

# DIAGNOSIS OF ASTHMA IN CHILDREN: A CHALLENGING PERSPECTIVE

Diagnosis of asthma is usually an entirely clinical undertaking and, as such, presents a challenge for the GP. Diagnosing asthma in children is further compounded by the dependence on parental reporting of symptoms. In this article – the first of a two-part feature – the authors describe a pragmatic approach to getting the diagnosis right.

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The World Health Organisation has defined asthma as “a disease characterised by recurrent attacks of breathlessness and wheezing which vary in frequency and severity from person to person”.<sup>1</sup> Cough and wheeze in children are one of the common presentations to a primary care physician; it is estimated that around 50% of children wheeze in some way or the other before reaching school age and most often these episodes are transient and not associated with any serious illness.<sup>2</sup>

Asthma is a chronic inflammatory disease of the airways characterised by airway hyper-responsiveness and intermittent reversible airway obstruction. It is the most common chronic disease in children, with a prevalence of between 17% and 23%,<sup>3</sup> affecting boys more often than girls before puberty.<sup>1,3</sup> In the UK, it is estimated that >1.1 million children are currently receiving asthma treatment.

## History and diagnosis

The diagnosis of asthma remains a clinical one and is largely dependent on parental reporting of symptoms such as cough, wheeze, tightness of chest and shortness of breath.<sup>4,5</sup> It is therefore important that a detailed, focused clinical history is elicited in a child presenting with asthma symptoms.

The most common asthma symptom reported by parents is wheeze. There is considerable confusion as to what is a “wheeze” and thus it is of paramount importance that the clinician probes into what actually parents mean when they report wheeze in their

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child.<sup>2,6</sup> A true wheeze can be described as polyphonic whistling noises audible during expiration, and sometimes in inspiration.<sup>2,7</sup>

In an outpatient clinic study involving 160 parents who reported “wheeze” in their child, the concept of wheeze reported by parents differed from the epidemiological definitions. Parental reports of acute wheeze and the findings by the clinicians also differed, with less than 50 per cent agreement between parents’ and clinicians’ reporting.<sup>8</sup> Most parents perceived airway noise (e.g. palpable cracking in the chest wall, noise as if to clear throat or nasal snuffles) and difficulty in breathing as wheeze.<sup>2,8</sup> Another study from Sheffield, involving the parents of 92 infants with ‘noisy breathing’, demonstrated that after education / instruction more than a third of parents revised use of term “wheeze” in favour of other terms (e.g. rattles) to describe noisy breathing.<sup>9</sup>

Once an agreement has been reached with the parents that the child actually has a wheeze, the next step is to decide the symptoms are actually due to asthma. Tables 1, 2 and 3 highlights the risk factors and clinical features that increase or decrease the possibility of a child presenting with asthma, as described in national guidelines.<sup>4,10,11</sup> It is also important to enquire about interval symptoms, such as exercise induced wheezy symptoms, night coughs and disturbed sleep, and the frequency for using bronchodilator therapy if already prescribed (although some parents are known to use another sibling’s inhalers without prescription).

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The next step is to determine the severity of the symptoms and how they disrupt the child's and family's life (e.g. missing school, limitation of participation in PE/sports, disrupted night sleep, parental time off work), so as to ensure that the treatment is focused to the child's needs.<sup>2</sup>

## Physical examination

Examination should start with a general inspection of the child and their growth and development. A child who is suffering from severe symptomatic asthma is unlikely to be growing well. Serial plotting of their growth parameters in an age- and sex-appropriate growth chart is therefore useful, and a serial trend is an important indicator of appropriate therapy.

The next step is to do a general examination. Most children seen in primary care are generally well with relatively few signs, but special attention should be given to identify clubbing in fingers and toes (often not checked by clinicians), central cyanosis, eczematous patches (sign of atopy and increased risk of asthma), barrel shaped chest wall (increased anterior-posterior diameter) and Harrison's sulcus (a horizontal groove along the lower border of the thorax) – the latter two being signs of a chronic respiratory illness.<sup>2,5</sup>

Findings from examination, including chest auscultation in children with asthmatic symptoms, can be entirely normal in between the episodes of exacerbation. In such situations, it may be useful to request the parents to keep a diary and to bring their child back for a medical consultation when they become symptomatic next time.<sup>5</sup>

Wheeze due to asthma is usually scattered, polyphonic and end-expiratory. As severity increases, the wheeze may last throughout expiration, and in a more severe asthmatic episode, wheezing may also be present during inspiration. During a very severe episode, wheezing may be absent because of the severe limitation of airflow associated with airway narrowing and respiratory muscle fatigue.

That said, if wheezing is never heard during a symptomatic episode, the diagnosis is highly unlikely to be asthma. A monophonic wheeze – i.e. a single-pitch sound that is produced in the larger airways during expiration – may indicate foreign body

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**TABLE 1. RISK FACTORS FOR CHILDHOOD ASTHMA<sup>2,10,11</sup>**

■ Onset of wheezy symptoms aged ≥2 years
■ Male sex in pre-pubertal child
■ Co-existence of other atopic conditions such as eczema, hay fever, food allergies, etc.
■ Strong family history (parents or siblings) of atopic or asthma symptoms
■ Sensitisation to house dust mite at an early age
■ Prematurity (more likely to have chronic lung disease) and low birth weight
■ Exposure to passive smoke in the house or active smoking in adolescents
■ Low socio-economic status, behavioural difficulties in the child or parents (increased chance of non-compliance to treatment)

**TABLE 2. CLINICAL FEATURES THAT INCREASE THE PROBABILITY OF ASTHMA<sup>10</sup>**

■ More than one of the following symptoms: wheeze, cough, difficulty breathing, chest tightness, particularly if these symptoms: <ul style="list-style-type: none"> <li>- are frequent and recurrent</li> <li>- are worse at night and in the early morning</li> <li>- occur in response to, or are worse after, exercise or other triggers, such as exposure to pets, cold or damp air, or with emotions or laughter</li> <li>- occur apart from colds</li> </ul>
■ Personal history of atopic disorder
■ Family history of atopic disorder and/or asthma
■ Widespread wheeze heard on auscultation
■ History of improvement in symptoms or lung function in response to adequate therapy

**TABLE 3. CLINICAL FEATURES THAT LOWER THE PROBABILITY OF ASTHMA<sup>10</sup>**

■ Symptoms with colds only, with no interval symptoms
■ Isolated cough in the absence of wheeze or difficulty breathing
■ History of moist/loose cough (e.g. associated with pneumonia, protracted bacterial bronchitis, etc)
■ Prominent dizziness, light-headedness, peripheral tingling
■ Repeatedly normal physical examination of chest when symptomatic
■ Normal peak expiratory flow (PEF) or spirometry when symptomatic
■ No response to a trial of asthma therapy
■ Clinical features pointing to alternative diagnosis

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inhalation, especially if unilateral and combined with a history of a sudden onset of coughing or choking.<sup>2,5</sup>

It is also important to seek out signs of cardiac and systemic disease which may mimic asthma symptoms.<sup>1</sup> Gastroesophageal reflux and “Sandifer syndrome” (a paediatric condition involving spasmodic torsional dystonia with arching of the back and rigid opisthotonic posturing) can also mimic asthma.

### Investigation

Asthma is a clinical diagnosis and in most cases in the community investigations are not necessary. It is extremely important that the clinician invests the time to understand the reported symptoms before making a diagnosis of asthma. Cases with a high probability of asthma (see Table 2) should be given a trial of treatment without any investigation, with a review of the response to treatment.<sup>10</sup> