2025

Summary Guide for Asthma Management and Prevention

For Adults, Adolescents and Children 6–11 Years

A Summary Guide for Health Professionals | Updated 2025

Based on the 2025 Global Strategy for Asthma Management and Prevention

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This summary guide is a summary of the *Global Strategy for Asthma Management and Prevention 2025* (the full 2025 GINA Report). The full report (available from ginasthma.org/reports) contains the references for statements about medical evidence.

More GINA resources are available from ginasthma.org.

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Tables and Figures

Abbreviations

AIR	Anti-inflammatory reliever (combination of ICS and a rapid-acting bronchodilator)
COPD	Chronic obstructive pulmonary disease
COVID-19	Coronavirus disease due to SARS-CoV-2 coronavirus
DPI	Dry-powder inhaler
FEV_1	Forced expiratory volume in 1 second (measured by spirometry)
FVC	Forced vital capacity
GERD	Gastroesophageal reflux disease
HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
ICS	Inhaled corticosteroid
ICS-LABA	Combination of an inhaled corticosteroid and a long-acting $beta_2$-agonist
LABA	Long-acting $beta_2$-agonist
LAMA	Long-acting muscarinic antagonist
LMICs	Low- and middle-income countries
LTRA	Leukotriene receptor antagonist
MART	Maintenance-and-reliever therapy with combination ICS-formoterol (also called SMART)
PEF	Peak expiratory flow
pMDI	Pressurized metered-dose inhaler
SABA	Short-acting $beta_2$-agonist

Introduction

Asthma is a serious global health problem.

Approximately 300 million people around the world have asthma. It is becoming more prevalent in many economically developing countries.

Asthma is a growing problem for patients, communities and healthcare systems. It interferes with people's work, education and family life, especially when children have asthma. Around the world, asthma still kills people, including young people. Approximately 96% of people who die from asthma are in low-income or middle-income countries.

The Global Initiative for Asthma (GINA) was established to increase awareness about asthma among healthcare providers, public health authorities and communities, to improve medical care for people with asthma, and to help prevent asthma. GINA works with many people around the world to achieve these goals. GINA contributors are listed on page 46.

GINA publishes information and recommendations on asthma care, based on the latest medical evidence.
GINA also promotes international collaboration on asthma research.

The Global Strategy for Asthma Management and Prevention (the GINA Report) provides comprehensive information on asthma management, which can be adapted for local healthcare systems and for individual patients. It is based on strong scientific evidence and provides practical advice for healthcare providers. The GINA Report is updated every year, based on a systematic review of new medical evidence (original research and systematic reviews).

The full 2025 GINA Report and other resources are available from **ginasthma.org/reports**.

Asthma Facts

Asthma is a common chronic (long-term) disease. It causes respiratory symptoms and can restrict people's activity. Many people with asthma have infrequent symptoms, but some have frequent or severe symptoms. Asthma can be a substantial problem for families and communities.

Asthma can be serious. People with asthma can have exacerbations (also called flare-ups or asthma attacks), which can be mild or severe. Severe asthma exacerbations require urgent health care and can cause death.

Asthma can be treated effectively. Most patients can achieve good long-term control of their asthma with treatment that includes inhaled corticosteroids (ICS). 'Well-controlled asthma' means that the person does not have severe asthma exacerbations, they do not have troublesome asthma symptoms during the day or night, they have normal lung function or almost normal lung function, and they are able to lead active lives, including exercise.

All adults, adolescents and children aged 6–11 years should receive treatment that includes ICS. These medicines greatly reduce the frequency and severity of asthma symptoms, the risk of exacerbations, and the risk of death from asthma.

Asthma treatment should be carefully selected for each patient. Healthcare providers should consider each person's level of symptom control, their risk factors for exacerbations, and their type of asthma ('phenotype'). They should also consider the effectiveness and safety of the available medications, the cost to the payer or patient, whether the patient can use the inhaler correctly, and the environmental impact. If more than one suitable inhaler is available, the patient should participate in choosing. (see pages 16–17)

Definitions

Asthma: a chronic (long-term) respiratory disease with many variations (phenotypes), usually characterized by chronic airway inflammation. Asthma causes respiratory symptoms that get better or worse at different times. Symptoms include wheezing, difficult breathing, chest tightness and cough. These symptoms can be mild or severe, frequent or infrequent. When a person with asthma has symptoms, the flow of air out of their lungs is reduced. It is difficult to breathe out because the airways become narrower (bronchoconstriction), the airway walls become thicker, and there is more mucus. In people with untreated asthma, expiratory airflow decreases more often and much more than in people without asthma.

Triggers: anything that can cause asthma symptoms, or make symptoms worse. Triggers include viral respiratory infections, allergens in the air at home or work (for example, house dust mite, pets, pollens, or cockroach particles), tobacco smoke or vaping, exercise, and stress. These are more likely to cause asthma symptoms when asthma is not already controlled by treatment. Some medicines (for example, beta-blockers) can cause asthma symptoms or exacerbations. In some patients, aspirin and other nonsteroidal anti-inflammatory drugs cause asthma symptoms or exacerbations.

Asthma exacerbation (also called asthma flare-up or asthma attack): acute or sub-acute (sudden or gradual) worsening in symptoms (shortness of breath, cough, wheezing, or chest tightness) and lung function, compared with the person's usual condition. Exacerbations are often triggered by viral upper respiratory tract infection, exposure to pollen or pollution, or poor adherence to ICS treatment, but they can also occur in people without any of these risk factors. Severe exacerbations can be fatal, even in people with infrequent symptoms. The risk of severe exacerbations is greatly reduced by taking ICS-containing treatment.

Diagnosing Asthma

Asthma has two defining features (Figure 1, Table 1) :

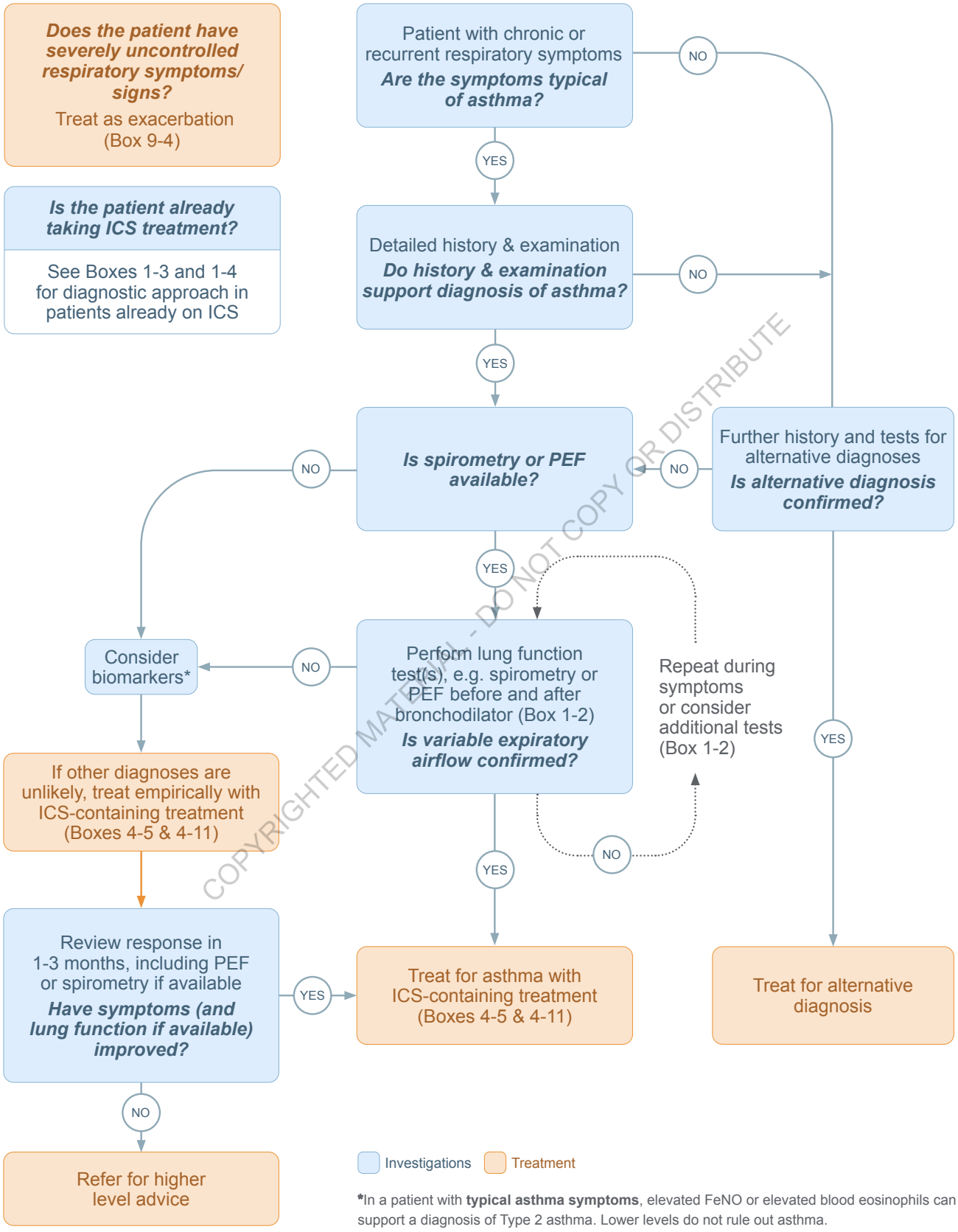
- A history of typical respiratory symptoms that are variable, meaning that they are sometimes more frequent and more severe than at other times, **AND**
- Variable expiratory airflow. However, in people with asthma for many years, airflow limitation may become permanent.

Symptoms can include wheeze, difficult breathing, a feeling of tightness in the chest, and cough.

Physical examination is often normal. Wheezing may be heard, especially during forced expiration.

The diagnosis of asthma should be confirmed, and the evidence should be documented in the patient's medical record. To confirm the diagnosis of asthma, there should be a history of typical variable respiratory symptoms and evidence of variable expiratory airflow (current or previous). If patients are already taking ICS treatment, additional tests may be needed to confirm the diagnosis of asthma (see page 9 and GINA 2025 Box 1-4).

FIGURE 1. Diagnosing asthma in clinical practice (adults, adolescents and children 6–11 years)



ICS: inhaled corticosteroid; PEF: peak expiratory flow. Box numbers refer to the full 2025 GINA Report.

TABLE 1. Criteria for initial diagnosis of asthma in adults (≥18 years) and children (6–17 years)

1. A history of variable respiratory symptoms

Typical asthma symptoms are wheeze, shortness of breath, chest tightness, and/or cough.

These features support the diagnosis of asthma:

- The person's symptoms vary in frequency and intensity.
- Symptoms often occur or worsen at night or when the person wakes up.
- Symptoms are often triggered by exercise, laughter, allergens, or cold air.
- Symptoms worsen after exertion (very distinctive).
- Symptoms often occur or worsen when the person has a viral respiratory infection.

2. Evidence of variable expiratory airflow

Any of these features indicates excessive variability in expiratory lung function:

- **Significant bronchodilator responsiveness** (also called reversibility) measured with spirometry by comparing FEV_1 before and after inhaled bronchodilator[a] (or PEF if spirometry not available)[b] [d]

  Adults: FEV_1 or FVC increases by ≥12% and by ≥200 mL from the pre-bronchodilator value (or PEF increases by ≥20%)

  Children: FEV_1 increases by ≥12% of the predicted value (or PEF increases by ≥15%)

- **Excessive average daily variability in PEF over 2 weeks**[c]

  Adults: >10%

  Children: >13%

- **Significant response to ICS treatment for 4 weeks**

  Adults: FEV_1 or FVC increases by ≥12% and by ≥200 mL (or PEF increases by ≥20%[b]) from measurements recorded before ICS treatment started

  Children: FEV_1 increases by ≥12% of the predicted value (or PEF increases by ≥15%)[b]

- **Positive bronchial challenge test**[e]

- **Excessive variation in lung function between visits**[f]

  Adults: FEV_1 changes between visits by ≥12% and by ≥200 mL (or PEF[g] by ≥20%)

  Children: FEV_1 changes between visits by ≥12% (or PEF by ≥15%)[g]

Role of Type 2 biomarkers in diagnosis of asthma

In patients with typical asthma symptoms, if spirometry or PEF is not available or testing is negative, elevated FeNO (adults/adolescents: >50 ppb; children: >35 ppb) or blood eosinophils above national/regional reference range can support the diagnosis of Type 2 asthma, but can also be due to non-asthma conditions. Lower levels of FeNO or blood eosinophils do not rule out asthma. FeNO and blood eosinophils vary substantially by sex, age and (for FeNO) device and site). Blood eosinophils are higher in the morning, and FeNO is lower in the morning. See Appendix A in full 2025 GINA Report.

FEV_1: forced expiratory volume in 1 second measured by spirometry; FVC: forced vital capacity measured by spirometry; PEF: peak expiratory flow.

Notes:

a. Measure change by comparing spirometry 10–15 minutes before and after 200-400 mcg salbutamol (albuterol). Responsiveness is more likely to be significant if bronchodilators are withheld before test. Recommended withholding periods are on page 9.

b. PEF is less reliable than spirometry, but can be used if spirometry is not available.

c. To calculate average daily variability:

1. Measure PEF morning and night for 1–2 weeks using same PEF meter (each time, measure PEF 3 times and record only the highest).
2. Calculate daily variability each day: (difference between morning and evening PEF) divided by ([morning PEF plus evening PEF] divided by 2).
3. Add daily variability scores for all days and divide by number of days.

An online PEF variability calculator is available: https://www.asthmaandlung.org.uk/healthcare-professionals/adult-asthma/diagnosis-testing/perf-calc

d. In a person with asthma, bronchodilator response may not be present during a viral respiratory infection.

e. Standardized challenge with methacholine, hyperventilation, hypertonic saline, mannitol, or exercise

f. Good specificity but poor sensitivity for the diagnosis of asthma

g. Use the same peak flow meter and record highest of three readings each time.

