Review of the Updated Korean Asthma Guidelines and Updates in GINA

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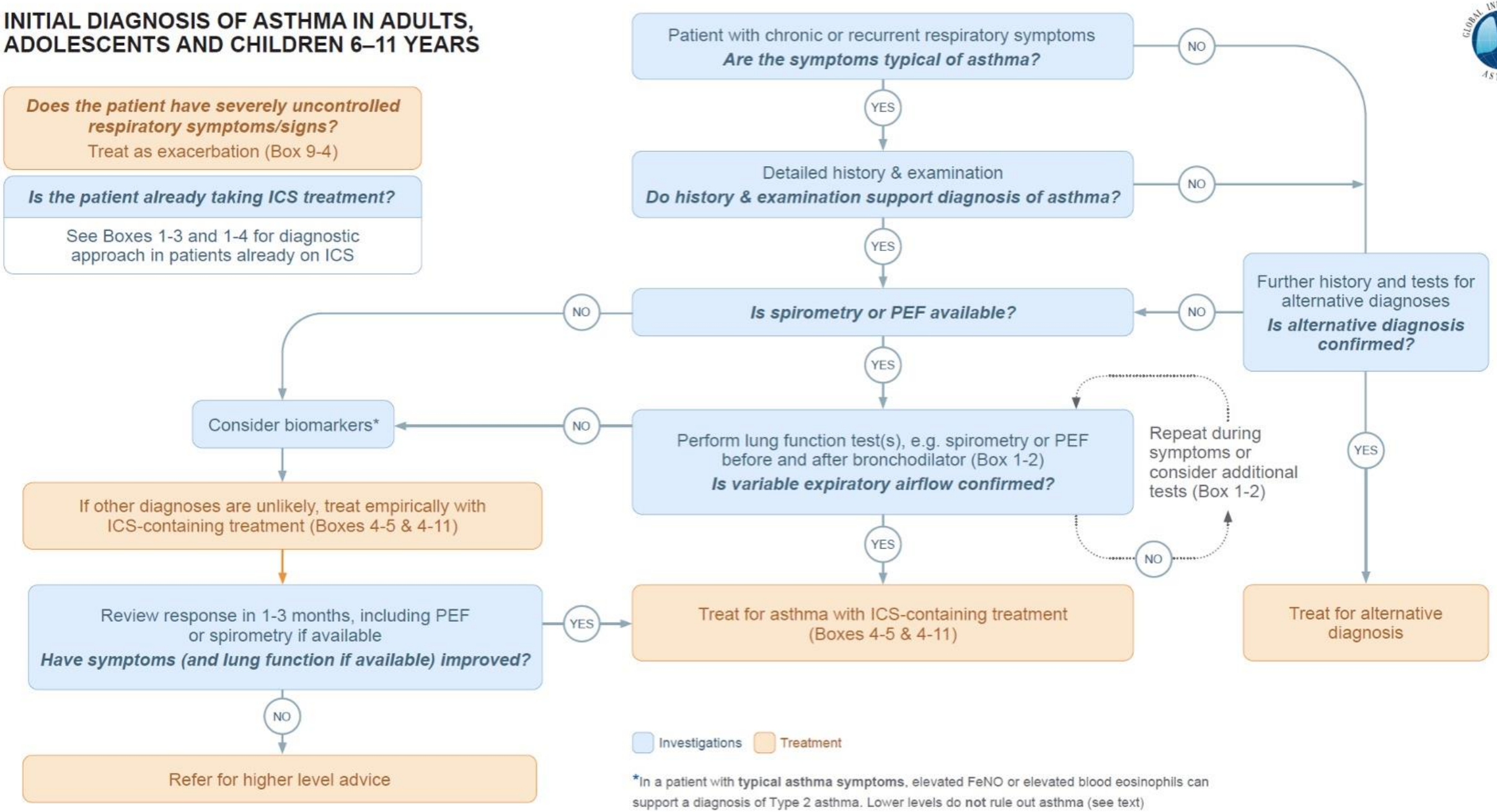
INITIAL DIAGNOSIS OF ASTHMA IN ADULTS, ADOLESCENTS AND CHILDREN 6–11 YEARS



*In a patient with **typical asthma symptoms**, elevated FeNO or elevated blood eosinophils can support a diagnosis of Type 2 asthma. Lower levels do **not** rule out asthma (see text)

GINA 2026.

Criteria for initial diagnosis of asthma

1. HISTORY OF TYPICAL VARIABLE RESPIRATORY SYMPTOMS	
Feature	*Symptoms or features that support the diagnosis of asthma*
Wheeze, shortness of breath, chest tightness and/or cough (Descriptors may vary by region and by age)	• Symptoms occur variably over time and vary in intensity • Symptoms are often worse at night or on waking • Symptoms are often triggered by exercise, laughter, allergens, cold air • Symptoms worsen after end-exercise (very distinctive) • Symptoms often appear or worsen with viral infections
2. CONFIRMED VARIABLE EXPIRATORY AIRFLOW	
Feature	*Considerations, definitions, criteria*
Excessive variability in expiratory lung function (one or more of the following):	The greater the variations, or the more occasions excess variation is seen, the more confidently the diagnosis of asthma can be made. If spirometry is not possible, PEF† may be used, but it is less reliable.
Positive bronchodilator (BD) responsiveness (reversibility) test with spirometry (or PEF†) When possible, test during symptoms or in the morning	Measure change 10–15 minutes after 200–400 mcg salbutamol (albuterol) or equivalent, compared with pre-BD readings. Positive test more likely if BD withheld before test: SABA ≥4 hours, long-acting bronchodilators 24–48 hours (see below). *Adults*: increase from baseline in FEV_1 or FVC of ≥12% and ≥200 mL, with greater confidence if the increase is ≥15% and ≥400 mL; or increase in PEF† ≥20% if spirometry is not available. For more details see p.29. *Children*: increase from baseline in FEV_1 of ≥12% predicted (or in PEF† of ≥15%)
Excessive variability in twice-daily PEF over 2 weeks*	*Adults*: average daily diurnal PEF variability >10%* *Children*: average daily diurnal PEF variability >13%*
Increase in lung function after 4 weeks of ICS-containing treatment	*Adults*: increase from baseline in FEV_1 by ≥12% and ≥200 mL (or PEF† by ≥20%) after 4 weeks of daily ICS-containing treatment *Children*: increase from baseline in FEV_1 of ≥12% predicted (or in PEF† of ≥15%).

Criteria for initial diagnosis of asthma

Positive bronchial provocation test	*Adults*: Fall from baseline in FEV_1 of ≥20% with standard doses of methacholine, or ≥15% with standardized hyperventilation, hypertonic saline or mannitol challenge, or >10% and >200 mL with standardized exercise challenge. *Children*: fall from baseline in FEV_1 of >12% predicted (or fall in PEF† >15%) with standardized exercise challenge. If FEV_1 decreases during a challenge test, check that FEV_1/FVC ratio has also decreased, since incomplete inhalation, e.g., due to inducible laryngeal obstruction or poor effort, can result in a false reduction in FEV_1.
Excessive variation in lung function between visits (good specificity but poor sensitivity)	*Adults*: variation in FEV_1 of ≥12% and ≥200 mL (or in PEF† of ≥20%) between visits. *Children*: variation of ≥12% in FEV_1 (or ≥15% in PEF†) between visits

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. Both vary by time of day: blood eosinophil count is higher in the early morning than in the afternoon, but FeNO is lower in the early morning. See Appendix A for more details about blood eosinophils and FeNO (p.216).

Bronchodilator responsiveness

- **Random BDR test**: vey limited utility, especially if long after disease onset
  - ✓ Variable in asthma: symptoms (and bronchoconstriction) not present all the time
  - ✓ ICS-containing treatment: increased pre-BD FEV_1 → decreased BDR
  - ✓ Longer asthma duration: little BD responsiveness with persistent airflow limitation
  - ✓ In COPD: significant BD responsiveness in some patients with/without asthma

- Current criteria
  - ✓ Increase in **FEV_1 or FVC** from baseline by **≥12% and ≥200 mL of the baseline value**

- Recommendation of ERS/ATS Technical Standards Committee
  - ✓ Increase in **FEV_1 or FVC** from baseline by **>10% of the predicted value**
  - ✓ Based on data for mortality in general populations
  - ✓ Not yet widely compared with other diagnostic tests for asthma

- GINA will review this again when more data are available

Blood eosinophil count as a type 2 biomarker

Biomarker	Typical criteria for 'high' in adults/adolescents	Factors affecting measurement
Blood eosinophil count (BEC)	For diagnosis of asthma: BEC ≥ upper limit of normal for the population from regional or national laboratory reference values. **In severe asthma patients taking high-dose ICS**: ▪ BEC ≥150/μL suggests presence of Type 2 inflammation ▪ BEC ≥300/μL is a common threshold for eligibility for Type 2–targeted biologic	BEC levels are influenced by multiple factors, including age, sex, time of day, smoking, and allergen exposure in sensitized individuals. **Within a population, BEC is higher:** ▪ in males than females ▪ in the early morning than the afternoon ▪ in current smokers ▪ with parasitic infections (e.g., helminths) ▪ in allergic diseases (e.g., atopic dermatitis, allergic rhinitis, drug hypersensitivity) ▪ with allergen exposure in sensitized individuals ▪ in other non-asthma conditions (e.g., eosinophilic bronchitis, EGPA). **Within a population, BEC is lower:** ▪ in some asthma phenotypes ▪ in patients taking corticosteroids (particularly oral corticosteroids, but also inhaled and intranasal)

FeNO as a type 2 biomarker

Biomarker	Typical criteria for 'high' in adults/adolescents	Factors affecting measurement
Fractional exhaled nitric oxide (FeNO)	Population reference values are not possible at present. In the interim, the following levels are suggested as **indicating high FeNO**: ▪ ICS-naïve: >50 ppb ▪ Medium-dose ICS: ≥25 ppb ▪ High-dose ICS: ≥20 ppb	FeNO levels are influenced by multiple factors, including age, sex, time of day, and by allergen exposure in sensitized individuals, as well as by measuring device and site. **Within a population, FeNO is higher:** ▪ in males than females ▪ in the afternoon than the early morning ▪ in allergic diseases, e.g., atopic dermatitis, allergic rhinitis ▪ approximately 24 hours after allergen exposure in sensitized individuals **Within a population, FeNO is lower:** ▪ in current smokers ▪ during bronchoconstriction and with lower lung function ▪ during the early allergic response ▪ with inhaled corticosteroids (dose-dependent) but also with oral or nasal corticosteroids.

Clinical utility of type 2 biomarkers: Diagnosis

1. INITIAL DIAGNOSIS OF ASTHMA		
Blood eosinophil count (BEC)	Adults with typical symptoms of asthma, but normal or obstructive spirometry without a positive bronchodilator responsiveness test	In a patient with typical asthma symptoms, high BEC may support a diagnosis of Type 2 asthma, but consider non-asthma causes of elevated BEC (as above). Low BEC does not rule out asthma.[46,700,971-974] Diagnosis of asthma is further supported if there is a clinical response to asthma treatment (see Box 1-1 [p.24] and Box 1-2 [p.25]).
FeNO	Adults with typical symptoms of asthma, but normal or obstructive spirometry without a positive bronchodilator responsiveness test	In a patient with typical asthma symptoms, a high FeNO may support a diagnosis of Type 2 asthma, but there are non-asthma causes of elevated FeNO (as above), and a low FeNO does not rule out asthma.[46,49,313,973,975-984] Diagnosis of asthma is further supported if there is a clinical response to asthma treatment (see Box 1-1 [p.24] and Box 1-2 [p.25]).

Clinical utility of type 2 biomarkers: Phenotyping

2. PHENOTYPING OF ASTHMA		
2.1 *Mild-to-moderate asthma*		
BEC	Identification of asthma phenotypes in adults and adolescents	High BEC in a patient with an established diagnosis of asthma is consistent with eosinophilic asthma.[19,47,985]
FeNO	Identification of asthma phenotypes in adults and adolescents	High FeNO in a patient with an established diagnosis of asthma is consistent with Type 2 asthma.[19,47,985]
Serum total IgE Allergen-specific IgE	Identification of asthma phenotypes in adults, adolescents and children	One or more positive tests for a clinically-relevant allergen-specific IgE (or skin prick tests) in a patient with an established diagnosis of asthma is consistent with allergic asthma,[19,47,985] when consistent with a medical history of symptoms triggered by exposure to specific aeroallergen(s).
2.2 *Severe asthma*		
See GINA 2025 Chapter 8: Difficult-to-treat and Severe Asthma (p.139). To identify Type 2-high severe asthma in patients taking high-dose ICS-containing therapy, BEC and FeNO may need to be repeated up to 3 times. For patients taking OCS, the biomarkers should be measured, if possible, at least 1–2 weeks after cessation of a burst of OCS, or on the lowest possible maintenance dose; a pause of 2 days in maintenance OCS dose can allow BEC to increase (p.150).[702]		

Clinical utility of type 2 biomarkers: Prognosis

3. PROGNOSIS OF ASTHMA		
BEC	Patients with a history of ≥1 asthma exacerbation in the previous year	A high BEC is associated with a higher risk of (future) asthma exacerbations, particularly in patients taking a medium/high dose of ICS or OCS.[14,986,987]
FeNO	Patients with a history of ≥1 asthma exacerbation in the previous year	In ICS-treated patients, a high FeNO is associated with a higher risk of (future) asthma exacerbations.[14,986,987]
BEC and FeNO	Patients with a history of ≥1 asthma exacerbation in the previous year	BEC and FeNO provide complementary prognostic information in patients with asthma; risk of future asthma exacerbations is highest when both BEC and FeNO are high.[14]

Clinical utility of type 2 biomarkers: Treatment

4.SELECTING ASTHMA TREATMENT, OR PREDICTING RESPONSE		
4.1 Mild asthma		
BEC	Adults with mild asthma taking low-dose ICS or no ICS	The reduction in severe exacerbations seen with as-needed-only ICS-formoterol (AIR-only) compared with as-needed SABA or daily ICS plus as-needed SABA is independent of baseline BEC, i.e., patients with either low or high BEC have a significant reduction in severe exacerbations with AIR-only compared with these other regimens.[195,196]
FeNO	Adults with mild asthma taking low-dose ICS or no ICS	The reduction in severe exacerbations seen with as-needed-only ICS-formoterol vs SABA-only or daily ICS plus as-needed SABA is independent of baseline FeNO, i.e., patients with either low or high FeNO have a significant reduction in severe exacerbations with AIR-only compared with these other regimens.
4.2 Moderate asthma		
BEC	Adults with uncontrolled asthma despite prescription of GINA step 3 or 4 treatment	The reduction in severe exacerbations with maintenance-and-reliever therapy (MART) with ICS-formoterol is independent of baseline BEC, (i.e., patients with low BEC have a significant reduction in severe exacerbations with MART compared with SABA-based regimens), but the benefit increases with higher BEC.[988] If BEC is high, first check adherence and inhaler technique first; consider switching to anti-inflammatory reliever therapy (GINA Track 1) or (if reliever is SABA) increasing ICS dose.[368]
FeNO	Adults with uncontrolled asthma despite prescription of GINA step 3 or 4 treatment	In patients with difficult-to-treat asthma and persistently high FeNO despite prescribing of medium-high dose ICS-LABA, directly observed or monitored corticosteroid therapy suppresses FeNO in approximately two-thirds of patients, and is associated with previous poor adherence.[236,506] If FeNO is high, check adherence and inhaler technique first;[236,506] if asthma remains uncontrolled, consider switching to anti-inflammatory reliever therapy (GINA Track 1) or, if reliever is SABA, increasing ICS dose.[368]
BEC and FeNO	Adults with uncontrolled asthma despite prescription of GINA step 3 or 4 treatment	If both BEC and FeNO are low, either in stable state or during exacerbations, consider other treatment options (pharmacological and non-pharmacological) before increasing ICS dose.[368]

Clinical utility of type 2 biomarkers: Treatment

4.3 Severe asthma		
BEC	Adults with severe asthma who experience exacerbations despite treatment with high dose ICS-LABA	A high BEC predicts a better asthma response to add-on treatment with all biologics licensed for treatment of asthma than a lower BEC.[398,403,989]
FeNO	Adults with severe asthma who experience exacerbations despite treatment with high-dose ICS-LABA	For patients with high FeNO, first check adherence, because FeNO suppression with directly observed administration of corticosteroid identifies poor adherence in two-thirds of patients with persistently high FeNO despite prescription of high-dose ICS-LABA.[236,506] A high FeNO predicts a better asthma response to add-on treatment with dupilumab, omalizumab and tezepelumab than a lower FeNO.[398,403,989] The efficacy of anti-IL5 (mepolizumab, reslizumab) and anti-IL5R (benralizumab) is independent of FeNO levels.[989]
BEC and FeNO	Adults with severe asthma who experience exacerbations despite treatment with high-dose ICS-LABA	BEC and FeNO provide complementary theragnostic information in severe asthma; patients with severe asthma treated with dupilumab or tezepelumab have the best clinical response if both BEC and FeNO (pre-biologic) are high.[398,403,989]

Population-level decisions about asthma treatment

Choosing between treatment options at a population level

(e.g., national formularies, health maintenance organizations, national guidelines)

The 'preferred' medication at each step is the best treatment for most patients, based on:

Efficacy

Effectiveness

Safety

Mainly based on evidence about symptoms and exacerbations (from randomized controlled trials, pragmatic studies and strong observational data)

Access

Population-level availability and cost

There are different population-level recommendations by age-group (adults/adolescents, children 6–11 years, children 5 years and younger). For patients with severe asthma, there are also different population-level recommendations depending on the inflammatory phenotype.

Patient-level decisions about asthma treatment

Choosing between controller options for individual patients

Use shared decision-making with the patient or parent/caregiver to discuss the following:

1. Preferred medication

- What is the best medication for symptom control and risk reduction (as above)?

2. Patient characteristics or phenotype

- Does the patient have any factors that predict differences in risk or treatment response, compared with other patients, e.g., smoking; SABA over-use; exacerbation history; high FeNO or eosinophils; environmental exposures; comorbidities?

