

Management of asthma in adults in primary care

Ban AYL, Omar A, Chong LY, Lockman H, Ida Zaliza ZA, Ali IAH, Jaya M, Leong SW, Mazapuspavina MY, Yusof MAM, Zim MAM, Nor Azila MI, Jamal SM, Yoon CK, Malek Abdol Hamid ZI

Ban AYL, Omar A, Chong LY, Lockman H, et al. Clinical Practice Guidelines Management of asthma in adults. Management of asthma in adults in primary care. *Malays Fam Physician*. 2018;13(3); 20–26.

Keywords:

asthma, acute asthma, stable asthma, written asthma action plan, asthma control

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Abstract

Asthma is a chronic inflammatory disease of the airway which is often misdiagnosed and undertreated. Early diagnosis and vigilant asthma control are crucial to preventing permanent airway damage, improving quality of life and reducing healthcare burdens. The key approaches to asthma management should include patient empowerment through health education and self-management and, an effective patient-healthcare provider partnership.

Introduction

Asthma is a common medical condition in adults, with a prevalence of 4.5% in Malaysia, based on the National Health and Morbidity Survey 2006. It is an inflammatory disease of the airway which is triggered by external stimuli in genetically-predisposed individuals, leading to mucus secretion, bronchoconstriction and airway narrowing.

The most common symptom is a chronic cough. Misdiagnoses or underdiagnoses cause persistent airway inflammation, airway remodeling, and subsequently, fixed airway obstruction. Therefore, it is important for healthcare professionals to diagnose and manage asthma confidently.

Risk Factors

Asthma is a multifactorial disease brought about by various familial and environmental influences, as seen in Table 1 below:

Table 1. Risk factors for asthma

Genetic factors
Environmental factors <ul style="list-style-type: none"> • Smoking • Air pollution • Paint • Pesticides
Other risk factors/co-morbidities <ul style="list-style-type: none"> • Overweight or obese • Gastroesophageal reflux disease • Nasal blockage, rhinorrhea, and allergic rhinitis • Elevated fractional exhaled nitric oxide and positive skin prick test

Diagnosis

The diagnosis of asthma is based on a combination of clinical features suggestive of reversible airway obstruction supported by investigations, as shown in Tables 2 and 3. A response to treatment may support the diagnosis; however, a lack of response does not exclude asthma.

Table 2. Clinical features of asthma

Common symptoms	<ul style="list-style-type: none"> • Cough • Wheeze • Chest tightness • Shortness of breath
Symptom variability	<ul style="list-style-type: none"> • Episodic symptoms • Diurnal symptoms • Symptoms after/during exercise
Triggers	<ul style="list-style-type: none"> • Common cold (viral infection) • Allergens, e.g. dust mites, pets • Cold weather • Irritants <ul style="list-style-type: none"> • smoke • haze • strong smells, i.e. perfumes, cleaning solutions • exhaust fumes
History of atopy	<ul style="list-style-type: none"> • Eczema • Allergic rhinitis
Family history	<ul style="list-style-type: none"> • Asthma • Allergic rhinitis • Eczema
Physical examination	<ul style="list-style-type: none"> • Eczema • Use of accessory muscles • Hyperinflation • Audible wheeze • Ronchi on auscultation

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Table 3. Investigations for asthma

Investigation	Description
<i>Demonstration of airway obstruction</i>	
Spirometry	• A FEV ₁ (forced expiratory volume in 1 second)/FVC (forced vital capacity) ratio of <70% is a positive test for obstructive airway disease.
<i>Demonstration of airway obstruction variability</i>	
Bronchodilator reversibility	• An improvement in FEV ₁ of ≥12% AND ≥200 ml is a positive bronchodilator reversibility test.
Other method	• An increase in FEV ₁ >12% and >200 ml [or peak expiratory flow (PEF) >20%] from baseline after four weeks on inhaled corticosteroids (ICS) is a positive test. Patient must not have respiratory infections.
Peak flow charting	• Peak flow monitoring over 2 - 4 weeks. • Calculate mean variability. Daily diurnal PEF variability is calculated from twice daily PEFs as [(day's highest - day's lowest)/mean of day's highest and lowest] and averaged over one week. • Variability ≥20% or diurnal variation >15% on >3 days/week indicates a positive test.

General Principles of Management

The aims of management are to achieve good asthma symptom control and minimise future risk of exacerbations. The partnership between the patients/caregivers and healthcare providers is important in ensuring the success of the management. The patient's preferences for treatment, ability to use an inhaler correctly, side effects and cost of medications should be taken into consideration during the treatment process.

- a regular medical review by healthcare providers

A home nebuliser should be avoided, as it leads to underestimation of the severity of an acute exacerbation of asthma.

