POCKET GUIDE FOR ASTHMA MANAGEMENT AND PREVENTION

(for Adults and Children Older than 5 Years)

A Pocket Guide for Health Professionals
Updated 2016

BASED ON THE GLOBAL STRATEGY FOR ASTHMA MANAGEMENT AND PREVENTION

GLOBAL INITIATIVE FOR ASTHMA

POCKET GUIDE FOR HEALTH PROFESSIONALS

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PREFACE

Asthma affects an estimated 300 million individuals worldwide. It is a serious global health problem affecting all age groups, with increasing prevalence in many developing countries, rising treatment costs, and a rising burden for patients and the community. Asthma still imposes an unacceptable burden on health care systems, and on society through loss of productivity in the workplace and, especially for pediatric asthma, disruption to the family.

Health care providers managing asthma face different issues around the world, depending on the local context, the health system, and access to resources.

The **Global Initiative for Asthma (GINA)** was established to increase awareness about asthma among health professionals, public health authorities and the community, and to improve prevention and management through a coordinated worldwide effort. GINA prepares scientific reports on asthma, encourages dissemination and implementation of the recommendations, and promotes international collaboration on asthma research.

The Global Strategy for Asthma Management and Prevention was extensively revised in 2014 to provide a comprehensive and integrated approach to asthma management that can be adapted for local conditions and for individual patients. It focuses not only on the existing strong evidence base, but also on clarity of language and on providing tools for feasible implementation in clinical practice. The report has been updated each year since then.

The GINA 2016 report and other GINA publications listed on page 28 can be obtained from www.ginasthma.org.

The reader acknowledges that this **Pocket Guide** is a brief summary of the GINA 2016 report for primary health care providers. It does NOT contain all of the information required for managing asthma, for example, about safety of treatments, and it should be used in conjunction with the full GINA 2016 report and with the health professional's own clinical judgment. GINA cannot be held liable or responsible for healthcare administered with the use of this document, including any use which is not in accordance with applicable local or national regulations or guidelines.

WHAT IS KNOWN ABOUT ASTHMA?

Asthma is a common and potentially serious chronic disease that imposes a substantial burden on patients, their families and the community. It causes respiratory symptoms, limitation of activity, and flare-ups (attacks) that sometimes require urgent health care and may be fatal.

Fortunately…asthma can be effectively treated, and most patients can achieve good control of their asthma. When asthma is under good control, patients can:

- ✓ Avoid troublesome symptoms during 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 (exacerbations, or attacks)

What is asthma? Asthma causes symptoms such as wheezing, shortness of breath, chest tightness and cough that vary over time in their occurrence, frequency and intensity.

These symptoms are associated with variable expiratory airflow, i.e. difficulty breathing air out of the lungs due to bronchoconstriction (airway narrowing), airway wall thickening, and increased mucus. Some variation in airflow can also occur in people without asthma, but it is greater in asthma.

Factors that may trigger or worsen asthma symptoms include viral infections, domestic or occupational allergens (e.g. house dust mite, pollens, cockroach), tobacco smoke, exercise and stress. These responses are more likely when asthma is uncontrolled. Some drugs can induce or trigger asthma, e.g. beta-blockers, and (in some patients), aspirin or other NSAIDs.

Asthma flare-ups (also called exacerbations or attacks) may occur even in people taking asthma treatment. When asthma is uncontrolled, or in some high-risk patients, these episodes are more frequent and more severe, and may be fatal.

A stepwise approach to treatment, customized to the individual patient, takes into account the effectiveness of available medications, their safety, and their cost to the payer or patient.

Regular controller treatment, particularly with inhaled corticosteroid (ICS)-containing medications, markedly reduces the frequency and severity of asthma symptoms and the risk of having a flare-up.

Asthma is a common condition, affecting all levels of society. Olympic athletes, famous leaders and celebrities, and ordinary people live **successful and active lives with asthma**.

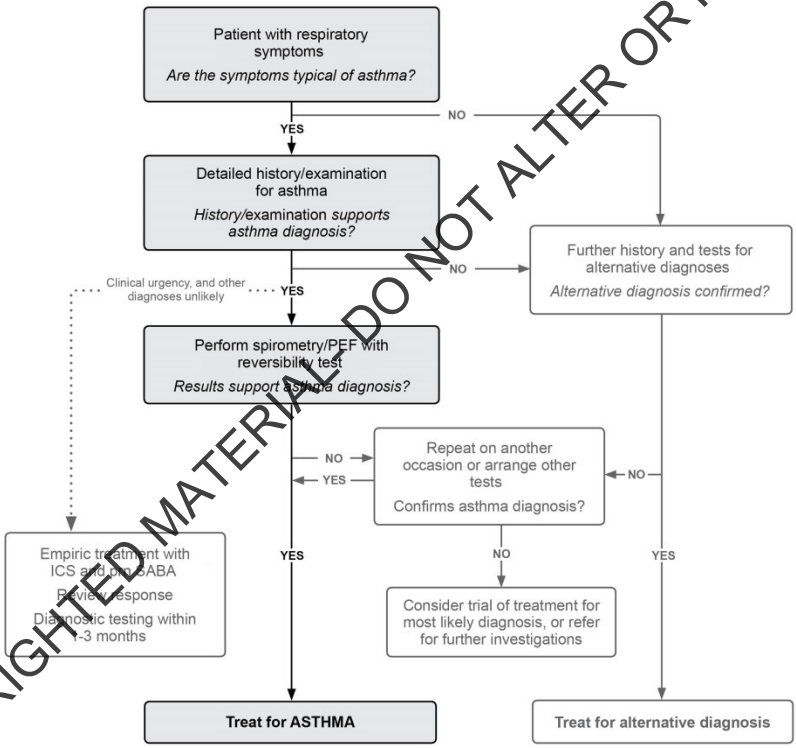
MAKING THE DIAGNOSIS OF ASTHMA

Asthma is a disease with many variations (heterogeneous), usually characterized by chronic airway inflammation. Asthma has two key defining features:

- a history of respiratory symptoms such as wheeze, shortness of breath, chest tightness and cough that vary over time and in intensity, AND
- variable expiratory airflow limitation.

A flow-chart for making the diagnosis in clinical practice is shown in Box 1, with the specific criteria for diagnosing asthma in Box 2.

Box 1. Diagnostic flow-chart for asthma in clinical practice



The **diagnosis of asthma** should be confirmed and, for future reference, the evidence documented in the patient's notes. Depending on clinical urgency and access to resources, this should preferably be done before starting controller treatment. Confirming the diagnosis of asthma is more difficult after treatment has been started (see p7).

CRITERIA FOR MAKING THE DIAGNOSIS OF ASTHMA

Box 2. Features used in making the diagnosis of asthma

1. A history of variable respiratory symptoms

Typical symptoms are wheeze, shortness of breath, chest tightness, cough

- People with asthma generally have more than one of these symptoms
- The symptoms occur variably over time and vary in intensity
- The symptoms often occur or are worse at night or on waking
- Symptoms are often triggered by exercise, laughter, allergens or cold air
- Symptoms often occur with or worsen with viral infections

2. Evidence of variable expiratory airflow limitation

- At least once during the diagnostic process when FEV_1 is low, document that the FEV_1/FVC ratio is reduced. The FEV_1/FVC ratio is normally more than 0.75–0.80 in adults, and more than 0.90 in children.
- Document that variation in lung function is greater than in healthy people. For example:
    - FEV_1 increases by more than 12% and 200mL (in children, >12% of the predicted value) after inhaling a bronchodilator. This is called 'bronchodilator reversibility'.
    - Average daily diurnal PEF variability* is >10% (in children, >13%)
    - FEV_1 increases by more than 12% and 200mL from baseline (in children, by >12% of the predicted value) after 4 weeks of anti-inflammatory treatment (outside respiratory infections)
- The greater the variation, or the more times excess variation is seen, the more confident you can be of the diagnosis
- Testing may need to be repeated during symptoms, in the early morning, or after withholding bronchodilator medications.
- Bronchodilator reversibility may be absent during severe exacerbations or viral infections. If bronchodilator reversibility is not present when it is first tested, the next step depends on the clinical urgency and availability of other tests.
- For other tests to assist in diagnosis, including bronchial challenge tests, see Chapter 1 of the GINA 2016 report.

*Calculated from twice daily readings (best of 3 each time), as (the day's highest PEF minus the day's lowest PEF) divided by the mean of the day's highest and lowest PEF, and averaged over 1-2 weeks. If using PEF at home or in the office, use the same PEF meter each time.

Physical examination in people with asthma is often normal, but the most frequent finding is wheezing on auscultation, especially on forced expiration.

DIAGNOSING ASTHMA IN SPECIAL POPULATIONS

Patients with cough as the only respiratory symptom

This may be due to chronic upper airway cough syndrome ('post-nasal drip'), chronic sinusitis, gastroesophageal reflux (GERD), vocal cord dysfunction, or eosinophilic bronchitis, or cough variant asthma. Cough variant asthma is characterized by cough and airway hyperresponsiveness, and documenting variability in lung function is essential to make this diagnosis. However, lack of variability at the time of testing does not exclude asthma. For other diagnostic tests, see Box 2, and Chapter 1 of the GINA 2016 report, or refer the patient for specialist opinion.

Occupational asthma and work-aggravated asthma

Every patient with adult-onset asthma should be asked about occupational exposures, and whether their asthma is better when they are away from work. It is important to confirm the diagnosis objectively (which often needs specialist referral) and to eliminate exposure as soon as possible.

Pregnant women

Ask all pregnant women and those planning pregnancy about asthma, and advise them about the importance of asthma treatment for the health of both mother and baby.

The elderly

Asthma may be under-diagnosed in the elderly, due to poor perception, an assumption that dyspnea is normal in old age, lack of fitness, or reduced activity. Asthma may also be over-diagnosed in the elderly through confusion with shortness of breath due to left ventricular failure or ischemic heart disease. If there is a history of smoking or biomass fuel exposure, COPD or asthma-COPD overlap syndrome (ACOS) should be considered (see Chapter 5 of the GINA 2016 report).

Smokers and ex-smokers

Asthma and COPD may co-exist or overlap (asthma-COPD overlap syndrome, ACOS), particularly in smokers and the elderly. The history and pattern of symptoms and past records can help to distinguish asthma with fixed airflow limitation from COPD. Uncertainty in diagnosis should prompt early referral, as ACOS has worse outcomes than asthma or COPD alone.

Confirming an asthma diagnosis in patients taking controller treatment:

For many patients (25–35%) with a diagnosis of asthma in primary care, the diagnosis cannot be confirmed. If the basis of the diagnosis has not already been documented, confirmation with objective testing should be sought.

If standard criteria for asthma (Box 2) are not met, consider other investigations. For example, if lung function is normal, repeat reversibility testing after withholding medications for 12 hours. If the patient has frequent symptoms, consider a trial of step-up in controller treatment and repeat lung function testing after 3 months. If the patient has few symptoms, consider stepping down controller treatment, but ensure the patient has a written asthma action plan, monitor them carefully, and repeat lung function testing.

ASSESSING A PATIENT WITH ASTHMA

Take every opportunity to assess patients with a diagnosis of asthma, particularly when they are symptomatic or after a recent exacerbation, but also when they ask for a prescription refill. In addition, schedule a routine review at least once a year.

Box 3. How to assess a patient with asthma

1. Asthma control – assess both symptom control and risk factors
• Assess symptom control over the last 4 weeks (Box 4, p9) • Identify any other risk factors for poor outcomes (Box 4) • Measure lung function before starting treatment, 3–6 months later, and then periodically, e.g. yearly
2. Treatment issues
• Record the patient's treatment (Box 7, p14), and ask about side-effects • Watch the patient using their inhaler, to check their technique (p18) • Have an open empathic discussion about adherence (p18) • Check that the patient has a written asthma action plan (p22) • Ask the patient about their attitudes and goals for their asthma
3. Are there any comorbidities?
• These include rhinitis, rhinosinusitis, gastroesophageal reflux (GERD), obesity, obstructive sleep apnea, depression and anxiety. • Comorbidities should be identified as they may contribute to respiratory symptoms and poor quality of life. Their treatment may complicate asthma management.

HOW TO ASSESS ASTHMA CONTROL

Asthma control means the extent to which the effects of asthma can be seen in the patient, or have been reduced or removed by treatment. Asthma control has two domains: symptom control (previously called 'current clinical control') and risk factors for future poor outcomes.

Poor symptom control is a burden to patients and a risk factor for flare-ups. **Risk factors** are factors that increase the patient's future risk of having exacerbations (flare-ups), loss of lung function, or medication side-effects.

Box 4. Assessment of symptom control and future risk

A. Level of asthma symptom control

In the past 4 weeks, has the patient had:		Well controlled	Partly controlled	Uncontrolled
Daytime symptoms more than twice/week?	Yes☐ No☐			
Any night waking due to asthma?	Yes☐ No☐	None of these	1–2 of these	3–4 of these
Reliever needed* more than twice/week?	Yes☐ No☐			
Any activity limitation due to asthma?	Yes☐ No☐			

B. Risk factors for poor asthma outcomes

Assess risk factors at diagnosis and periodically, particularly for patients experiencing exacerbations.

Measure FEV_1 at start of treatment, after 3–6 months of controller treatment to record personal best lung function, then periodically for ongoing risk assessment.

