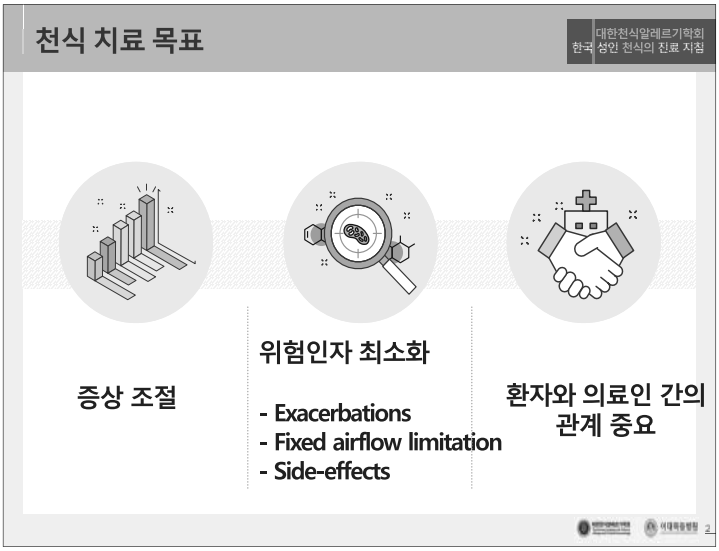
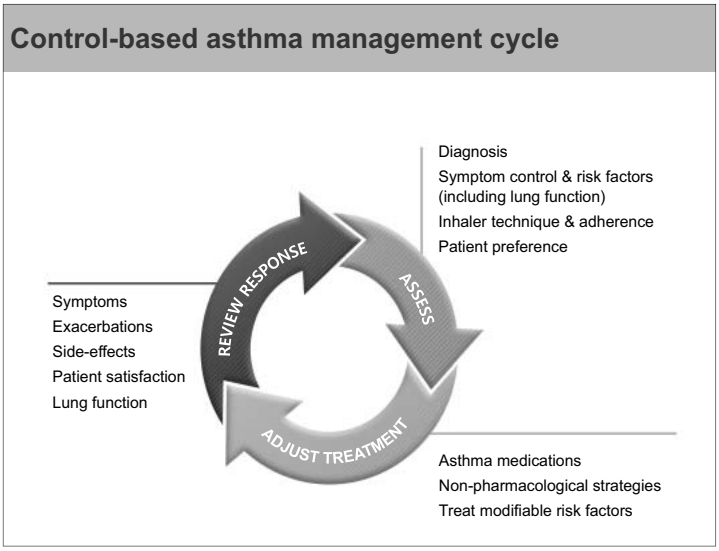
천식 가이드라인을 통해 천식치료의 달인이 되는 비법

김민혜
이대서울병원 알레르기내과





천식 조절과 위험인자

지난 4주간 환자가 경험한 증상		조절	부분 조절	조절 안 됨
일주일에 3번 이상의 주간 증상	있음 ☐ 없음 ☐	모두 없음	1 - 2개	3 - 4개
천식으로 인한 야간 증상	있음 ☐ 없음 ☐			
일주일에 3번 이상의 증상완화제 사용*	있음 ☐ 없음 ☐			
천식으로 인한 활동 제한	있음 ☐ 없음 ☐			

급성악화의 위험인자

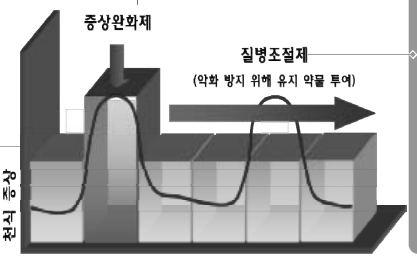
- SABA를 자주 쓰는 사람(한 달에 SABA를 200회 이상 사용하면 사망률도 증가)
- ICS를 사용하지 않거나 부적절하게 처방 받았거나 잘 사용하지 않거나 쓰는 방법을 잘 모르는 사람
- FEV1이 낮은 사람(특히 예측치의 60% 미만)
- 기관지 확장제에 의해 호전되는 부분이 큼
- 중대한 정신, 사회적 문제
- 흡연, 감작되어 있는 알레르겐에 지속 노출
- 비만, 만성 부비동염, 음식물 알레르기 동반
- 객담, 혈액내 호산구 증가증
- ICS를 사용하는 성인에서 FeNO 증가
- 임신
- 천식으로 인해 중환자실 입실 혹은 기도 삽관한 병력
- 지난 1년 사이에 심한 천식 악화가 1회 이상

천식 치료제: 질병조절제 vs. 증상완화제

대한천식알레르기학회 한국 성인 천식의 진료 지침

Reliever
- Inhaled SABA
- Systemic Corticosteroid
- Anticholinergics
- Methylxanthine
- Oral SABA

- 악화 시에만 사용
- 단기간만 사용



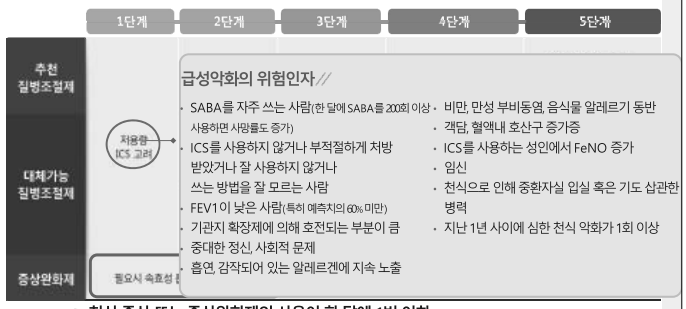
Controller
- Inhaled Corticosteroid
- Systemic Corticosteroid
- Methylxanthine
- Oral SABA
- Anti-leukotrienes
- Anti-IgE)

