Updates in Asthma Management

รศ.นพ.ณรงค์กร ซ้ายโพธิ์กลาง

หน่วยโรคระบบการหายใจและเวชบำบัดวิกฤต

ภาควิชาอายุรศาสตร์ คณะแพทยศาสตร์ มหาวิทยาลัยธรรมศาสตร์

Asthma Guidelines



Key changes in GINA 2026 guidelines

- **Pediatric AIR therapy:** low-dose budesonide-formoterol for age 6-11 y
- **Oxygen saturation target**: **AE asthma O_2Rx if SpO_2 <92%**
- **Acute asthma flowchart**: for primary care and ER across all ages
- **New severe asthma biologics: Depemokimab** & **omalizumab-igec** (biosimilar anti-IgE)
- **Inhaler safety:** shaking salbutamol inhaler before each actuation
- **OCS Stewardship**: minimizing short- and long-term harm

WHAT'S NEW IN GINA 2026

Key Updates for Better Asthma Care

GINA
GLOBAL INITIATIVE FOR ASTHMA

1 ACUTE ASTHMA MANAGEMENT

4 NEW FLOWCHARTS (PRIMARY CARE & ED) BY AGE GROUP

NEW OXYGEN THRESHOLD

Do NOT start oxygen if SpO_2 > 92%

TARGET SpO_2

Adults & older children (6–11 years): 93%

Young children (≤ 5 years): 92%

ICS-FORMOTEROL IN ACUTE MILD EXACERBATION

Use as-needed low-dose ICS-formoterol instead of SABA alone to start anti-inflammatory reliever early

ANAPHYLAXIS

Give EPINEPHRINE FIRST, then bronchodilators

SABA DOSING – USE CAUTIOUSLY

Careful dosing to reduce risk of SABA toxicity (e.g., lactic acidosis)

4 NEW FLOWCHARTS PRIMARY CARE & ED | Adults (≥12 years) | Adolescents (12–17 years) | Children (6–11 years) | Young children (≤5 years)

ACUTE MANAGEMENT AT A GLANCE

MILD	MODERATE	SEVERE / LIFE-THREATENING
Talks in phrases, SpO_2 ≥93%, PEF >70%	Talks in words, SpO_2 92–93%, PEF 50–70%	Unable to speak, SpO_2 <92%, PEF <50%

START TREATMENT IMMEDIATELY

MILD	MODERATE	SEVERE / LIFE-THREATENING
• Low-dose ICS-formoterol as-needed (preferred) OR • SABA carefully dosed	• SABA carefully titrated + consider ipratropium • Add oral corticosteroid early • Reassess in 1 hour	• SABA + ipratropium • Systemic corticosteroid • Oxygen to target SpO_2 • Consider $MgSO_4$ • Arrange transfer / admission

REASSESS AT 1 HOUR OR EARLIER

If improving → continue treatment & plan discharge

If worsening or not improving → escalate care / transfer

ANAPHYLAXIS PRESENT?

Give EPINEPHRINE immediately before any other medication

3 NEW BIOLOGICS FOR SEVERE ASTHMA

NEW

DEPEMOKIMAB

(Anti–IL-5)

- Long-acting injection every 2 weeks
- Approved for use in eosinophilic asthma in patients ≥12 years

NEW

OMALIZUMAB–IGECC

(Anti–IgE Biobetter)

- First biosimilar of omalizumab
- Same indications as omalizumab

2 ASTHMA TREATMENT TRACKS – ICS IN EVERY PATIENT, NO SABA-ONLY

Track 1 (Preferred): Use low-dose ICS-formoterol as reliever in every step

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
TRACK 1 PREFERRED ICS-formoterol as reliever ✓	As-needed low-dose ICS-formoterol	Daily low-dose ICS + as-needed low-dose ICS-formoterol	Low-dose ICS-LABA + as-needed low-dose ICS-formoterol	Medium-dose ICS-LABA + as-needed low-dose ICS-formoterol	Add-on LAMA (Triple Therapy) e.g., budesonide–formoterol–glycopyrronium
TRACK 2 ALTERNATIVE SABA-based track	NEW As-needed ICS-SABA (simultaneous separate inhalers instead of SABA alone)	Low-dose ICS daily + as-needed SABA	Low-dose ICS-LABA + as-needed SABA	Medium/High-dose ICS-LABA + as-needed SABA	Add-on LAMA (Triple Therapy) e.g., budesonide–formoterol–glycopyrronium

✓ All Steps: Educate • Check inhaler technique • Adherence • Address risk factors • Review & Adjust

4 DIAGNOSIS & ASSESSMENT TOOLS

SIMPLIFIED DIAGNOSTIC FLOWCHART

Easier & clearer for everyday practice

NEW & UPDATED TOOLS

CAAT
(Childhood Asthma Assessment Test)
Now questionniare (from CAT in COPD) to assess control status in children (6 years through 12 years)

Ped-ACCESS
For children 5–11 years
Assesses symptoms, SABA risk, control

PRAM
(Pediatric Respiratory Assessment Measure)
Simplify recommended to assess severity and control in children up to 12 years

5 CHILDREN (≤ 11 YEARS): AIR THERAPY IN CHILDREN

CAGE study supports:

As-needed low-dose budesonide-formoterol in Step 1 and 2

- ✓ Reduces severe exacerbations by nearly 50% vs SABA alone
- ✓ No impact on growth velocity

Use age-appropriate devices and dosing

OTHER IMPORTANT UPDATES

GLP-1 RA
Preliminary evidence on the role of GLP-1 RA in patients with asthma and obesity – may improve outcomes in the future.

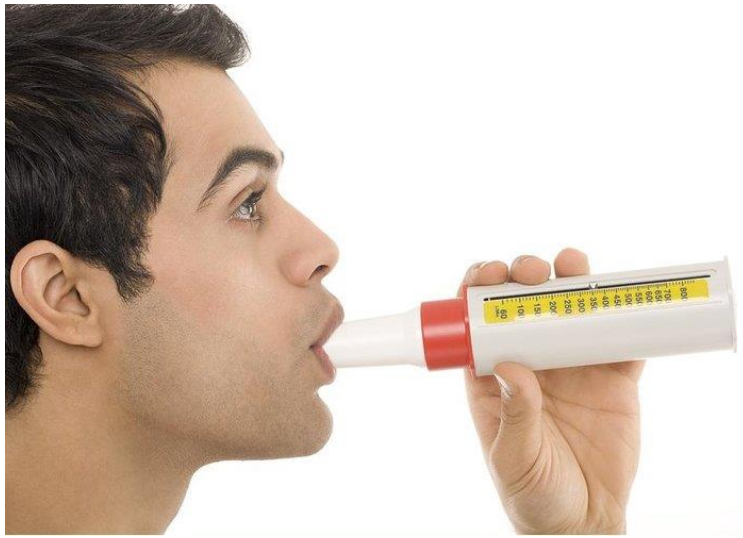
RSV VACCINATION
Updated efficacy data for RSV vaccines in pregnancy and use of nirsevimab in infants – may help reduce risk of wheeze and asthma in children.

OCS STEWARDSHIP
Maintain and re-evaluate OCS use to the lowest possible dose and shortest duration to reduce long-term risks.

Diagnosis of Asthma

- History of *4* respiratory symptoms +
- Evidence of variable expiratory airflow

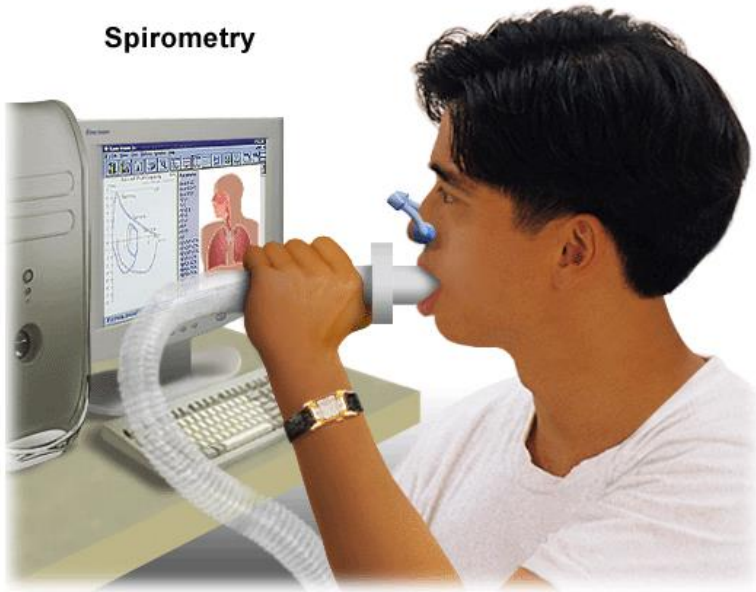
Peak Expiratory Flow (PEF)