A previous diagnosis of asthma should be confirmed

In primary care, many patients (25–35%) with a diagnosis of asthma may not actually have asthma. If the criteria for asthma (Table 1) have not already been recorded, the patient's asthma diagnosis should be confirmed by objective tests.

If the patient does not show variable expiratory airflow, consider other investigations. For example, if lung function is normal, repeat the bronchodilator response test when the patient has symptoms, or after stopping bronchodilators, such as SABA or long-acting beta$_2$-agonist (LABA), for the following times before the test (if safe):

- No short-acting beta$_2$-agonist (SABA) for more than 4 hours
- No ICS-LABA combination for more than 24 hours, if prescribed for twice daily use (e.g. ICS-formoterol, ICS-salmeterol)
- No ICS-LABA combination for more than 36 hours, if prescribed for once daily use (e.g. ICS-vilanterol, ICS-indacaterol)
- No long-acting muscarinic antagonists (LAMA) for 36–48 hours.

How to confirm the diagnosis of asthma in patients taking ICS

If the patient is already taking medication that contains ICS and has frequent symptoms, and their lung function is less than 70% predicted, consider increasing treatment to the next step (pages 22 and 30), then measure lung function again 3 months later. If symptoms and lung function improve, this confirms the diagnosis of asthma.

If the patient has few symptoms and their lung function is greater than 70% predicted, consider stepping down ICS-containing treatment before measuring lung function again. Ensure that the patient has a written asthma action plan (page 21) and monitor asthma carefully.

For more information about confirming the diagnosis of asthma, see full 2025 GINA Report Box 1-4 and Box 1-5.

Diagnosing asthma in specific populations

Patients with persistent cough but no other respiratory symptoms: In some children and adults, cough may be the only symptom of asthma, and the patient may not have bronchodilator responsiveness. Cough-variant asthma is characterized by cough and airway hyperresponsiveness detected by bronchial provocation testing. It should be treated with ICS-containing medication, like other asthma phenotypes. Other common causes of persistent dry cough include chronic upper airway cough syndrome ('postnasal drip'), chronic sinusitis, gastroesophageal reflux disease (GERD), treatment with angiotensin-converting enzyme (ACE) inhibitors, inducible laryngeal obstruction (often called vocal cord dysfunction), and eosinophilic bronchitis.

Occupational asthma and work-aggravated (work-exacerbated) asthma: If a patient's asthma started in adulthood, ask if there are allergens or irritants in the air at work or at home, and whether their asthma is better when they are away from these places. The diagnosis must be confirmed with objective tests. The patient should be referred to a specialist (if available) without delay. The cause must be identified, and the patient's exposure to the cause must be stopped immediately.

Pregnant women: Ask all pregnant women, and those planning pregnancy, whether they have asthma. Advise pregnant women with asthma that it is important to use ICS-containing treatment during pregnancy for their baby's health, as well as their own health. If the diagnosis of asthma has not been objectively confirmed, start or continue ICS-containing treatment, and wait until after delivery to confirm the diagnosis. Do not stop or reduce ICS-containing treatment, and do not do bronchial provocation testing during pregnancy.

Older adults: Asthma may be under-diagnosed in older adults due to poor perception of airflow limitation, the belief that breathlessness is normal in old age, lack of fitness, or reduced activity. Breathlessness due to heart failure or ischemic heart disease can also be mistakenly attributed to asthma. If patients have a history of smoking or exposure to biomass fuel, consider the possibility of chronic obstructive pulmonary disease (COPD) as a co-occurring or alternative diagnosis.

Patients with persistent airflow limitation: If a patient has airflow limitation that does not respond to bronchodilator (Table 1), try to distinguish between asthma with persistent airflow limitation and COPD, by analyzing their medical history, pattern of symptoms, and past medical records. If a patient has clinical features consistent with both asthma and COPD, or the diagnosis is uncertain, refer them to a specialist.

COPD: Patients can have asthma and COPD at the same time. This is called “asthma+COPD” or “asthma-COPD overlap”. It is more common among smokers and the elderly. Asthma+COPD is not a specific disease and probably has several causes. Asthma+COPD has worse outcomes than asthma or COPD alone.

Patients with a diagnosis of COPD who also have asthma (or a history of asthma) should be treated with ICS-containing treatment. Their risk of hospitalization or death is higher if they receive only bronchodilators.

Diagnosis of asthma in low- and middle-income countries (LMICs): In some LMICs the differential diagnosis of asthma often includes other endemic respiratory disease such as tuberculosis, HIV/AIDS-associated lung diseases, and parasitic or fungal lung diseases. Practical strategies for asthma diagnosis, based on history and clinical findings, have been developed and tested in LMICs. These are less precise than diagnosis based on spirometry, but they help identify patients with probable asthma who need treatment.

If spirometry is unavailable or unaffordable, peak expiratory flow (PEF) meters can be used to detect variable expiratory airflow to confirm the diagnosis of asthma (Figure 1, Table 1, pages 7 & 8). To avoid underdiagnosis and overdiagnosis of asthma in LMICs, health workers need much greater access to spirometry and PEF meters, and need training to use them.

Assessing asthma

Assess each person's asthma at every visit. The most important times to reassess asthma are after an exacerbation, and when the patient needs a new prescription for asthma medication. Also assess each person's asthma at least once every year, even if they have no symptoms.

How to assess asthma control

Asthma control means how much asthma is affecting the person's health or their risk of future health problems, on their current asthma treatment.

Asthma control includes both:

- **Control of asthma symptoms** (Table 2A, page 12) – assess symptom control at every opportunity. People with poorly controlled asthma symptoms have a high risk of exacerbations. Symptoms are also a burden for patients.
- **Control of risk factors** (Table 2B, page 12) – identify features that increase the patient's future risk of having exacerbations (flare-ups, attacks), loss of lung function, or medication side-effects. Assess risk factors at diagnosis and then periodically, including after the patient has had an exacerbation.

Lung function: Measure lung function with spirometry (or with a PEF meter, if spirometry is not possible). Measure lung function before starting ICS treatment, 3–6 months later, and then at least once every 1–2 years. Measure lung function more often in people with a high risk of exacerbations and people with risk factors for lung function decline (Table 2B). If a patient has few symptoms despite poor lung function, or good lung function despite frequent symptoms, investigate for underlying conditions.

Treatment issues: Document the patient's current treatment. Ask about side-effects. Check inhaler technique by watching the patient use their inhaler. Check adherence to treatment by asking the patient how often they take their medicines and whether they have any problems. Check that the patient has a written asthma action plan (page 21). Ask the patient about their goals and preferences for asthma treatment.

Assess multimorbidity: Check whether any other medical conditions are causing symptoms, affecting quality of life, or making asthma harder to control (for example, rhinitis, rhinosinusitis, gastroesophageal reflux disease, obesity, obstructive sleep apnea, or depression and anxiety).

TABLE 2. Assessment of asthma control in adults, adolescents and children 6–11 years

A. Assess symptom control

In the past 4 weeks, has the patient had:	Level of asthma symptom control: Well controlled	Partly controlled	Uncontrolled
Daytime symptoms more than twice/week? Any night waking due to asthma? SABA* reliever needed more than twice/week? Any activity limitation due to asthma?	None of these	1–2 of these	3–4 of these

*Only for patients using SABA reliever (not ICS-formoterol reliever). Do not include SABA taken before exercise.

B. Assess risk factors

B.1. Risk factors for exacerbations

Uncontrolled asthma symptoms (important risk factor)

Other factors that increase risk of exacerbations, even if the person has few asthma symptoms

- Over-use of SABA (≥3 x 200-dose canisters/year)†
- Inadequate ICS (no ICS, poor adherence, incorrect inhaler technique)
- Medical conditions (obesity, chronic rhinosinusitis, GERD, confirmed food allergy) or pregnancy
- Exposure to allergens (if sensitized), smoking, vaping, air pollution
- Major psychological or socioeconomic problems
- Poor lung function (especially if FEV_1 <60% predicted), large FEV_1 response to bronchodilator
- Type 2 inflammatory markers (higher blood eosinophil level, high FeNO)§
- Severe exacerbation in past year or lifetime history of intubation or ICU admission for asthma

B.2. Risk factors for developing persistent airflow limitation

- History of preterm birth, low birth weight and rapid infant weight gain, frequent productive cough
- Lack of ICS treatment in patient with a history of severe exacerbations
- Exposure to tobacco smoke or noxious chemicals
- Low initial FEV_1
- High eosinophil levels in sputum or blood

B.3. Risk factors for side-effects of medication

- Systemic effects: frequent OCS, long-term high-dose and/or potent ICS, P450 inhibitors‡
- Local effects: high-dose and/or potent ICS, poor inhaler technique

FeNO: fractional exhaled nitric oxide; FEV_1: Forced expiratory volume in 1 second; GERD: gastroesophageal reflux disease; ICS: inhaled corticosteroid; OCS: oral corticosteroids; SABA: short-acting $beta_2$-agonist; ICU: intensive care unit

† Also increases risk of asthma death, especially if very high use (≥1 canister per month)

‡ Cytochrome P450 inhibitors such as ritonavir, ketoconazole, itraconazole may increase systemic exposure to some types of ICS and some long-acting $beta_2$-agonists

§ Several factors affect blood eosinophils and FeNO, including sex, age, smoking status & time of day. See GINA 2025 report for details.

How to assess asthma severity

Asthma severity usually means the level of treatment needed to control a person's symptoms and to prevent exacerbations. Severity can be assessed after several months of treatment.

Difficult-to-treat asthma is asthma that is uncontrolled despite prescribing of medium- or high-dose ICS with a second controller (usually a LABA) or with maintenance OCS, or that requires high-dose treatment to maintain good symptom control and reduce the risk of exacerbations. It does not mean a 'difficult patient'. In many cases, asthma may appear to be difficult to treat because of modifiable factors such as incorrect inhaler technique, poor adherence, smoking or comorbidities, or because the diagnosis is incorrect.

Asthma is severe if it is still uncontrolled despite good adherence with high-dose ICS-LABA and management of contributory factors, or if the patient needs high-dose ICS-LABA to maintain good asthma control.

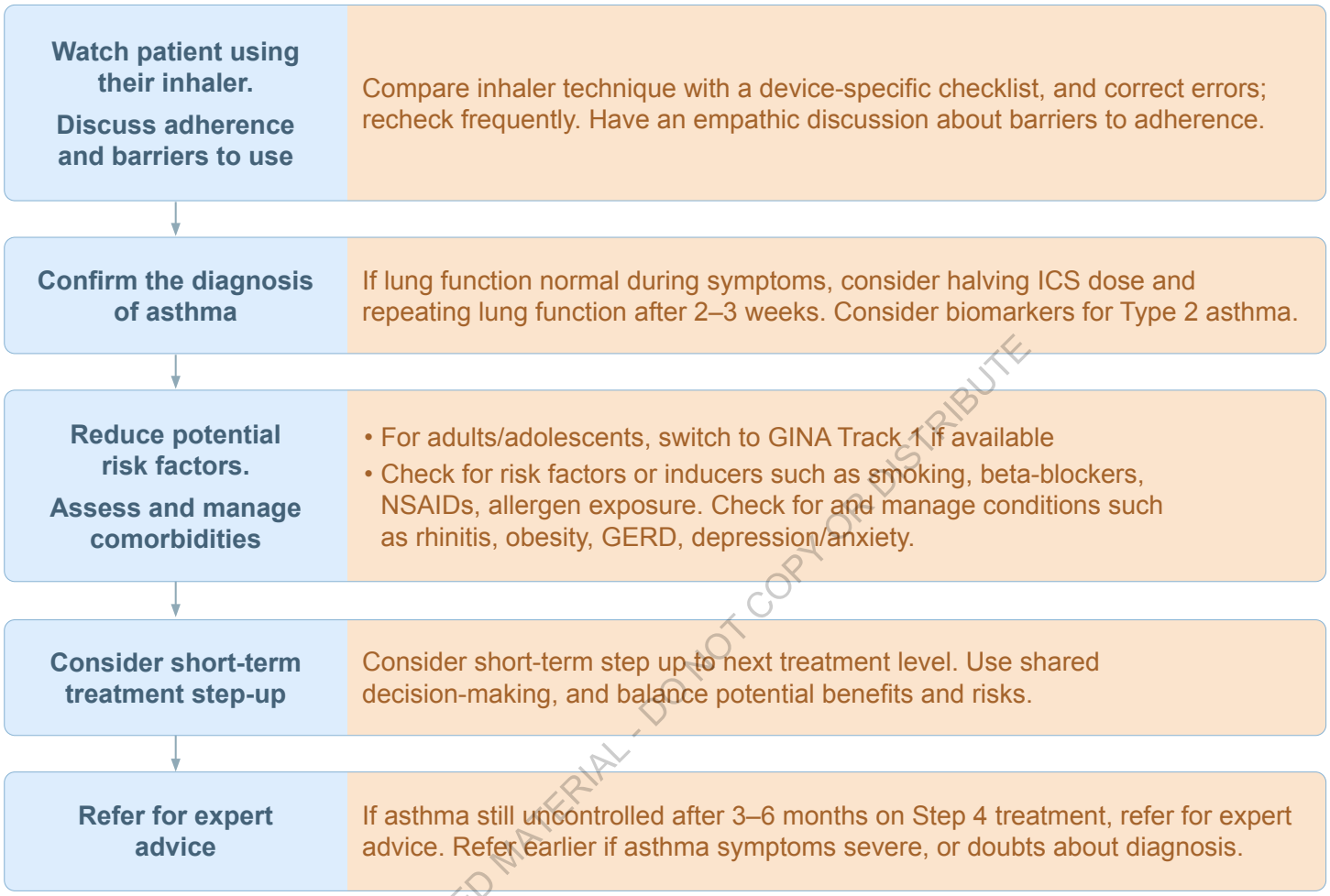
Asthma is mild if it can be well controlled with ICS-formoterol taken as needed (page 23), or with low-dose ICS taken daily.

