalization<sup>5</sup>. These severe exacerba-

tions are most frequently associated with increased morbidity and mortality<sup>6</sup>. Although there has been an overall decrease in asthma mortality in many parts of the world in recent decades<sup>1</sup>, in Spain there were still 1,118 deaths<sup>7</sup> in 2017. Moreover, exacerbations and hospitalizations significantly increase healthcare expenditure<sup>8,9</sup>. Despite current recommendations on disease management, many patients remain symptomatic and experience exacerbations that, in many cases, are preventable<sup>10</sup>.

Some studies conducted in Spain have analyzed the epidemiology of exacerbations and their clinical characteristics<sup>11</sup>, as well as the factors that trigger and predict hospitalization<sup>12,13</sup>. Since asthma management is multidisciplinary, the Spanish scientific societies of allergology, pneumology and emergency medicine have agreed on the main recommendations to optimize the management of adult patients with asthma attending an ED during an exacerbation, including detection, correct diagnosis and choice of appropriate treatment<sup>14</sup>. However, there are no specific recommendations on when to refer to specialized care (SC) or primary care (PC), nor on possible quality indicators that would serve to validate correct action in the emergency settings.

This manuscript offers a series of consensual recommendations on the correct diagnosis of asthmatic exacerbations, the criteria for hospitalization or discharge from the ED, and on therapeutic recommendations and referral to the field of SC and PC in the event of discharge, including the criteria for prioritizing such referral. Quality indicators are also included to validate a correct performance in the ED.

Method

A multidisciplinary team composed of 9 specialists from the areas of pneumology, allergology and hospital emergencies (three per area) participated in the preparation of this document. A non-systematic review of the literature was conducted, focusing on articles and clinical practice guidelines on the management of asthma, using as main references the provisions of the Global Initiative for Asthma (GINA)<sup>4</sup> and the Spanish Guide for the Management of Asthma (GEMA)<sup>2</sup>. Subsequently, at a first meeting, the contents of the document were agreed upon and consensual, structured in the following thematic blocks: 1) context (introduction); 2) clinical evaluation and complementary data on the patient attended in the emergency department for an asthma crisis; 3) hospitalization criteria; 4) discharge and treatment criteria; 5) referral criteria and their prioritization. Each subject was distributed to a work team made up of two experts (except for the introduction which was carried out by one person). The resulting materials were pooled and used for the preparation of the final manuscript. All authors reviewed the entire material and all relevant modifications were made to reach the maximum consensus possible.

This document has been endorsed by the three

scientific societies involved in its preparation: the Spanish Society of Pneumology and Thoracic Surgery (SEPAR), the Spanish Society of Allergology and Clinical Immunology (SEAIC) and the Spanish Society of Emergency Medicine (SEMES).

Clinical evaluation and complementary data of the patient in the emergency department for asthma crisis

The first step in the care of a patient attending an ED is classification or triage. The main objective of triage is the effective management of healthcare in order to give priority to patients who need it. However, it also pursues other objectives such as determining the appropriate treatment area and initiating protocolized therapeutic guidelines<sup>15</sup>. Structured triage is a critical process for the efficient and effective management of modern EDs<sup>16</sup>. When asthma is suspected, and whenever possible, spirometry should be performed, or in its absence the measurement of peak expiratory flow (PEF) or peak flow. After triage, anamnesis will be performed, which will guide the identification of the cause of the exacerbation, direct the necessary complementary tests and, moreover, stratify its severity and the risk associated with it. Complementary tests will be directed to rule out another cause of dyspnea and to stratify the risk of exacerbation<sup>2,4</sup>.

Anamnesis

Anamnesis should not delay the onset of treatment and should be performed in a systematized manner, since it is essential for emergency care, for the treatment plan, for making the decision on discharge or hospital admission and for follow-up in the ED itself and after discharge. In addition, it must be brief, concise and directed, taking into account the characteristics of the patient. It is essential to know whether or not there is a previous diagnosis of asthma. If so, it is necessary to know the time of diagnosis (pediatric/adult age), how it was carried out (spirometry, other complementary tests, consultation in the context of a crisis) and whether there has been follow-up. In the case of patients with known asthma, the existence of maintenance treatment and adequate adherence to it must be verified, as well as a self-management plan that includes instructions for the correct use of a systemic glucocorticoid (SGC) regimen. On the other hand, it is necessary to make an adequate differential diagnosis with a series of diseases that can simulate or even complicate an asthmatic exacerbation (congestive heart failure, acute chronic obstructive pulmonary disease-COPD, pulmonary thromboembolism, upper airway obstruction, foreign body aspiration, vocal cord dysfunction or even an anxiety crisis). In this sense, in patients consulting for dyspnea who have no known history of asthma or who do not improve with the treatment administered, it is always necessary to bear these diseases in mind. It is essential to early identify those patients at risk of life-threatening asthma (LTA) attacks and risk of

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death from asthma, following the criteria that will be discussed later.

