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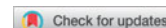
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Chinese guidelines for childhood asthma 2016: Major updates, recommendations and key regional data

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ABSTRACT

Objective: With increased industrialization and urbanization in China, pediatric asthma is becoming more prevalent. Despite a growing body of evidence, there remains a significant unmet need for adequate management of childhood asthma. The Subspecialty Group of Respiratory Diseases of the Society of Pediatrics, the Chinese Medical Association, and the editorial board of the Chinese Journal of Pediatrics have recently updated the "Guidelines for diagnosis and optimal management of asthma in children," first published in 2008. **Methods:** This article reviews the major updates to the guidelines and covers the main recommendations for diagnosis, assessment, and treatment of pediatric asthma in China. Key regional data on epidemiology, clinical features, disease burden, knowledge among children and parents, and risk factors including pollution are provided to contextualize the recommendations. **Results:** The major updates to the guidelines include: (1) A more practical definition of asthma; (2) assessment of asthma control that takes into account both current symptom control and future risk; (3) classification based on disease severity that corresponds with treatment step; (4) differentiation between difficult-to-treat and poorly controlled asthma; (5) an open-ended approach to pharmacological management; and (6) allergen immunotherapy (AIT) in mild- to moderate-persistent asthma. **Conclusions:** The updated "Guidelines for the diagnosis and optimal management of asthma in children (2016)" combine the latest national and international clinical evidence and experience to provide practical and reliable recommendations to Chinese clinicians.

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Introduction

For over 20 years, there has been a steady increase in the prevalence of asthma among children under the age of 14 in China. In 1990, 1.1% of children were affected (1), rising to 1.7% in 2000 (2), and 3.0% in 2010 (3). Compared with other countries in Asia, the overall level of asthma control among children is relatively low in China (4). Although the proportion of children with asthma on long-term controller medication has increased over the last 10 years (3), Hong and Bao highlighted that both under- and over-treatment still occur (5). In one study, almost a quarter of children treated for asthma had received more than three controller medications simultaneously, which is at odds with the reported levels of severe-persistent asthma (5). There is also a disparity

between recommended and actual management practice, caused by educational gaps and a lack of adequate disease-related knowledge among parents of children with asthma (6). Overall, there is a significant unmet need for adequate management and appropriate guidance for clinicians and parents of children with asthma in China (7).

In 2008, the Subspecialty Group of Respiratory Diseases of the Society of Pediatrics, the Chinese Medical Association, and the editorial board of the Chinese Journal of Pediatrics produced the Chinese "Guidelines for the diagnosis and optimal management of asthma in children" (8). These evidence-based guidelines build upon two earlier guidelines. "Standards for the diagnosis and classification of bronchial asthma" was first published in 1988, revised in 1993 and 1998, and eventually became

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“Conventions for the prevention and treatment of pediatric bronchial asthma (trial)” in 2003. In 2016, the 2008 guidelines were updated based on international asthma guidelines (9–13), Chinese clinical experience, and new clinical evidence. The aim of the 2016 revision was to produce practical guidelines, providing reliable, evidence-based recommendations to Chinese clinicians (14).

What are the key regional data that contextualize the guidelines?

Epidemiology

The third nationwide survey of childhood asthma revealed a significantly higher prevalence in males than females (3.5% vs. 2.3%, $p < 0.01$) (3). The prevalence of asthma was highest in pre-school children (3–5 years, 4.2%), followed by school-age children (6–14 years, 2.8%) and infants (0–2 years, 1.8%). The highest prevalence of asthma was observed in Shanghai (7.6%) and the lowest in Lhasa (0.5%). Most (87.7%) children with asthma experienced wheezing 1–5 times within the last year, and the most severe exacerbation in over half of children was rated as “moderate” (3). Almost three quarters (72.5%) of children had a history of allergic disease and nearly half (45.2%) had a family history of allergy (3). A recent study of asthma control among 4,223 Chinese children with persistent asthma aged 2–16 demonstrated that 19.9% had uncontrolled asthma (15).

Clinical features

The 2016 guidelines summarize typical symptoms of pediatric asthma to help physicians distinguish between asthma and other diseases with asthma-like symptoms, focusing on variable causes, recurrent symptoms, rhythmicity, seasonality, and reversibility (14). The guidelines note that the most common symptom is expiratory wheezing and that lung function is marked by variable expiratory airflow limitation and airway hyper-responsiveness.