However, the term "mild asthma" is often understood or used differently than this in the community. Many people with infrequent asthma symptoms think that their asthma is mild and that they do not need ICS treatment because they have not had any severe attacks. Therefore, you should explain that people with infrequent or mild asthma symptoms can have severe or fatal exacerbations if they are treated only with SABA. Explain that treatment with low-dose ICS or as-needed low-dose ICS-formoterol reduces the risk of severe exacerbations by half to two-thirds, compared with SABA alone.

How to investigate uncontrolled asthma

Most patients can achieve good asthma control with treatment that contains ICS, but some patients do not. In these cases, look for the cause (Figure 2) before changing the treatment. Always check inhaler technique and adherence first.

FIGURE 2. Investigating asthma in a patient who has poor symptom control or exacerbations despite treatment



GERD: gastroesophageal reflux disease; ICS: inhaled corticosteroid; NSAID: nonsteroidal anti-inflammatory drug; Track 1: see page 24.

Managing asthma: general principles

The **long-term goals** of asthma management are to control symptoms (long-term, not just in recent days/weeks) and to prevent exacerbations, airway damage, and medication side-effects. The aim is to achieve the best possible outcomes for the patient. Also ask the patient about their own goals and preferences for their asthma treatment.

Children with pre-school wheezing often have **clinical remission** of these symptoms, off treatment, by school-age or adolescence, but this does not mean it is cured, as it often recurs. Risk factors for persistence of childhood asthma include allergy features, a family history of asthma or allergy, later onset of symptoms, wheezing without colds, and maternal smoking or tobacco smoke exposure.

Some patients with severe asthma demonstrate **clinical remission** while taking biologic therapy. Predictors of remission in these patients include fewer symptoms, better lung function, little multimorbidity, earlier asthma onset, and no or lower maintenance OCS use at baseline.

Essential asthma medicines

Make sure that every patient's medication includes ICS (or a combination medication that contains ICS) to reduce their risk of serious exacerbations, even if symptoms are infrequent (see page 23 for options in adults and adolescents and page 29 for options in children 6–11 years).

ICS-containing medication should be started as soon as possible after diagnosis, for these reasons:

- Any patient can have severe exacerbations, even those whose asthma seems to be mild.
- ICS-containing medication markedly reduces risk of asthma hospitalizations and death. It is very effective in preventing severe exacerbations, reducing symptoms, improving lung function, and preventing exercise-induced bronchoconstriction, even in patients with mild asthma.
- Early treatment with low-dose ICS is associated with better lung function than starting when symptoms have been present for more than 2–4 years.
- Patients who have a severe exacerbation when not taking ICS have worse long-term lung function than those who have started ICS.

Every patient needs a reliever containing a rapid-acting bronchodilator to use whenever they have asthma symptoms. The reliever can be either ICS-formoterol, ICS-SABA or SABA. Low-dose ICS-formoterol is the preferred reliever for adolescents and adults, because it reduces the risk of severe exacerbations, compared with treatment regimens with SABA reliever (see page 23 for options in adults and adolescents and page 29 for options in children 6–11 years).

For safety, GINA recommends that asthma should not be treated solely with as-needed SABA. Most patients with asthma have airway inflammation, even if they have only intermittent or infrequent symptoms. SABA-only treatment is associated with increased risk of exacerbations, worse lung function, and increased risk of death due to asthma. Regular use of SABA increases allergic responses and airway inflammation, and reduces the bronchodilator response to SABA. Over-use of SABA (for example, ≥3 x 200-dose canisters dispensed in a year) is associated with an increased risk of severe exacerbations compared, with 0–2 canisters. Dispensing of ≥12 SABA canisters (possibly less) in a year is associated with increased risk of death due to asthma. Home use of nebulized SABA is also associated with an increased risk of asthma death.

For more information on asthma medicines see the list of asthma medication classes and medicines on page 38.

Principles of selecting treatment

There are different treatment recommendations for adults/adolescents (page 23) and children aged 6–11 years (page 29). See the full 2025 GINA Report for recommendations about children aged 5 years and younger.

For each age group, GINA provides "preferred" treatment options and "alternative" treatment options. **Preferred asthma treatments** are the treatments that were most effective in clinical trials, particularly for reducing exacerbations, and/or are more convenient for patients.

To choose the best treatment for an individual patient, also consider their risk factors, their other medical conditions, the type of asthma they have, their personal goals for their asthma treatment, their ability to use different types of inhalers correctly, whether they are likely to adhere to treatment, the cost of medication, and its environmental impact.

GINA treatment options for each age group are shown as "steps". The step number indicates a level of intensity: Step 5 has more medicines and higher doses than Step 1. Treatment can be stepped down or up.

Principles of choosing and using inhalers

Inhaled medicines are essential for effective asthma management. Make sure each patient uses their inhaler effectively. Incorrect use is very common. It contributes to poor symptom control and exacerbations, and increases the risk of local adverse effects.

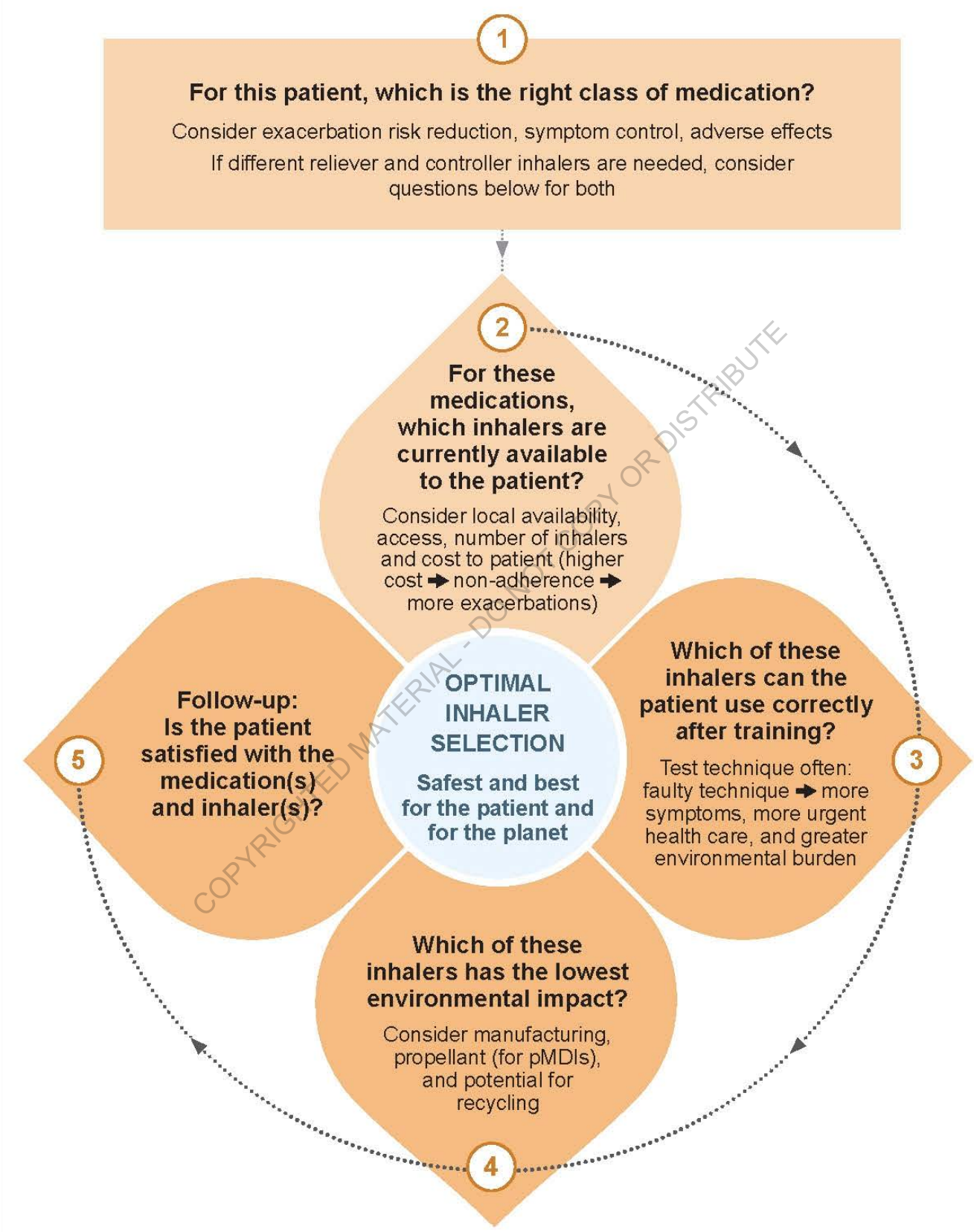
Choose the medication and the most appropriate device for the patient before prescribing (Figure 3). Consider physical problems such as arthritis, the patient's skills, and cost. Patients using ICS in a pressurized metered-dose inhaler should use a spacer. If more than one type of inhaler is available for the preferred treatment, and the patient can use these inhalers equally well, discuss their relative environmental impact with the patient (see Figure 3).

Train patients to use inhalers correctly. Obtain a checklist for each type of inhaler you prescribe, and learn the correct technique so you can show patients.

Check inhaler technique at every opportunity. Ask the patient to show you how they use the inhaler, and use a checklist for the specific device to identify any errors.

Correct errors by physically demonstrating the correct technique, paying attention to incorrect steps. Check the patient's technique again, up to 2–3 times if necessary.

FIGURE 3. Choosing the best inhaler with the patient



Assess, adjust treatment, review response

To minimize risk and control symptoms, assess each patient's asthma, adjust their treatment, and review the response. Repeat this cycle continuously (Figure 4).

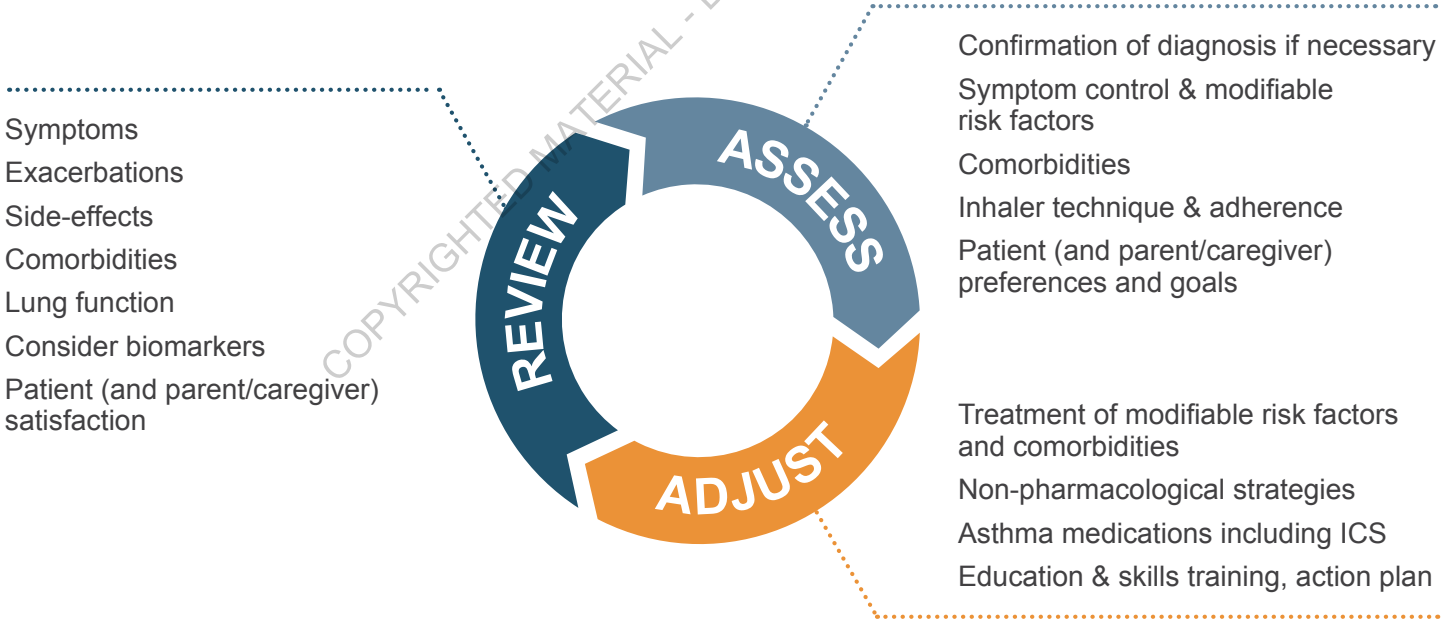
Asthma control can change, so ICS-containing treatment is periodically adjusted by the healthcare provider or patient/parent/caregiver. Treatment can be increased day-to-day, short term or for several months. Treatment can be reduced when good asthma control has been achieved and maintained for 2–3 months (see page 27 and page 31).

Every time the treatment is changed, reassess symptom control, exacerbations, side-effects, and lung function, and ask the patient (or parent/caregiver) if they are satisfied with their treatment.

In general, asthma should be reviewed 1–3 months after starting treatment, then every 3–12 months (every 4–6 weeks during pregnancy). After an exacerbation, review within 1 week. The frequency of review also depends on the patient's previous symptom control, their risk factors, their response to initial treatment, and their ability and willingness to manage asthma using an action plan.

Review asthma frequently if a patient has risk factors for a fatal exacerbation, such as other relevant medical conditions, previous near-fatal asthma (ever), a very severe exacerbation in the last year, currently using or recently stopped oral corticosteroids, over-use of SABA, especially if dispensed more than 1 canister (200 doses) per month. If FeNO is high, check and correct adherence and inhaler technique first, before considering step-up in asthma treatment

FIGURE 4. The asthma management cycle of shared decision-making



ICS: inhaled corticosteroids

Managing risk factors

Treat risk factors (Table 2, page 12), including other medical conditions that interfere with asthma or asthma treatment.