PEF variability **>10%**

↑PEF >20% after BDR test

Spirometry

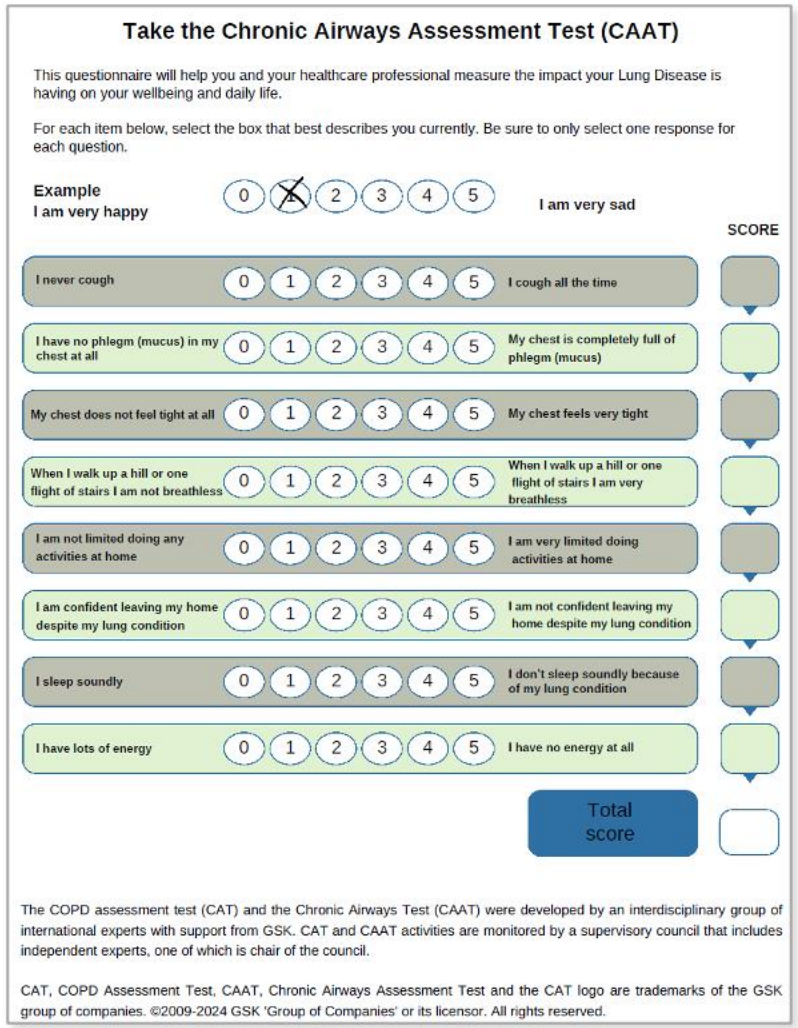


Bronchodilator response =

↑post-BD FEV_1 or FVC **200 mL & 12%**

Chronic Airways Assessment Test (CAAT)

- CAAT is a brief (2–3 minute) patient-reported health status tool for a range of respiratory conditions
  - Gives more information about the patient's health status than standard asthma questionnaires includes cough, energy)
  - Identical to the CAT (COPD Assessment Test) except for the introductory sentence (now "… your lung disease")
- Validated for use in asthma and/or COPD, and being validated for bronchiectasis and interstitial lung disease
- Available in multiple translations, and for electronic and paper use: https://gaapp.org/caat-cat



Take the Chronic Airways Assessment Test (CAAT)

This questionnaire will help you and your healthcare professional measure the impact your Lung Disease is having on your wellbeing and daily life.

For each item below, select the box that best describes you currently. Be sure to only select one response for each question.

Example I am very happy	0	X	2	3	4	5	I am very sad

SCORE

I never cough	0	1	2	3	4	5	I cough all the time
I have no phlegm (mucus) in my chest at all	0	1	2	3	4	5	My chest is completely full of phlegm (mucus)
My chest does not feel tight at all	0	1	2	3	4	5	My chest feels very tight
When I walk up a hill or one flight of stairs I am not breathless	0	1	2	3	4	5	When I walk up a hill or one flight of stairs I am very breathless
I am not limited doing any activities at home	0	1	2	3	4	5	I am very limited doing activities at home
I am confident leaving my home despite my lung condition	0	1	2	3	4	5	I am not confident leaving my home despite my lung condition
I sleep soundly	0	1	2	3	4	5	I don't sleep soundly because of my lung condition
I have lots of energy	0	1	2	3	4	5	I have no energy at all
							Total score

The COPD assessment test (CAT) and the Chronic Airways Test (CAAT) were developed by an interdisciplinary group of international experts with support from GSK. CAT and CAAT activities are monitored by a supervisory council that includes independent experts, one of which is chair of the council.

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Tomaszewski EL et al. Respir Res 2023; 24: 106; Jones et al, ERJ Open Res 2025.

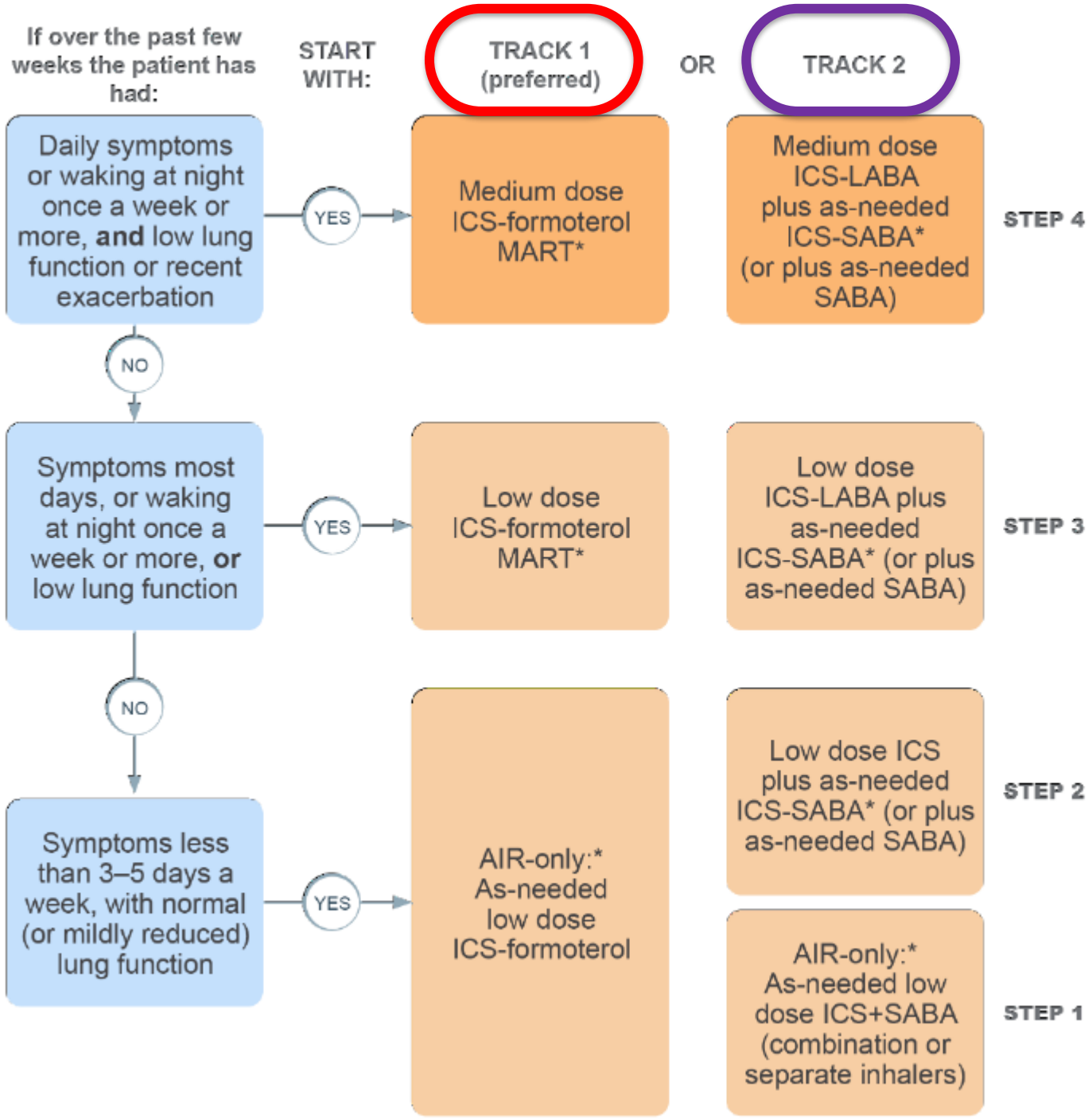
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Initial Treatment