Disease burden

Around a quarter of children with asthma cannot participate in physical activities or can only do so in a limited way (16). An observational study of over 4,200 Chinese children with persistent asthma showed that uncontrolled asthma causes significant limitations in physical activities, especially among 12–16 year olds (15). The survey revealed that a significantly higher proportion of children with uncontrolled asthma missed school than those with controlled asthma (15). Furthermore, parents and

caregivers were required to miss a median of between 7 (child aged 12–16) and 10 days’ work (child aged 4–11) irrespective of their child’s control status adding to indirect costs (15). Parents and caregivers of children aged 2–3 with uncontrolled asthma were required to take significantly longer periods of absence than those whose child’s asthma was controlled (median 20 days vs. 10 days over 1 year) (15). In a survey conducted in Beijing, the families of almost 40% of children with asthma had spent over 10,000 RMB (almost \$1,500) on asthma-related treatment (16).

Children and parents’ knowledge and awareness of asthma

In a survey of disease-related knowledge, conducted among the parents of children with asthma from 29 Chinese cities, only 18.3% answered $\geq 60\%$ of questions correctly (6). Since more than 80% parents preferred accessing asthma knowledge directly from physicians (6), the 2016 guidelines recommend individualized physician-led outpatient education as the primary source of information.

Risk factors

With the increasing industrialization and urbanization in recent years, environmental pollution is now a serious problem in China, and smog is a major cause of concern in many cities. Environmental pollution is associated with the occurrence of asthma symptoms in children (17,18). High levels of fine particles ($PM_{2.5}$), NO_2 and SO_2 are significantly associated with decreased lung function (forced expiratory volume in 1 sec [FEV_1] and peak expiratory flow [PEF] rate) (19). A study conducted in Shanghai showed that high dose-dependent concentrations of black carbon (relative risk [RR] = 1.06; 95% confidence interval [CI], 1.05–1.07) and $PM_{2.5}$ (RR = 1.03; 95% CI, 1.02–1.05) were significantly correlated with an increased risk of hospitalization among children with asthma after adjusting for NO_2 and SO_2 concentration (20). The effect of indoor environment intervention on the prevention and treatment of pediatric asthma is included as a “future research area” in the 2016 guidelines.

Mechanism and pathophysiology of pediatric asthma

The relationship between pathophysiology, children’s clinical phenotypes, and treatment response is still unclear (21). Since there is a large overlap between different phenotypes and the interchange rate of two different

phenotypes within 1 year can be as high as 40% (5), current descriptions of clinical phenotypes are of limited use. The 2016 guidelines avoid detailed descriptions of pathophysiology and phenotypes, and recommend that physicians do not base diagnoses and treatment decisions upon them.

What are the major updates to the 2016 guidelines?

A more practical definition of asthma

“Bronchial asthma is a heterogeneous disease characterized by chronic airway inflammation and airway hyper-responsiveness. Clinical symptoms include recurrent wheeze, cough, shortness of breath, and chest tightness. Symptoms usually occur or worsen during the night and/or early morning. Presentation and intensity of symptoms will change over time, and patients always experience variable expiratory airflow limitation.” This definition, similar to that of the Global Initiative for Asthma (GINA) (22), replaces the lengthy 2008 definition by omitting detailed descriptions of asthma pathophysiology. Instead, the focus is on the two clinical features required for diagnosis, namely respiratory symptoms and variable expiratory airflow limitation. Emphasis is placed on the heterogeneity of asthma and multiple clinical phenotypes establishing an individualized management approach.

Assessment of asthma control should take into account both current symptom control and future risk

Three classification systems are included in the 2016 guidelines, based on control level, exacerbation severity, and disease severity. Long-term management plans should be principally guided by control level-based classification. It is important to note that even in patients with well-controlled symptoms, there may be a future risk of exacerbations due to additional factors such as poor adherence (9,23), high use of short-acting β_2 agonists (SABA) (24), exposure to allergens (25), or obesity (26).