- 매일 사용
- 증상이 없어도 사용
- 규칙적으로 사용

↓ Airway inflammation, symptoms, future risks

환자 특성에 따른 초기 치료제 선택

대한천식알레르기학회 한국 성인 천식의 진료 지침



급성악화의 위험인자

- SABA를 자주 쓰는 사람(한 달에 SABA를 200회 이상 사용하면 사망률도 증가)
- ICS를 사용하지 않거나 부적절하게 처방 받았거나 잘 사용하지 않거나 쓰는 방법을 잘 모르는 사람
- FEV1이 낮은 사람(특히 예측치의 60% 미만)
- 기관지 확장제에 의해 호전되는 부분이 큼
- 중대한 정신, 사회적 문제
- 흡연, 감작되어 있는 알레르겐에 지속 노출
- 비만, 만성 부비동염, 음식물 알레르기 동반
- 객담, 혈액내 호산구 증가증
- ICS를 사용하는 성인에서 FeNO 증가
- 임신
- 천식으로 인해 중환자실 입실 혹은 기도 삽관한 병력
- 지난 1년 사이에 심한 천식 악화가 1회 이상

- **천식 증상 또는 증상완화제의 사용이 한 달에 1번 이하**
- **지난 1달 간 천식으로 인한 수면장애가 없음**
- **급성 악화의 위험인자가 없음**
- **지난 1년 간 급성 악화를 경험한 적이 없음**
- 비추천: Ipratropium, oral SABA, theophylline

한국천식진료지침, 2015

환자 특성에 따른 초기 치료제 선택

대한천식알레르기학회 한국 성인 천식의 진료 지침

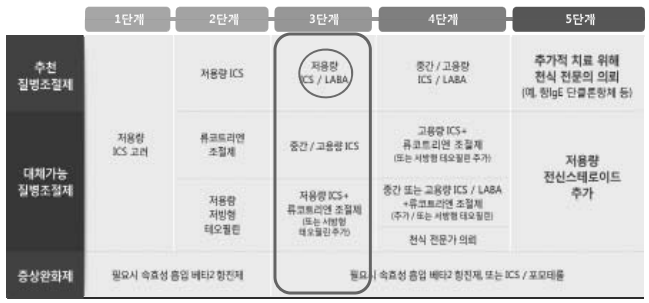
- 천식 증상, 또는 증상완화제의 사용이 한 달에 2번 이상, 일주일에 2번 이하
- 천식 증상으로 인한 수면장애가 한 달에 한 번 이상
- 천식 증상은 드물지만 급성 악화의 위험인자가 한 가지 이상 있음
- **ICS>>LTRA>>Theophylline** (Weak efficacy, higher risk of side-effects)

한국천식진료지침, 2015

7

환자 특성에 따른 초기 치료제 선택

대한천식알레르기학회 한국 성인 천식의 진료 지침



- 일상생활에 지장을 주는 천식 증상이 거의 매일 발생
- 천식 증상으로 인한 수면장애가 일주일에1번 이상
- ICS/formoterol maintenance & reliever
  - ↓ Exacerbations, low dose ICS vs. fixed dose ICS/LABA+PRN SABA
- BA + AR (HDM), exacerbation despite low ICS, FEV1 >70% ➔ SLIT

한국천식진료지침, 2015

8

환자 특성에 따른 초기 치료제 선택

대한천식알레르기학회 한국 성인 천식의 진료 지침

- 심한 천식이 조절되지 않는 경우, 또는 급성 악화의 형태로 천식 증상이 시작
- 단기간 전신스테로이드 추가 가능
- SLIT
- High-dose ICS/LABA: little additional benefit (3-6mo trial)
- Budesonide: efficacy improved with 4 times daily

한국천식진료지침, 2015

9

환자 특성에 따른 초기 치료제 선택

대한천식알레르기학회 한국 성인 천식의 진료 지침

- Tiotropium (LAMA) (≥12yrs)
- ≥6yrs, allergic asthma: Anti-immunoglobulin E (anti-IgE): omalizumab
- Severe eosinophilic asthma: Anti-interleukin-5 (anti-IL-5):
  - Mepolizumab: SC, ≥12yrs
  - Reslizumab: IV, ≥18yrs
  - Benralizumab: SC, ≥12yrs

한국천식진료지침, 2015

STEP 5 – Severe asthma

- Sputum guided tx
  - Induced sputum eosinophilia (>3%)
  - ↓Exacerbations, ICS dose
- Low dose oral corticosteroids
  - ≤7.5mg/d, prednisone
  - Only with poor symptom control & frequent exacerbations
  - ↑S/E: ≥3mo → prevention of osteoporosis