The existence of crises or previous admissions due to asthma must be assessed, with special attention to possible admissions to intensive care units (ICU). It is necessary to know whether the patient consults for this reason on a regular basis, how often he/she does so, where he/she goes or whether he/she carries out any type of follow-up on the illness<sup>4,14</sup>. Personal history such as pregnancy, toxic habits (tobacco, alcohol or other drugs), cardiovascular risk factors, history of allergic respiratory disease or chronic rhinosinusitis (with or without polyposis), should be reflected in the medical history, taking into account their relationship with the prognosis of the asthmatic disease<sup>17</sup>. Other data that should be reflected in the clinical history are related to the current exacerbation, such as the characteristics and speed of the onset, the intensity of the symptoms and the identification of a possible trigger (food, pharmacological, inhalant, infectious, toxic, time of the menstrual period), since they are essential for classifying the crisis<sup>2,18</sup>.

Complementary tests

Anamnesis and physical examination are essential, but it is necessary to rely on complementary tests to rule out other causes of dyspnea or to confirm the diagnosis. When clinically possible, the performance of spirometry or in its absence the measurement of PEF or peak flow, if possible already in the triage, is essential for the classification of the severity of the exacerbation and the subsequent monitoring of the patient in the ED. With this scan, depending on the spirometric parameters (forced vital capacity -FVC-, PEF and forced expiratory volume in the first second -FEV1-), it is possible to classify the exacerbation as mild, moderate or severe<sup>2</sup>. Reference values should be appropriate for the age and ethnicity/race of each patient. On the other hand, this classification will also allow evaluation of the response to treatment<sup>2</sup>. The measurement of PEF and FEV1 is especially useful in patients who experience worsening lung function without perceiving changes in their symptoms. This situation usually affects patients with a history of LTAs. A fall in PEF > 50% from baseline is a marker of mortality risk<sup>19,20</sup>. In addition, pulse oximetry should always be performed in the classification of the asthmatic patient, since it can predict, mainly in children, the need for hospitalization.

Chest X-ray should only be used in cases where there are symptoms suggestive of complications or diseases other than asthma causing the dyspnea. A blood count should be ordered if fever is present or pulmonary infection is suspected, and an electrocardiogram if arrhythmia is suspected. The determination of potassium may be important, especially if subsequent treatment is based on long-acting beta-2-agonists (LABA) in high doses or SGC. Arterial blood gas is recommended in those patients who do not manage to maintain O<sub>2</sub> saturation above 90% despite the supply of oxygen<sup>2,14,21</sup> or do not respond to initial treatment<sup>22</sup>. The eosinophil

count in the hemogram can help to establish diagnostic suspicion at discharge and guide the phenotype in the subsequent follow-up of the patient, although it should be taken into account that eosinophilia is not always present at the acute moment<sup>23</sup>.

Assessment of the severity of the asthmatic crisis

The type and severity of the crisis should be assessed based on the speed of onset, the intensity of symptoms, and the result of the complementary tests discussed above.

The speed of implementation can influence decision making. In this sense, two types of crises have been described: subacute progressive onset (in days or weeks) and rapid onset (less than 3 hours). The first constitutes more than 80% of those recorded in the ED and is often due to upper respiratory infections or poor control of the disease due to noncompliance with therapy. The fundamental mechanism of the deterioration is the inflammation and, for that reason, the response to the treatment is also slower. On the other hand, rapid-onset crises account for between 10% and 20% and are due to inhaled allergens, drugs (non-steroidal anti-inflammatory drugs -NSAIDs- or E-blockers), foods, additives and preservatives or emotional stress. The fundamental mechanism is the bronchoconstriction and, although they have a greater initial severity with a higher risk of intubation and death (“almost fatal or deadly asthma” or LTA), the response to treatment is usually more favorable and rapid.

The intensity of the symptoms and signs should be assessed:

- Degree of dyspnea.
- Use of rescue medication.
- Speech (words, broken sentences).
- Affected level of consciousness (agitation, confusion or coma).
- Cyanosis.
- Use of accessory muscles.
- Paradoxical thoracic-abdominal movement.
- Auscultatory silence.
- Respiratory frequency (RF).
- Heart rate (HR).
- Blood pressure (BP)

Considering the above data, asthma attacks can be classified as mild, moderate-severe, or life-threatening<sup>24</sup>.

Clinical history should detail the treatment received in the ED during the crisis, as well as the response and characteristics of the crisis. It is also essential to include all the information related to the anamnesis, physical examination and complementary tests. The discharge report should detail the treatment plan and the destination in the follow-up of the patient. In addition, for the assessment of severity, it is important to bear in mind that it can be better defined in terms of response to treatment than based on the initial presentation<sup>25</sup>. The extent of improvement in lung function after initial treatment is therefore the most informative measure and probably marks the requirement for hospital admission<sup>22,26</sup>. Response to treatment is assessed by symptoms, clinical signs and improvement in lung function and oximetry.