Potentially modifiable independent risk factors for exacerbations include:

- Uncontrolled asthma symptoms (as above)
- ICS not prescribed; poor ICS adherence; incorrect inhaler technique
- High SABA use (with increased mortality if >1x200-dose canister/month)
- Low FEV_1, especially if <60% predicted
- Major psychological or socioeconomic problems
- Exposures: smoking; allergen exposure if sensitized
- Comorbidities: obesity; rhinosinusitis; confirmed food allergy
- Sputum or blood eosinophilia
- Pregnancy

Other major independent risk factors for flare-ups (exacerbations) include:

- Ever being intubated or in intensive care for asthma
- Having 1 or more severe exacerbations in the last 12 months.

Having one or more of these risk factors increases the risk of exacerbations even if symptoms are well controlled.

Risk factors for developing fixed airflow limitation include lack of ICS treatment; exposure to tobacco smoke, noxious chemicals or occupational exposures; low FEV_1; chronic mucus hypersecretion; and sputum or blood eosinophilia

Risk factors for medication side-effects include:

- *Systemic*: frequent OCS; long-term, high dose and/or potent ICS; also taking P450 inhibitors
- *Local*: high-dose or potent ICS; poor inhaler technique

What is the role of lung function in monitoring asthma?

Once asthma has been diagnosed, lung function is most useful as an indicator of future risk. It should be recorded at diagnosis, 3–6 months after starting treatment, and periodically thereafter. Patients who have either few or many symptoms relative to their lung function need more investigation.

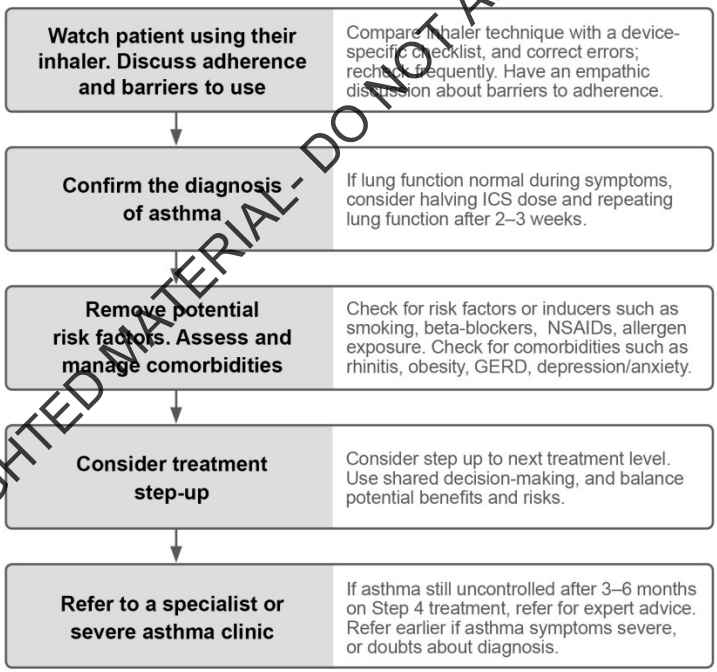
How is asthma severity assessed?

Asthma severity can be assessed retrospectively from the level of treatment (p14) required to control symptoms and exacerbations. Mild asthma is asthma that can be controlled with Step 1 or 2 treatment. Severe asthma is asthma that requires Step 4 or 5 treatment, to maintain symptom control. It may appear similar to asthma that is uncontrolled due to lack of treatment.

HOW TO INVESTIGATE UNCONTROLLED ASTHMA

Most patients can achieve good asthma control with regular controller treatment, but some patients do not, and further investigation is needed.

Box 5. How to investigate uncontrolled asthma in primary care



This flow-chart shows the most common problems first, but the steps can be carried out in a different order, depending on resources and clinical context.

MANAGEMENT OF ASTHMA

GENERAL PRINCIPLES

The long-term goals of asthma management are **symptom control** and **risk reduction**. The aim is to reduce the burden to the patient and their risk of exacerbations, airway damage, and medication side-effects. The patient's own goals regarding their asthma and its treatment should also be identified.

Population-level recommendations about 'preferred' asthma treatments represent the best treatment for most patients in a population.

Patient-level treatment decisions should take into account any individual characteristics or phenotype that predict the patient's likely response to treatment, together with the patient's preferences and practical issues such as inhaler technique, adherence, and cost.

A **partnership** between the patient and their health care providers is important for effective asthma management. Training health care providers in **communication skills** may lead to increased patient satisfaction, better health outcomes, and reduced use of health care resources.

Health literacy – that is, the patient's ability to obtain, process and understand basic health information to make appropriate health decisions – should be taken into account in asthma management and education.

TREATING TO CONTROL SYMPTOMS AND MINIMIZE RISK

Treatment of asthma for symptom control and risk reduction includes:

- Medications. Every patient with asthma should have a reliever medication, and most adults and adolescents with asthma should have a controller medication
- Treating modifiable risk factors
- Non-pharmacological therapies and strategies

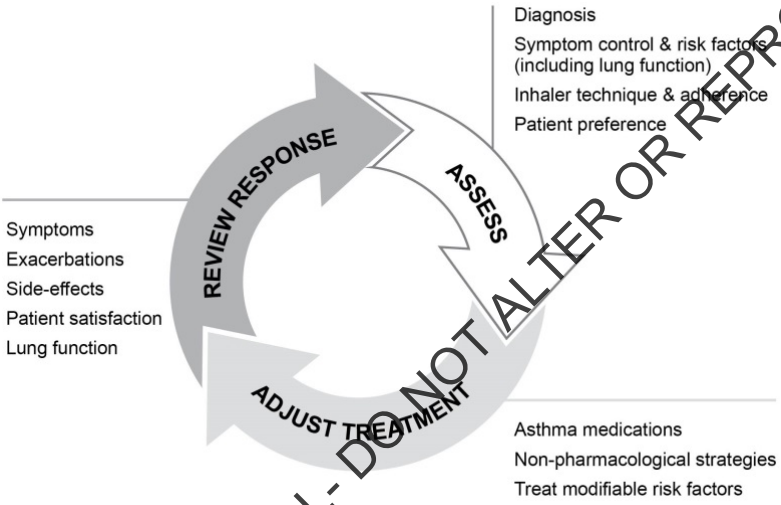
Importantly, every patient should also be trained in essential skills and guided asthma self-management, including:

- Asthma information
- Inhaler skills (p18)
- Adherence (p18)
- Written asthma action plan (p22)
- Self-monitoring
- Regular medical review (p8)

CONTROL-BASED ASTHMA MANAGEMENT

Asthma treatment is adjusted in a continuous cycle to **assess**, **adjust treatment** and **review response**. The main components of this cycle are shown in Box 6.

