

Asthma assessment, diagnosis and management in young children

Diagnosis and treatment of asthma in young children can be problematic.

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Many guidelines have been published in the last year for the treatment of asthma.¹⁻³ Two of these have included management principles for children. Broadly speaking, asthma diagnosis and treatment is very similar in older children and adults and it seems appropriate that with minor modifications the principles of asthma management that are used in adults can be extrapolated to older children. In this regard all guidelines are clear. It is however obvious to practising doctors that the problem in asthma management lies in the diagnosis and treatment of pre-school children. This is an age category where problems have been identified and where only one of the new guidelines³ has provided clear diagnostic and treatment recommendations.

This age group requires attention in two main areas, namely the diagnosis of asthma in young children with wheeze and chronic cough, and the management of asthma, principles of drug selection and the assessment of control, risk and impairment to determine success of therapy. Let us consider each of these in turn.

Diagnosis of asthma in young children

Martinez and colleagues classified wheezing in children into three distinct categories based on outcome. Transient early wheezing was wheezing in the first 3 years of life that settled. Late-onset wheezing referred to children with no wheezing during the first 3 years of life, but onset during the fourth year, and persistent wheezing referred to wheezing continuing from early onset beyond 5 years of life.⁴ These epidemiological studies have shown that wheeze in young children is often not due to asthma, while onset of regular wheezing in the wheezy older child may well be due to asthma.

Transient (limited to a few months or years) wheezing in infancy is more likely to be a function of small airways, and wheezing in the first year of life does not persist as asthma in two-thirds of those afflicted. Respiratory syncytial virus (RSV) infection can predispose to recurrent wheeze. Certainly it has been shown that RSV bronchiolitis severe enough to cause hospitalisation is a risk factor for allergic asthma in early adolescence.

A typical presentation of asthma in infancy is wheezing, but since not all wheezing in this age group is asthma, care should be taken with a differential diagnosis. Other causes of wheeze in young children include:

- gastro-oesophageal reflux
- cystic fibrosis
- aspiration
- immune deficiency

No infant or child should be treated with regular courses of antibiotics for chronic chest symptoms without being evaluated for asthma.

- TB
- bronchopulmonary dysplasia.

Recurrent wheezing in young children may not be due to asthma. However, asthma has important quality-of-life issues and long-term implications and may be quite severe – hence proof of a diagnosis of asthma is indicated. No infant or child should be treated with regular courses of antibiotics for chronic chest symptoms without being evaluated for asthma.

In South Africa the concept of ‘wheezy phenotypes’ is not applicable to a large percentage of the population who wheeze in response to other significant diseases. Here a clue to many is the failure to thrive or poor weight gain. Other history and examination clues are found in the markers of specific diseases, such as stigmata of AIDS, tuberculosis, congenital cardiac disease, cystic fibrosis and gastro-oesophageal reflux. A careful examination of a wheezing infant is mandatory.

Most of these significant diseases are marked by associated signs that should not be missed. A chronic cough in a young child will create the same diagnostic dilemma, and again a differential diagnosis is important, especially in the child who is failing to thrive, has a cardiac murmur or vomits regularly, when HIV-associated infections, a congenital cardiac abnormality or gastro-oesophageal reflux are likely.

Despite the epidemiological classification of wheezy youngsters the diagnostic approach to these children is poorly described. In view of the uncertainty of diagnosis and heterogeneity of wheezing phenotypes in young children, when deciding about appropriate management of recurrent wheezing in children under the age of 5 years it is useful to check the clinical points listed in Table I, which point to a diagnosis of asthma rather than other causes of wheezing.

A careful examination of a wheezing infant is mandatory.

Table I. Criteria for a working diagnosis of asthma

- Wheezing more than 1x/month
- Activity-induced cough or wheeze
- Cough at night
- Absence of seasonal variation
- Symptoms persisting after the age of 3 years
- Symptoms worsening with certain exposures
- Colds repeatedly going to the chest
- Response to a bronchodilator
- Response to a 10-day oral steroid course
- Concomitant rhinitis, eczema or food allergies
- Family history of allergy
- Response to a bronchodilators in children under 5 (FEV >12%, PEFR >20% of pre-bronchodilators PEF)
- Diurnal variation of PEF >20% with twice daily readings

It is simplistic to state that if patients have 2 or more of the clinical points in Table I, the diagnosis is asthma, since some asthmatics may only have one of the features in addition to wheezing.

Publication of the Asthma Prediction Index,⁵ which makes use of features of atopy to diagnose asthma, has helped but not been applied in the clinical context. Another useful diagnostic tool for diagnosing asthma is the modified bronchodilator response test (MBRT). In this test a patient suspected of having asthma (often a young child with persistent or recurrent wheezing) is given a bronchodilator by nebuliser or metered-dose inhaler (MDI) with a spacer, and symptoms/signs are evaluated 10 - 15 minutes later. Only asthmatics have sufficient bronchial hyper-responsiveness to respond to a bronchodilator. Most other causes of wheezing in young children will not respond. In these children further testing (such as a chest X-ray) may be useful.