อาการทุกวัน *หรือ* ตื่นกลางคืน ≥ 1 ครั้ง/สัปดาห์ และ ค่าสมรรถภาพปอดต่ำ *หรือ* หอบกำเริบเร็ว ๆ นี้

อาการเกือบทุกวัน *หรือ* ตื่นกลางคืน ≥ 1 ครั้ง/สัปดาห์ *หรือ* ค่าสมรรถภาพปอดต่ำ

อาการ < 3 - 5 ครั้ง/สัปดาห์ และ ค่าสมรรถภาพปอดปกติ



"As-needed ICS+SABA with separate inhalers" means that the patient should take a low dose ICS whenever they take SABA for symptom relief

AIR = anti-inflammatory reliever
ICS = inhaled corticosteroid
LABA = long-acting beta-2 agonist
MART = maintenance and reliever therapy
SABA = short-acting beta-2agonist

GINA 2026
Adults & adolescents 12+ years

Personalized asthma management

Assess, Adjust, Review for individual patient needs



ASSESS

- Confirmation of diagnosis if necessary
- Symptom control & modifiable risk factors
- Comorbidities
- Inhaler technique & adherence
- Patient (and parent/caregiver) preferences and goals

REVIEW

- Symptoms
- Exacerbations
- Side-effects
- Comorbidities
- Lung function
- Consider biomarkers
- Patient (and parent/caregiver) satisfaction

ADJUST

- Treatment of modifiable risk factors and comorbidities
- Non-pharmacological strategies
- Asthma medication including ICS
- Education & skills training, action plan

TRACK 1: PREFERRED CONTROLLER and RELIEVER

Using ICS-formoterol* as the reliever reduces the risk of exacerbations compared with using a SABA reliever, and Track 1 is a simple, single inhaler, strategy

STEPS 1 – 2	STEP 3	STEP 4	STEP 5
AIR-only:* as-needed low dose ICS-formoterol	MART* with low dose maintenance ICS-formoterol	MART* with medium dose maintenance ICS-formoterol	Consider add-on LAMA. Refer for assessment of phenotype. Consider trial of high dose maintenance ICS-formoterol. Consider anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

RELIEVER: As-needed low dose ICS-formoterol*

TRACK 2: Alternative **CONTROLLER and RELIEVER**

Before considering a regimen with a SABA reliever, check if the patient is likely to adhere to their ICS treatment

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
AIR-only:* as-needed low dose ICS+SABA (combination or separate inhalers)	Low dose maintenance ICS	Low dose maintenance ICS-LABA	Medium dose maintenance ICS-LABA	Consider add-on LAMA. Refer for assessment of phenotype. Consider trial of high dose maintenance ICS-LABA. Consider anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

RELIEVER: As-needed low dose ICS-SABA* (or, if not available, as-needed SABA)

See GINA severe asthma guide

GINA 2026 Asthma Treatment

TRACK 1

PREFERRED CONTROLLER and RELIEVER

Using ICS–formoterol* as the reliever reduces the risk of exacerbations compared with using a SABA reliever.

Track 1 is a simple, single inhaler strategy.

STEPS 1 – 2	STEP 3	STEP 4	STEP 5
AIR-only*: as-needed low dose ICS–formoterol	MART* with low dose maintenance ICS–formoterol	MART* with medium dose maintenance ICS–formoterol	Consider add-on LAMA. Refer for assessment of phenotype. Consider trial of high dose maintenance ICS–formoterol. Consider

Budesonide-formoterol 160/4.5
Beclometasone-formoterol 100/6

+Tiotropium
Budesonide-formoterol-glycopyrronium
Fluticasone-vilanterol-umeclidinium
Beclomethasone-formoterol-glycopyrronium

RELIEVER: As-needed low dose ICS–formoterol*

TRACK 2

ALTERNATIVE CONTROLLER and RELIEVER

Before considering a regimen with a SABA reliever, check if the patient is likely to adhere to their ICS treatment.

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
AIR-only*: as-needed low dose ICS + SABA (combination or separate inhalers)	Low dose maintenance ICS	Low dose maintenance ICS–LABA	Medium dose maintenance ICS–LABA	Consider add-on LAMA. Refer for assessment of phenotype. Consider trial of high dose maintenance ICS–LABA. Consider anti–IgE, anti–IL5/5R, anti–IL4Rα, anti–TSLP

RELIEVER: As-needed low dose ICS–SABA* (or, if not available, as-needed SABA)

KEY POINTS

- Track 1 (ICS–formoterol) is the preferred approach.
- It reduces the risk of severe exacerbations.
- Track 2 (SABA reliever) is an alternative when Track 1 is not suitable.
- Steps 4–5: Consider add-on LAMA and referral for assessment of phenotype.

AIR = anti-inflammatory reliever
ICS = inhaled corticosteroid
LABA = long-acting beta-2 agonist
LAMA = long-acting muscarinic antagonist
MART = maintenance and reliever therapy
SABA = short-acting beta-2agonist

GLOBAL INITIATIVE FOR ASTHMA

EVIDENCE-BASED.
PERSON-CENTERED.
BETTER ASTHMA OUTCOMES.

GINA 2026:
No SABA Monotherapy

Every patient should receive ICS-containing treatment to **reduce the risk** of life-threatening exacerbations.

SABA MONOTHERAPY

- ✕ Increases risk of severe exacerbations
- ✕ No anti-inflammatory protection
- ✕ Higher risk of hospitalization
- ✕ Linked to increased asthma-related deaths





ICS-FORMOTEROL (AIR / MART)

- ✓ Reduces risk of severe exacerbations
- ✓ Provides anti-inflammatory protection
- ✓ Lowers risk of hospitalization
- ✓ Improves long-term asthma outcomes

PROVEN TO REDUCE RISK

- FEWER EXACERBATIONS ↓
- FEWER HOSPITAL VISITS ↓
- LOWER RISK OF INTENSIVE CARE ADMISSIONS ↓
- REDUCED RISK OF ASTHMA-RELATED DEATHS ↓

SAFETY FIRST. INFLAMMATION FIRST.
Choose ICS-containing treatment.
Protect today. Prevent tomorrow.

WORLD ASTHMA DAY 2026
MAY 5, 2026

Theme: "Access to anti-inflammatory inhalers for everyone with asthma"
Ensuring access to ICS is the simplest way to reduce asthma mortality globally.