Stable Asthma

Stable asthma is defined as the absence of symptoms, no limitations on activities and not requiring any relievers in the last four weeks.

Asthma Self-Management

The patient's active participation is important in asthma management. All patients should be made aware of the components of asthma self-management, which include:

a. Assessment of asthma control

Asthma control can be assessed by using Asthma Control Test (ACT) scores or asking recommended questions, as shown in Table 4 below.

- self-monitoring of symptoms and/or PEF
- a written asthma action plan (WAAP) for optimisation of asthma control through self-adjustment of medications

Table 4. Assessment of asthma symptom control

Asthma symptom control			Level of asthma symptom control		
In the past four weeks, has the patient had:			Well-controlled	Partly controlled	Uncontrolled
• Daytime asthma symptoms more than twice/week?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	None of these	1 - 2 of these	3 - 4 of these
• Any night waking due to asthma?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
• Reliever needed for symptoms more than twice/week?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
• Any activity limitation due to asthma?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			

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b. Assessment of the severity of future risks

Assessment of the risk factors for a poor asthma outcome is important in treatment adjustments and prediction of exacerbation. Refer to Table 5 for more details.

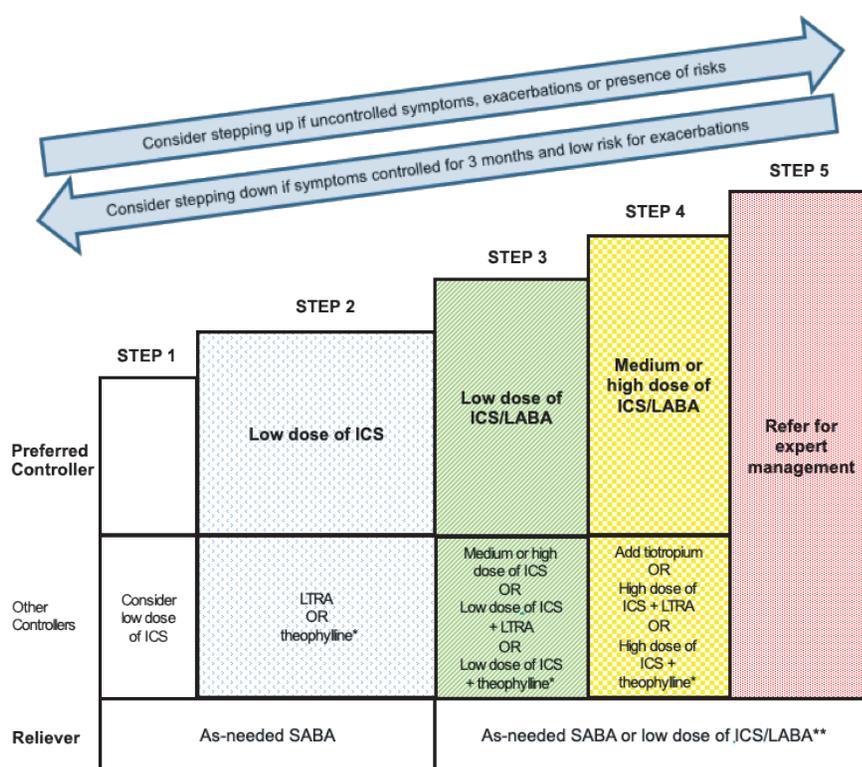
Table 5. Investigations for asthma

Risk factors for poor asthma outcome	
<ul style="list-style-type: none"> • Assess risk factors at diagnosis and periodically (1 - 2 years) • Measure FEV¹ at the start of treatment and periodically 	
Independent risk factors	Having one or more of these risk factors increases the risk of exacerbations, even if symptoms are well-controlled: <ul style="list-style-type: none"> • Uncontrolled asthma symptoms • ICS not prescribed, poor ICS adherence, incorrect inhaler technique • High short-acting β₂-agonists (SABA) use • Low FEV₁, especially if <60% predicted • Major psychological or socioeconomic problems • Exposures: smoking; allergen exposure, if sensitised • Co-morbidities: obesity, rhinosinusitis, confirmed food allergy • Sputum or blood eosinophilia, elevated fractional exhaled nitric oxide in allergic adults • Pregnancy • Ever being intubated or in intensive care for asthma • Having ≥1 severe exacerbations in the last 12 months
Risk factors for fixed airflow limitation	<ul style="list-style-type: none"> • Lack of ICS treatment • Exposure to tobacco smoke • Noxious chemical or occupational exposures • Low FEV₁ • Chronic mucus hypersecretion • Sputum or blood eosinophilia
Risk factors for medication side effect	<ul style="list-style-type: none"> • Systemic: frequent oral corticosteroids (OCS); long-term, high-dose ICS; taking P450 inhibitors, e.g. itraconazole, ketoconazole, etc. • Local: high-dose or potent ICS, poor inhaler technique

c. Treatment

The goal of asthma treatment is to achieve and maintain symptom control. This is done using a stepwise approach, as shown in Figure 1. Any of the following issues should be addressed before considering treatment adjustment:

- inhaler technique
- adherence to medications
- modifiable risk factors
- presence of co-morbidities



ICS = inhaled corticosteroids, LABA = long-acting β_2 -agonists, ICS/LABA = combination medication in a single inhaler, LTRA = leukotriene receptor antagonists, SABA = short-acting β_2 -agonists, *theophylline = ≤ 250 mg daily
 **Budesonide/formoterol or beclomethasone/formoterol

Figure 1. Stepwise treatment ladder in stable asthma

• **Reliever**

Inhaled SABA are the reliever of choice in stable asthma. Oral SABA should be avoided in asthma due to their side effects.

A low dose of budesonide/formoterol or beclomethasone/formoterol may be used as a single inhalant for maintenance and reliever therapy in moderate to severe asthma.

Inhaled long-acting β_2 -agonists without ICS should not be used in reliever monotherapy in stable asthma.

• **Controller (in addition to as-needed reliever inhaler)**

- o ICS are the preferred controller therapy in asthma.
- o Initiation of ICS should not be delayed in symptomatic asthma.
- o Low-dose ICS should be considered in steroid-naïve, symptomatic asthma.
- o Long-acting β_2 -agonists should not be used as controller monotherapy without ICS in asthma.

- o Leukotriene receptor antagonists as add-on can be beneficial in patients with concomitant seasonal allergic rhinitis and asthma.
- o The soft-mist inhaler tiotropium may be used as add-on therapy in patients with asthma that is not well-controlled with medium- or high-dose ICS.
- o Patients with difficult-to-control asthma should be referred to a respiratory physician.

Non-Pharmacological Treatment

Non-pharmacological treatments may improve symptom control and/or reduce future risk of asthma exacerbation. This includes smoking cessation, vaccination and weight loss management.

Acute Exacerbation of Asthma

Acute exacerbation of asthma is defined as a progressive or sudden onset of worsening symptoms. Status asthmaticus is a life-threatening and medical emergency situation.

a. Assessment of severity and management

Rapid clinical assessment of severity (refer to Table 6) should be performed in all acute exacerbation of asthma. Treatment should be initiated immediately based on the severity of the asthma (refer to Algorithm 1).

Table 6. Level of severity of acute exacerbation of asthma

Severity	Clinical features	Clinical parameters
Mild to moderate	<ul style="list-style-type: none"> Speaks in phrases Sits up Not agitated 	<ul style="list-style-type: none"> Respiratory Rate (RR): 20 - 30/min Pulse rate (PR): 100 - 120/min O₂ saturation: 90 - 95% PEF: >50% predicted or best
Severe	<ul style="list-style-type: none"> Speaks in words Sits forward Agitated Accessory muscles used 	<ul style="list-style-type: none"> RR: >30/min PR: >120/min O₂ Saturation <90% PEF: <50% predicted or best
Life-threatening	Severe asthma with ANY OF THE FOLLOWING:	
	<ul style="list-style-type: none"> Drowsy Confused Exhaustion Cyanosis Hypotension Silent chest Poor respiratory effort 	<ul style="list-style-type: none"> PEF: <33% PaO₂: <60 mmHg Normal (30 - 45 mmHg) or raised PaCO₂

In acute exacerbation of asthma, inhaled β₂-agonists are the first-line treatment.

- In mild to moderate exacerbations, a pressurised metered dose inhaler with a spacer is the preferred method of delivery.
- In severe and life-threatening exacerbations, continuous delivery of nebulised oxygen-driven β₂-agonists should be used.

Systemic corticosteroids should be given to all patients with acute exacerbation of asthma. They should be continued for 5 to 7 days. Asthma patients prescribed OCS should continue their regular ICS.