In order to contextualise both the tests and place them into a South African scenario we suggest that an algorithm as outlined in Fig. 1 could be used for workup of a young child with wheeze.

Treatment of asthma

The literature is full of algorithms for the management of both chronic and acute asthma in children,⁶ but treatment of the pre-school or young child is seldom stressed. Principles of treatment remain the same, and it is as important to treat inflammation in the persistent chronic young asthmatic as in the older child and adult. However, some special situations exist.

The key to treatment decisions in the local context depends on what therapeutic tools are available for treating asthma and non-asthmatic wheeze in very young children. Unfortunately until recently our therapeutic armamentarium was severely limited. Most available anti-asthma therapies have been disappointing in their effect on non-asthmatic wheeze. This is true for both bronchodilators and anti-inflammatory drugs. Even inhaled steroids have not offered much help in this regard. Montelukast, the leukotriene receptor antagonist (LTRA), may prevent recurrence of non-asthmatic wheezing in young children where viruses are involved,^{7,9} but the evidence is not yet complete.

Only asthmatics have sufficient bronchial hyper-responsiveness to respond to a bronchodilator.

Viruses also play an integral role in early childhood asthma and there is marked interplay between allergy/atopy and viral infections. There is mounting evidence from 3 studies that it is useful to treat asthma in young children with leukotriene receptor antagonists at the time of a viral-induced asthma exacerbation.⁷⁻⁹ Episodic asthma is an important form of asthma for which more studies are required to provide evidence-based guidelines. Studies are currently investigating the role of LTRAs as an option in such cases.

Assessing asthma control and asthma risk

The new NAEPP Asthma Guidelines suggest a unique new approach to asthma assessment that crosses the divide between proponents of asthma severity assessment as a treatment selection approach and proponents of assessment of control as a monitoring tool. Neither tool is, on its own, the total solution and by building in tools for determining risk and impairment, we can address more scientifically the problem of unchecked asthma morbidity.

Having made a working diagnosis of asthma, after considering all of the criteria in Table I, the decision on how to treat the child depends on his current level of control (as per GINA 2006 guidelines), his current impairment (symptom profile and quality-of-life profile) and the individual risk factors present in the child.

A practical approach to the selection of treatment of wheezing/asthma in all children is given in Fig. 2, based on taking cognisance of risk factors. This approach can be applied both to children under 5 and to older children.

Where the risk is low and episodes infrequent or mild, bronchodilators as required and LTRAs would be a good option. Avoidance of triggers of attacks should be implemented. Three- to 6-monthly follow-up visits are appropriate. Where the risk is high (Fig. 2), irrespective of the age of the child, inhaled steroids are the preferred option and adjustments with add-on therapy with LTRAs or long-acting β_2 -agonists (LABAs) according to the new 2006 GINA guidelines would be appropriate.

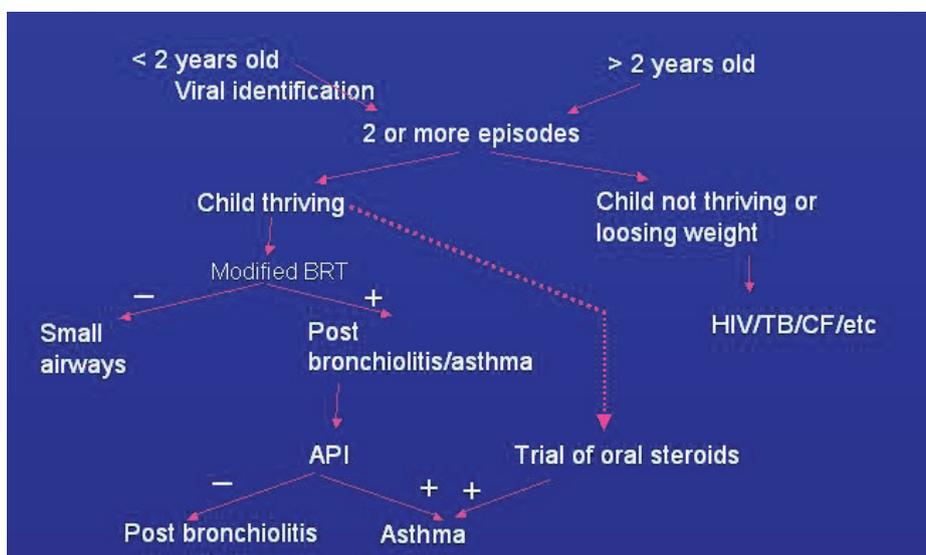


Fig.1. Diagnostic approach to South African young wheezers.