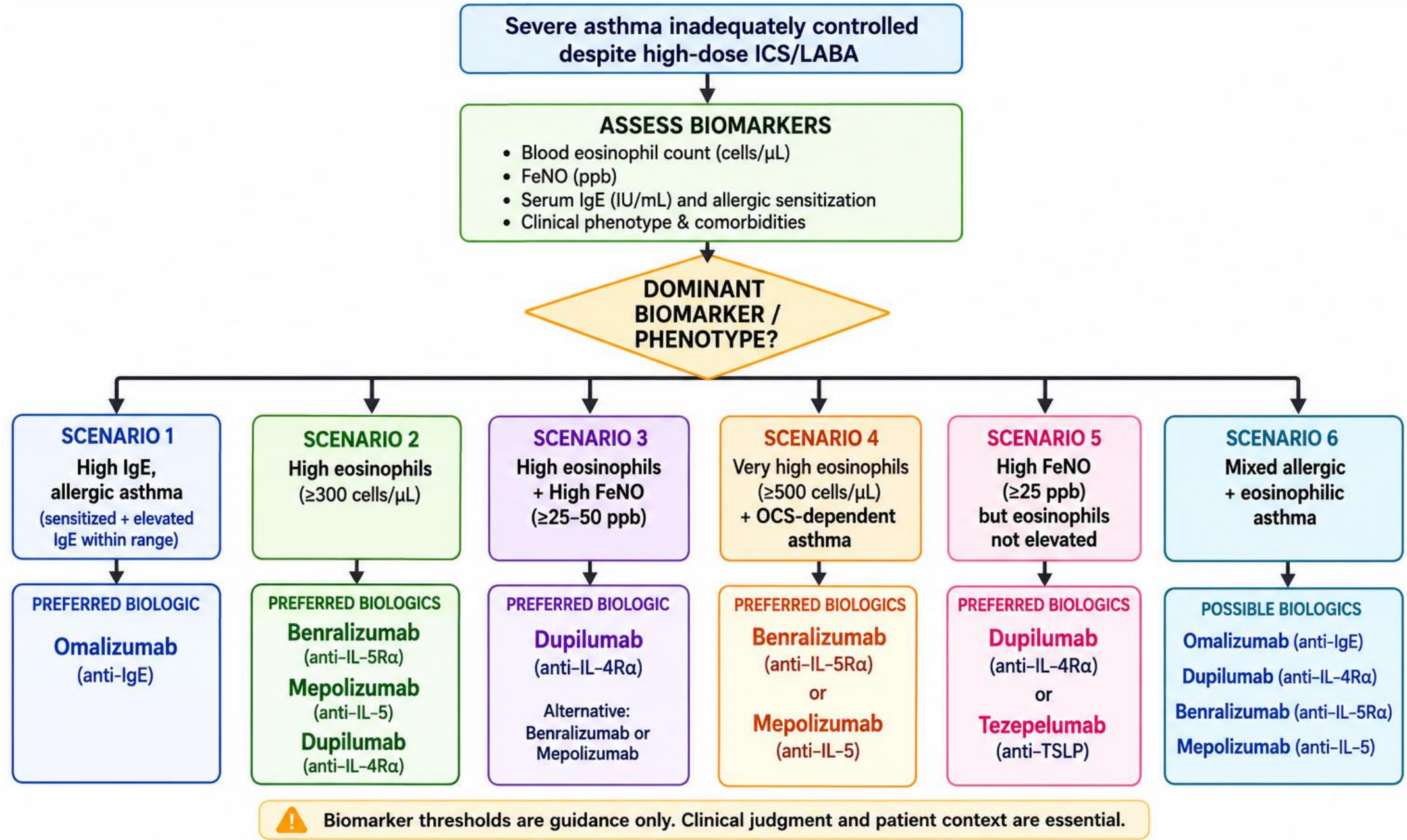
Management of Severe Asthma

- **Confirm diagnosis** and **optimize adherence/inhaler technique**
- Identify Type 2 inflammation: **eosinophils, FeNO, allergy test**
- Biologics: **anti-IgE, anti-IL5/5R, anti-IL4Rα, or anti-TSLP**
- **Avoid long-term oral corticosteroids** if possible
- **Regular review** and **personalized asthma action plan** are essential

	Omalizumab	Mepolizumab	Reslizumab	Benralizumab	Dupilumab	Tezepelumab
Biomarkers associated with reduced exacerbation rate						
BEC, cells/uL	≥260	≥300	≥400	≥300	**≥300**	≥150
FeNO, ppb	≥19.5	Not associated	Not associated	Not associated	**≥25**	≥25
Outcomes						
Exacerbation rate reduction	25%	~50%	~40%	~50%	**~70%**	~70%
OCS reduction		**++**		**++**	**++**	
Quality of life improvement	+	+	+	+	+	++
FEV_1 improvement	+/–	+	+/–	+	++	++
Treatment of comorbidities						
CRSwNP	**++**	**++**		**+**	**++**	
Atopic dermatitis					**++**	
EGPA		**++**	**+**	**+**		
Practical considerations						
Age	6+	6+	18+	6+	6+	12+
Frequency & route	2–4 weekly, sc	4 weekly, sc	4 weekly, **iv**	8 weekly, sc	2 weekly, sc	4 weekly, sc

Asthma and Allergy Foundation of America 2024. Kavanagh JE, et al. Breathe (Sheff) 2021;17:210144.

PRACTICAL DECISION ALGORITHM
for Biologic Treatment in Severe Asthma



Biologics for asthma in Thailand



1. Omalizumab
2. Benralizumab
3. Mepolizumab
4. Dupilumab
5. Tezepelumab
6. Omalizumab-igec

ASTHMA EXACERBATION (GINA 2026)

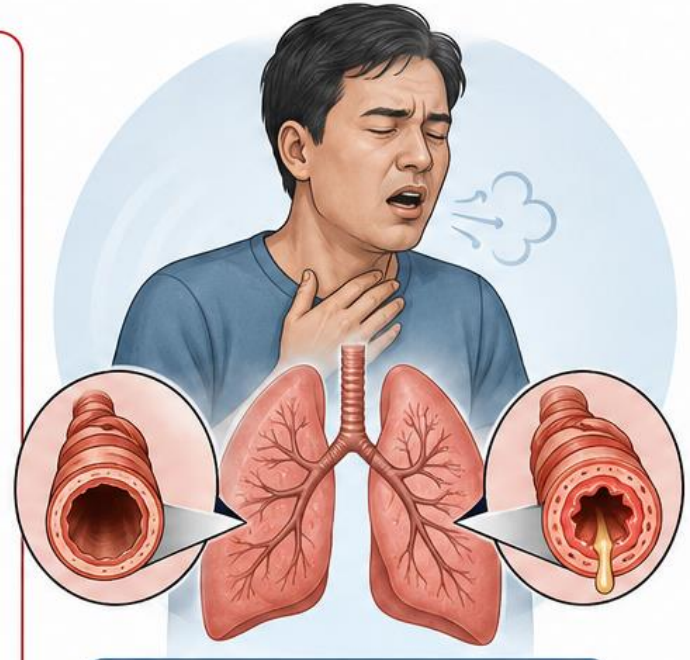
DEFINITION

Progressive increase in symptoms (shortness of breath, cough, wheezing, or chest tightness) and a **progressive decrease in lung function** that represents a significant change from the patient's usual status

PROGRESSIVE INCREASE IN SYMPTOMS



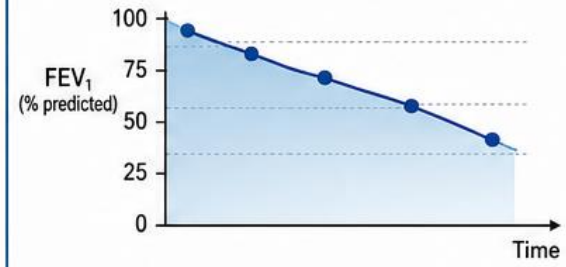
- **Shortness of breath** (Dyspnea)
- **Cough**
- **Wheezing**
- **Chest tightness**



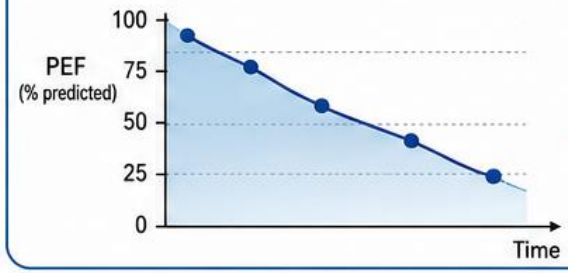
Airway inflammation, edema, bronchoconstriction and mucus lead to worsening airflow limitation

PROGRESSIVE DECREASE IN LUNG FUNCTION

FEV_1 (Forced Expiratory Volume in 1 second)



PEF (Peak Expiratory Flow)





REPRESENTS A SIGNIFICANT CHANGE FROM THE PATIENT'S USUAL STATUS

An exacerbation is an acute or sub-acute deterioration in symptoms and lung function that may require a change in treatment.

Common exacerbation triggers

- Viral respiratory infections
- Allergen exposure
- Food allergy
- Outdoor air pollution
- Seasonal changes
- Poor adherence with ICS

Risk factors for asthma-related death

- **History of near-fatal asthma requiring intubation and mechanical ventilation**
- **Hospitalization** or **emergency care visit** for asthma in the past year
- **Current use of oral corticosteroids**
- **Not use of ICS**
- **Over-use of SABA** (>1 canister/mo)
- Poor adherence with ICS and/or written asthma action plan
- History of psychiatric disease
- Food allergy or history of anaphylaxis
- Poor perception of bronchoconstriction/ severe AHR
- Comorbidities: pneumonia, DM, arrhythmia

GINA
GLOBAL INITIATIVE FOR ASTHMA

Managing Worsening Asthma (1–4 weeks)

Track 1 (ICS-formoterol) remains the preferred GINA strategy.



PREFERRED
ICS–FORMOTEROL RELIEVER

During worsening asthma, increase anti-inflammatory treatment early, not just bronchodilator use.



WORSENING ASTHMA →  INCREASE ICS EARLY →  BETTER CONTROL & PREVENT EXACERBATION

Quadrupling ICS dose for 1–2 weeks is recommended in selected patients using Track 2.



USUAL ICS DOSE →



QUADRUPLE ICS DOSE FOR 1–2 WEEKS

1–2 WEEKS

Urgent medical review is needed if reviewer use exceeds safety thresholds.

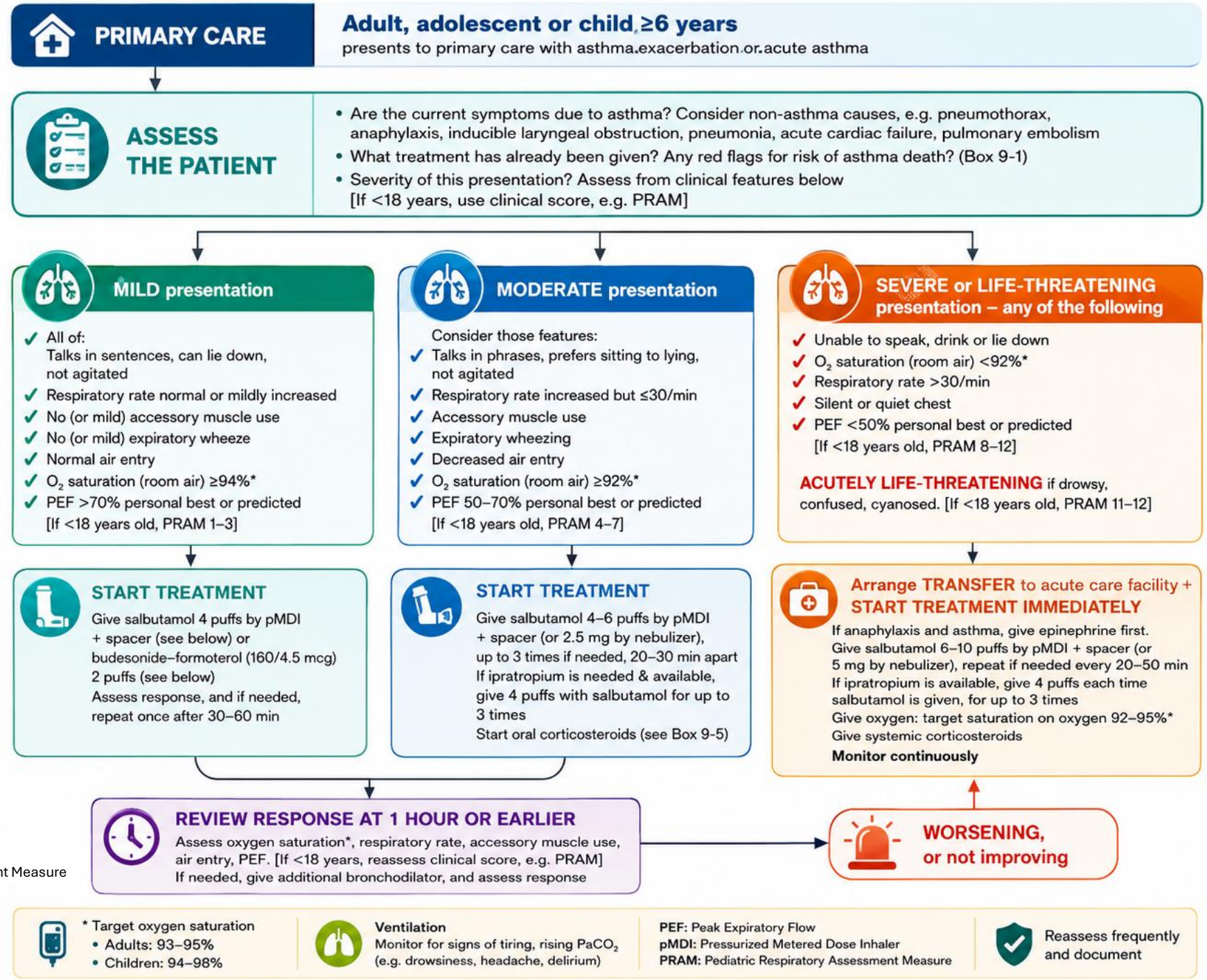
ICS–FORMOTEROL (Track 1)	ICS–SABA (Track 2)	SABA RELIEVER (Track 2)
>12 inhalations/day (total reliever use)	>6 doses/day (>12 inhalations/day)	>12 inhalations/day

Excessive reliever use indicates poor asthma control and risk of severe exacerbation.



FREQUENT RELIEVER USE (OVER THRESHOLD) →  POOR ASTHMA CONTROL →  HIGH RISK OF SEVERE EXACERBATION →  URGENT MEDICAL ATTENTION NEEDED

ONE-LINE MEMORY AID: "Worsening asthma → increase ICS early, continue reliever appropriately, and seek care when reliever use becomes excessive." (GINA 2026)



PRAM=Pediatric Respiratory Assessment Measure

Pediatric Respiratory Assessment Measure (PRAM)

- Included in GINA 2026 for assessment of severity of acute asthma in children aged 2–17 years
- Internal and external validation
- Strong association with need for admission
- Responsive to change after bronchodilator
- Online training available

Chalut et al, J Pediatr 2000; Ducharme et al, J Pediatr 2008



Oxygen saturation by pulse oximetry may be overestimated in people with dark skin color

Adjust oxygen saturation targets for altitude, where relevant, e.g. ≥1,500–2,000 m

PRAM scoring table

O_2 Saturation	≥ 95%	0
	92-94%	1
	< 92%	2
Suprasternal retraction	Absent	0
	Present	2
Scalene muscle contraction	Absent	0
	Present	2
Air entry*	Normal	0
	↓ at the base	1
	↓ at the apex and the base	2
	Minimal or absent	3
Wheezing §	Absent	0
	Expiratory only	1
	Inspiratory (± expiratory)	2
	Audible without stethoscope or silent chest (minimal or no air entry)	3
	PRAM score : (max. 12)	

Score	0-3	4-7	8-12
Severity	Mild	Moderate	Severe

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* In case of asymmetry, the most severely affected (apex-base) lung field (right or left, anterior or posterior) will determine the rating of the criterion.
§In case of asymmetry, the two most severely affected auscultation zones, irrespectively of their location (RUL, RML, RLL, LUL, LLL), will determine the rating of the criterion. The PRAM score is reproduced and adapted with the permission of Dr Francine Ducharme.

GINA 2026 Box 12-2

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IMPROVING

ASSESS FOR DISCHARGE

- Symptoms and signs improved and satisfy 'mild' criteria above for at least 1–2 hours after last salbutamol dose.
- Oxygen saturation ≥92%* on room air
- PEF improving, and >70% of personal best or predicted
- Adequate resources at home

ARRANGE BEFORE DISCHARGE

- **Document the diagnosis** of asthma, if confirmed (Box 1-2)
- **Start or increase ICS-containing therapy** to reduce risk of another attack; preferably ICS-formoterol MART if ≥12 years (Box 4-7, 4-8)
- **Reliever** should be taken as needed NOT routinely.
- **Train inhaler technique** (with spacer if pMDI), and reinforce adherence
- **Continue OCS (if started):** see Box 9-5 for duration
- **Arrange follow-up:** adults within 2–7 days; children 2–5 days
- Ensure adequate medication supply until follow-up

For more detailed discharge instructions, see Box 9-5

How to give bronchodilators by pMDI and spacer for acute asthma

- Salbutamol (albuterol) 100 mcg per puff; ipratropium (if needed) 20 mcg per puff
- Give by spacer 1 puff at a time (if too breathless for single breath with breath hold, use tidal breathing)
- Salbutamol, shake inhaler ***before every puff***

*Oxygen saturation may be overestimated by pulse oximetry in people with dark skin color. At altitude (e.g. >1500–2000m), oxygen saturation is normally lower than at sea level.

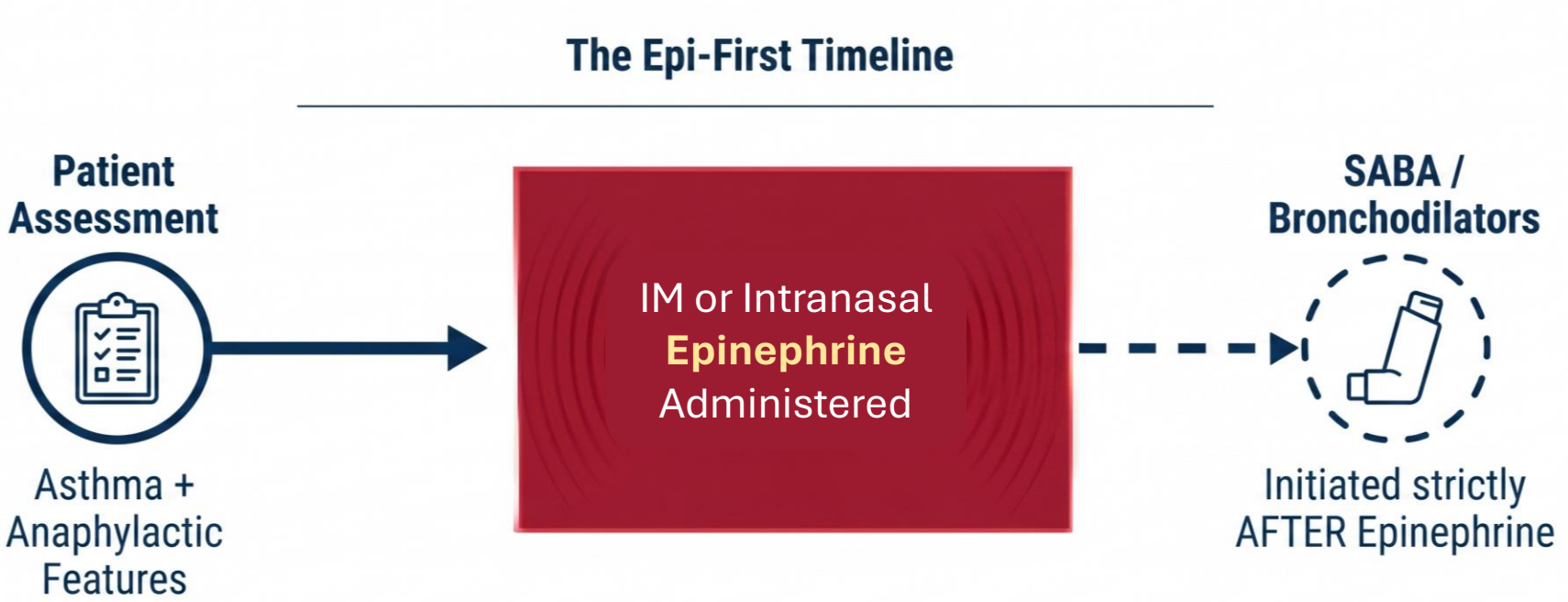
FOLLOW UP (adults within 2–7 days; children 2–5 days)