There is consistent, high-quality evidence that these strategies can reduce the risk of exacerbations:

- **Guided self-management**. Teach patients to monitor their symptoms and/or PEF, give them a written asthma action plan (page 21), and review asthma regularly.
- **Treatment regimens that include ICS**. For all patients, prescribe treatment that includes ICS. This includes ICS-formoterol taken as needed for asthma symptoms, ICS taken every day, or combination ICS-LABA taken every day (see options for adults/adolescents on pages 24–25 and options for children on page 29). For adults and adolescents, GINA Track 1 with ICS-formoterol reliever (page 24) reduces the risk of severe exacerbations, compared with using a SABA reliever.
- **Avoiding tobacco smoke.** Advise and help patients to quit smoking/vaping, and to avoid other people's smoke/vapes. Advise parents not to smoke or vape in rooms or cars that children use.
- **Management of confirmed food allergy**. Advise appropriate food avoidance and ensure patient has injectable epinephrine for anaphylaxis.
- **Referral to a specialist center**. If available, refer patients with severe asthma for detailed assessment and consideration of add-on biologic medications and/or sputum-guided treatment.
- **School-based programs** that include asthma self-management skills.

Non-pharmacological treatment

In addition to medications, other therapies and strategies may help control symptoms and reduce risk (see the full 2025 GINA Report for details).

There is consistent, high-quality evidence to support some strategies, for example:

- **Advice about smoking cessation**. At every visit, strongly encourage smokers to quit. Provide access to counselling and resources. Advise parents/caregivers not to smoke in rooms or cars used by children with asthma.
- **Physical activity**. Encourage people with asthma to do regular physical activity for its general health benefits; it may also slightly improve asthma control and lung function. Advise patients how to manage exercise-induced bronchoconstriction.
- **Investigation for occupational asthma**. Ask all patients with adult-onset asthma about their work history. Identify sensitizers in the workplace and remove them as soon as possible. Refer for expert advice, if available.
- **Managing aspirin-exacerbated respiratory disease**. Always ask about previous reactions before prescribing nonsteroidal anti-inflammatory drugs, including aspirin.

Allergens may contribute to asthma symptoms in sensitized patients, but allergen avoidance is not recommended for other people with asthma. Allergen avoidance strategies are often complex and expensive, and there are no validated methods for identifying those who are likely to benefit.

Some common triggers for asthma symptoms, such as exercise and laughter, should not be avoided. Others, such as viral respiratory infections and stress, are difficult to avoid and must be managed when they occur.

Check and improve adherence to asthma treatment

Many patients do not take their asthma medications as prescribed. Poor adherence may be unintentional (for example, due to forgetfulness, cost, or misunderstanding) and/or intentional (for example, due to belief that the medicine is unnecessary, fear of side-effects, cultural issues, or cost).

If ICS-containing maintenance treatment is prescribed but the patient does not take it regularly, they may be using only SABA reliever. SABA-only treatment results in poor symptom control and increases the risk of exacerbations.

Identify patients with adherence problems:

- Show empathy when asking patients about their treatment use, for example: *"Most patients don't take their inhaler exactly as prescribed. In the last 4 weeks, how many days a week have you been taking it? 0 days a week, or 1, or 2 days …?", or "Do you find it easier to remember your inhaler in the morning or night?"*
- Check medication usage, from prescription date, inhaler date/dose counter, dispensing records.
- Ask patients about their attitudes and beliefs about asthma and medications.
- Check adherence if FeNO is high despite prescription of GINA Step 3 or Step 4 treatment.

Studies have shown improved adherence with these strategies:

- Shared decision-making for medication and dose choice
- Electronic inhaler reminders for missed doses
- Comprehensive asthma education with home visits by asthma nurses
- Healthcare providers reviewing feedback about their patients' dispensing records
- An automated voice recognition program with telephone messages triggered when refills are due or overdue
- Direct observation of children taking maintenance asthma treatment at school.

Educate patients and caregivers about asthma

Give patients, parents and caregivers information that they can understand clearly.

Explain:

- Why they need long-term treatment for asthma
- How to use the inhaler correctly
- How to use their written asthma action plan
- How to monitor symptoms and/or peak flow
- Why they need regular medical review for asthma.

To manage asthma effectively, health providers and patients need to work together. When healthcare providers are trained to communicate well, patients with asthma may be more satisfied with their health care, be less restricted by their asthma, and have fewer emergency visits for asthma.

Provide a written asthma action plan

Give all patients (or parents/caregivers) a written asthma action plan, so they can recognize worsening asthma and act appropriately. The plan can be handwritten, printed, digital or pictorial – not just spoken instructions. It must be suitable for the person's level of asthma control, and their ability to understand health information and follow the instructions.

The written asthma action plan should include:

- The patient's usual asthma medications
- When to increase inhaled medications and how to do this (page 33)
- When to start oral corticosteroids, if needed
- How to get urgent medical care if symptoms continue or worsen.

Action plans can be based on symptoms and/or (in adults) PEF.

Choosing asthma medication for adults and adolescents

Starting treatment

Adults and adolescents with asthma should not be treated with SABA alone. They should all receive ICS-containing treatment. The optimal treatment that should be started immediately after diagnosis of asthma depends on the patient's history and current symptoms (Table 3). Most adults and adolescents should start with low-dose ICS-containing treatment (page 44). The preferred treatment options use ICS-formoterol as the patient's reliever, instead of SABA (page 22). This is called anti-inflammatory reliever (AIR) therapy.

Before starting treatment:

- Record evidence for the diagnosis of asthma
- Document symptom control and risk factors
- Assess lung function, when possible
- Train the patient to use the inhaler correctly, and check their technique
- Schedule a follow-up visit.

Treatment tracks

There are two approaches to asthma treatment for adults and adolescents (Figure 5):

- The preferred treatment, in which the reliever is low-dose ICS-formoterol ("Track 1", page 24).
- Alternative treatment regimens in which the reliever is SABA, or a combination of ICS and SABA (ICS-SABA) ("Track 2", page 25).

GINA recommends Track 1 because there is strong evidence that it reduces the risk of severe exacerbations, compared with Track 2, with similar symptom control. Track 1 is also simpler, because it requires only one medication and one inhaler technique across treatment steps 1–4.

TABLE 3. Suggested initial treatment for adults and adolescents with asthma

Clinical features	Preferred (GINA Track 1)	Alternatives (GINA Track 2)
Infrequent asthma symptoms (for example, 1–2 days/week or less)	Low-dose ICS-formoterol taken as needed	Low-dose ICS taken whenever SABA is taken for asthma symptoms (combination or separate inhalers)
Asthma symptoms less than 3–5 days/week, with normal or mildly reduced lung function	Low-dose ICS-formoterol taken as needed	Regular daily low-dose ICS, plus SABA as needed
Asthma symptoms most days, waking due to asthma once a week or more, or low lung function	Low-dose ICS-formoterol maintenance-and-reliever therapy (MART)	Regular daily low-dose ICS-LABA, plus SABA or ICS-SABA as needed Regular daily medium-dose ICS, plus SABA or ICS-SABA as needed
Daily asthma symptoms, waking at night with asthma once a week or more, with low lung function, or current smokers	Medium-dose ICS-formoterol MART	Regular daily medium-dose ICS-LABA, plus SABA or ICS-SABA as needed Regular daily high-dose ICS plus SABA as needed
During acute asthma exacerbation	Treat exacerbation (page 34). Start medium-dose ICS-formoterol MART	Treat exacerbation (page 34). Start regular daily medium-dose ICS-LABA, plus SABA as needed

ICS: inhaled corticosteroids; MART: maintenance-and-reliever therapy with ICS-formoterol; SABA: short-acting beta$_2$-agonist. See page 45 for medications and doses for AIR/MART. See page 44 for total daily ICS doses for patients using a SABA or ICS-SABA reliever. GINA Track 1 is preferred because it reduces the risk of severe exacerbations compared with treatment with a SABA reliever, and it is simpler. Check local regulatory and payer criteria.

Adjusting treatment

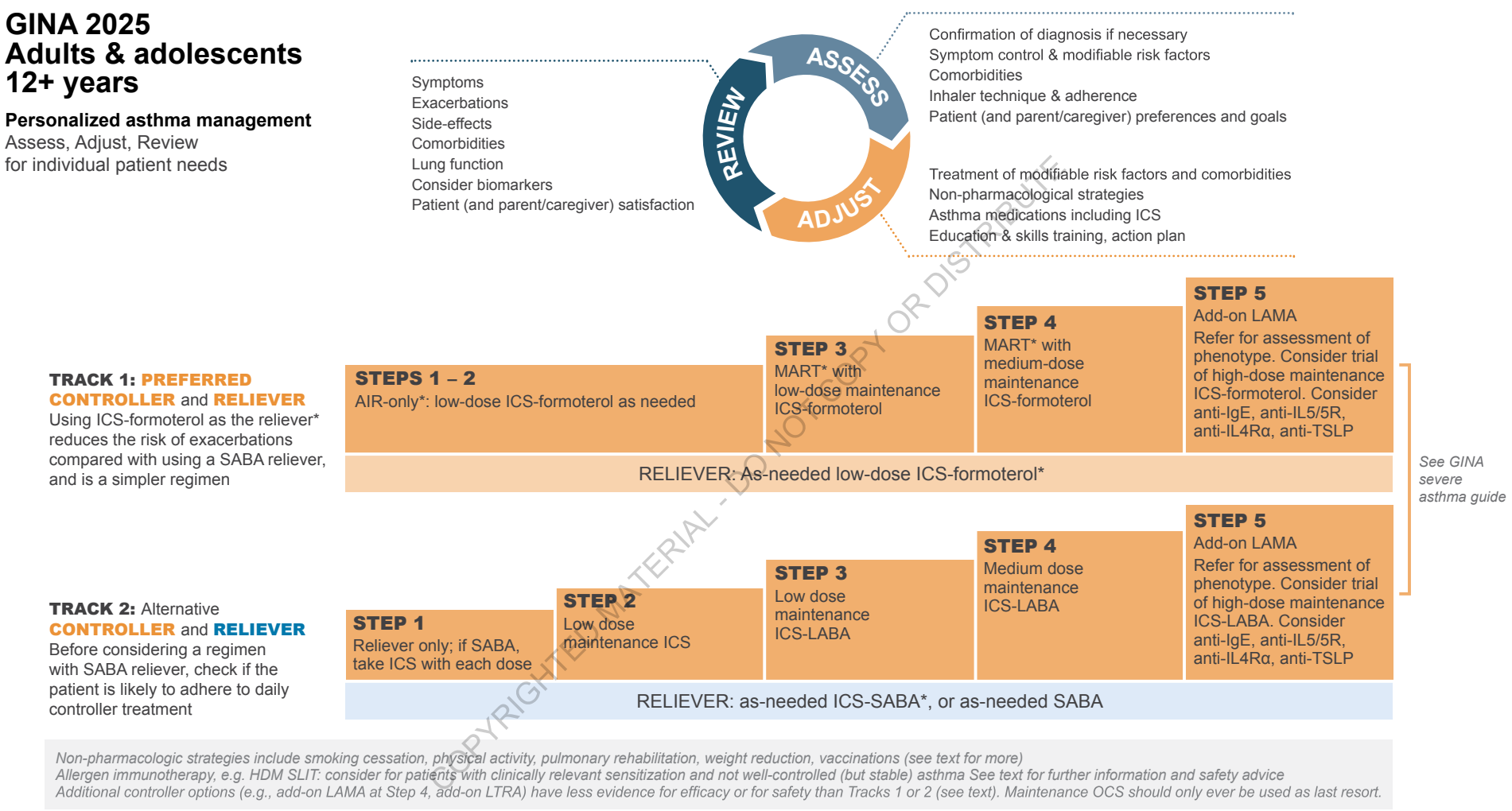
After the patient has started treatment, reassess asthma at every visit, adjust treatment if necessary, and review the response to treatment.

Within each track, treatment can be stepped up or down, using the same reliever at each step. A patient can switch from one track to another, if needed. At each step, there are also some other controller options with less evidence for efficacy and safety, or with specific indications.

If a patient's asthma is not well controlled, check adherence, inhaler technique, risk factors and comorbidities first, before stepping up treatment or changing to a different medication at the same step.

If asthma has been well controlled for 3 months or more, consider stepping down.

FIGURE 5. Treatment steps for adults and adolescents

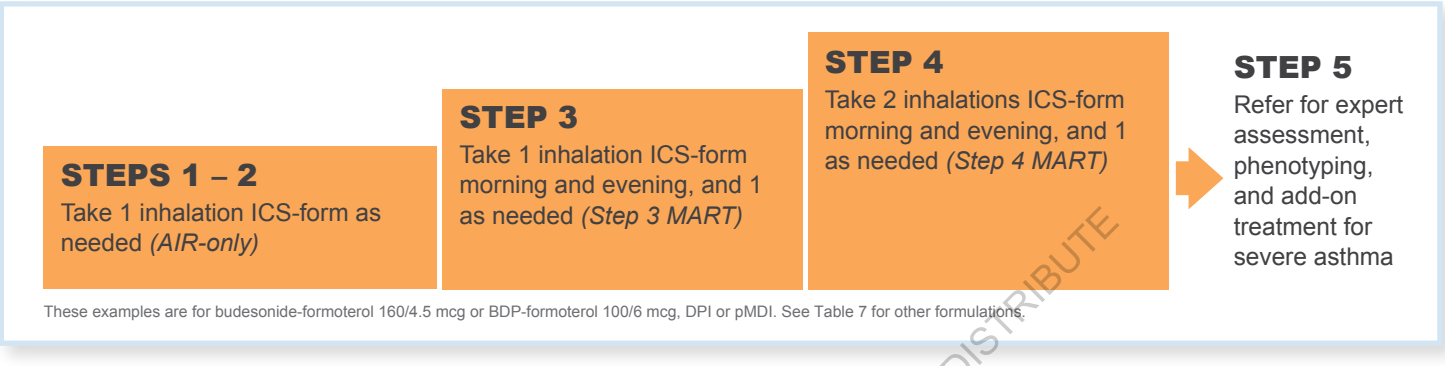


*AIR: Anti-inflammatory reliever; HDM: house dust mite; Ig: immunoglobulin; ICS: inhaled corticosteroids; IL: interleukin; LABA: long-acting beta$_2$-agonist; LAMA: long-acting muscarinic antagonist; MART: maintenance-and reliever therapy with ICS-formoterol; OCS: oral corticosteroid; SLIT: sublingual immunotherapy; TSLP: thymic stromal lymphopoietin. †If prescribing LTRA, advise patient/caregiver about risk of neuropsychiatric adverse effects.
See page 44 for information about doses of ICS-formoterol and frequency of use.

