POCKET GUIDE FOR ASTHMA MANAGEMENT AND PREVENTION

(for Children 5 Years and Younger)

A Guide for Health Care Professionals
Updated 2015

BASED ON THE GLOBAL STRATEGY FOR ASTHMA MANAGEMENT AND PREVENTION

GLOBAL INITIATIVE FOR ASTHMA

DIAGNOSIS and MANAGEMENT of ASTHMA in CHILDREN 5 YEARS and YOUNGER

POCKET GUIDE FOR HEALTH PROFESSIONALS

Updated 2015

PREFACE

Asthma is the most common chronic disease of childhood, and in up to half of people with asthma, symptoms begin during childhood, often early in life. School absences, emergency department visits and hospitalizations make asthma the leading cause of childhood morbidity from chronic disease. Although some risk factors for the development of asthma are known, such as allergen specific sensitization, no intervention has yet been shown to prevent the development of asthma, or modify its long-term natural course.

There are challenges involved in diagnosing and managing asthma in children aged 5 years and younger; in addition, health care providers managing asthma in young children 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 was updated in 2015.

This **Pocket Guide** is a brief summary of the GINA 2015 report for primary health care providers about diagnosis and management of asthma in children 5 years and younger. It does NOT contain all of the information required for managing asthma, for example, about safety of treatments, and it should therefore be used in conjunction with the full GINA 2015 report. 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.

The GINA 2015 report and other GINA publications (listed on page 23) can be obtained from www.ginasthma.org.

TABLE OF CONTENTS

TABLE OF FIGURES

ABBREVIATIONS USED IN THIS POCKET GUIDE

ICS	Inhaled corticosteroids	OCS	Oral corticosteroids
LABA	Long-acting beta$_2$-agonists	pMDI	Pressurized metered dose inhaler
LTRA	Leukotriene receptor antagonist	SABA	Short-acting beta$_2$-agonists

WHAT IS KNOWN ABOUT ASTHMA IN YOUNG CHILDREN?

Asthma in young children has many similarities to, as well as differences from, asthma in older age groups**.**

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 difficulty breathing air out of the lungs due to bronchoconstriction (airway narrowing), airway wall thickening, and increased mucus.

Factors that may worsen asthma symptoms include viral infections, allergens (e.g. house dust mite, pollens, cockroach), tobacco smoke, exercise and stress. These responses are more likely when asthma is uncontrolled.

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

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

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

Asthma in young children is associated with unique challenges. Wheezing occurs in many young children who do not have asthma, making diagnosis of asthma difficult. Lung function tests cannot be performed in this age group to help confirm the diagnosis. Administering medication to young children may be challenging, and many medications for asthma are poorly studied in very young children.

Fortunately…asthma in this young age group can be effectively treated, and most children can achieve good control of their asthma. When asthma is under good control, children can:

- ✓ Avoid troublesome symptoms during day and night
- ✓ Need little or no reliever medication
- ✓ Have normal, physically active lives
- ✓ Avoid severe asthma flare-ups (exacerbations, or attacks)

MAKING THE DIAGNOSIS OF ASTHMA IN YOUNG CHILDREN

Making a confident diagnosis of asthma in children 5 years and younger is difficult because episodic respiratory symptoms such as wheezing and cough are also common in children without asthma - particularly in those younger than 3 years of age. Typically, wheezing is associated with viral respiratory tract infections (colds), which occur in this age group around 6–8 times per year.

Intermittent or episodic wheezing of any severity may represent

- An isolated viral-induced wheezing episode
- An episode of seasonal or allergen-induced asthma, or
- Unrecognized uncontrolled asthma.

Asthma should be considered in any child with recurrent wheezing. However, unfortunately, there are no tests that can diagnose asthma with certainty in young children.

For this reason, **the diagnosis of asthma in young children is based largely on *symptom patterns*** (wheeze, cough, breathlessness, activity limitation and nocturnal symptoms or awakenings) **and *frequency,*** combined with a clinical assessment of family history and physical findings (Box 1).

