Paediatric asthma

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Abstract

Childhood asthma has been with us for many years, and prevalence has been increasing. Asthma is the fifth most common killer in our country, and although it may not kill as many people as infectious diseases, the quality of life of an asthmatic may be seriously impaired, leaving a child or adult with compromised lung health that never goes away. The diagnosis of asthma, which is characterised by variable expiratory airflow limitation, is primarily based on recurrent cough and wheeze. Asthma management should be personalised, and long-term asthma management involves assessing, adjusting and reviewing treatment response. Medication should be titrated up or down for individual patient needs.

Keywords: paediatric asthma, inhaled corticosteroids, long-acting beta$_2$-agonist (LABA), short-acting beta$_2$-agonist (SABA)

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Childhood asthma has been with us for many years, and sadly, has been increasing in prevalence. Although the focus has been on AIDS and TB pandemics in Africa, asthma is still common (or more common), and yet little attention is paid to it, probably because many believe that asthma is not serious or severe, and that few people die from this respiratory illness. These are myths. Asthma is the fifth most common killer in our country and although it may not kill as many people as infectious diseases, the quality of life of an asthmatic may be seriously impaired, leaving a child or adult with compromised lung health. This never goes away. Activities, sleep and school attendance are affected, causing additional stress to asthmatic children, their parents, families and carers. In addition, the term "mild" asthma may lull one into a false sense of security; any asthma may be complicated by severe acute exacerbations, and it is sobering that up to two-thirds of asthma deaths occur outside of medical facilities.[1] The diagnosis and management of asthma, therefore, require strengthening to optimise outcomes and improve health.

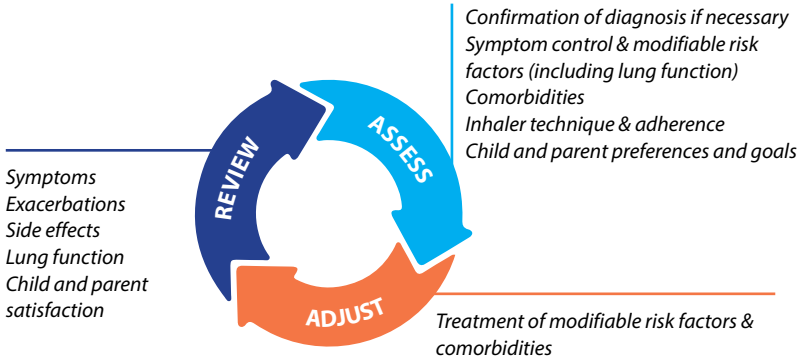
The diagnosis of asthma, which is characterised by variable expiratory airflow limitation, is primarily based on recurrent cough and wheeze, which may occur on a broad clinical spectrum that also includes breathlessness and chest tightness, induced by reversible airflow obstruction, airway inflammation with eosinophilia and/or infection. A third of children have had a wheezy illness by their third birthday, and these are mostly caused by viral triggers such as bronchiolitis and laryngotracheobronchitis. Far less commonly, functional (e.g. cystic fibrosis, gastro-oesophageal reflux disease) and structural (e.g. TB lymphadenopathy, congenital) abnormalities may cause wheeze in children under six years of age. That said, symptoms start in the preschool years in 80% of patients diagnosed with asthma.[2] However, the term wheeze is often misclassified – there is no data on sensitivity or specificity of the term 'wheeze' – and control of asthma symptoms is correlated best with composite scores of symptoms rather than wheeze.[3] An audible wheeze occurs late in airway obstruction. Cough correlates with lung function and atopy in preschoolers, similar to, and independent of, wheeze.[4]

Diagnosis of asthma in a preschool child relies on the typical history and examination, as well as demonstration of reversibility such as an FEV_1 increase > 12% with a bronchodilator or an FEV_1 decline > 15% during an exercise challenge, diurnal variation of PEF > 20% with twice-daily readings or a positive methacholine challenge test. The role of FeNO is controversial. Evidence strongly suggestive of asthma includes activity-induced cough or wheeze, cough at night, and symptoms persisting after the age of three years. Other symptoms suggestive of asthma include absence of seasonal variation, symptoms worsening with certain exposures, colds repeatedly going to the chest, concomitant rhinitis, eczema or food allergies, a family history of allergies and a positive response to a bronchodilator or a six- to eight-week therapeutic trial of an inhaled corticosteroid (ICS) such as beclomethasone, fluticasone or budesonide.[5] Wheezing more than once a month may also be suggestive of asthma, although the evidence for this is weaker.