Severe asthma

Management of severe asthma

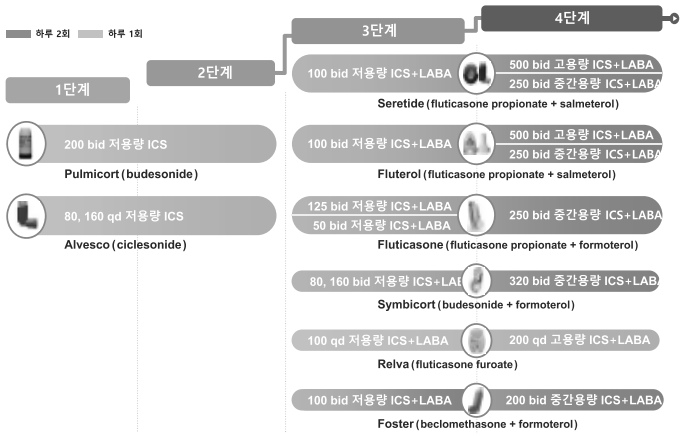
Very few patients are completely resistant to corticosteroids, so ICS remain the mainstay of therapy for difficult-to-treat asthma. Additional therapeutic options include:

- **Optimization of ICS/LABA dose**: some patients may respond to higher doses of ICS than are routinely recommended for general use[342] (Evidence B). However, this carries the risk of systemic side-effects,[339] after some months dose optimization should be pursued by stepping down slowly at 3–6 month intervals; see Box 3-7 (p.49) (Evidence D).
- **Oral corticosteroids**: some patients with severe asthma may benefit from low dose maintenance OCS treatment[339] (Evidence D), but the potential long-term side-effects should be taken into account.[205] Patients should be monitored for risk of corticosteroid-induced osteoporosis, and those expected to be treated for ≥3 months should be provided with relevant lifestyle counselling and prescription of therapy for prevention of osteoporosis (where appropriate).[209]
- **Add-on treatments without phenotyping**: In patients selected for uncontrolled symptoms and persistent airflow limitation despite moderate-high dose ICS and LABA, add-on treatment with the long-acting muscarinic antagonist bronchodilator, tiotropium, showed improved lung function and increased time to first exacerbation.[343] Other add-on controller medications such as theophylline and LTRAs, although suggested for severe asthma, appear in the small number of available studies to be of limited benefit.
- **Sputum-guided treatment**: in centers with specific expertise in inducing and analyzing sputum, adjusting treatment for severe asthma on the basis of sputum eosinophils may allow corticosteroid dose and/or exacerbation frequency to be reduced[147] (Evidence A).
- **Phenotype-guided add-on treatment**: patients with severe asthma, uncontrolled on Step 4 treatment, may benefit from phenotyping into categories such as severe allergic, aspirin-exacerbated or eosinophilic asthma.[6,7,143,339] Patients ≥6 years with severe allergic asthma with elevated IgE levels may benefit from omalizumab (anti-IgE) therapy[199,200] (Evidence A benralizumab) s with severe eosinophilic asthma may benefit from anti-IL5 therapy (mepolizumab, reslizumab) (Evidence B), and LTRAs may be helpful for patients found to be aspirin sensitive[339] (Evidence B).
- **Non-pharmacological interventions**: bronchial thermoplasty may be helpful in selected patients with severe asthma (Evidence B),[104] but more studies are needed to identify its efficacy and long-term safety in broader severe asthma populations[126] (see p.51). Carefully controlled trials are important as a large placebo effect has been seen in studies to date.[104] High-altitude treatment[339] (Evidence C) or psychological interventions[344] (Evidence C) may be helpful in some patients. The place of these therapies and strategies in severe asthma has not been established.[126]

Daily doses of ICS

약제	저용량 (μg / 일)	중간용량 (μg / 일)	고용량 (μg / 일)
Beclomethasone dipropionate (CFC*)	200 - 500	>500 - 1000	>1000
Beclomethasone dipropionate (HFA**)	100 - 200	>200 - 400	>400
Budesonide (DPI†)	200 - 400	>400 - 800	>800
Ciclesonide (HFA**)	80 - 160	>160 - 320	>320
Fluticasone propionate (DPI† HFA**)	100 - 250	>250 - 500	>500
Fluticasone furoate	100		200

Daily doses of ICS



Review & Adjust: Step-Up

- Sustained step up (≥2-3mo)
  - Therapeutic trial → review response after 2-3 mo
  - No response → alternative options or referral
- Short-term step-up (1-2 wks)
  - ↑ICS during viral infection or seasonal allergen exposure (or action plan)
- Day-to-day adjustment
  - ICS/formoterol (SMART or MART)

Review & Adjust: Step-Down

- Well-controlled for 3mo
- Lung function plateau
- Predictors of loss of control
  - Airway hyperresponsiveness, sputum eosinophilia