Box 1. Features suggesting a diagnosis of asthma in children ≤5 years

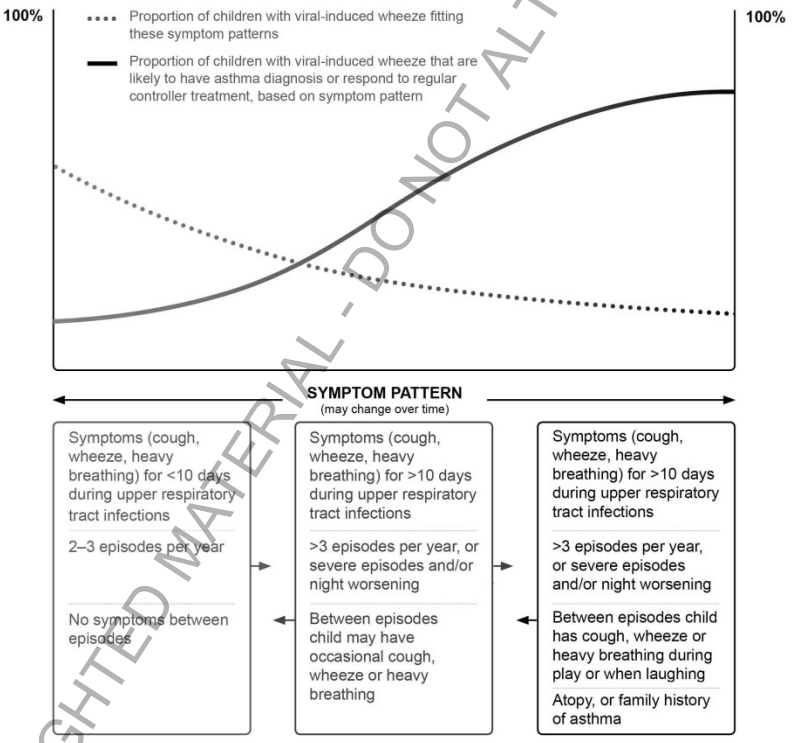
Feature	Characteristics suggesting asthma
Cough	Recurrent or persistent non-productive cough that may be worse at night or accompanied by some wheezing and breathing difficulties. Cough occurring with exercise, laughing, crying or exposure to tobacco smoke in the absence of an apparent respiratory infection
Wheezing	Occurring recurrently, during sleep or with triggers such as viral colds, activity, laughing, crying or exposure to tobacco smoke or air pollution (indoor or outdoor)
Difficult or heavy breathing or shortness of breath	Occurring with colds, 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, i.e. parents or siblings
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

ICS: inhaled corticosteroid; SABA: inhaled short-acting beta$_2$-agonist

A trial of treatment for at least 2–3 months with inhaled as-needed bronchodilator (short-acting beta agonist, SABA) and regular low-dose ICS (with a spacer) may help to confirm the diagnosis of asthma. Children who have fewer symptoms and less frequent wheezing episodes during treatment, and who deteriorate when it is stopped, are likely to have asthma. Due to the variable nature of asthma in young children, a therapeutic trial may need to be repeated in order to be more confident of the diagnosis. The reason for giving the treatment should be documented in the child's medical record.

It is important to make decisions for each child individually, to avoid either over- or under-treatment. Discussing how the probability of asthma varies based on the pattern of symptoms during and between viral respiratory infections (Box 2) may be helpful in consultations with parents/carers about whether to give a child a trial of controller treatment.

Box 2. Probability of asthma diagnosis or response to asthma treatment



If there is doubt about the diagnosis of asthma in a wheezing or coughing child, a plain chest X-ray may help to exclude structural abnormalities (e.g. congenital lobar emphysema, vascular ring), chronic infections such as tuberculosis, an inhaled foreign body, or other diagnoses.

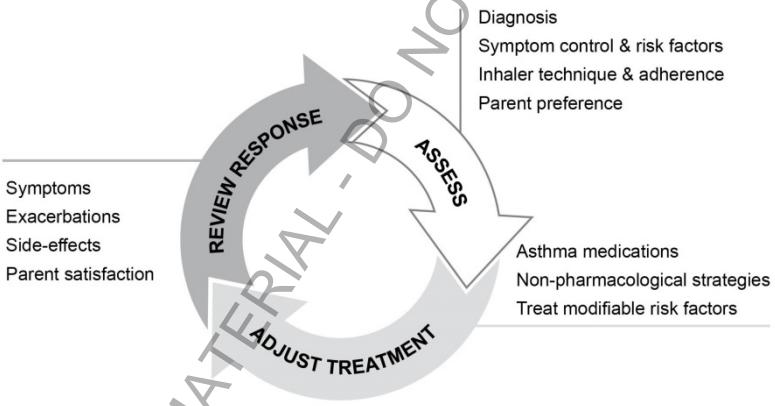
Any of the following features suggest an **alternative diagnosis** and indicate the need for further investigations or referral:

- Failure to thrive
- Neonatal or very early onset of symptoms (especially if associated with failure to thrive)
- Vomiting associated with respiratory symptoms
- Continuous wheezing
- Failure to respond to asthma controller medications
- Symptoms not associated with typical triggers, such as colds
- Focal lung or cardiovascular signs, or finger clubbing
- Hypoxemia outside context of viral illness

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 3.

Box 3. The control-based asthma management cycle in young children



ASSESSMENT OF ASTHMA IN YOUNG CHILDREN

Asthma control means the extent to which the manifestations of asthma are reduced or removed, including by treatment. Asthma control has two components: symptom control, as indicated by the child's asthma status over the previous four weeks, and future risk, meaning how asthma may affect the child in the future. Both symptom control and future risk should be monitored in order to form a complete picture of the child's asthma condition.

Assessing asthma control in children 5 years and younger

Defining satisfactory **symptom control** in this age-group is problematic. The assessment is entirely dependent on the reports of family members and carers, who may be unaware either of how often the child has experienced asthma symptoms, or that their respiratory symptoms represent uncontrolled asthma. Some children have increased **future risk** of poor outcomes, including flare-ups, even if they have few symptoms. Box 4 shows a working schema for assessing symptom control and future risk in this age group.

Box 4. Assessment of asthma control in children 5 years and younger

A. Level of asthma symptom control in young children

In the past 4 weeks, has the child had:		Well controlled	Partly controlled	Uncontrolled
Daytime symptoms for more than a few minutes, more than once a week?	Yes☐ No☐	None of these	1–2 of these	3–4 of these
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☐			

B. Risk factors for poor asthma outcomes in young children

Risk factors for flare-ups (exacerbations) in the next few months

- Uncontrolled asthma symptoms
- One or more severe exacerbation in the 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

*Excludes reliever taken before exercise.

ASTHMA MANAGEMENT IN YOUNG CHILDREN

The goals of asthma management in young children are to:

- Achieve good control of symptoms and maintain normal activity levels
- Minimize future risk – that is, reduce the risk of flare-ups, maintain lung function and lung development as close to normal as possible and minimize side effects from medications.

Asthma medications can produce good control of asthma in a majority of children. Generally, treatment includes the daily, long-term use of controller medications to keep asthma well-controlled, with reliever medications for as-needed symptom relief. The choice of inhaler device is also an important consideration (Box 7, p15). However, medications are only one component of asthma management; others include education of the child's parents and carers, skills training so that parents and carers know how to properly use inhaler devices and adhere to treatment regimens, environmental control where appropriate, regular monitoring, and clinical review. Asthma management should always be developed in a partnership between the child's family or carers and the health care provider.

ASTHMA EDUCATION FOR PARENTS AND CARERS

An educational program for family members and carers of young children who have asthma should include:

- A basic explanation of asthma and the factors that influence it
- Training in correct inhalation technique and use of inhalers with spacers
- The importance of adherence to the prescribed medication regimen
- A written asthma action plan.

Asthma education programs are more likely to succeed when parents and health care providers form a partnership with a high level of agreement regarding the goals of treatment for the child and regular follow-ups.

Health literacy and numeracy – that is, the family'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.

Asthma action plans have not been thoroughly studied in children 5 years and younger but should be provided when wheezing is suspected to be caused by asthma. A written asthma action plan should include:

- A description of how the parent or carer can recognize when symptom control is deteriorating
- Medications to administer, dosage, and method
- When and how to obtain medical care, including telephone numbers of services available for emergencies (e.g. doctors' offices, emergency rooms and hospitals, ambulance services, and emergency pharmacies).

INITIAL TREATMENT FOR CHILDREN 5 YEARS AND YOUNGER

Treatment of asthma follows a stepwise approach (Box 5, p12) with medication adjusted up or down to achieve good symptom control and minimize future risk of flare-ups and medication side effects. The need for controller treatment should be reassessed regularly.

Many children newly diagnosed with asthma, or suspected of having asthma, will begin treatment at Step 1 with a bronchodilator to be used as needed during wheezing episodes, e.g. every 3–6 hours as needed for one or more days until symptoms disappear. The same treatment is used for isolated viral-induced wheezing episodes.

Which children should be prescribed asthma controller therapy?

The indication for treatment at Step 2 (regular controller therapy) is based upon the frequency and severity of symptoms and of wheezing episodes.

Regular controller treatment should be prescribed if:

- The child's symptom pattern suggests a diagnosis of asthma and respiratory symptoms are uncontrolled (Box 4, p8)
- Wheezing episodes are frequent (e.g. three or more episodes in a season)
- Wheezing episodes are less frequent (1–2 in a season) but are severe
- The diagnosis of asthma is in doubt, and inhaled SABA therapy needs to be repeated frequently, e.g. more than 1–2 times per week. In such children, a trial of regular Step 2 controller treatment should be considered to confirm whether the symptoms are due to asthma.