- **Review symptoms and signs:** Is the exacerbation resolving? If not, should OCS be continued, or patient sent to ED?
- **Inhalers:** Confirm that the patient is continuing ICS-containing therapy. If ≥12 years, preferably switch to maintenance-and-reliever therapy (MART) with ICS-formoterol if not already done (Box 4-7, 4-8)
- **Reliever:** confirm it is being taken as-needed rather than routinely
- **Check and correct inhaler technique and adherence**
- **Risk factors:** check and correct modifiable risk factors (Box 2-2B)
- **Action plan:** Understood? Used appropriately? Needs modification?
- **Refer for expert advice** if more than 1 course of OCS in last year
- **Arrange** next follow-up visit within 2–3 months.

Additional treatment for asthma exacerbation

- **High-dose ICS** given **within first** hour reduces the need for hospitalization in patients not receiving systemic corticosteroids
- **IV magnesium** 2 g iv over 20 minutes for FEV_1 <25-30% at presentation
- Aminophylline and theophylline are not recommended
- Antibiotics is not recommended unless strong evidence of lung infection

Asthma with anaphylaxis



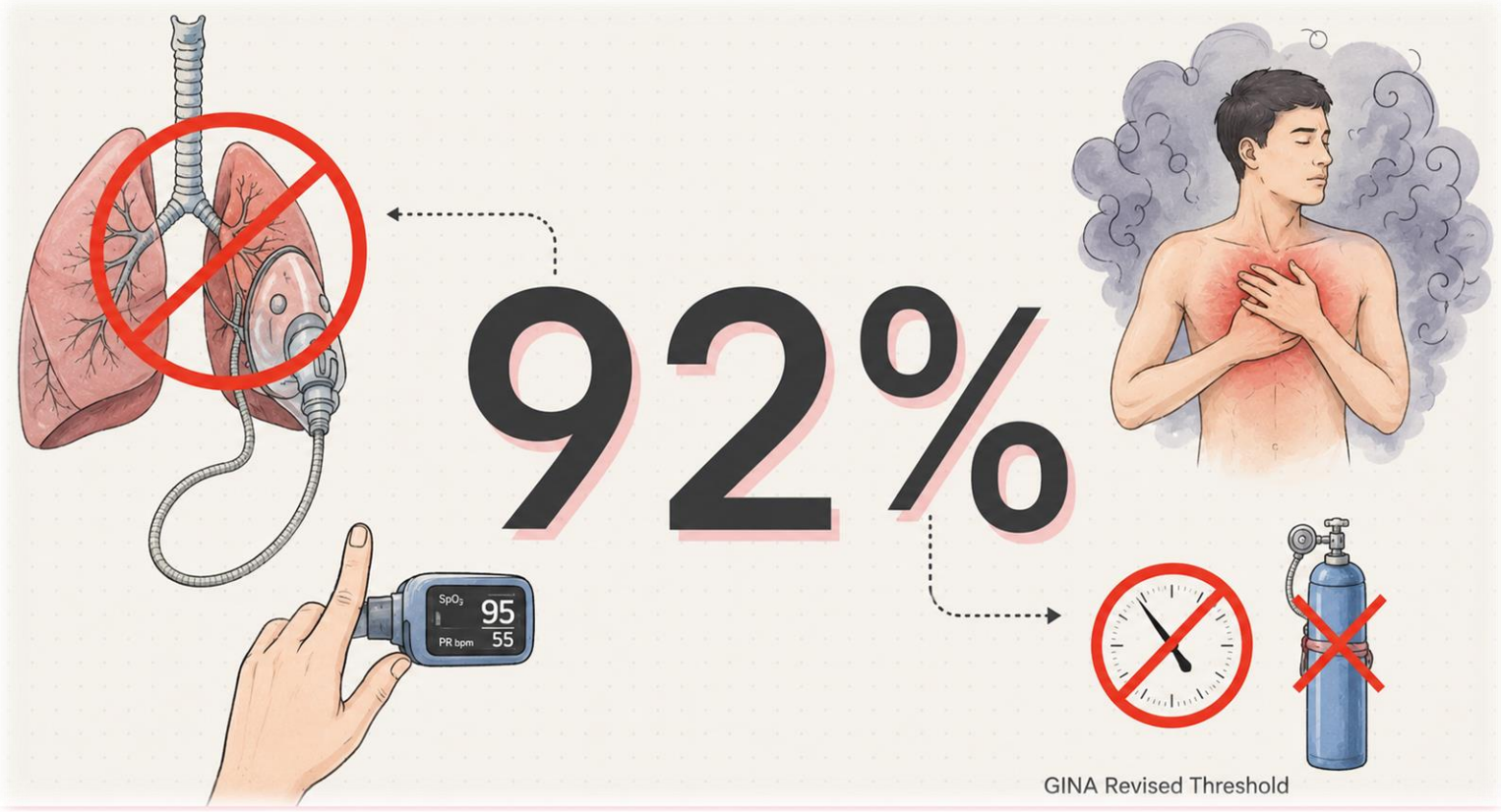
- When asthma presents with anaphylaxis, **give epinephrine (adrenaline) first**
- **Do not delay** epinephrine for bronchodilator
- **Dosage** : 1 mg/mL (1:1,000) 0.5 mL intramuscularly
- Epinephrine can be administered **intranasally**