Review & Adjust: Step-Down

Current step	Current medication and dose	Options for stepping down	Evidence
Step 5	High dose ICS/LABA plus oral corticosteroids (OCS)	• Continue high dose ICS/LABA and reduce OCS dose • Use sputum-guided approach to reducing OCS • Alternate-day OCS treatment • Replace OCS with high dose ICS	D B D D
	High dose ICS/LABA plus other add-on agents	• Refer for expert advice	D
Step 4	Moderate to high dose ICS/LABA maintenance treatment	• Continue combination ICS/LABA with 50% reduction in ICS component, by using available formulations • Discontinuing LABA may lead to deterioration[217]	B A
	Medium dose ICS/formoterol* as maintenance and reliever	• Reduce maintenance ICS/formoterol* to low dose, and continue as-needed low dose ICS/formoterol* reliever	D
	High dose ICS plus second controller	• Reduce ICS dose by 50% and continue second controller[216]	B
Step 3	Low dose ICS/LABA maintenance	• Reduce ICS/LABA to once daily • Discontinuing LABA may lead to deterioration[217]	D A
	Low dose ICS/formoterol* as maintenance and reliever	• Reduce maintenance ICS/formoterol* dose to once daily and continue as-needed low dose ICS/formoterol* reliever	C
	Moderate- or high-dose ICS	• Reduce ICS dose by 50%[216]	A
Step 2	Low dose ICS	• Once-daily dosing (budesonide, ciclesonide, mometasone)[216,219] • Adding LTRA may allow ICS dose to be stepped down[220] • Insufficient evidence to support step-down to as-needed ICS with SABA[221]	A B *
	Low dose ICS or LTRA	• Consider stopping controller treatment only if there have been no symptoms for 6–12 months, and patient has no risk factors (Box 2-2, p17). Provide a written asthma action plan, and monitor closely. • Complete cessation of ICS in adults is not advised as the risk of exacerbations is increased[214]	D A

OCS ↓

ICS ↓ 50%

ICS ↓ 50% or qd

ICS qd

Other Therapies

- Allergen Immunotherapy
  - Mild asthma, Allergic sensitization
  - SCIT
    - ↓Symptom, medication, AHR
    - S/E: anaphylaxis
  - SLIT
    - ↓ICS, exacerbations,
    - S/E: mild oral & GI sx

Other Therapies

- Vaccinations
  - Influenza vaccine
    - Annual, ↓morbidity & mortality
  - Pneumococcal vaccine
    - Children & elderly asthma
      - ↑Risk of pneumococcal disease
    - Insufficient evidence to recommend routine vaccination in asthmatics

Other Therapies

- Bronchial thermoplasty
  - Bronchoscopy with radiofrequency pulse
  - Exacerbations: ↑during 3mo → ↓
  - No effect on lung function or symptoms
  - Long-term f/u data is needed (effectiveness, safety)
- Vitamin D
  - No good-quality evidence

Non-Pharmacological

Intervention	Advice/recommendation (continued on next page)	Evidence
Cessation of smoking and ETS exposure	• At every visit, strongly encourage people with asthma who smoke to quit. Provide access to counseling and smoking cessation programs (if available)	A
	• Advise parents/carers of children with asthma not to smoke and not to allow smoking in rooms or cars that their children use	A
	• Strongly encourage people with asthma to avoid environmental smoke exposure	B
	• Assess smokers/ex-smokers for COPD or overlapping features of asthma and COPD (asthma–COPD overlap, ACO, Chapter 5, p.89), as additional treatment strategies may be required	D
Physical activity	• Encourage people with asthma to engage in regular physical activity for its general health benefits	A
	• Provide advice about prevention and management of exercise-induced bronchoconstriction (p50)	A
	• Regular physical activity improves cardiopulmonary fitness, but confers no other specific benefit on lung function or asthma symptoms, with the exception of swimming in young people with asthma	B
	• There is little evidence to recommend one form of physical activity over another	D
Avoidance of occupational exposures	• Ask all patients with adult-onset asthma about their work history and other exposures	A
	• In management of occupational asthma, identify and eliminate occupational sensitizers as soon as possible, and remove sensitized patients from any further exposure to these agents	A
	• Patients with suspected or confirmed occupational asthma should be referred for expert assessment and advice, if available	A
Avoidance of medications that may make asthma worse	• Always ask about asthma before prescribing NSAIDs, and advise patients to stop using them if asthma worsens	A
	• Always ask people with asthma about concomitant medications	D
	• Aspirin and NSAIDs (non-steroidal anti-inflammatory drugs) are not generally contraindicated unless there is a history of previous reactions to these agents (see p.69)	A
	• Decide about prescription of oral or intra-ocular beta-blockers on a case-by-case basis. Initiate treatment under close medical supervision by a specialist	D
	• If cardioselective beta-blockers are indicated for acute coronary events, asthma is not an absolute contra-indication, but the relative risks/benefits should be considered	D