The specific reason for prescribing controller therapy should be documented in the child's medical notes, and follow-up scheduled.

ASTHMA TREATMENT STEPS FOR CHILDREN 5 YEARS AND YOUNGER

In addition to the stepwise treatment below, see p16 for specific management of wheezing episodes or flare-ups (exacerbations).

STEP 1: As-needed inhaled short-acting beta$_2$-agonist (SABA)

All children who experience wheezing episodes should be provided with an inhaled SABA for relief of symptoms, although it is not effective in all wheezing children.

STEP 2: Initial controller treatment, plus as-needed SABA

For children aged 5 years and younger with any of the symptom patterns listed above, regular daily, low-dose ICS (Box 6, p12) is recommended as the preferred initial treatment to control asthma. It should be given for at least 3 months to establish its effectiveness in achieving good asthma control.

Other options: For young children with persistent asthma, regular leukotriene receptor antagonist (LTRA) may be considered as an alternative to ICS.

Intermittent ICS may be considered at this step, but first a treatment trial with as-needed SABA and *regular* low-dose ICS (with a spacer) should be undertaken for 2–3 months to facilitate a more accurate assessment of daily symptoms.

STEP 3: Additional controller treatment, plus as-needed SABA

For children whose symptoms are not well controlled after 3 months of low dose therapy, doubling the initial low dose of ICS is often the best option. Before stepping up treatment, consider alternative diagnoses, inhaler technique and adherence (see p14).

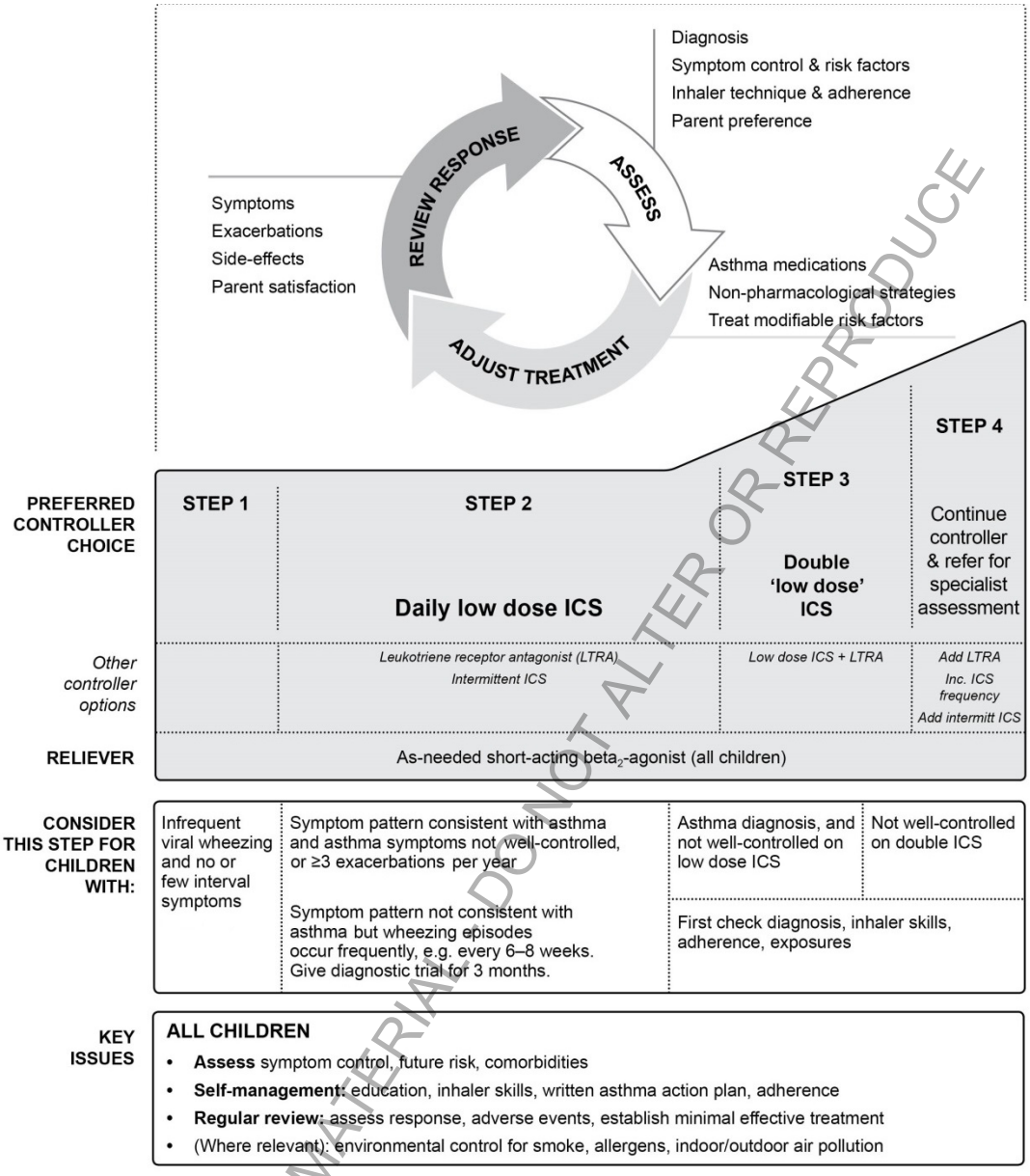
Other options: The addition of LTRA to low-dose ICS may be considered as an alternative to increasing the dose of ICS.

STEP 4: Continue controller treatment and refer for expert assessment

For children 5 years and younger whose symptoms are not well controlled with Step 3 treatment, the best treatment has not been established. Therefore, the recommendation is to refer the child for expert advice and further diagnosis and investigation.

Other options: Addition of regular LTRA or increasing the dose or frequency of ICS may be considered.

Box 5. Stepwise approach to asthma treatment in children ≤5 years



For medication Glossary, see p22. For details about treatment recommendations, supporting evidence, and clinical advice about implementation in different populations see the full GINA 2015 report (www.ginasthma.org).

Box 6. Low daily doses of inhaled corticosteroids for children ≤5 years

Drug	Low total daily dose (mcg)
Beclometasone dipropionate (HFA)	100
Budesonide pMDI + spacer	200
Budesonide nebulized	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 clinical 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. HFA: hydrofluoroalkane propellant.

REVIEWING TREATMENT RESPONSE AND ADJUSTING TREATMENT

Assessment at every visit should include asthma symptom control and risk factors (Box 4, p8), and side-effects. Because of the potential for corticosteroids to affect growth, the child's height should be measured at least every year. Parents should be asked if they have any concerns.

Stepping down treatment in children 5 years and younger

Asthma-like symptoms remit in a substantial proportion of children aged 5 years and younger, so the need for continued controller treatment should be regularly assessed (e.g. every 3–6 months).

In addition, marked seasonal variations may be seen in symptoms and exacerbations in this age group. For some children with only seasonal symptoms, daily long-term controller treatment can be discontinued (e.g. 4 weeks after their usual season ends).

If controller treatment is to be discontinued, schedule a follow-up visit 3–6 weeks later to check whether symptoms have recurred, as therapy may need to be reinstituted. The parent or carer should also be provided with a written asthma action plan detailing specific signs of worsening asthma, the medications that should be initiated (or recommenced), and when and how to contact medical care.

Before considering a step-up of controller treatment

If symptom control is poor and/or flare-ups persist despite 3 months of adequate controller therapy, check the following before any step up in treatment is considered.

- Check and instruct in correct inhaler technique
- Confirm good adherence with the prescribed dose and frequency of medication
- Enquire about risk factors such as allergen or tobacco smoke exposure
- Confirm that the symptoms are due to asthma rather than a concomitant or alternative condition.

Refer for expert assessment if the diagnosis is in doubt, or if asthma control remains sub-optimal.

CHOOSING AN INHALER DEVICE

Inhaled therapy constitutes the cornerstone of asthma treatment in children 5 years and younger (Box 5, p12). A **pressurized metered dose inhaler (pMDI) with a valved spacer** (with or without a face mask, depending on the child's age) is the preferred delivery system (Box 7). The dose delivered may vary considerably between spacers, so consider this if changing from one spacer to another.

The only possible inhalation technique in young children is tidal breathing. The optimal number of breaths required to empty the spacer depends on the child's tidal volume, and the dead space and volume of the spacer. Generally 5–10 breaths per actuation will be sufficient. The way a spacer is used can markedly affect the amount of drug delivered.

Nebulizers are reserved for the small number of children who cannot be taught effective use of a spacer device. If a nebulizer is used for delivery of ICS, it should be used with a face mask or a mouthpiece to avoid the medication reaching the eyes.

Box 7. 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

ASTHMA FLARE-UPS (EXACERBATIONS)

A flare-up or exacerbation of asthma in children 5 years and younger is defined as an acute or sub-acute deterioration in symptom control that is sufficient to cause distress or risk to health, and necessitates a visit to a health care provider or requires treatment with systemic corticosteroids. Sub-acute exacerbations are sometimes called 'episodes.'