Hospitalization criteria

Management of patients who come to the emergency ward for an asthma attack always involves the difficult decision of whether they require hospital admission or can be discharged. The importance of this decision lies in the fact that exacerbations are the main cause of mortality in asthmatic patients<sup>27</sup>, and in the possibility that patients with mild or previously well-controlled asthma may also suffer severe attacks. The rate of admissions in patients attending the emergency department is around 20%<sup>28</sup>, although variability has been observed depending on the country<sup>29,30</sup>, due in part to the variable implementation of the guidelines and the different healthcare systems. It is well known that adherence to the guidelines is associated with a lower risk of hospitalization<sup>29</sup>. In addition to the data related to the crisis itself, it is important to take into account a series of risk factors for hospitalization due to asthmatic exacerbation<sup>13,31-34</sup> or asthma-related death<sup>35-41</sup>, which have been described in different studies carried out both inside and outside Spain (Table 1). In particular, a systematic review by Arrotta et al.<sup>28</sup> identified the degree of functional impairment as the most important risk factor. In addition, the presence of one or more of these factors should be quickly identified and taken into account when deciding on the patient’s discharge.

The decision to hospitalize should be made within the first three hours of the start of treatment of the crisis, since longer monitoring periods rarely change decision-making<sup>42</sup>. Some authors believe that the assessment carried out in the first hour of evolution in the ED, both of clinical status and of lung function, already allows the prediction of the need for hospitalization<sup>43</sup>. Thus, when deciding on the discharge or admission of a patient with an asthmatic crisis, the following factors should be taken into account:

- Presence of symptoms and signs of severity: dyspnea, slurred speech, tirage, cyanosis, level of consciousness
- Use of accessory muscles.
- Vital signs: BP, HR, RF and O<sub>2</sub> saturation.
- PEF.
- Response to treatment.
- Speed of the establishment of the crisis.
- Failure of outpatient treatment prior to steroid treatment.
- Recent and past exacerbations.
- Previous intubation or LTA crisis.
- Ability of management at home: assess if there is psychiatric disease, physical limitation or difficulty in understanding, if the patient lives alone or socially isolated, if he/she has poor access to medications and if non-compliance is suspected.
- Repeated use of SABA (short acting beta-2-agonists) in monotherapy.
- No previous follow-up of the disease.
- Other diseases or concomitant circumstances: pneumonia, pneumothorax, pneumomediastinum or non-respiratory decompensated diseases.

Table 1. Risk factors for hospitalization and death from asthma

<b>Risk factors for hospitalization</b>
Advanced age
Female sex
No prior diagnosis of asthma
Poor control of symptoms
Mixed phenotype of COPD-asthma
Increases in the previous year
Asthma Severity
Functional impairment
Presence of comorbidities
Severity of Exacerbation
<b>Risk factors for asthma death</b>
History of LTA; life-threatening asthma attack or PaCO <sub>2</sub> > 50 mm Hg or pH < 7.30 <sup>61</sup>
Recent hospitalization or emergency visit or previous admission to ICU <sup>41,62,63</sup>
Frequent visits to out-of-hospital emergency departments
Recent use or suppression of oral steroids
Absence of maintenance with inhaled corticosteroids
Overuse of SABA
Psychiatric illness or psychosocial problems
Lack of adherence to treatment
Food allergy

COPD: chronic obstructive pulmonary disease; LTA: life-threatening asthma; ICU: intensive care unit; SABA: short-acting E2 adrenergic agonists; PaCO<sub>2</sub>: carbon dioxide blood pressure.

Hospital admission and intensive care unit (ICU) admission criteria are shown in Table 2. Based on the above, an algorithm is proposed for hospital admission or discharge of patients presenting to the ED with asthmatic crises (Figure 1).

Discharge and treatment criteria

There are no functional parameters that allow a patient to be discharged safely, so the decision is usually the result of the doctor’s clinical observation of the patient’s condition and oxygen saturation<sup>14</sup>. Since this aspect is influenced by experience, whenever possible the discharge should be indicated by a physician with experience in managing asthma crises. In general, before being discharged, the patient should have few symptoms, tolerate decubitus<sup>4</sup>, have presented a good and rapid response to the treatment administered in the emergency room, and have an oxygen saturation above 92% without receiving supplementary oxygenation<sup>2,14</sup>. For its part, to discharge a patient, the GEMA guide recommends that the patient be able to take the prescribed treatment at home, present few symptoms and have reduced the need for rescue medication<sup>2</sup>. However, it is highly recommended to have an objective lung function test, such as a spirometry, or a PEF determination, always added to the oxygen saturation. In general, lung function should be considered on admission to the emergency department and after response to treatment. The lesser the two, the greater the likelihood of relapse at discharge<sup>44</sup>. In this regard, the Expert Pannel Report 345 considers that those patients with an FEV1 or PEF > 70% of the estimated or best personal value and with minimal symptoms can be discharged. On the other hand, for those with an



Table 2. Criteria for hospital admission and admission to the intensive care unit (ICU)

Criteria for hospital admission	Criteria for admission to ICU
Remain symptomatic after treatment.	Respiratory arrest.
Require O <sub>2</sub> to maintain SatO <sub>2</sub> > 92%.	Decreased level of consciousness.
– PEF or FEV1 < 40% before treatment or < 60% and instability of symptoms after treatment <sup>64</sup> .	Progressive functional impairment despite treatment.
– PEF or FEV1 = 50-70% on arrival; a minimum observation period of 12 hours is recommended.	
– There is no functional parameter defining when a patient should be discharged, although PEF < 75% and variability greater than 25% are associated with a higher rate of readmissions <sup>65</sup> .	
Existence of previous LTAs with a history of intubation and ventilation, hospitalization or visit to the emergency department for recent asthma	SatO <sub>2</sub> < 90% in spite of supplementary O <sub>2</sub> PaCO <sub>2</sub> > 45 mm Hg (muscle depletion alarm sign).
Failure of outpatient oral steroid treatment.	Hypercapnia, need for ventilatory support or pneumothorax.
Impossibility to guarantee the necessary care at home.	
Respiratory comorbidities (pneumonia, pneumothorax, pneumomediastinum) or non-respiratory.	

SatO<sub>2</sub>: oxygen saturation; PEF: peak expiratory flow; FEV1: forced expiratory volume in the first second; LTA: life-threatening asthma; PaCO<sub>2</sub>: carbon dioxide blood pressure

FEV1 or PEF between 50% and 69% of the estimate or best value and with mild symptoms, it is necessary to consider possible risk factors (Table 3). For its part, the GINA guideline<sup>4</sup> establishes that it is possible to evaluate the discharge if the pulmonary function is between 40-60% of the estimated value and provided that the patient's risk factors are taken into account. In patients with lung function above 60% of the estimated value, discharge is recommended, always taking into account the risk factors.

Nevertheless, as a prerequisite for discharge it is necessary to carry out a review of the patient within a maximum of one week, as well as to review the inhalation technique<sup>2,4</sup> and ensure that the patient understands the prescribed treatment, particularly the importance of oral steroids. In the event that a clear trigger has been found during the anamnesis, the patient should be informed about measures to avoid it<sup>14</sup>.

Treatment

Reducing the risk of relapse and ensuring adequate patient follow-up should be the goals of therapeutic measures prescribed at emergency discharge after an exacerbation. Prior to discharge, the physician should ensure that emergency management was adequate and that discharge criteria were met. At discharge, a therapeutic guideline will be prescribed with instructions on how to follow it and a brief educational plan. The treatment algorithm is shown in Figure 2:

– Oral glucocorticoids (OGC) at a dose of .5-1 mg/kg/day of prednisone or equivalent for 5-7 days (maximum dose 60 mg/day)<sup>46-48</sup>. Numerous studies and a review of the Cochrane Library<sup>49</sup> have shown that they reduce the risk of relapse. Although generally not recommended, the use of intramuscular triamcinolone (40 mg single dose) may be considered in patients in whom adherence to OGC is considered highly unlikely. Triamcinolone may also be useful in

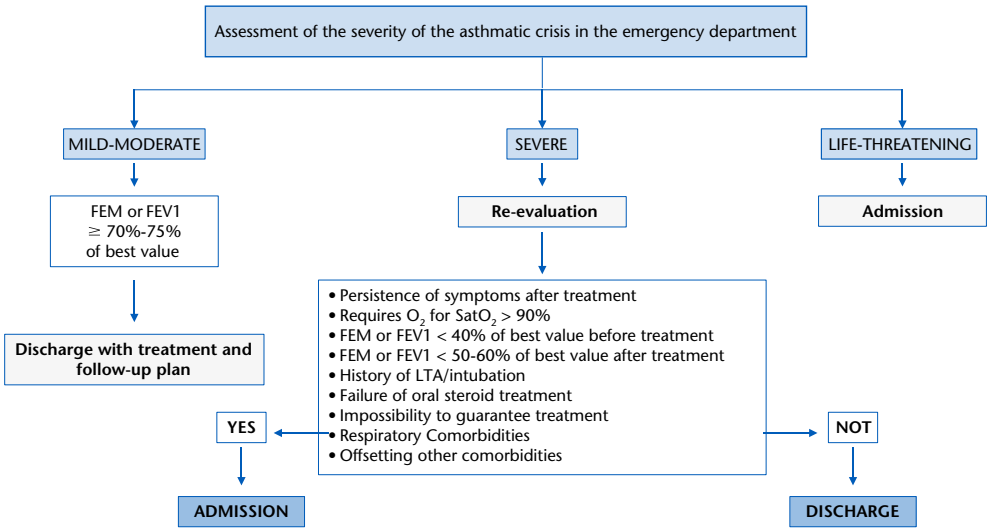


Figure 1. Assessment of admission or discharge after treatment in the emergency department. PEF: peak flow; FEV1: forced expiratory volume in the first second. SatO<sub>2</sub>: oxygen saturation; LTA: life-threatening asthma.