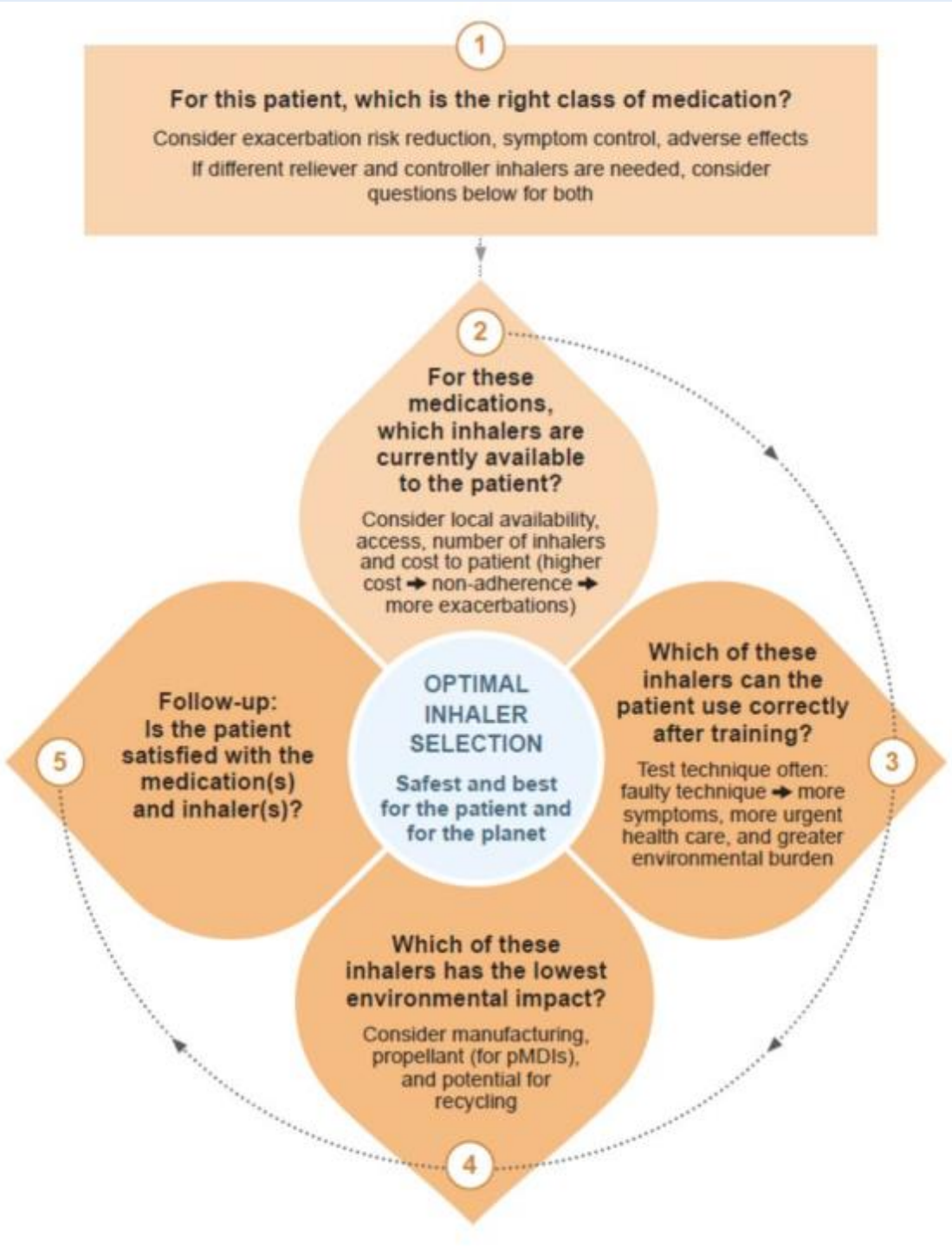
3. Patient views

- What are the patient's goals, beliefs and concerns about asthma and its treatment?

4. Practical issues

- For the preferred medication(s), which inhalers are available to this patient?
- Can they use the inhaler correctly after training?
- Can they afford the medication?
- Adherence – how often are they likely to take the medication?
- If more than one inhaler is suitable for the patient, which has the lowest environmental impact?

Shared decision-making about choice of inhaler device



GINA 2025
Adults & adolescents 12+ years

Personalized asthma management
Assess, Adjust, Review
for individual patient needs

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

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

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

TRACK 1: PREFERRED CONTROLLER and RELIEVER
Using ICS-formoterol as the reliever* reduces the risk of exacerbations compared with using a SABA reliever, and is a simpler regimen

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

RELIEVER: As-needed low-dose ICS-formoterol*

TRACK 2: Alternative CONTROLLER and RELIEVER
Before considering a regimen with SABA reliever, check if the patient is likely to adhere to daily controller treatment

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
Reliever only; if SABA, take ICS with each dose	Low dose maintenance ICS	Low dose maintenance ICS-LABA	Medium dose maintenance ICS-LABA	Add-on LAMA Refer for assessment of phenotype. Consider trial of high-dose maintenance ICS-LABA. Consider anti-IgE, anti-IL5/5R, anti-IL4Rα, anti-TSLP

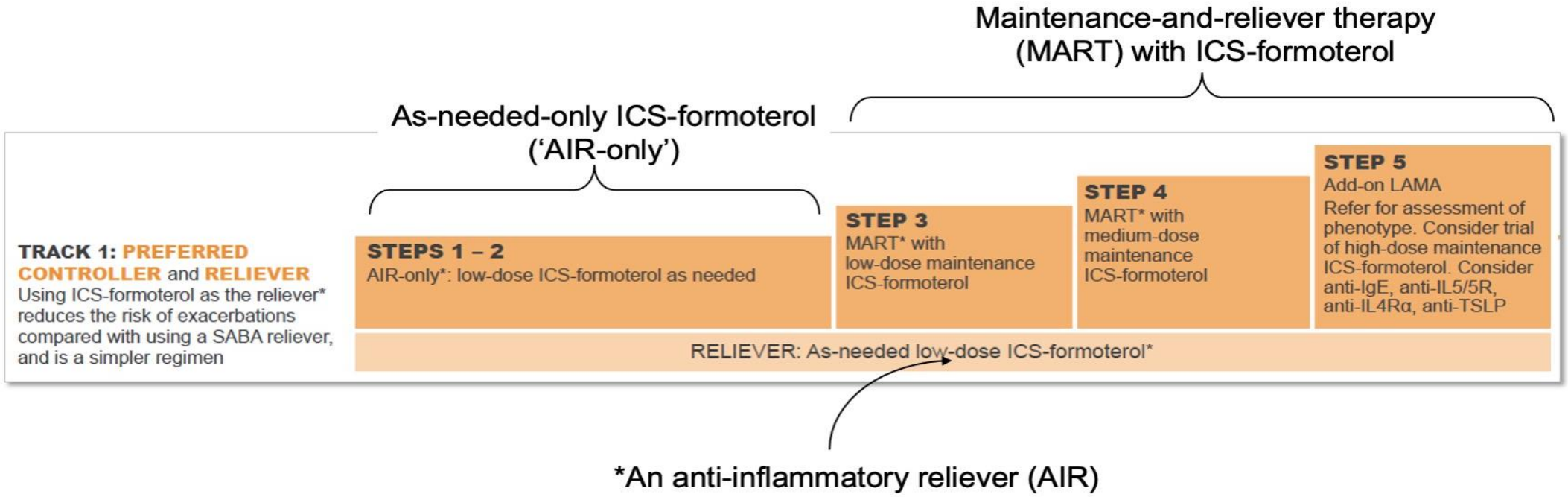
RELIEVER: as-needed ICS-SABA*, or as-needed SABA

See GINA severe asthma guide

Non-pharmacologic strategies include smoking cessation, physical activity, pulmonary rehabilitation, weight reduction, vaccinations (see text for more)
Allergen immunotherapy, e.g. HDM SLIT: consider for patients with clinically relevant sensitization and not well-controlled (but stable) asthma See text for further information and safety advice
Additional controller options (e.g., add-on LAMA at Step 4, add-on LTRA) have less evidence for efficacy or for safety than Tracks 1 or 2 (see text). Maintenance OCS should only ever be used as last resort.

AIR: anti-inflammatory reliever; HDM: house dust mite; ICS: inhaled corticosteroid; Ig: immunoglobulin; IL: interleukin; LABA: long-acting beta$_2$-agonist; LAMA: long-acting muscarinic antagonist; LTRA: leukotriene receptor antagonist; MART: maintenance-and-therapy with ICS-formoterol; OCS: oral corticosteroid; SABA: short-acting beta$_2$-agonist; SLIT: subcutaneous immunotherapy; TSLP: thymic stromal lymphopoietin

Terminology



Anti-inflammatory reliever (AIR)	Reliever inhaler that contains both a low-dose ICS and a rapid-acting bronchodilator	budesonide–formoterol, beclometasone–formoterol, ICS–salbutamol combinations
Maintenance-and-reliever therapy (MART)	Treatment regimen in which the patient uses an ICS–formoterol inhaler every day (maintenance dose), and also uses the same medication as needed for relief of asthma symptoms (reliever dose)	Used only with combination ICS–formoterol inhalers such as budesonide–formoterol and beclometasone–formoterol

Key changes to treatment recommendations

- **Two-track approach**: retained, given GINA's global audience

- **Track 1 with ICS-formoterol anti-inflammatory reliever**
  - ✓ Preferred: significant reduction of risk of severe exacerbations, OCS exposure and need for urgent health care compared with SABA-based regimens
  - ✓ With a single inhaler and single inhaler device across Steps 1 to 4, it is easier for patients than Track 2

- **In Track 2**
  - ✓ Step 4, 'medium/high dose' ICS-LABA changed to **'medium dose' ICS-LABA**
  - ✓ High ICS doses should be used only for a maximum of 3–6 months if possible
  - ✓ Check patients are adherent with maintenance ICS or ICS-LABA, else they will be taking SABA alone
  - ✓ Make sure the patient knows correct technique for their separate reliever and maintenance inhalers

- Other controller options include non-pharmacologic strategies (including smoking cessation, weight reduction, vaccinations, pulmonary rehabilitation), and allergen immunotherapy. **Some additional medications (add-on LAMA at Step 4, add-on LTRA) may be available but have less evidence for efficacy and safety**
  - ✓ Maintenance OCS should be used only as last resort

GINA 2025 – STARTING TREATMENT

in adults and adolescents 12+ years with a diagnosis of asthma

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

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

Asthma medications including ICS

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

IF the patient has:	START WITH:	TRACK 1 (preferred)	OR	TRACK 2	
Daily symptoms or waking at night once a week or more, and low lung function or recent exacerbation	YES	Medium dose ICS-formoterol maintenance and reliever (MART)		Medium dose ICS-LABA + as-needed SABA (or ICS-SABA)	STEP 4
NO					
Symptoms most days, or waking at night once a week or more, or low lung function	YES	Low dose ICS-formoterol maintenance and reliever (MART)		Low dose ICS-LABA + as-needed SABA (or ICS-SABA)	STEP 3
NO					
Symptoms less than 3–5 days a week, with normal (or mildly reduced) lung function	YES	As-needed-only low dose ICS-formoterol (AIR-only)		Low dose ICS + as-needed SABA (or ICS-SABA)	STEP 2
				As-needed ICS+SABA (separate inhalers or combination)	STEP 1

Short course of OCS may also be needed for patients presenting during an exacerbation

Track 2: in patients with symptoms 1–2 days a week or less, adherence with daily ICS would be very poor, so taking low-dose ICS whenever SABA is taken could reduce the risk of exacerbations

AIR: anti-inflammatory reliever; ICS: inhaled corticosteroid; LABA: long-acting beta$_2$-agonist; MART: maintenance-and-reliever therapy with ICS-formoterol; OCS: oral corticosteroid; SABA: short-acting beta$_2$-agonist

Not-recommended bronchodilators

- **Fenoterol**
  - ✓ Higher risk of adverse effects (including hypokalemia and cardiovascular effects)
  - ✓ Association with increased asthma mortality

- **Oral bronchodilators and theophylline**
  - ✓ Higher risk of side-effects than inhaled SABA
  - ✓ No long-term safety studies to assess the risk of severe exacerbations

- **Anticholinergic agents without ICS**
  - ✓ SAMA (e.g, ipratropium)
    - Potential alternatives to SABA for routine relief of asthma symptoms
    - Slower onset of action than inhaled SABA; Not be used without ICS
  - ✓ LAMA without concomitant ICS: increased risk of severe exacerbations.

- **Formoterol without ICS**
  - ✓ Strongly discouraged because of the risk of exacerbations

Difficult-to-treat and severe asthma

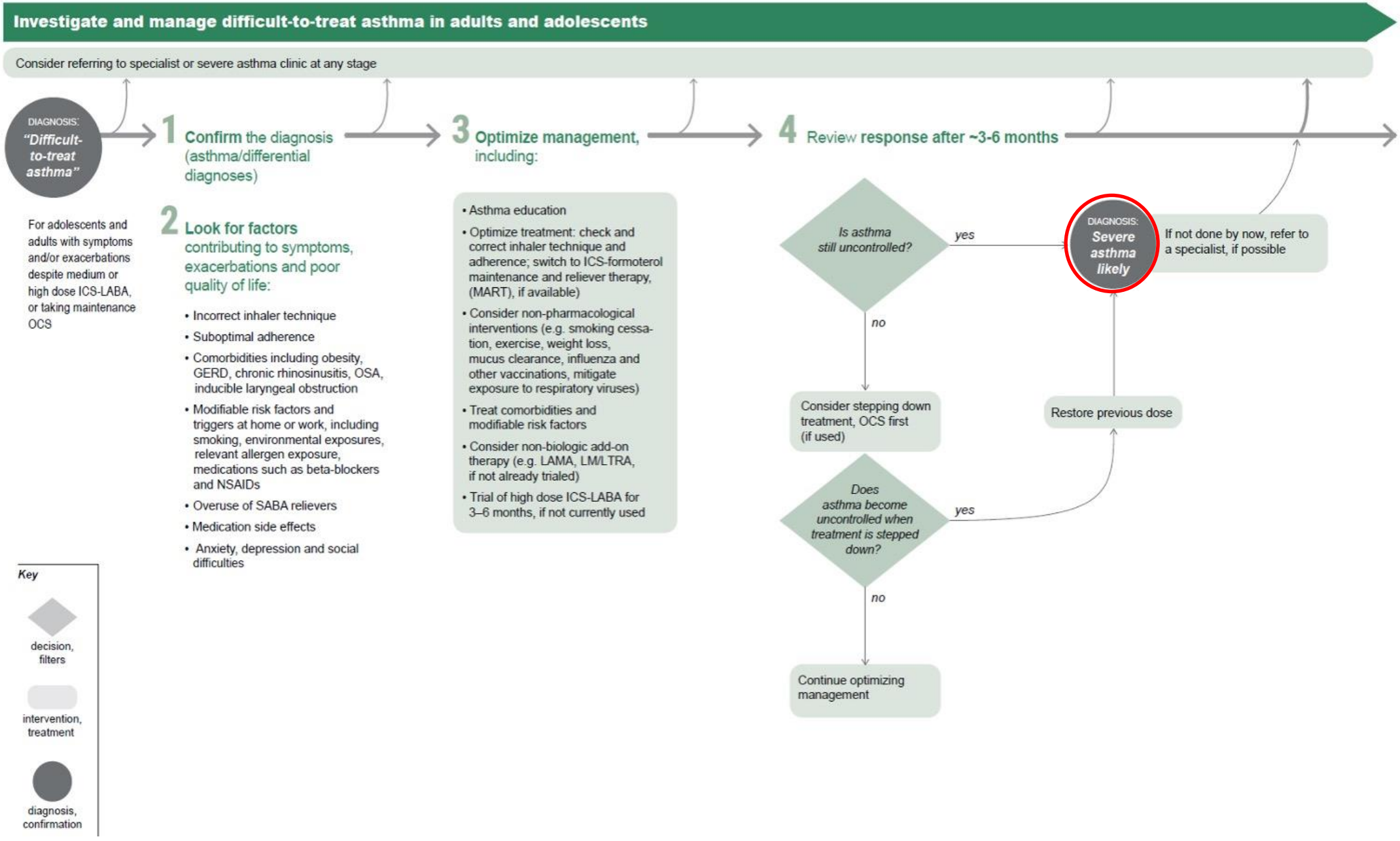
- **Uncontrolled asthma**
  - ✓ Frequent symptoms and/or flare-ups (exacerbations)
  - ✓ Could potentially have mild, easy-to-treat asthma, if treated appropriately with ICS

- **Difficult-to-treat asthma**
  - ✓ Uncontrolled despite medium- or high-dose ICS-containing treatment
  - ✓ Contributory factors may include incorrect diagnosis, incorrect inhaler technique, poor adherence, comorbidities, SABA over-use and other risk factors

- **Severe asthma**
  - ✓ Uncontrolled despite maximal optimized therapy and treatment of contributory factors, or worsened when high dose treatment is decreased
  - ✓ Relatively refractory to corticosteroids, but rarely completely refractory

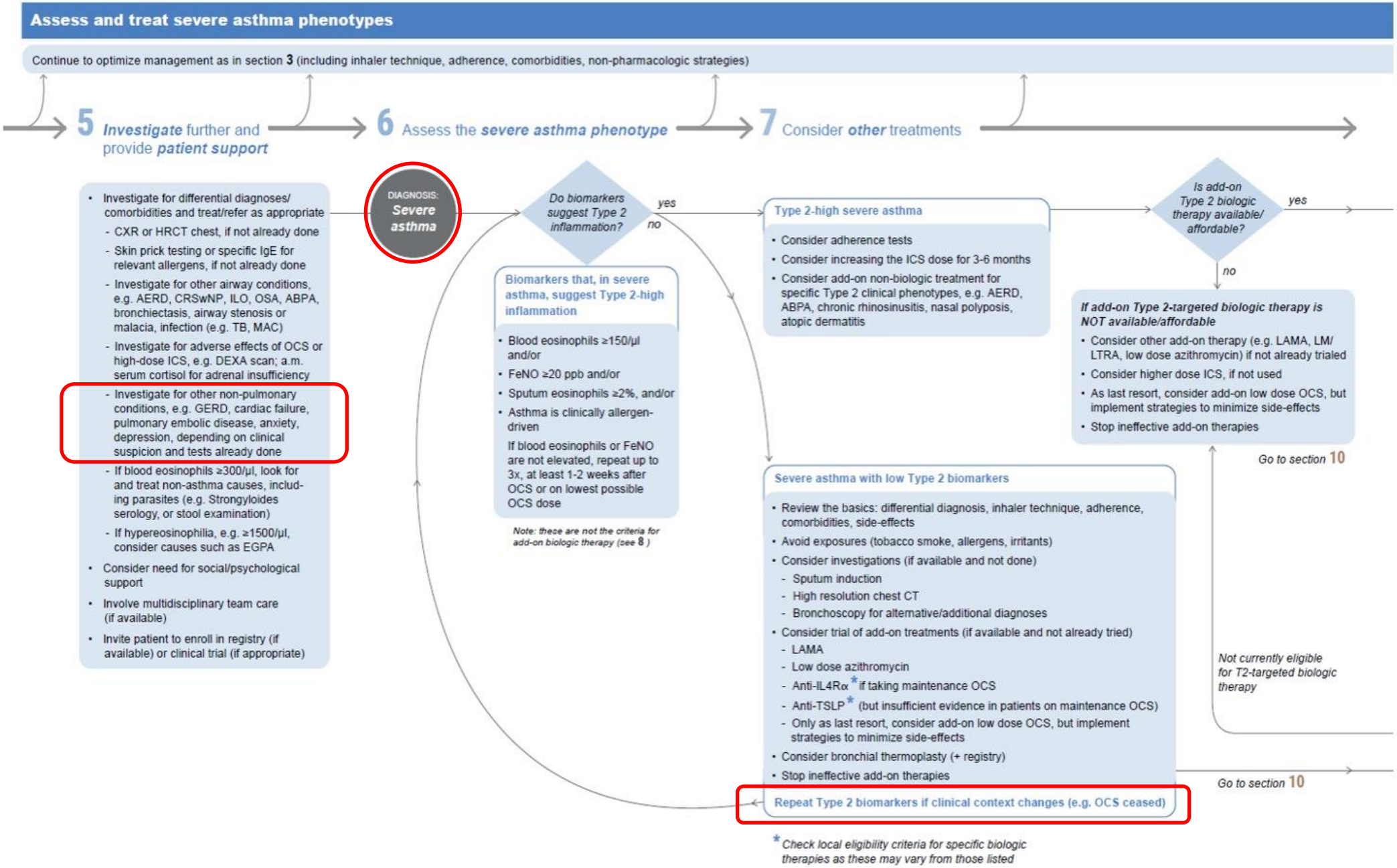
Box 8-2. Decision tree – investigate and manage difficult to treat asthma in adult and adolescent patients

GP OR SPECIALIST CARE



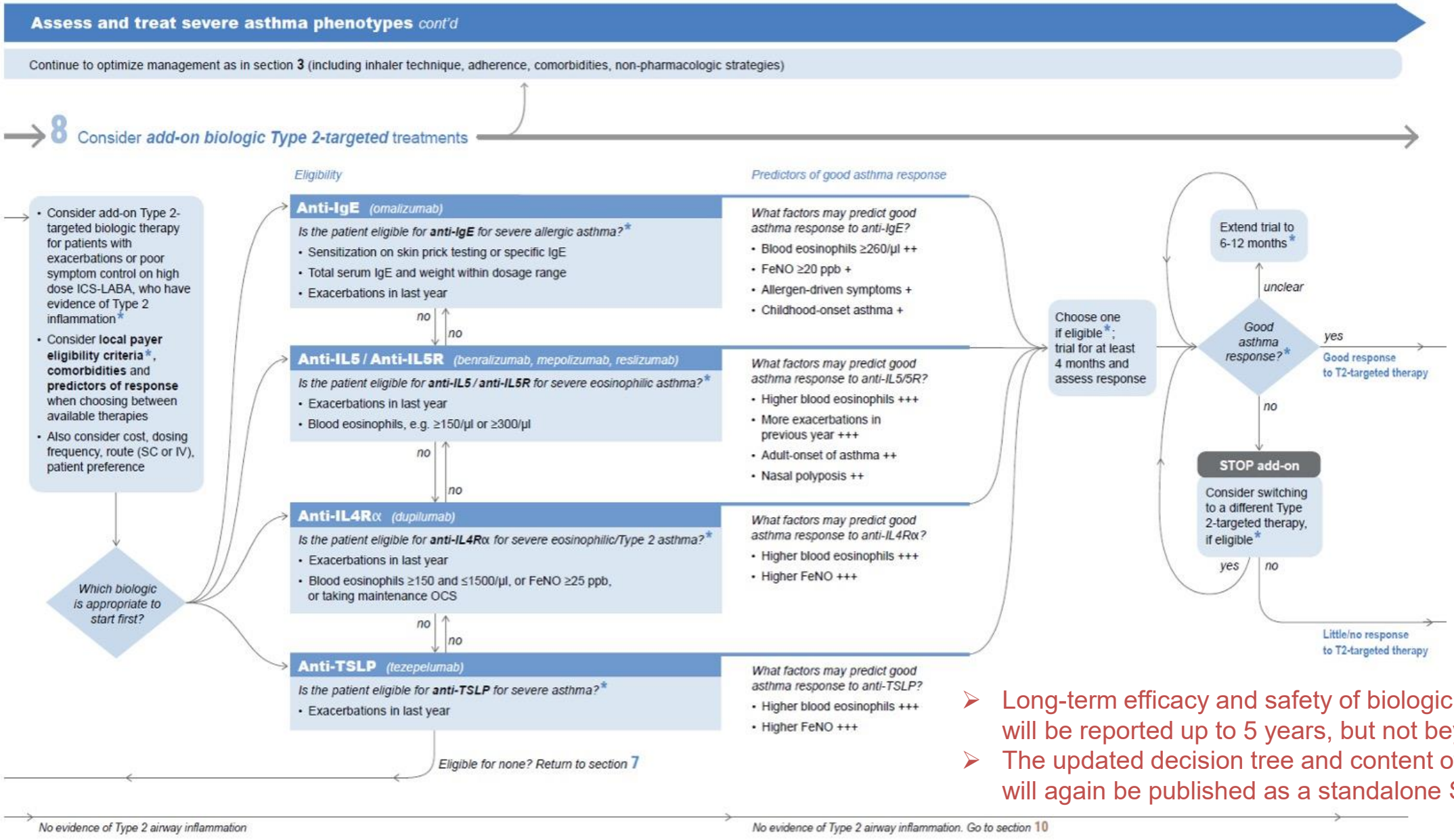
Box 8-3. Decision tree – assess and treat severe asthma phenotypes

SPECIALIST CARE; SEVERE ASTHMA CLINIC IF AVAILABLE



Box 8-4. Decision tree – consider add-on biologic Type 2-targeted treatments

SPECIALIST CARE; SEVERE ASTHMA CLINIC IF AVAILABLE



* Check local eligibility criteria for specific biologic therapies as these may vary from those listed

- Long-term efficacy and safety of biologic therapies will be reported up to 5 years, but not beyond.
- The updated decision tree and content of Section 8 will again be published as a standalone Short Guide.

Box 8-5. Decision tree – monitor and manage severe asthma treatment

SPECIALISTS AND PRIMARY CARE IN COLLABORATION

Monitor / Manage severe asthma treatment

Continue to optimize management

9 Review **response**

- Asthma: symptom control, exacerbations, lung function
- Type 2 comorbidities e.g. nasal polyposis, atopic dermatitis
- Medications: treatment intensity, side-effects, affordability
- Patient satisfaction

yes

If good response to Type 2-targeted therapy

- Re-evaluate the patient every 3-6 months*
- First, consider decreasing/stopping OCS (and check for adrenal insufficiency) then consider stopping other add-on asthma medications
- Order of reduction of treatments based on observed benefit, potential side-effects, cost and patient preference
- Then, if asthma well-controlled for 3-6 months, consider reducing maintenance ICS-LABA dose, but do not stop maintenance ICS-LABA. See text for details.
- For most patients, biologic therapy should be continued*

no

If no good response to Type 2-targeted therapy

- Stop the biologic therapy
- Review the basics: differential diagnosis, inhaler technique, adherence, comorbidities, side-effects, emotional support
- Consider high resolution chest CT (if not done)
- Reassess phenotype and treatment options
  - Induced sputum (if available)
  - Consider add-on low dose azithromycin
  - Consider bronchoscopy for alternative/additional diagnoses
  - As last resort, consider add-on low dose OCS, but implement strategies to minimize side-effects
  - Consider bronchial thermoplasty (+ registry)
- Stop ineffective add-on therapies
- Do not stop ICS

No evidence of Type 2 airway inflammation. Go to section 10

10 Continue to **optimize management** as in section **3**, including:

- Inhaler technique
- Adherence with inhaled and biologic therapy
- Comorbidity management
- Non-pharmacologic strategies
- Patients' social/emotional needs
- Multidisciplinary care (if available)
- Two-way communication with GP for ongoing care

* *Check local eligibility criteria for specific biologic therapies as these may vary from those listed*

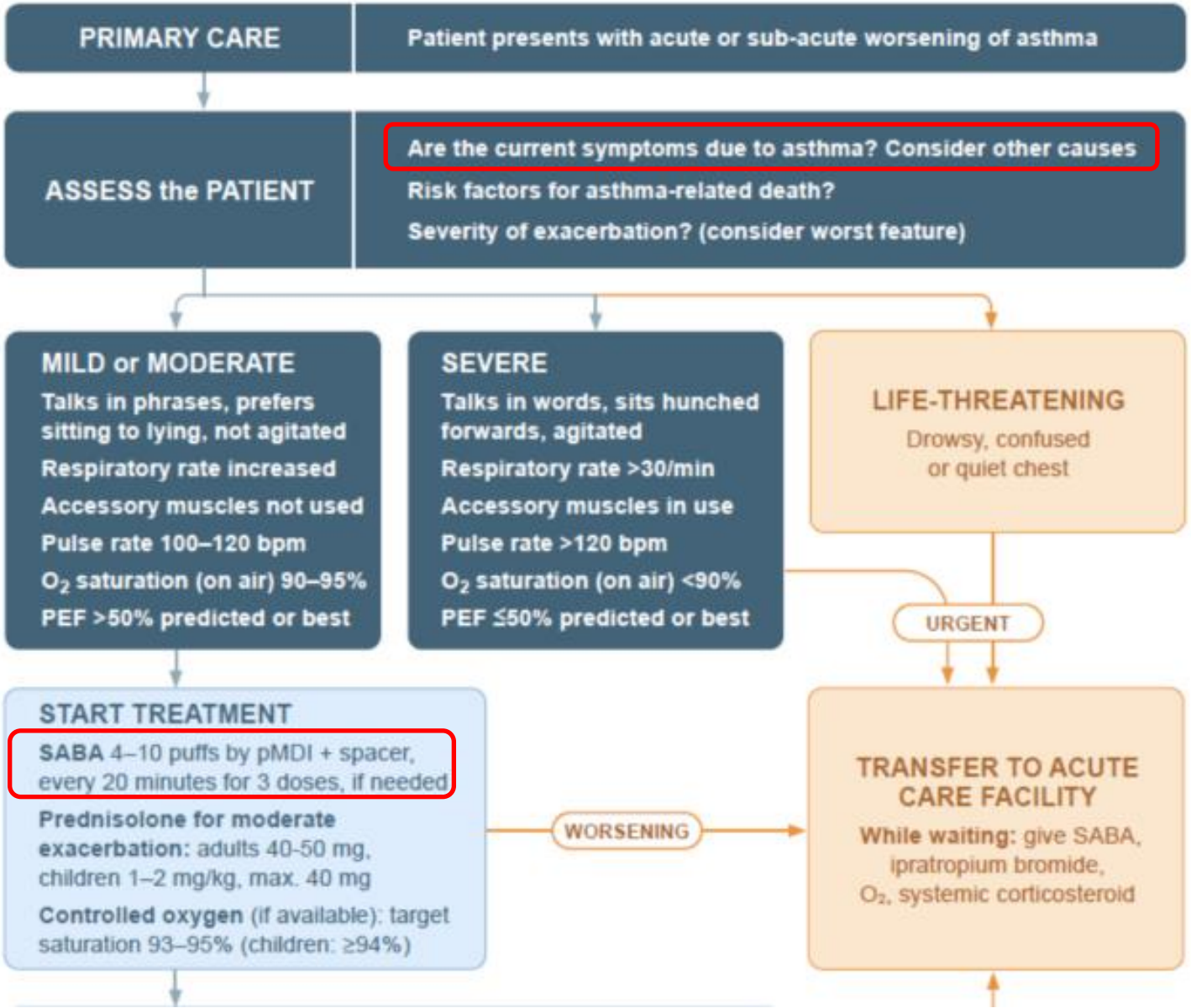
Medication options for written action plan

Track & step	Usual asthma treatment	Short-term action plan change (1–4 weeks) for worsening asthma	Evidence level
GINA Track 1 with ICS-formoterol reliever*			
Steps 1–2	As-needed-only ICS-formoterol (AIR-only)	For symptom relief, use 1 inhalation of ICS-formoterol (e.g., budesonide-formoterol 200/6 [160/4.5] mcg or BDP-formoterol 100/6 mcg) whenever needed. Maximum 12 inhalations in any 24-hour period.	A
Steps 3–5	Maintenance and reliever therapy (MART) with ICS-formoterol	Continue usual maintenance dose of ICS-formoterol. For symptom relief, use 1 inhalation of ICS-formoterol whenever needed. Maximum total 12 inhalations in any 24-hour period (as-needed + maintenance doses).	A
GINA Track 2 with combination ICS-SABA reliever#			
Step 1	As-needed-only combination ICS-SABA	For symptom relief, take 2 inhalations of ICS-SABA as needed. Do not take more than 6 doses (12 inhalations) in any 24-hour period.	B
Step 2	Maintenance ICS	Continue usual maintenance ICS dose. For symptom relief, take 2 inhalations of ICS-SABA as needed. Do not take more than 6 doses (12 inhalations) of ICS-SABA in any 24-hour period.	A
Steps 3–4	Maintenance ICS-LABA	Continue usual maintenance ICS-LABA dose. For symptom relief, take 2 inhalations of ICS-SABA as needed. Do not take more than 6 doses (12 inhalations) of ICS-SABA in any 24-hour period.	B

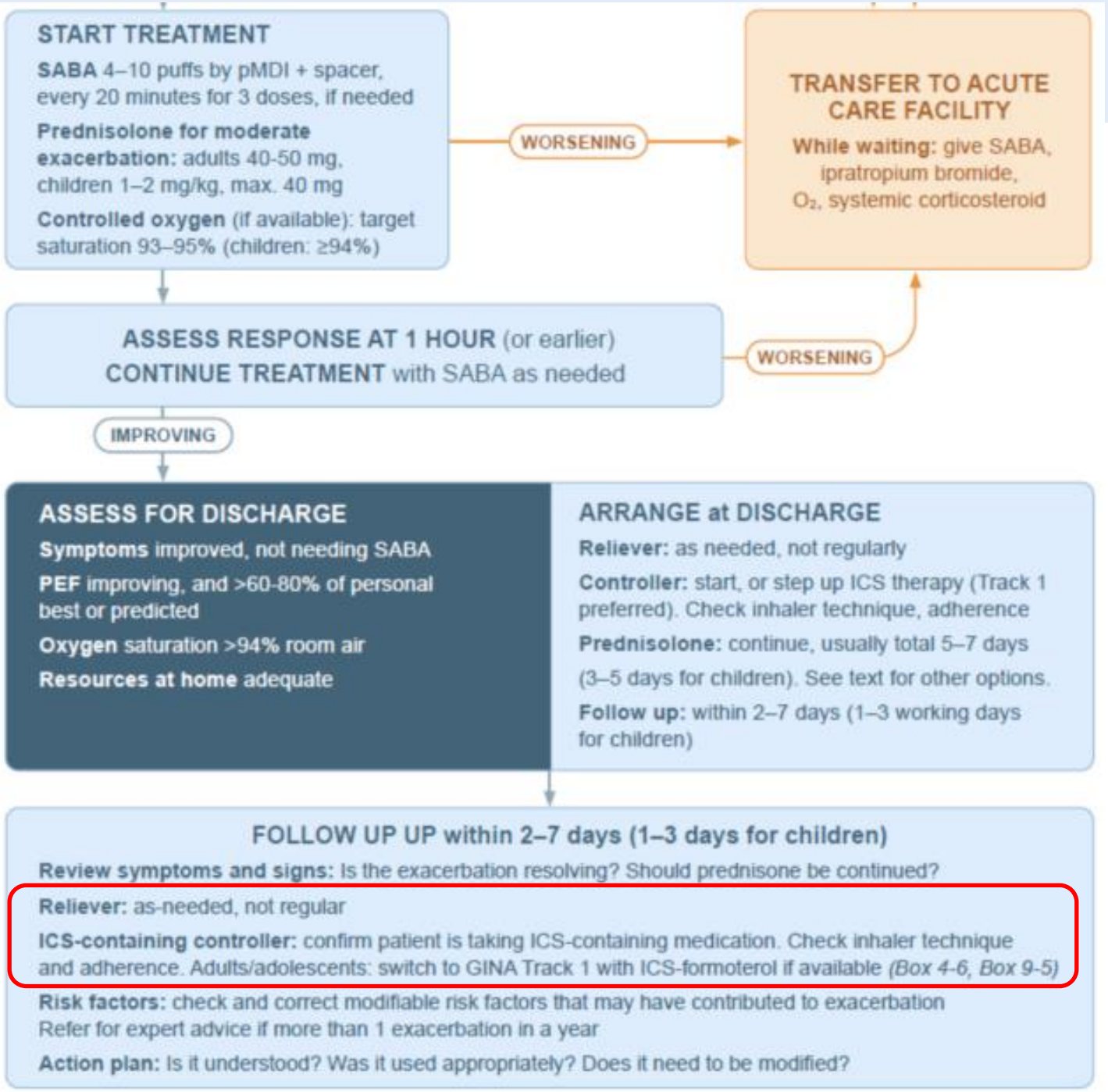
Medication options for written action plan

GINA Track 2 with SABA reliever			
Step 1	As-needed SABA plus ICS (separate inhalers)	For symptom relief, use SABA as below, and take ICS whenever SABA is taken (e.g., 1 inhalation of BDP 40 mcg per inhalation of SABA).	B
Step 2	Maintenance ICS	Consider quadrupling maintenance dose of ICS for 1–2 weeks. For symptom relief with SABA, see below.	B
Steps 3–4	Maintenance ICS-formoterol	Consider quadrupling maintenance dose of ICS-formoterol for 1–2 weeks. For symptom relief with SABA, see below.	B
	Maintenance ICS-LABA (non-formoterol)	Consider stepping up to higher dose formulation of ICS-LABA, if available. In adults, consider adding a separate ICS inhaler to quadruple ICS dose. For symptom relief with SABA, see below.	D
Reliever	As-needed SABA	For symptom relief, take 2 inhalations of SABA every 4–6 hours if needed. More frequent use or more inhalations of SABA is not recommended.	-
Severe exacerbations – all regimens			
All steps		• For severe exacerbations, e.g., PEF or FEV1 <60% personal best or predicted), or if not responding to above treatment over 2–3 days, consider adding short-course of oral corticosteroids. After first dose, morning dosing is preferable to minimize insomnia. Advise patients about potential adverse effects.	A
		• Usual dose of prednisolone: adults/adolescents, 40–50 mg/day for 5–7 days; children, 0.5 mg/kg/day, maximum 40 mg/day, for 3–5 days. See text for other systemic corticosteroid options.	B
		• Tapering not needed if OCS taken for less than 2 weeks	B
		• After any exacerbation, review triggers and risk factors including adherence and inhaler technique, and review the patient's action plan. Switch to Track 1 if possible to reduce the risk of further exacerbations. See Box 9-5 (p.171) for more details about post-exacerbation review.	B

Management of asthma exacerbation in primary care



- Prompt to consider differential diagnosis
- In mild/moderate exacerbations, review response to initial SABA before continuing high dose SABA or giving OCS
- Target O_2 saturation is 93–95% for adults and adolescents, ≥94% for children



- Initiate or increase ICS-containing treatment on discharge
  - ✓ Review risk factors, inhaler technique, adherence
- Life-threatening exacerbations: request urgent respiratory support (intubation rarely needed)
  - ✓ Prompt to assess arterial blood gases

Extreme weather and asthma

- Extreme weather: heat, cold, rain/floods, storms, drought/dust, landscape fires

- Impact on infrastructure and disruption to medical care

- **Direct health effects on people with asthma**
  - ✓ Heatwaves: increase the risk of asthma ED visits by 7–34%, for about 1 week
  - ✓ Cold spells: increase risk of ED visits by 20%; lag effect
  - ✓ Some evidence for increased asthma mortality
  - ✓ Thunderstorm asthma: epidemics of asthma exacerbations associated with grass pollen/fungi

- **Mitigation strategies: limited evidence**
  - ✓ Face masks to reduce PM2.5 exposure
  - ✓ Shelter in temperature-controlled environments, e.g., shopping malls
  - ✓ Mobile phone alerts to prompt behavior change