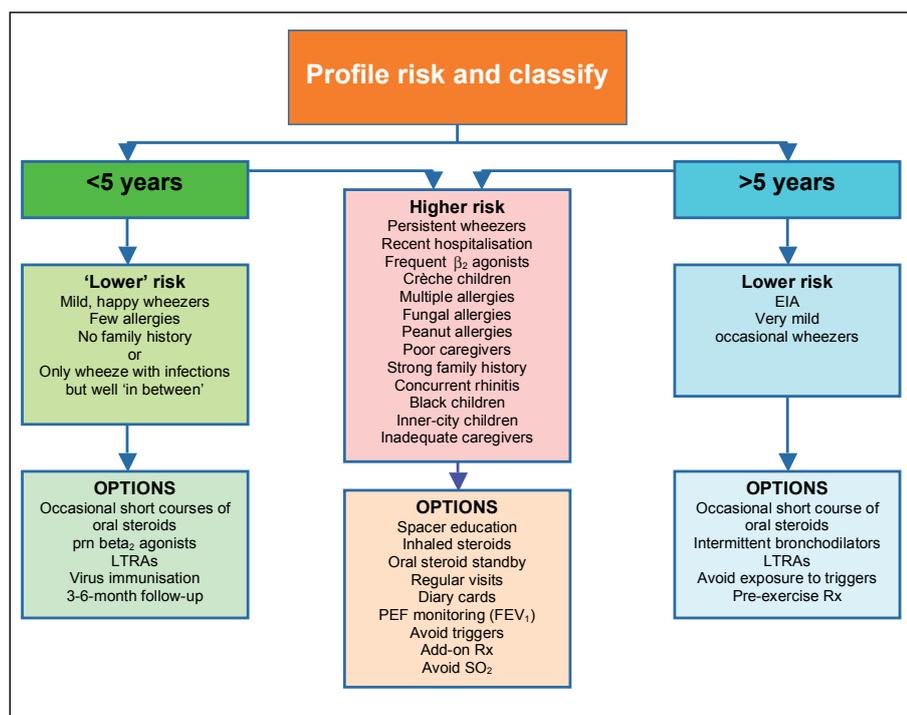


Fig. 2. A practical approach to wheezing/asthma in young children based on risk.

The level of control should not be the only criterion for adjusting medication – increasing the frequency of visits, diary card and peak flow monitoring, moving the child out of daycare or crèche and education of the caregivers should also be considered.

In the future, validation of biomarkers of inflammation in young children (e.g. exhaled nitric oxide, sputum eosinophils, bronchial challenge tests, genetic phenotyping and allergy profiling) may also assist the clinician to make the best therapeutic choice. It is most important that the pharmaceutical industry should focus on more studies on the under-5-year-olds, which have been ‘neglected’ to date, to assist clinicians with

evidence-based medicine for the possible use of add-on LABAs, add on LTRAs, allergen immunotherapy and anti-IgE therapy in this age group.

Conclusion

Asthma and the symptoms of asthma in pre-school children have a wide differential diagnosis. The old adage that ‘all that wheezes is not asthma’ is certainly true in young children. In addition, young children require a more flexible and comprehensive approach to management, both in selecting therapy and in monitoring the success of treatment. It is vital that more studies are conducted in this age group in the future.

This article addresses some of the needs. Asthma in young children is different from asthma in older children and adults.

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In a nutshell

- In a young child, not all wheezing is asthma.
- Children under the age of 5 need a different approach to the diagnosis and management of asthma to that in adults and older children.
- Transient (limited to a few months or years) wheezing in infancy is more likely to be a function of small airways, and wheezing in the first year of life does not persist as asthma in two-thirds of those afflicted.
- The differential diagnosis of wheezing in a young child includes: gastro-oesophageal reflux, cystic fibrosis, aspiration, immune deficiency, TB, bronchopulmonary dysplasia.
- A clue to the origin of wheeziness in children in South Africa may be failure to thrive or poor weight gain.
- Other history and examination clues are found in the markers of specific diseases, such as stigmata of AIDS, tuberculosis, congenital cardiac disease, cystic fibrosis and gastro-oesophageal reflux.
- It is as important to treat inflammation in the persistent chronic young asthmatic as it is in the older child and adult; however, some special situations exist.
- Viruses play an integral role in early childhood asthma and there is marked interplay between allergy/atopy and viral infections.
- There is mounting evidence from 3 studies that treating asthma in young children with leukotriene receptor antagonists at the time of a viral-induced asthma exacerbation is useful.
- The decision on how to treat a child depends on his/her current level of control, current impairment and individual risk factors.