Early symptoms of an exacerbation may include any of the following:

- An acute or sub-acute increase in wheeze and shortness of breath
- An increase in coughing, especially while the child is asleep
- Lethargy or reduced exercise tolerance
- Impairment of daily activities, including feeding
- A poor response to reliever medication.

Upper respiratory symptoms (colds) frequently precede the onset of an asthma exacerbation.

INITIAL TREATMENT AT HOME BY PARENTS OR CARERS

An asthma action plan should enable a child's family members and carers to recognize worsening asthma and initiate treatment, recognize when a flare-up (exacerbation) is severe, and identify when urgent hospital treatment is necessary. The action plan should include specific information about medications and dosages, and when and how to access medical care.

Immediate medical attention should be sought (at any stage) if:

- The child is acutely distressed
- The child's symptoms are not relieved promptly by inhaled bronchodilator
- The period of relief after inhaled SABA becomes progressively shorter
- Inhaled SABA is required repeatedly over several hours.

***Give inhaled short-acting beta$_2$-agonist (SABA) and review response*:** In the absence of any of the above factors, parents/carers may give initial treatment for an asthma flare-up at home. Treatment should be started with 2 puffs of inhaled SABA (200 mcg salbutamol or equivalent), given one puff at a time via a spacer (with or without face mask, depending on the child's age). This may be repeated a further two times at 20 minute intervals, if needed. The child should then be observed by the family/carer.

Urgent medical attention should be sought if any of the above features apply. In addition, medical attention should be sought *on the same day* if:

- More than 6 puffs of inhaled SABA are required for symptom relief within the first 2 hours
- The child has not improved after 24 hours.

Parent/carer-initiated corticosteroids: Although practiced in some parts of the world, the evidence to support the initiation of oral corticosteroid (OCS) treatment by family/carers in the home management of asthma exacerbations in children is weak. The evidence to support parent-initiated high dose ICS at the first sign of a cold or flare-up is also weak.

Because of the high potential for side effects and the demanding regimen, family-administered OCS or high-dose ICS should be considered *only* if the health care provider is confident that the medications will be used appropriately and the child will be closely monitored for side effects.

TREATMENT BY A PRIMARY HEALTH CARE PROVIDER

Assessment of exacerbation severity

Conduct a brief history and examination concurrently with the initiation of therapy (Box 8 below, Box 9, p19). The presence of any of the features of a severe exacerbation in Box 8 indicates a need for urgent treatment and immediate transfer to hospital. Other indications for immediate transfer are shown in Box 10 (p20).

Box 8. Initial assessment of acute asthma 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/minute	>200 beats/minute (0–3 years) >180 beats/minute (4–5 years)
Central cyanosis	Absent	Likely to be present
Wheeze intensity	Variable	Chest may be silent