Intervention	Advice/recommendation	Evidence
Healthy diet	• Encourage patients with asthma to consume a diet high in fruit and vegetables for its general health benefits	A
Avoidance of indoor allergens	• Allergen avoidance is not recommended as a general strategy in asthma	A
	• For sensitized patients, there is Limited evidence of clinical benefit for asthma with single-strategy indoor allergen avoidance	A
	• Remediation of dampness or mold in homes reduces asthma symptoms and medication use in adults	A
	• For patients sensitized to house dust mite and/or pets, there is limited evidence of clinical benefit for asthma with multi-component avoidance strategies (only in children)	B
	• Allergen avoidance strategies are often complicated and expensive, and there are no validated methods for identifying those who are likely to benefit	D
Weight reduction	• Include weight reduction in the treatment plan for obese patients with asthma	B
Allergen immunotherapy	• For adult patients with allergic rhinitis and sensitized to HDM, with exacerbations despite low to high dose ICS, consider adding sublingual immunotherapy (SLIT), provided FEV_1 is >70% predicted	B
	• Compared to pharmacological and avoidance options, potential benefits of allergen immunotherapy (SCIT or SLIT) must be weighed against the risk of adverse effects and the inconvenience and cost of the prolonged course of therapy, including for SCIT the minimum half-hour wait required after each injection.	D
Breathing exercises	• Breathing exercises may be a useful supplement to asthma pharmacotherapy	B
Avoidance of indoor air pollution	• Encourage people with asthma to use non-polluting heating and cooking sources, and for sources of pollutants to be vented outdoors where possible	B
Vaccinations	• People with asthma, particularly children and the elderly, are at higher risk of pneumococcal disease, but there is insufficient evidence to recommend routine pneumococcal vaccination in people with asthma	B
	• Advise patients with moderate-severe asthma to have an influenza vaccination every year, or at least when vaccination of the general population is advised	D
Bronchial thermoplasty	• For highly-selected adult patients with uncontrolled asthma despite use of recommended therapeutic regimens and referral to an asthma specialty center (Step 5), bronchial thermoplasty is a potential treatment option in some countries.	B
	• Caution should be used in selecting patients for this procedure, as the number of studies is small, and people with chronic sinus disease, frequent chest infections or FEV_1 <60% predicted were excluded.	D
Avoidance of outdoor allergens	• For sensitized patients, when pollen and mold counts are highest, closing windows and doors, remaining indoors, and using air conditioning may reduce exposure to outdoor allergens	D

2/wk aerobic & strength exercises is more effective for sx control

Non-Pharmacological

Intervention	Advice/recommendation	Evidence
Dealing with emotional stress	• Encourage patients to identify goals and strategies to deal with emotional stress if it makes their asthma worse	D
	• There is insufficient evidence to support one stress-reduction strategy over another, but relaxation strategies and breathing exercises may be helpful	B
	• Arrange a mental health assessment for patients with symptoms of anxiety or depression	D
Avoidance of outdoor air pollutants/ weather conditions	• In general, when asthma is well-controlled, there is no need for patients to modify their lifestyle to avoid unfavorable outdoor (air pollutants, weather).	D
	• It may be helpful during unfavorable environmental conditions (very cold weather, low humidity or high air pollution) to avoid strenuous outdoors physical activity and stay indoors in a climate-controlled environment; and during viral infections to avoid polluted environments	D
Avoidance of foods and food chemicals	• Food avoidance should not be recommended unless an allergy or food chemical sensitivity has been clearly demonstrated, usually by carefully supervised oral challenges	D
	• For confirmed food allergy, food allergen avoidance may reduce asthma exacerbations	D
	• If food chemical sensitivity is confirmed, complete avoidance is not usually necessary, and sensitivity often decreases when asthma control improves	D

Indications for Referral

Difficulty confirming the diagnosis of asthma

- Patient has symptoms of chronic infection, or features suggesting a cardiac or other non-pulmonary cause (Box 1-3, p.20) (immediate referral recommended)
- Diagnosis is unclear even after a trial of therapy with ICS or systemic corticosteroids
- Patients with features of both asthma and COPD, if there is doubt about priorities for treatment

Suspected occupational asthma

- Refer for confirmatory testing and identification of sensitizing or irritant agent, specific advice about eliminating exposure and pharmacological treatment. See specific guidelines (e.g. [31]) for details.

Persistent uncontrolled asthma or frequent exacerbations

- Patient's symptoms remain uncontrolled, or patient has ongoing exacerbations or low lung function despite correct inhaler technique and good adherence with Step 4 treatment (moderate or high-dose ICS/LABA, Box 3-5, p.43). Before referral, depending on the clinical context, identify and treat modifiable risk factors (Box 2-2, p.29; Box 3-8, p.50) and comorbidities (p.62)
- Patient has frequent asthma-related health care utilization (e.g. multiple ED visits or urgent primary care visits)

Any risk factors for asthma-related death (see Box 4-1, p.75)

- Near-fatal asthma attack (ICU admission, or mechanical ventilation for asthma) at any time in the past
- Anaphylaxis or confirmed food allergy in a patient with asthma

Evidence of, or risk of, significant treatment side-effects

- Patients with significant side-effects from treatment
- Need for long-term oral corticosteroid use
- Frequent courses of oral corticosteroids (e.g. two or more courses a year)

Symptoms suggesting complications or sub-types of asthma

- e.g. aspirin-exacerbated respiratory disease (p.69); allergic bronchopulmonary aspergillosis

Additional reasons for referral in children 6–11 years

- Doubts about diagnosis of asthma e.g. respiratory symptoms are not responding well to treatment in a child who was born prematurely
- Symptoms or exacerbations remain uncontrolled despite moderate dose ICS (Box 3-6B, p.44) with correct inhaler technique and good adherence
- Suspected side-effects of treatment (e.g. growth delay)
- Asthma and confirmed food allergy