Box 6. The control-based asthma management cycle



INITIAL CONTROLLER TREATMENT

For the best outcomes, regular daily controller treatment should be initiated as soon as possible after the diagnosis of asthma is made, because:

- Early treatment with low dose ICS leads to better lung function than if symptoms have been present for more than 2–4 years
- Patients not taking ICS who experience a severe exacerbation have lower long-term lung function than those who have started ICS
- In occupational asthma, early removal from exposure and early treatment increase the probability of recovery

Regular low dose ICS is recommended for patients with any of the following:

- Asthma symptoms more than twice a month
- Waking due to asthma more than once a month
- Any asthma symptoms plus any risk factor(s) for exacerbations (e.g. needing OCS for asthma within the last 12 months; low FEV_1; ever in intensive care unit for asthma)

Consider starting at a higher step (e.g. medium/high dose ICS, or ICS/LABA) if the patient has troublesome asthma symptoms on most days; or is waking from asthma once or more a week, especially if there are any risk factors for exacerbations.

If the initial asthma presentation is with severely uncontrolled asthma, or with an acute exacerbation, give a short course of OCS and start regular controller treatment (e.g. high dose ICS, or medium dose ICS/LABA).

Low, medium and high dose categories for different ICS medications are shown in Box 8 (p14).

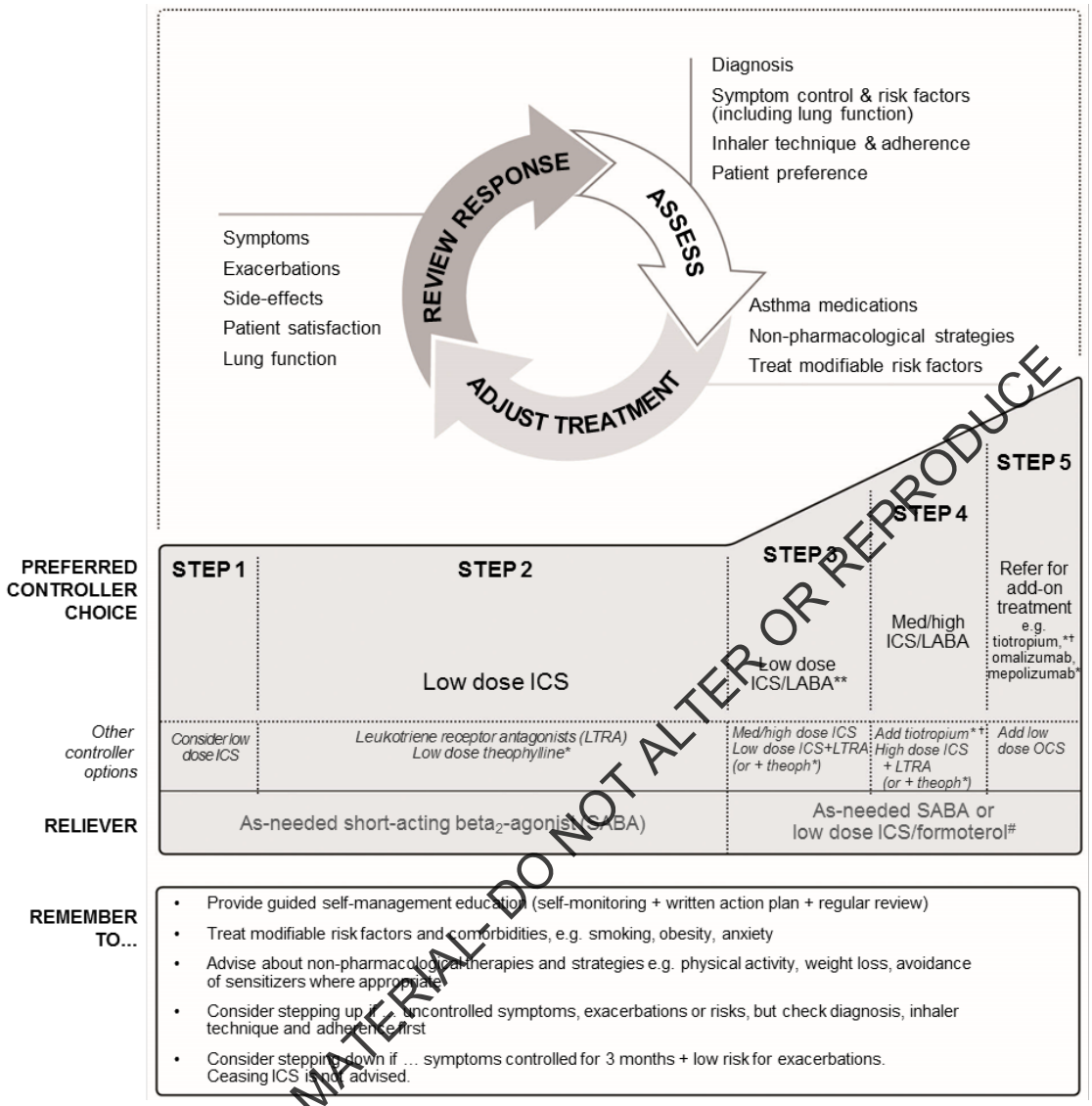
Before starting initial controller treatment

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

After starting initial controller treatment

- Review response after 2–3 months, or according to clinical urgency
- See Box 7 for ongoing treatment and other key management issues
- Consider step down when asthma has been well-controlled for 3 months

Box 7. Stepwise approach to asthma treatment



*Not for children <12 years. **For children 6–11 years, the preferred Step 3 treatment is medium dose ICS. # Low dose ICS/formoterol is the reliever medication for patients prescribed low dose budesonide/formoterol or low dose beclometasone/formoterol for maintenance and reliever therapy. †Tiotropium by mist inhaler is an add-on treatment for patients with a history of exacerbations*.

For medication Glossary, see p26. For details about treatment recommendations, supporting evidence, and clinical advice about implementation in different populations see the full GINA 2016 report (www.ginasthma.org).

Box 8. Low, medium and high daily doses of inhaled corticosteroids (mcg)

Inhaled corticosteroid	Adults and adolescents			Children 6–11 years		
	Low	Medium	High	Low	Medium	High
Beclometasone dipropionate (CFC)*	200–500	>500–1000	>1000	100–200	>200–400	>400
Beclometasone dipropionate (HFA)	100–200	>200–400	>400	50-100	>100-200	>200
Budesonide (DPI)	200–400	>400–800	>800	100–200	>200–400	>400
Budesonide (nebules)				250–500	>500–1000	>1000
Ciclesonide (HFA)	80–160	>160–320	>320	80	>80-160	>160
Fluticasone furoate (DPI)	100	n.a.	200	n.a.	n.a.	n.a.
Fluticasone propionate(DPI)	100–250	>250–500	>500	100–200	>200–400	>400
Fluticasone propionate (HFA)	100–250	>250–500	>500	100–200	>200–500	>500
Mometasone furoate	110–220	>220–440	>440	110	≥220–<440	≥440
Triamcinolone acetonide	400–1000	>1000–2000	>2000	400–800	>800–1200	>1200

CFC: chlorofluorocarbon propellant; DPI: dry powder inhaler; HFA: hydrofluoroalkane propellant. *Included for comparison with older literature.