Track 1 treatment options for adults and adolescents

In Track 1, across all steps, the patient takes low-dose ICS-formoterol whenever needed to relieve asthma symptoms (Figure 6). Patients can also use low-dose ICS-formoterol before exercise or before or during exposure to allergens, if needed. The same ICS-formoterol inhaler is also used for the patient's maintenance treatment in Steps 3–5.

FIGURE 6. Track 1 (preferred) treatment Steps 1–4 for adults and adolescents



AIR: anti-inflammatory reliever; ICS: inhaled corticosteroid; form: formoterol; MART: maintenance-and-reliever therapy with ICS-formoterol. See page 44 for ICS-formoterol doses and frequency of use.

Steps 1–2: The recommended treatment is low-dose ICS-formoterol taken whenever needed to relieve asthma symptoms. In clinical trials this treatment reduced the risk of emergency room visits or hospitalizations by about two-thirds compared with SABA alone, and by over one-third compared with low dose ICS (plus SABA as needed for asthma symptoms), in patients who previously used SABA alone, low-dose ICS, or a leukotriene receptor antagonist.

In **Steps 3–5**, patients take combination ICS-formoterol as daily maintenance treatment, and they take extra doses of the same medication when they have asthma symptoms. This is called "maintenance-and-reliever therapy" (MART) with ICS-formoterol. In patients with or without a history of severe exacerbations, MART reduces the risk of severe exacerbations, with a similar level of symptom control, compared with other maintenance treatments (including ICS-LABA and higher-dose ICS) plus as-needed SABA. (Note: ICS-LABA inhalers that do not include formoterol cannot be used as MART.)

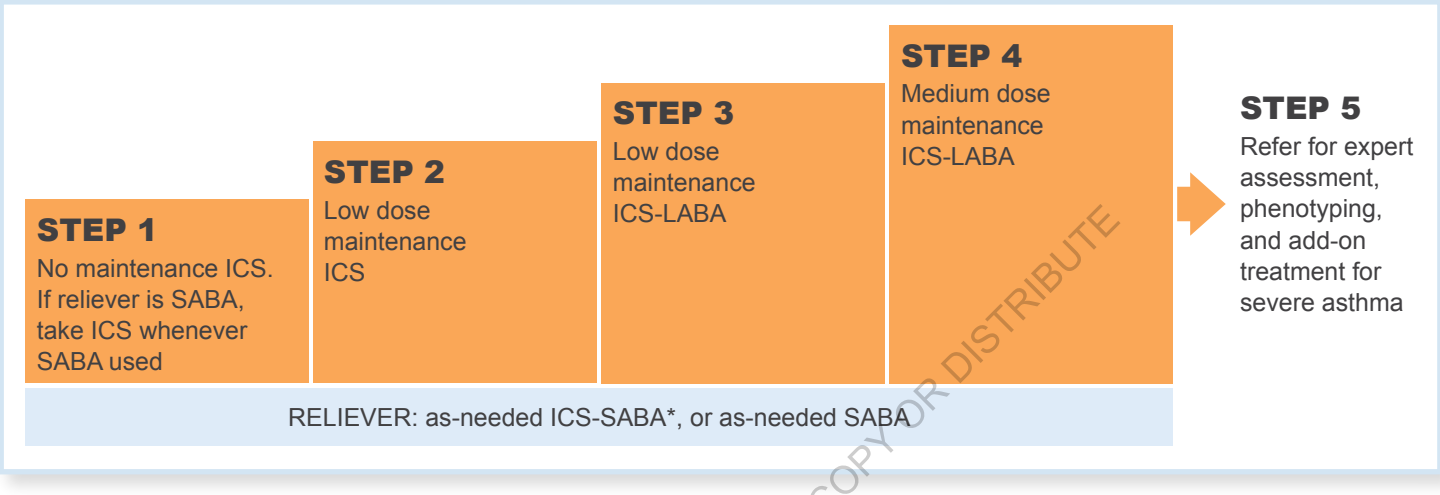
Recommended doses for ICS-formoterol combinations at all steps are shown in the reference table on page 44.
See the full 2025 GINA Report for a summary of evidence supporting each option.

Step 5 options for adults and adolescents with severe asthma are shown on page 26.

Track 2 treatment options for adults and adolescents

In Track 2 the reliever is as-needed SABA or ICS-SABA (Figure 7). This is an alternative approach when ICS-formoterol is not available. Track 2 may also be considered if a patient has stable asthma and no exacerbations with their maintenance ICS-containing treatment, they take it regularly, and they prefer to continue with this treatment.

FIGURE 7. Track 2 (alternative) treatment Steps 1–4 for adults and adolescents



*A anti-inflammatory reliever (AIR); ICS: inhaled corticosteroid; LABA: long-acting beta$_2$-agonist; SABA: short acting beta$_2$-agonist. See page 44 for ICS doses.

In **Step 1**, the patient uses a SABA when symptoms occur and takes a low dose of ICS at the same time. This can be done by using a combination inhaler that contains ICS and SABA, or the patient can take a low dose of ICS immediately after using SABA, every time they have symptoms.

In **Steps 2–5**, the patient takes maintenance ICS-containing medication every day, plus SABA as needed to relieve symptoms. In Steps 3–5, adults (≥ 18 years) can use a combination of ICS and SABA in a single inhaler as their reliever (if available) instead of SABA. This reduces the risk of exacerbations, compared with using a SABA reliever.

At any step, patients can also take their reliever before exercise, if needed.

If maintenance and reliever medications are in different types of inhalers, or if changing steps requires a change in inhaler type, train the patient in the correct techniques.

There is strong evidence that taking ICS every day, even at a low dose, substantially reduces the risks of severe exacerbations, hospitalizations and death due to asthma, improves symptoms, and reduces exercise-induced bronchoconstriction, compared with SABA-only treatment. Even in patients with symptoms one day per week or less, the risk of severe exacerbations is halved, compared with using SABA alone.

Before prescribing a regimen with SABA reliever, consider whether the patient is likely to use ICS correctly. A patient with low adherence will be exposed to SABA-only treatment and have a higher risk of exacerbations. A maintenance-and-reliever regimen with ICS-formoterol (Track 1) would be safer for such patients.

See page 44 for inhaled corticosteroid doses. See the full 2025 GINA Report for a summary of evidence supporting each option.

Note: ICS-formoterol should not be used as reliever for patients using daily ICS-LABA with a different (non-formoterol) LABA.

Other treatment options for some adults and adolescents

Some other treatment options may be available in some countries, that either have specific indications, or have less evidence for efficacy or safety compared with the main treatments shown in Track 1 and 2.

Specific allergen immunotherapy: If an adult or adolescent has house dust mite allergy, and their asthma is not well controlled by treatment that includes ICS, consider adding house dust mite sublingual immunotherapy. Do not use sublingual immunotherapy if forced expiratory volume in 1 second (FEV_1) is ≤70% predicted. See the full 2025 GINA Report for information on immunotherapy with other antigens.

Long-acting muscarinic antagonist (LAMA): Compared with ICS-LABA, add-on LAMA slightly improves lung function and slightly reduces the risk of exacerbations, but there is no clinically important reduction in symptoms such as breathlessness. Before considering add-on LAMA for patients with exacerbations, increase ICS dose to at least medium, or switch to MART. Currently available LAMAs include tiotropium in a separate mist inhaler (patients ≥6 years) and combination inhalers containing ICS, LABA and a LAMA (patients ≥18 years) including beclometasone-formoterol-glycopyrronium, fluticasone furoate-vilanterol-umeclidinium, and mometasone-indacaterol-glycopyrronium.

Leukotriene receptor antagonists: These include montelukast, pranlukast, zafirlukast and zileuton. They are less effective than daily ICS, particularly for preventing exacerbations. Montelukast has been associated with risk of serious mental health effects.

Step 5: managing severe asthma in adults and adolescents

If a patient has uncontrolled symptoms and/or exacerbations despite Step 4 treatment, assess causes and optimize treatment. Refer the patient for expert assessment, including assessment of severe asthma inflammatory phenotype, comorbidities, risk factors, and for potential add-on treatment. If sputum eosinophil count is available, this test may be useful to guide treatment in patients with moderate–severe asthma.

High-dose ICS-LABA can be considered, but it increases the risk of side effects, including adrenal suppression (see Section 8 of the full 2025 GINA Report for details).

Long-acting muscarinic antagonists can be used in addition to maintenance ICS-LABA treatment, but the potential reduction in severe exacerbations is small (page 33).

Biologic treatment can be added to maximal treatment, if available and affordable. Options include:

- Anti-immunoglobin E (subcutaneous omalizumab) for severe allergic asthma
- Anti-interleukin 5 or anti-interleukin 5 receptor alpha for severe eosinophilic asthma. Options include intravenous reslizumab for patients aged ≥18 years, subcutaneous mepolizumab for patients aged ≥ 6 years, and subcutaneous benralizumab for patients aged ≥ 12 years.
- Anti-interleukin 4 receptor alpha (subcutaneous dupilumab) for severe eosinophilic asthma/asthma with Type 2 airway inflammation or patients who need maintenance oral corticosteroids
- Anti-thymic stromal lymphopoietin (subcutaneous tezepelumab) for severe asthma.

See list of asthma medications on page 38. Always check local eligibility criteria for specific add-on treatments.

Maintenance oral corticosteroids should only be used as a last resort, and at the lowest possible dose, because short-term and long-term systemic side-effects are common and serious.

For more information, see the full 2025 GINA Report or the GINA booklet ***Difficult-to-treat and severe asthma in adolescent and adult patients***, available at ginasthma.org.

Stepping down treatment when asthma is well controlled

When good asthma control has been maintained for 2–3 months, consider stepping down treatment. The aims are to find the lowest treatment step that controls both symptoms and exacerbations, and to minimize side-effects.

Choose an appropriate time for step-down (no respiratory infection, patient not travelling, not pregnant). Assess risk factors for exacerbation, including history of previous exacerbations or emergency department visits for asthma, and low lung function (see Table 2, page 12).

Record symptom control and lung function before stepping down, provide a written asthma action plan, monitor closely, and plan a follow-up visit.

Reduce the ICS dose by 25–50% by changing to an inhaler with a lower strength of the same ICS or by reducing the frequency of inhalations (see Box 4-13 in the full 2025 GINA Report for information on how to step down from different treatments). Review asthma after each step-down, and wait 2–3 months to confirm asthma is stable before stepping down again. Do not completely stop ICS in adults or adolescents with asthma.

Non-recommended treatments

Maintenance oral corticosteroids should only be used as a last resort.

GINA does not recommend oral salbutamol, oral theophylline, or inhaled fenoterol, because of the increased risk of adverse effects.

Choosing asthma medication for children 6–11 years

Starting asthma treatment

Children aged 6–11 years with asthma should not be treated with SABA alone; they should all receive ICS-containing treatment. The optimal treatment that should be started immediately after diagnosis of asthma depends on the child's asthma history and current symptoms (Table 4).