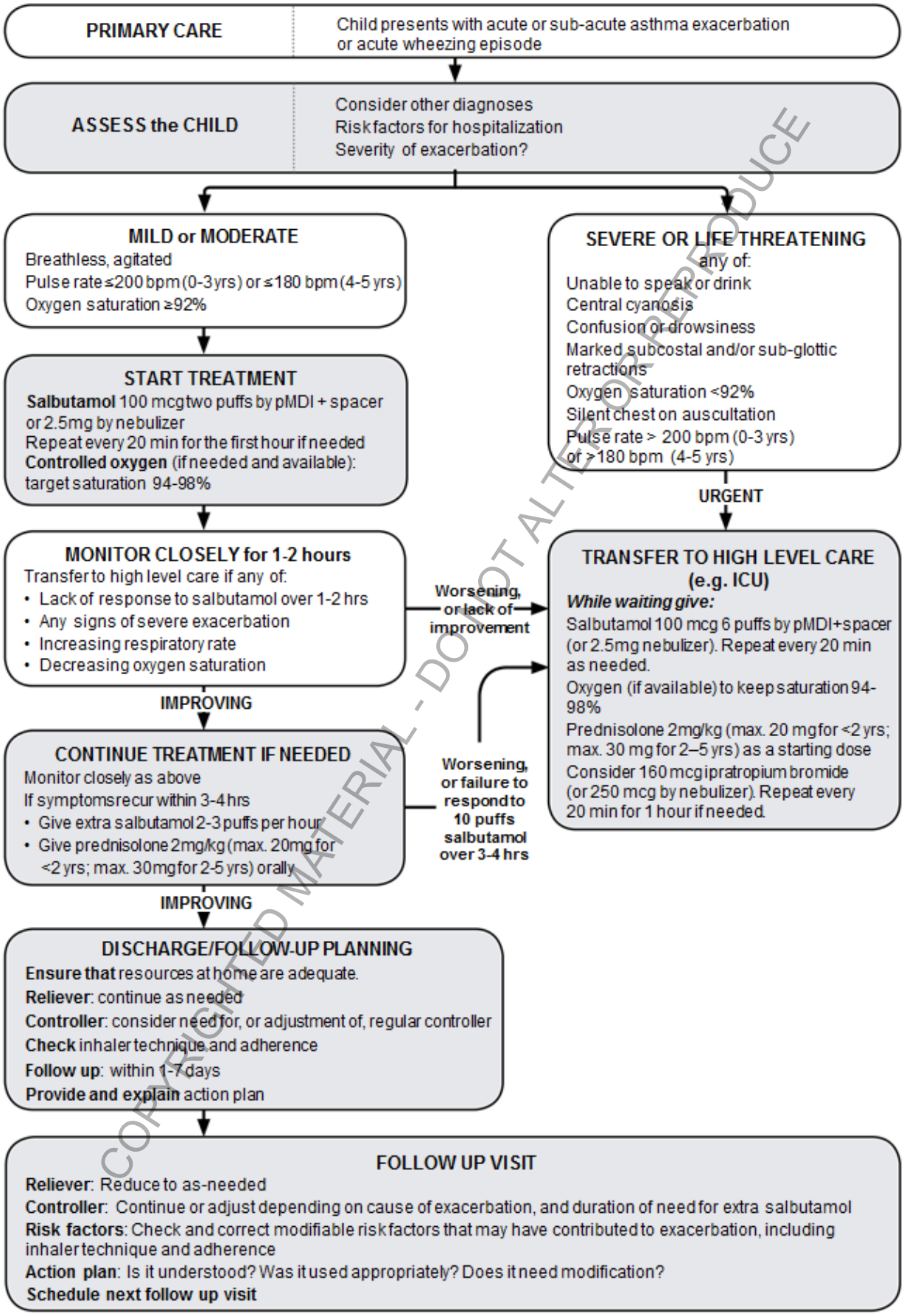
*Any of these features indicates a severe asthma exacerbation.

**Oximetry before treatment with oxygen or bronchodilator.

†The normal developmental capability of the child must be taken into account.

Oxygen saturation from pulse oximetry of <92% on presentation (before oxygen or bronchodilator treatment) is associated with high morbidity and likely need for hospitalization; saturation of 92–95% is also associated with higher risk. Agitation, drowsiness and confusion are features of cerebral hypoxemia. A silent chest on auscultation indicates minimal ventilation, insufficient to produce a wheeze. Children with any of these features should be started on treatment immediately with SABA and OCS, and oxygen if appropriate, and be transferred to hospital.

Box 9. Primary care management of acute asthma or wheezing in children ≤5 years



Initial pharmacotherapy of exacerbations in young children

Children with a mild-moderate asthma exacerbation can often be managed by the primary care physician. Treatment options normally include:

- Higher or more frequent doses of SABA depending on the initial response
- Two puffs of ipratropium bromide 80mcg (or 250 mcg by nebulizer) every 20 minutes for 1 hour only, for children who fail to respond to SABA
- Oral corticosteroids should be considered; the dose of oral prednisolone or equivalent is 2mg/kg (maximum 20 mg for children <2 yrs; 30 mg for children 2–5 yrs); 3–5 days' treatment is usually sufficient.

The child should be observed and the response to treatment monitored by the health care provider. Correct inhalation technique should be ensured.

For children with intermittent viral wheeze without interval symptoms and with insufficient effect of SABA, high dose ICS for about 7 days has been advocated, but the evidence for this is weak. Because the ICS dose should be high (around 1 mg/day) the regimen is demanding and hence likely to fail; and no data are available about the long-term safety of this treatment.

Indications for immediate transfer to hospital

For a child 5 years or younger, urgent transfer to hospital is indicated if any of the features shown in Box 10 are present.

Box 10. Indications for immediate transfer to hospital

Immediate transfer to hospital is indicated if a child 5 years or younger with asthma has ANY of the following:

- At initial or subsequent assessment
  - Respiratory arrest or impending respiratory arrest
  - Child is unable to speak or drink
  - Central cyanosis
  - Subcostal retractions
  - 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 three administrations of inhaled SABA, even if the child shows other clinical signs of improvement
- Social environment that impairs delivery of acute treatment, or parent/carer unable to manage acute asthma at home

*Normal respiratory rates: <60 breaths/minute in children 0–2 months; <50 breaths/minute in children 2–12 months; <40 breaths/minute in children 1–5 years.

