

Global Initiative for Asthma (GINA)

Teaching slide set

2017 update



This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA

Global INitiative for Asthma





Peer-reviewed articles about GINA

- A summary of the new GINA strategy: a roadmap to asthma control
 - Reddel HK *et al.* Eur Respir J 2015; 46: 622-39 ([free full text](#))
 - Summarizes key changes in GINA 2014-15, with their rationale
 - We recommend that this article should be read as a companion piece to the GINA report itself
- The GINA asthma strategy report: what's new for primary care?
 - Reddel HK, Levy ML. NPJ Prim Care Respir Med 2015; 25: 15050 ([free full text](#))
 - Summary of key changes in the GINA report for primary care
- GINA 2014: a global asthma strategy for a global problem
 - Reddel HK *et al.* Int J Tuberc Lung Dis 2014; 18: 505-6 ([free full text](#))
 - Emphasizing the distinction between population-level and individualized patient-level decisions
- The revised 2014 GINA strategy report: opportunities for change
 - Boulet LP *et al.* Curr Opin Pulm Med 2015; 21: 1-7
 - Describes the context that prompted key changes in the GINA report

The burden of asthma



GINA Global Strategy for Asthma Management and Prevention 2017

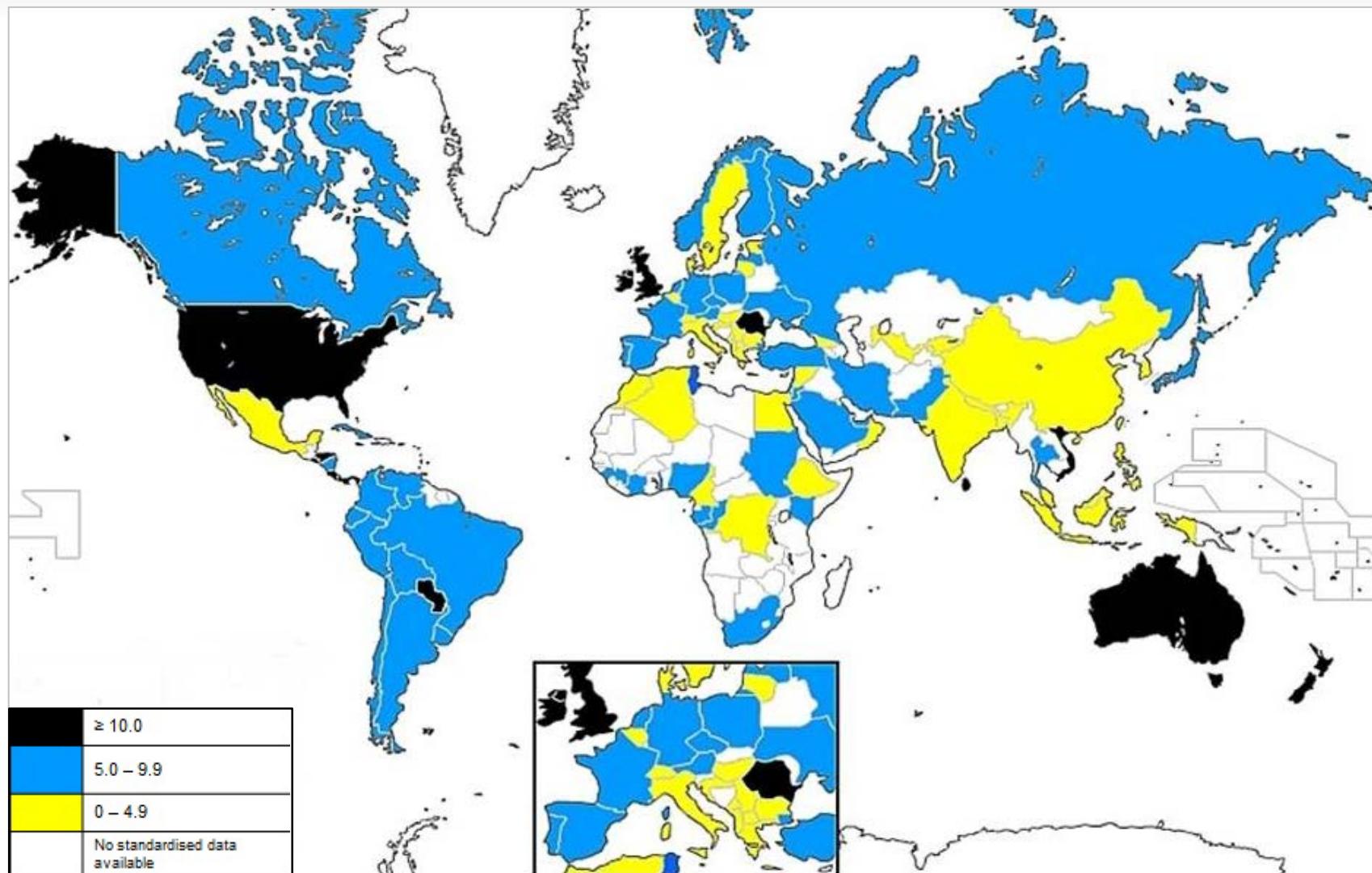
This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Burden of asthma

- Asthma is one of the most common chronic diseases worldwide with an estimated 300 million affected individuals
- Prevalence is increasing in many countries, especially in children
- Asthma is a major cause of school and work absence
- Health care expenditure on asthma is very high
 - Developed economies might expect to spend 1-2 percent of total health care expenditures on asthma.
 - Developing economies likely to face increased demand due to increasing prevalence of asthma
 - Poorly controlled asthma is expensive
 - However, investment in prevention medication is likely to yield cost savings in emergency care

Prevalence of asthma in children aged 13-14 years





Burden of asthma

- Countries should enter their own data on burden of asthma

The GINA program



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.

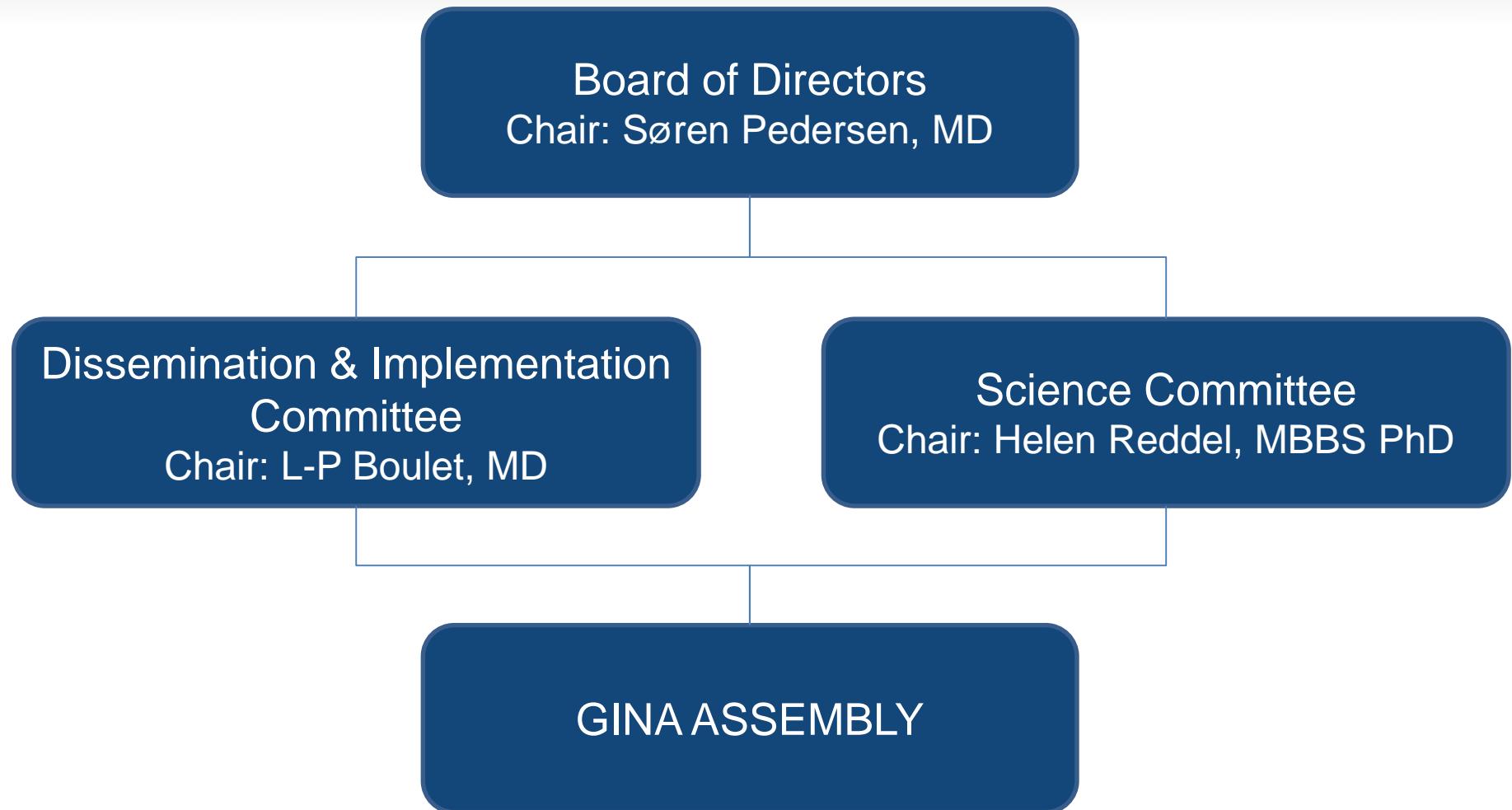


GINA Program Objectives

- To increase appreciation of asthma as a global public health problem
- To present key recommendations for diagnosis and management of asthma
- To provide strategies to adapt recommendations to varying health needs, services, and resources
- To identify areas for future investigation of particular significance to the global community



GINA structure





GINA Board of Directors 2016

- Søren Pedersen, Denmark, *Chair*
- Eric Bateman, South Africa
- Louis-Philippe Boulet, Canada
- Alvaro Cruz, Brazil
- J Mark FitzGerald, Canada
- Hiromasa Inoue, Japan
- Mark Levy, United Kingdom
- Jiangtao Lin, China
- Paul O'Byrne, Canada
- Helen Reddel, Australia
- Stanley Szefler, USA
- Arzu Yorgancioglu, Turkey



GINA Science Committee 2016

- Helen Reddel, Australia, *Chair*
- Leonard Bacharier, USA
- Eric Bateman, South Africa
- Allan Becker, Canada
- Roland Buhl, Germany
- Johan de Jongste, The Netherlands
- J. Mark FitzGerald, Canada
- Hiromasa Inoue, Japan
- Fanny Wai-san Ko, Hong Kong
- Jerry Krishnan, USA
- Paul O'Byrne, Canada
- Soren Pedersen, Denmark
- Emilio Pizzichini, Brazil
- Stanley J. Szefler, USA



GINA Science Committee

- Members serve in a voluntary capacity
- Twice-yearly meetings before ATS and ERS conferences
 - Routine review of new scientific literature about asthma, including clinical trials, pragmatic studies and observational studies, together with reviews/meta-analyses
 - Other peer-reviewed material that has been submitted for review
 - Discussion of any paper considered to impact on the GINA report
 - Recommendations about therapies for which at least two good quality clinical trials are available, and that have been approved for asthma by a major regulator
- Annual update of GINA report, appendix and Pocket Guides

GINA Assembly



- A network of individuals participating in the dissemination and implementation of asthma management programs at the local, national and regional level
- GINA Assembly members are invited to meet with the GINA Executive Committee during the ATS and ERS meetings
- 45 countries are currently represented in the GINA Assembly



GINA Assembly



GINA resources - 2017

- Global Strategy for Asthma Management and Prevention 2017
 - Full report with many clinical tools/flow-charts, and Online Appendix
 - Fully revised in 2014, updated 2015, 2016, 2017
 - Diagnosis of asthma-COPD overlap syndrome (ACOS): a project of GINA and GOLD. Published within GINA report and separately
- Pocket Guides 2017
 - Asthma Management and Prevention, adults and children >5 years
 - Asthma Management and Prevention, children ≤5 years
 - Dissemination and Implementation Strategies
- All materials available on the GINA web site www.ginasthma.org can also be ordered in hard copy
 - Use 'Contact us' link at bottom of webpage to order materials
- Additional dissemination and implementation tools will be added to the website during 2017

GINA Global Strategy for Asthma Management and Prevention



- Not a guideline, but a practical approach to managing asthma in clinical practice
- A global strategy, relevant to both low and high resource countries
- Evidence-based and clinically-oriented
- Provides clinical tools and measurable outcomes

Global Strategy for Asthma Management & Prevention 2017



Evidence category	Sources of evidence
A	<ul style="list-style-type: none"><li data-bbox="424 426 1301 469">■ Well-designed RCTs or meta-analyses<li data-bbox="424 498 1762 599">■ Consistent pattern of findings in the population for which the recommendation is made<li data-bbox="424 627 1263 671">■ Substantial numbers of large studies
B	<ul style="list-style-type: none"><li data-bbox="424 728 1800 829">■ Limited number of patients, <i>post hoc</i> or sub-group analyses of RCTs or meta-analyses<li data-bbox="424 858 1762 959">■ Few RCTs, or small in size, or differing population, or results somewhat inconsistent
C	<ul style="list-style-type: none"><li data-bbox="424 1016 1340 1059">■ Uncontrolled or non-randomized studies<li data-bbox="424 1088 956 1131">■ Observational studies
D	<ul style="list-style-type: none"><li data-bbox="424 1189 1762 1232">■ Panel consensus based on clinical experience or knowledge

Key changes in GINA 2017 - 'Asthma-COPD overlap'

- The word 'syndrome' has been removed from the previous term 'asthma-COPD overlap syndrome (ACOS)' because:
 - This term was being commonly used in the respiratory community as if it was a single disease ('the asthma-COPD overlap syndrome')
 - There are two medically-accepted definitions of 'syndrome'
 - This distracted from the key messages for clinicians and regulators
- The aim is to focus attention back on the original issues
 - These patients are commonly seen in clinical practice
 - They are almost always excluded from the RCTs that provide the evidence base for treatment recommendations, and from studies of underlying mechanisms
 - Current guidelines have opposite safety recommendations
 - Asthma: never use LABA without ICS
 - COPD: start treatment with LABA and/or LAMA, without ICS
 - Pragmatic interim advice is needed for clinical practice

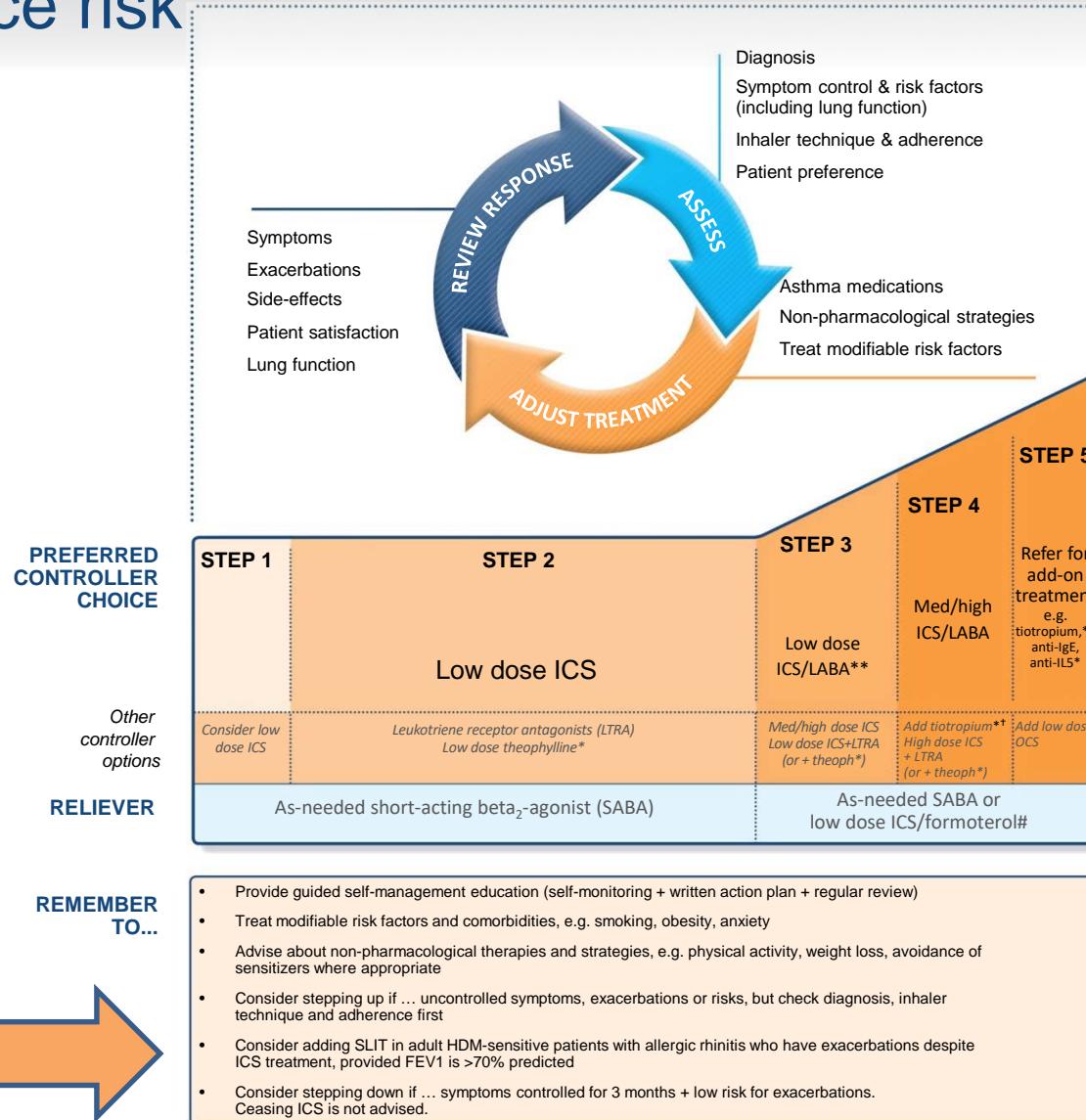
Key changes in GINA 2017 - lung function

- Clarification about 'periodical' assessment of lung function
 - Most adults: lung function should be recorded at least every 1-2 yrs
 - More frequently in higher risk patients
 - More frequently in children based on severity and clinical course
- Lung function trajectories
 - Children with persistent asthma may have reduced growth in lung function, and some are at risk of accelerated decline in lung function in early adult life [McGeachie, NEJMed 2016]
- Low resource areas
 - Poverty is commonly associated with spirometric restriction, so where possible, both FEV₁ and FVC should be recorded

Key changes in GINA 2017 – FeNO

- Diagnosis of asthma
 - Additional factors that increase or decrease FENO are listed
 - FENO is not helpful in ruling in or ruling out asthma as defined by GINA
- Assessment of future risk
 - Elevated FENO in allergic patients has been added to the list of independent predictors of exacerbations [Zeiger JACI 2011]
- Single measurements
 - Results of FENO measurement at a single point in time should be interpreted with caution
- Controller treatment
 - Given the lack of long-term safety studies, FENO cannot be recommended at present for deciding against treatment with ICS in patients with a diagnosis or suspected diagnosis of asthma.
 - Based on current evidence, GINA recommends treatment with low-dose ICS for most patients with asthma, even those with infrequent symptoms, to reduce the risk of serious exacerbations.

Stepwise approach to control asthma symptoms and reduce risk



Key changes in GINA 2017 – role of SLIT



REMEMBER TO...

- Provide guided self-management education
- Treat modifiable risk factors and comorbidities
- Advise about non-pharmacological therapies and strategies
- Consider stepping up if ... uncontrolled symptoms, exacerbations or risks, but check diagnosis, inhaler technique and adherence first
- Consider adding SLIT in adult HDM-sensitive patients with allergic rhinitis who have exacerbations despite ICS treatment, provided FEV₁ is 70% predicted
- Consider stepping down if ... symptoms controlled for 3 months + low risk for exacerbations. Ceasing ICS is not advised.

SLIT: sublingual immunotherapy

Key changes in GINA 2017 – other treatment

- Step 5 treatment for severe asthma
 - Anti-IL5: reslizumab (IV) added to mepolizumab (SC) for ≥ 18 years
- Step-down from low-dose ICS (Box 3-7)
 - Add-on LTRA may help
 - Insufficient evidence for step-down to as-needed ICS with SABA
- Side-effects of oral corticosteroids
 - When prescribing short-term OCS, remember to advise patients about common side-effects (sleep disturbance, increased appetite, reflux, mood changes); references added
- Vitamin D
 - To date, no good quality evidence that Vitamin D supplementation leads to improved asthma control or fewer exacerbations
- Chronic sinonasal disease
 - Treatment with nasal corticosteroids improves sinonasal symptoms but not asthma outcomes



Key changes in GINA 2017 - ICS and growth in children

- This topic previously covered in detail in the online Appendix
 - Information now also added to main report for accessibility
- Assessment of future risk
 - Height should be checked at least yearly, as poorly-controlled asthma can affect growth [*Pedersen 2001*], and growth velocity may be lower in the first 1-2 years of ICS treatment [*Loke, 2015*].
 - Consider referral if there is growth delay
- Choice of controller treatment
 - Discuss relative benefits and risks with parents or carers, including the importance of maintaining normal physical activity
 - Effects of ICS on growth velocity are not progressive or cumulative [*Kelly 2012, Loke 2015*].
 - The one study that examined long-term outcomes showed a difference of only 0.7% in adult height [*Kelly 2012, Loke 2015*]

Key changes in GINA 2017 - other changes

■ Cough in infancy

- Prolonged cough in infancy, and cough without cold symptoms, are associated with later parent-reported physician-diagnosed asthma, independent of infant wheeze [Oren 2015]

■ Primary prevention of asthma

- No consistent effects of maternal dietary intake of fish or long-chain polyunsaturated fatty acids during pregnancy on the risk of wheeze, asthma or atopy in the child (based on RCTs and epidemiological studies) [Best, 2016]

■ Effective implementation studies

- Update of adherence strategies effective in real-life settings
- Examples of high impact interventions (from appendix)

Definition and diagnosis of asthma



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



What is known about asthma?

- Asthma is a common and potentially serious chronic disease that can be controlled but not cured
- Asthma causes symptoms such as wheezing, shortness of breath, chest tightness and cough that vary over time in their occurrence, frequency and intensity
- Symptoms are associated with variable expiratory airflow, i.e. difficulty breathing air out of the lungs due to
 - Bronchoconstriction (airway narrowing)
 - Airway wall thickening
 - Increased mucus
- Symptoms may be triggered or worsened by factors such as viral infections, allergens, tobacco smoke, exercise and stress



What is known about asthma?

- Asthma can be effectively treated
- When asthma is well-controlled, patients can
 - ✓ Avoid troublesome symptoms during the day and night
 - ✓ Need little or no reliever medication
 - ✓ Have productive, physically active lives
 - ✓ Have normal or near-normal lung function
 - ✓ Avoid serious asthma flare-ups (also called exacerbations, or severe attacks)

Definition of asthma



Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation.

It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation.



Diagnosis of asthma

- The diagnosis of asthma should be based on:
 - A history of characteristic symptom patterns
 - Evidence of variable airflow limitation, from bronchodilator reversibility testing or other tests
- Document evidence for the diagnosis in the patient's notes, preferably before starting controller treatment
 - It is often more difficult to confirm the diagnosis after treatment has been started
- Asthma is usually characterized by airway inflammation and airway hyperresponsiveness, but these are not necessary or sufficient to make the diagnosis of asthma.

Patient with
respiratory symptoms
Are the symptoms typical of asthma?