When starting treatment:

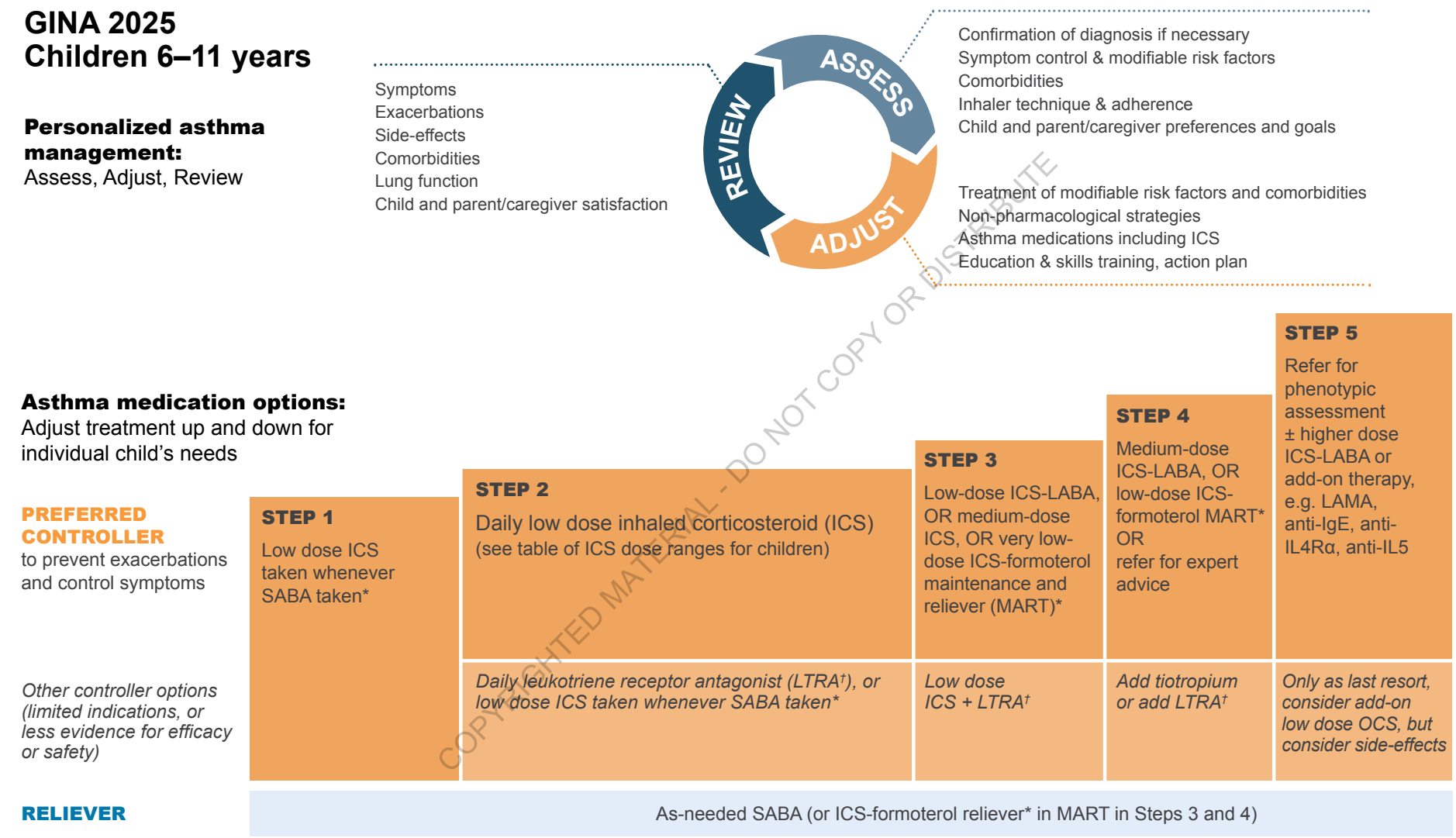
- Record evidence for the diagnosis of asthma
- Document symptom control and risk factors (see Table 2) before starting treatment
- Assess lung function, when possible, before starting treatment
- Train the child and parents to use the inhaler correctly, and check their technique
- Schedule a follow-up visit.

TABLE 4. Suggested initial treatment for children with asthma

Clinical features	Preferred
Infrequent asthma symptoms (for example, 1–2 days/week or less)	Low-dose ICS taken whenever SABA is taken for asthma symptoms (combination or separate inhalers)
Asthma symptoms 2–5 days per week	Low-dose ICS maintenance (daily) treatment, plus SABA as needed
Asthma symptoms most days, waking due to asthma once a week or more	Options: • Low-dose maintenance ICS, plus SABA as needed • Medium-dose maintenance ICS, plus SABA as needed • Very-low-dose ICS-formoterol maintenance-and-reliever therapy (MART)
Asthma symptoms every day, waking at night once or more a week, and low lung function	Options: • Medium-dose maintenance ICS-LABA, plus SABA as needed • Low-dose ICS-formoterol MART
During acute asthma exacerbation	Treat exacerbation (page 34). Start treatment with one of these options: • Low-dose or medium-dose maintenance ICS-LABA, plus SABA as needed • Very-low-dose or low-dose ICS-formoterol MART.

ICS: inhaled corticosteroids; LABA: long-acting beta$_2$-agonist; MART: maintenance-and-reliever therapy with ICS-formoterol; SABA: short-acting beta$_2$-agonist. See page 45 for formulations and doses used for MART in children. See page 44 for ICS doses for maintenance ICS-containing treatment. Check local regulatory and payer criteria.

FIGURE 8. Treatment steps for children 6–11 years



ICS: inhaled corticosteroids; Ig: immunoglobulin; IL: interleukin; LABA: long-acting beta$_2$-agonist; LTRA: leukotriene receptor antagonist; MART: maintenance-and-reliever therapy with ICS-formoterol; OCS: oral corticosteroid; SABA: short-acting beta2-agonist; *Anti-inflammatory reliever; †If prescribing LTRA, advise patient/caregiver about risk of neuropsychiatric adverse effects. See reference table on page 45 for MART doses. See reference table on page 44 for total daily ICS doses.

Treatment steps for children 6–11 years

After the child has started treatment, reassess asthma at every visit, adjust treatment if necessary, and review the response to treatment. If a patient's asthma is not well controlled, check adherence, inhaler technique, risk factors and comorbidities first, before stepping up treatment or changing to a different medication at the same step (page 29). If asthma has been well controlled for 3 months or more, consider stepping down.

In **Step 1**, the child uses a SABA when symptoms occur and takes a low dose of ICS at the same time.

In **Steps 2–5** the child takes maintenance ICS-containing treatment every day. ICS, even at a low dose, reduces the risk of severe exacerbations, improves lung function, and reduces symptoms, compared with no ICS.

In **Step 2**, the child takes a low total dose of ICS every day, plus SABA as needed for symptoms.

In **Steps 3–4**, the child takes ICS or ICS-LABA every day, plus reliever as needed. There are several options:

- The child takes ICS as daily maintenance treatment, plus SABA as needed for symptoms.
- The child takes combination ICS-LABA as daily maintenance treatment, plus SABA as needed for symptoms.
- The child takes combination ICS-formoterol as daily maintenance treatment, and they take extra doses of the same medication when they have asthma symptoms. This is called "maintenance-and-reliever therapy" (MART). ICS-formoterol is the only ICS-LABA that can be used for MART.

Recommended doses for ICS-formoterol combinations are shown in the table on page 45. See page 44 for total daily ICS doses for children using a SABA reliever. See the full 2025 GINA report for a summary evidence supporting each option.

If a child needs Step 4 treatment to control asthma, refer them to a pediatric asthma expert.

Step 5 options for children with severe asthma are shown below.

At any step, the child can also take their reliever (SABA or ICS-formoterol) before exercise, if needed. For children prescribed MART, their ICS-formoterol reliever can also be taken before or during exposure to allergens, to prevent and relieve symptoms.

Step 5: managing severe asthma in children

If a child has uncontrolled symptoms and/or exacerbations despite good inhaler technique and good adherence with Step 4 treatment, refer them to a pediatric asthma expert if available for phenotypic assessment and review of factors contributing to symptoms and/or exacerbations.

Add-on treatments that may be considered for children with severe asthma include:

Tiotropium can be added to other recommended treatments

Biologic treatment added to other recommended treatments. Options for children include:

- Anti-immunoglobin E (subcutaneous omalizumab) for severe allergic asthma
- Anti-interleukin 5 (subcutaneous mepolizumab) for severe eosinophilic asthma
- Anti-interleukin 4 receptor alpha (subcutaneous dupilumab) for severe eosinophilic asthma/asthma with Type 2 airway inflammation.

See table of asthma medication classes on page 38 for more details. Always check local eligibility criteria for specific add-on treatments.

After referral – other treatments for children 6–11 years

If the child's asthma is not well-controlled on Step 3 or 4 treatment despite good adherence and correct inhaler technique, they should be referred for expert advice, if available.

Medication options that may be considered for some children after referral include:

Add-on long-acting muscarinic antagonist: At Step 4, tiotropium in a separate mist inhaler can be added to recommended treatment.

High-dose ICS-LABA: At Step 4, the dose may be increased to high pediatric dose (see Table 6 on page 44), but first consider the risk of side-effects.

Leukotriene antagonist: A leukotriene antagonist can be added to recommended treatment. Montelukast has been associated with risk of serious mental health effects in some children.

Specific allergen immunotherapy: If a child with asthma has ragweed allergy, consider adding ragweed sublingual immunotherapy before and during the ragweed season. Do not use sublingual immunotherapy if forced expiratory volume in 1 second (FEV_1) is <80% predicted. See the full 2025 GINA Report for information on allergen immunotherapy with other antigens.

Non-recommended treatments

Maintenance oral corticosteroids should only be used as a last resort.

GINA does not recommend use of oral salbutamol, oral theophylline, or inhaled fenoterol, because of the increased risk of adverse effects.

Stepping down treatment when asthma is well controlled

When good asthma control has been achieved and maintained for 2–3 months, consider stepping down treatment. The aims are to find the lowest treatment step that controls both symptoms and exacerbations, and to minimize side-effects.

Managing asthma in specific populations or contexts

Occupational asthma

If asthma was caused by airborne irritants or allergens in the workplace, ICS treatment should be started immediately. For suspected occupational asthma, refer the patient as soon as possible for expert care, if available. Exposure to the cause should be eliminated.

Pregnancy

Asthma control often changes during pregnancy, so asthma should be monitored every 4–6 weeks. All pregnant women with asthma should receive treatment that includes ICS, because asthma exacerbations are associated with increased risk of pre-term delivery, low birth weight and increased perinatal mortality, and these risks are reduced by ICS. Usual asthma treatment should not be stopped. ICS and $beta_2$-agonists are not associated with increased risk of fetal abnormalities. Treat exacerbations as for non-pregnant adults, to avoid fetal hypoxia.

Allergic rhinitis and chronic rhinosinusitis

Allergic rhinitis is very common among people with asthma. It should be treated with intranasal corticosteroids as well as treating asthma.

Chronic rhinosinusitis, especially if associated with nasal polyps, is associated with more severe asthma. Treatment of allergic rhinitis or chronic rhinosinusitis reduces nasal symptoms, but may not improve asthma control. Some biologic treatments (anti-immunoglobulin E, anti-interleukin 4 receptor alpha, anti-interleukin 5, and anti-interleukin 5 receptor alpha) improve nasal symptoms in patients with chronic rhinosinusitis with nasal polyps and asthma (see the full 2025 GINA Report).

Obesity

Asthma is more difficult to control in people with obesity. Include weight reduction in the treatment plan for obese patients with asthma; even 5–10% weight loss can improve asthma control.

Gastroesophageal reflux disease (GERD)

Asymptomatic GERD is unlikely to cause poor asthma control. Symptomatic reflux should be treated, but patients with poorly controlled asthma should not be treated with anti-reflux therapy unless they also have symptomatic reflux.

The elderly

Comorbidities and their treatment may complicate asthma management. Consider all other medicines the person is taking, and check for side-effects. When choosing medications and inhaler devices, consider factors like arthritis, eyesight, inspiratory flow, and complexity of treatment regimens, and the environmental impact of the inhaler.

Aspirin-exacerbated respiratory disease (AERD)

A history of asthma exacerbation after taking aspirin or other nonsteroidal anti-inflammatory drugs (NSAIDs) strongly suggests AERD. Patients with AERD often have severe asthma and nasal polyposis. If the history clearly suggests AERD, advise the patient to avoid all nonsteroidal anti-inflammatory drugs. Challenge testing can confirm the diagnosis, but this should only be done in a specialized center with resuscitation facilities. In some patients, addition of a leukotriene receptor antagonist to ICS-containing treatment improves lung function and reduces symptoms. (Note: there are concerns about risk of neuropsychiatric side effects with montelukast.) Desensitization is sometimes effective, but this must only be done under specialist care; there is a significantly increased risk of adverse effects such as asthma exacerbation, gastritis and gastrointestinal bleeding.

Food allergy and anaphylaxis

Food allergy may cause anaphylaxis but is rarely a trigger for asthma symptoms. Food allergy must be assessed by specialist testing, because confirmed food allergy is a risk factor for asthma-related death. Good asthma control is essential. Ensure patients (and parents/caregivers) have an anaphylaxis plan, know how to avoid the allergen, and know how to use injectable epinephrine.

Surgery in patients with asthma

If possible, surgery should be done when the patient has good asthma control. Ensure that ICS-containing treatment is continued throughout the peri-operative period. For patients on long-term high-dose ICS, and patients who have used oral corticosteroids for more than 2 weeks in the previous 6 months, hydrocortisone should be administered during the operation to reduce the risk of adrenal crisis.

COVID-19 and other respiratory viral infections

People with well-controlled asthma do not have a higher risk of severe COVID-19 or COVID-19-related death than the general population. However, people with severe asthma exacerbations (people who recently needed oral corticosteroids for asthma, and people hospitalized with severe asthma) have a higher risk of death due to COVID-19.

When COVID-19 or other respiratory viruses are circulating in the community, advise patients to continue taking their prescribed asthma medications, including ICS, even if they have a respiratory infection. Make sure that every patient has a written asthma action plan. Advise people with asthma to keep up to date with respiratory vaccines (including for pneumococcus, pertussis, COVID-19, influenza, respiratory syncytial virus) according to local advice for their age-group.

Avoid using nebulizers for patients with a respiratory infection or a high probability of infection. To deliver SABA for acute asthma in adults and children, use a pressurized metered-dose inhaler and spacer, with a mouthpiece or tightly fitting face mask, if needed. Avoid spirometry in patients with confirmed or suspected COVID-19. Follow infection control protocols for other procedures.

Before prescribing antiviral therapies for COVID-19, consult local prescribing guidelines, and check carefully for potential interactions with asthma therapy.

For details, see the full 2025 GINA Report. More information is available from the World Health Organization.

Managing asthma exacerbations

An exacerbation is an acute or subacute worsening in symptoms and lung function, compared with the patient's usual status; some patients' initial presentation of asthma may be with an exacerbation. Exacerbations are usually due to a viral upper respiratory tract infection, exposure to pollen or pollution, or poor adherence to inhaled corticosteroid treatment, but can also occur in people without any of these risk factors.

An exacerbation is regarded as moderate if it is troublesome for the patient and requires a change in treatment. An exacerbation is regarded as severe if urgent treatment is needed to prevent hospitalization or death. Severe exacerbations can be fatal, even in people with previously infrequent symptoms.

When talking to patients about exacerbations, use a word they can understand, e.g. attack, flare-up.