Personalised long-term asthma management involves assessing, adjusting and reviewing treatment response. Medication should be titrated up or down for individual patient needs. The 2022 updates of the Global Initiative for Asthma (GINA) guidelines recommend that a low-dose ICS be taken whenever a short-acting beta$_2$ agonist (SABA) such as salbutamol is used in children aged 6–11 years with mild asthma.[6] This is the preferred controller combination, used to prevent exacerbations and to control symptoms. Daily low-dose ICS may be considered an alternative, although the evidence for this approach is less rigorous (Figure 1). Should the asthma require Step 2 treatment, the evidence supports daily low-dose ICS. Alternatives include a daily leukotriene receptor antagonist.[6]

Children 6–11 years

Personalised asthma management:
Assess, Adjust, Review



Asthma medication options:
Adjust treatment up and down for individual child's needs

	STEP 1	STEP 2	STEP 3	STEP 4	STEP 5
PREFERRED CONTROLLER to prevent exacerbation and control symptoms	Low ICS taken whenever SABA taken	Daily low dose inhaled corticosteroid (ICS) (see table of ICS dose ranges for children)	Low dose ICS-LABA, OR very low dose* ICS-formoterol maintenance and reliever (MART)	Medium dose ICS-LABA, OR low dose† ICS-formoterol maintenance and reliever therapy (MART). Refer for expert advice	Refer for phenotypic assessment ± higher dose ICS-LABA or add-on therapy, e.g. anti-IgE
Other controller options	*Consider daily low dose ICS*	*Daily leukotriene receptor antagonist (LTRA), or low dose ICS taken whenever SABA taken*	*Low dose ICS + LTRA*	*Add tiotropium or add LTRA*	*Add-on anti-IL5, or add-on low dose OCS, but consider side effects*
RELIEVER	*As-needed short-acting beta$_2$-agonist (or ICS-formoterol reliever for MART as above)*				

** Very low dose: BUD-FORM 100/6 mcg*
† Low dose: BUD-FORM 200/6 mcg (metered dose)

Figure 1: Personalised management for children 6–11 years to control symptoms and minimise future risk

BUD-FORM – budesonide-formoterol, ICS – inhaled corticosteroid, LABA – long-acting β_2-agonist, LTRA – leukotriene receptor antagonist, MART – maintenance and reliever therapy, OCS – oral corticosteroid, SABA – short-acting β_2-agonist[6]

In this 6–11-year age group, reliever medication typically includes an as-needed SABA (salbutamol) or an ICS-formoterol reliever, which forms the cornerstone of maintenance and reliever therapy (MART). Although formoterol is a long-acting beta$_2$ agonist (LABA) with a duration of up to 12 hours, it has a quick onset of action, typically within two to three minutes. Budesonide is the low-dose ICS typically used in combination with formoterol.[6]

Adolescents from 12 years of age are treated similarly to adults, i.e. with a low-dose ICS-formoterol combination to relieve acute symptoms or prior to exercise if required. GINA no longer recommends SABA-only or LABA-only treatment in adults and adolescents because of the increased risk of rebound exacerbations.[6]

A retrospective multinational 24-country observational study of 8 351 asthmatics (> 12 years) recently demonstrated an association between high SABA prescriptions (> 3 canisters/year) and poor asthma control, including higher rates of acute exacerbations, across a wide range of healthcare settings and asthma severities, providing support for initiatives to improve asthma morbidity by reducing SABA overreliance.[7] Targeting the inflammatory component of asthma with a corticosteroid is a rational approach to curtailing unopposed SABA monotherapy.

The 2021 South African childhood asthma guidelines recommend that in children under 11 years who have an upper or lower respiratory tract infection triggering a wheeze (with no wheeze between infections), a 7–10 day course of low dose ICS be taken to complement the as-needed SABA. If asthma is moderate to severe and persistent in children over six years, daily ICS-formoterol in a single inhaler is advised for reliever and controller therapy.[5] Inhaler devices include a pressurised metered-dose inhaler (pMDI) and spacer with a face mask for the under fours, a pMDI and spacer with a mouthpiece for the four- to six-year-olds, and a dry powder inhaler, or a pMDI with spacer and mouthpiece or breath-actuated pMDI for children over six years.[8]

Early, predictive symptoms of exacerbations in young (under five-year-old) children include increased night cough, lethargy, impaired feeding and reduced response to SABA reliever therapy. Symptom deterioration may risk the child's health and prompt an urgent visit to the doctor. When assessing a distressed child with acute asthma, it is most useful to monitor oxygen saturation. If O_2 sats remain < 92% on room air, despite a total of approximately 6–12 puffs of inhaled SABA, the child should be admitted for further treatment, which often includes systemic corticosteroids. For children under five years, this equates to two separate puffs

repeated three times at 20-minute intervals, while for children six years and over, 4–10 puffs at 20-minute intervals for the first hour. Other symptoms warranting admission for young children include an inability to speak or drink, a respiratory rate > 40 breaths/minute or cyanosis. A chest X-ray is not required in a clear diagnosis of bronchiolitis, and there is no need for routine blood tests. However, the diagnosis should be reconsidered, and investigations are required if there is lethargy, severe tachycardia, high temperatures, and/or seizures. Nasal prong oxygen is a cornerstone of acute asthma treatment. Antibiotics, nebulised agents including bronchodilators, adrenaline, steroids or hypertonic saline, oral steroids or chest physiotherapy are not usually required.[6]

Conclusion

As asthma is the most common chronic disease in childhood, it is important that diagnostic skills and treatment approaches are honed. Although acute exacerbations usually require prompt and repeated SABA administration, the move away from chronic SABA reliever monotherapy to a low dose ICS-rapid onset LABA combination may ultimately improve the health of children and save more lives.

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