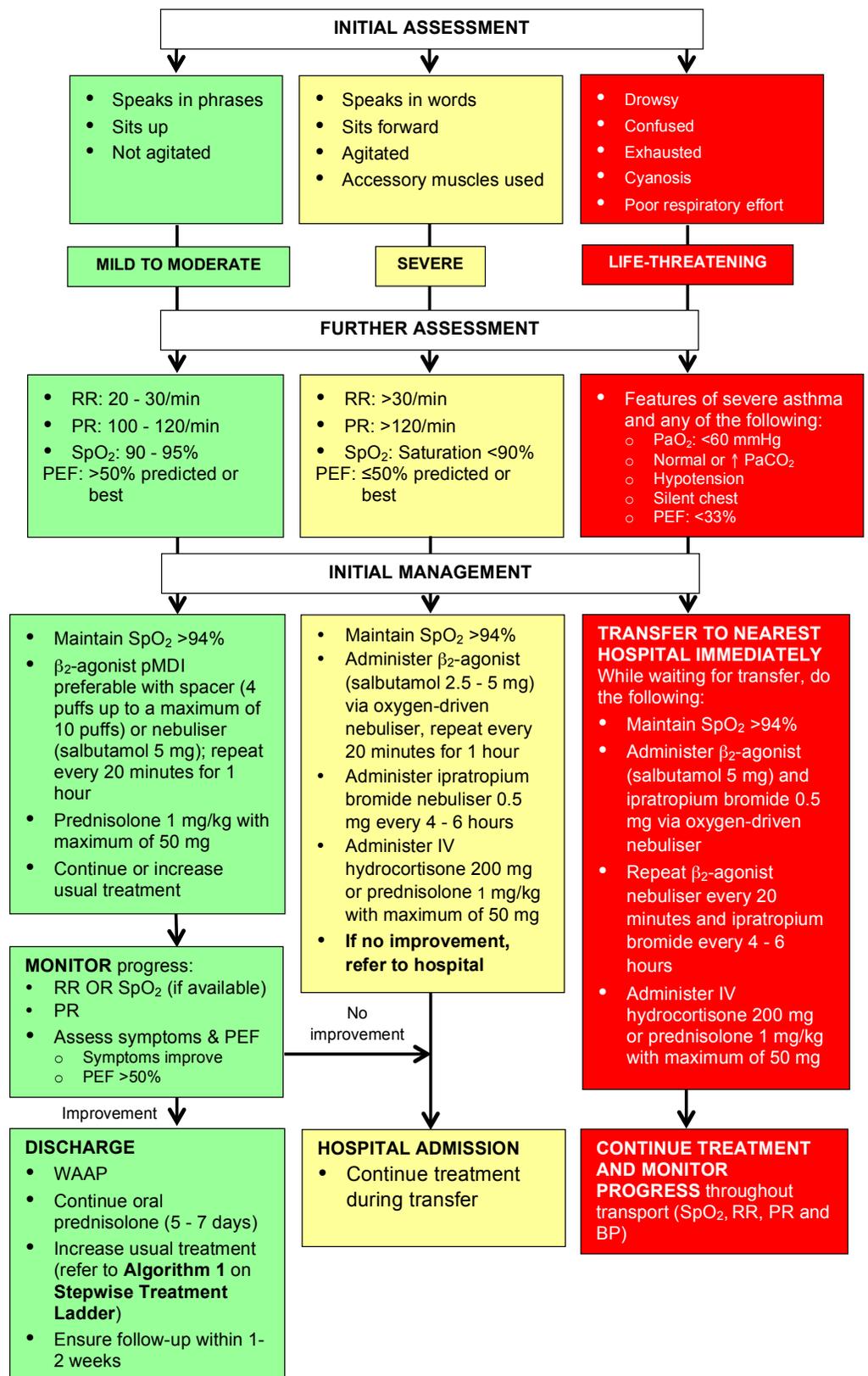
b. Criteria for admission/discharge

All patients with severe, life-threatening asthma and those with PEF<75% personal best or predicted one hour after initial treatment should be admitted. The following factors may be considered for admission:

- persistent symptoms
- pregnancy
- previous near-fatal asthma attack
- deteriorating PEF
- living alone/socially isolated
- persisting or worsening hypoxia
- psychological problems
- exhaustion
- physical disability or learning difficulties
- drowsiness, confusion or altered conscious state
- asthma attack despite recent adequate steroid treatment
- respiratory arrest

Patients with resolution of symptoms and PEF >75% personal best or predicted one hour after initial treatment may be discharged home with a WAAP.

Algorithm 1. Management of acute asthma in primary care



Referral

A referral to a specialist with experience in asthma should be made for asthma patients with the following conditions:

- diagnosis of asthma is not clear
- suspected occupational asthma
- poor response to asthma treatment
- persistent use of high-dose ICS without being able to taper off
- symptoms remain uncontrolled with persistent use of high-dose ICS
- persistent symptoms despite continuous use of moderate- to high-dose ICS combined with LABA
- severe/life-threatening asthma exacerbations
- asthma in pregnancy
- asthma with multiple co-morbidities

Acknowledgement

Details of the evidence supporting the above statements can be found in the Clinical Practice Guidelines on the Management of Asthma in Adults 2017, available on the following websites: Ministry of Health Malaysia: <http://www.moh.gov.my> and Academy of Medicine: <http://www.acadmed.org.my>. Corresponding organisation: CPG Secretariat, Health Technology Assessment Section, Medical Development Division, Ministry of Health Malaysia, contactable at htamalaysia@moh.gov.my