The management of worsening asthma and exacerbations is a continuum from self-management by the patient (or parent/caregiver) with a written asthma action plan, through to management of severe symptoms in primary care, the emergency department, and in hospital.

All patients should have a written asthma action plan. Examples of action plan templates for Track 1 are available at https://www.jaci-inpractice.org/article/S2213-2198(21)01128-4/fulltext and https://www.nationalasthma.org.au/health-professionals/asthma-action-plans/asthma-action-plan-library.

How to increase inhaled medication in a written asthma action plan

For patients using low-dose ICS-formoterol reliever (adults/adolescents using Track 1 treatment, and children 6–11 years using MART): advise the patient to take extra doses of their ICS-formoterol inhaler whenever needed for symptom relief. If using MART, they should also continue their usual doses of maintenance ICS-formoterol. They should get medical care if symptoms are rapidly getting worse, or are not improving after 2–3 days, or if they need more than the total daily maximum number of inhalations (see page 44 for usual and maximal doses).

Note: Patients whose maintenance treatment is ICS-LABA with a non-formoterol LABA should not use ICS-formoterol as their reliever; they should instead use SABA or ICS-SABA as their reliever.

For patients using ICS-SABA reliever (adults/adolescents using Track 2 treatment): advise the patient to take extra doses of ICS-SABA (2 inhalations of budesonide-salbutamol 100/100 mcg [delivered dose 80/90 mcg] each time) for symptom relief, and continue their usual maintenance ICS-containing treatment. They should get medical care if they are rapidly deteriorating, or are not improving after 2–3 days, or if they need ICS-SABA more than 6 times in any day.

Patients using SABA reliever (adults/adolescents using Track 2 treatment, and children 6–11 years): advise the patient to take SABA when needed for symptom relief, and to increase their ICS-containing maintenance treatment (if prescribed) for at least 1–2 weeks. For adults, consider increasing maintenance ICS dose to 4 times usual dose for 1–2 weeks.

The patient should get medical care if they need SABA again within 3 hours, or if asthma symptoms are worsening rapidly or are not improving.

Use of oral corticosteroids in written asthma action plans

For most adults and adolescents, the written asthma action plan should give instructions for when and how to start oral corticosteroid treatment, and whether to contact the doctor first. A short course of oral corticosteroid is often used if:

- Asthma symptoms are getting worse over 2–3 days, despite using more reliever
- Asthma symptoms are rapidly getting worse
- Lung function is low (FEV_1 <60% of predicted value, PEF <60% of personal best)
- Symptoms are worsening in person with a history of sudden severe exacerbations.

Usual doses are:

- Adults: prednisolone 40–50 mg each morning for 5–7 days
- Children: prednisolone 1–2 mg/kg/day up to 40 mg, each morning for 3–5 days.

If an oral corticosteroid is used for less than 2 weeks, it is not necessary to reduce the dose at the end of treatment before stopping it.

If patients are provided with a prescription for oral corticosteroids for use as part of their asthma action plan, they should be told to contact their doctor if they start taking the medications. Advise patients about common side-effects, including sleep disturbance, increased appetite, reflux, and mood changes.

Oral corticosteroids can be life-saving during severe asthma exacerbations, but there is more and more evidence that the risk of side-effects increases with each course. The need for courses of oral corticosteroids can be reduced by optimizing inhaled therapy, including attention to inhaler technique and adherence, and by switching to Track 1 therapy with ICS-formoterol, if available.

Managing exacerbations in primary or acute care

Figure 9 (page 36) summarizes assessment and management of asthma exacerbations in adults, adolescents and children 6–11 years in primary care.

Assess severity of the exacerbation while starting SABA and oxygen (if needed): check for anaphylaxis and assess dyspnea, respiratory rate, pulse rate, oxygen saturation* and lung function (for example, PEF).

Consider alternative causes of acute breathlessness (for example, heart failure, upper airway dysfunction, inhaled foreign body, pulmonary embolism).

Arrange immediate transfer to an acute care facility if there are signs of severe exacerbation (see Figure 9). Immediately give inhaled SABA, inhaled ipratropium bromide, oxygen and systemic corticosteroids. Transfer to intensive care if the patient is drowsy, confused, or has a silent chest.

*Pulse oximetry may overestimate oxygen saturation in a hypoxemic patient with dark skin color. Oxygen saturation targets should be adjusted for altitude, where appropriate.

Start bronchodilator treatment with repeated doses of SABA (usually by pressurized metered-dose inhaler and spacer) and controlled flow oxygen, if needed and available. Inhaled albuterol (salbutamol) is the most common bronchodilator used to treat acute asthma. High-dose budesonide-formoterol was as effective and safe as high-dose salbutamol in studies in patients with FEV_1 >30% predicted treated in emergency departments. In acute care facilities, consider intravenous magnesium sulfate if the patient has an inadequate response to intensive initial treatment.

Start oral corticosteroids (except for mild exacerbations): Adults: prednisolone 40–50 mg each morning for 5–7 days. Children: prednisolone 1–2 mg/kg/day up to 40 mg, each morning for 3–5 days. See the full 2025 GINA Report for other corticosteroid options.

Titrate oxygen, if needed, to maintain target saturation of 93–95%* in adults and adolescents (≥ 94%* in children 6–12 years).

Do not routinely perform chest X-ray or blood gases, or routinely prescribe antibiotics.

Do not use sedatives.

Monitor closely: Check symptoms and oxygen saturation frequently. Measure lung function after 1 hour. Titrate treatment according to response. Transfer to higher-level care if patient's condition worsens or symptoms fail to respond.

Decide whether to hospitalize the patient based on clinical status, symptoms and lung function, response to treatment, recent and history of exacerbations, and their ability to manage at home.

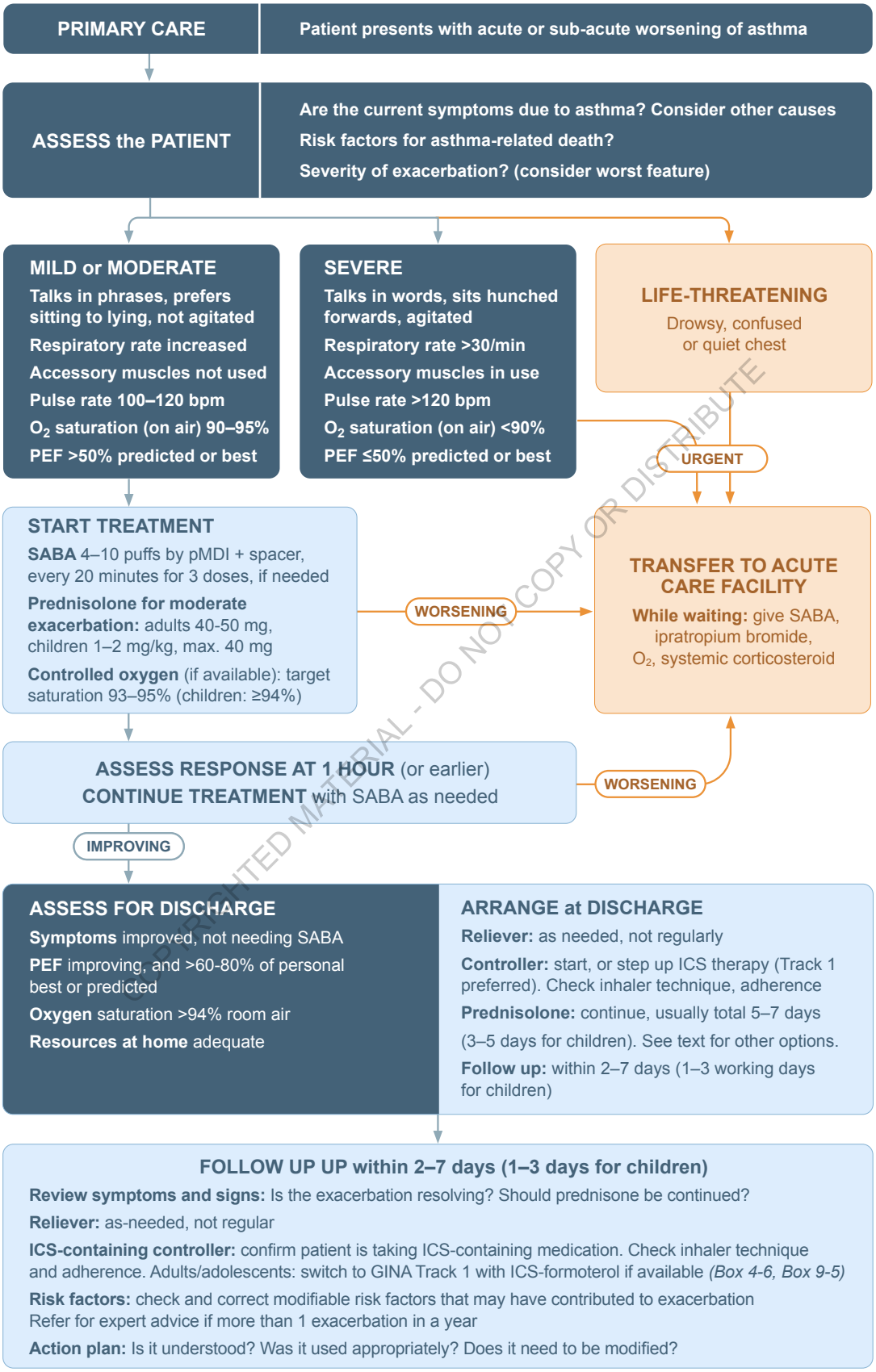
Before discharge, arrange ongoing treatment to reduce the chance of another exacerbation:

- **Prescribe regular maintenance treatment that includes ICS:** For adults and adolescents, the preferred treatment is ICS-formoterol MART, if available. If not, prescribe regular daily medium-dose ICS-LABA. For children 6–11 years, the treatment options are low-dose ICS-LABA plus SABA as needed, medium-dose ICS plus SABA as needed, or MART. See Table 7 for MART doses for adults and children, and see Table 6 for low, medium and high-dose ICS if used with as-needed SABA.
- **Reduce reliever use to as-needed:** tell patient (or parent/caregiver) to use reliever only as needed for symptoms (not regularly), so they can tell if asthma is worsening or improving.
- **Check inhaler technique and adherence.**
- **Provide an interim written asthma action plan.**

Arrange follow-up: if possible, within 2–7 days for adults and adolescents, and within 1–2 working days for children. Consider early referral for specialist advice after hospitalization, or for patients with repeated emergency visits for asthma.

*Pulse oximetry may overestimate oxygen saturation in a hypoxemic patient with dark skin color. Oxygen saturation targets should be adjusted for altitude, where appropriate.

FIGURE 9. Management of asthma exacerbations in primary care



ICS: inhaled corticosteroid; PEF: peak expiratory flow; O_2: oxygen; pMDI: pressurized metered-dose inhaler; SABA: short-acting beta$_2$-agonist (doses are for salbutamol [albuterol] 100 mcg/actuation).

Follow-up after an exacerbation

All patients must be followed up regularly by a healthcare provider until symptoms and lung function return to normal.

Reassess long-term treatment. For adults and adolescents, consider changing to Track 1 (page 24) with ICS-formoterol reliever to reduce the risk of another exacerbation. Check adherence to ICS containing medications. Make sure the patient/parent/caregiver understands the purposes of asthma medications, and check if they are using the inhaler correctly. Review the written asthma action plan.

Ask what the patient/parent/caregiver thinks may have caused the exacerbation. Check risk factors for exacerbations, such as smoking, allergen exposure, regular use or over-use of SABA (see Table 2).

Consider referring patients for expert advice after hospitalization for severe asthma or recurring acute asthma. Refer patients who have had more than 1 or 2 exacerbations/year despite medium-dose or high-dose ICS-LABA.

TABLE 5. List of asthma medication classes and medicines

Anti-inflammatory reliever medications

Low-dose combination ICS-formoterol

Medications	Beclometasone-formoterol or budesonide-formoterol
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler
Use in asthma	Used as reliever (without maintenance treatment) for adults and adolescents at GINA Track 1 Steps 1–2, instead of SABA. Reduces emergency visits/hospitalizations by 65% compared with SABA alone, and by 37% compared with daily ICS plus as-needed SABA. Used as the reliever for patients prescribed maintenance-and-reliever therapy with ICS-formoterol (adults and adolescents at GINA Track 1 Steps 3–5, children 6–11 at GINA Steps 3–5). Reduces the risk of severe exacerbations, compared with regimens using SABA as reliever, with similar symptom control. Can be used before exercise to prevent exercise-induced bronchoconstriction. Can be used before or during allergen exposure to prevent and relieve asthma symptoms. More information: Track 1 treatment options for adults and adolescents (page 24) Medications and doses: Table 7 (page 44) Treatment steps for children 6–11 years (page 29)
Adverse effects	See: ICS in combination with long-acting beta$_2$-agonist (ICS-LABA), below

Low-dose combination ICS-SABA

Medications	Budesonide-salbutamol (albuterol), beclometasone-salbutamol
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler
Use in asthma	Reliever (instead of SABA) for adults and adolescents in GINA Track 2. Maximum 6 doses, each of 2 inhalations of 80 mcg budesonide with 90 mcg albuterol, in any 24-hour period. Cannot be used for maintenance-and-reliever therapy (MART). Not recommended for children
Adverse effects	See: Inhaled corticosteroids (ICS), below Short-acting inhaled beta$_2$-agonist bronchodilators (SABA), below

Medications for daily maintenance treatment

Inhaled corticosteroids (ICS)

Medications	Beclometasone, budesonide, ciclesonide, fluticasone propionate, fluticasone furoate, mometasone, triamcinolone
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler
Use in asthma	Medications that contain ICS are the most effective anti-inflammatory medications for asthma. ICSs reduce symptoms, increase lung function, reduce airway hyperresponsiveness, improve quality of life, and reduce the risk of exacerbations, asthma-related hospitalizations and death. Potency and bioavailability varies between ICS. Most of the clinical benefit is achieved at low doses (Table 6).
Adverse effects	Most patients do not experience side-effects. Local: oropharyngeal candidiasis, dysphonia. Risk of candidiasis is reduced by rinsing mouth with water and spitting it out after inhaling the medication. Risk of dysphonia and candidiasis with pMDI is reduced by using a spacer. Systemic: osteoporosis, cataract, glaucoma with long-term use of high doses. Risk of some systemic adverse effects, such as adrenal suppression, may increase if patient uses medications that inhibit cytochrome P450 (for example, ketoconazole, ritonavir, itraconazole, erythromycin, clarithromycin).