Table 3. Risk factors to be considered for discharge

Risk factors for the discharge of a patient with an asthmatic exacerbation
Previous crises that would have required intubation and mechanical ventilation.
Previous hospitalizations for asthma or previous emergency care for asthma.
Treatment (current or recent) with oral steroids.
Patient not receiving inhaled steroids.
Overuse of SABA.
Psychiatric illnesses or psychosocial problems that may affect medication intake.
Poor compliance.
Concomitant sensitivity to food, especially if it is very high, in adolescents and if the patient has had previous serious reactions.
Sudden onset of crises.
Concomitant cardiovascular diseases.
Patients who lack regular follow-up of their asthma.
Advanced age.
Pregnancy.

SABA: short-acting Beta 2 adrenergic receptor agonists (Modified from GEMA 4.32, GINA report 2018<sup>4</sup>, and Pola-Bibian et al. 2018<sup>66</sup>).

patients with partial insensitivity to other systemic steroids<sup>50</sup>.  
– Inhaled Glucocorticoids (IGC) at high doses associated with LABA. Different studies show the decrease of relapses with the use of IGC<sup>51-53</sup>, reinforcing that they always have to be prescribed; the association with LABA improves the control and its use is generalized, so the use of this combination at the begin-

ning seems reasonable in all patients.  
– To evaluate the association of long-acting muscarinic antagonists (LAMA) in patients who previously took them or in whom chronic airflow limitation (CAFL) is evident or suspected.  
– SABA on demand when the prescribed maintenance treatment does not contain formoterol in its composition, or the IGC-formoterol combination itself also for use on demand.  
– In cases where the patient was taking another controller drug prior to going to the ED (e.g., an anti-leukotriene) it is recommended that this be maintained to avoid later non-compliance.  
As for the educational plan (Figure 2), it should include instructions on the correct technique of the prescribed inhalation devices. In addition, it should explain the entire treatment pattern, dosage and daily intake, as well as instill the importance of compliance and the strategies that exist to encourage compliance and avoid forgetfulness. Likewise, clear indications should be included about the signs of deterioration and when and how to ask for medical help. Individually, those patients who have a previous written action plan (WAP) should be checked to see if they can follow it if necessary. If WAPs are not available, a basic plan should be indicated (recommend going back to the emergency room or visiting a doctor if you need SABA every less than 4 hours or have nocturnal awakenings). Finally, it is important to identify the causes of the exacerbation and show how to avoid them. Often, the immediate cause of an exacerbation is a viral infection and, ex-

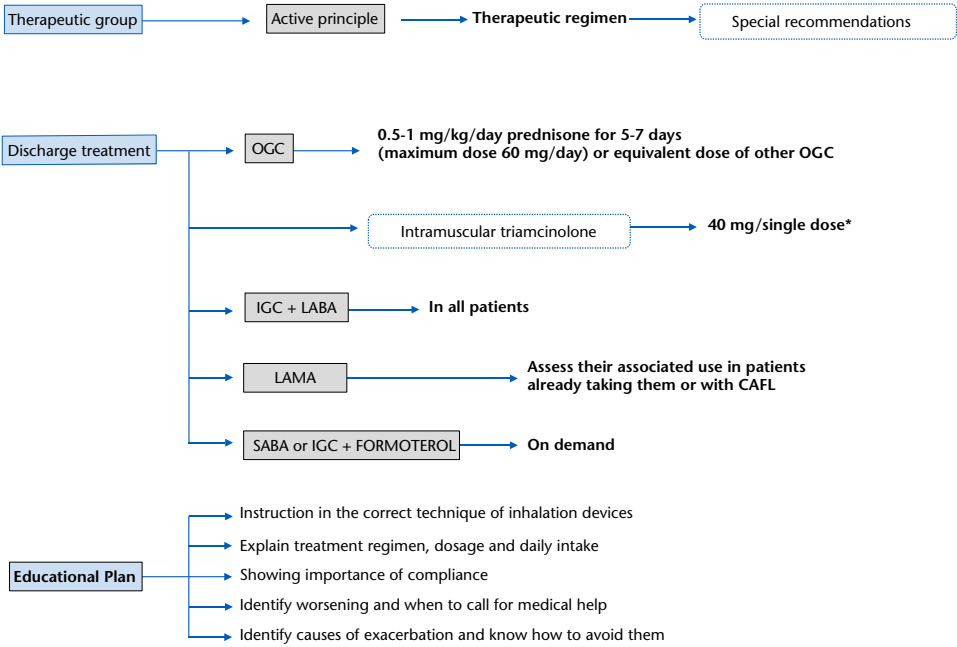


Figure 2. Criteria for hospital admission and admission to the intensive care unit (ICU). OGC: oral glucocorticoid; IGC: inhaled glucocorticoid; LABA: long-acting E2-adrenergic agonist; LAMA: long-acting muscarinic agonist; CAFL: chronic airflow limitation; SABA: short-acting Beta 2 adrenergic receptor agonists.

cept for the recommendation of flu vaccination, there are no effective preventive measures. In addition, it is not uncommon for there to be contributing factors, such as lack of therapeutic compliance, the presence of comorbidities (obesity, sleep apneas-hypopneas syndrome -SAHS-, etc.), exposure to some non-specific allergen or irritant, or smoking. All of these should be addressed from the emergency department<sup>54</sup>.