The main factors associated with poor prognosis are acute exacerbations, low lung function as measured by FEV₁, and drug-related adverse events. Future risk should be monitored via lung function testing at diagnosis, after 3–6 months of treatment (to establish the patient’s “personal best”), and regularly thereafter. A retrospective study of 13,842 children seen annually over a 15-year interval showed that FEV₁ is an independent predictor for exacerbation. When FEV₁ <60% of predicted, the risk of future exacerbation is 2–5 times greater than when FEV₁ >80% of predicted (27) and stepping up

treatment should be considered. Classification of exacerbation severity enables a quick assessment to facilitate guided treatment in a timely manner during or soon after an exacerbation. Classification based on disease severity should be based, retrospectively, on the level of treatment required to achieve control after several months (9,14).

Classification based on disease severity corresponds with treatment step

Mild asthma should be well controlled with Step 1–2 treatment, moderate asthma should be well controlled with Step 3 treatment, and severe asthma should be well controlled with Step 4–5 treatment. In China, classification of patients by disease severity is commonplace in many epidemiological, clinical, and preclinical studies. By linking disease severity with treatment step, clinicians are in a better position to understand and implement the findings of these studies. However, it is important to note that assessing asthma severity by treatment step is only applicable to patients whose asthma is well controlled with their current treatment and should be distinguished from pretreatment severity.

Differentiating between difficult-to-treat and poorly controlled asthma

The definition of difficult-to-treat asthma is still under debate. It should be noted that suboptimal outcomes usually result from inappropriate choice of treatment regimens, poor medication adherence, incorrect inhaler technique, or the existence of comorbidities. Once these factors have been excluded, a diagnosis of difficult-to-treat asthma should be made if, after 3–6 months’ treatment with moderate to high-dose inhaled corticosteroid/long-acting β_2 agonist (ICS/LABA) combined with ≥ 2 other controllers, asthma remains inadequately controlled (5,14). Genuine cases of difficult-to-treat asthma are rare in the pediatric population (5). Overall, it is estimated that only 5–10% of patients have difficult-to-treat asthma (28).

An open-ended management flow chart

Unlike GINA’s three-part management cycle, “assess, adjust treatment, review response” (22), the Chinese guidelines promote an open-ended management approach. The recommended management approach includes intensified initial treatment, timely step-up and step-down, pre-emptive and intermittent interventions, and regular monitoring (Figure 1).

Intensified initial treatment with a high-dose controller, followed by stepping down after a short period (4–8 weeks), provides better short-term efficacy in controlling airway hyper-responsiveness compared with low

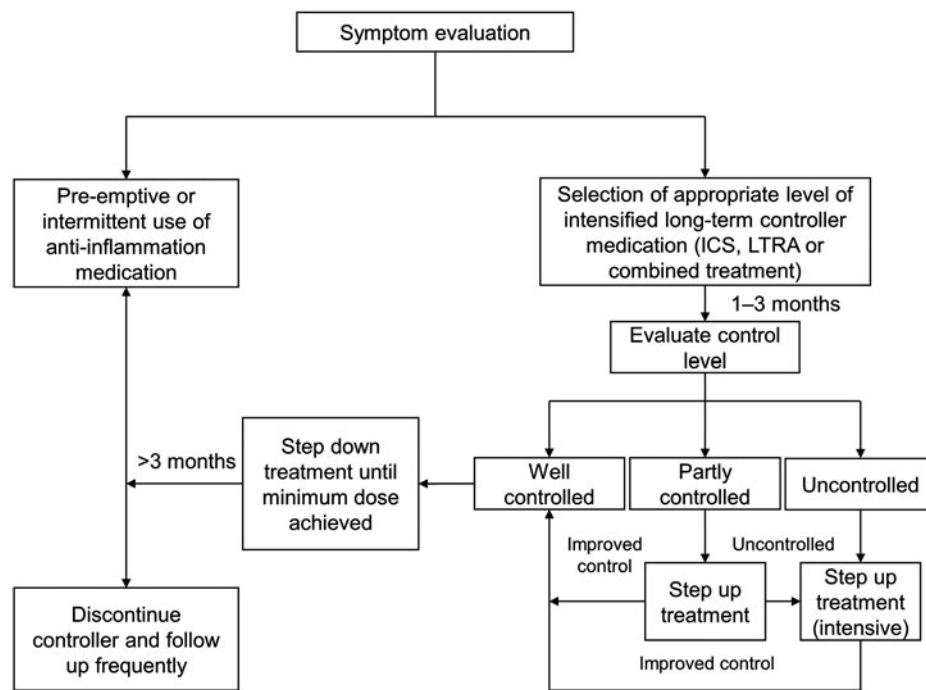


Figure 1. Management flow for pediatric asthma. ICS, inhaled corticosteroid; LTRA, leukotriene receptor antagonist.

to medium starting doses of ICS (29). In a study of 191 Chinese patients with moderate-persistent asthma, a high initial dose of ICS/LABA improved symptoms and lung function faster than a low initial dose, with significantly improved short-term efficacy ($p < 0.05$) (30). Efficient intensified initial treatment may help to build the patient's confidence in the treatment plan and increase medication adherence. Timely step-up and step-down is crucial to avoid under- and over-treatment. Non-pharmacological factors that may have a detrimental effect on control, such as treatment non-compliance, incorrect diagnosis and comorbidities (e.g. gastroesophageal reflux disease and obesity), must be ruled out before stepping up (14). The long-term safety of pre-emptive intervention is unclear and clinical trials are needed to fully evaluate safety and efficacy in the pediatric population. However, a randomized, placebo-controlled, clinical study showed that in children with virus-induced wheezing, pre-emptive intervention with high-dose ICS reduced the frequency of rescue oral corticosteroid use (odds ratio [OR], 0.49; 95% CI, 0.30–0.83) and the duration of symptoms by 1–2 days (31). When instigating pre-emptive intervention, potential adverse effects caused by high-dose ICS should be closely monitored (9). The pre-emptive intervention period should be limited to 5–10 days and the drug administered via multiple doses over the course of each day. Studies have shown that daily low-dose ICS did not reduce the frequency of exacerbation compared with symptom-based usage of high-dose ICS, but resulted in a higher accumulated

dose (32). Symptom-based, intermittent intervention can improve patient compliance and provide efficient anti-inflammation therapy as needed but the approach is highly dependent on children and parents' knowledge of asthma symptoms (7).

Since a long-running population-based survey showed that the remission rate of childhood asthma was 65%, (33), in many cases it may be appropriate to discontinue medication. If discontinuation is deemed appropriate, an initial follow-up visit within 2–4 weeks and regular, long-term follow-ups should be scheduled (14). If asthma symptoms resurface, monitoring and intervention may be required (7). In cases of mild, occasional symptoms, discontinue medication again after symptom relief. For moderate, non-frequent symptoms restart the previous treatment regimen. In cases of severe or frequent symptoms, a step-up in treatment may be considered.

Allergen immunotherapy (AIT) in mild to moderate-persistent asthma

Allergic rhinitis affects 50% of children with asthma in urban areas (3). Allergy is one of the most important risk factors for the development of persistent asthma in younger children, and atopic status should be assessed in every child with asthma (7). Allergen immunotherapy (AIT) improves a patient's tolerability to an allergen by repeated exposure to increasing doses of the allergen (34). AIT is indicated in mild- to moderate-persistent asthma that cannot be controlled with medication

and allergen avoidance or in asthma presenting with allergic rhinitis. In Chinese children, the allergens used in AIT are mainly derived from dust mites. Measurement of allergen-specific immunoglobulin E (IgE) level is a widely accepted method to identify external allergens. Prior to initiating AIT, an emergency response plan to deal with potential adverse events should be in place. Patients should be observed for a minimum of 30 min following the introduction of the allergen.

What are the main recommendations for diagnosis, assessment, and treatment of pediatric asthma?

Tests and diagnostic tools

A diagnosis of pediatric asthma can be based either on the presentation of typical respiratory symptoms or on lung function test results (14). A lung function test is not mandatory but can provide objective evidence of variable expiratory airflow limitation and is encouraged to avoid over-diagnosis. Results from lung function tests that support a diagnosis of asthma include an increase in FEV₁ of $\geq 12\%$ 15 min after inhalation of SABA or following 4–8 weeks' treatment with ICS and/or leukotriene receptor antagonist (LTRA), or an average of $\geq 13\%$ variability in daily diurnal PEF. Physicians should be aware that other diseases can cause similar symptoms and should be ruled out prior to a diagnosis of asthma to avoid over-diagnosis. Missed diagnoses are also the cause for concern and may occur in up to 30% of children with asthma in urban areas of China (3).

