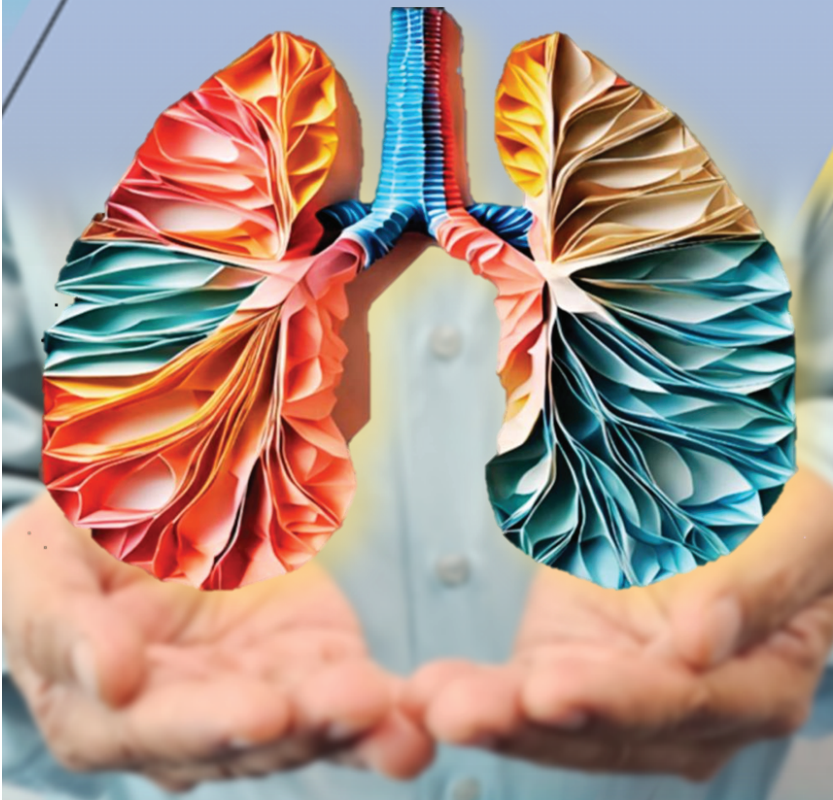
QUICK REFERENCE FOR HEALTHCARE PROVIDERS

Management of Asthma in Adults

(Second Edition)



Ministry of Health Malaysia

Malaysian Thoracic Society

Academy of Medicine of Malaysia

KEY MESSAGES

1. Asthma is a chronic inflammatory airway disease triggered by external stimuli in genetically-predisposed individuals.
2. Diagnosis of asthma is based on typical clinical history, physical examination & evidence of airway obstruction variability, with spirometry being the preferred diagnostic tool.
3. The assessment of asthma control should be performed before considering stepping up or down the treatment.
4. All asthma patients should be prescribed inhaled corticosteroids (ICS)-containing therapy.
5. Inhaled short-acting β_2-agonists (SABA) should not be used as monotherapy.
6. All asthma patients should be offered self-management education including asthma action plan (AAP).
7. Inhaler technique should be reviewed by Respiratory Medication Therapy Adherence Clinic (RMTAC) pharmacist when available.
8. Adherence to treatment should be assessed at every clinic visit.
9. During an exacerbation, treatment should be initiated immediately based on severity & all patients should be provided a follow-up plan upon discharge.
10. In severe asthma, biologics should be considered as add-on treatment after optimising therapy & conducting a phenotype assessment prior to initiation.

This Quick Reference provides key messages & a summary of the main recommendations in the Clinical Practice Guidelines (CPG) Management of Asthma in Adults (Second Edition).

Details of the evidence supporting these recommendations can be found in the above CPG, available on the following websites:
Ministry of Health Malaysia: www.moh.gov.my
Academy of Medicine Malaysia: www.acadmed.org.my
MaHTAS: https://mymahtas.moh.gov.my

CLINICAL PRACTICE GUIDELINES SECRETARIAT
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INVESTIGATIONS

Investigation	Description
Demonstration of airway obstruction	
Spirometry	A FEV_1/FVC <0.7 or <lower limit normal (LLN)
Demonstration of airway obstruction variability or reversibility	
Spirometry	An improvement in FEV_1 or FVC ≥12% AND ≥200 ml following bronchodilator treatment
	An improvement in FEV_1 or FVC ≥12% AND ≥200 ml from baseline after four weeks on ICS
Peak Expiratory Flow Rate (PEFR)	A ≥20% improvement in PEFR following bronchodilator treatment
	A ≥20% improvement in PEFR from baseline after four weeks on ICS
	Diurnal Variation • PEFR measured and recorded at least twice daily (morning and evening) over two weeks. • PEFR variability of ≥20% is suggestive of asthma.
Detection of T2-high inflammation	
Blood eosinophils	Threshold for blood eosinophils is ≥150 cells/μL or >4%
Immunoglobulin E (IgE)**	Total serum IgE >100 kU/
	Any allergen-specific IgE >0.35 kU/L
Immunoglobulin E (IgE)**	Elevated FeNO level (≥50 ppb)