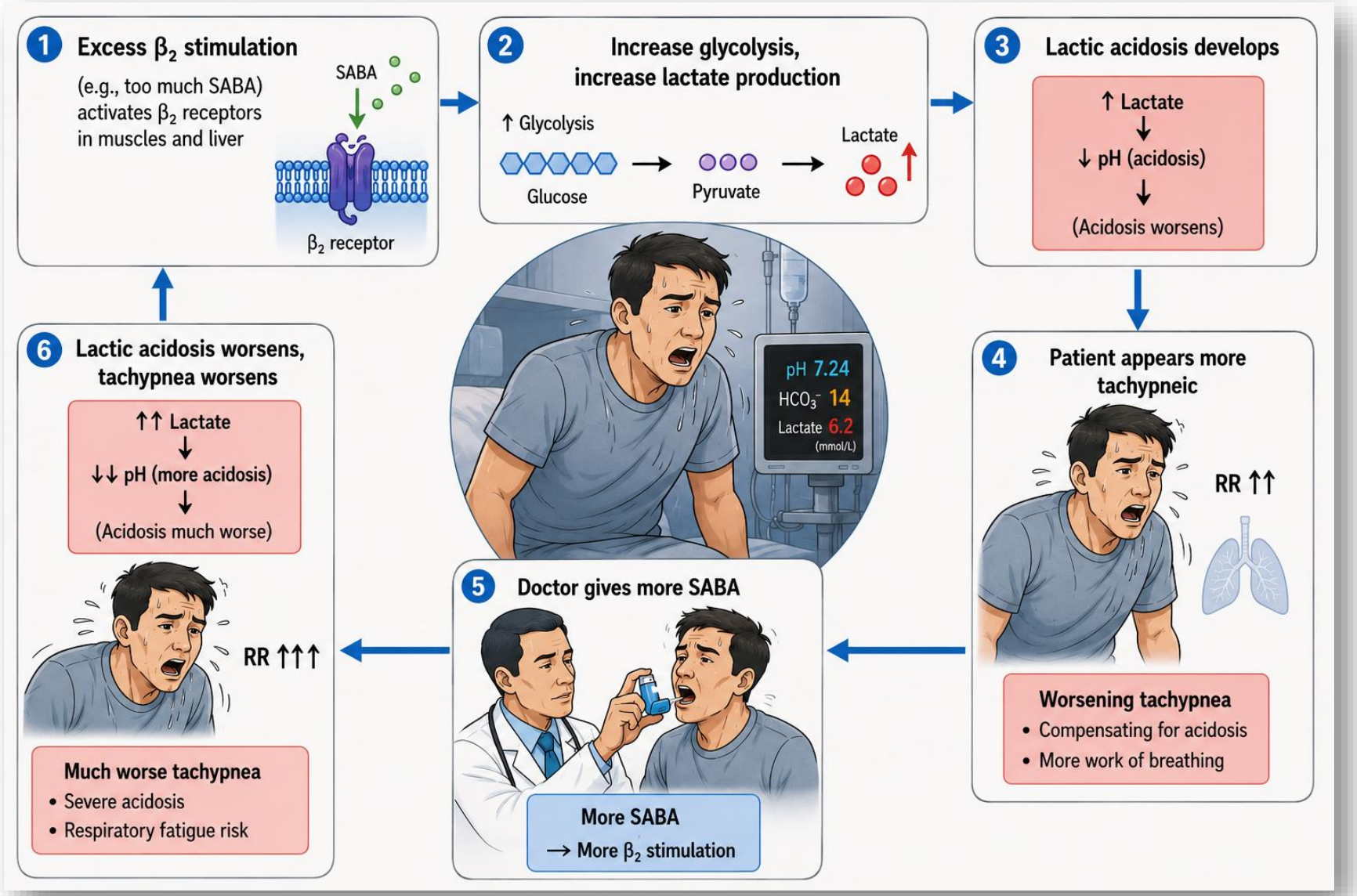
SpO_2 thresholds and target levels

- Supplemental oxygen **not recommended unless saturation is below 92%**
- If oxygen is given, **the upper limit** of the **oxygen saturation target is 95%**

Keep SpO_2 92-95%



Recommended dose of SABA



Mild

- **Salbutamol** pMDI **4 puff** with spacer

Moderate

- **Salbutamol** pMDI **4-6 puff** + **ipratropium** 4 puff with spacer
- Up to 3 times every 20-30 mins

Severe

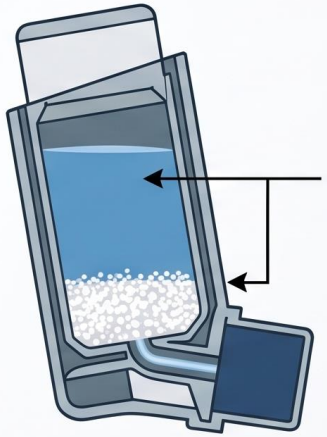
- **Salbutamol** pMDI **6-10 puff** + **ipratropium** 4 puff with spacer
- Up to 3 times every 20-30 mins

SABA Toxicity

- Tachycardia
- Palpitation
- Anxiety
- Hypokalemia
- Arrhythmias
- Lactic acidosis
- Hyperventilation

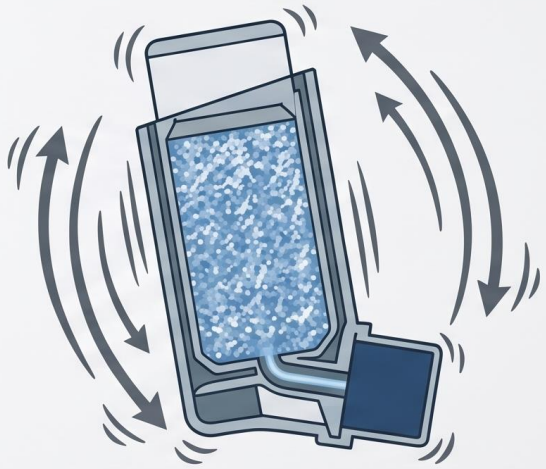
To avoid **inadvertent administration** of ultra-high doses with a new inhaler

Unshaken



Separation causes ultra-high medication doses initially, and empty propellant-only doses later.

Agitated



Shake immediately BEFORE EACH INDIVIDUAL ACTUATION.
Do not shake once for a 4-puff sequence.

Spacer Management: Pre-washing with detergent (or pri with 2–4 puffs of the inhaler) before use.

NotebookLM

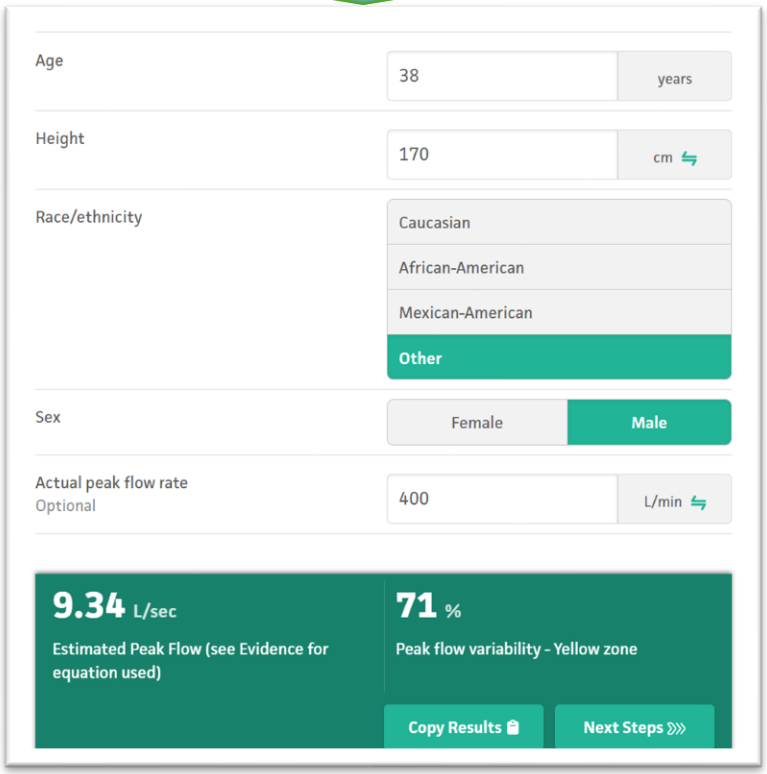
Lung function measurement

- Using **spirometry** or **PEF**, is strongly recommended for all patient (except preschool or life-threatening presentation)
  - ✓ **Before treatment is initiated**
  - ✓ **Review response** after 1 hour or earlier
  - ✓ **Again before discharge**





Estimated peak expiratory flow (PEF)



Criteria to discharge home for AE asthma



Symptoms significantly improved



Satisfy **"Mild criteria"** for **at least 1-2 hours** after last dose salbutamol