Signs to aid diagnosis of pediatric asthma in children <6 years

Pediatric asthma usually starts before the age of 3, and among children with persistent asthma lung function damage often occurs before they reach school age. "Pre-school wheeze" can affect around one-third of children between the ages of 1 and 6 and, although asthma is a frequent cause, other factors may be involved. Therefore, identifying children who have the potential to develop persistent asthma and initiating treatment early is a priority (35). However, no specific testing or indicators are available for confirming a diagnosis of pediatric asthma in pre-school children. For children without typical clinical features, the frequency and severity of symptoms and exacerbations, and the existence of asthma risk factors are the main considerations when determining the likelihood of developing persistent asthma and whether long-term controller treatment is necessary. The following features are highly suggestive of a diagnosis of asthma in wheezing

children: (1) Wheezing that occurs with a frequency of more than once a month; (2) exercise-induced cough or wheeze; (3) an intermittent nocturnal cough that is not caused by viral infection; (4) continued wheezing after the age of 3 years; (5) anti-asthmatic treatment is effective and symptoms recur after treatment discontinuation. If asthma is suspected, a closely monitored trial treatment can be initiated immediately. If the child responds well to treatment, a diagnosis of asthma can be confirmed. Conversely, if there is no obvious improvement after 4–8 weeks, treatment discontinuation and re-evaluation of the diagnosis are recommended. Ultimately, most pre-school children with asthma have a good prognosis and outgrow their symptoms. In these children, regular (3–6 monthly) re-evaluation must be scheduled to decide whether treatment should continue.

Clinical phasing

The 2016 guidelines divide the course of pediatric asthma into three phases: acute exacerbation phase, chronic persistent phase, and clinical remission phase (14). To our knowledge, the concept of the clinical remission phase is unique to the Chinese guidelines. However, there is only anecdotal evidence from clinical experience and a lack of support from clinical studies (36). Clinical remission is defined as a state in which asthma symptoms remit and lung function restores to pre-exacerbation levels for ≥ 3 months (36). Airway hyper-responsiveness may still be present during the clinical remission phase (36).

Treatment strategies

Goals and principles

Treatment goals include symptom control, lung function improvement, and minimization of future risks (acute exacerbation and death) and adverse effects of treatment. Pharmacological management based on symptom control should be started as early as possible following the principles of long-term, continuous, individualized treatment. Non-pharmacological interventions such as patient education and allergen avoidance remain important tools in the long-term management of pediatric asthma.

Individualized management strategy

The stepwise management plan differs between children aged ≥ 6 (Figure 2) and <6 (Figure 3).

Reliever therapy

Inhaled SABA (commonly salbutamol or terbutaline) is the recommended reliever medication for children of all

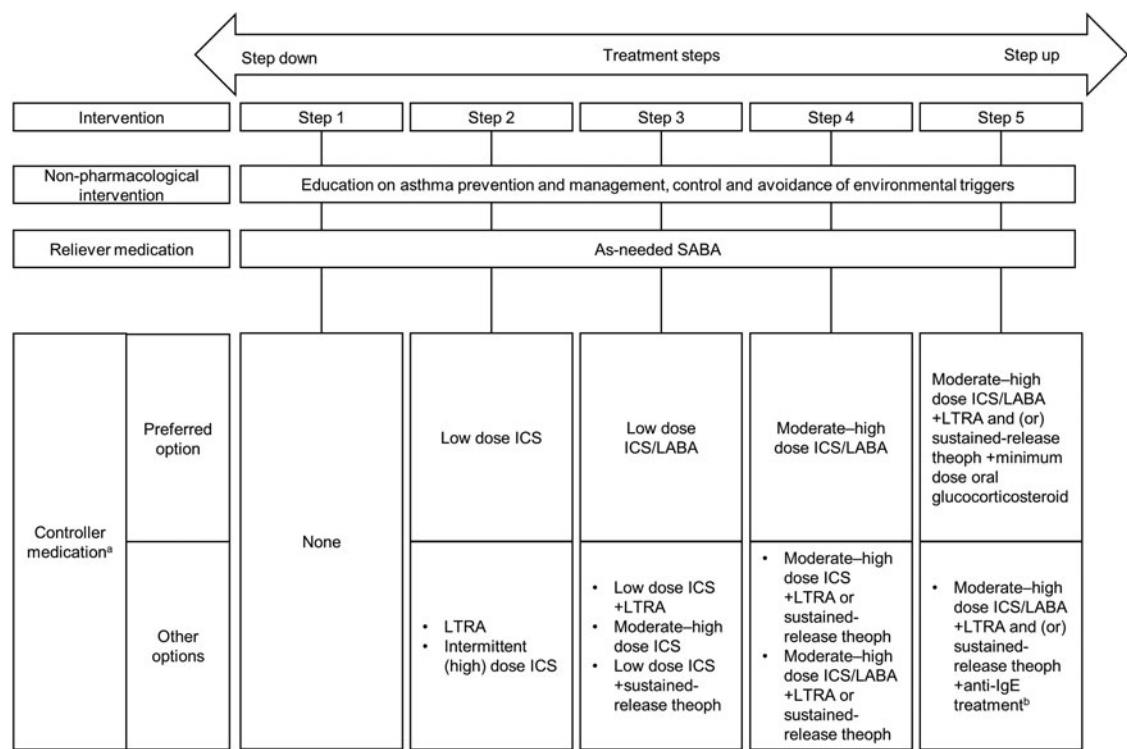


Figure 2. Long-term treatment plan for children ≥ 6 years. ^aICS dosing equivalents are given in Table 1. ^bAnti-IgE treatment is only suitable for children ≥ 6 years. ICS, inhaled corticosteroid; LABA, long-acting β_2 agonist; LTRA, leukotriene receptor antagonist; SABA, short-acting β_2 agonist; theoph, theophylline.