STEPWISE APPROACH FOR ADJUSTING TREATMENT

Once asthma treatment has been started, ongoing decisions are based on a cycle to assess, adjust treatment and review response. The preferred treatments at each step are summarized below and in Box 7 (p14); for details, see full GINA 2016 report. See Box 8 (p14) for ICS dose categories.

STEP 1**: **As-needed SABA with no controller (this is indicated only if symptoms are rare, there is no night waking due to asthma, no exacerbations in the last year, and normal FEV_1).
Other options: regular low dose ICS for patients with exacerbation risks.

STEP 2**: **Regular low dose ICS plus as-needed SABA
Other options: LTRA are less effective than ICS; ICS/LABA leads to faster improvement in symptoms and FEV_1 than ICS alone but is more expensive and the exacerbation rate is similar. For purely seasonal allergic asthma, start ICS immediately and cease 4 weeks after end of exposure.

STEP 3**: **Low dose ICS/LABA either as maintenance treatment plus as-needed SABA, or as ICS/formoterol maintenance and reliever therapy
For patients with ≥1 exacerbation in the last year, low dose BDP/formoterol or BUD/formoterol maintenance and reliever strategy is more effective than maintenance ICS/LABA with as-needed SABA.
Other options: Medium dose ICS
Children (6–11 years): Medium dose ICS. Other options: low dose ICS/LABA

STEP 4: ***Low dose ICS/formoterol maintenance and reliever therapy, or medium dose ICS/LABA as maintenance plus as-needed SABA***
Other options: Add-on tiotropium by mist inhaler for patients ≥12 years with a history of exacerbations; high dose ICS/LABA, but more side-effects and little extra benefit; extra controller, e.g. LTRA or slow-release theophylline (adults)
Children (6–11 years): Refer for expert assessment and advice.

STEP 5**: **Refer for expert investigation and add-on treatment
Add-on treatments include tiotropium by mist inhaler for patients with a history of exacerbations (age ≥12 years), omalizumab (anti-IgE) for severe allergic asthma, and mepolizumab (anti-IL5) for severe eosinophilic asthma (age ≥12 years). Sputum-guided treatment, if available, improves outcomes.
Other options: Some patients may benefit from low dose OCS but long-term systemic side-effects occur.

REVIEWING RESPONSE AND ADJUSTING TREATMENT

How often should patients with asthma be reviewed?

Patients should preferably be seen 1–3 months after starting treatment and every 3–12 months after that, except in pregnancy when they should be reviewed every 4–6 weeks. After an exacerbation, a review visit within 1 week should be scheduled. The frequency of review depends on the patient's initial level of control, their response to previous treatment, and their ability and willingness to engage in self-management with an action plan.

Stepping up asthma treatment

Asthma is a variable condition, and periodic adjustment of controller treatment by the clinician and/or patient may be needed.

- *Sustained step-up (for at least 2–3 months)*: if symptoms and/or exacerbations persist despite 2–3 months of controller treatment, assess the following common issues before considering a step-up
    - Incorrect inhaler technique
    - Poor adherence
    - Modifiable risk factors, e.g. smoking
    - Are symptoms due to comorbid conditions, e.g. allergic rhinitis
- *Short-term step-up (for 1–2 weeks)* by clinician or by patient with written asthma action plan (p22), e.g. during viral infection or allergen exposure
- *Day-to-day adjustment by patient* for patients prescribed low dose beclometasone/formoterol or budesonide/formoterol as maintenance and reliever therapy.

Stepping down treatment when asthma is well-controlled

Consider stepping down treatment once good asthma control has been achieved and maintained for 3 months, to find the lowest treatment that controls both symptoms and exacerbations, and minimizes side-effects.

- Choose an appropriate time for step-down (no respiratory infection, patient not travelling, not pregnant)
- Document baseline status (symptom control and lung function), provide a written asthma action plan, monitor closely, and book a follow-up visit
- Step down through available formulations to reduce the ICS dose by 25–50% at 2–3 month intervals (see full GINA report for details of how to step down different controller treatments)
- Do not completely withdraw ICS (in adults or adolescents) unless it is needed temporarily to confirm the diagnosis of asthma

INHALER SKILLS AND ADHERENCE

Provide skills training for effective use of inhaler devices

Most patients (up to 80%) cannot use their inhaler correctly. This contributes to poor symptom control and exacerbations. To ensure effective inhaler use:

- **Choose** the most appropriate device for the patient before prescribing: consider medication, physical problems e.g. arthritis, patient skills, and cost; for ICS by pressurized metered dose inhaler, prescribe a spacer.
- **Check** inhaler technique at every opportunity. Ask the patient to show you how they use the inhaler. Check their technique against a device-specific checklist.
- **Correct** using a physical demonstration, paying attention to incorrect steps. Check technique again, up to 2–3 times if necessary.
- **Confirm** that you have checklists for each of the inhalers you prescribe, and can demonstrate correct technique on them.

Information about inhaler devices and techniques for their use can be found on the GINA website (www.ginasthma.org) and the ADMIT website (www.admit-inhalers.org).

Check and improve adherence with asthma medications

Around 50% of adults and children do not take controller medications as prescribed. Poor adherence contributes to poor symptom control and exacerbations. It may be unintentional (e.g. forgetfulness, cost, misunderstandings) and/or non-intentional (e.g. not perceiving the need for treatment, fear of side-effects, cultural issues, cost).

To identify patients with adherence problems:

- Ask an empathic question, e.g. “Most patients don’t take their inhaler exactly as prescribed. In the last 4 weeks, how many days a week have you been taking it? 0 days a week, or 1, or 2 days [etc]?”, or “Do you find it easier to remember your inhaler in the morning or night?”
- Check medication usage, from prescription date, inhaler date/dose counter, dispensing records
- Ask about attitudes and beliefs about asthma and medications

Only a few adherence interventions have been studied closely in asthma.

- Shared decision-making for medication and dose choice
- Inhaler reminders for missed doses
- Reduced complexity of the regimen (once- vs twice-daily)
- Comprehensive asthma education with home visits by asthma nurses
- Clinicians reviewing feedback on their patients’ dispensing records

TREATING MODIFIABLE RISK FACTORS

Exacerbation risk can be minimized by optimizing asthma medications, and by identifying and treating modifiable risk factors. Some examples of risk modifiers with consistent high quality evidence are:

- **Guided self-management**: self-monitoring of symptoms and/or PEF, a written asthma action plan (p22), and regular medical review
- **Use of a regimen that minimizes exacerbations**: prescribe an ICS-containing controller. For patients with 1 or more exacerbations in the last year, consider a low dose ICS/formoterol maintenance and reliever regimen
- **Avoidance of exposure to tobacco smoke**
- **Confirmed food allergy**: appropriate food avoidance; ensure availability of injectable epinephrine for anaphylaxis
- **For patients with severe asthma**: refer to a specialist center, if available, for consideration of add-on medications and/or sputum-guided treatment.