YES

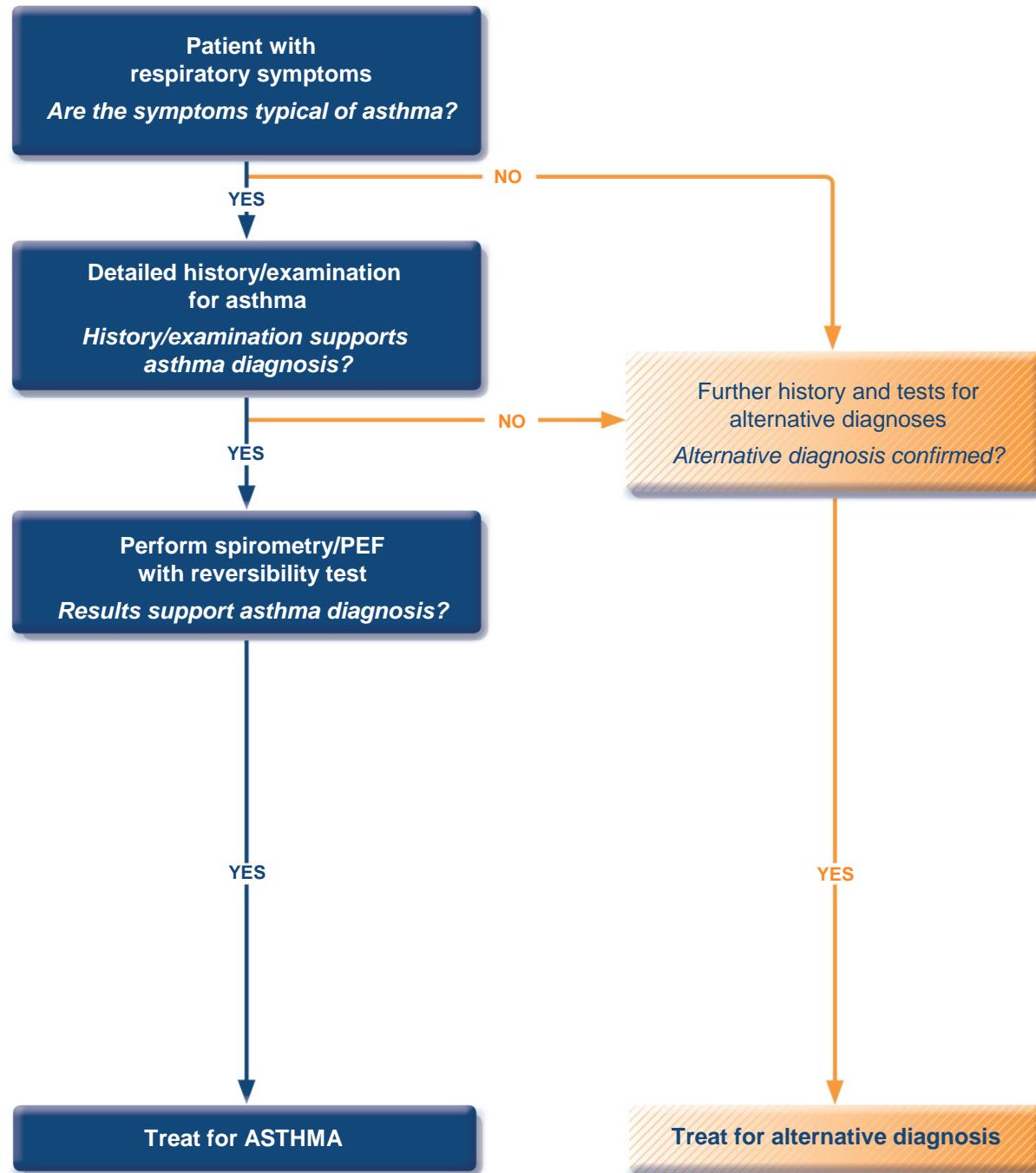
Detailed history/examination
for asthma
*History/examination supports
asthma diagnosis?*

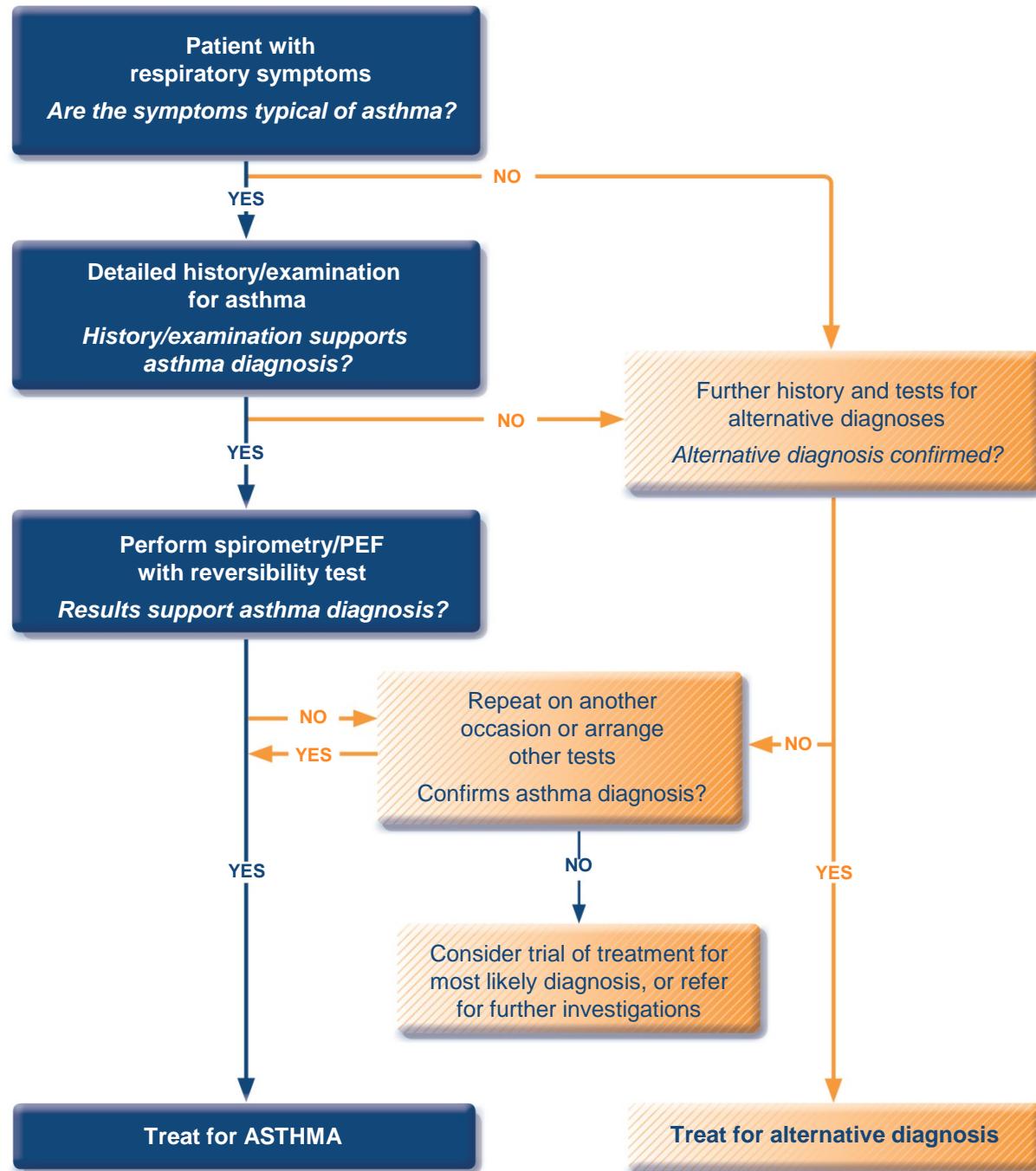
YES

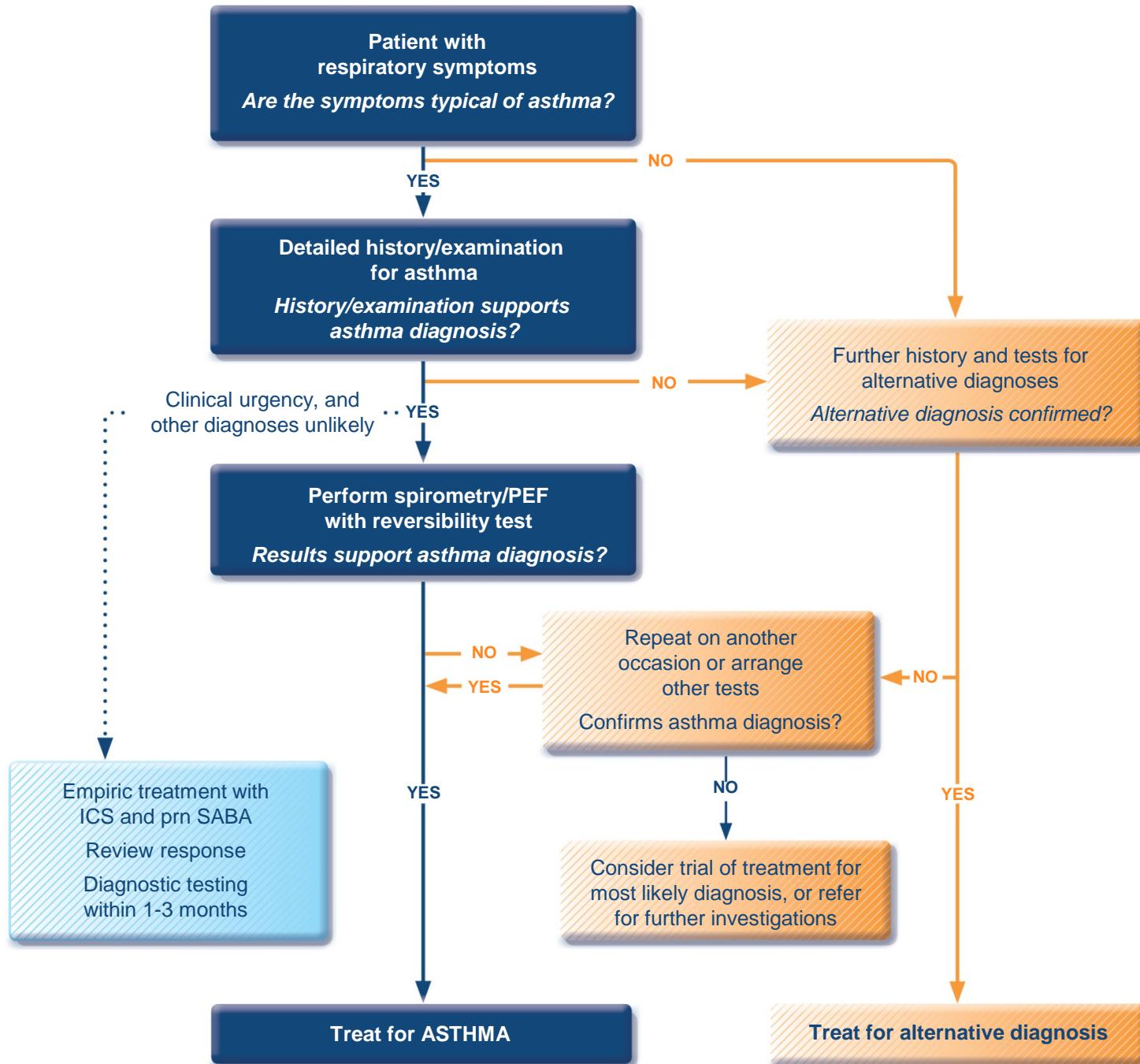
Perform spirometry/PEF
with reversibility test
Results support asthma diagnosis?

YES

Treat for ASTHMA









Diagnosis of asthma – symptoms

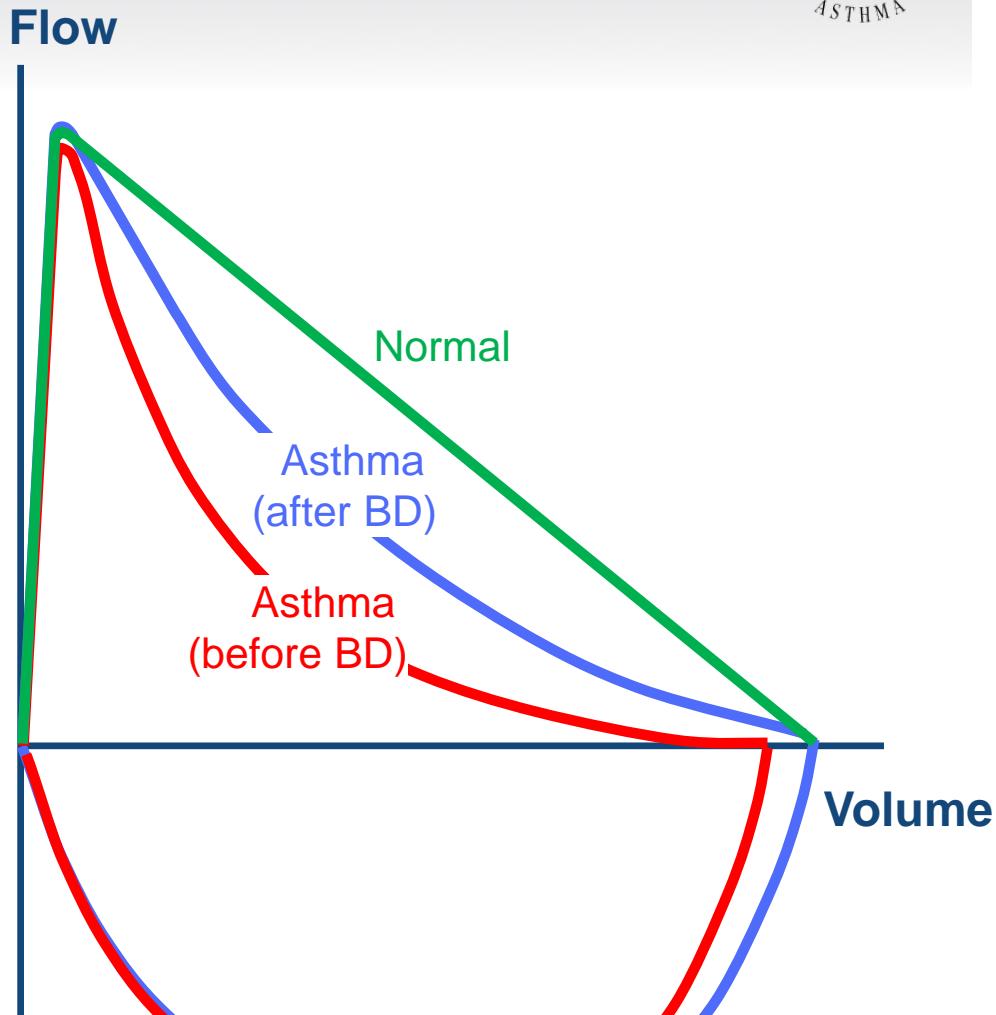
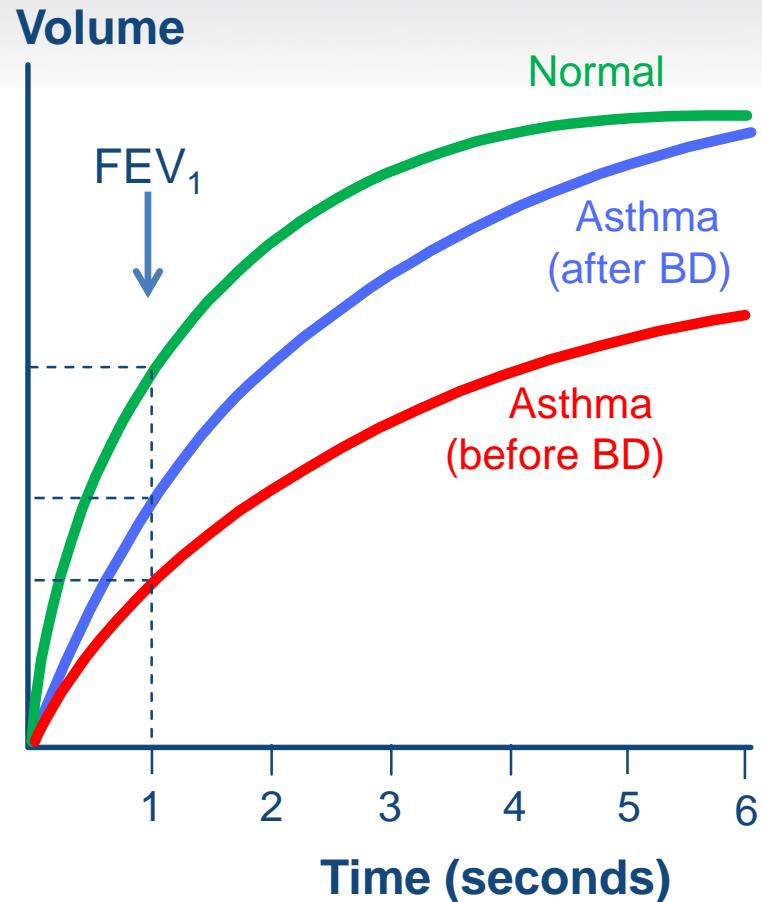
- *Increased probability that symptoms are due to asthma if:*
 - More than one type of symptom (wheeze, shortness of breath, cough, chest tightness)
 - Symptoms often worse at night or in the early morning
 - Symptoms vary over time and in intensity
 - Symptoms are triggered by viral infections, exercise, allergen exposure, changes in weather, laughter, irritants such as car exhaust fumes, smoke, or strong smells
- *Decreased probability that symptoms are due to asthma if:*
 - Isolated cough with no other respiratory symptoms
 - Chronic production of sputum
 - Shortness of breath associated with dizziness, light-headedness or peripheral tingling
 - Chest pain
 - Exercise-induced dyspnea with noisy inspiration (stridor)



Diagnosis of asthma – variable airflow limitation

- Confirm presence of airflow limitation
 - Document that FEV₁/FVC is reduced (at least once, when FEV₁ is low)
 - FEV₁/ FVC ratio is normally >0.75 – 0.80 in healthy adults, and >0.90 in children
- Confirm variation in lung function is greater than in healthy individuals
 - The greater the variation, or the more times variation is seen, the greater probability that the diagnosis is asthma
 - Excessive bronchodilator reversibility (adults: increase in FEV₁ >12% and >200mL; children: increase >12% predicted)
 - Excessive diurnal variability from 1-2 weeks' twice-daily PEF monitoring (daily amplitude x 100/daily mean, averaged)
 - Significant increase in FEV₁ or PEF after 4 weeks of controller treatment
 - If initial testing is negative:
 - Repeat when patient is symptomatic, or after withholding bronchodilators
 - Refer for additional tests (especially children ≤5 years, or the elderly)

Typical spirometric tracings



Note: Each FEV₁ represents the highest of three reproducible measurements



Diagnosis of asthma – physical examination

- Physical examination in people with asthma
 - Often normal
 - The most frequent finding is wheezing on auscultation, especially on forced expiration
- Wheezing is also found in other conditions, for example:
 - Respiratory infections
 - COPD
 - Upper airway dysfunction
 - Endobronchial obstruction
 - Inhaled foreign body
- Wheezing may be absent during severe asthma exacerbations ('silent chest')

Assessment of asthma



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Assessment of asthma

1. Asthma control - two domains
 - Assess symptom control over the last 4 weeks
 - Assess risk factors for poor outcomes, including low lung function
2. Treatment issues
 - Check inhaler technique and adherence
 - Ask about side-effects
 - Does the patient have a written asthma action plan?
 - What are the patient's attitudes and goals for their asthma?
3. Comorbidities
 - Think of rhinosinusitis, GERD, obesity, obstructive sleep apnea, depression, anxiety
 - These may contribute to symptoms and poor quality of life



GINA assessment of symptom control

A. Symptom control

In the past 4 weeks, has the patient had:

- Daytime asthma symptoms more than twice a week?
- Any night waking due to asthma?
- Reliever needed for symptoms* more than twice a week?
- Any activity limitation due to asthma?

	Level of asthma symptom control	
	Well-controlled	Partly controlled
Yes <input type="checkbox"/>	No <input type="checkbox"/>	None of these
Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Yes <input type="checkbox"/>	No <input type="checkbox"/>	
Yes <input type="checkbox"/>	No <input type="checkbox"/>	1-2 of these
		3-4 of these

*Excludes reliever taken before exercise, because many people take this routinely



GINA assessment of asthma control

A. Symptom control

In the past 4 weeks, has the patient had:

- Daytime asthma symptoms more than twice a week?
- Any night waking due to asthma?
- Reliever needed for symptoms* more than twice a week?
- Any activity limitation due to asthma?

			Well-controlled	Partly controlled	Uncontrolled
	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
	Yes <input type="checkbox"/>	No <input type="checkbox"/>	None of these	1-2 of these	3-4 of these

B. Risk factors for poor asthma outcomes

- Assess risk factors at diagnosis and periodically
- Measure FEV₁ at start of treatment, after 3 to 6 months of treatment to record the patient's personal best, then periodically for ongoing risk assessment

ASSESS PATIENT'S RISKS FOR:

- Exacerbations
- Fixed airflow limitation
- Medication side-effects

Assessment of risk factors for poor asthma outcomes

Independent* risk factors for exacerbations include:

- Ever intubated for asthma
- Uncontrolled asthma symptoms
- Having ≥ 1 exacerbation in last 12 months
- Low FEV₁ (measure lung function at start of treatment, at 3-6 months to assess personal best, and periodically thereafter)
- Incorrect inhaler technique and/or poor adherence
- Smoking
- Elevated FeNO in adults with allergic asthma
- Obesity, pregnancy, blood eosinophilia



* Independent of the level of symptom control



Assessment of risk factors for poor asthma outcomes

Risk factors for exacerbations include:

- Ever intubated for asthma
- Uncontrolled asthma symptoms
- Having ≥ 1 exacerbation in last 12 months
- Low FEV₁ (measure lung function at start of treatment, at 3-6 months to assess personal best, and periodically thereafter)
- Incorrect inhaler technique and/or poor adherence
- Smoking
- Elevated FeNO in adults with allergic asthma
- Obesity, pregnancy, blood eosinophilia

Risk factors for fixed airflow limitation include:

- No ICS treatment, smoking, occupational exposure, mucus hypersecretion, blood eosinophilia



Assessment of risk factors for poor asthma outcomes

Risk factors for exacerbations include:

- Ever intubated for asthma
- Uncontrolled asthma symptoms
- Having ≥ 1 exacerbation in last 12 months
- Low FEV₁ (measure lung function at start of treatment, at 3-6 months to assess personal best, and periodically thereafter)
- Incorrect inhaler technique and/or poor adherence
- Smoking
- Elevated FeNO in adults with allergic asthma
- Obesity, pregnancy, blood eosinophilia

Risk factors for fixed airflow limitation include:

- No ICS treatment, smoking, occupational exposure, mucus hypersecretion, blood eosinophilia

Risk factors for medication side-effects include:

- Frequent oral steroids, high dose/potent ICS, P450 inhibitors

The role of lung function in asthma



- Diagnosis
 - Demonstrate variable expiratory airflow limitation
 - Reconsider diagnosis if symptoms and lung function are discordant
 - Frequent symptoms but normal FEV₁: cardiac disease; lack of fitness?
 - Few symptoms but low FEV₁: poor perception; restriction of lifestyle?
- Risk assessment
 - Low FEV₁ is an independent predictor of exacerbation risk
- Measure lung function to monitor progress
 - At diagnosis and 3-6 months after starting treatment (to identify personal best)
 - Periodically thereafter, at least every 1-2 years for most adults; more often for high risk patients and for children, depending on age and asthma severity
 - Consider long-term PEF monitoring for patients with severe asthma or impaired perception of airflow limitation
- Adjusting treatment?
 - Utility of lung function for adjusting treatment is limited by between-visit variability of FEV₁ (15% year-to-year)



Assessing asthma severity

- How?
 - Asthma severity is assessed retrospectively from the level of treatment required to control symptoms and exacerbations
- When?
 - Assess asthma severity after patient has been on controller treatment for several months
 - Severity is not static – it may change over months or years, or as different treatments become available
- Categories of asthma severity
 - *Mild asthma*: well-controlled with Steps 1 or 2 (as-needed SABA or low dose ICS)
 - *Moderate asthma*: well-controlled with Step 3 (low-dose ICS/LABA)
 - *Severe asthma*: requires Step 4/5 (moderate or high dose ICS/LABA ± add-on), or remains uncontrolled despite this treatment



How to distinguish between uncontrolled and severe asthma

Watch patient using their inhaler. Discuss adherence and barriers to use



Compare inhaler technique with a device-specific checklist, and correct errors; recheck frequently. Have an empathic discussion about barriers to adherence.



How to distinguish between uncontrolled and severe asthma

Watch patient using their inhaler. Discuss adherence and barriers to use

Compare inhaler technique with a device-specific checklist, and correct errors; recheck frequently. Have an empathic discussion about barriers to adherence.



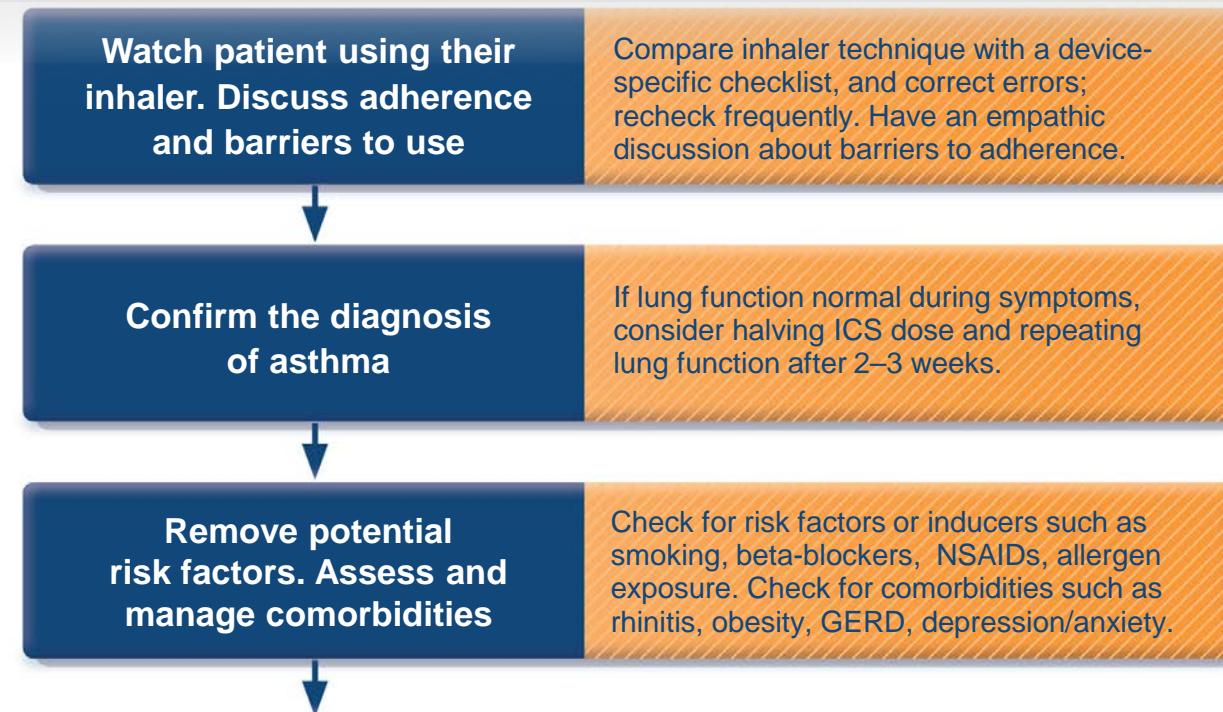
Confirm the diagnosis of asthma

If lung function normal during symptoms, consider halving ICS dose and repeating lung function after 2–3 weeks.