Other indications for transfer to hospital are recurrence of signs of a severe exacerbation within 48 hours (particularly if treatment with OCS has already been given). In addition, early medical attention should be sought for children less than 2 years of age as the risk of dehydration and respiratory fatigue is increased.

FOLLOW-UP AFTER AN EXACERBATION

Children who have had an asthma exacerbation are at risk of further episodes and require follow up. The purpose is to ensure complete recovery and, when necessary, to establish appropriate maintenance treatment and adherence.

A child admitted to the emergency department or hospital for an asthma exacerbation should have a follow-up appointment with his or her primary care provider within 2–7 days, and another within 1–2 months, depending on the clinical, social, and practical context of the exacerbation.

At the follow up appointment, the following topics should be addressed:

- **How to recognize signs of exacerbation recurrence**: family/carers should receive instruction on recognizing and responding to signs of worsening asthma.
- **The factors that precipitated the exacerbation** should be identified, and strategies for early recognition and, when possible, avoidance of these factors implemented.
- **A written, individualized action plan**, including details of accessible emergency services, should be provided.
- **Asthma symptom control should be assessed**, and treatment adjusted if needed
- **Inhaler technique** should be reviewed carefully.
- **The use of controllers and relievers** should be covered, including an explanation that:
  - Bronchodilators should be used on an as-needed basis, but the daily requirement should be recorded to ensure it is decreasing over time to pre-exacerbation levels
  - ICS have been initiated where appropriate (at twice the low initial dose in Box 6 (p12) for the first months after discharge, then adjusted as needed) or continued. After severe flare-ups, ICS should often be continued for several months.

GLOSSARY OF ASTHMA MEDICATION CLASSES

For more details, see full GINA 2015 report and Appendix (www.ginasthma.org) and Product Information from manufacturers.

Medications	Action and use	Adverse effects
CONTROLLER MEDICATIONS		
Inhaled corticosteroids (ICS) e.g. beclometasone, budesonide, ciclesonide, fluticasone propionate, mometasone	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 6 (p12) for low doses of different ICS).	Most patients using ICS do not experience side-effects. Local side-effects include dysphonia and oropharyngeal candidiasis. 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 such as reduction in growth.
ICS and long-acting beta$_2$ agonist bronchodilator combinations (ICS/LABA) e.g. fluticasone propionate/salmeterol.	Addition of LABA to regular ICS has only been studied in children 4 years and older, and only in a small number of patients.	The LABA component may be associated with tachycardia, headache or cramps. Use of LABA without ICS in asthma is associated with increased risk of adverse outcomes.
Leukotriene modifiers (tablets) e.g. montelukast	Target one part of the inflammatory pathway in asthma. Used as an option for controller therapy. Less effective than low dose ICS.	Few side-effects.
Systemic corticosteroids (tablets,suspension or intramuscular (IM) or intravenous (IV) injection) e.g. prednisone, prednisolone, methylprednisolone, hydrocortisone	Short-term treatment (usually 3–5 days) is important early in the treatment of severe acute exacerbations. Oral therapy is preferred and is as effective as IM or IV therapy in preventing relapse. In young children, suspension is often better tolerated/accepted than tablets. Tapering is required if treatment is given for more than 2 weeks.	Short-term use: some adverse effects e.g. hyperglycaemia, gastro-intestinal side-effects, and mood changes. Long-term use: limited by the risk of significant systemic adverse effects e.g. cataract, growth inhibition, osteoporosis, adrenal suppression.
RELIEVER MEDICATIONS		
Inhaled short-acting beta$_2$-agonists (SABA) (pMDI with spacer, or nebulizer) e.g. salbutamol (albuterol), terbutaline.	Inhaled SABAs are the medications of choice for quick relief of asthma symptoms and bronchoconstriction including in acute exacerbations. SABAs should be used only as-needed at the lowest dose/frequency required.	Tremor and tachycardia are commonly reported with initial use, but tolerance to these effects usually develops rapidly. Excess use, or poor response indicate poor asthma control.
Short-acting anticholinergics (pMDIs plus spacer or nebulizer) e.g. ipratropium bromide	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.

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- **Global Strategy for Asthma Management and Prevention** (updated 2015). 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 in 2015. It has a user-friendly format with practical summary tables and flow-charts for use in clinical practice.
- **GINA Online Appendix (updated 2015).** Detailed background information to support the main report.
- **Pocket Guide for asthma management and prevention for adults and children older than 5 years** (updated 2015). Summary for primary health care providers, to be used in conjunction with the main GINA 2015 report.
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- **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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