ICS in combination with a long-acting beta$_2$-agonist (ICS-LABA)

Medications	Beclometasone-formoterol, budesonide-formoterol, fluticasone furoate-vilanterol, fluticasone propionate formoterol, fluticasone propionate-salmeterol, mometasone-formoterol, mometasone-indacaterol
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler
Use in asthma	When a low daily dose of ICS fails to achieve good control of asthma despite correct technique and good adherence, addition of LABA to maintenance ICS improves symptoms, lung function and reduces exacerbations. ICS-LABA is more effective than doubling the dose of ICS. Two regimens are available: 1. Maintenance-and-reliever therapy (MART): combination of beclometasone or budesonide with formoterol used for both maintenance and reliever treatment (see Anti-inflammatory reliever medications, above, and doses in Table 7, page 45) 2. ICS-LABA as maintenance treatment, plus SABA (or ICS-SABA) as reliever. For adults and adolescents, MART is preferred (GINA Track 1) because it reduces exacerbations compared with the same or higher dose of ICS-LABA maintenance plus as-needed SABA reliever, and is a simpler regimen. See: Track 1 treatment options for adults and adolescents (page 24) Track 2 treatment options for adults and adolescents (page 25) Treatment steps for children 6–11 years (page 29) Doses in reference tables on page 44 and page 45

ICS in combination with a long-acting beta$_2$-agonist bronchodilator (ICS-LABA) - CONTINUED

Adverse effects	LABA: tachycardia, headache, muscle cramps. LABA should not be used without ICS in patients with asthma (or asthma+COPD). ICS: See Inhaled corticosteroids (above)

Leukotriene receptor antagonists (LTRA)

Medications	Montelukast, pranlukast, zafirlukast, zileuton
Delivery	Oral: tablets
Use in asthma	Target one part of the inflammatory pathway in asthma. Sometimes used as maintenance therapy, mainly in children. However, LTRA is less effective than low-dose ICS, and ICS plus LTRA is less effective than ICS-LABA.
Adverse effects	Zileuton and zafirlukast: elevated liver function tests Montelukast: concerns about risk of serious behavioral and mood changes, including suicidal ideation in adults and children – discuss with patients/parents/caregivers

Add-on maintenance medications

Long-acting muscarinic antagonists (LAMA) – check local eligibility criteria

Medications	Patients aged ≥6 years: tiotropium by mist inhaler, in addition to maintenance ICS-LABA treatment Patients aged ≥18 years: combination ICS-LABA-LAMA inhalers (beclometasone-formoterol-glycopyrronium, fluticasone furoate-vilanterol-umeclidinium, mometasone-indacaterol-glycopyrronium)
Delivery	Inhaled: pressurized metered-dose inhaler, dry-powder inhaler, or mist inhaler
Use in asthma	Can be added to other treatment for patients with uncontrolled asthma despite ICS-LABA. Consider adding at Step 5 (or Step 4 as add-on to low-dose ICS-LABA), but weaker evidence for benefit. Adding LAMA to ICS-LABA improves lung function by a small amount (but not symptoms or quality of life), and reduces exacerbations by a small amount. For patients with exacerbations, increase ICS to at least medium dose before adding a LAMA.
Adverse effects	Uncommon: dry mouth, urinary retention

Anti-immunoglobin E – check local eligibility criteria

Medications	Patients aged ≥6 years: omalizumab
Delivery	Subcutaneous injection: syringe or pen device (self-injection may be an option)
Use in asthma	Can be added to other treatment for patients with severe allergic asthma uncontrolled on high-dose ICS-LABA (see local product information and payer advice for other indications)
Adverse effects	Common: minor reactions at injection site Rare: anaphylaxis

Anti-interleukin 5 and anti-interleukin 5 receptor alpha – check local eligibility criteria

Medications	Patients aged ≥6 years: mepolizumab Patients aged ≥12 years: benralizumab Patients aged ≥18 years: reslizumab
Delivery	Subcutaneous injection: mepolizumab, benralizumab (self-injection may be an option) Intravenous infusion: reslizumab
Use in asthma	Can be added to other treatment for patients with severe eosinophilic asthma uncontrolled on high-dose ICS-LABA (see local product information and payer advice for other indications). Maintenance oral corticosteroid dose can be significantly reduced with benralizumab and mepolizumab.
Adverse effects	Common: headache, minor reactions at injection site

Anti-interleukin 4 receptor alpha – check local eligibility criteria

Medications	Patients aged ≥6 years: dupilumab
Delivery	Subcutaneous injection: syringe or pen device (self-injection may be an option)
Use in asthma	Can be added to other treatment for patients with severe eosinophilic asthma or Type 2 airway inflammation, if asthma is uncontrolled on high-dose ICS-LABA, or for patients requiring maintenance oral corticosteroids (see local product information and payer advice for other indications). Not advised for patients with current or past blood eosinophils ≥1500/microliter.
Adverse effects	Common: minor reactions at injection site Uncommon: transient blood eosinophilia (4–13% of patients) Rare: eosinophilic granulomatosis with polyangiitis after reducing or stopping oral corticosteroids while on dupilumab

Anti-thymic stromal lymphopoietin (anti-TSLP) – check local eligibility criteria

Medications	Patients aged ≥12 years: tezepelumab
Delivery	Subcutaneous injection: syringe or pen device (self-injection may be an option)
Use in asthma	Can be added to other treatment for patients with severe asthma that is uncontrolled on high-dose ICS-LABA
Adverse effects	Common: minor reactions at injection site Rare: anaphylaxis

Systemic corticosteroids

Medications	Prednisone, prednisolone, methylprednisolone, hydrocortisone, dexamethasone
Delivery	Oral (tablets or liquid), intramuscular injection, or intravenous injection
Use in asthma	Short-term use for severe acute exacerbations: effective for preventing short-term recurrence of severe asthma exacerbations. Treatment usually oral 5–7 days in adults, 3–5 days in children. If used for >2 weeks, reduce dose gradually before stopping. After an exacerbation, optimize inhaled therapy to reduce risk of needing another course. Long-term use: avoid due to risk of serious adverse effects, except as a last resort, and only if asthma cannot be controlled by other treatments. Check and manage adverse effects. Refer patient for specialist review.
Adverse effects	Short courses: sepsis, thromboembolism, sleep disturbance, gastroesophageal reflux, increased appetite, hyperglycemia, mood changes. Multiple short courses increase later risk of diabetes, osteoporosis, cataract, glaucoma, heart failure and other conditions. Maintenance use: adverse effects include cataract, glaucoma, hypertension, diabetes, adrenal suppression, osteoporosis

Short-acting bronchodilator reliever medications

Short-acting inhaled beta$_2$-agonist bronchodilators (SABA)

Medications	Salbutamol (albuterol), terbutaline
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler (also solution for nebulization or injection)
Use in asthma	Quick relief of asthma symptoms and bronchoconstriction, and for pretreatment before exercise. SABAs should be used only when needed (not regularly) at the dose needed to relieve symptoms. Use without ICS not recommended due to risk of severe exacerbations and asthma-related death (page 15). Commonly used for treatment of severe exacerbations in primary care and emergency departments. Fenoterol is not recommended because of its association with increased cardiovascular adverse effects and increased risk of asthma mortality.
Adverse effects	Short-term: tremor, tachycardia with initial use Regular or frequent use: tolerance results in increased airway hyperresponsiveness, reduced bronchodilator effect, and increased airway inflammation. Excess use, or poor response, indicates poor asthma control and risk of exacerbations. Dispensing of 3 or more 200-dose canisters per year is associated with increased risk of exacerbations, and dispensing of 12 or more canisters per year is associated with a markedly increased risk of death.

Short-acting antimuscarinic antagonists (anticholinergics)

Medications	Ipratropium bromide, oxitropium bromide May be in combination inhaler with SABA
Delivery	Inhaled: pressurized metered-dose inhaler or dry-powder inhaler; nebulizer
Use in asthma	Short-term use in acute care for severe exacerbations: ipratropium plus SABA reduces risk of hospital admission acute asthma, compared with SABA alone As-needed use as reliever: less effective than SABA, with slower onset of action
Adverse effects	Dry mouth, bitter taste. Should be used with caution in patients with narrow-angle glaucoma.

TABLE 6. Low, medium and high daily metered doses of inhaled corticosteroids

Adults and adolescents

Inhaled corticosteroid	Total daily ICS dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (pMDI)	200–500	>500–1000	>1000
Beclometasone dipropionate (DPI or pMDI, extrafine particle)	100–200	>200–400	>400
Budesonide (DPI or pMDI)	200–400	>400–800	>800
Ciclesonide (pMDI, extrafine particle)	80–160	>160–320	>320
Fluticasone furoate (DPI)	100		200
Fluticasone propionate (DPI)	100–250	>250–500	>500
Fluticasone propionate (pMDI)	100–250	>250–500	>500
Mometasone furoate (DPI)	Depends on DPI device		
Mometasone furoate (pMDI)	200–400		400

Children 6–11 years

Inhaled corticosteroid	Total daily ICS dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (pMDI)	100–200	>200–400	>400
Beclometasone dipropionate (pMDI, extrafine particle)	50–100	>100–200	>200
Budesonide (DPI)	100–200	>200–400	>400
Budesonide (nebules)	250–500	>500–1000	>1000
Ciclesonide (pMDI, extrafine particle)	80	>80–160	>160
Fluticasone furoate (DPI)	50		–
Fluticasone propionate (DPI)	50–100	>100–200	>200
Fluticasone propionate (pMDI)	50–100	>100–200	>200
Mometasone furoate (pMDI)	100		200

DPI: dry-powder inhaler; ICS: inhaled corticosteroid; pMDI: pressurized metered-dose inhaler*

Notes:

This table shows suggested total daily ICS doses for low dose, medium dose and high dose, not dose equivalence. The table shows metered doses.

Available doses, regulatory approval, labelling and clinical guidelines may differ between countries. Check the manufacturer's product Information carefully if using new or generic products, or products containing a LAMA. Different preparations of a particular ICS molecule may not be clinically equivalent. For example, mometasone doses change when LAMA is added to ICS-LABA.

A low daily dose of ICS provides most of the clinical benefit for most patients. Some patients have less response to ICS and may need a medium dose if asthma is uncontrolled despite good adherence and correct inhaler technique with a low dose. High doses of ICS are rarely needed. Long-term use of high doses of ICS increases the risk of local and systemic side-effects.

*A spacer should be used for ICS by pMDI. All the pMDIs listed in this table contain an HFA propellant. New propellants with a lower environmental impact are under development.

TABLE 7. Anti-inflammatory relievers (AIR) and MART– recommended inhalers and doses

For as-needed use of ICS-formoterol, patients should take one inhalation whenever needed for symptom relief. If symptoms have not improved after a few minutes, another dose can be taken. Patients do not need to wait a certain number of hours before taking more reliever doses, but they should not take more than the maximum total number of inhalations in a single day. Most patients need far less than this. If a patient feels that they need more doses than the recommended maximum total in any day, they should seek medical advice the same day. ICS-formoterol can also be taken before exercise or allergen exposure, instead of a SABA reliever.

Age (years)	**Inhaler: metered dose per inhalation [delivered dose] in micrograms**	**GINA Step**	**Dosing**	**Maximum total in any one day#**
6–11	Budesonide-formoterol 100/6 [80/4.5] **DPI***	Step 3	MART: 1 inhalation once daily plus 1 as needed	8 inhalations in any day
		Step 4	MART: 1 inhalation twice daily plus 1 as needed	
12–17	Budesonide-formoterol 200/6 [160/4.5] **DPI** or **pMDI**	Step 1–2	AIR-only: 1 inhalation as needed	12 inhalations in any day
		Step 3	MART: 1 inhalation twice (or once) daily plus 1 as needed	
		Steps 4–5	MART: 2 inhalations twice daily plus 1 as needed	
≥ 18	Budesonide-formoterol 200/6 [160/4.5] **DPI** or **pMDI**	Step 1–2	AIR-only: 1 inhalation as needed	12 inhalations in any day
		Step 3	MART: 1 inhalation twice (or once) daily plus 1 as needed	
		Steps 4–5	MART: 2 inhalations twice daily plus 1 as needed	
	Beclometasone-formoterol 100/6 **DPI**† Beclometasone-formoterol 100/6 **pMDI**†	Step 3	MART: 1 inhalation twice (or once) daily plus 1 as needed	12 inhalations in any day‡
		Steps 4–5	MART: 2 inhalations twice daily plus 1 as needed	

AIR: anti-inflammatory reliever; DPI: dry-powder inhaler; MART: maintenance-and-reliever therapy; pMDI: pressurized metered-dose inhaler

*Children: budesonide-formoterol is not recommended for Step 5 MART in children. There are no studies of budesonide-formoterol AIR-only at Steps 1–2 in children.

#If a patient needs to take more than this number of inhalations in a day, they should seek medical attention the same day.

†Adults: There are no studies of beclometasone-formoterol for as-needed-only treatment

‡For MART with beclometasone-formoterol, GINA suggests patients can use up to 12 inhalations total in one day if needed, based on extensive formoterol safety data, including from studies of budesonide-formoterol

For more inhaler options, see Box 4-8 in the full 2025 GINA Report

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