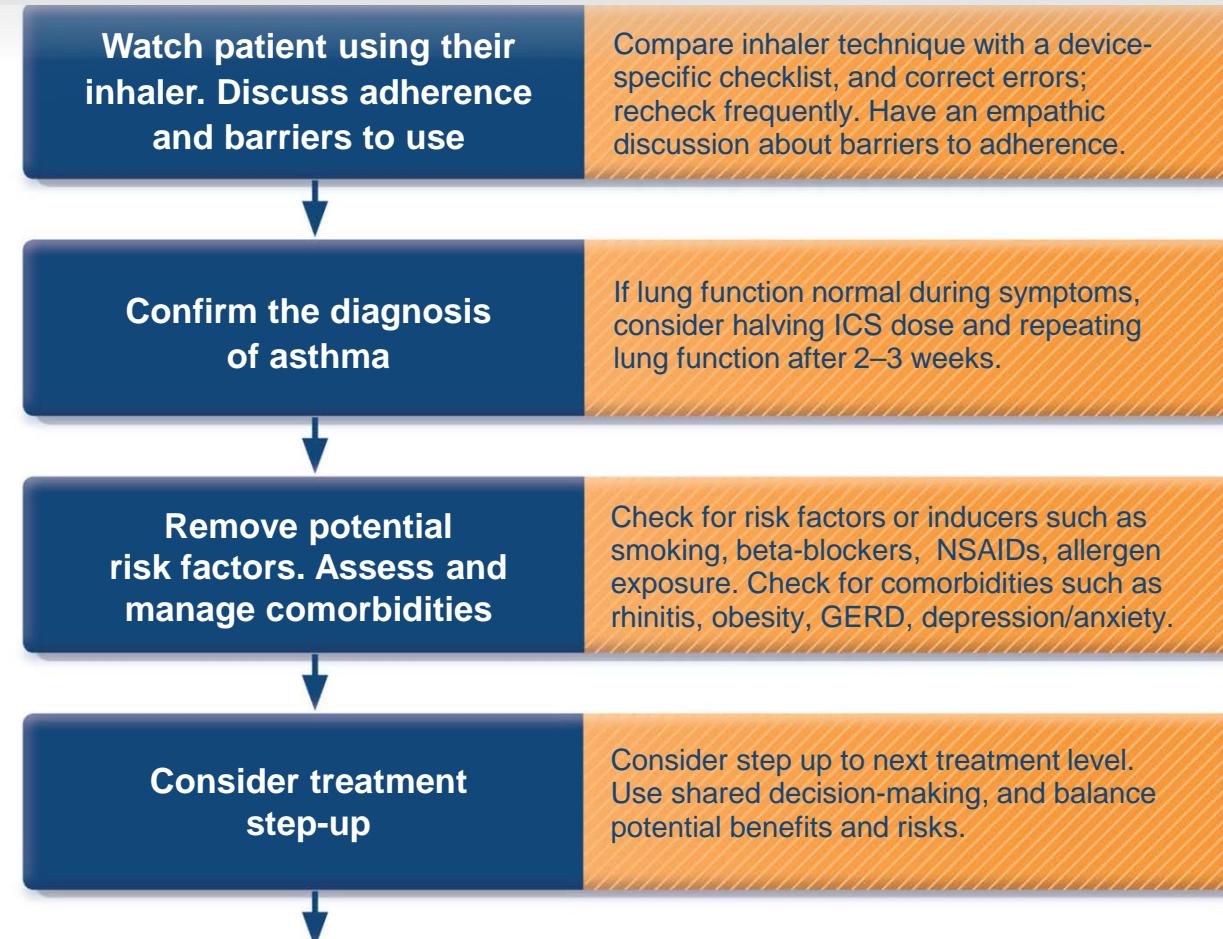




How to distinguish between uncontrolled and severe asthma



How to distinguish between uncontrolled and severe asthma



How to distinguish between uncontrolled and severe asthma



Treating asthma to control symptoms and minimize risk



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Goals of asthma management

- The long-term goals of asthma management are
 1. **Symptom control:** to achieve good control of symptoms and maintain normal activity levels
 2. **Risk reduction:** to minimize future risk of exacerbations, fixed airflow limitation and medication side-effects
- Achieving these goals requires a partnership between patient and their health care providers
 - Ask the patient about their own goals regarding their asthma
 - Good communication strategies are essential
 - Consider the health care system, medication availability, cultural and personal preferences and health literacy



Key strategies to facilitate good communication

- Improve communication skills
 - Friendly manner
 - Allow the patient to express their goals, beliefs and concerns
 - Empathy and reassurance
 - Encouragement and praise
 - Provide appropriate (personalized) information
 - Feedback and review
- Benefits include:
 - Increased patient satisfaction
 - Better health outcomes
 - Reduced use of health care resources

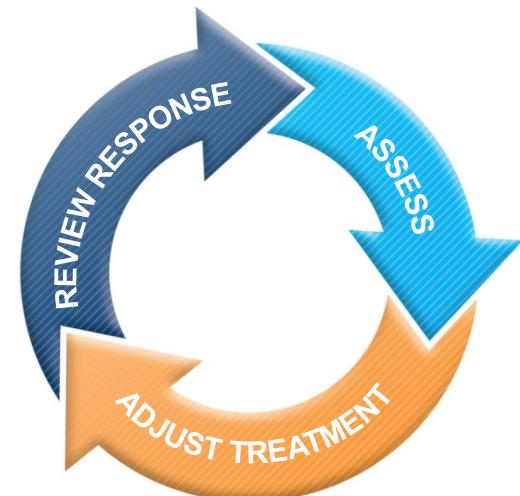


Reducing the impact of impaired health literacy

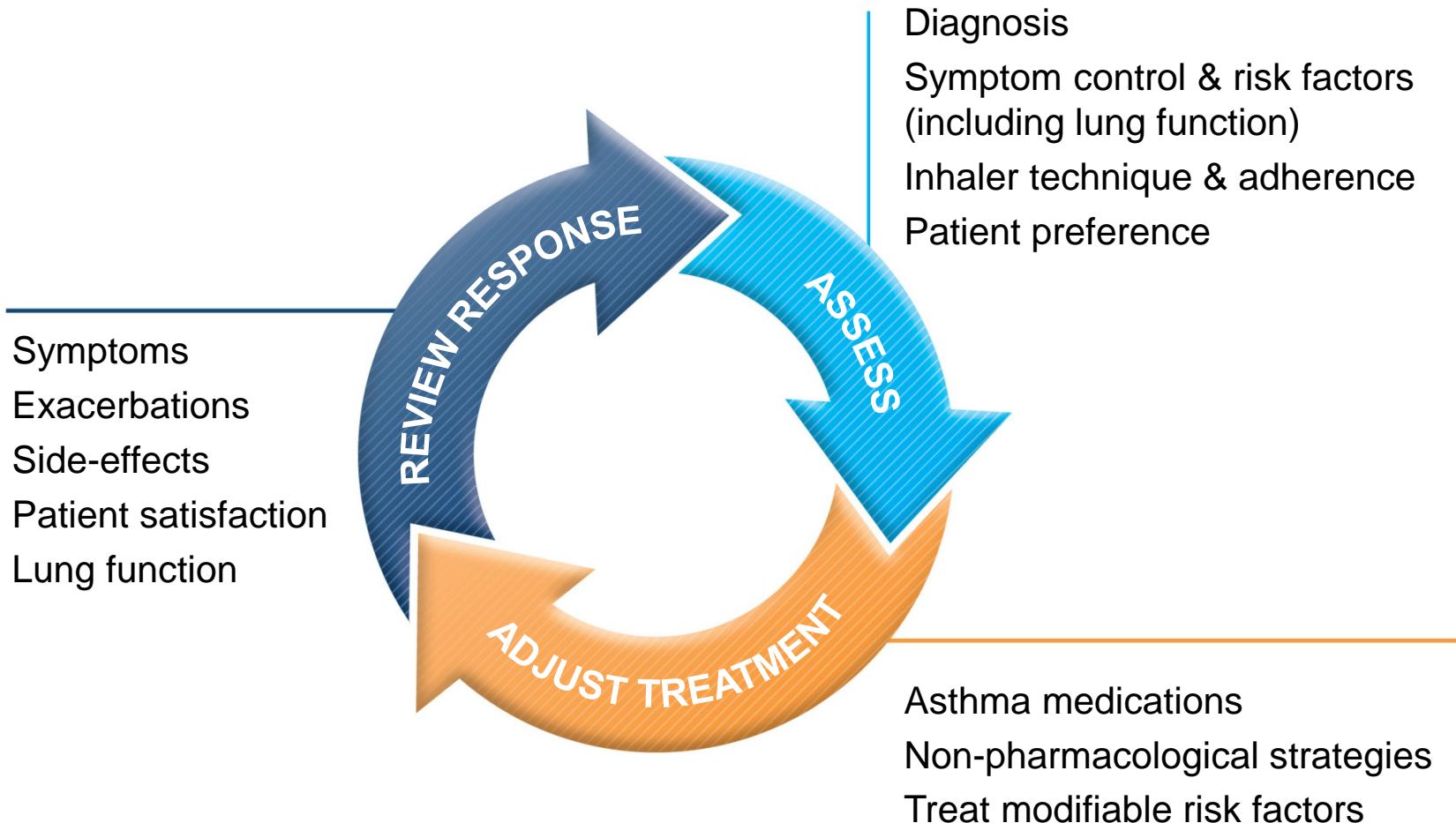
- Health literacy affects health outcomes, including in asthma
 - ‘The degree to which individuals have the capacity to obtain, process and understand basic health information and services to make appropriate health decisions’ (Rosas-Salazar, JACI 2012)
- Strategies for reducing the impact of impaired health literacy
 - Prioritize information (most important to least important)
 - Speak slowly, avoid medical language, simplify numeric concepts
 - Use anecdotes, drawings, pictures, tables and graphs
 - Use the ‘teach-back’ method – ask patients to repeat instructions
 - Ask a second person to repeat the main messages
 - Pay attention to non-verbal communication

Treating to control symptoms and minimize risk

- Establish a patient-doctor partnership
- Manage asthma in a continuous cycle:
 - **Assess**
 - **Adjust** treatment (pharmacological and non-pharmacological)
 - **Review** the response
- Teach and reinforce essential skills
 - Inhaler skills
 - Adherence
 - Guided self-management education
 - Written asthma action plan
 - Self-monitoring
 - Regular medical review



The control-based asthma management cycle





Choosing between controller options – population-level decisions

Choosing between treatment options at a population level

e.g. national formularies, health maintenance organisations, national guidelines

The 'preferred treatment' at each step is based on:

- Efficacy
 - Effectiveness
 - Safety
 - Availability and cost at the population level
- } based on group mean data for symptoms, exacerbations and lung function (from RCTs, pragmatic studies and observational data)



Choosing between controller options – individual patient decisions

Decisions for individual patients

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

1. Preferred treatment for symptom control and for risk reduction
2. Patient characteristics (phenotype)
 - Does the patient have any known predictors of risk or response?
(e.g. smoker, history of exacerbations, blood eosinophilia)
3. Patient preference
 - What are the patient's goals and concerns for their asthma?
4. Practical issues
 - Inhaler technique - can the patient use the device correctly after training?
 - Adherence: how often is the patient likely to take the medication?
 - Cost: can the patient afford the medication?



Initial controller treatment for adults, adolescents and children 6–11 years

- Start controller treatment early
 - For best outcomes, initiate controller treatment as early as possible after making the diagnosis of asthma
- Indications for regular low-dose ICS - any of:
 - Asthma symptoms more than twice a month
 - Waking due to asthma more than once a month
 - Any asthma symptoms plus any risk factors for exacerbations
- Consider starting at a higher step if:
 - Troublesome asthma symptoms on most days
 - Waking from asthma once or more a week, especially if any risk factors for exacerbations
- If initial asthma presentation is with an exacerbation:
 - Give a short course of oral steroids and start regular controller treatment (e.g. high dose ICS or medium dose ICS/LABA, then step down)

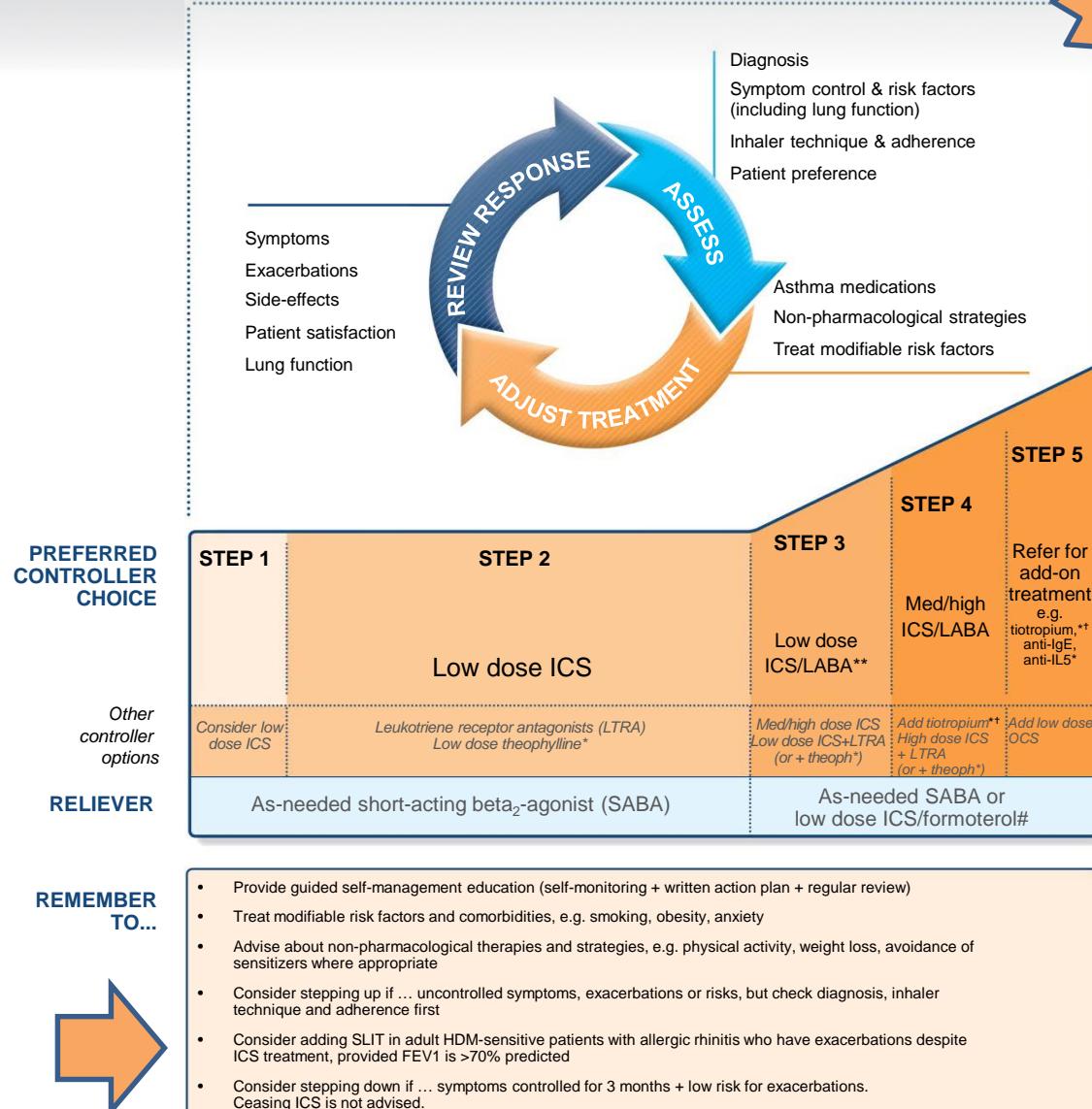
Initial controller treatment

- Before starting initial controller treatment
 - Record evidence for diagnosis of asthma, if possible
 - Record symptom control and risk factors, including lung function
 - Consider factors affecting choice of treatment for this patient
 - Ensure that the patient can use the inhaler correctly
 - Schedule an appointment for a follow-up visit
- After starting initial controller treatment
 - Review response after 2-3 months, or according to clinical urgency
 - Adjust treatment (including non-pharmacological treatments)
 - Consider stepping down when asthma has been well-controlled for 3 months

Stepwise approach to control asthma symptoms and reduce risk



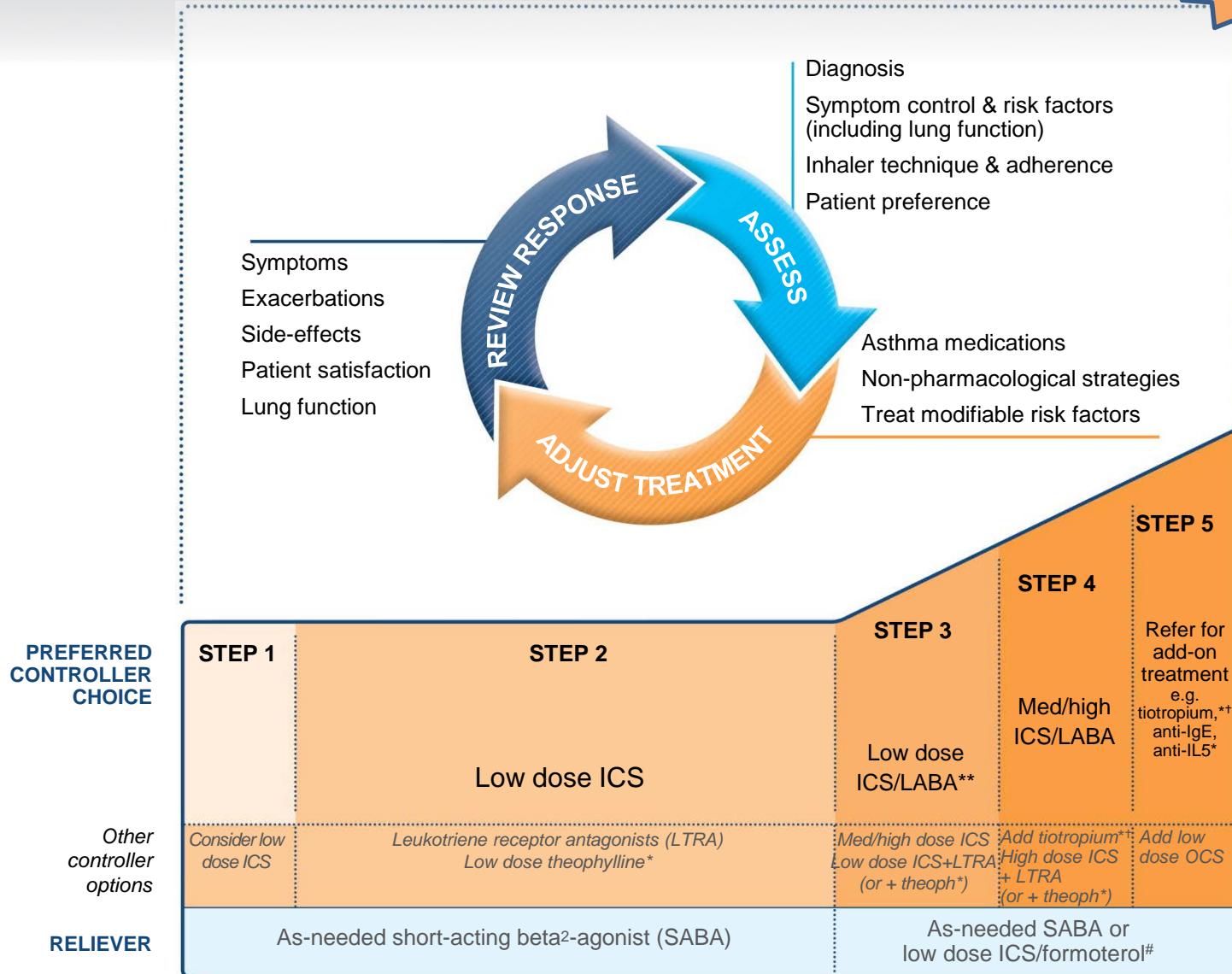
UPDATED
2017



Stepwise management - pharmacotherapy



UPDATED
2017



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/formoterol maintenance and reliever therapy

+ Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

Stepwise management – additional components



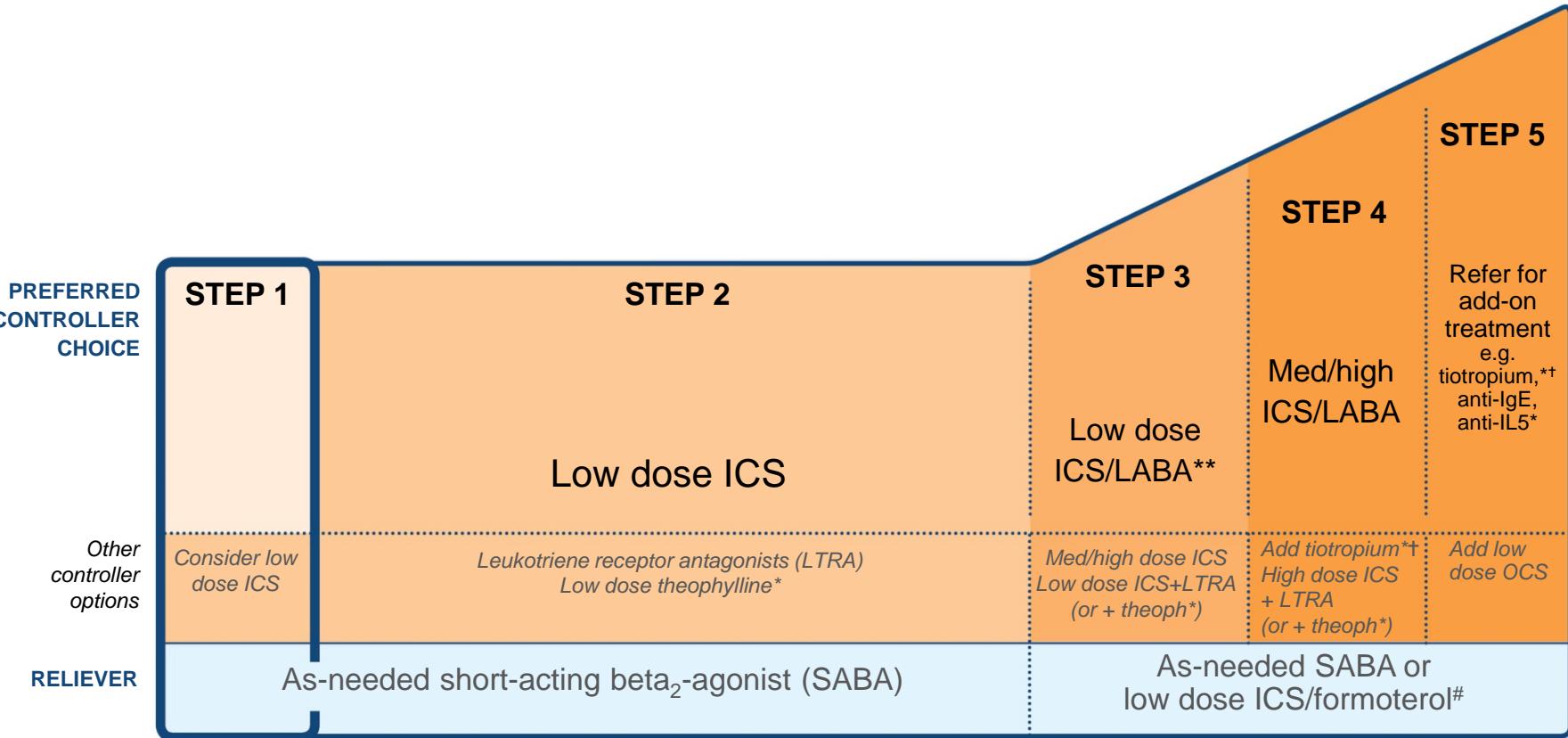
REMEMBER TO...

- Provide guided self-management education
- Treat modifiable risk factors and comorbidities
- Advise about non-pharmacological therapies and strategies
- Consider stepping up if ... uncontrolled symptoms, exacerbations or risks, but check diagnosis, inhaler technique and adherence first
- Consider adding SLIT in adult HDM-sensitive patients with allergic rhinitis who have exacerbations despite ICS treatment, provided FEV₁ is 70% predicted
- Consider stepping down if ... symptoms controlled for 3 months + low risk for exacerbations. Ceasing ICS is not advised.

SLIT: sublingual immunotherapy



Step 1 – as-needed inhaled short-acting beta₂-agonist (SABA)



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/ formoterol maintenance and reliever therapy

† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

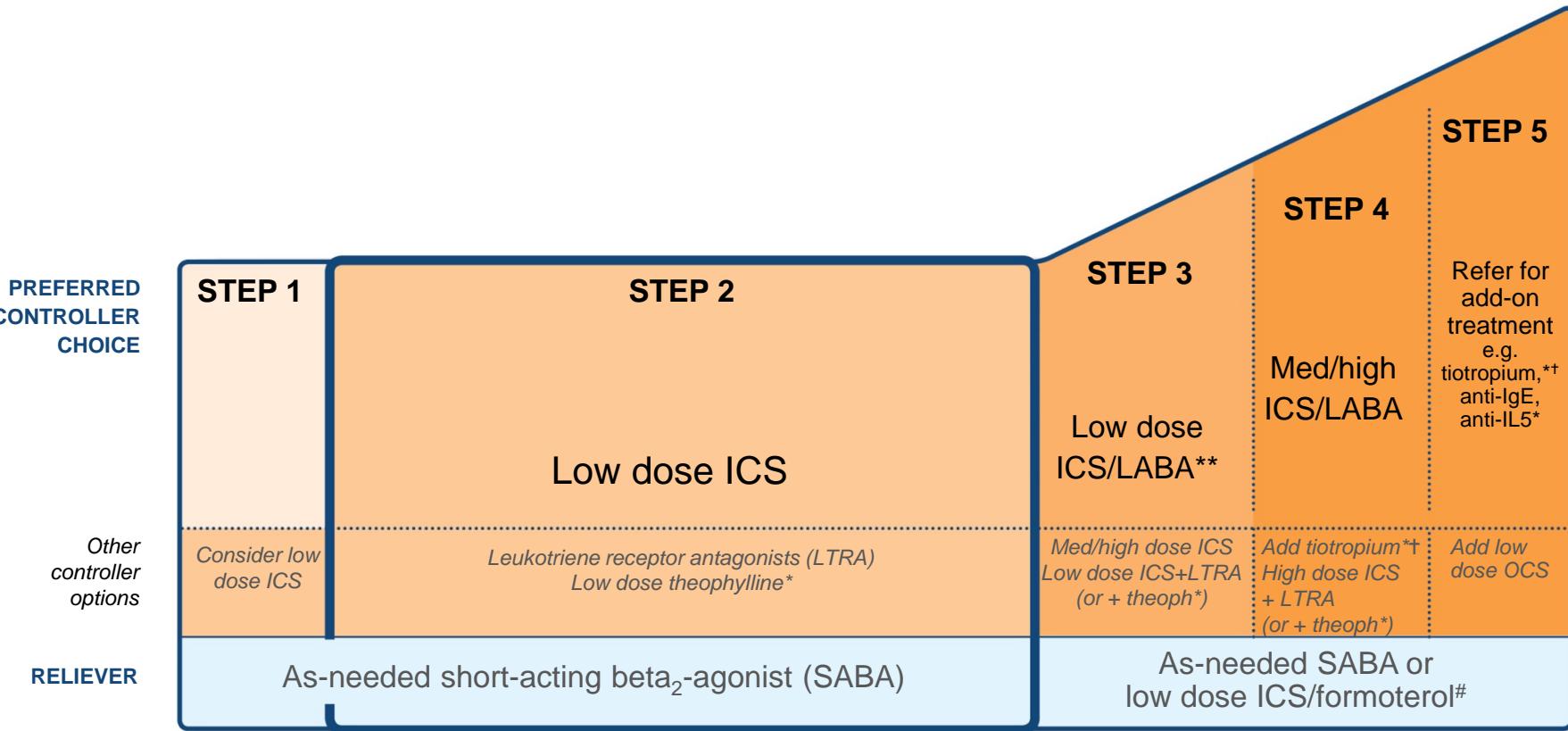


Step 1 – as-needed reliever inhaler

- Preferred option: as-needed inhaled short-acting beta₂-agonist (SABA)
 - SABAs are highly effective for relief of asthma symptoms
 - However there is insufficient evidence about the safety of treating asthma with SABA alone
 - This option should be reserved for patients with infrequent symptoms (less than twice a month) of short duration, and with no risk factors for exacerbations
- Other options
 - Consider adding regular low dose inhaled corticosteroid (ICS) for patients at risk of exacerbations



Step 2 – low-dose controller + as-needed inhaled SABA



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/ formoterol maintenance and reliever therapy

† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

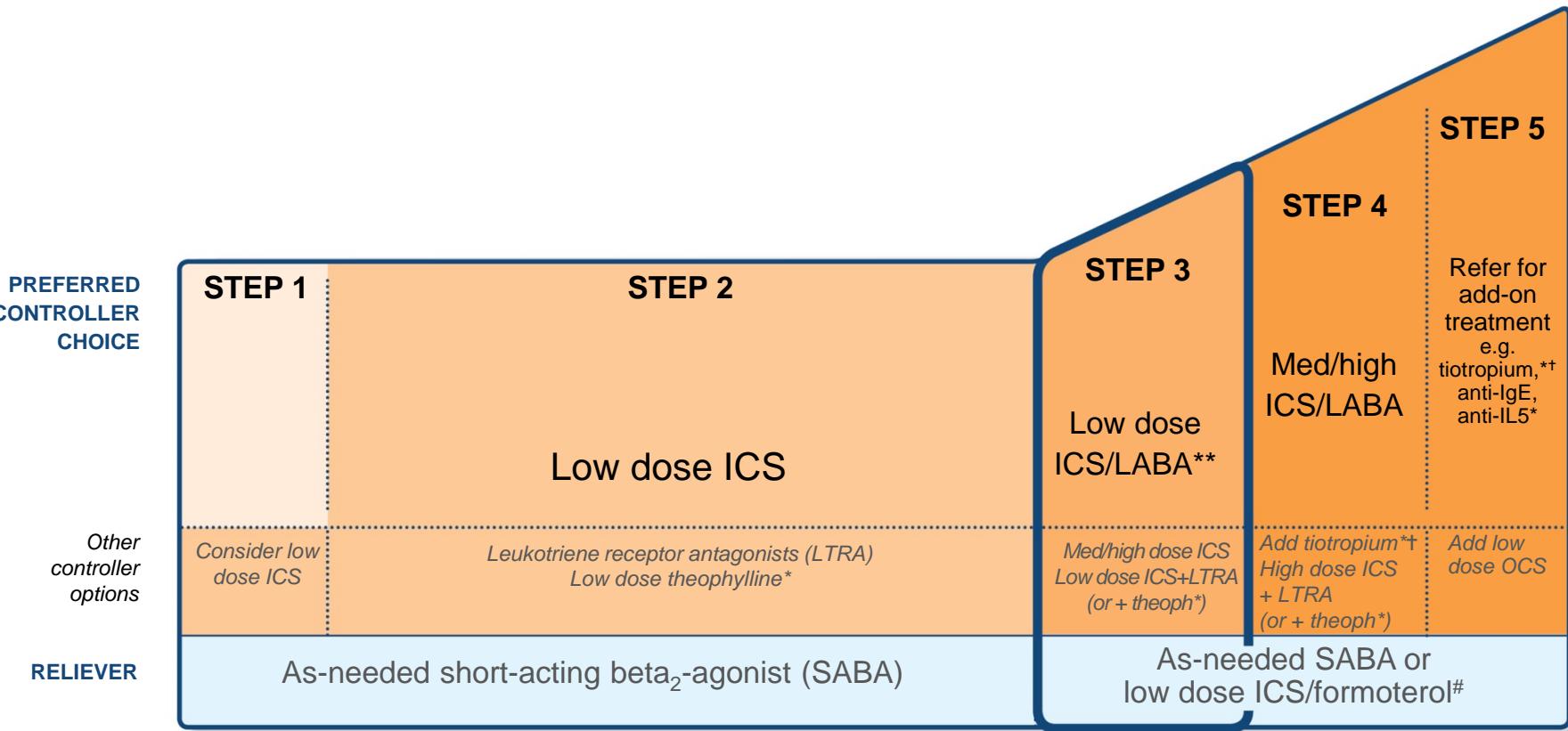


Step 2 – Low dose controller + as-needed SABA

- Preferred option: regular low dose ICS with as-needed inhaled SABA
 - Low dose ICS reduces symptoms and reduces risk of exacerbations and asthma-related hospitalization and death
- Other options
 - Leukotriene receptor antagonists (LTRA) with as-needed SABA
 - Less effective than low dose ICS
 - May be used for some patients with both asthma and allergic rhinitis, or if patient will not use ICS
 - Combination low dose ICS/long-acting beta₂-agonist (LABA) with as-needed SABA
 - Reduces symptoms and increases lung function compared with ICS
 - More expensive, and does not further reduce exacerbations
 - Intermittent ICS with as-needed SABA for purely seasonal allergic asthma with no interval symptoms
 - Start ICS immediately symptoms commence, and continue for 4 weeks after pollen season ends