**To be performed when resources are available

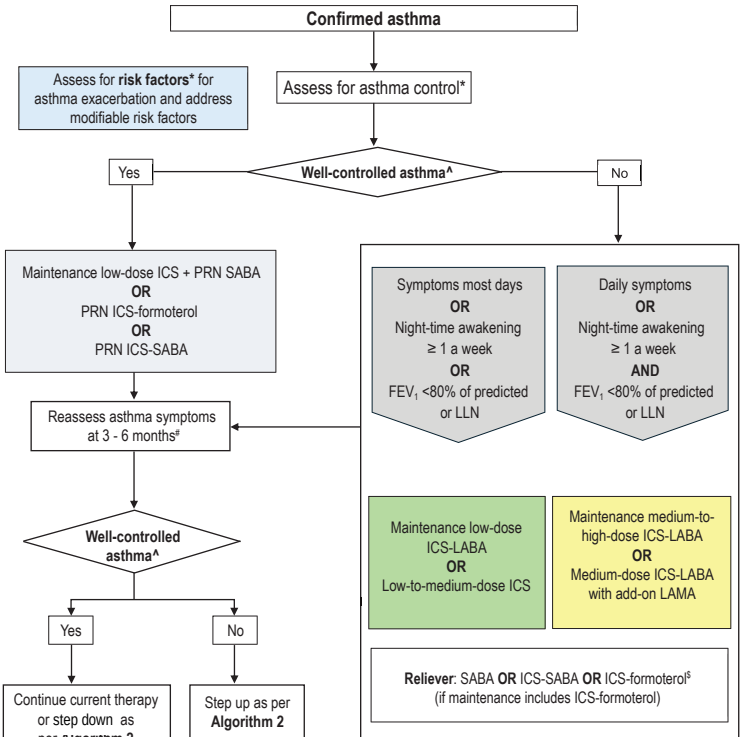
ASTHMA CONTROL TEST

Asthma Control Test provides a numerical score to determine the control of asthma symptoms.

1.	**In the past 4 weeks, how much of the time did your asthma keep you from getting as much done at work, school or at home?**					**Score**
	All of the time (1)	Most of the time (2)	Some of the time (3)	A little of the time (4)	None of the time (5)	
2.	**During the past 4 weeks, how often have you had shortness of breath?**					**Score**
	More than once a day (1)	Once a day (2)	3 to 6 times a week (3)	Once or twice a week (4)	Not at all (5)	
3.	**During the past 4 weeks, how often did your asthma symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?**					**Score**
	≥4 nights a week (1)	2 to 3 nights a week (2)	Once a week (3)	Once or twice (4)	Not at all (5)	
4.	**During the past 4 weeks, how often had you used your rescue inhaler or nebuliser?**					**Score**
	≥3 times per day (1)	1 to 2 times per day (2)	2 or 3 times per week (3)	Once a week or less (4)	Not at all (5)	
5.	**How would you rate your asthma control in the last 4 weeks?**					**Score**
	Not controlled at all (1)	Poorly controlled (2)	Somewhat controlled (3)	Well controlled (4)	Completely controlled (5)	