SpO_2 > 92% on room air



FEV_1 or **PEF > 70%** personal best or predicted

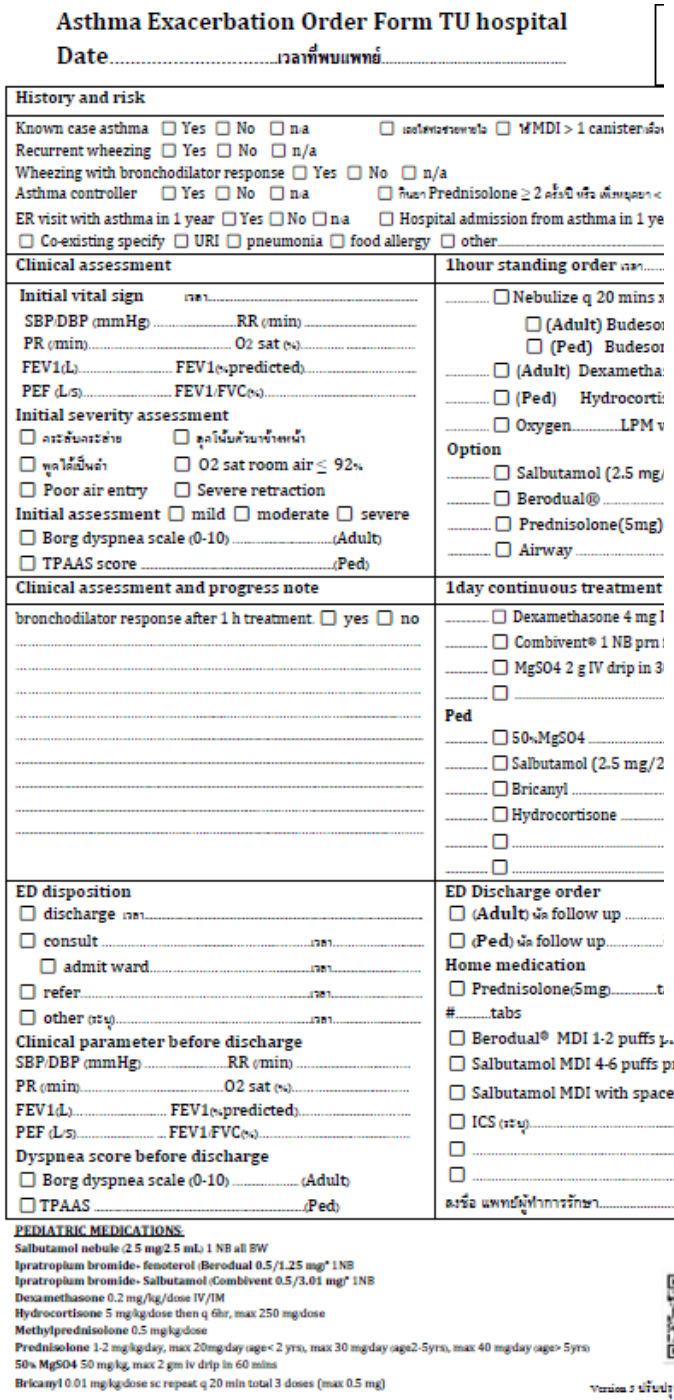


Adequate resources at home

Summary : management of exacerbation

Mild	Moderate	Severe
○ **Salbutamol 4 puffs** pMDI with spacer ○ **Budesonide/Formoterol** DPI (160/4.5) 2 puffs	○ Salbutamol **4-6 puffs** pMDI with spacer ○ Salbutamol **2.5 mg** NB ✓ **+ Ipratropium 4 puffs (if available)** ✓ **Up to 3 times** if needed, **20-30 min apart**	○ Salbutamol **6-10 puffs** pMDI with spacer ○ Salbutamol **5 mg** NB ✓ **+ Ipratropium 4 puffs (if available)** ✓ **Up to 3 times** if needed, **20-30 min apart**
		✓ **Give oxygen** ✓ Target SpO_2 92-95%
	• Oral corticosteroids	• Oral / IV systemic steroid
	• Consider IV magnesium (only if FEV_1 < 60% predicted after 1 h of care)	• Consider IV magnesium

Global Strategy for Asthma Management and Prevention. Updated 2026. https://ginasthma.org/gina-reports/



Asthma Exacerbation Order Form TU hospital

Date.....เวลาที่พบแพทย์.....

History and risk

Known case asthma ☐ Yes ☐ No ☐ n/a ☐ เคยใส่ท่อช่วยหายใจ ☐ ใช้ MDI > 1 canister/เดือน

Recurrent wheezing ☐ Yes ☐ No ☐ n/a

Wheezing with bronchodilator response ☐ Yes ☐ No ☐ n/a

Asthma controller ☐ Yes ☐ No ☐ n/a ☐ กินยา Prednisolone ≥ 2 ครั้ง/ปี หรือ เพิ่งหยุดยา <

ER visit with asthma in 1 year ☐ Yes ☐ No ☐ n/a ☐ Hospital admission from asthma in 1 ye

☐ Co-existing specify ☐ URI ☐ pneumonia ☐ food allergy ☐ other.....

Clinical assessment

Initial vital sign เวลา.....

SBP/DBP (mmHg).....RR (/min).....

PR (/min).....O2 sat (%).....

FEV1(L).....FEV1(%predicted).....

PEF (L/S).....FEV1/FVC(%).....

Initial severity assessment

☐ กระสับกระส่าย ☐ ลูกโน้มตัวมาข้างหน้า

☐ พูดได้เป็นคำ ☐ O2 sat room air ≤ 92%

☐ Poor air entry ☐ Severe retraction

Initial assessment ☐ mild ☐ moderate ☐ severe

☐ Borg dyspnea scale (0-10).....(Adult)

☐ TPAAS score.....(Ped)

1hour standing order เวลา.....

.....☐ Nebulize q 20 mins x

☐ (Adult) Budeso

☐ (Ped) Budeso

.....☐ (Adult) Dexametha

.....☐ (Ped) Hydrocorti

.....☐ Oxygen.....LPM v

Option

.....☐ Salbutamol (2.5 mg/

.....☐ Berodual®.....

.....☐ Prednisolone(5mg)

.....☐ Airway.....

Clinical assessment and progress note

bronchodilator response after 1 h treatment ☐ yes ☐ no

1day continuous treatment

.....☐ Dexamethasone 4 mg I

.....☐ Combivent® 1 NB prn

.....☐ MgSO4 2 g IV drip in 3

.....☐

Ped

.....☐ 50%MgSO4.....

.....☐ Salbutamol (2.5 mg/2

.....☐ Bricanyl.....

.....☐ Hydrocortisone.....

.....☐

.....☐

ED disposition

☐ discharge เวลา.....

☐ consult.....เวลา.....

☐ admit ward.....เวลา.....

☐ refer.....เวลา.....

☐ other (ระบุ).....เวลา.....

Clinical parameter before discharge

SBP/DBP (mmHg).....RR (/min).....

PR (/min).....O2 sat (%).....

FEV1(L).....FEV1(%predicted).....

PEF (L/S).....FEV1/FVC(%).....

Dyspnea score before discharge

☐ Borg dyspnea scale (0-10).....(Adult)

☐ TPAAS.....(Ped)

ED Discharge order

☐ (Adult) นัด follow up.....

☐ (Ped) นัด follow up.....

Home medication

☐ Prednisolone(5mg).....t

#.....tabs

☐ Berodual® MDI 1-2 puffs p... for dyspnea #.....

☐ Salbutamol MDI 4-6 puffs prn for dyspnea #.....

☐ Salbutamol MDI with spacer 4 puffs q 6-8 hrs #.....

☐ ICS (ระบุ).....

☐.....

☐.....

ลงชื่อ แพทย์ผู้ทำการรักษา.....เวลา.....

PEDIATRIC MEDICATIONS:

Salbutamol nebule (2.5 mg/2.5 mL) 1 NB all BW

Ipratropium bromide- fenoterol (Berodual 0.5/1.25 mg/* 1 NB

Ipratropium bromide- Salbutamol (Combivent 0.5/3.01 mg/* 1NB

Dexamethasone 0.2 mg/kg/dose IV/IM

Hydrocortisone 5 mg/kg/dose then q 6hr, max 250 mg/dose

Methylprednisolone 0.5 mg/kg/dose

Prednisolone 1-2 mg/kg/day, max 20mg/day (age< 2 yrs), max 30 mg/day (age2-5yrs), max 40 mg/day (age> 5yrs)

50% MgSO4 50 mg/kg, max 2 gm iv drip in 60 mins

Bricanyl 0.01 mg/kg/dose sc repeat q 20 min total 3 doses (max 0.5 mg)

Download Asthma care

Version 2 ปรับปรุงเมื่อ 15/5/69

Android

Asthma Exacerbation Order Form TU hospital

Date.....เวลาที่พบแพทย์.....

สติ๊กเกอร์ผู้ป่วย

History and risk

Known case asthma ☐ Yes ☐ No ☐ n/a ☐ เคยใส่ท่อช่วยหายใจ ☐ ใช้ MDI > 1 canister/เดือน

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Wheezing with bronchodilator response ☐ Yes ☐ No ☐ n/a

Asthma controller ☐ Yes ☐ No ☐ n/a ☐ กินยา Prednisolone ≥ 2 ครั้ง/ปี หรือ เพิ่งหยุดยา < 1 wk

ER visit with asthma in 1 year ☐ Yes ☐ No ☐ n/a ☐ Hospital admission from asthma in 1 year ☐ Yes ☐ No ☐ n/a

☐ Co-existing specify ☐ URI ☐ pneumonia ☐ food allergy ☐ other.....

Clinical assessment

Initial vital sign เวลา.....

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☐ พูดได้เป็นคำ ☐ O2 sat room air ≤ 92%

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Initial assessment ☐ mild ☐ moderate ☐ severe

☐ Borg dyspnea scale (0-10).....(Adult)

1hour standing order เวลา.....

..... ☐ Nebulize q 20 mins x 3 doses of Combivent® 1 NB +

☐ **(Adult)** Budesonide 3 NB (1 mg/2ml)

☐ **(Ped)** Budesonide 1NB (1 mg/2 ml)

..... ☐ **(Adult)** Dexamethasone 4 mg IV stat

..... ☐ **(Ped)** Hydrocortisone.....mg IV stat

..... ☐ Oxygen.....LPM via.....keep O2 sat ≥ 92%

Option

..... ☐ Salbutamol (2.5 mg/2.5 ml).....

..... ☐ Berodual®.....

..... ☐ Prednisolone(5mg).....tabs oral stat

☐ Ainway

Standard order at TUH


Thank You