

**ABSTRACT**

The diagnosis of paediatric asthma is confounded by the fact that history is obtained from a caregiver and often, not from the child experiencing the symptoms. This is fraught with the difficulties of perception of the parents. Furthermore, there is increasing recognition that there are several wheezing phenotypes in children, and not just what has been classically known as asthma. These different wheezing phenotypes respond quite differently to current asthma medications. Inhaled glucocorticosteroids are the most effective drugs for treating asthma. However, for viral-induced wheezing, leukotriene receptor antagonists have been shown to reduce asthma exacerbations better than inhaled steroids. The goal of treatment is to achieve control which encompasses adequate drug therapy, patient education and identifying and reducing exposures to risk factors. The GOAL Study has demonstrated that it is possible to achieve total control in the majority of patients with adequate treatment. With optimal treatment, children with asthma can lead a normal life without restrictions.

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**INTRODUCTION**

Paediatric asthma is not adult asthma in little people. One major difficulty with paediatric asthma is in making an accurate diagnosis of asthma. Wheezing in children is common, especially in the presence of viral illnesses. The recognition is that not all recurrent wheezing in children is due to asthma and that there are several wheezing phenotypes which respond quite differently to current asthma medications. The ability to differentiate these various wheezing phenotypes will better guide the appropriate management of these patients.

**DIAGNOSIS OF ASTHMA**

The diagnosis of asthma in early childhood still remains a challenge and is based largely on clinical judgment and an assessment of symptoms and physical findings. Three categories of wheezing have been described by Martinez et al<sup>1</sup> in their cohort study in children aged 5 years and younger:

- κ **Transient early wheezing**, which is often outgrown in the first 3 years. This is associated with prematurity and parental smoking.
- κ **Persistent early-onset wheezing**: children who wheeze before age 3 and the episodes of wheezing are associated with acute viral infections. In children with viral-induced wheezing, they have no family history of atopy.
- κ **Late-onset wheezing/asthma**: children with asthma that often persists throughout childhood and may persist into adult life. They typically have an atopic background and a positive family history of asthma.

A simple clinical index based on the presence of a wheeze before age 3 and the presence of 1 major risk factor (parental history of asthma or eczema) or 2 of 3 minor risk factors (eosinophilia, wheezing without colds, and allergic rhinitis) has been shown to predict the presence of asthma in later childhood<sup>2</sup>.

Use of spirometry and other lung function measures are difficult to perform in young children below the age of 5 years old and are not suitable for routine use. A trial of treatment with short-acting bronchodilators and inhaled glucocorticosteroids with marked clinical improvement supports the diagnosis of asthma.

**ASTHMA TREATMENTS**

The goal of treatment is to achieve and maintain control. Medications to treat asthma can be divided into controllers or relievers. Controllers are medications taken daily on a long-term basis to keep asthma under control. They include inhaled glucocorticosteroids, leukotriene receptor antagonists, and combination therapies with long-acting beta agonists and glucocorticosteroids, anti-IgE and other steroid-sparing therapies. Relievers are used on an as-needed basis to quickly reverse bronchoconstriction and relieve symptoms. The most commonly used relievers are inhaled short-acting beta agonists.

Inhaled therapy is the preferred route as the drugs are delivered directly to the airways, producing higher local concentrations with significantly less risk of systemic side effects. Inhaled medications available as metered-dose inhalers (MDIs), breath-actuated MDIs or dry powder inhalers have been shown to be as effective as nebulisers, even when used during an asthma exacerbation<sup>3</sup>. In general, a metered-dose inhaler with spacer is preferable to nebulised therapy due to its convenience, more effective lung deposition, lower risk of side effects, and lower cost.

Inhaled glucocorticosteroids are the most effective controller therapy for asthma in children with rapid improvement in symptoms and lung function, even at low

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doses of inhaled glucocorticosteroids (<400mcg budesonide daily)<sup>4-7</sup>. Duration of treatment should continue till bronchial hyper-responsiveness improves. When the glucocorticosteroids are discontinued, the children have to be monitored as asthma control may deteriorate within weeks to months<sup>8</sup>. In terms of safety of inhaled steroids, adult final height is not decreased at doses of 400mcg inhaled budesonide or equivalent per day<sup>9</sup>.

Leukotriene receptor antagonists are beneficial in asthma, but generally less than that of inhaled glucocorticosteroids<sup>10-13</sup>. They provide partial protection against exercise-induced bronchoconstriction<sup>14-15</sup> and are effective as add-on therapy in children whose asthma are insufficiently controlled on low-doses of inhaled steroids alone<sup>16-17</sup>. For young children, leukotriene receptor antagonist have been shown to reduce viral-induced asthma exacerbations in children aged <5 years with a history of intermittent asthma<sup>18</sup>.

Long-acting inhaled beta-agonists are primarily used as add-on therapy in children older than 5 years whose asthma is not controlled by medium doses of inhaled steroids. Significant improvements in lung function have been found<sup>19-20</sup>. The effect of long-acting inhaled beta-agonists or combination products have not been adequately studied in young children.

## ASTHMA MANAGEMENT AND PREVENTION

Education is an integral part of management of a chronic illness such as asthma where daily compliance to treatment is important<sup>21</sup>. Giving each patient an individualized written asthma action plan will also help to give autonomy to the patients and their caregivers in the management of their own illness. Identifying and reducing exposures to risk factors is an important part of reducing asthma exacerbations. There are currently no primary prevention strategies that have been effective in preventing the onset of asthma.

As the goal of asthma treatment is to achieve control, all patients must be continually reviewed to monitor that control has been achieved and is maintained. This can be achieved with various tools such as a symptom assessment questionnaire or Asthma Control Test (ACT) or monitoring of pulmonary function with peak expiratory flow rates, spirometry, or exhaled nitric oxide. Drug therapy can then be adjusted according to the patient's level of control. Children who are very well controlled on low doses of inhaled corticosteroids may be able to come off treatment. Difficult-to-manage asthma should be referred to specialists as they may require more tests to confirm the diagnosis of asthma or to look for comorbidities that may aggravate asthma.

The GOAL Study<sup>22</sup> has demonstrated that it is possible to achieve total control in the majority of patients with daily treatment of inhaled corticosteroids or combination. The longer these patients are on treatment, the more of

these patients achieve control. Thus, in managing these children with asthma, we should aim to achieve total control with optimal treatment and a holistic management so as to allow these children to live a normal childhood without severe restrictions to activity or lifestyle.

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**LEARNING POINTS**

- **Asthma in children is difficult to diagnose as not all wheezing in children is due to asthma and very young children are unable to perform standard pulmonary function tests.**
- **Different wheezing phenotypes may respond differently to treatment and have different prognosis in relation to persistence of wheeze.**
- **The goal of managing childhood asthma should be to achieve total control by appropriate drug therapy, education, and identification of allergens and their avoidance.**
- **The GOAL Study has demonstrated that it is possible to achieve total control of asthma in the majority of patients.**
- **Children with asthma should be able to live a normal lifestyle which includes no restriction in sports and exercise.**