TOTAL SCORE: _____

INITIATION OF ASTHMA TREATMENT



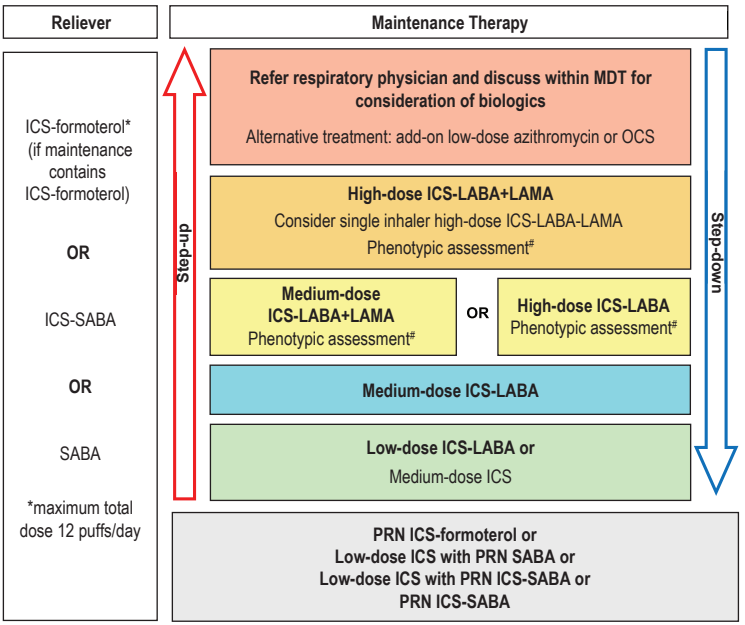
LTRA may be added to maintenance therapy if the patient has concurrent allergic rhinitis.
#Inhaler technique and adherence to treatment should be assessed at every clinic/hospital visit and before escalating treatment
^Well-controlled asthma as defined by ACT ≥20 or 'NO' to all GINA questionnaire
$e.g. budesonide-formoterol or beclometasone diproprionate-formoterol

***Assess the presence of risk factors for asthma exacerbation and address them accordingly:**

- Previous history of severe asthma exacerbation requiring systemic steroids or hospitalisation within the past year (consider initiating medium dose ICS)
- Overuse of SABA (≥3 canisters per year)
- Inadequate ICS use or not on ICS
- Poor adherence to maintenance therapy
- Incorrect inhaler technique
- Current smoker including e-cigarette or vape user
- Co-morbidities: obesity, GERD
- Pregnancy
- T2-high inflammation: high FeNO, blood eosinophilia
- Lung function: Low FEV_1 especially <60% predicted, high bronchodilator responsiveness

Abbreviations ACT=Asthma Control Test questionnaire; FeNO=fractionated nitric oxide; FEV_1=forced expiratory volume in first 1 second; GERD=gastroesophageal reflux disease; ICS=inhaled corticosteroids; LABA=long-acting β-agonists; LLN=lower limit normal; PRN=as needed; SABA=short-acting β-agonists; T2=Type 2 inflammatory marker; LTRA=leukotriene receptor antagonist

STEP UP AND STEP DOWN OPTIONS IN MANAGEMENT OF STABLE ASTHMA



Note: LTRA may be added to maintenance therapy if the patient has concurrent allergic rhinitis.

#phenotypic assessment should be done at this stage upon stepping up

Abbreviations: ICS=inhaled corticosteroids; ICS-LABA+LAMA=fixed dose combination ICS-LABA with separate inhaler LAMA; ICS-LABA-LAMA=single inhaler of ICS-LABA-LAMA; LABA=long-acting β-agonists; LAMA=long-acting muscarinic antagonists; MDT=multidisciplinary team; OCS=oral corticosteroids; PRN=as needed; SABA=short-acting β-agonists

INHALER TECHNIQUE AND ADHERENCE

- Proper inhaler technique varies by device (pMDI, DPI, SMI), but generally includes exhaling fully, sealing the lips around the mouthpiece, inhaling correctly, and holding the breath for up to 10 seconds to optimise medication delivery. Recognising the differences between inhalers is crucial. Refer to pamphlets or instructional materials for device-specific guidance.
- The Test of Adherence to Inhaler (TAI) Questionnaire is one of the available tools for assessing inhaler adherence, The 10-item TAI questionnaire has been validated in the Malay language.

MANAGEMENT OF ASTHMA EXACERBATION IN PRIMARY CARE

INITIAL ASSESSMENT
Risk assessment for asthma-related death performed with clinical evaluation concurrently

SEVERITY	MILD	MODERATE	SEVERE	LIFE-THREATENING
Conscious level	Alert	Alert	Alert/confused/drowsy	Confused/drowsy/coma
Speech	Normal	Speaks in phrases	Speaks in words	Unable to speak
Respiratory rate (RR)	Normal	>20/min	>25/min	<12/min
Pulse rate (PR)	<100/min	100 – 120/min	>120/min	Bradycardia/cardiac arrest
Blood pressure (BP)	Normal	Normal	Normal or hypotension	Hypotension
Accessory muscle use	Absent	Present	Very evident	Paradoxical chest movement/absent
Breath sounds	Wheezing	Wheezing	Wheezing	Silent chest
SpO_2	≥95%	90 – 94%	<90%	<90%
ABG: PaO_2	Normal	<80 mmHg	<60 mmHg	<60 mmHg
ABG: $PaCO_2$	Normal	<40 mmHg	<40 mmHg or normal	>45 mmHg