Step 3 – one or two controllers + as-needed inhaled reliever



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/ formoterol maintenance and reliever therapy

† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

Step 3 – one or two controllers + as-needed inhaled reliever

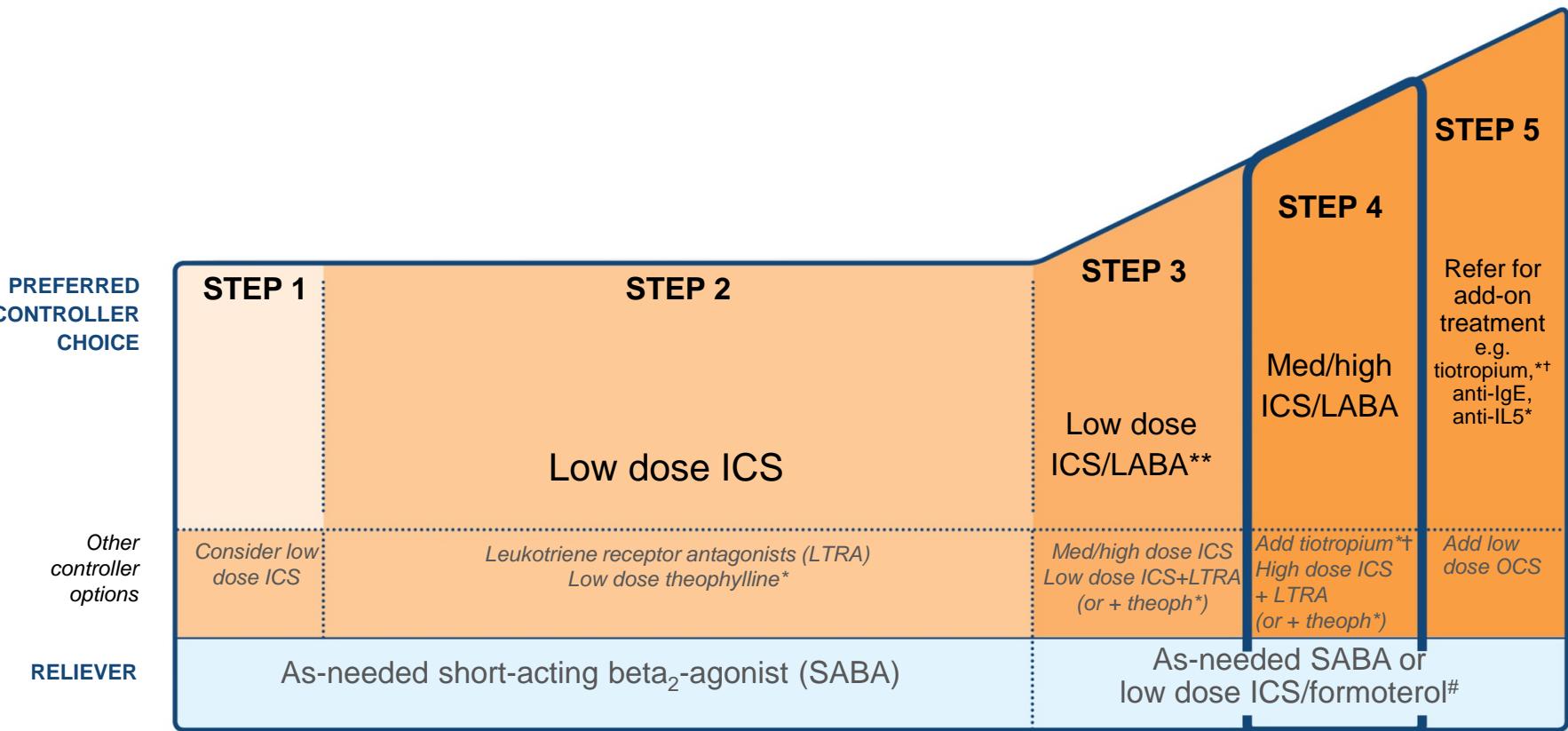
- Before considering step-up
 - Check inhaler technique and adherence, confirm diagnosis
- Adults/adolescents: preferred options are either combination low dose ICS/LABA maintenance with as-needed SABA, OR combination low dose ICS/formoterol maintenance and reliever regimen*
 - Adding LABA reduces symptoms and exacerbations and increases FEV₁, while allowing lower dose of ICS
 - In at-risk patients, maintenance and reliever regimen significantly reduces exacerbations with similar level of symptom control and lower ICS doses compared with other regimens
- Children 6-11 years: preferred option is medium dose ICS with as-needed SABA
- Other options
 - Adults/adolescents: Increase ICS dose or add LTRA or theophylline (less effective than ICS/LABA)
 - Adults: consider adding SLIT (see Non-pharmacological interventions)
 - Children 6-11 years – add LABA (similar effect as increasing ICS)



*Approved only for low dose beclometasone/formoterol and low dose budesonide/formoterol



Step 4 – two or more controllers + as-needed inhaled reliever



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/ formoterol maintenance and reliever therapy

† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

Step 4 – two or more controllers + as-needed inhaled reliever

- Before considering step-up
 - Check inhaler technique and adherence
- Adults or adolescents: preferred option is combination low dose ICS/formoterol as maintenance and reliever regimen*, OR combination medium dose ICS/LABA with as-needed SABA
- Children 6–11 years: preferred option is to refer for expert advice
- Other options (adults or adolescents)
 - Tiotropium by mist inhaler may be used as add-on therapy for patients aged ≥ 12 years with a history of exacerbations
 - Adults: consider adding SLIT (see Non-pharmacological therapy)
 - Trial of high dose combination ICS/LABA, but little extra benefit and increased risk of side-effects
 - Increase dosing frequency (for budesonide-containing inhalers)
 - Add-on LTRA or low dose theophylline

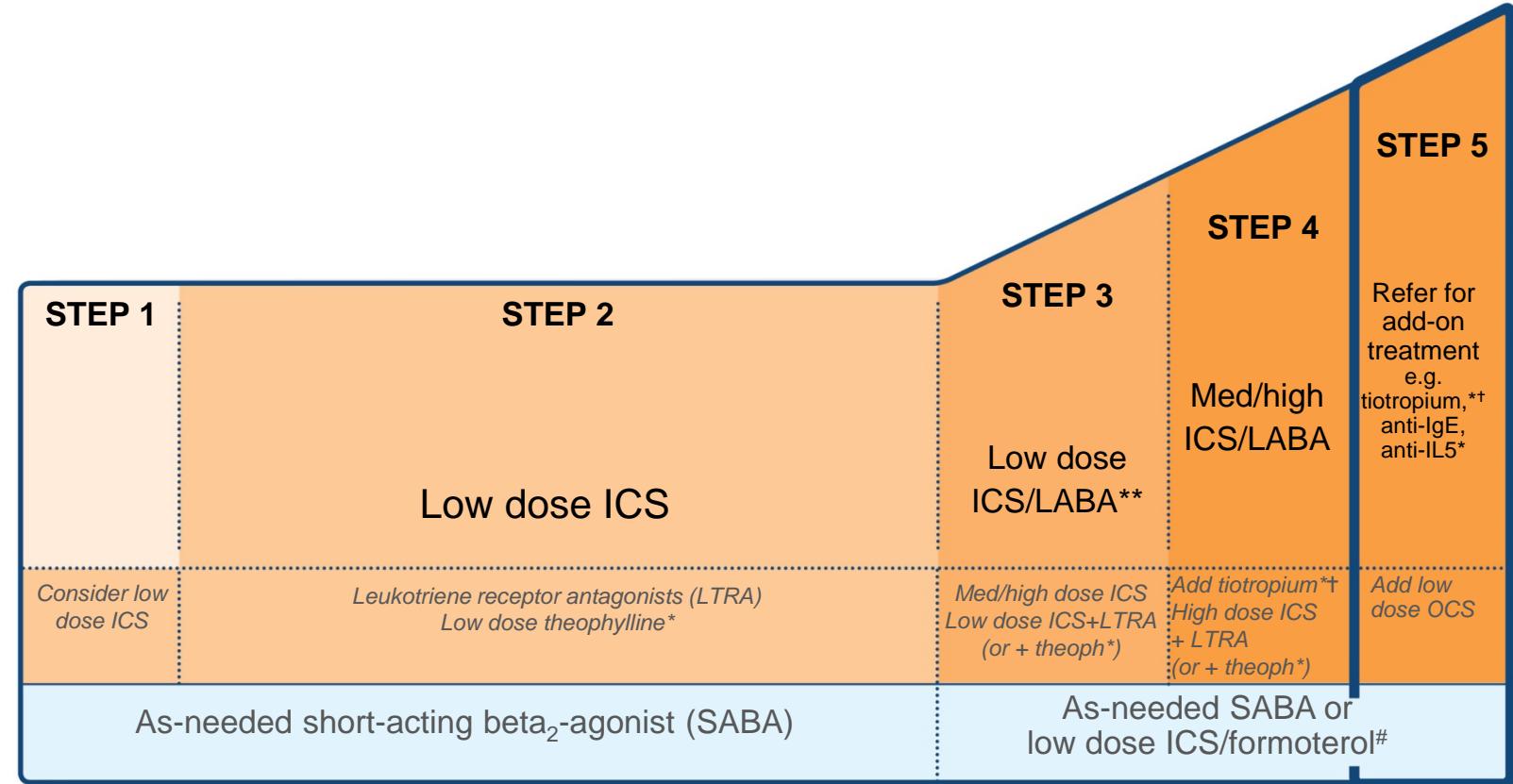


*Approved only for low dose beclometasone/formoterol and low dose budesonide/formoterol

Step 5 – higher level care and/or add-on treatment



UPDATED
2017



*Not for children <12 years

**For children 6-11 years, the preferred Step 3 treatment is medium dose ICS

#For patients prescribed BDP/formoterol or BUD/ formoterol maintenance and reliever therapy

† Tiotropium by mist inhaler is an add-on treatment for patients ≥12 years with a history of exacerbations

Step 5 – higher level care and/or add-on treatment

- Preferred option is referral for specialist investigation and consideration of add-on treatment
 - If symptoms uncontrolled or exacerbations persist despite Step 4 treatment, check inhaler technique and adherence before referring
 - Add-on tiotropium for patients ≥ 12 years with history of exacerbations
 - Add-on anti-IgE (omalizumab) for patients with severe allergic asthma
 - Add-on anti-IL5 (mepolizumab (SC) or reslizumab (IV)) for severe eosinophilic asthma (≥ 12 yrs)
- Other add-on treatment options at Step 5 include:
 - Sputum-guided treatment: this is available in specialized centers; reduces exacerbations and/or corticosteroid dose
 - Add-on low dose oral corticosteroids (≤ 7.5 mg/day prednisone equivalent): this may benefit some patients, but has significant systemic side-effects. Assess and monitor for osteoporosis
 - See ERS/ATS Severe Asthma Guidelines (Chung et al, ERJ 2014) for more detail





Low, medium and high dose inhaled corticosteroids

Adults and adolescents (≥ 12 years)

Inhaled corticosteroid	Total daily dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (CFC)	200–500	>500–1000	>1000
Beclometasone dipropionate (HFA)	100–200	>200–400	>400
Budesonide (DPI)	200–400	>400–800	>800
Ciclesonide (HFA)	80–160	>160–320	>320
Fluticasone furoate (DPI)	100	n.a.	200
Fluticasone propionate (DPI or HFA)	100–250	>250–500	>500
Mometasone furoate	110–220	>220–440	>440
Triamcinolone acetonide	400–1000	>1000–2000	>2000

- This is not a table of equivalence, but of estimated clinical comparability
- Most of the clinical benefit from ICS is seen at low doses
- High doses are arbitrary, but for most ICS are those that, with prolonged use, are associated with increased risk of systemic side-effects

Low, medium and high dose inhaled corticosteroids

Children 6–11 years

Inhaled corticosteroid	Total daily dose (mcg)		
	Low	Medium	High
Beclometasone dipropionate (CFC)	100–200	>200–400	>400
Beclometasone dipropionate (HFA)	50–100	>100–200	>200
Budesonide (DPI)	100–200	>200–400	>400
Budesonide (nebulles)	250–500	>500–1000	>1000
Ciclesonide (HFA)	80	>80–160	>160
Fluticasone furoate (DPI)	n.a.	n.a.	n.a.
Fluticasone propionate (DPI)	100–200	>200–400	>400
Fluticasone propionate (HFA)	100–200	>200–500	>500
Mometasone furoate	110	≥220–<440	≥440
Triamcinolone acetonide	400–800	>800–1200	>1200

- This is not a table of equivalence, but of estimated clinical comparability
- Most of the clinical benefit from ICS is seen at low doses
- High doses are arbitrary, but for most ICS are those that, with prolonged use, are associated with increased risk of systemic side-effects

Reviewing response and adjusting treatment

- How often should asthma be reviewed?
 - 1-3 months after treatment started, then every 3-12 months
 - During pregnancy, every 4-6 weeks
 - After an exacerbation, within 1 week
- Stepping up asthma treatment
 - *Sustained step-up*, for at least 2-3 months if asthma poorly controlled
 - Important: first check for common causes (symptoms not due to asthma, incorrect inhaler technique, poor adherence)
 - *Short-term step-up*, for 1-2 weeks, e.g. with viral infection or allergen
 - May be initiated by patient with written asthma action plan
 - *Day-to-day adjustment*
 - For patients prescribed low-dose ICS/formoterol maintenance and reliever regimen*
- Stepping down asthma treatment
 - Consider step-down after good control maintained for 3 months
 - Find each patient's minimum effective dose, that controls both symptoms and exacerbations



*Approved only for low dose beclometasone/formoterol and low dose budesonide/formoterol

General principles for stepping down controller treatment

- Aim
 - To find the lowest dose that controls symptoms and exacerbations, and minimizes the risk of side-effects
- When to consider stepping down
 - When symptoms have been well controlled and lung function stable for ≥ 3 months
 - No respiratory infection, patient not travelling, not pregnant
- Prepare for step-down
 - Record the level of symptom control and consider risk factors
 - Make sure the patient has a written asthma action plan
 - Book a follow-up visit in 1-3 months
- Step down through available formulations
 - Stepping down ICS doses by 25–50% at 3 month intervals is feasible and safe for most patients (*Hagan et al, Allergy 2014*)
 - See GINA 2017 report Box 3-7 for specific step-down options
- Stopping ICS is not recommended in adults with asthma because of risk of exacerbations (*Rank et al, JACI 2013*)



Treating modifiable risk factors

- Provide skills and support for guided asthma self-management
 - This comprises self-monitoring of symptoms and/or PEF, a written asthma action plan and regular medical review
- Prescribe medications or regimen that minimize exacerbations
 - ICS-containing controller medications reduce risk of exacerbations
 - For patients with ≥ 1 exacerbations in previous year, consider low-dose ICS/formoterol maintenance and reliever regimen*
- Encourage avoidance of tobacco smoke (active or ETS)
 - Provide smoking cessation advice and resources at every visit
- For patients with severe asthma
 - Refer to a specialist center, if available, for consideration of add-on medications and/or sputum-guided treatment
- For patients with confirmed food allergy:
 - Appropriate food avoidance
 - Ensure availability of injectable epinephrine for anaphylaxis

*Approved only for low dose beclometasone/formoterol and low dose budesonide/formoterol

Non-pharmacological interventions

- Avoidance of tobacco smoke exposure
 - Provide advice and resources at every visit; advise against exposure of children to environmental tobacco smoke (house, car)
- Physical activity
 - Encouraged because of its general health benefits. Provide advice about exercise-induced bronchoconstriction
- Occupational asthma
 - Ask patients with adult-onset asthma about work history. Remove sensitizers as soon as possible. Refer for expert advice, if available
- Avoid medications that may worsen asthma
 - Always ask about asthma before prescribing NSAIDs or beta-blockers
- Remediation of dampness or mold in homes
 - Reduces asthma symptoms and medication use in adults
- Sublingual immunotherapy (SLIT)
 - Consider as add-on therapy in adult HDM-sensitive patients with allergic rhinitis who have exacerbations despite ICS treatment, provided FEV1 is 70% predicted
- See GINA Box 3-9 and online Appendix for details



This slide shows examples of interventions with high quality evidence

Indications for considering referral, where available

- Difficulty confirming the diagnosis of asthma
 - Symptoms suggesting chronic infection, cardiac disease etc
 - Diagnosis unclear even after a trial of treatment
 - Features of both asthma and COPD, if in doubt about treatment
- Suspected occupational asthma
 - Refer for confirmatory testing, identification of sensitizing agent, advice about eliminating exposure, pharmacological treatment
- Persistent uncontrolled asthma or frequent exacerbations
 - Uncontrolled symptoms or ongoing exacerbations or low FEV₁, despite correct inhaler technique and good adherence with Step 4
 - Frequent asthma-related health care visits
- Risk factors for asthma-related death
 - Near-fatal exacerbation in past
 - Anaphylaxis or confirmed food allergy with asthma

Indications for considering referral, where available

- Significant side-effects (or risk of side-effects)
 - Significant systemic side-effects
 - Need for oral corticosteroids long-term or as frequent courses
- Symptoms suggesting complications or sub-types of asthma
 - Nasal polyposis and reactions to NSAIDS (may be aspirin exacerbated respiratory disease)
 - Chronic sputum production, fleeting shadows on CXR (may be allergic bronchopulmonary aspergillosis)
- Additional reasons for referral in children 6-11 years
 - Doubts about diagnosis, e.g. symptoms since birth
 - Symptoms or exacerbations remain uncontrolled
 - Suspected side-effects of treatment, e.g. growth delay
 - Asthma with confirmed food allergy



Guided asthma self-management and skills training

Essential components are:

- Skills training to use inhaler devices correctly
- Encouraging adherence with medications, appointments
- Asthma information
- Guided self-management support
 - Self-monitoring of symptoms and/or PEF
 - Written asthma action plan
 - Regular review by a health care provider



Provide hands-on inhaler skills training

Choose

- Choose an appropriate device before prescribing. Consider medication options, arthritis, patient skills and cost. For ICS by pMDI, prescribe a spacer
- Avoid multiple different inhaler types if possible

Provide hands-on inhaler skills training

Choose

- Choose an appropriate device before prescribing. Consider medication options, arthritis, patient skills and cost. For ICS by pMDI, prescribe a spacer
- Avoid multiple different inhaler types if possible

Check

- Check technique at every opportunity – “*Can you show me how you use your inhaler at present?*”
- Identify errors with a device-specific checklist

Provide hands-on inhaler skills training

Choose

- Choose an appropriate device before prescribing. Consider medication options, arthritis, patient skills and cost. For ICS by pMDI, prescribe a spacer
- Avoid multiple different inhaler types if possible

Check

- Check technique at every opportunity – “*Can you show me how you use your inhaler at present?*”
- Identify errors with a device-specific checklist

Correct

- Give a physical demonstration to show how to use the inhaler correctly
- Check again (up to 2-3 times)
- Re-check inhaler technique frequently, as errors often recur within 4-6 weeks



Provide hands-on inhaler skills training

Choose

- Choose an appropriate device before prescribing. Consider medication options, arthritis, patient skills and cost. For ICS by pMDI, prescribe a spacer
- Avoid multiple different inhaler types if possible

Check

- Check technique at every opportunity – “*Can you show me how you use your inhaler at present?*”
- Identify errors with a device-specific checklist

Correct

- Give a physical demonstration to show how to use the inhaler correctly
- Check again (up to 2-3 times)
- Re-check inhaler technique frequently, as errors often recur within 4-6 weeks

Confirm

- Can you demonstrate correct technique for the inhalers you prescribe?
- Brief inhaler technique training improves asthma control



Check adherence with asthma medications

- Poor adherence:
 - Is very common: it is estimated that 50% of adults and children do not take controller medications as prescribed
 - Contributes to uncontrolled asthma symptoms and risk of exacerbations and asthma-related death
- Contributory factors
 - Unintentional (e.g. forgetfulness, cost, confusion) and/or
 - Intentional (e.g. no perceived need, fear of side-effects, cultural issues, cost)
- How to identify patients with low adherence:
 - Ask an empathic question, e.g. "*Do you find it easier to remember your medication in the morning or the evening?*", or "*Would you say you are taking it 3 days a week, or less, or more?*"
 - Check prescription date, label date and dose counter
 - Ask patient about their beliefs and concerns about the medication



Strategies to improve adherence in asthma

- Only a few interventions have been studied closely in asthma and found to be effective for improving adherence
 - Shared decision-making
 - Comprehensive asthma education with nurse home visits
 - Inhaler reminders for missed doses
 - Reviewing patients' detailed dispensing records





'Guided self-management education'

- Highly effective in improving asthma outcomes
 - Reduced hospitalizations, ED visits, symptoms, night waking, time off work, improved lung function and quality of life
- Three essential components
 - Self-monitoring of symptoms and/or PEF
 - Written asthma action plan
 - Describe how to recognize and respond to worsening asthma
 - Individualize the plan for the patient's health literacy and autonomy
 - Provide advice about a change in ICS and how/when to add OCS
 - If using PEF, base action plan on personal best rather than predicted
 - Regular medical review



Investigations in patients with severe asthma

- Confirm the diagnosis of asthma
 - Consider alternative diagnoses or contributors to symptoms, e.g. upper airway dysfunction, COPD, recurrent respiratory infections
- Investigate for comorbidities
 - Chronic sinusitis, obesity, GERD, obstructive sleep apnea, psychological or psychiatric disorders
- Check inhaler technique and medication adherence
- Investigate for persistent environmental exposure
 - Allergens or toxic substances (domestic or occupational)

Management of severe asthma

- Optimize dose of ICS/LABA
 - Complete resistance to ICS is rare
 - Consider therapeutic trial of higher dose
- Consider low dose maintenance oral corticosteroids
 - Monitor for and manage side-effects, including osteoporosis
- Add-on treatments without phenotyping
 - Tiotropium - reduces exacerbations (history of exacerbations, age ≥ 12 years)
 - Theophylline, LTRA – limited benefit
- Phenotype-guided treatment
 - Severe allergic asthma: add-on omalizumab (anti-IgE)
 - Severe eosinophilic asthma: add-on mepolizumab or reslizumab (anti-IL5)
 - Sputum-guided treatment to reduce exacerbations and/or steroid dose
 - Aspirin-exacerbated respiratory disease: consider add-on LTRA
- Non-pharmacological interventions
 - Consider bronchial thermoplasty for selected patients
 - Comprehensive adherence-promoting program
- For detailed guidelines, see Chung *et al*, ERJ 2014



Management of asthma in low-resource settings



- Where?
 - Low-resource settings may be found not only in low and middle income countries (LMIC), but also in affluent nations
- Diagnosis in low-resource settings
 - Up to 50% asthma undiagnosed, up to 34% over-diagnosed (*José 2014*)
 - Ask about symptoms suggestive of chronic respiratory infections e.g. TB
 - Check FVC as well as FEV₁, as spirometric restriction is common
 - Peak flow meters recommended by WHO as essential tools for Package of Essential Non-communicable Diseases Interventions (WHO-PEN)
- Management of asthma in low-resource settings
 - GINA strategy for stepwise treatment includes options for low-resource settings
 - Prioritize the most cost-effective approach; include ICS and SABA
 - Build capacity of primary health care teams, including nurses and pharmacist
 - WHO-PEN recommends inclusion of peak flow meters as essential tools, and oximeters if resources permit

Asthma flare-ups (exacerbations)



GINA Global Strategy for Asthma
Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Definition and terminology

- A flare-up or exacerbation is an acute or sub-acute worsening of symptoms and lung function compared with the patient's usual status
- Terminology
 - 'Flare-up' is the preferred term for discussion with patients
 - 'Exacerbation' is a difficult term for patients
 - 'Attack' has highly variable meanings for patients and clinicians
 - 'Episode' does not convey clinical urgency
- Consider management of worsening asthma as a continuum
 - Self-management with a written asthma action plan
 - Management in primary care
 - Management in the emergency department and hospital
 - Follow-up after any exacerbation



Identify patients at risk of asthma-related death

- Patients at increased risk of asthma-related death should be identified
 - Any history of near-fatal asthma requiring intubation and ventilation
 - Hospitalization or emergency care for asthma in last 12 months
 - Not currently using ICS, or poor adherence with ICS
 - Currently using or recently stopped using OCS
 - (indicating the severity of recent events)
 - Over-use of SABAs, especially if more than 1 canister/month
 - Lack of a written asthma action plan
 - History of psychiatric disease or psychosocial problems
 - Confirmed food allergy in a patient with asthma
- Flag these patients for more frequent review



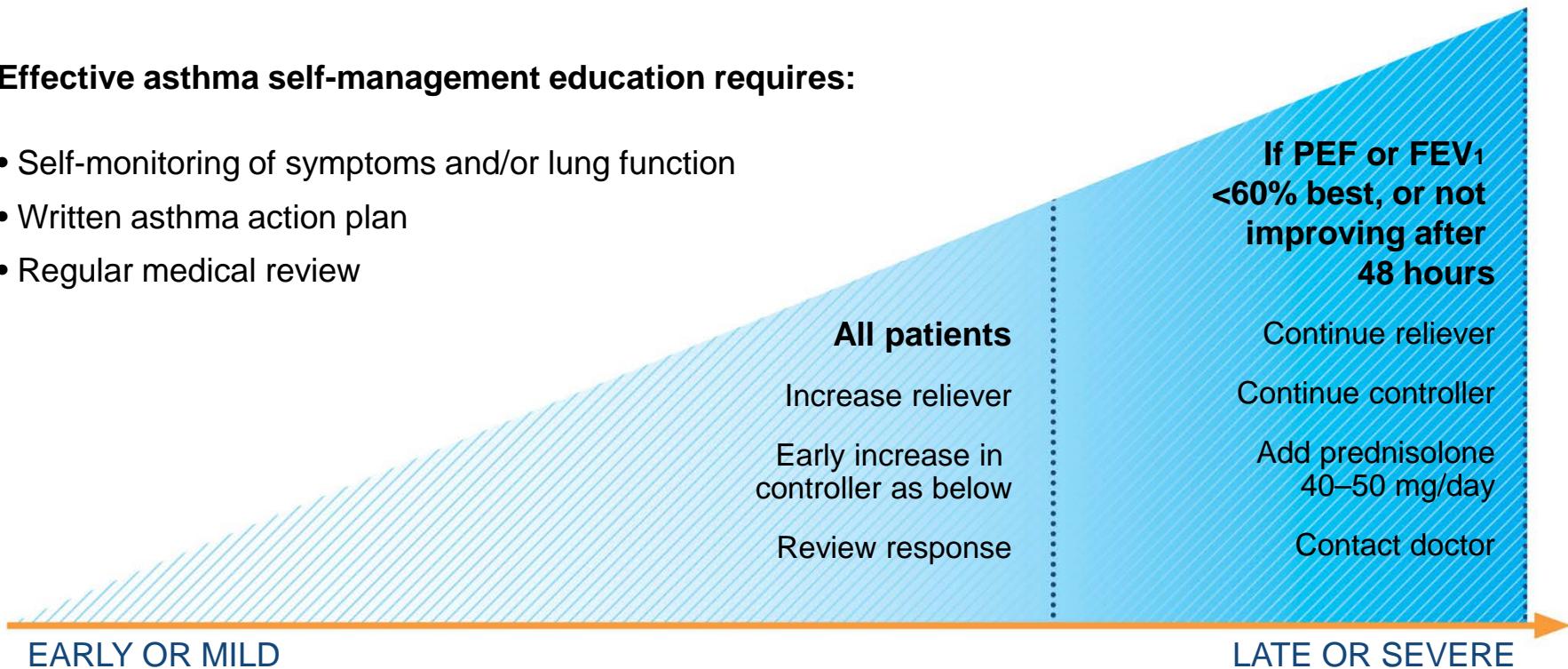
Written asthma action plans

- All patients should have a written asthma action plan
 - The aim is to show the patient how to recognize and respond to worsening asthma
 - It should be individualized for the patient's medications, level of asthma control and health literacy
 - Based on symptoms and/or PEF (children: only symptoms)
- The action plan should include:
 - The patient's usual asthma medications
 - When/how to increase reliever and controller or start OCS
 - How to access medical care if symptoms fail to respond
- Why?
 - When combined with self-monitoring and regular medical review, action plans are highly effective in reducing asthma mortality and morbidity

Written asthma action plans

Effective asthma self-management education requires:

- Self-monitoring of symptoms and/or lung function
- Written asthma action plan
- Regular medical review



Written asthma action plans – medication options



- Increase inhaled reliever
 - Increase frequency as needed
 - Adding spacer for pMDI may be helpful
- Early and rapid increase in inhaled controller
 - Up to maximum ICS of 2000mcg BDP/day or equivalent
 - Options depend on usual controller medication and type of LABA
 - See GINA 2017 report Box 4-2 for details
- Add oral corticosteroids if needed
 - Adults: prednisolone 1mg/kg/day up to 50mg, usually 5-7 days
 - Children: 1-2mg/kg/day up to 40mg, usually 3-5 days
 - Morning dosing preferred to reduce side-effects
 - Tapering not needed if taken for less than 2 weeks
 - Remember to advise patients about common side-effects (sleep disturbance, increased appetite, reflux, mood changes)



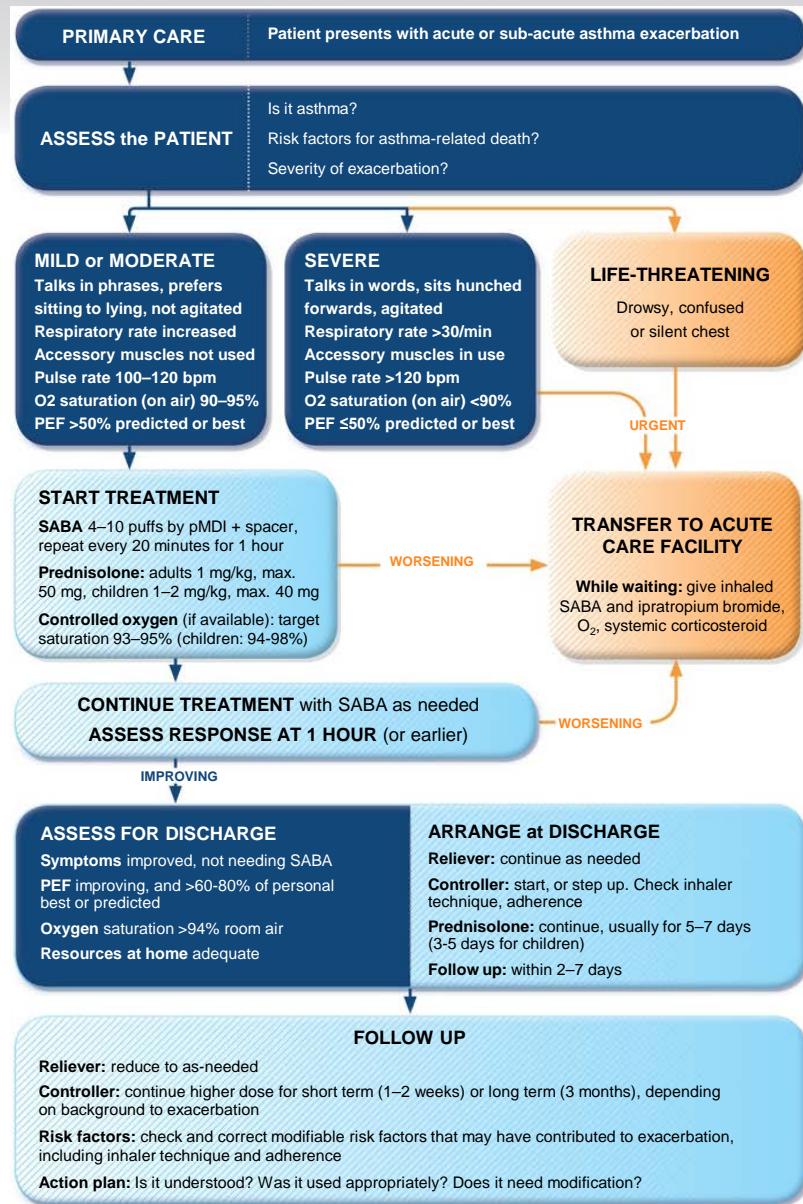


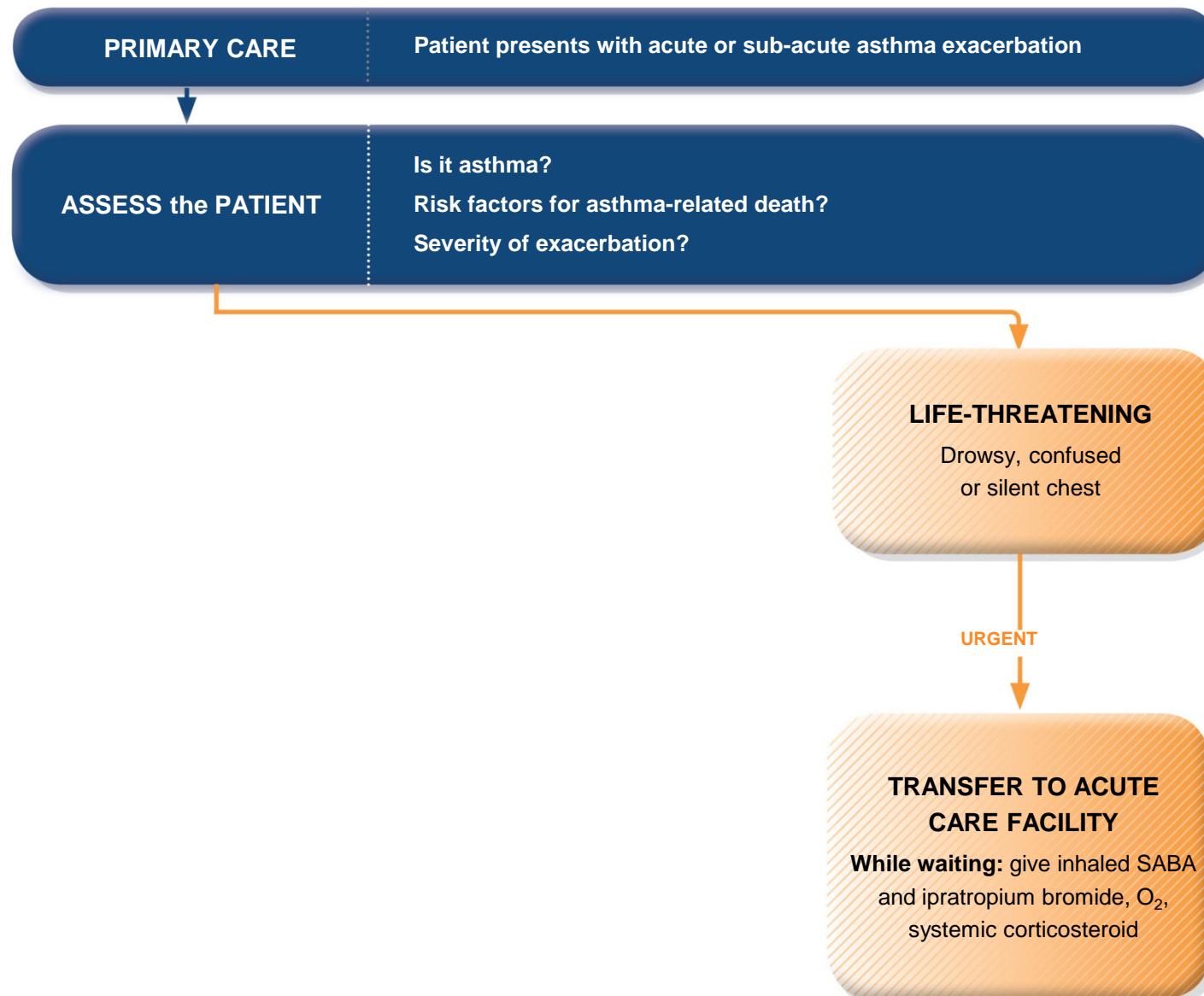
Rationale for change in recommendation about controller therapy in asthma action plans

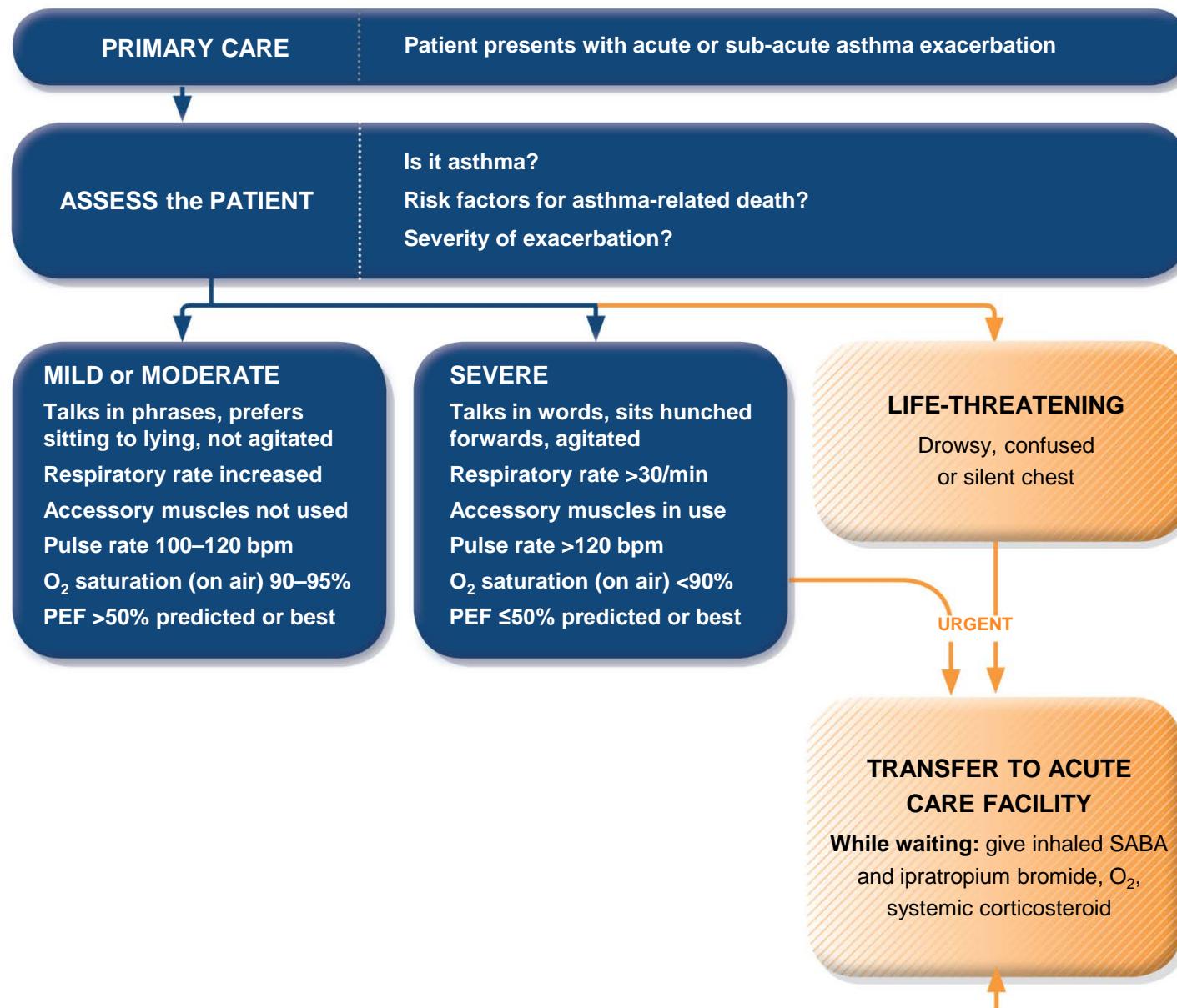
For the last 10 years, most guidelines recommended treating worsening asthma with SABA alone until OCS were needed, but ...

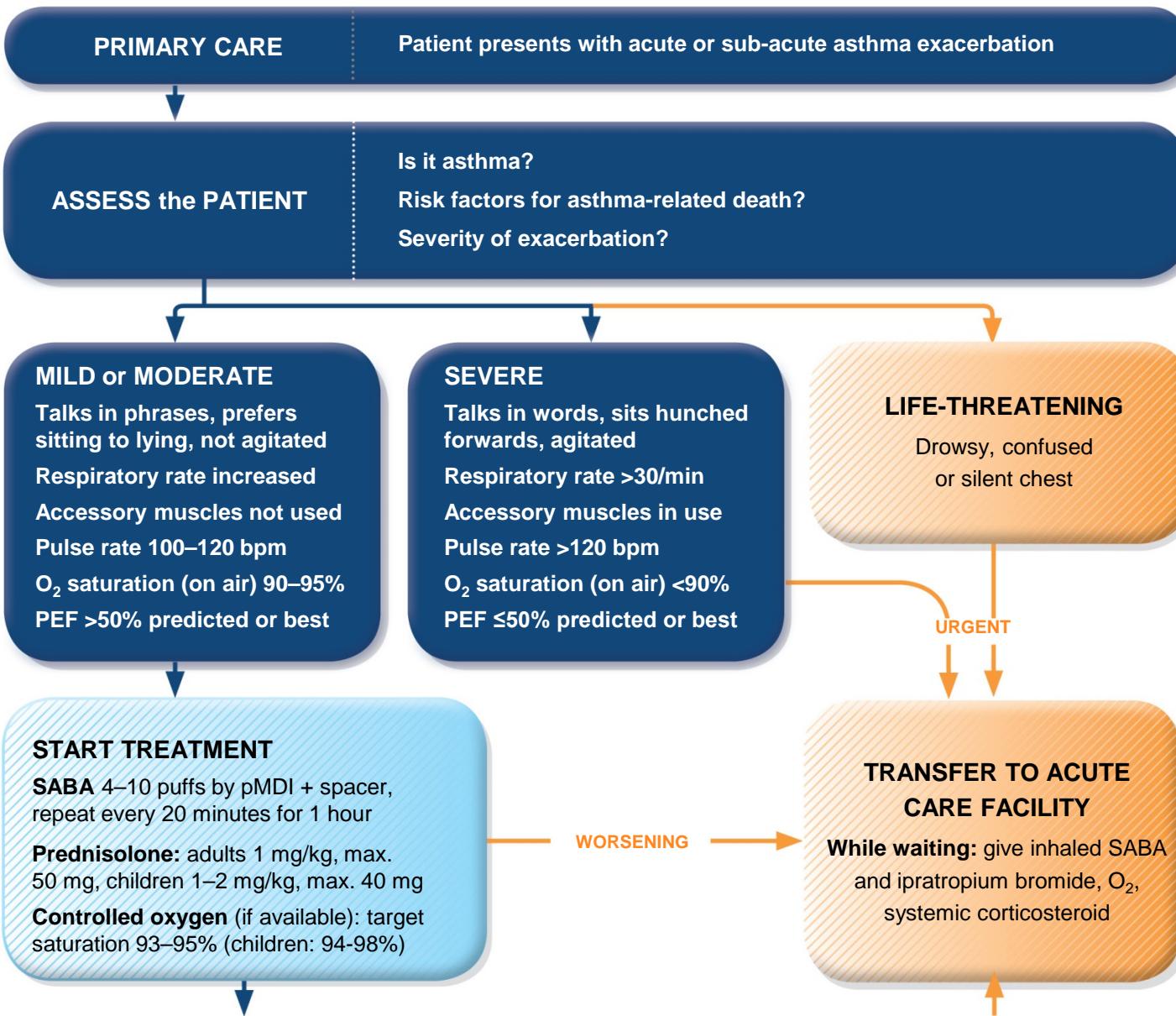
- Most exacerbations are characterised by increased inflammation
- Most evidence for self-management involved doubling ICS dose
 - Outcomes were consistently better if the action plan prescribed both increased ICS, and OCS
- Lack of generalisability of placebo-controlled RCTs of doubling ICS
 - Participants were required to be highly adherent
 - Study inhalers were not started, on average, until symptoms and airflow limitation had been worsening for 4-5 days.
- Severe exacerbations are reduced by short-term treatment with
 - Quadrupled dose of ICS
 - Quadrupled dose of budesonide/formoterol
 - Early small increase in ICS/formoterol (maintenance & reliever regimen)
- Adherence by community patients is poor
 - Patients commonly take only 25-35% of prescribed controller dose
 - Patients often delay seeking care for fear of being given OCS

Managing exacerbations in primary care











START TREATMENT

SABA 4–10 puffs by pMDI + spacer,
repeat every 20 minutes for 1 hour

Prednisolone: adults 1 mg/kg, max.
50 mg, children 1–2 mg/kg, max. 40 mg

Controlled oxygen (if available): target
saturation 93–95% (children: 94–98%)

WORSENING

TRANSFER TO ACUTE CARE FACILITY

While waiting: give inhaled SABA
and ipratropium bromide, O₂,
systemic corticosteroid

CONTINUE TREATMENT with SABA as needed
ASSESS RESPONSE AT 1 HOUR (or earlier)

IMPROVING

WORSENING



START TREATMENT

SABA 4–10 puffs by pMDI + spacer, repeat every 20 minutes for 1 hour

Prednisolone: adults 1 mg/kg, max. 50 mg, children 1–2 mg/kg, max. 40 mg

Controlled oxygen (if available): target saturation 93–95% (children: 94–98%)

WORSENING

TRANSFER TO ACUTE CARE FACILITY

While waiting: give inhaled SABA and ipratropium bromide, O₂, systemic corticosteroid

CONTINUE TREATMENT with SABA as needed
ASSESS RESPONSE AT 1 HOUR (or earlier)

IMPROVING

WORSENING

ASSESS FOR DISCHARGE

Symptoms improved, not needing SABA

PEF improving, and >60–80% of personal best or predicted

Oxygen saturation >94% room air

Resources at home adequate

ARRANGE at DISCHARGE

Reliever: continue as needed

Controller: start, or step up. Check inhaler technique, adherence

Prednisolone: continue, usually for 5–7 days (3–5 days for children)

Follow up: within 2–7 days



START TREATMENT

SABA 4–10 puffs by pMDI + spacer, repeat every 20 minutes for 1 hour

Prednisolone: adults 1 mg/kg, max. 50 mg, children 1–2 mg/kg, max. 40 mg

Controlled oxygen (if available): target saturation 93–95% (children: 94–98%)

WORSENING

TRANSFER TO ACUTE CARE FACILITY

While waiting: give inhaled SABA and ipratropium bromide, O₂, systemic corticosteroid

CONTINUE TREATMENT with SABA as needed
ASSESS RESPONSE AT 1 HOUR (or earlier)

IMPROVING

WORSENING

ASSESS FOR DISCHARGE

Symptoms improved, not needing SABA

PEF improving, and >60–80% of personal best or predicted

Oxygen saturation >94% room air

Resources at home adequate

ARRANGE at DISCHARGE

Reliever: continue as needed

Controller: start, or step up. Check inhaler technique, adherence

Prednisolone: continue, usually for 5–7 days (3–5 days for children)

Follow up: within 2–7 days

FOLLOW UP

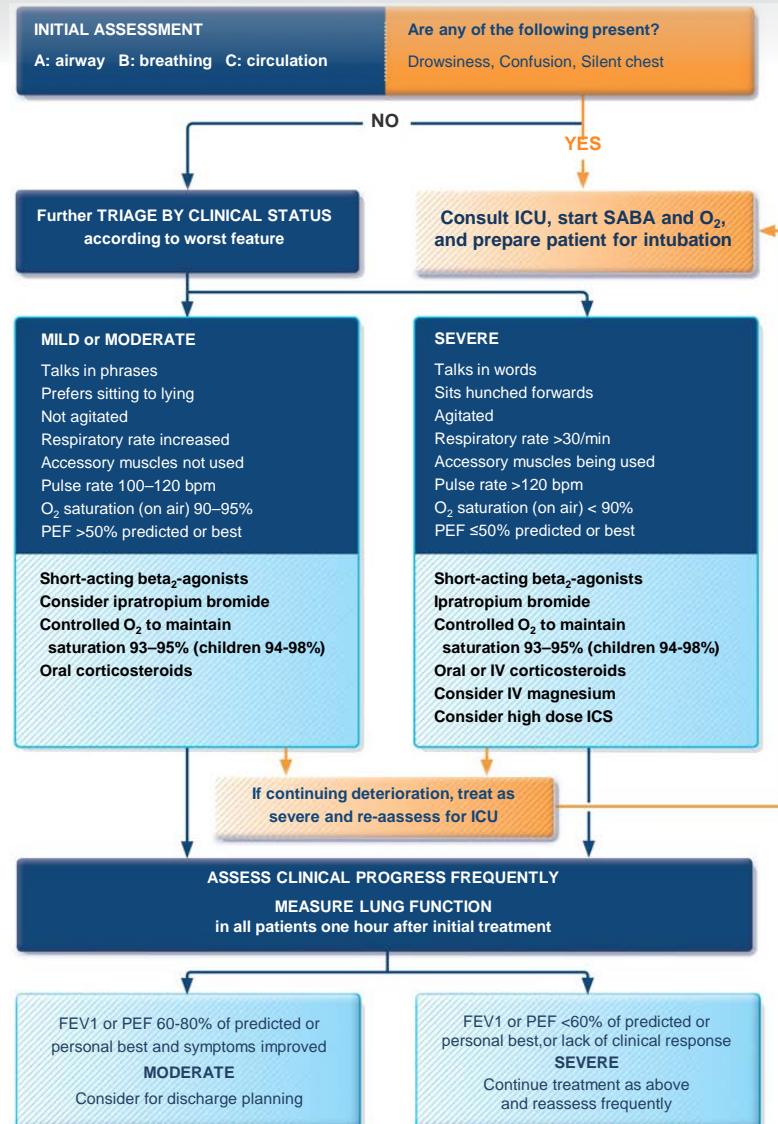
Reliever: reduce to as-needed

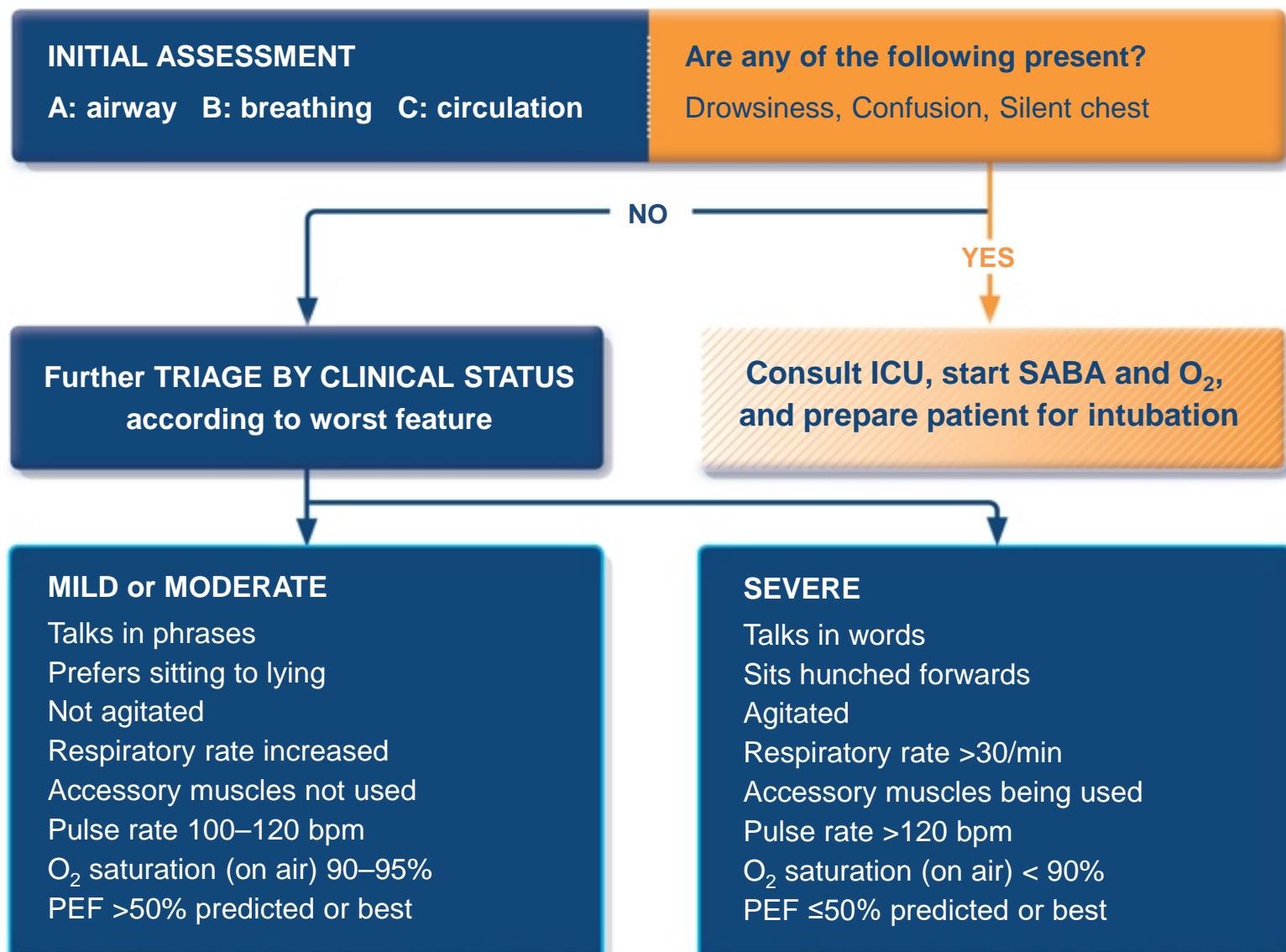
Controller: continue higher dose for short term (1–2 weeks) or long term (3 months), depending on background to exacerbation

Risk factors: check and correct modifiable risk factors that may have contributed to exacerbation, including inhaler technique and adherence

Action plan: Is it understood? Was it used appropriately? Does it need modification?

Managing exacerbations in acute care settings





MILD or MODERATE

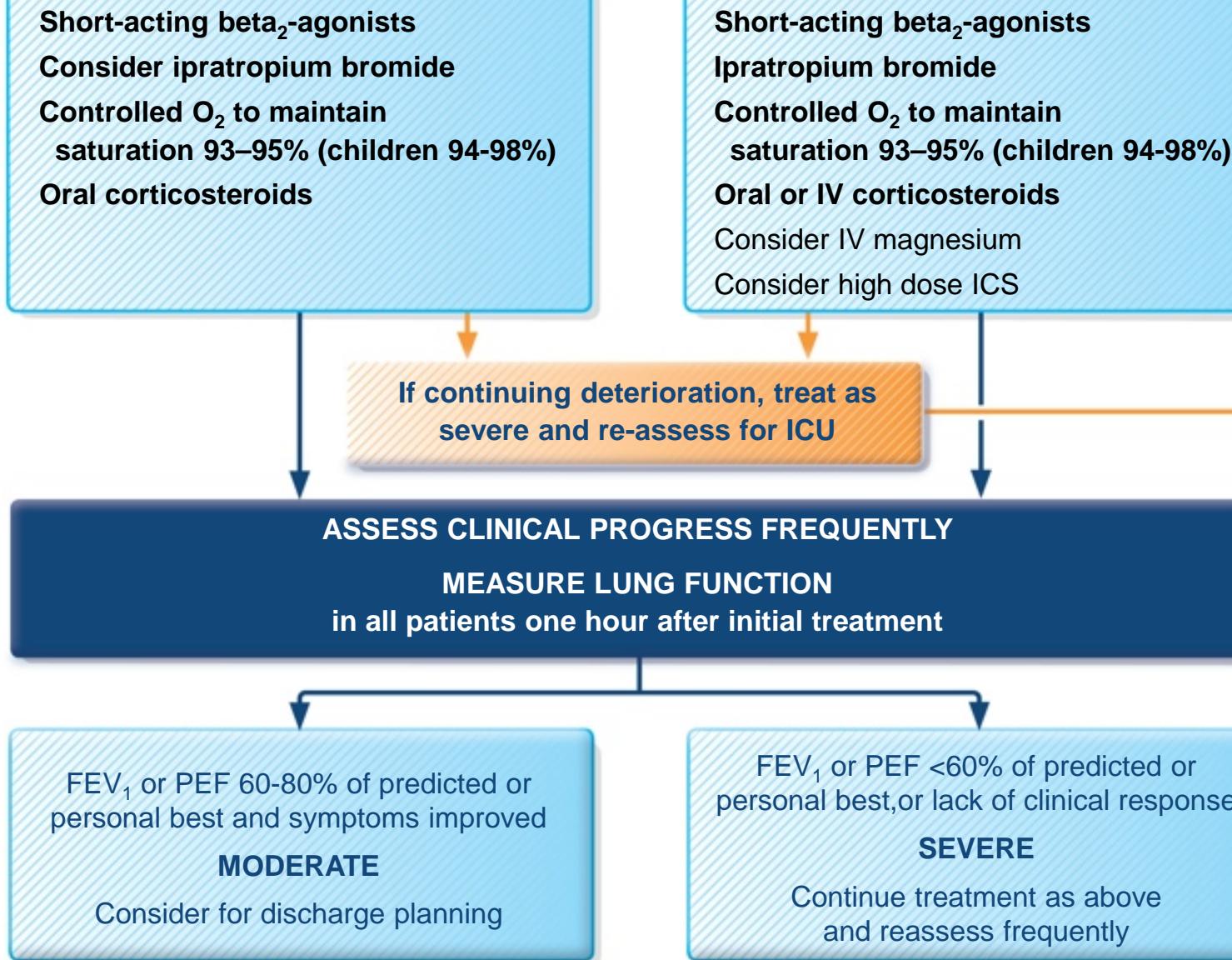
Talks in phrases
Prefers sitting to lying
Not agitated
Respiratory rate increased
Accessory muscles not used
Pulse rate 100–120 bpm
 O_2 saturation (on air) 90–95%
PEF >50% predicted or best

Short-acting beta₂-agonists
Consider ipratropium bromide
Controlled O₂ to maintain saturation 93–95% (children 94–98%)
Oral corticosteroids

SEVERE

Talks in words
Sits hunched forwards
Agitated
Respiratory rate >30/min
Accessory muscles being used
Pulse rate >120 bpm
 O_2 saturation (on air) < 90%
PEF ≤50% predicted or best

Short-acting beta₂-agonists
Ipratropium bromide
Controlled O₂ to maintain saturation 93–95% (children 94–98%)
Oral or IV corticosteroids
Consider IV magnesium
Consider high dose ICS



Follow-up after an exacerbation

- Follow up all patients regularly after an exacerbation, until symptoms and lung function return to normal
 - Patients are at increased risk during recovery from an exacerbation
- The opportunity
 - Exacerbations often represent failures in chronic asthma care, and they provide opportunities to review the patient's asthma management
- At follow-up visit(s), check:
 - The patient's understanding of the cause of the flare-up
 - Modifiable risk factors, e.g. smoking
 - Adherence with medications, and understanding of their purpose
 - Inhaler technique skills
 - Written asthma action plan

Diagnosis and initial treatment of asthma, COPD and asthma-COPD overlap (ACO)

A joint project of GINA and GOLD



**GINA Global Strategy for Asthma Management
and Prevention**

**GOLD Global Strategy for Diagnosis,
Management and Prevention of COPD**

Background



- For patients with respiratory symptoms, infectious diseases and non-pulmonary conditions need to be distinguished from chronic airways disease
- In patients with chronic airways disease, the differential diagnosis differs by age
 - Children and young adults: most likely to be asthma
 - Adults >40 years: COPD becomes more common, and distinguishing asthma from COPD becomes more difficult
- Many patients with symptoms of chronic airways disease have features of both asthma and COPD
 - This has been called asthma-COPD overlap (ACO)
- ACOS is not a single disease
 - It is likely that a range of different underlying mechanisms and origins will be identified



Background



- Patients with features of both asthma and COPD have worse outcomes than those with asthma or COPD alone
 - Frequent exacerbations
 - Poor quality of life
 - More rapid decline in lung function
 - Higher mortality
 - Greater health care utilization
- Reported prevalence of overlap varies by definitions used
 - Concurrent doctor-diagnosed asthma and COPD are found in 15–20% of patients with chronic airways disease
 - Reported rates of overlap are between 15–55% of patients with chronic airways disease, depending on the definitions used for 'asthma' and 'COPD', and the population studied
 - Prevalence varies by age and gender



Asthma-COPD overlap – change in terminology



- Distinguishing asthma from COPD can be problematic
 - Particularly in smokers and older adults
 - Some patients may have clinical features of both asthma and COPD
- Most clinical trials and guidelines are about asthma or COPD alone
- The descriptive term asthma-COPD overlap (ACO) is useful
 - It maintains awareness by clinicians, researchers and regulators of the needs of these patients
- “Asthma-COPD overlap” is not a single disease entity
 - As for asthma and COPD, it includes patients with several different forms of airways disease (phenotypes)...
 - These features are caused by a range of different underlying mechanisms
- To avoid the impression that this is a single disease, the previous term Asthma COPD Overlap Syndrome (ACOS) is no longer advised.



Objectives of the asthma-COPD overlap chapter



- To provide interim advice to assist clinicians (especially in primary care and non-pulmonary specialties):
 - To identify patients with a disease of chronic airflow limitation
 - To distinguish asthma from COPD and identify patients who have features of both
 - To decide on safe initial treatment and/or need for referral
- To stimulate research into asthma-COPD overlap, by promoting:
 - Study of characteristics and outcomes in broad populations of patients with chronic airflow limitation
 - Research into underlying mechanisms that might allow development of specific interventions for prevention and management in this population



Definitions

Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2017]

Definitions



Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2017]

COPD

Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. [GOLD 2017]

Definitions



Asthma

Asthma is a heterogeneous disease, usually characterized by chronic airway inflammation. It is defined by the history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, together with variable expiratory airflow limitation. [GINA 2017]

COPD

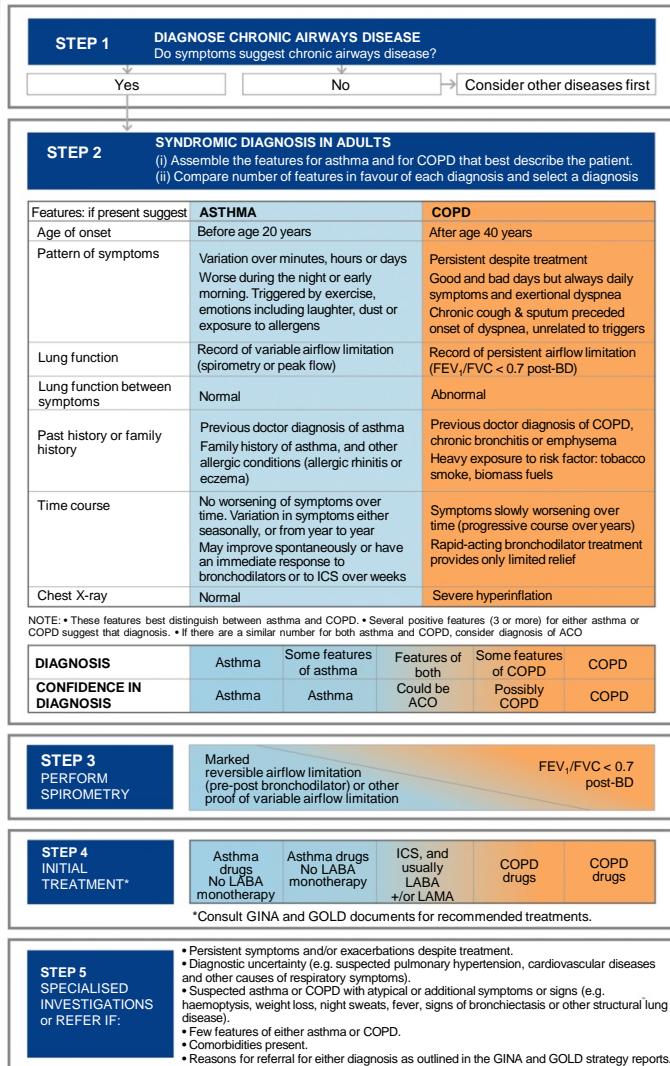
Chronic obstructive pulmonary disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particles or gases. [GOLD 2017]

Asthma-COPD overlap [not a definition, but a description for clinical use]

Asthma-COPD overlap (ACO) is characterized by persistent airflow limitation with several features usually associated with asthma and several features usually associated with COPD. Asthma-COPD overlap is therefore identified in clinical practice by the features that it shares with both asthma and COPD.

This is not a definition, but a description for clinical use, as asthma-COPD overlap includes several different clinical phenotypes and there are likely to be several different underlying mechanisms.

Stepwise approach to diagnosis and initial treatment



For an adult who presents with respiratory symptoms:

1. Does the patient have chronic airways disease?
2. Syndromic diagnosis of asthma, COPD and overlap
3. Spirometry
4. Commence initial therapy
5. Referral for specialized investigations (if necessary)

Step 1 – Does the patient have chronic airways disease?



STEP 1

DIAGNOSE CHRONIC AIRWAYS DISEASE

Do symptoms suggest chronic airways disease?

Yes

No

Consider other diseases first

Step 1 – Does the patient have chronic airways disease?



- Clinical history: consider chronic airways disease if
 - Chronic or recurrent cough, sputum, dyspnea or wheezing, or repeated acute lower respiratory tract infections
 - Previous doctor diagnosis of asthma and/or COPD
 - Previous treatment with inhaled medications
 - History of smoking tobacco and/or other substances
 - Exposure to environmental hazards, e.g. airborne pollutants
- Physical examination
 - May be normal
 - Evidence of hyperinflation or respiratory insufficiency
 - Wheeze and/or crackles

Step 1 – Does the patient have chronic airways disease?



- Radiology (CXR or CT scan performed for other reasons)
 - May be normal, especially in early stages
 - Hyperinflation, airway wall thickening, hyperlucency, bullae
 - May identify or suggest an alternative or additional diagnosis, e.g. bronchiectasis, tuberculosis, interstitial lung disease, cardiac failure
- Screening questionnaires
 - Designed to assist in identification of patients at risk of chronic airways disease
 - May not be generalizable to all countries, practice settings or patients
 - See GINA and GOLD reports for examples

Step 2 – Syndromic diagnosis of asthma, COPD and asthma-COPD overlap



- Assemble the features that, **when present**, most favor a diagnosis of typical asthma or typical COPD
- Compare the number of features on each side
 - If the patient has ≥ 3 features of either asthma or COPD, there is a strong likelihood that this is the correct diagnosis
- Consider the level of certainty around the diagnosis
 - Diagnoses are made on the weight of evidence
 - The absence of any of these features does not rule out either diagnosis, e.g. absence of atopy does not rule out asthma
 - When a patient has a similar number of features of both asthma and COPD, consider the diagnosis of asthma-COPD overlap



STEP 2

SYNDROMIC DIAGNOSIS IN ADULTS

- (i) Assemble the features for asthma and for COPD that best describe the patient.
- (ii) Compare number of features in favour of each diagnosis and select a diagnosis

Features: if present suggest -	ASTHMA	COPD
Age of onset	<input type="checkbox"/> Before age 20 years	<input type="checkbox"/> After age 40 years
Pattern of symptoms	<input type="checkbox"/> Variation over minutes, hours or days <input type="checkbox"/> Worse during the night or early morning <input type="checkbox"/> Triggered by exercise, emotions including laughter, dust or exposure to allergens	<input type="checkbox"/> Persistent despite treatment <input type="checkbox"/> Good and bad days but always daily symptoms and exertional dyspnea <input type="checkbox"/> Chronic cough & sputum preceded onset of dyspnea, unrelated to triggers
Lung function	<input type="checkbox"/> Record of variable airflow limitation (spirometry or peak flow)	<input type="checkbox"/> Record of persistent airflow limitation (FEV ₁ /FVC < 0.7 post-BD)
Lung function between symptoms	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal
Past history or family history	<input type="checkbox"/> Previous doctor diagnosis of asthma <input type="checkbox"/> Family history of asthma, and other allergic conditions (allergic rhinitis or eczema)	<input type="checkbox"/> Previous doctor diagnosis of COPD, chronic bronchitis or emphysema <input type="checkbox"/> Heavy exposure to risk factor: tobacco smoke, biomass fuels
Time course	<input type="checkbox"/> No worsening of symptoms over time. Variation in symptoms either seasonally, or from year to year <input type="checkbox"/> May improve spontaneously or have an immediate response to bronchodilators or to ICS over weeks	<input type="checkbox"/> Symptoms slowly worsening over time (progressive course over years) <input type="checkbox"/> Rapid-acting bronchodilator treatment provides only limited relief
Chest X-ray	<input type="checkbox"/> Normal	<input type="checkbox"/> Severe hyperinflation

NOTE: • These features best distinguish between asthma and COPD. • Several positive features (3 or more) for either asthma or COPD suggest that diagnosis. • If there are a similar number for both asthma and COPD, consider diagnosis of ACO

DIAGNOSIS	Asthma	Some features of asthma	Features of both	Some features of COPD	COPD
CONFIDENCE IN DIAGNOSIS	Asthma	Asthma	Could be ACO	Possibly COPD	COPD



STEP 3 PERFORM SPIROMETRY

Marked
reversible airflow limitation
(pre-post bronchodilator) or other
proof of variable airflow limitation

$FEV_1/FVC < 0.7$
post-BD

Step 3 - Spirometry



- Essential if chronic airways disease is suspected
 - Confirms chronic airflow limitation
 - More limited value in distinguishing between asthma with fixed airflow limitation, COPD and asthma-COPD overlap
- Measure at the initial visit or subsequent visit
 - If possible measure before and after a trial of treatment
 - Medications taken before testing may influence results
- Peak expiratory flow (PEF)
 - Not a substitute for spirometry
 - Normal PEF does not rule out asthma or COPD
 - Repeated measurement may confirm excessive variability, found in asthma or in some patients with asthma-COPD overlap

Step 3 - Spirometry



Spirometric variable	Asthma	COPD	Overlap
Normal FEV ₁ /FVC pre- or post-BD	Compatible with asthma	Not compatible with diagnosis (GOLD)	Not compatible unless other evidence of chronic airflow limitation
Post-BD FEV ₁ /FVC <0.7	Indicates airflow limitation; may improve	Required for diagnosis by GOLD criteria	Usual in asthma-COPD overlap (ACO)
FEV ₁ ≥80% predicted	Compatible with asthma (good control, or interval between symptoms)	Compatible with GOLD category A or B if post-BD FEV ₁ /FVC <0.7	Compatible with mild ACO
FEV ₁ <80% predicted	Compatible with asthma. A risk factor for exacerbations	Indicates severity of airflow limitation and risk of exacerbations and mortality	Indicates severity of airflow limitation and risk of exacerbations and mortality
Post-BD increase in FEV ₁ >12% and 200mL from baseline (reversible airflow limitation)	Usual at some time in course of asthma; not always present	Common in COPD and more likely when FEV ₁ is low	Common in ACO, and more likely when FEV ₁ is low
Post-BD increase in FEV ₁ >12% and 400mL from baseline	High probability of asthma	Unusual in COPD. Consider ACO	Compatible with diagnosis of ACO



STEP 4 INITIAL TREATMENT*

Asthma drugs
No LABA
monotherapy

Asthma drugs
No LABA
monotherapy

ICS and
consider LABA
+or LAMA

COPD drugs

COPD drugs

*Consult GINA and GOLD documents for recommended treatments.

Step 4 – Commence initial therapy



- Initial pharmacotherapy choices are based on both efficacy and safety
- If syndromic assessment suggests asthma as single diagnosis
 - Start with low-dose ICS
 - Add LABA and/or LAMA if needed for poor control despite good adherence and correct technique
 - Do not give LABA alone without ICS
- If syndromic assessment suggests COPD as single diagnosis
 - Start with bronchodilators or combination therapy
 - Do not give ICS alone without LABA and/or LAMA
- If differential diagnosis is equally balanced between asthma and COPD, i.e. asthma-COPD overlap
 - Start treatment as for asthma, pending further investigations
 - Start with ICS at low or moderate dose
 - Usually also add LABA and/or LAMA, or continue if already prescribed

Step 4 – Commence initial therapy



- For all patients with chronic airflow limitation:
 - Treat modifiable risk factors including advice about smoking cessation
 - Treat comorbidities
 - Advise about non-pharmacological strategies including physical activity, and, for COPD or asthma-COPD overlap, pulmonary rehabilitation and vaccinations
 - Provide appropriate self-management strategies
 - Arrange regular follow-up
- See GINA and GOLD reports for details





STEP 5

SPECIALISED INVESTIGATIONS or REFER IF:

- Persistent symptoms and/or exacerbations despite treatment.
- Diagnostic uncertainty (e.g. suspected pulmonary hypertension, cardiovascular diseases and other causes of respiratory symptoms).
- Suspected asthma or COPD with atypical or additional symptoms or signs (e.g. haemoptysis, weight loss, night sweats, fever, signs of bronchiectasis or other structural lung disease).
- Few features of either asthma or COPD.
- Comorbidities present.
- Reasons for referral for either diagnosis as outlined in the GINA and GOLD strategy reports.

Step 5 – Refer for specialized investigations if needed



- Refer for expert advice and extra investigations if patient has:
 - Persistent symptoms and/or exacerbations despite treatment
 - Diagnostic uncertainty, especially if alternative diagnosis (e.g. TB, cardiovascular disease) needs to be excluded
 - Suspected airways disease with atypical or additional symptoms or signs (e.g. hemoptysis, weight loss, night sweats, fever, chronic purulent sputum). Do not wait for a treatment trial before referring
 - Suspected chronic airways disease but few features of asthma, COPD or asthma-COPD overlap
 - Comorbidities that may interfere with their management
 - Issues arising during on-going management of asthma, COPD or asthma-COPD overlap

Step 5 – Refer for specialized investigations if needed



Investigation	Asthma	COPD
DLCO	Normal or slightly elevated	Often reduced
Arterial blood gases	Normal between exacerbations	In severe COPD, may be abnormal between exacerbations
Airway hyperresponsiveness	Not useful on its own in distinguishing asthma and COPD. Higher levels favor asthma	
High resolution CT scan	Usually normal; may show air trapping and increased airway wall thickness	Air trapping or emphysema; may show bronchial wall thickening and features of pulmonary hypertension
Tests for atopy (sIgE and/or skin prick tests)	Not essential for diagnosis; increases probability of asthma	Conforms to background prevalence; does not rule out COPD
FENO	If high (>50ppb) supports eosinophilic inflammation	Usually normal. Low in current smokers
Blood eosinophilia	Supports asthma diagnosis	May be found during exacerbations
Sputum inflammatory cell analysis	Role in differential diagnosis not established in large populations	

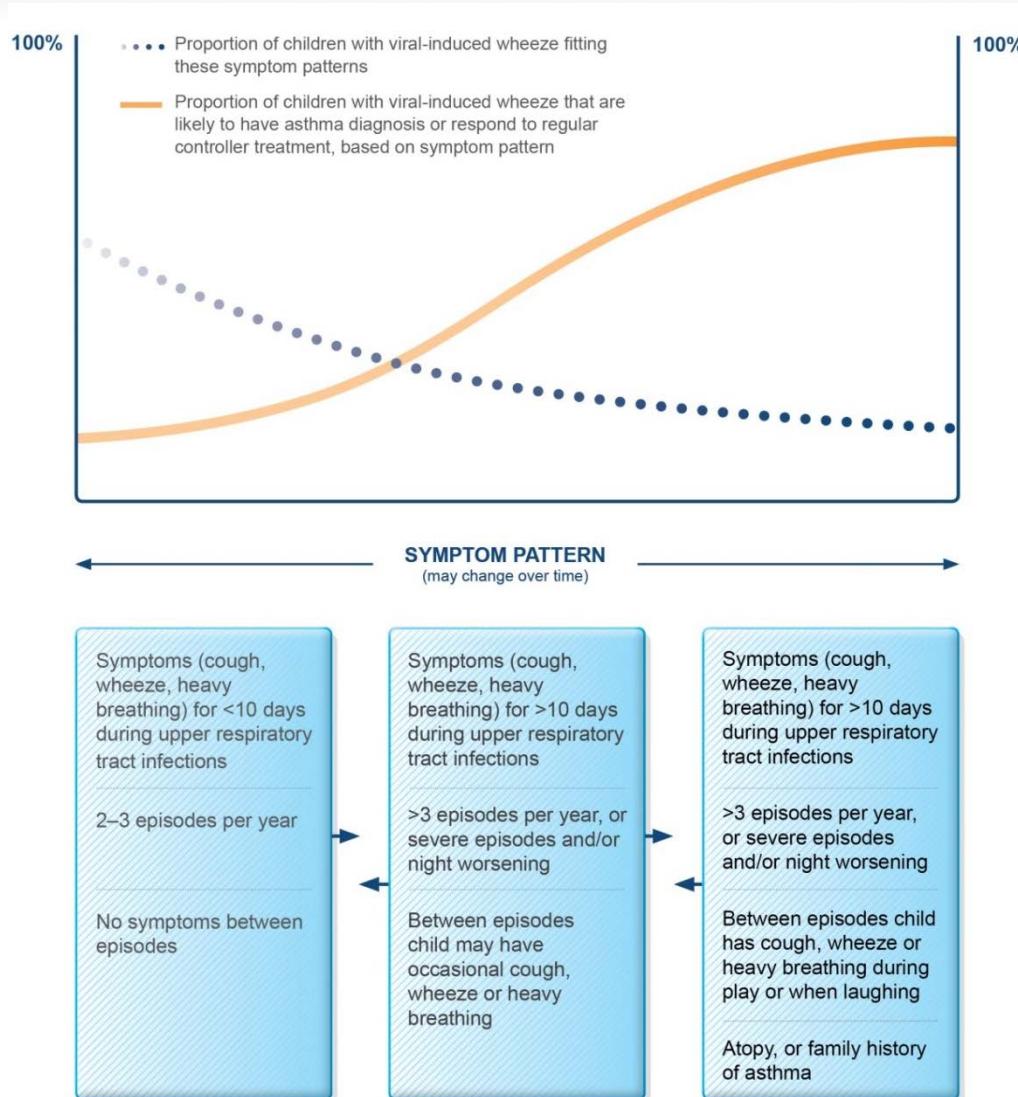
Diagnosis and management of asthma in children 5 years and younger



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.

Probability of asthma diagnosis or response to asthma treatment in children ≤5 years



Symptom patterns in children ≤5 years



SYMPTOM PATTERN

(may change over time)

Symptoms (cough, wheeze, heavy breathing) for <10 days during upper respiratory tract infections

2–3 episodes per year

No symptoms between episodes

Symptoms (cough, wheeze, heavy breathing) for >10 days during upper respiratory tract infections

>3 episodes per year, or severe episodes and/or night worsening

Between episodes child may have occasional cough, wheeze or heavy breathing

Symptoms (cough, wheeze, heavy breathing) for >10 days during upper respiratory tract infections

>3 episodes per year, or severe episodes and/or night worsening

Between episodes child has cough, wheeze or heavy breathing during play or when laughing

Atopy, or family history of asthma



Features suggesting asthma in children ≤5 years

Feature	Characteristics suggesting asthma
Cough	Recurrent or persistent non-productive cough that may be worse at night or accompanied by some wheezing and breathing difficulties. Cough occurring with exercise, laughing, crying or exposure to tobacco smoke in the absence of an apparent respiratory infection Prolonged cough in infancy, and cough without cold symptoms, are associated with later parent-reported physician-diagnosed asthma, independent of infant wheeze
Wheezing	Recurrent wheezing, including during sleep or with triggers such as activity, laughing, crying or exposure to tobacco smoke or air pollution
Difficult or heavy breathing or shortness of breath	Occurring with exercise, laughing, or crying
Reduced activity	Not running, playing or laughing at the same intensity as other children; tires earlier during walks (wants to be carried)
Past or family history	Other allergic disease (atopic dermatitis or allergic rhinitis) Asthma in first-degree relatives
Therapeutic trial with low dose ICS and as-needed SABA	Clinical improvement during 2–3 months of controller treatment and worsening when treatment is stopped



Common differential diagnoses of asthma in children ≤5 years

Condition	Typical features
Recurrent viral respiratory infections	Mainly cough, runny congested nose for <10 days; wheeze usually mild; no symptoms between infections
Gastroesophageal reflux	Cough when feeding; recurrent chest infections; vomits easily especially after large feeds; poor response to asthma medications
Foreign body aspiration	Episode of abrupt severe cough and/or stridor during eating or play; recurrent chest infections and cough; focal lung signs
Tracheomalacia or bronchomalacia	Noisy breathing when crying or eating, or during URTIs; harsh cough; inspiratory or expiratory retraction; symptoms often present since birth; poor response to asthma treatment
Tuberculosis	Persistent noisy respirations and cough; fever unresponsive to normal antibiotics; enlarged lymph nodes; poor response to BD or ICS; contact with someone with TB
Congenital heart disease	Cardiac murmur; cyanosis when eating; failure to thrive; tachycardia; tachypnea or hepatomegaly; poor response to asthma medications



Common differential diagnoses of asthma in children ≤5 years (continued)

Condition	Typical features
Cystic fibrosis	Cough starting shortly after birth; recurrent chest infections; failure to thrive (malabsorption); loose greasy bulky stools
Primary ciliary dyskinesia	Cough and recurrent mild chest infections; chronic ear infections and purulent nasal discharge; poor response to asthma medications; situs inversus (in ~50% children with this condition)
Vascular ring	Respirations often persistently noisy; poor response to asthma medications
Bronchopulmonary dysplasia	Infant born prematurely; very low birth weight; needed prolonged mechanical ventilation or supplemental oxygen; difficulty with breathing present from birth
Immune deficiency	Recurrent fever and infections (including non-respiratory); failure to thrive



GINA assessment of asthma control in children ≤5 years

A. Symptom control

In the past 4 weeks, has the child had:

- Daytime asthma symptoms for more than few minutes, more than once/week? Yes No
- Any activity limitation due to asthma? (runs/plays less than other children, tires easily during walks/playing) Yes No
- Reliever needed* more than once a week? Yes No
- Any night waking or night coughing due to asthma? Yes No

Level of asthma symptom control

Well-controlled Partly controlled Uncontrolled

None of these

1-2 of these

3-4 of these

B. Risk factors for poor asthma outcomes

ASSESS CHILD'S RISK FOR:

- Exacerbations within the next few months
- Fixed airflow limitation
- Medication side-effects



Risk factors for poor asthma outcomes in children ≤5 years

Risk factors for exacerbations in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in previous year
- The start of the child's usual 'flare-up' season (especially if autumn/fall)
- Exposures: tobacco smoke; indoor or outdoor air pollution; indoor allergens (e.g. house dust mite, cockroach, pets, mold), especially in combination with viral infection
- Major psychological or socio-economic problems for child or family
- Poor adherence with controller medication, or incorrect inhaler technique



Risk factors for poor asthma outcomes in children ≤5 years

Risk factors for exacerbations in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in previous year
- The start of the child's usual 'flare-up' season (especially if autumn/fall)
- Exposures: tobacco smoke; indoor or outdoor air pollution; indoor allergens (e.g. house dust mite, cockroach, pets, mold), especially in combination with viral infection
- Major psychological or socio-economic problems for child or family
- Poor adherence with controller medication, or incorrect inhaler technique

Risk factors for fixed airflow limitation

- Severe asthma with several hospitalizations
- History of bronchiolitis



Risk factors for poor asthma outcomes in children ≤5 years

Risk factors for exacerbations in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in previous year
- The start of the child's usual 'flare-up' season (especially if autumn/fall)
- Exposures: tobacco smoke; indoor or outdoor air pollution; indoor allergens (e.g. house dust mite, cockroach, pets, mold), especially in combination with viral infection
- Major psychological or socio-economic problems for child or family
- Poor adherence with controller medication, or incorrect inhaler technique

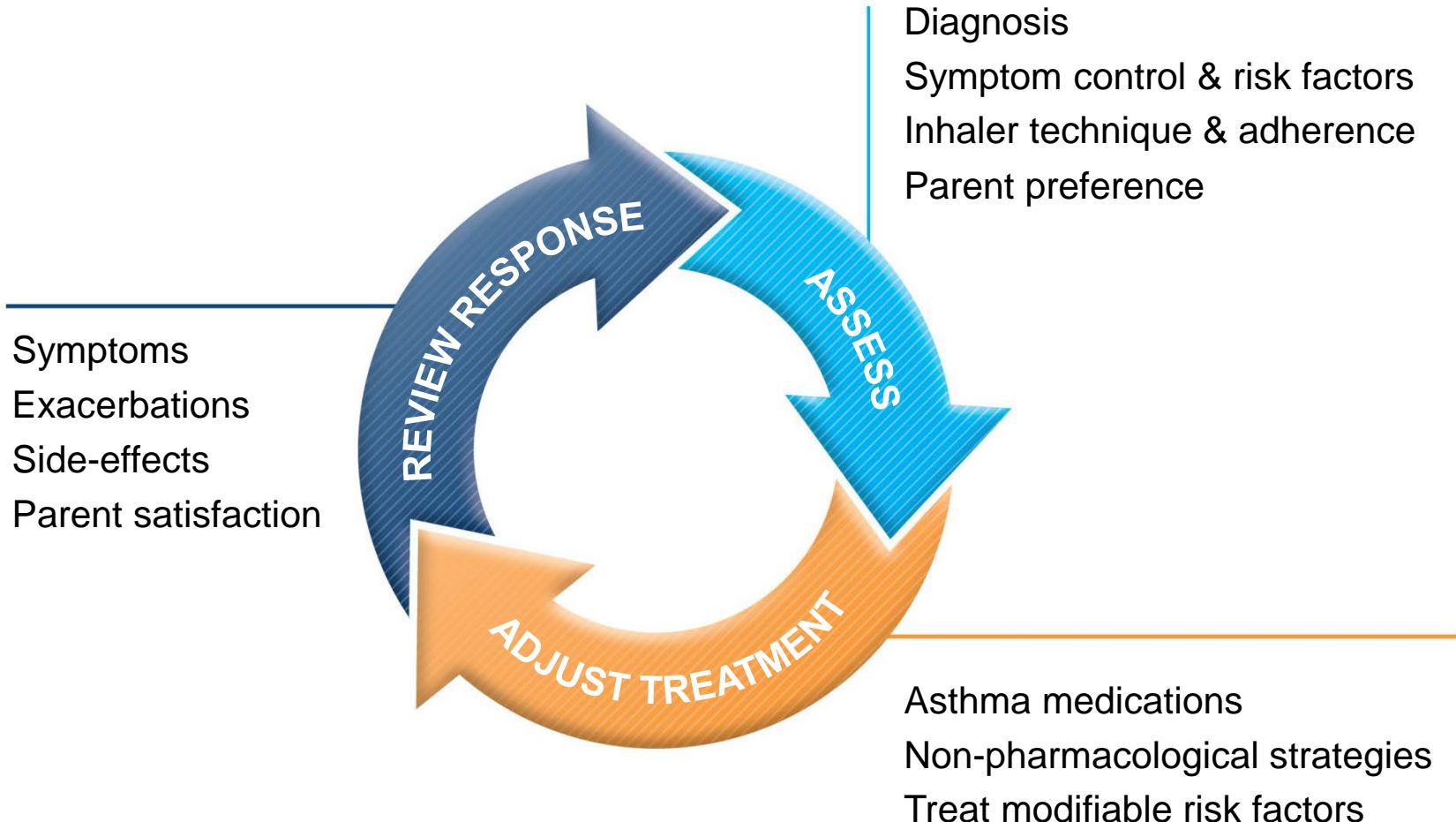
Risk factors for fixed airflow limitation

- Severe asthma with several hospitalizations
- History of bronchiolitis

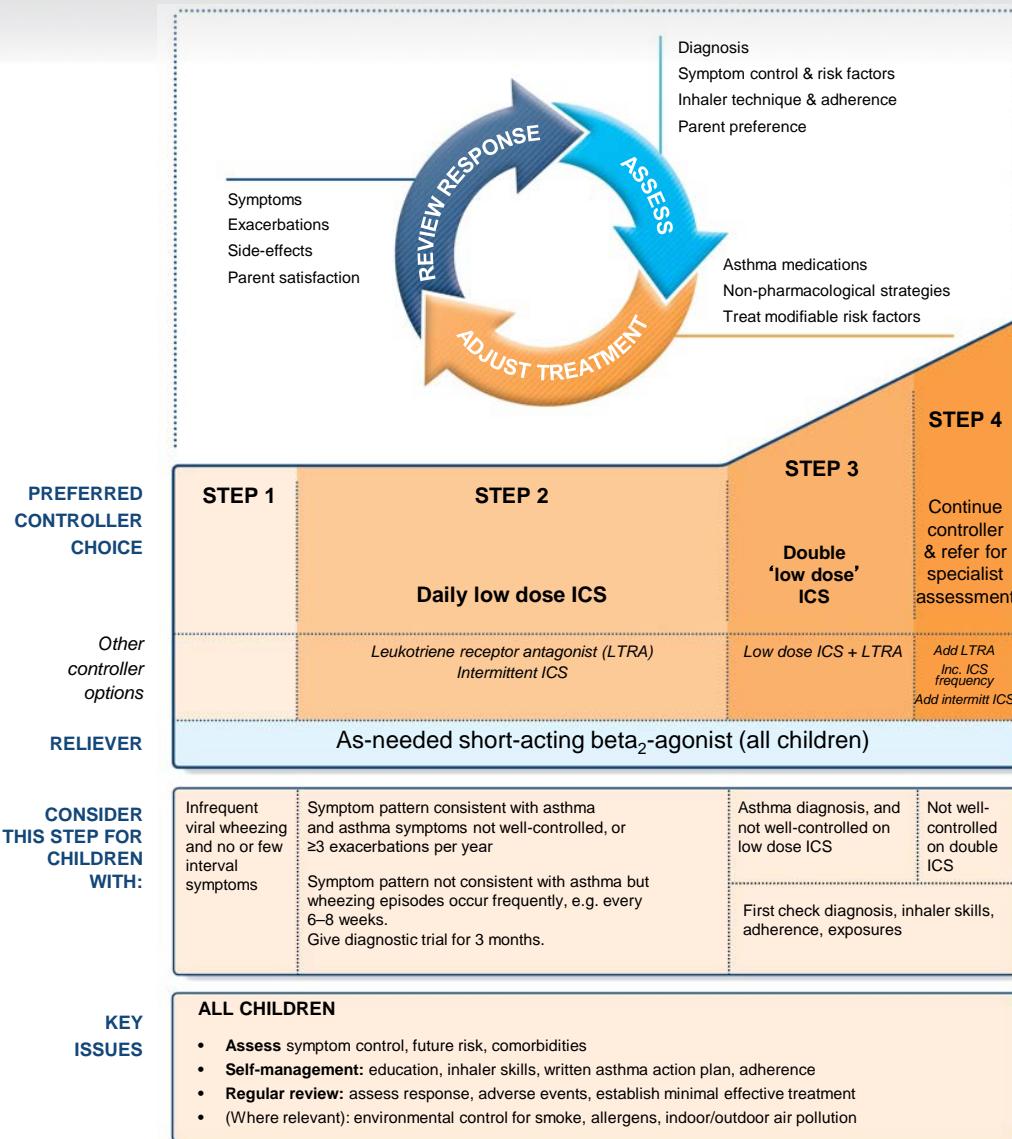
Risk factors for medication side-effects

- Systemic: Frequent courses of OCS; high-dose and/or potent ICS
- Local: moderate/high-dose or potent ICS; incorrect inhaler technique; failure to protect skin or eyes when using ICS by nebulizer or spacer with face mask

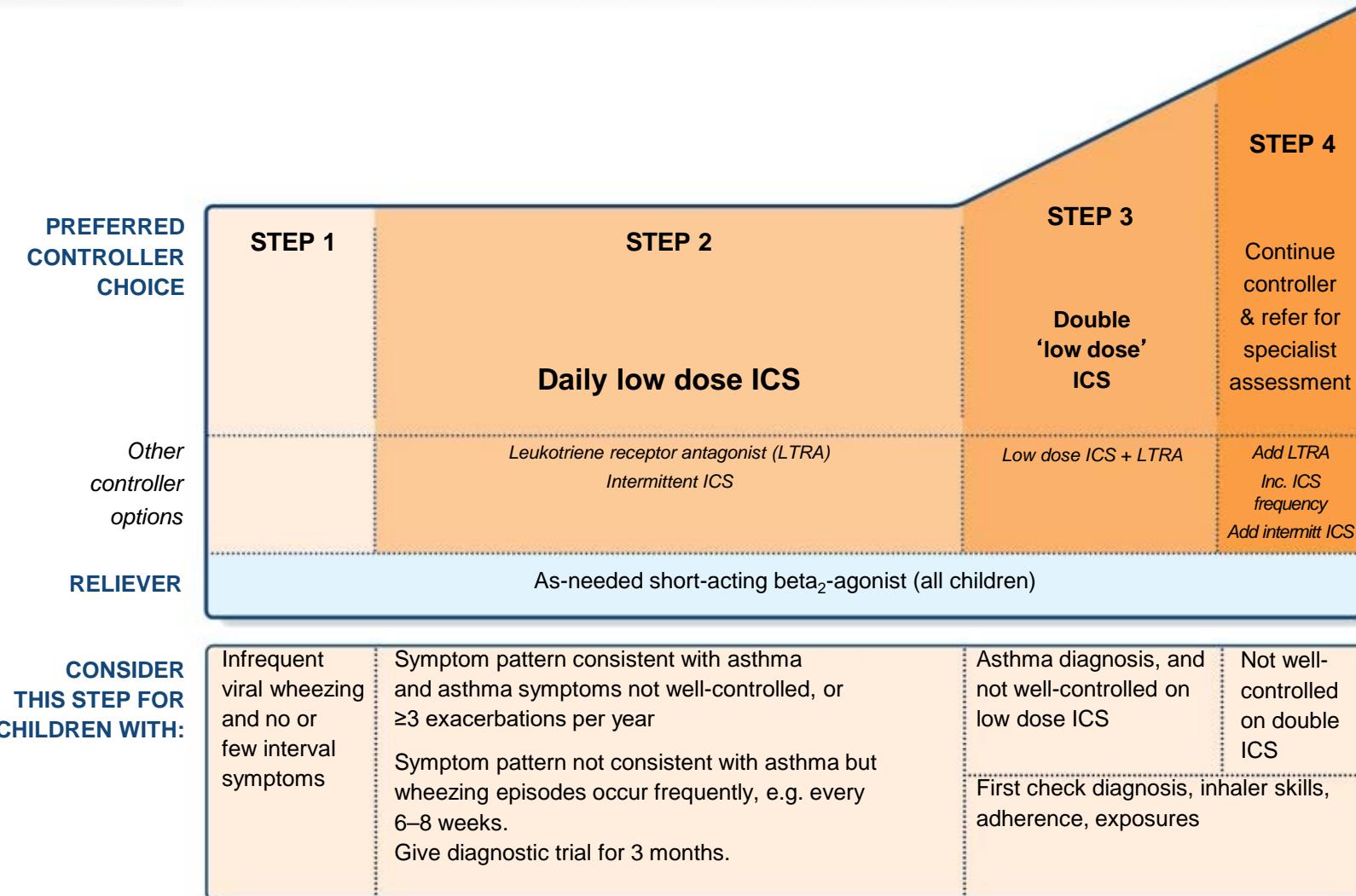
Control-based asthma management cycle in children ≤5 years



Stepwise approach to control symptoms and reduce risk (children ≤5 years)



Stepwise approach – pharmacotherapy (children ≤5 years)



Stepwise approach – key issues (children ≤5 years)



KEY
ISSUES

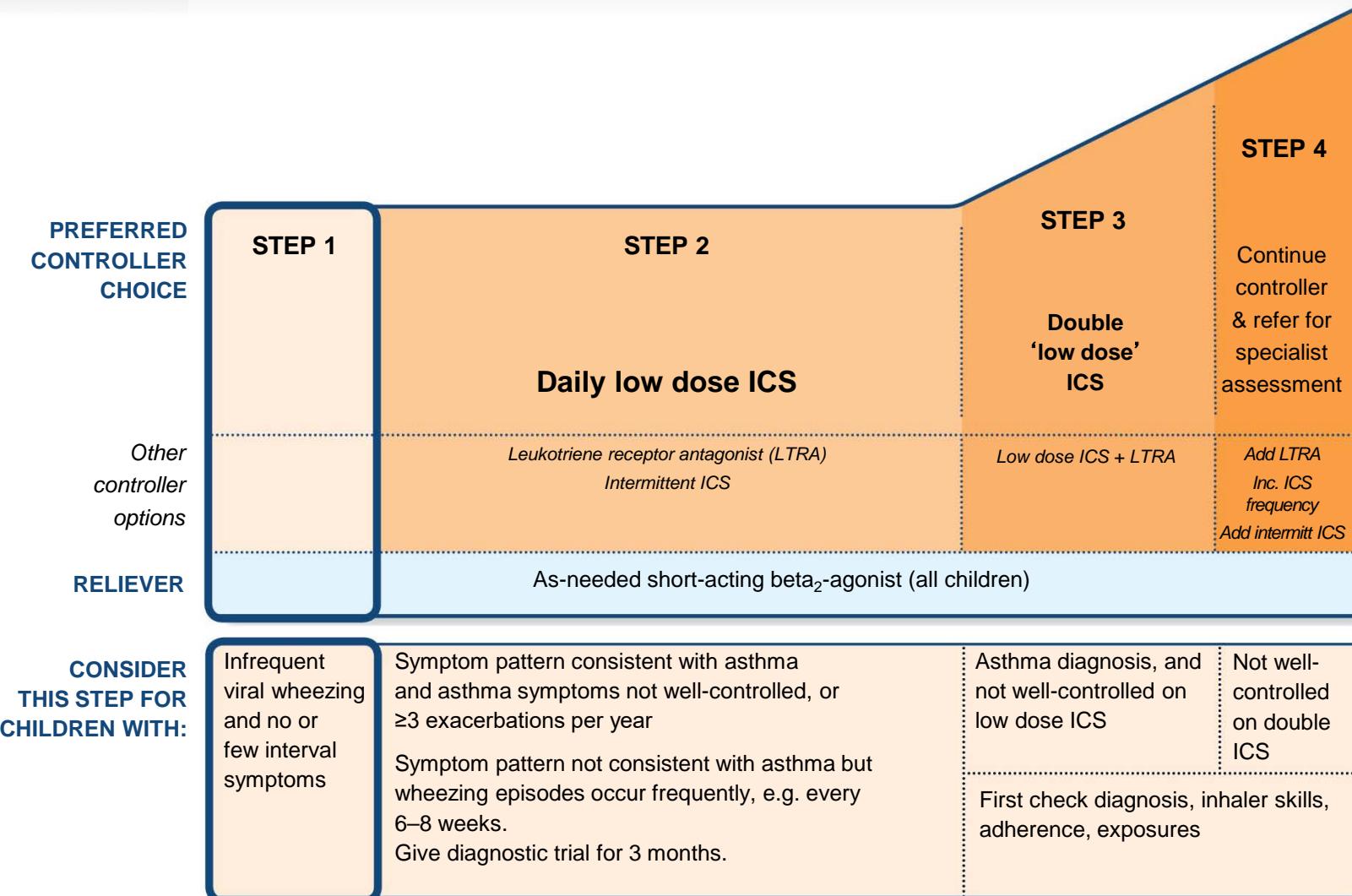
ALL CHILDREN

- **Assess** symptom control, future risk, comorbidities
- **Self-management:** education, inhaler skills, written asthma action plan, adherence
- **Regular review:** assess response, adverse events, establish minimal effective treatment
- (Where relevant): environmental control for smoke, allergens, indoor/outdoor air pollution

- Assess asthma control
 - Symptom control, future risk, comorbidities
- Self-management
 - Education, inhaler skills, written asthma action plan, adherence
- Regular review
 - Assess response, adverse events, establish minimal effective treatment
 - Record height each year, as poorly-controlled asthma may influence growth, and ICS may be associated with growth delay in first 1-2 years
- Other
 - (Where relevant): environmental control for smoke, allergens, indoor or outdoor air pollution



Step 1 (children ≤5 years) – as-needed inhaled SABA



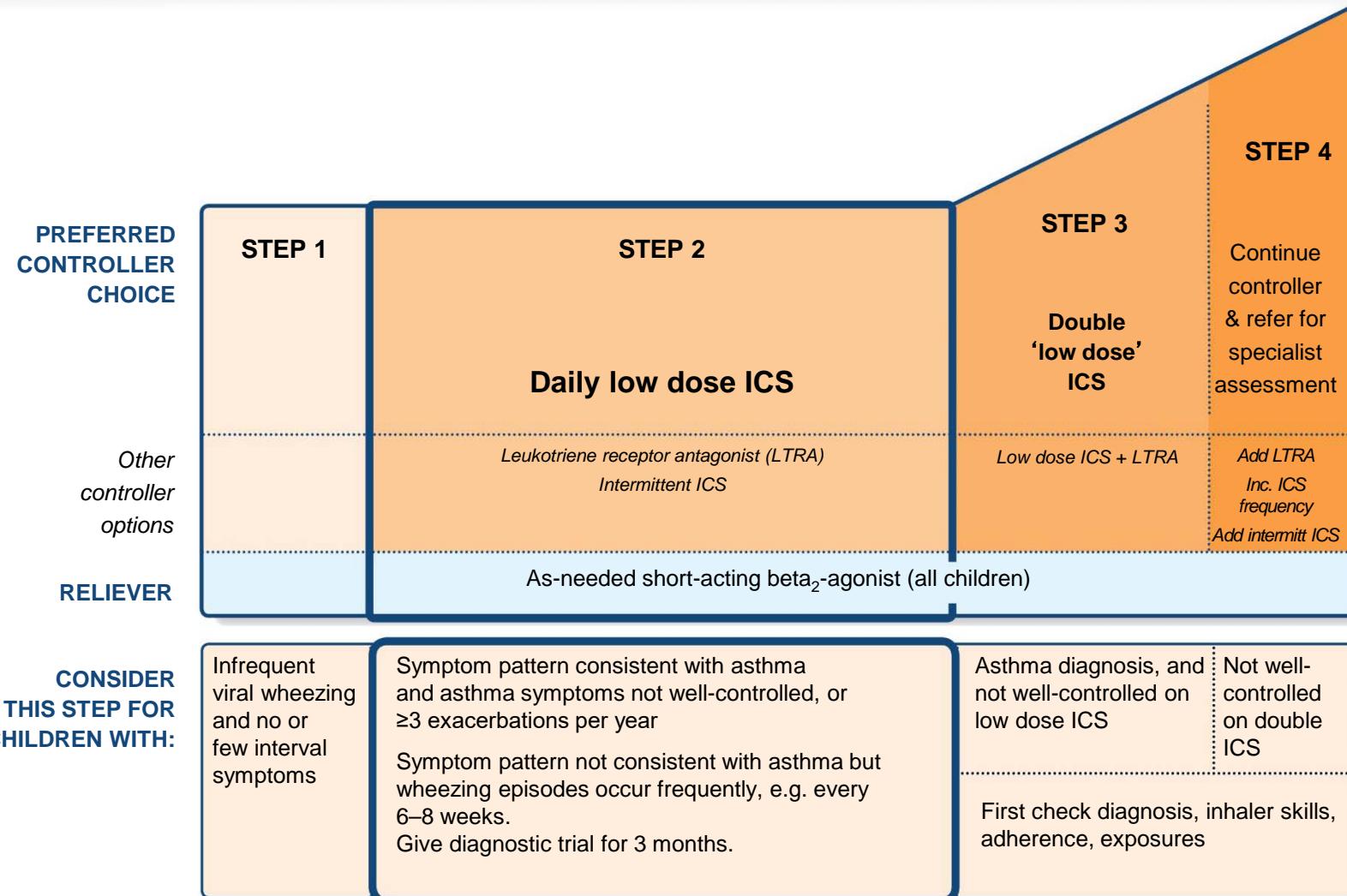


Step 1 (children ≤5 years) – as-needed inhaled SABA

- Preferred option: as-needed inhaled SABA
 - Provide inhaled SABA to all children who experience wheezing episodes
 - Not effective in all children
- Other options
 - Oral bronchodilator therapy is not recommended (slower onset of action, more side-effects)
 - For children with intermittent viral-induced wheeze and no interval symptoms, if as-needed SABA is not sufficient, consider intermittent ICS. Because of the risk of side-effects, this should only be considered if the physician is confident that the treatment will be used appropriately.



Step 2 (children ≤5 years) – initial controller + as-needed SABA





Step 2 (children ≤5 years) – initial controller + as-needed SABA

- Indication
 - Child with symptom pattern consistent with asthma, and symptoms not well-controlled, or ≥3 exacerbations per year
 - May also be used as a diagnostic trial for children with frequent wheezing episodes
- Preferred option: regular daily low dose ICS + as-needed inhaled SABA
 - Give for ≥3 months to establish effectiveness, and review response
- Other options depend on symptom pattern
 - (Persistent asthma) – regular leukotriene receptor antagonist (LTRA) leads to modest reduction in symptoms and need for OCS compared with placebo
 - (Intermittent viral-induced wheeze) – regular LTRA improves some outcomes but does not reduce risk of exacerbations
 - (Frequent viral-induced wheeze with interval symptoms) – consider episodic or as-needed ICS, but give a trial of regular ICS first

Checking height in children with asthma



- Check height at least yearly, because:
 - Poorly-controlled asthma can affect growth [Pedersen 2001]
 - Growth velocity may be lower in the first 1-2 years of ICS treatment but this is not progressive or cumulative [Kelly 2012, Loke 2015].
 - The one study that examined long-term outcomes showed a difference of only 0.7% in adult height [Kelly 2012, Loke 2015]
- If decreased growth velocity is seen, also consider:
 - Poorly-controlled asthma
 - Frequent use of OCS
 - Poor nutrition

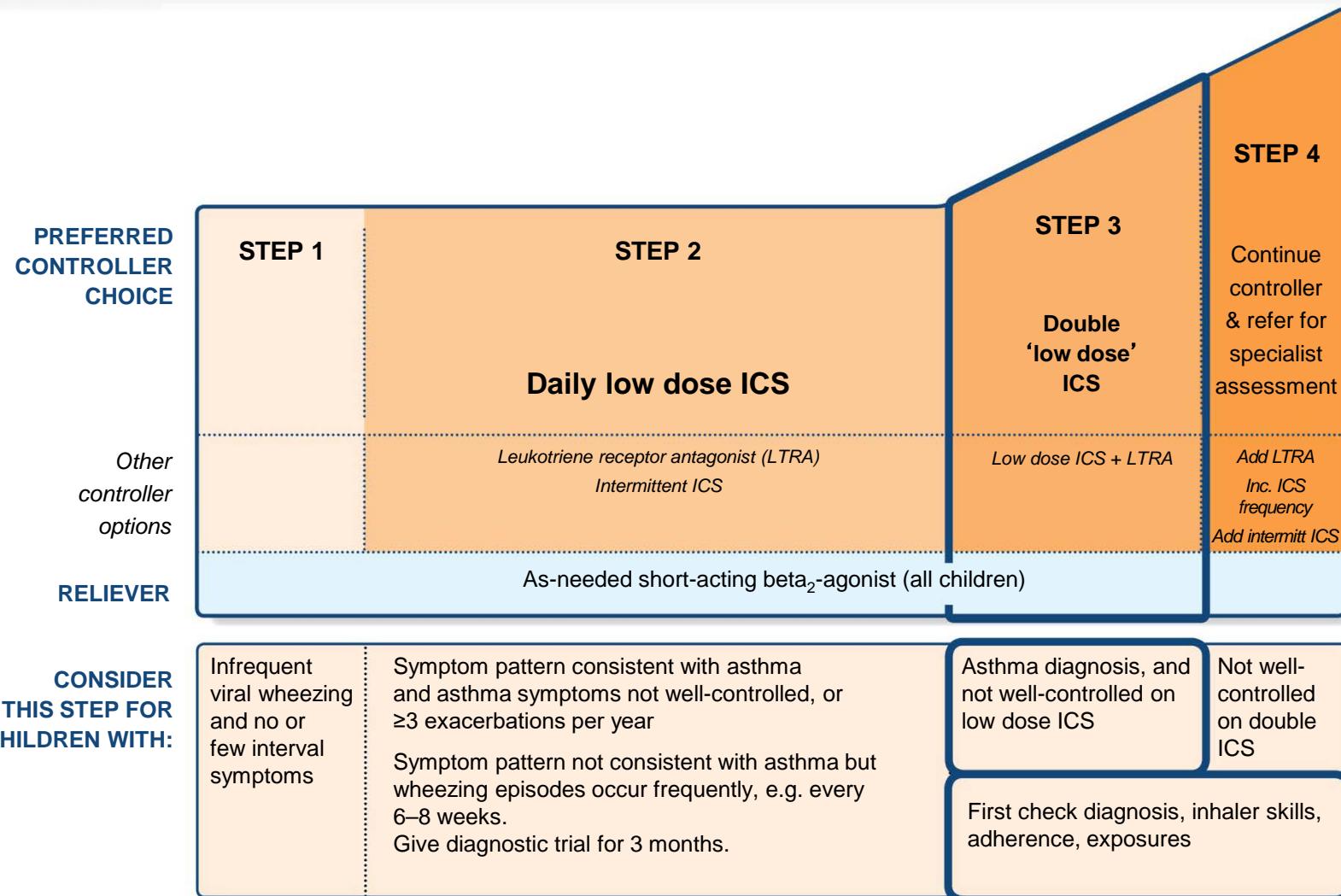
Inhaled corticosteroids and growth in children



- Discuss decisions about controller treatment with parents/carers
 - Discuss the relative benefits and risks of treatment/no treatment
 - Emphasize the importance of maintaining normal activity levels for normal physical and social development
- ICS can have a small but usually temporary effect on growth
 - An effect of ICS on growth velocity is seen in pre-pubertal children in the first 1-2 years of treatment
 - This is not progressive or cumulative [*Kelly 2012, Loke 2015*].
 - The one study that examined long-term outcomes showed a difference of only 0.7% in adult height [*Kelly 2012, Loke 2015*]
- Poorly-controlled asthma itself adversely affects adult height [*Pedersen 2001*]
- For more detail see GINA 2017 Appendix Chapter 5B



Step 3 (children ≤5 years) – medium dose ICS + as-needed inhaled SABA



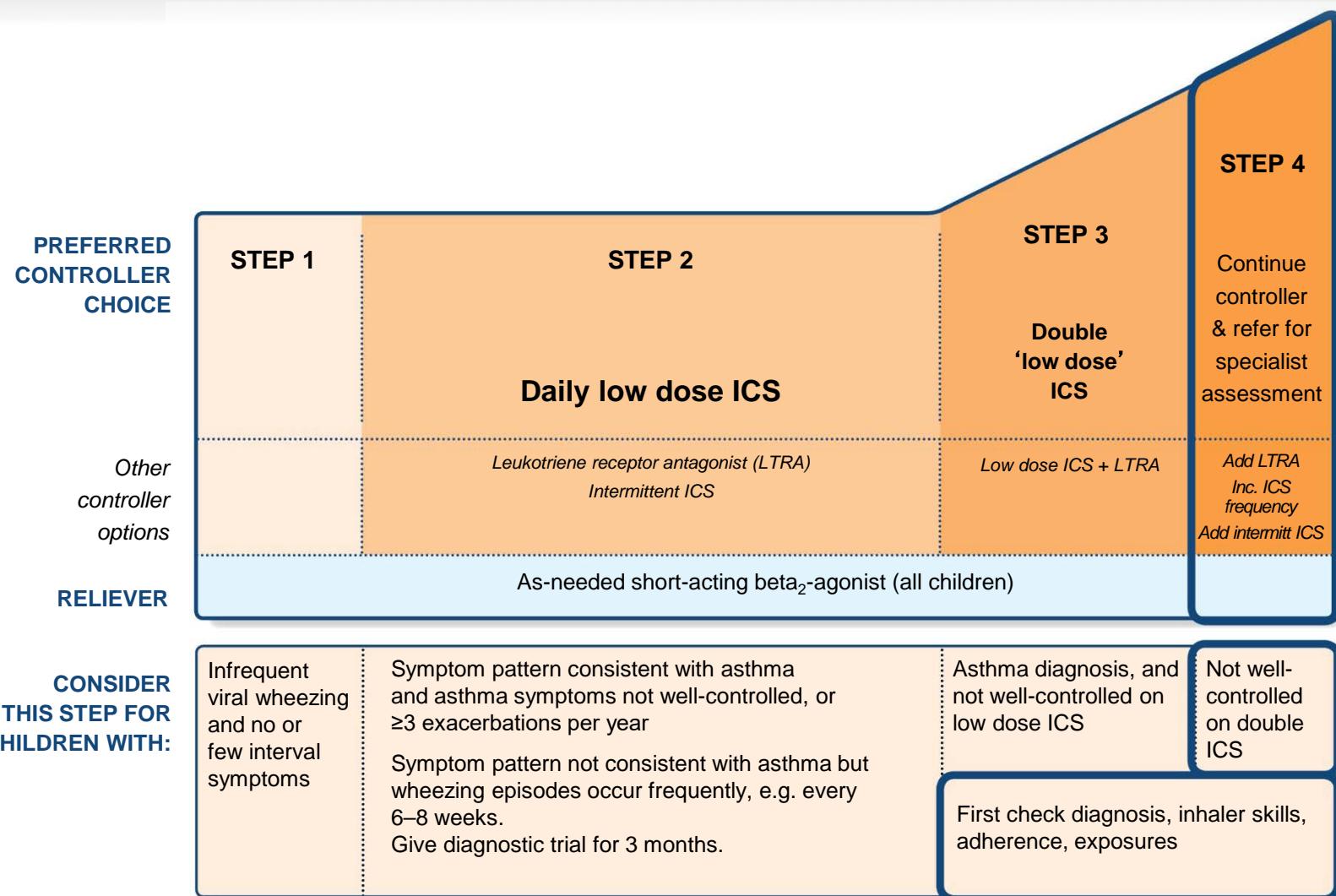


Step 3 (children ≤5 years) – medium dose ICS + as-needed inhaled SABA

- Indication
 - Asthma diagnosis, and symptoms not well-controlled on low dose ICS
 - First check symptoms are due to asthma, and check adherence, inhaler technique and environmental exposures
- Preferred option: medium dose ICS with as-needed inhaled SABA
 - Review response after 3 months
- Other options
 - Consider adding LTRA to low dose ICS (based on data from older children)



Step 4 (children ≤5 years) – refer for expert assessment





Step 4 (children ≤5 years) – refer for expert assessment

- Indication
 - Asthma diagnosis, and symptoms not well-controlled on medium dose ICS
 - First check symptoms are due to asthma, and check adherence, inhaler technique and environmental exposures
- Preferred option: continue controller treatment and refer for expert assessment
- Other options (preferably with specialist advice)
 - Higher dose ICS and/or more frequent dosing (for a few weeks)
 - Add LTRA, theophylline or low dose OCS (for a few weeks only)
 - Add intermittent ICS to regular daily ICS if exacerbations are the main problem
 - ICS/LABA not recommended in this age group



'Low dose' inhaled corticosteroids (mcg/day) for children ≤5 years

Inhaled corticosteroid	Low daily dose (mcg)
Beclometasone dipropionate (HFA)	100
Budesonide (pMDI + spacer)	200
Budesonide (nebulizer)	500
Fluticasone propionate (HFA)	100
Ciclesonide	160
Mometasone furoate	Not studied below age 4 years
Triamcinolone acetonide	Not studied in this age group

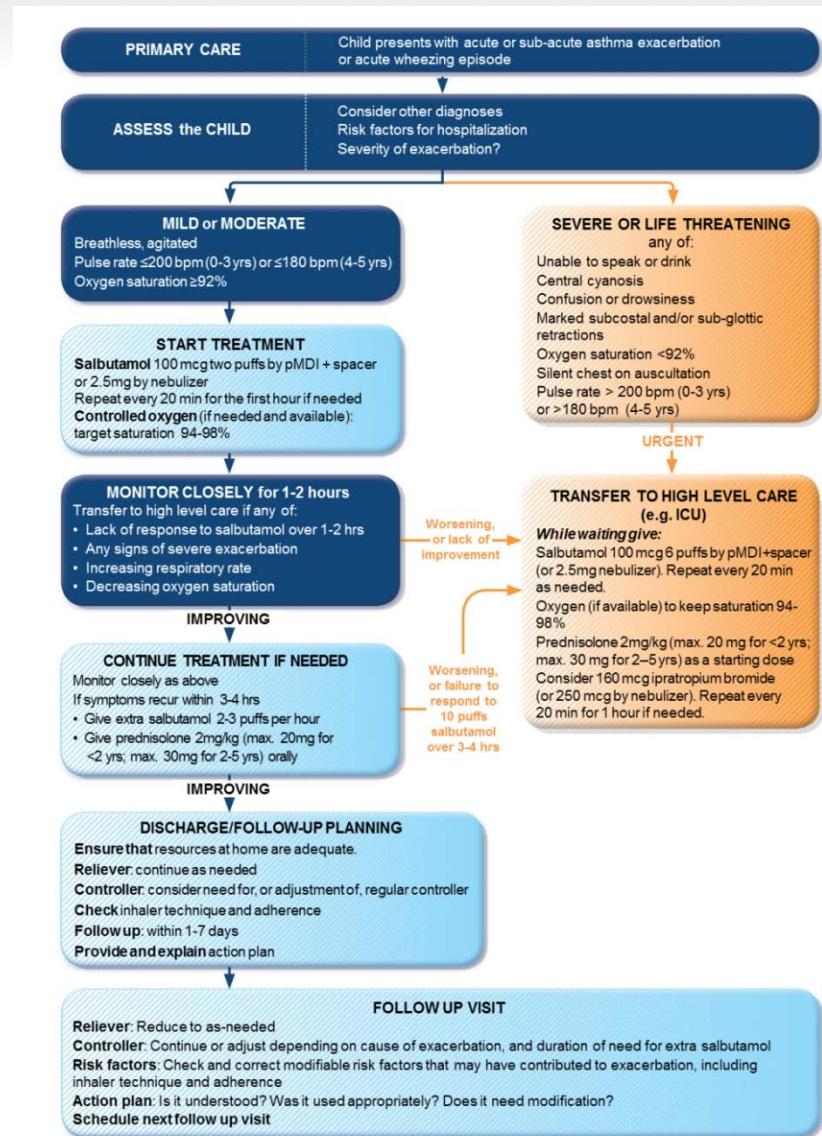
- This is not a table of equivalence
- A low daily dose is defined as the dose that has not been associated with clinically adverse effects in trials that included measures of safety

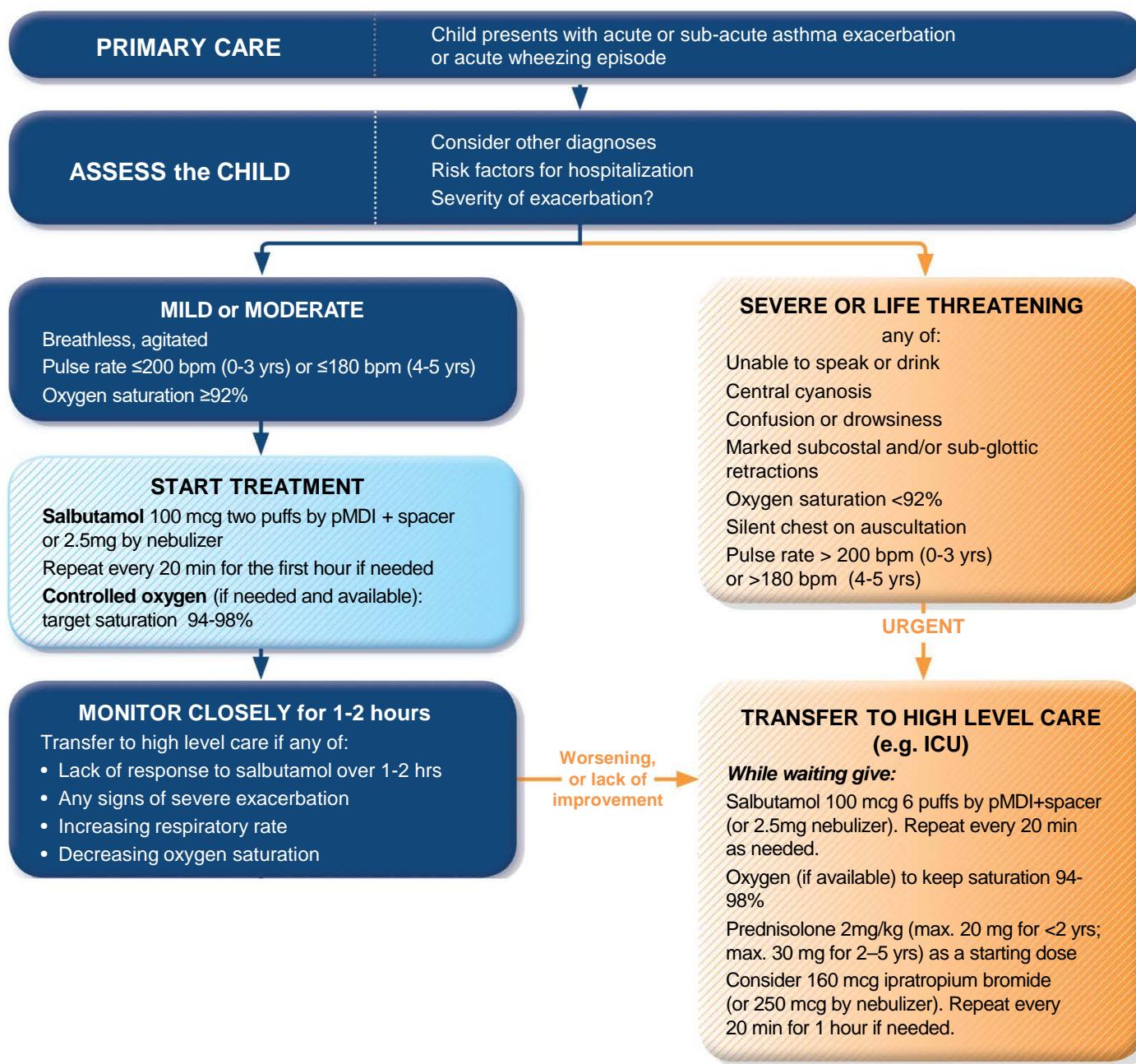
Choosing an inhaler device for children ≤5 years

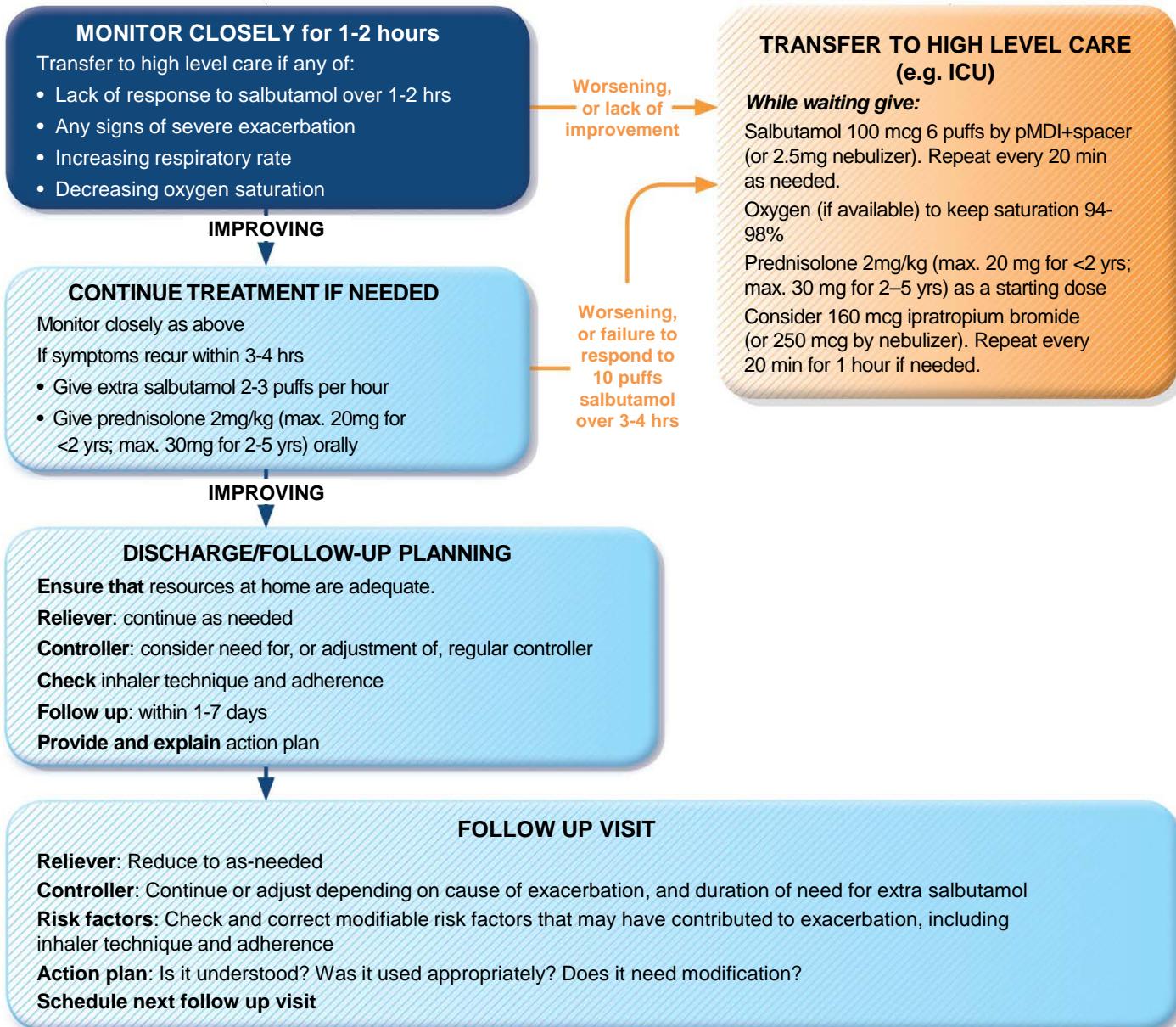


Age	Preferred device	Alternate device
0–3 years	Pressurized metered dose inhaler plus dedicated spacer with face mask	Nebulizer with face mask
4–5 years	Pressurized metered dose inhaler plus dedicated spacer with mouthpiece	Pressurized metered dose inhaler plus dedicated spacer with face mask, or nebulizer with mouthpiece or face mask

Primary care management of acute asthma or wheezing in pre-schoolers







Initial assessment of acute asthma exacerbations in children ≤5 years



Symptoms	Mild	Severe*
Altered consciousness	No	Agitated, confused or drowsy
Oximetry on presentation (SaO_2)**	>95%	<92%
Speech [†]	Sentences	Words
Pulse rate	<100 beats/min	>200 beats/min (0–3 years) >180 beats/min (4–5 years)
Central cyanosis	Absent	Likely to be present
Wheeze intensity	Variable	Chest may be quiet

*Any of these features indicates a severe exacerbation

**Oximetry before treatment with oxygen or bronchodilator

† Take into account the child's normal developmental capability



Indications for immediate transfer to hospital for children ≤5 years

Transfer immediately to hospital if ANY of the following are present:

Features of severe exacerbation at initial or subsequent assessment

- Child is unable to speak or drink
- Cyanosis
- Subcostal retraction
- Oxygen saturation <92% when breathing room air
- Silent chest on auscultation

Lack of response to initial bronchodilator treatment

- Lack of response to 6 puffs of inhaled SABA (2 separate puffs, repeated 3 times) over 1-2 hours
- Persisting tachypnea* despite 3 administrations of inhaled SABA, even if the child shows other clinical signs of improvement

Unable to be managed at home

- Social environment that impairs delivery of acute treatment
- Parent/carer unable to manage child at home

*Normal respiratory rates (breaths/minute): 0-2 months: <60; 2-12 months: <50; 1-5 yrs: <40



Initial management of asthma exacerbations in children ≤5 years

Therapy	Dose and administration
Supplemental oxygen	24% delivered by face mask (usually 1L/min) to maintain oxygen saturation 94-98%
Inhaled SABA	2–6 puffs of salbutamol by spacer, or 2.5mg by nebulizer, every 20 min for first hour, then reassess severity. If symptoms persist or recur, give an additional 2-3 puffs per hour. Admit to hospital if >10 puffs required in 3-4 hours.
Systemic corticosteroids	Give initial dose of oral prednisolone (1-2mg/kg up to maximum of 20mg for children <2 years; 30 mg for 2-5 years)



Initial management of asthma exacerbations in children ≤5 years

Therapy	Dose and administration
Supplemental oxygen	24% delivered by face mask (usually 1L/min) to maintain oxygen saturation 94-98%
Inhaled SABA	2–6 puffs of salbutamol by spacer, or 2.5mg by nebulizer, every 20 min for first hour, then reassess severity. If symptoms persist or recur, give an additional 2-3 puffs per hour. Admit to hospital if >10 puffs required in 3-4 hours.
Systemic corticosteroids	Give initial dose of oral prednisolone (1-2mg/kg up to maximum of 20mg for children <2 years; 30 mg for 2-5 years)
Additional options in the first hour of treatment	
Ipratropium bromide	For moderate/severe exacerbations, give 2 puffs of ipratropium bromide 80mcg (or 250mcg by nebulizer) every 20 minutes for one hour only
Magnesium sulfate	Consider nebulized isotonic MgSO ₄ (150mg) 3 doses in first hour for children ≥2 years with severe exacerbation

Primary prevention of asthma



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Primary prevention of asthma

- The development and persistence of asthma are driven by gene-environment interactions
- For children, a ‘window of opportunity’ exists *in utero* and in early life, but intervention studies are limited
- For intervention strategies including allergen avoidance
 - Strategies directed at a single allergen have not been effective
 - Multifaceted strategies may be effective, but the essential components have not been identified
- Current recommendations are
 - Avoid exposure to tobacco smoke in pregnancy and early life
 - Encourage vaginal delivery
 - Advise breast-feeding for its general health benefits
 - Where possible, avoid use of paracetamol (acetaminophen) and broad-spectrum antibiotics in the first year of life

Implementing asthma management strategies into health systems

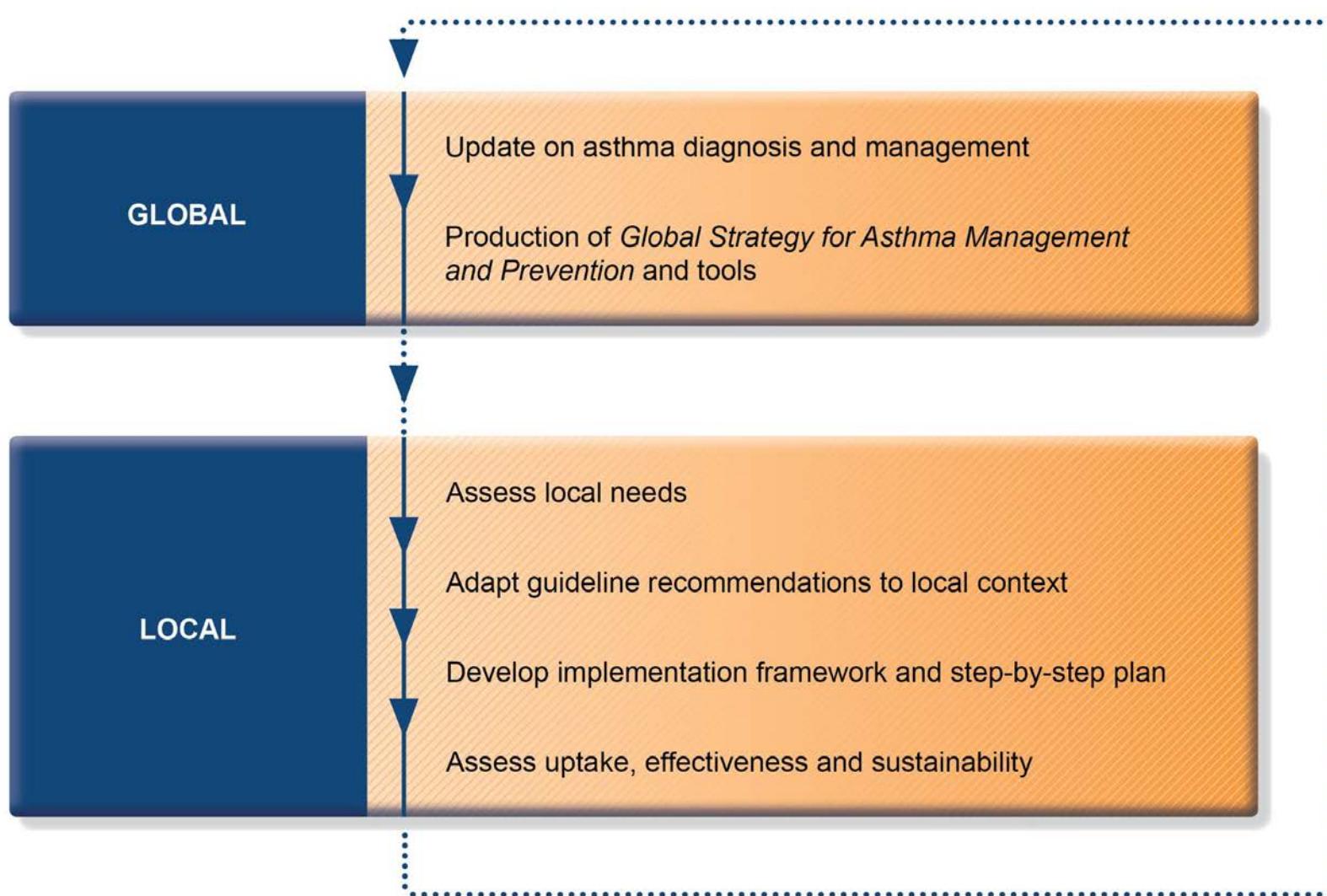


GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.



Approach to implementation of the Global Strategy for Asthma Management and Prevention





Essential elements to implement a health-related strategy

1. Develop a multidisciplinary working group
2. Assess current status of asthma care delivery, care gaps, needs
3. Prepare materials for implementation
 - Choose materials, agree on main goals, identify key recommendations, adapt to local context
4. Identify barriers to, and facilitators for, implementation
5. Develop a step-by-step implementation plan
 - Select target population and evaluable outcomes
 - Identify local resources to support implementation
 - Set timelines
 - Distribute tasks to members
 - Evaluate outcomes
6. Continuously review progress, modify strategy if needed



Examples of barriers to implementation

- Health care providers
 - Insufficient knowledge of recommendations
 - Lack of agreement with or confidence in recommendations
 - Resistance to change
 - External barriers (organizational, policies, cost)
 - Lack of time and resources
 - Medico-legal issues
- Patients
 - Low health literacy
 - Insufficient understanding of asthma and its management
 - Lack of agreement with recommendations
 - Cultural and economic barriers
 - Peer influence
 - Attitudes, beliefs, preferences, fears and misconceptions



Examples of high-impact interventions in asthma management

- Free ICS for patients with a recent hospital admission and/or severe asthma (Brazil)
- Early treatment with ICS, guided self-management, reduction in exposure to tobacco smoke, improved access to asthma education (Finnish asthma program)
- Self-inking stamp prompting assessment of asthma control and treatment strategies (Canadian primary care)
- Use of individualized written asthma action plans as part of self-management education (Cochrane review, 2004)
- An evidence-based care process model for acute and chronic pediatric asthma management, implemented at multiple hospitals (USA)

www.ginasthma.org



GINA Global Strategy for Asthma Management and Prevention 2017

This slide set is restricted for academic and educational purposes only. Use of the slide set, or of individual slides, for commercial or promotional purposes requires approval from GINA.