Self-management

- Inhaler skill
  - Misuse 70-80%

CHOOSE
• Choose the most appropriate inhaler device for the patient before prescribing. Consider the medication options (Box 3-5, p.43), the available devices, patient skills and cost. • If different options are available, encourage the patient to participate in the choice • For pMDIs, use of a spacer improves delivery and (with ICS) reduces the potential for side-effects • Ensure that there are no physical barriers, e.g. arthritis, that limit use of the inhaler • Avoid use of multiple different inhaler types where possible, to avoid confusion
CHECK
• Check inhaler technique at every opportunity • Ask the patient to show you how they use their inhaler (don't just ask if they know how to use it) • Identify any errors using a device-specific checklist
CORRECT
• Show the patient how to use the device correctly with a physical demonstration, e.g. using a placebo inhaler • Check technique again, paying attention to problematic steps. You may need to repeat this process 2–3 times.[233] • Only consider an alternative device if the patient cannot use the inhaler correctly after several repeats of training • Re-check inhaler technique frequently. After initial training, errors often recur within 4–6 weeks.[234]
CONFIRM
• Clinicians should be able to demonstrate correct technique for each of the inhalers they prescribe • Pharmacists and nurses can provide highly effective inhaler skills training[235,236]

Adherence

Factors contributing to poor adherence	How to identify poor adherence in clinical practice

Medication/regimen factors
• Difficulties using inhaler device (e.g. arthritis)
• Burdensome regimen (e.g. multiple times per day)
• Multiple different inhalers
Unintentional poor adherence
• Misunderstanding about instructions
• Forgetfulness
• Absence of a daily routine
• Cost
Intentional poor adherence
• Perception that treatment is not necessary
• Denial or anger about asthma or its treatment
• Inappropriate expectations
• Concerns about side-effects (real or perceived)
• Dissatisfaction with health care providers
• Stigmatization
• Cultural or religious issues
• Cost
	Ask an empathic question
	• Acknowledge the likelihood of incomplete adherence and encourage an open non-judgemental discussion. Examples are:
	  • 'Many patients don't use their inhaler as prescribed. In the last 4 weeks, how many days a week have you been taking it – not at all, 1, 2, 3 or more days a week?'[251]
	  • 'Do you find it easier to remember your inhaler in the morning or the evening?'
	Check medication usage
	• Check the date of the last controller prescription
	• Check the date and dose counter on the inhaler
	• In some health systems, prescribing and dispensing frequency can be monitored electronically by clinicians and/or pharmacists
	• See review articles for more detail.[128,252]

Examples of successful adherence interventions • Shared decision-making for medication/dose choice[131] • Inhaler reminders for missed doses[246,247] • Prescribing ICS once-daily versus twice-daily[253] • Home visits for a comprehensive asthma program by an asthma nurse[248]	

Asthma Information

- Verbal → Written or pictorial information
- http://www.kaaf.org/
- Self-monitoring (sx & PEF)
- Action plan
- Regular review of control, treatment, skills

Goal: To provide the person with asthma, their family and other carers with suitable information and training to manage their asthma in partnership with their health care providers	
Approach • Focus on the development of the partnership • Accept that this is a continuing process • Share information • Adapt the approach to the patient's level of health literacy (Box 3-1, p.37) • Fully discuss expectations, fears and concerns • Develop shared goals	**Content** • Asthma diagnosis • Rationale for treatment, and differences between 'relievers' and 'controllers' • Potential side-effects of medications • Prevention of symptoms and flare-ups • How to recognize worsening asthma and what actions to take; how and when to seek medical attention • Management of comorbidities

Comorbidities

- GERD
  - Possible cause of dry cough
  - Symptomatic reflux should be treated
  - No anti-reflux therapy unless symptomatic
    - No significant benefit for asthma outcomes

Comorbidities

- Rhinitis, sinusitis, nasal polyp
  - Link between upper & lower airways
    - 80% asthma → rhinitis
    - 10-40% AR → asthma
  - Chronic (≥12wks) rhinosinusitis /c polyps → ass. with severe asthma
  - Mx
    - INS: only symptom control, not asthma control

Special settings

- Exercise-induced bronchoconstriction (EIB)
  - SABA before exercise
    - Symptoms only after exercise & no risk factors
    - Regular use (>1/d) → tolerance
  - LTRA: alternative pre-exercise tx
  - Training, sufficient warm-up
  - Regular controller (ICS or LTRA)
    - Symptoms unrelated to exercise & risk factors

Special settings

- Pregnancy
  - 1/3 worsen, 1/3 improve, 1/3 unchanged
  - Exacerbations are common (2nd trimester)
    - Mechanical/hormonal changes
    - Cessation of medications
    - Susceptible to viral respiratory infections
  - Exacerbations & poor control
    - Baby: ↑pre-term delivery, low birth weight, perinatal mortality
    - Mother: pre-eclampsia
  - Well control: no increased risk of complications

Special settings

  - Advantage of treating asthma >> risk of medications
    - ICS, β2-agonist,montelukast, theophylline
      - Not associated with increased incidence of fetal abnormalities
    - Cessation of ICS → risk factor for exacerbation
      - Not stop during pregnancy
  - Monthly monitoring
  - Exacerbation
    - To avoid fetal hypoxia
    - Aggressively treat with SABA, O2, systemic steroids
  - During labor & delivery
    - Usual controller & reliever if needed
    - High dose SABA → neonatal hypoglycemia

Special settings

- Perimenstrual asthma
  - 20% women, asthma worsen
  - Oral contraceptives &/or LTRA may be helpful

Special settings

- The elderly
  - Side-effects
    - β2-agonist: cardiotoxicity
    - Steroid: skin bruising, osteoporosis, cataracts
    - Theophylline: ↓clearance
  - Other medications: drug interactions
  - Arthritis, muscle weakness, impaired vision, inspiratory flow, cognitive function
  - Check inhaler technique

Special settings

- Surgery
  - ↑Peri-operative risk
    - Asthma (X) vs. COPD, Asthma with↓FEV1 (O)
  - Achieve good control
    - Severe asthma, uncontrolled sx, exacerbation hx, fixed airflow limitation
  - Maintain regular controller
  - Emergency op
    - Hydrocortisone
      - Long-term high-dose ICS, OCS ≥2wks in 6mo

Special settings

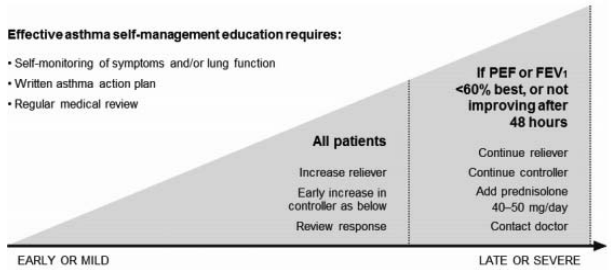
- Aspirin-exacerbated respiratory disease
  - Triad
    - Chronic rhinosinusitis /c nasal polyps
    - Asthma
    - Aspirin hypersensitivity
  - 7% in asthma, 15% in severe asthma
  - Diagnosis: aspirin challenge
    - High risk of severe reaction, resuscitation capabilities
  - Management: avoid aspirin or NSAIDS
    - Cox-2 inhibitor or AAP
    - ICS, LTRA, desensitization (daily aspirin tx)

Asthma Exacerbations

- Exacerbation = flare-up
  - ↑Symptoms (shortness of breath, cough, wheezing, chest tightness)
  - ↓Lung function (PEF or FEV1)
- Asthma-related death

- A history of near-fatal asthma requiring intubation and mechanical ventilation[351]
- Hospitalization[351] or emergency care visit for asthma in the past year
- Currently using or having recently stopped using oral corticosteroids (a marker of event severity)[351]
- Not currently using inhaled corticosteroids[81,351]
- Over-use of SABAs, especially use of more than one canister of salbutamol (or equivalent) monthly[80,352]
- A history of psychiatric disease or psychosocial problems,[85]
- Poor adherence with asthma medications and/or poor adherence with (or lack of) a written asthma action plan[85]
- Food allergy in a patient with asthma[291,353]

Self mx with action plan



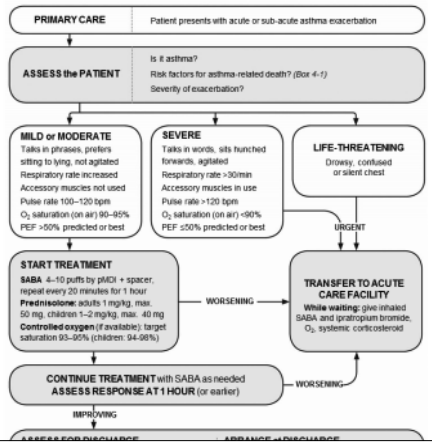
Self mx with action plan

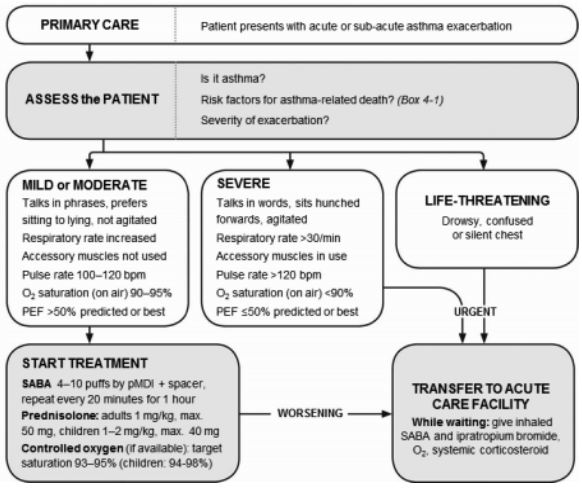
Medication	Short-term change (1-2 weeks) for worsening asthma	Evidence Level
Increase usual reliever:		
Short-acting beta2-agonist (SABA)	Increase frequency of SABA use For pMDI, add spacer	A A
Low dose ICS/formoterol *	Increase frequency of reliever use (maximum formoterol total 72 mcg/day)	A
Increase usual controller:		
Maintenance and reliever ICS/formoterol *	Continue maintenance ICS/formoterol and increase reliever ICS/formoterol as needed* (maximum formoterol total 72 mcg/day)	A
Maintenance ICS with SABA as reliever	At least double ICS; consider increasing ICS to high dose (maximum 2000 mcg/day BDP equivalent)	B
Maintenance ICS/formoterol with SABA as reliever	Quadruple maintenance ICS/formoterol (maximum formoterol 72 mcg/day)	B
Maintenance ICS/other LABA, with SABA as reliever	Step up to higher dose formulation of ICS/other LABA, or consider adding a separate ICS inhaler (to maximum total 2000 mcg/day BDP equivalent)	D
Add oral corticosteroids (OCS) and contact doctor		
OCS (prednisone or prednisolone)	Add OCS for severe exacerbations (e.g. PEF or FEV_1 <60% personal best or predicted), or patient not responding to treatment over 48 hours	A
	Adults: prednisolone 1 mg/kg/day (maximum 50 mg) usually for 5–7 days. *Children*: 1–2 mg/kg/day (maximum 40 mg) usually for 3–5 days.	D
	Tapering is not needed if OCS are prescribed for <2 weeks	B