INITIAL MANAGEMENT

MILD / MODERATE

- SABA 4 - 10 puffs by pMDI + spacer (preferably patient's own) or via nebuliser, repeat every 20 minutes for 1 hour
- Prednisolone: 0.5 - 1 mg/kg with a maximum of 50 mg stat
- Controlled oxygen: target saturation ≥94%

MONITOR PROGRESS
- ○ Symptoms
- ○ Conscious level, SpO_2, PR, BP
- ○ CXR when indicated (if available)

Clinical Improvement*

No clinical improvement

SEVERE

- SABA via oxygen driven nebuliser, repeat every 20 minutes for 1 hour
- Ipratropium bromide nebuliser 0.5 mg stat
- Controlled oxygen: target saturation ≥94%
- IV hydrocortisone 100 mg stat
- IV magnesium sulphate 2 g infusion over 20 minutes (single dose)

Clinical Improvement*

No clinical improvement

LIFE THREATENING

TRANSFER TO NEAREST HOSPITAL IMMEDIATELY
While waiting for transfer, do the following:

- SABA via oxygen driven nebuliser, repeat every 20 minutes for 1 hour
- Ipratropium bromide nebuliser 0.5 mg stat
- Controlled oxygen: target saturation ≥94%
- IV hydrocortisone 100 mg stat (if not given earlier)
- IV magnesium sulphate 2 g infusion over 20 minutes (single dose) (if not given earlier)
- Consider intubation if patient's condition deteriorates

DISCHARGE
- Assess inhaler technique and adherence
- Continue prednisolone (5 - 7 days)
- Step-up treatment if indicated
- AAP
- Ensure follow up within 1 - 2 weeks

REFER TO HOSPITAL FOR ADMISSION
Continue treatment during transfer and monitor progress

CONTINUE TREATMENT AND MONITOR PROGRESS
throughout transport (SpO_2, RR, PR and BP)

*Improvement of symptoms (not needing continuous SABA) and SpO2 ≥94% under room air

Abbreviations: AAP=asthma action plan; ABG=arterial blood gas; BP=blood pressure; CXR=chest X-ray; IV=intravenous; pMDI=pressurised metered-dose- inhaler; PR=pulse rate; RR=respiratory rate; SABA=short-acting β_2-agonist; SpO_2=oxygen saturation

MANAGEMENT OF ASTHMA EXACERBATION IN EMERGENCY DEPARTMENT

INITIAL ASSESSMENT
Risk assessment for asthma-related death performed with clinical evaluation concurrently

SEVERITY	MILD	MODERATE	SEVERE	LIFE-THREATENING
Conscious level	Alert	Alert	Alert/confused/drowsy	Confused/drowsy/coma
Speech	Normal	Speaks in phrases	Speaks in words	Unable to speak
Respiratory rate (RR)	Normal	>20/min	>25/min	<12/min
Pulse rate (PR)	<100/min	100 – 120/min	>120/min	Bradycardia/cardiac arrest
Blood pressure (BP)	Normal	Normal	Normal or hypotension	Hypotension
Accessory muscle use	Absent	Present	Very evident	Paradoxical chest movement/absent
Breath sounds	Wheezing	Wheezing	Wheezing	Silent chest
SpO2	≥95%	90 – 94%	<90%	<90%
ABG: PaO_2	Normal	<80 mmHg	<60 mmHg	<60 mmHg
ABG: $PaCO_2$	Normal	<40 mmHg	<40 mmHg or normal	>45 mmHg

INITIAL MANAGEMENT

MILD / MODERATE
- SABA 4 - 10 puffs by pMDI + spacer (preferably patient's own) or via nebuliser, repeat every 20 minutes for 1 hour
- Prednisolone: 0.5 - 1 mg/kg with a maximum of 50 mg stat
- Controlled oxygen: target saturation ≥94%

Clinical Improvement* → **DISCHARGE**
- Continue prednisolone (5 - 7 days)
- Continue usual treatment
- AAP
- Ensure follow-up at primary care clinic within 1 - 2 weeks

No clinical improvement →

SEVERE
- SABA via oxygen driven nebuliser, repeat every 20 minutes for 1 hour
- Ipratropium bromide nebuliser 0.5 mg stat
- Controlled oxygen: target saturation ≥94%
- IV hydrocortisone 100 mg stat
- IV magnesium sulphate 2 g infusion over 20 minutes (single dose)

Clinical Improvement* / No clinical improvement →

LIFE THREATENING
- SABA via oxygen driven nebuliser, repeat every 20 minutes for 1 hour
- Ipratropium bromide nebulizer 0.5 mg every 4 - 6 hours
- Controlled oxygen: target saturation ≥94%
- Consider early intubation^
- IV hydrocortisone 100 mg stat (if not given earlier)
- IV magnesium sulphate 2 g infusion over 20 minutes (single dose) (if not given earlier)
- Early referral to critical care