Follow-up appointments

After a visit to the emergency ward, the check-up appointment with the PC physician should be made within one week and, in cases where it is deemed necessary to be reviewed by a pulmonologist or allergist, within one month. Ideally, the patient should leave the ED with the appointment already made. Although there are few studies that analyze the impact of checkups on relapse prevention, there is some evidence of their importance<sup>55</sup>.

Referral criteria and priority

When caring for a patient who has suffered an asthma attack and has required ED care, it is not only necessary to be clear about the previously mentioned strategies, but also about the guidelines to distinguish if SC is required and the criteria to determine if it is required as a priority. Therefore, the care of the patient who has suffered an asthma attack does not end when he or she is discharged from the ED, but rather it must have a continuity of care and future control and follow-up medical consultations must be established. Both the patient and the healthcare professionals must understand that the process continues and that it must be indicated whether the patient will require a referral to PC, or if he or she meets the criteria for referral to SC. In addition, the priority of this visit should be established (less than one month from ED discharge or less than two weeks if priority criteria are met).

Determining the referral to one or another doctor will depend, on the one hand, on the characteristics of the patient as recorded in the anamnesis, and on the other hand, on the characteristics of the exacerbation of the asthma for which the patient is referred to the emergency department.

SC referral criteria, as well as priority referral criteria are listed in Table 4. First, any patient who has suffered an asthma attack and has not been previously diagnosed must be referred to SC. In studies conducted in Spain, up to 21%-45% of patients who experienced an asthma exacerbation had no previous diagnosis of this disease<sup>13,56</sup>, and in discharge reports more than 40% did not appear as referrals to any reference specialist. Another important point is that, despite the fact that patients are correctly diagnosed with asthma, a significant number do not receive any type of treatment at discharge for asthma (up to 63.7% as recorded in a study carried out by Dominguez-Ortega et al.<sup>56</sup>). Furthermore, it has been shown that even among patients who had suffered an exacerbation in the previous year, less than 40% received maintenance treatment<sup>13</sup>. Another aspect that needs to be taken into account at the time of referral is the loss of asthma control of the patient attended in the ED in spite of taking correct inhaled base therapy, since this fact has been identified as a strong predictor of relapse<sup>57</sup>, as are asthmatic patients who are only on E-adrenergic treatment<sup>40</sup>. In the ED, hyperfrequent asthmatics are a special case. These are patients who repeatedly visit the ED. They may be asthmatics with a correct diagnosis and treatment who adequately comply with the therapeutic regime, or patients who do not comply; there are even patients who only have contact with the healthcare system through the ED. According to the medical literature, the minimum number of visits to consider hyperfrequency ranges from two to three visits per year<sup>58</sup>. The presence of previous attacks has been identified as the most important predictor of suffering a new asthma attack, so patients with frequent exacerbations should have a more exhaustive specialized follow-up<sup>59</sup>. Asthmatic patients who receive SGC on a sustained basis or in repetitive batches should also be referred to SC, especially if they are found to be self-reported or outside the stipulated action plan.

On the other hand, it is possible to define clinical profiles of asthmatic patients who require priority referral to SC (Table 4). Thus, the severity of the current crisis or the history of a VRS crisis in the last year will be taken into account<sup>2</sup>. Similarly, any pregnant asthmatic patient suffering an asthma attack should be referred as a priority, as well as those asthmatic patients who are receiving the maximum maintenance medica-

tion established for asthma control, and who, nevertheless, persist with symptoms that require frequent use of SABA (a sign of poor control and risk of exacerbation<sup>2</sup>). Finally, those patients who have suffered an anaphylactic episode or a severe, life-threatening allergic reaction should also be referred to SC as a matter of priority<sup>60</sup>.

Quality indicators

The following are the quality indicators to validate a correct performance in the ED.

Indicator no. 1. Percentage of patients with spirometry or PEF measurement in the emergency department

- Justification: Performing a spirometry or PEF in the ED helps to classify the severity of the exacerbation and to monitor its evolution, including the response to treatment applied in the ED.
- Measurement: Number of patient records with an asthmatic exacerbation in which lung function data are collected by spirometry (FEV1) or PEF.
- Standard: > 80%.
- Sources of information: Medical reports (discharge and hospital admission).
- Exclusions: Not applicable.
- Calculation formula: [Total number of patients attending the ED whose medical history is reflected as FEV1 or PEF/Total number of patients attending the ED due to asthma attacks] x100 per year.