NON-PHARMACOLOGICAL STRATEGIES AND INTERVENTIONS

In addition to medications, other therapies and strategies may be considered where relevant, to assist in symptom control and risk reduction. Some examples with consistent high quality evidence are:

- **Smoking cessation advice**: at every visit, strongly encourage smokers to quit. Provide access to counselling and resources. Advise parents and carers to exclude smoking in rooms/cars used by children with asthma
- **Physical activity**: encourage people with asthma to engage in regular physical activity because of its general health benefits. Provide advice about management of exercise-induced bronchoconstriction.
- **Occupational asthma**: ask all patients with adult-onset asthma about their work history. Identify and remove occupational sensitizers as soon as possible. Refer patients for expert advice, if available.
- **NSAIDs including aspirin**: always ask about asthma before prescribing.

Although allergens may contribute to asthma symptoms in sensitized patients, allergen avoidance is not recommended as a general strategy for asthma. These strategies are often complex and expensive, and there are no validated methods for identifying those who are likely to benefit.

Some common triggers for asthma symptoms (e.g. exercise, laughter) should **not** be avoided, and others (e.g. viral respiratory infections, stress) are difficult to avoid and should be managed when they occur.

TREATMENT IN SPECIAL POPULATIONS OR CONTEXTS

Pregnancy: asthma control often changes during pregnancy. For baby and mother, the advantages of actively treating asthma markedly outweigh any potential risks of usual controller and reliever medications. Down-titration has a low priority in pregnancy. Exacerbations should be treated aggressively.

Rhinitis and sinusitis often coexist with asthma. Chronic rhinosinusitis is associated with more severe asthma. For some patients with allergic rhinitis, treatment with intranasal corticosteroids improves asthma control.

Obesity: to avoid over- or under-treatment, it is important to document the diagnosis of asthma in the obese. Asthma is more difficult to control in obesity. Weight reduction should be included in the treatment plan for obese patients with asthma; even 5–10% weight loss can improve asthma control.

The elderly: comorbidities and their treatment should be considered and may complicate asthma management. Factors such as arthritis, eyesight, inspiratory flow, and complexity of treatment regimens should be considered when choosing medications and inhaler devices.

Gastroesophageal reflux (GERD) is commonly seen in asthma. Symptomatic reflux should be treated for its general health benefits, but there is no benefit from treating asymptomatic reflux in asthma.

Anxiety and depression: these are commonly seen in people with asthma, and are associated with worse symptoms and quality of life. Patients should be assisted to distinguish between symptoms of anxiety and of asthma.

Aspirin-exacerbated respiratory disease (AERD): a history of exacerbation following ingestion of aspirin or other NSAIDs is highly suggestive. Patients often have severe asthma and nasal polyposis. Confirmation of the diagnosis of AERD requires challenge in a specialized center with cardiopulmonary resuscitation facilities, but avoidance of NSAIDs may be recommended on the basis of a clear history. ICS are the mainstay of treatment, but OCS may be required. Desensitization under specialist care is sometimes effective.

Food allergy and anaphylaxis: food allergy is rarely a trigger for asthma symptoms. It must be assessed with specialist testing. Confirmed food allergy is a risk factor for asthma-related death. Good asthma control is essential; patients should also have an anaphylaxis plan and be trained in appropriate avoidance strategies and use of injectable epinephrine.

Surgery: whenever possible, good asthma control should be achieved pre-operatively. Ensure that controller therapy is maintained throughout the peri-operative period. Patients on long-term high dose ICS, or having more than 2 weeks' OCS in the past 6 months, should receive intra-operative hydrocortisone to reduce the risk of adrenal crisis.

ASTHMA FLARE-UPS (EXACERBATIONS)

A flare-up or exacerbation is an acute or sub-acute worsening in symptoms and lung function from the patient's usual status; occasionally it may be the initial presentation of asthma.

For discussion with patients, the word 'flare-up' is preferred. 'Episodes', 'attacks' and 'acute severe asthma' are often used, but they have variable meanings, particularly for patients.

The management of worsening asthma and exacerbations should be considered as a continuum, from self-management by the patient with a written asthma action plan, through to management of more severe symptoms in primary care, the emergency department and in hospital.

Identifying patients at risk of asthma-related death

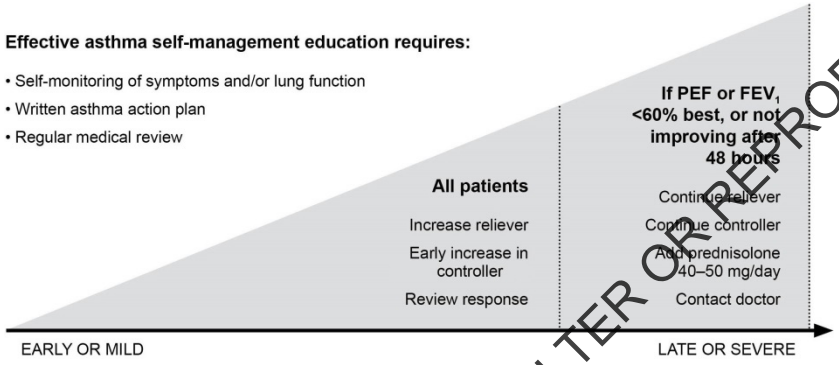
These patients should be identified, and flagged for more frequent review.

- A 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 (this indicates the severity of recent events)
- Over-use of SABAs, especially 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

WRITTEN ASTHMA ACTION PLANS

All patients should be provided with a written asthma action plan appropriate for their level of asthma control and health literacy, so they know how to recognize and respond to worsening asthma.

Box 9. Self-management with a written action plan



The written asthma action plan should include:

- The patient's usual asthma medications
- When and how to increase medications, and start OCS
- How to access medical care if symptoms fail to respond

The action plan can be based on symptoms and/or (in adults) PEF. Patients who deteriorate quickly should be advised to go to an acute care facility or see their doctor immediately.

Medication changes for written asthma action plans

Increase frequency of inhaled reliever (SABA, or low dose ICS/formoterol if using maintenance and reliever regimen); add spacer for pMDI.

Increase controller*:* Rapid increase in ICS component up to max. 2000mcg BDP equivalent. Options depend on usual controller medication, as follows:

- *ICS*: At least double dose, consider increasing to high dose.
- *Maintenance ICS/formoterol*: Quadruple maintenance ICS/formoterol dose (to maximum formoterol dose of 72 mcg/day).
- *Maintenance ICS/salmeterol*: Step up at least to higher dose formulation; consider adding separate ICS inhaler to achieve high ICS dose.
- *Maintenance and reliever ICS/formoterol*: Continue maintenance dose; increase as-needed ICS/formoterol (maximum formoterol 72 mcg/day).

Oral corticosteroids *(preferably morning dosing)*:

- Adults - prednisolone 1mg/kg/day up to 50mg, usually for 5–7 days.
- For children, 1–2 mg/kg/day up to 40mg, usually for 3–5 days.
- Tapering not needed if treatment has been given for less than 2 weeks.

MANAGING EXACERBATIONS IN PRIMARY OR ACUTE CARE

Assess exacerbation severity while starting SABA and oxygen. Assess dyspnea (e.g. is the patient able to speak sentences, or only words), respiratory rate, pulse rate, oxygen saturation and lung function (e.g. PEF). Check for anaphylaxis.

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

Arrange immediate transfer to an acute care facility if there are signs of severe exacerbation, or to intensive care if the patient is drowsy, confused, or has a silent chest. For these patients, immediately give inhaled SABA, inhaled ipratropium bromide, oxygen and systemic corticosteroids.

Start treatment with repeated doses of SABA (usually by pMDI and spacer), early oral corticosteroids, and controlled flow oxygen if available. Check response of symptoms and saturation frequently, and measure lung function after 1 hour. Titrate oxygen to maintain saturation of 93–95% in adults and adolescents (94–98% in children 6–12 years).

For severe exacerbations, add ipratropium bromide, and consider giving SABA by nebulizer. In acute care facilities, intravenous magnesium sulfate may be considered if the patient is not responding to intensive initial treatment.

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

REVIEWING RESPONSE

Monitor patients closely and frequently during treatment, and titrate treatment according to response. Transfer the patient to higher level care if worsening or failing to respond.

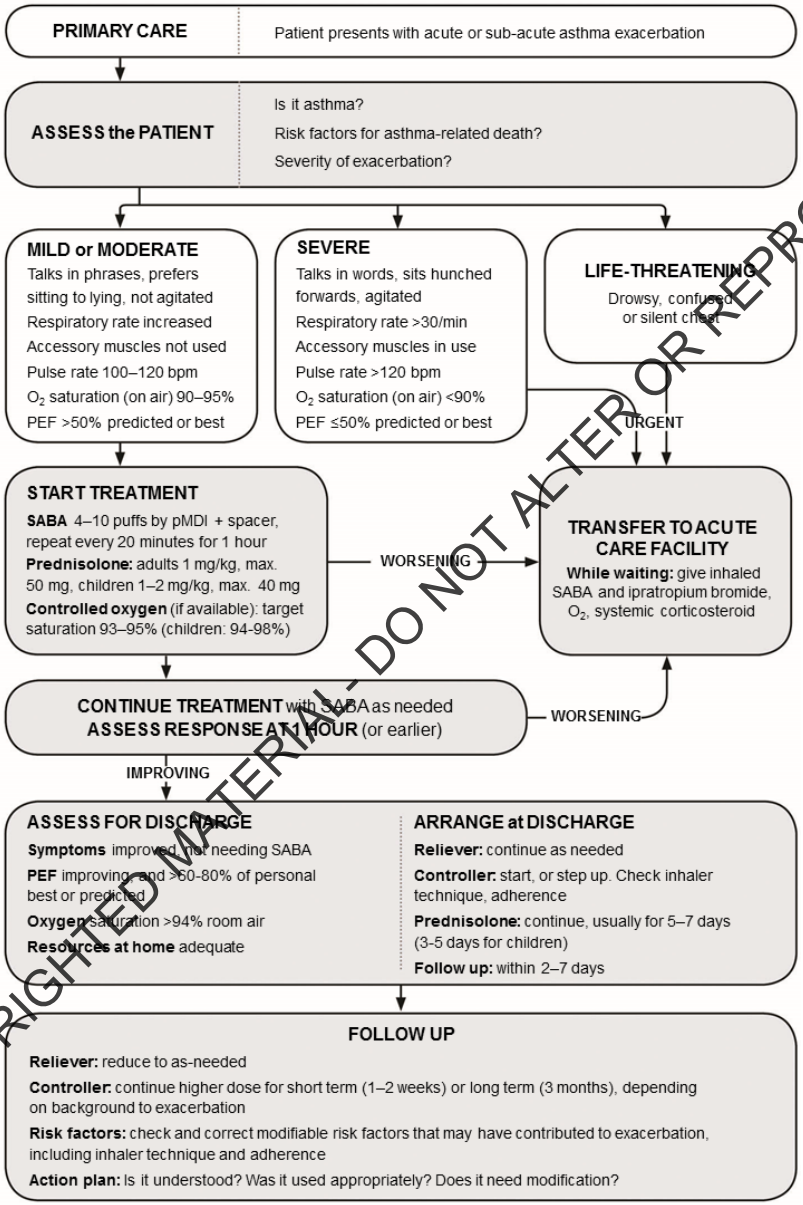
Decide about need for hospitalization based on clinical status, symptomatic and lung function, response to treatment, recent and past history of exacerbations, and ability to manage at home.

Before discharge, arrange ongoing treatment. For most patients, prescribe regular controller therapy (or increase current dose) to reduce the risk of further exacerbations. Continue increased controller doses for 2–4 weeks, and reduce reliever to as-needed. Check inhaler technique and adherence. Provide an interim written asthma action plan.

Arrange early follow-up after any exacerbation, within 2–7 days.

Consider referral for specialist advice for patients with an asthma hospitalization, or repeated emergency department presentations.

Box 10. Management of asthma exacerbations in primary care



O_2: oxygen; PEF: peak expiratory flow; SABA: short-acting beta$_2$-agonist (doses are for salbutamol)

FOLLOW-UP AFTER AN EXACERBATION

Exacerbations often represent failures in chronic asthma care, and they provide opportunities to review the patient's asthma management. **All patients must be followed up regularly by a health care provider until symptoms and lung function return to normal.**

Take the opportunity to review:

- The patient's understanding of the cause of the exacerbation
- Modifiable risk factors for exacerbations, e.g. smoking
- Understanding of purposes of medications, and inhaler technique skills
- Review and revise written asthma action plan

Discuss medication use, as adherence with ICS and OCS may fall to 50% within a week after discharge.

Comprehensive post-discharge programs that include optimal controller management, inhaler technique, self-monitoring, written asthma action plan and regular review are cost-effective and are associated with significant improvement in asthma outcomes.

Referral for expert advice should be considered for patients who have been hospitalized for asthma, or who re-present for acute asthma care.

GLOSSARY OF ASTHMA MEDICATION CLASSES

For more details, see full GINA 2016 report and Appendix (www.ginasthma.org) and Product Information from manufacturers.

Medications	Action and use	Adverse effects
CONTROLLER MEDICATIONS		
Inhaled corticosteroids (ICS) (pMDIs or DPIs) e.g. beclometasone, budesonide, ciclesonide, fluticasone propionate, fluticasone furoate, mometasone, triamcinolone	The most effective anti-inflammatory medications for persistent asthma. ICS reduce symptoms, increase lung function, improve quality of life, and reduce the risk of exacerbations and asthma-related hospitalizations or death. ICS differ in their potency and bioavailability, but most of the benefit is seen at low doses (see Box 8 (p14) for low, medium and high doses of different ICS).	Most patients using ICS do not experience side-effects. Local side-effects include oropharyngeal candidiasis and dysphonia. Use of spacer with pMDI, and rinsing with water and spitting out after inhalation, reduce local side effects. High doses increase the risk of systemic side-effects.
ICS and long-acting beta$_2$ agonist bronchodilator combinations (ICS/LABA) (pMDIs or DPIs) e.g. beclometasone/ formoterol, budesonide/formoterol, fluticasone furoate/ vilanterol, fluticasone propionate/formoterol, fluticasone propionate/ salmeterol, and mometasone/formoterol.	When a medium dose of ICS alone fails to achieve good control of asthma, the addition of LABA to ICS improves symptoms, lung function and reduces exacerbations in more patients, more rapidly, than doubling the dose of ICS. Two regimens are available: maintenance ICS/LABA with SABA as reliever, and low-dose combination beclometasone or budesonide with formoterol for maintenance and reliever treatment.	The LABA component may be associated with tachycardia, headache or cramps. Current recommendations are that LABA and ICS are safe for asthma when used in combination. Use of LABA without ICS in asthma is associated with increased risk of adverse outcomes.
Leukotriene modifiers (tablets) e.g. montelukast, pranlukast, zafirlukast, zileuton	Target one part of the inflammatory pathway in asthma. Used as an option for controller therapy, particularly in children. Used alone: less effective than low dose ICS; added to ICS: less effective than ICS/LABA.	Few side-effects except elevated liver function tests with zileuton and zafirlukast.
Chromones (pMDIs or DPIs) e.g. sodium cromoglycate and nedocromil sodium	Very limited role in long-term treatment of asthma. Weak anti-inflammatory effect, less effective than low-dose ICS. Require meticulous inhaler maintenance.	Side effects are uncommon but include cough upon inhalation and pharyngeal discomfort.
Long-acting anticholinergic (tiotropium)	An add-on option at Step 4 or 5 by mist inhaler for patients ≥12 years with a history of exacerbations despite ICS ± LABA	Side-effects are uncommon but include dry mouth.
Anti-IgE (omalizumab)	An add-on option for patients with severe persistent allergic asthma uncontrolled on Step 4 treatment (high dose ICS/LABA).	Reactions at the site of injection are common but minor. Anaphylaxis is rare.
Anti-IL5 (mepolizumab)	An add-on option for patients aged ≥12 yrs with severe eosinophilic asthma uncontrolled on Step 4 treatment (high dose ICS/LABA)	Headache and reactions at injection site are common but minor.

Medications	Action and use	Adverse effects
Systemic corticosteroids (tablets,suspension or intramuscular (IM) or intravenous (IV) injection) e.g. prednisone, prednisolone, methylprednisolone, hydrocortisone	Short-term treatment (usually 5–7 days in adults) is important early in the treatment of severe acute exacerbations, with main effects seen after 4–6 hours. Oral corticosteroid (OCS) therapy is preferred and is as effective as IM or IV therapy in preventing relapse. Tapering is required if treatment given for more than 2 weeks. Long-term treatment with OCS may be required for some patients with severe asthma.	Short-term use: some adverse effects e.g. hyperglycaemia, gastro-intestinal side-effects, mood changes. Long-term use: limited by the risk of significant systemic adverse effects e.g. cataract, glaucoma, osteoporosis, adrenal suppression. Patients should be assessed for osteoporosis risk and treated appropriately.
RELIEVER MEDICATIONS		
Short-acting inhaled beta$_2$-agonist bronchodilators (SABA) (pMDIs, DPIs and, rarely, solution for nebulization or injection) e.g. salbutamol (albuterol), terbutaline.	Inhaled SABAs are medications of choice for quick relief of asthma symptoms and bronchoconstriction including in acute exacerbations, and for pre-treatment of exercise-induced bronchoconstriction. SABAs should be used only as-needed at the lowest dose and frequency required.	Tremor and tachycardia are commonly reported with initial use of SABA, but tolerance to these effects usually develops rapidly. Excess use, or poor response indicate poor asthma control.
Short-acting anticholinergics (pMDIs or DPIs) e.g. ipratropium bromide, oxitropium bromide	Long-term use: ipratropium is a less effective reliever medication than SABAs. Short-term use in acute asthma: inhaled ipratropium added to SABA reduces the risk of hospital admission	Dryness of the mouth or a bitter taste.

Abbreviations used in this pocket guide

BDP Beclometasone dipropionate
BUD Budesonide
DPI Dry powder inhaler
FEV_1 Forced expiratory volume in 1 second
FVC Forced vital capacity
ICS Inhaled corticosteroids
LABA Long-acting beta$_2$-agonists
n.a. Not applicable
O_2 Oxygen
OCS Oral corticosteroids
PEF Peak expiratory flow
pMDI Pressurized metered dose inhaler
SABA Short-acting beta$_2$-agonists

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GINA Assembly

The GINA Assembly includes members from 45 countries. Their names are listed on the GINA website, www.ginasthma.org.

GINA PUBLICATIONS

- **Global Strategy for Asthma Management and Prevention** (updated 2016). This report, provides an integrated approach to asthma that can be adapted for a wide range of health systems. The report was extensively revised in 2014, and has been updated yearly since then. The report has a user-friendly format with many practical summary tables and flow-charts for use in clinical practice.
- **GINA Online Appendix** (updated 2016). Detailed background information to support the main GINA report.
- **Pocket Guide for asthma management and prevention for adults and children older than 5 years** (updated 2016). Summary for primary health care providers, to be used in conjunction with the main GINA report.
- **Pocket guide for asthma management and prevention in children 5 years and younger** (updated 2016). A summary of patient care information about pre-schoolers with asthma or wheeze, to be used in conjunction with the main GINA 2016 report.
- **Diagnosis of asthma-COPD overlap syndrome (ACOS)** (updated 2015). This is a stand-alone copy of the corresponding chapter in the main GINA report. It is co-published by GINA and GOLD (the Global Initiative for Chronic Obstructive Lung Disease, www.goldcopd.org).
- **Clinical practice aids and implementation tools** will be available on the GINA website.

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