*Improvement of symptoms (not needing continuous SABA) and SpO2 ≥94% under room air
#Refer to **Subchapter 7.3** on **Monitoring and Evaluation**
^Patients with signs of respiratory distress, worsening hypoxaemia, hypercapnia or altered mental status or also failure to respond to maximal medical therapy

Abbreviations: AAP=asthma action plan; ABG=arterial blood gas; BP=blood pressure; CXR=chest X-ray; HFNC=high-flow nasal cannula; IV=intravenous; pMDI=pressurised metered-dose-inhaler; PR=pulse rate; RR=respiratory rate; SABA=short-acting β2-agonist; SpO_2=oxygen saturation

MONITORING AND EVALUATION#
- Conscious level, SpO2, PR, BP
- PaO_2 and $PaCO_2$
- CXR for complication and alternative diagnosis

REFER FOR ADMISSION AND/OR CRITICAL CARE

MEDICATIONS COMMONLY USED FOR ASTHMA

CLASS	DRUG	DOSING
	RELIEVER	
SABA	Salbutamol 100 µg/dose inhaler (pMDI)	• 1 to 2 puffs PRN (max. 8 puffs/day)
AIR	Budesonide 160 µg & formoterol 4.5 µg inhaler, Turbuhaler® (DPI)	• 1 puff PRN (max. 12 puffs/day)
	MAINTENANCE	
ICS	Beclometasone dipropionate 50, 100 & 200 µg/dose inhaler (pMDI)	• Extra-fine formulation: 50 to 400 µg BD (max.)
	Budesonide 100 & 200 µg/dose inhaler (pMDI)	• 100 to 800 µg BD (max.)
	Fluticasone propionate 50 & 125 µg/dose inhaler (pMDI)	• 100 to 1000 µg BD (max.)
ICS-LABA	Beclometasone dipropionate 100 µg & formoterol 6 µg inhaler (pMDI)	**Maintenance therapy:** • 1 to 2 puffs BD (max. 2 puffs BD) **Maintenance & reliever therapy**: • 1 puff BD • Take an additional 1 puff as needed • Total max. dose: 8 puffs/day (up to 12 puffs/day based on GINA)
	Budesonide 160 µg & formoterol 4.5 µg inhaler Turbuhaler® (DPI)	**Maintenance therapy**: • 1 to 2 puffs BD (max. 4 puffs BD) **Maintenance & reliever therapy**: • 1 puff BD or 2 puffs OD (2 puffs BD may be used in some patients) • Take an additional 1 puff as needed • Total max. dose: 12 puffs/day
	Fluticasone furoate 100 µg & vilanterol 25 µg inhaler Ellipta® (DPI)	• 1 puff OD
	Fluticasone furoate 200 µg & vilanterol 25 µg inhaler Ellipta® (DPI)	
	Salmeterol 25 µg & fluticasone propionate 125 µg inhaler (pMDI)	• 2 puffs BD
	Salmeterol 50 µg & fluticasone propionate 250 µg inhaler Accuhaler® (DPI)	• 1 puffs BD
	Salmeterol 50 µg & fluticasone propionate 500 µg inhaler Accuhaler® (DPI)	
LAMA	Tiotropium 2.5 µg, solution for inhalation, Respimat® (Soft Mist Inhaler)	• 2 puffs OD
ICS-LABA-LAMA	Indacaterol acetate 150 µg, glycopyrronium bromide 50 µg, mometasone furoate 160 µg inhalation powder cap, Breezhaler® (DPI)	• 1 cap OD (inhalation)
	Indacaterol acetate 150 µg, glycopyrronium bromide 50 µg, mometasone furoate 80 µg inhalation powder cap, Breezhaler® (DPI)	
	Beclometasone dipropionate 100 µg, formoterol fumarate dihydrate 6 µg, glycopyrronium bromide 12.5 µg (pMDI)	• 2 puffs BD
LTRA	Montelukast 10 mg tablet	• 10 mg OD

REFERRAL

The indications for asthma referral include:

- difficulty in confirming the diagnosis of asthma
- severe or uncontrolled asthma
- severe or life-threatening asthma exacerbations
- frequent unscheduled healthcare visits for exacerbations
- asthma in pregnancy
- frequent bursts or ongoing use of OCS
- asthma with multiple co-morbidities
- asthma with concurrent food allergy or anaphylaxis
- suspected occupational asthma