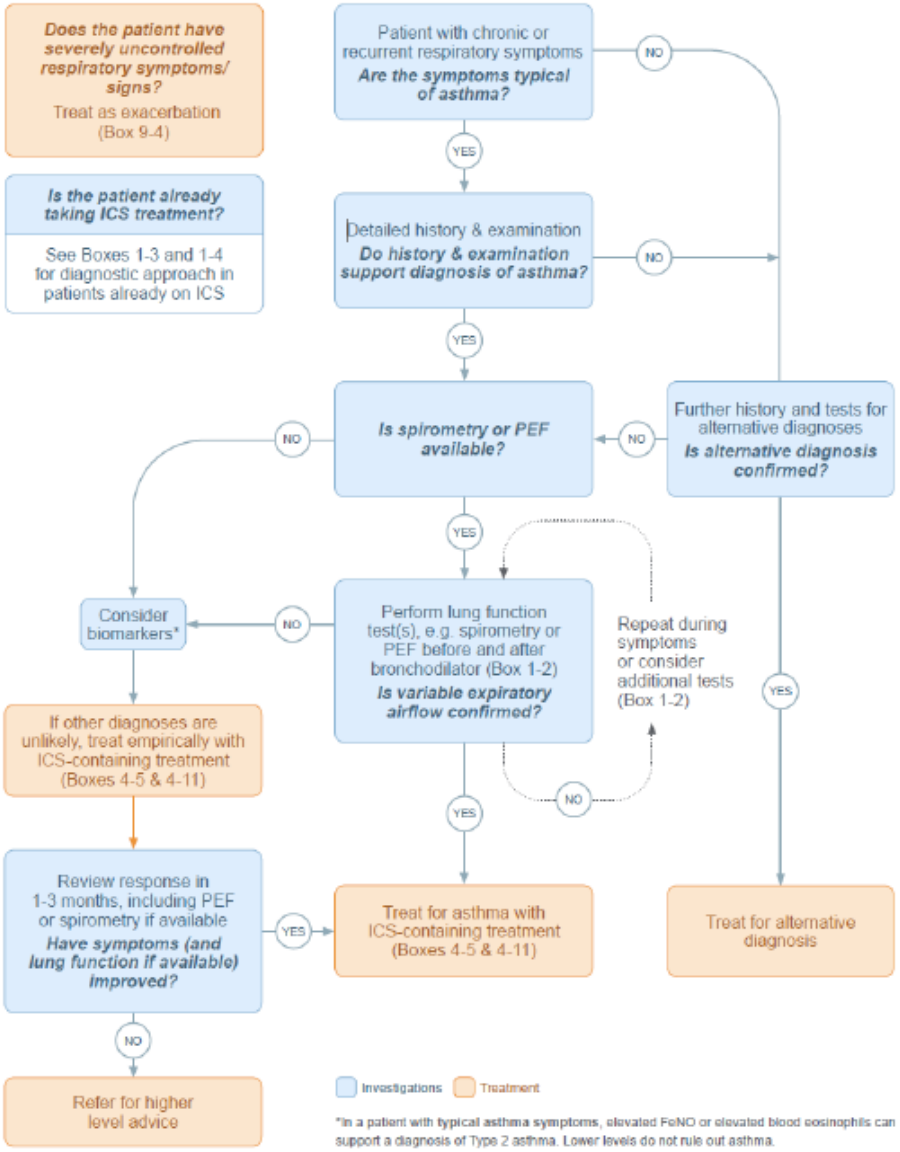
Summary: GINA

- **Diagnosis of asthma in adults/adolescent**: Updated flow chart/criteria for initial diagnosis
- **Type 2 biomarkers**: Role in diagnosis, assessment and management
- **Population-level and patient-level treatment decisions**
- **Asthma treatment recommendations for adults/adolescents**
  - ✓ Clear treatment strategy based on AIR/MART use to prevent exacerbation
- **Decision tree for severe asthma**
- **Action plans for adults/adolescents**: split by treatment track
- **Management of asthma exacerbation in primary care**
- **Impact of extreme weather**: new section

KATRD 천식진료 지침 업데이트

- GINA 변경된 부분 대부분 반영 예정
- 한국에서 발표된 논문 추가
- 중증 천식 알고리즘 새로 제작

진단 알고리즘



ICS: inhaled corticosteroid; PEF: peak expiratory flow. PEF is less reliable than spirometry, but it is better than no objective measurement of lung function. When measuring PEF, use the same meter each time as the value may vary by up to 20% between different meters, and use only the highest of three readings. For more information about diagnosis, see text and Box 1-2, p.25.

GINA 원안 수용 예정

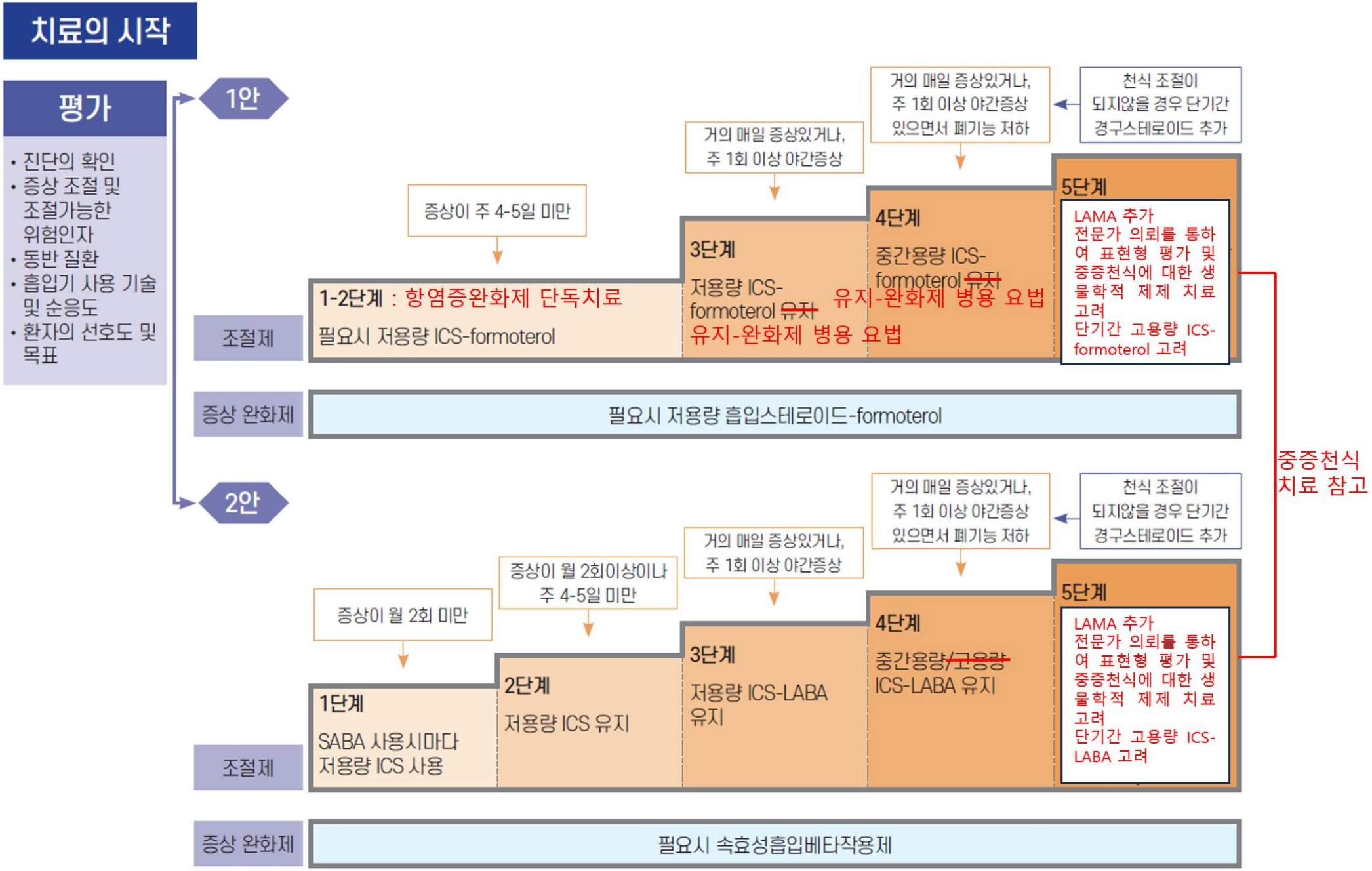


그림 4-3. 증상 조절과 위험 요인 최소화를 위한 단계별 접근

표 5-3. 천식악화에서 자기관리요법과 문서화된 천식행동지침

	투약	악화된 천식을 위한 단기 (1-4주) 행동 지침 변화	근거 정도
1안			
1-2단계	필요시 저용량 ICS-formoterol	증상 완화를 위해 필요할 때마다 ICS-formoterol(예: budesonide-formoterol 200/6 [160/4.5] mcg 또는 beclomethasone-formoterol 100/6 mcg)을 1회 흡입*	A
3-5단계	ICS-formoterol 유지	일반적인 유지 용량의 ICS-formoterol을 계속 사용. 증상 완화를 위해 필요할 때마다 ICS-formoterol을 1회 흡입*	A
2안 중 ICS-SABA 완화제 사용(국내 미도입)			
1단계	필요시 ICS-SABA	증상 완화를 위해 필요할 때마다 ICS-SABA를 2회 흡입(24시간 동안 6회[12회 흡입] 이상 사용 금지)	B
2단계	ICS 유지	일반적인 유지 용량의 ICS를 계속 사용. 증상 완화를 위해 필요할 때마다 ICS-SABA를 2회 흡입(24시간 동안 6회[12회 흡입] 이상 사용 금지)	A
3-4단계	ICS-LABA 유지	일반적인 유지 용량의 ICS-LABA를 계속 사용. 증상 완화를 위해 필요할 때마다 ICS-SABA를 2회 흡입(24시간 동안 6회[12회 흡입] 이상 사용 금지)	B
2안 중 SABA 완화제 사용			
1단계	필요시 SABA와 ICS득 개별 흡입기로 사용	증상 완화를 위해 아래와 같이 SABA를 사용하고, SABA를 사용할 때마다 ICS를 사용(예: SABA 1회 흡입당 beclomethasone 40 mcg 1회 흡입).	B
2단계	ICS 유지	유지 용량의 ICS를 1-2주 동안 4배로 늘리는 것을 고려. 증상 완화를 위해 SABA를 아래와 같이 사용.	B
3-4단계	ICS-포모테롤 유지	유지 용량의 ICS-formoterol을 1-2주 동안 4배로 늘리는 것을 고려. 증상 완화를 위해 SABA를 아래와 같이 사용	B
	ICS-LABA (비-포모테롤 LABA)	가능하다면 ICS-LABA의 고용량 제형으로 단계적으로 증량하는 것을 고려. 성인의 경우, ICS 용량을 4배로 늘리기 위해 별도의 ICS 흡입기를 추가하는 것을 고려. 증상 완화를 위해 SABA를 아래와 같이 사용	D
완화제	필요시 SABA	증상 완화를 위해 필요할 때마다 4-6시간마다 SABA를 2회 흡입. 더 자주 사용하거나 더 많은 흡입을 하는 것은 권장되지 않음.	-

*국내 허가사항에 따라 budesonide-formoterol은 하루 최대 12회, beclomethasone-formoterol은 하루 최대 8회 흡입할 수 있다.