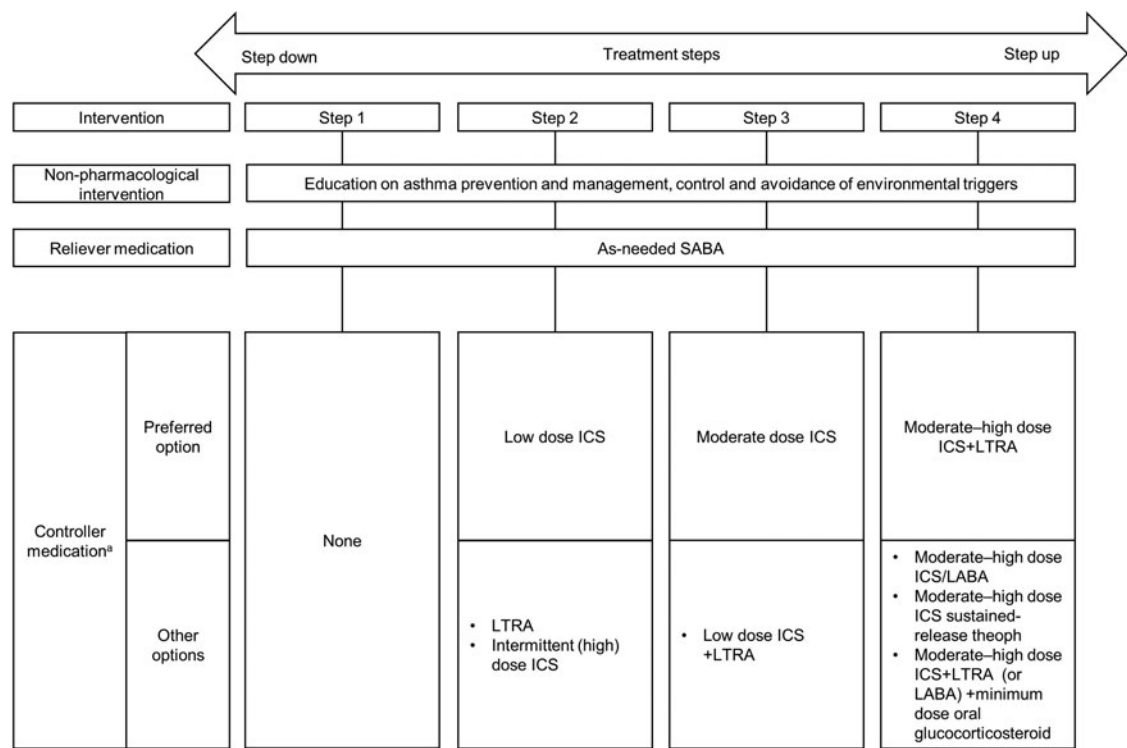


Figure 3. Long-term treatment plan for children < 6 years. ^aICS dosing equivalents are given in Table 2. ICS, inhaled corticosteroid; LABA, long-acting β_2 agonist; LTRA, leukotriene receptor antagonist; SABA, short-acting β_2 agonist; theoph, theophylline.

Table 1. Daily inhaled glucocorticoid dose conversion for children ≥ 6 years (μg)^a.

Drug	Low dose		Medium dose		High dose	
	<12 years	≥ 12 years	<12 years	≥ 12 years	<12 years	≥ 12 years
Beclomethasone dipropionate (CFC)	100–200	200–500	~400	~1,000	>400	>1,000
Beclomethasone dipropionate (HFA)	50–100	100–200	~200	~400	>200	>400
Budesonide (DPI)	100–200	200–400	~400	~800	>400	>800
Budesonide (nebulized)	250–500	NA	~1,000	NA	>1,000	NA
Fluticasone propionate (HFA)	100–200	100–250	~500	~500	>500	>500

^aNote. This conversion does not show equivalent doses between drugs, but indicates clinical comparability between the listed drugs. Low-dose ICS treatment is effective for most children with asthma. CFC: chlorofluorocarbon propellant; HFA: hydrofluoroalkane propellant; DPI: dry powder inhaler; NA: not applicable.

Table 2. Low daily inhaled glucocorticoid dose conversion for children <6 years (μg)^a.

Drug	Low daily dose
Beclomethasone dipropionate (HFA)	100
Budesonide pMDI + spacer	200
Budesonide nebulized	500
Fluticasone propionate (HFA)	100

^aThe doses shown are relatively safe for children <6 years. HFA: hydrofluoroalkane propellant; pMDI: pressurized metered dose inhaler.

ages. For patients at Step 1, additional medications are usually unnecessary.

Controller therapy for children ≥ 6 years

The recommended controller at Step 2 is low-dose ICS (commonly beclomethasone dipropionate, budesonide, or fluticasone propionate [Figure 2, Table 1]). Other options include LTRA (usually montelukast, despite having a lower efficacy than ICS) or intermittent high-dose ICS. LTRA can be used as monotherapy for mild-persistent asthma. Controllers should be used regularly and the dose should be stepped up or down in response to asthma control levels. ICS plus LABA (usually salmeterol or formoterol) is the preferred option for stepping up: low dose at Step 3; moderate to high dose at

Step 4; moderate to high dose plus an additional controller (LTRA, theophylline, oral corticosteroid, or anti-IgE) at Step 5.

Controller therapy for children <6 years

Low-dose ICS should be used at Step 2 and stepped up if symptoms remain uncontrolled (Figure 3, Table 2). Moderate dose at Step 3 and moderate to high dose plus LTRA at Step 4. LTRA should be considered in children unwilling or unable to receive ICS.

Treatment during the clinical remission phase

Children should be monitored for signs of exacerbations and appropriate preventative measures taken accordingly. While the general principle is to maintain long-term treatment, physicians should adjust the dose of controller medications based on the patients' control status. In some case, discontinuation can be considered.

Treatment of acute exacerbations

Grading of exacerbation severity differs between children aged ≥ 6 (Table 3) and <6 (Table 4).

Table 3. Exacerbation severity grading for children ≥ 6 years^a.