Indicator no. 2. Percentage of patients with medical history who inquire about the trigger of the crisis

- Justification: Knowing a possible exacerbation trigger helps in the classification of severity, follow-up in the emergency and in the post-discharge. Therefore, the patient with asthma who goes to the ED should always be assessed in the anamnesis.
- Measurement: Number of histories in patients with an asthmatic exacerbation in which the data of a possible exacerbation trigger is collected.
- Standard: > 80%.
- Information sources: Medical reports (discharge and hospital admission).
- Exclusions: Not applicable.
- Calculation formula: [Total number of medical records of those patients attending the ED for asthmatic crisis in which the trigger of this/total number of patients attending the ED for asthmatic crisis is reflected] x 100 x year.

Indicator no. 3. Percentage of patients with medical history of previous asthmatic crisis

- Justification: The presence of a history of crises during the previous year or a serious exacerbation that has required ICU admission at some point in life corresponds with a greater risk of presenting an exacerbation in the future. For this reason, it is an essential piece of information in the anamnesis to be carried

out in an ED with an asthma patient attending for an exacerbation.

- Measurement: Number of histories in patients with an asthmatic exacerbation in which data from previous exacerbations is collected.
- Standard: > 80%.
- Information sources: Medical reports (discharge and hospital admission).
- Exclusions: Not applicable.
- Calculation formula: [Total number of medical records of those patients who attend the ED for an asthmatic crisis in which the existence or not of previous exacerbations is reflected/Total number of patients who attend the ED for an asthmatic crisis] x 100 x year.

Indicator no. 4. Percentage of patients with treatment plan at discharge

- Justification: Making a written action plan has proven to be an essential tool for the correct management of the patient with asthma. From the healthcare setting of an ED, it is important to establish a minimum management plan until the assessment by PC or SC.
- Measurement: Number of patients discharged from an ED with an asthma treatment plan.
- Standard: > 90%.
- Information sources: Discharge reports from the ED.
- Exclusions: Patients with initial suspicion of asthma attacks who are eventually not diagnosed as such at discharge.
- Calculation formula: [Total number of medical records of those patients attending the ED for asthma attacks reflecting the treatment plan at discharge/Total number of patients attending the ED for asthma attacks] x 100 x year.

Indicator no. 5. Percentage of patients treated for asthmatic crisis with hospital admission

- Justification: It is necessary to know the percentage of patients admitted as a result of an asthma exacerbation over the total number of patients treated for asthma in the ED.
- Measurement: Number of patients admitted annually for asthma after being treated in the ED for an asthma exacerbation.
- Standard: < 20%.
- Sources of information: Clinical records/admission records.
- Exclusions: Admission for psychosocial problems.
- Calculation formula: [Total number of asthmatics admitted/Total number of exacerbations of asthma attended] x 100 x year.

Indicator no. 6. Percentage of patients returning to the ED after discharge from an asthma attack within one week

- Justification: It is necessary to know the number of patients incorrectly discharged.
- Measurement: Cases that come for a new asthma crisis in less than a week after being attended and dis-

Table 4. Criteria for referral to the specialist and referral to the specialist with priority

Referral to specialist (recommended in < 1 month)	Referral to specialist with priority (recommended in ≤ 2 weeks)
Patient without objective diagnosis of asthma.	Serious crisis.
Patients who fail to comply with treatment or are not controlled by ICS/LABA.	History of LTAs in the last year.
Patients who are over-frequent due to exacerbation (≥ 3 times/year) or have required at least 1 hospitalization in the previous year.	Pregnant.
Treated with SABA only and that use > 2 times a week or > 1 canister a month.	Daily use of SABA despite adequate treatment.
Patients receiving systemic steroids in a sustained or repeated manner (> 2 rounds of prednisone or equivalent per year).	Anaphylaxis.

ICS: inhaled corticosteroids; LABA: long-acting adrenergic beta 2 agonists; LTA: life-threatening asthma; SABA: short-acting adrenergic beta 2 agonists.



charged from an emergency department for an asthma crisis.

- Standard: 10%.
- Sources of Information: ED patient identification system.
- Exclusions: Not applicable.
- Calculation formula: [No. of asthma patients who return to the ED in the first week after being discharged from the ED for an asthma attack/No. of patients who return to the ED for an asthma attack] x 100 x year.

Indicator no. 7. Percentage of patients with OGC pattern, after discharge from the ED

- Justification: The OGC guidelines are the therapeutic measure that prevents further relapses.
- Measurement: Cases discharged from the emergency department for an asthma exacerbation that were prescribed an OGC guideline.
- Standard: 90%.
- Sources of information: Clinical history.
- Exclusions: Not applicable.
- Calculation formula: [No. of patients discharged from EDs for asthma attacks who were prescribed an OGC guideline/No. of patients discharged from EDs for asthma attacks] x 100 x year.