A case of biologic use in acute asthma exacerbation refractory to conventional management

TABLE I. Daily progress

	Day 1																
	ER	Admission	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9 (dupilumab SC)	Day 10	Day 11	Day 12	Day 13	Day 15 (discharge)	Day 22	Day 29	Day 36
Dyspnea			Improved						Worsened	Worsened	Improved							
O_2 supply	Room air → reservoir mask 15 L → NC 4 L	NC 2 L	NC 2 L	NC 2 L	NC 2 L	NC 2 L	NC 2 L	NC 2 L	NC 2 L	HFNC FiO_2 50%, 50 L	HFNC FiO_2 40%, 40 L	HFNC FiO_2 40%, 40 L	NC 5 L	NC 3 L	Quit			
SpO_2 (%)	88 → 97 → 94	96	97						94	94	97	99	99		98			
Systemic steroid, the equivalent dose of PD (mg)	50		50	50	50	30	30	30	60	60	60	40	30	20	15	10	5	Quit
Eosinophil (%)	11.3												2.2					
Eosinophil count (/mm^3)	1345												176					
Arterial blood gas test																		
pH	7.37*					7.42			7.37				7.41					
PaO_2 (mmHg)	58.0*					111.0			80.2				110.0					
$PaCO_2$ (mmHg)	45.0*					30.1			52.8				28.7					
Pre-BD FEV_1 (L)			0.86						0.71					1.15		2.08	2.03	2.46
Pre-BD FEV_1 (%pred)			35.1						28.9					47.3		85.5	83.4	101.0
Post-BD FEV_1 (L)			0.87						0.70					1.15		2.11	2.24	2.52
Post-BD FEV_1 (%pred)			35.7						28.8					47.3		86.6	91.7	103.6
FeNO (ppb)									55									

BD, Bronchodilator; *ER*, emergency room; *FeNO*, fractional exhaled nitric oxide; *FEV_1*, forced expiratory volume in 1 second; *HFNC*, high-flow nasal cannula; *NC*, nasal cannula; *$PaCO_2$*, arterial partial pressure of carbon dioxide; *PaO_2*, arterial partial pressure of oxygen; *PD*, prednisolone; *SpO_2*, peripheral oxygen saturation; *% pred*, % predicted value.
*At room air.

Kim BG. J Allergy Clin Immunol Pract 2023; 11: 2922-2925.

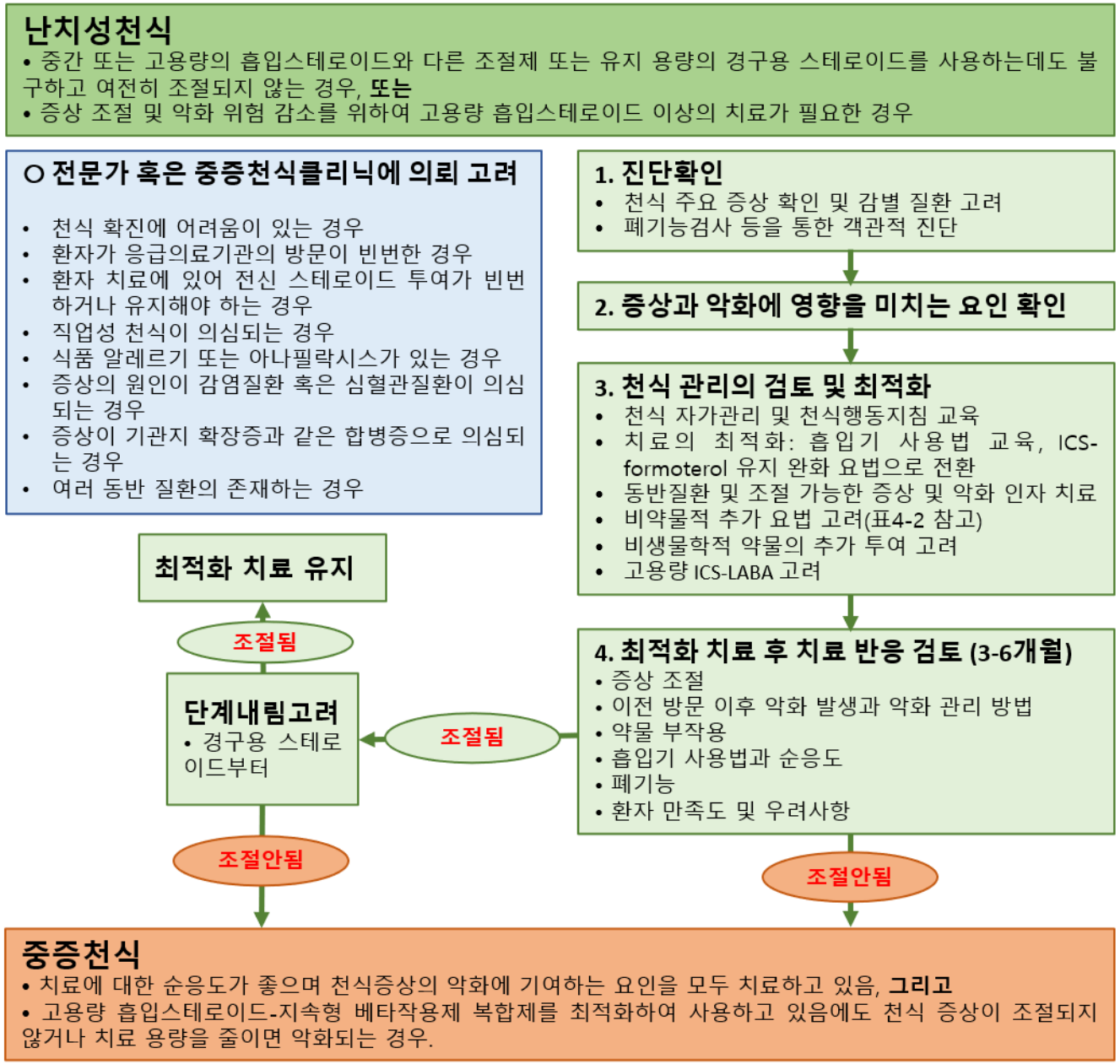


그림1. 난치성/중증 천식의 평가 및 관리 알고리즘

중증천식
- 치료에 대한 순응도가 좋으며 천식증상의 악화에 기여하는 요인을 모두 치료하고 있음, **그리고**
- 고용량 흡입스테로이드-지속형 베타작용제 복합제를 최적화하여 사용하고 있음에도 천식 증상이 조절되지 않거나 치료 용량을 줄이면 악화되는 경우.

1. 중증천식의 표현형 평가
- 다음 중 하나 이상 해당되는 경우 2형 염증성 천식의 가능성이 높음
  : 호산구 ≥ 150/μl , FeNO ≥ 20ppb, 객담 호산구 ≥ 2%, 알레르기 항원에 의해 유발 , 전신스테로이드 유지요법 필요
  (가능한 최소 용량의 전신스테로이드 용량에서 호산구와 FeNO를 3번이상 반복 측정하여 결정)

2. 중증천식의 추가치료

2형 염증성 천식

생물학적제제의 투여가 가능한 상황인가?

비 2형 염증성 천식
- 다음 추가치료 고려
  - LAMA
  - Low dose azithromycin (치료 전 마이코박테리아 감염, 부정맥 확인)
  -Anti-IL4Rα (전신스테로이드 사용중인 경우)
  - Anti-TSLP(전신스테로이드 사용하지 않는 경우)
  - 저용량 전신스테로이드 추가
  - 기관지열성형술 고려
- 비효과적 추가치료 중지

가능

불가능

- 비생물학적제제 추가치료 고려 (LAMA, LTRA, low dose azithromycin, high dose ICS)
- 저용량 전신스테로이드 추가고려
- 비효과적 추가치료 중지

	Anti-IgE	Anti-IL5/Anti-IL5R	Anti-IL4Rα	Anti-TSLP
약제 접합성	• 알레르기피부반응검사 혹은 특이 IgE 양성 • 총 혈청 IgE와 체중이 사용 가능 용량 범위 • 지난해 악화 병력	• 지난해 악화 병력 • 혈중 호산구 ≥150/㎕ 또는 ≥300/㎕	• 지난해 악화 병력 • 혈중호산구 150-1500/㎕ 또는 FeNO ≥25ppb 또는 • 전신스테로이드제 유지가 필요한 경우	• 지난해 악화 병력
좋은 반응이 예측되는 경우	• 혈중 호산구 ≥ 260/㎕ ++ • FeNO ≥ 20 ppb + • 알레르기 관련 증상 + • 소아-발병 천식 +	• 혈중 호산구 수가 높을수록 +++ • 지난 해에 악화가 많을수록 +++ • 성인-발병 천식 ++ • 비용종 ++	• 혈중 호산구 수가 높을수록 +++ • FeNO가 높을수록 +++	• 혈중 호산구 수가 높을수록 +++ • FeNO가 높을수록 +++

3. 치료반응 평가 및 지속 여부 결정
- 생물학적제제 사용 시작 3-4개월 후 반응 평가, 첫 평가후 3-6개월마다 다음 항목을 평가
  - 천식 증상 조절, 천식 악화의 빈도 및 중등도, 폐기능 등
  - 2형 염증반응과 관련된 동반 질환: 비용종, 아토피피부염 등
  - 약물 사용: 전신스테로이드를 비롯한 치료약물의 강도 및 그 이상반응
  - 환자 만족도

그림2. 중증 천식의 평가 및 관리 알고리즘

Thank You for Your Attention