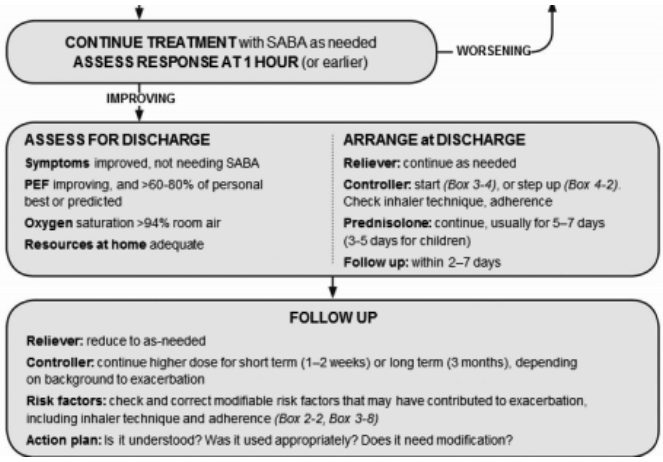
Oral corticosteroids

- 40-50mg/d, 5-7days (children 6-11: 1-2mg/kg/d, max 40mg/d)
- Fail to respond to ↑reliever & controller for 2-3days
- Deteriorate rapidly
- PEF or FEV1 <60% of personal best or predicted value
- History of sudden severe exacerbations

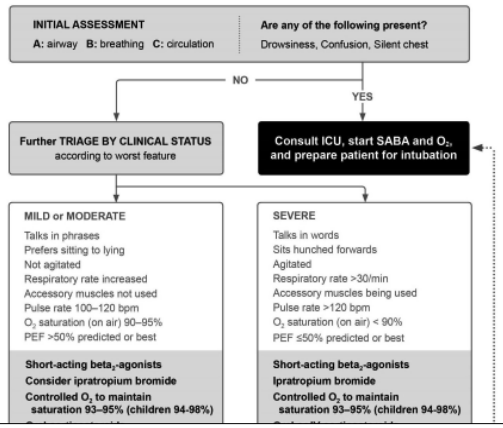
Management of Asthma Exacerbations (primary care)

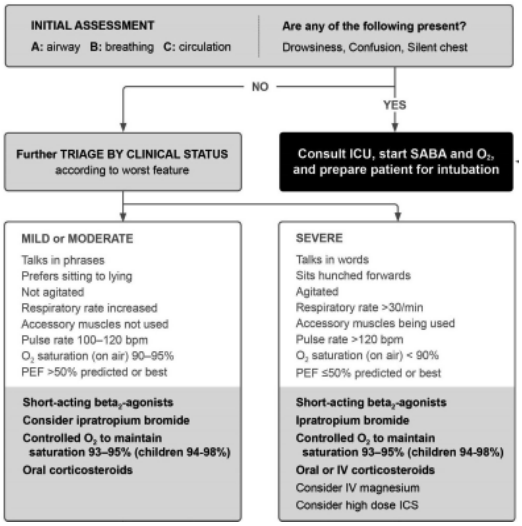


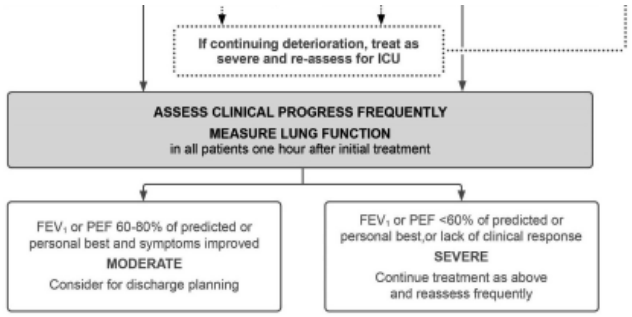




Management of Asthma Exacerbations (ER)







Management of Asthma Exacerbations

Medications
Oral corticosteroids (OCS) Prescribe at least a 5–7 day course of OCS for adults (prednisolone or equivalent 1 mg/kg/day to a maximum of 50 mg/day) and 3–5 days for children (1–2 mg/kg/day to a maximum of 40 mg). For patients considered at risk of poor adherence, intramuscular corticosteroids may be considered[393] (Evidence B). *Reliever medication* Transfer patients back to as-needed rather than regular reliever medication use, based on symptomatic and objective improvement. If ipratropium bromide was used in the emergency department or hospital, it may be quickly discontinued, as it is unlikely to provide ongoing benefit. *Inhaled corticosteroids (ICS)* Initiate ICS prior to discharge, if not previously prescribed (Box 3-4, p.42). Patients currently prescribed ICS-containing medication should generally have their treatment stepped up for 2–4 weeks (Box 4-2, p.77) and should be reminded about the importance of adherence with daily use.
Risk factors that contributed to the exacerbation
Identify factors that may have contributed to the exacerbation and implement strategies to reduce modifiable risk factors (Box 3-8, p.50). An exacerbation severe enough to require hospitalization may follow irritant or allergen exposure, inadequate long-term treatment, problems with adherence, and/or lack of a written asthma action plan, as well as unavoidable factors such as viral respiratory infections.