Indicator no. 8. Percentage of patients referred from SC in less than 1 month with general referral criteria

- Justification: Patients with asthma attacks referred from the ED to SC who meet the established criteria needed to be registered.
- Measurement: Cases of asthma attacks referred from the hospital ED to SC (pneumology or allergology) in the last year.
- Standard: 90%.
- Sources of information: Clinical documentation/attendance records of appointment/admission services.
- Exclusions: Not applicable.
- Calculation formula: [No. of patients with asthma attending the ED for an asthma attack referred to SC/ No. of patients attending the ED for an asthma attack] x 100 x year.

Indicator no. 9. Percentage of patients referred to SC in less than 2 weeks with priority referral criteria

- Justification: To record the number of asthma attack patients referred from the ED to SC who meet priority referral criteria.
- Measurement: Cases of asthma attacks referred from hospital EDs to SC (pneumology or allergology) in the last year.
- Standard: 90%.
- Information sources: Clinical documentation.
- Exclusions: Not applicable.
- Calculation formula: [Number of patients with asthma attending the ED for an asthma attack referred to SC as a priority/Number of patients attending the ED for an asthma attack] x 100 x year.

Indicator no. 10. Percentage of patients receiving ICS/LABA at discharge

- Justification: In patients with severe exacerbation of asthma, ICS/LABA treatment should be indicated in addition to treatment with oral steroids. It is necessary to know this fact, there cannot be patients who have a severe exacerbation of asthma and who do not receive ICS/LABA at discharge.
- Measurement: Number of patient histories attending the emergency department with a severe exacerbation and that the treatment with ICS/LABA is included in the discharge report.
- Standard: > 90% (ideally this percentage should be 100%)
- Information sources: ED discharge reports.
- Exclusions: Not applicable.
- Calculation formula: [Total number of medical records of patients attending the ED for asthmatic crisis in which treatment with ICS/LABA is indicated in the discharge report/total number of patients attending the ED for asthmatic crisis and discharged] x 100 x year.

**Conflicting interests:** Antolín López-Viña declares to have received fees for the last three years for giving conferences sponsored by AstraZeneca, GSK, Teva, Novartis and Mundipharma; and as a consultant for GSK, Sanofi, Teva, Astra-Zeneca and Mundipharma. He received grants to attending meetings and congresses from Novartis, FAES, Chiesi and Teva. Marina Blanco-Aparicio states that for the last three years she has received fees for giving lectures and grants to attend meetings and congresses from AstraZeneca, GSK, Teva, Novartis, Mundipharma and Chiesi.

Javier Domínguez Ortega states that for the last three years he has received fees for consulting work and giving conferences sponsored by ALK, AstraZeneca, GSK, Teva, Bial, Novartis and Mundipharma, LETI-Pharma and Stallergenes.

Lorena Soto-Retes states that in the last three years she has received conference fees or grants for attending scientific conferences and meetings from GSK, Menarini, FAES, Astrazeneca, Chiesi, Mundipharma, Stallergenes, Leti, Hal-Allergy, Allergy-Therapeutics, Immunotek and has received funds/subsidies for research projects from non-profit foundations of SEAIC (Spanish Society of Allergy and Clinical Immunology) and SEPAR (Spanish Society of Pneumology and Thoracic Surgery).

Francisco Javier Álvarez-Gutiérrez declares to have received fees for consultancy work, lectures or grants to attend congresses and scientific meetings from ALK, Astra-Zeneca, Bial, Boehringer-Ingelheim, Chiesi, GSK, Menarini, Mundi-pharma, Novartis and TEVA over the last three years.

Ignacio Davila states that for the last three years he has received fees for giving lectures or attending advisory boards of ALK, AstraZeneca, Chiesi, Diater, GSK, Leti, Novartis, Sanofi, Stallergènes, Teva.

Cesáreo Álvarez Rodríguez: declares to have received fees for advisory work and attendance at scientific meetings sponsored by GSK for the last three years.

**Financing:** This study received funding from the Spanish Society of Emergency Medicine (SEMES), the Spanish Society of Allergology and Clinical Immunology (SEAIC) and the Spanish Society of Pneumology and Thoracic Surgery (SEPAR). AstraZeneca Spain facilitated the initial meeting for the preparation of the manuscript with all the authors.

**Ethical responsibilities:** All authors have confirmed the maintenance of confidentiality and respect for patients’ rights in the author’s responsibilities document, publication agreement and assignment of rights to EMERGENCIAS. The content of the work reflects the opinions, criteria, conclusions and/or findings of its authors, which may not necessarily coincide with those of AstraZeneca.

**Article not commissioned by the Editorial Committee and with external peer review.**

**Acknowledgements:**The authors would like to thank Almudena Fuster-Matanzo (PhD), Medical Writer of MSC S.L. for her collaboration in the writing of this manuscript.

Addendum

This article has been scientifically endorsed by the following Scientific Societies: Spanish Society of Emergency Medicine (SEMES), Spanish Society of Allergology and Clinical Immunology (SEAIC) and the Spanish Society of Pneumology and Thoracic Surgery (SEPAR).

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