Symptoms	Mild	Moderate	Severe	Critical severe
Shortness of breath	When walking	When speaking	At rest	Incomplete breath
Position	Can lie down on the back	Prefers sitting	Lordotic	Unpredictable
Speech	Can complete a sentence	Short sentences	Single words	Unable to speak
Altered consciousness	Periods of anxiety and agitation	Always anxious and agitated	Always anxious and agitated	Drowsy, confused
Use of accessory respiratory muscles	Never	Sometimes	Always	Active expiration
Wheezing	Scattered, end stage of breath	Loud, diffuse	Loud, diffuse, during both expiration and inspiration	Diminished or absent
Pulse rate	Mild increase	Increase	Significant increase	Decrease or irregular
PEF % (predicted normal or best recorded value)	After SABA treatment: >80%	Before SABA treatment: >50–80% After SABA treatment: >60–80%	Before SABA treatment: $\leq 50\%$ After SABA treatment: $\leq 60\%$	Unable to complete the examination
Blood oxygen saturation (in air)	90–94% ^b	90–94% ^b	90%	<90%

^aYoung children are more susceptible to hypercapnia (hypoventilation) than older children and adults.

^bThe upper limit of this range is slightly lower than that of GINA (90–95%) (22). PEF, peak expiratory flow; SABA, short-acting β_2 agonist.

Table 4. Exacerbation severity grading for children <6 years.

Symptoms	Mild	Severe ^a
Speech ^b	Can complete a sentence	Single words
Altered consciousness	None	Anxious, agitated, drowsy, or unconscious
Wheezing	Present	Diminished or absent
Pulse rate (beats/min)	No significant tachycardia	>200 (0–3 years) >180 (4–5 years)
Blood oxygen saturation (prior to treatment) ^c	≥92%	<92%
Cyanosis	Absent	May be present

^aThe presence of any of these symptoms indicates a severe exacerbation.

^bThe normal developmental capability should be taken into consideration.

^cThis should be the value before oxygen therapy and bronchodilator treatment.

The 2016 guidelines emphasize the importance of first response by children and/or their parents. At the first sign of an exacerbation, an inhaled SABA should be administered. If symptoms persist for ≥4 h, the child should be sent to hospital immediately, where the following treatment options may be considered:

1. Oxygen: Maintain oxygen saturation >94% via nasal cannula or oxygen mask (9,10).
2. Inhaled SABA: First-line pharmacological treatment. Nebulized salbutamol or terbutaline (2.5 mg for children ≤20 kg, 5 mg for children >20 kg), one inhalation every 20 min over the first hour, then gradually extend dosing interval according to response (every 1–4 h) (10,37).
3. Glucocorticoids: In China, oral corticosteroids are rarely used for the treatment of exacerbations, and management of exacerbations in primary care differs from that of GINA (22) by including the use of high dose of ICS or parenteral use of glucocorticoids. Oral prednisone or prednisolone 1–2 mg/kg/day (9,10). Intravenous methylprednisolone (1–2 mg/kg) or hydrocortisone succinate 5–10 mg/kg every 4–8 h (8,10). High-dose nebulized ICS (budesonide 1 mg, beclomethasone propionate 0.8 mg) every 6–8 h (38) may be used in less severe cases but should not replace systemic glucocorticoid treatment in severe cases (8–10).
4. Anticholinergic drugs: The bronchodilating effect of short-acting anticholinergic drugs (SAMA) is integral to the treatment of exacerbations. Ipratropium bromide 0.25 mg for children ≤20 kg, ipratropium bromide 0.5 mg for children >20 kg in combination with β_2 -agonist (8) or alone (37).
5. Magnesium sulfate: A slow infusion of magnesium sulfate (25–40 mg/kg [≤ 2 g/day] in 10% glucose) may help relieve symptoms (8,9).
6. Theophylline: Due to the narrow treatment window and reduced potency in comparison to SABA, theophylline is not generally recommended (9,37).

However, a slow infusion of theophylline (loading dose 4–6 mg/kg [≤ 250 mg] followed by maintenance dose 0.7–1 mg/kg/h) may be considered if the above treatments have not adequately controlled the exacerbation (8).

7. Mechanical ventilation: If symptoms worsen despite the above treatments and there are signs of respiratory failure, mechanical ventilation should be initiated promptly (8,9).

Conclusion

With increased industrialization and urbanization in China, pediatric asthma is becoming more prevalent. Despite a growing body of evidence, there remains a significant unmet need for adequate management of childhood asthma. The updated “Guidelines for the diagnosis and optimal management of asthma in children (2016)” combine the latest national and international clinical evidence and experience to provide practical and reliable recommendations to Chinese clinicians.

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Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

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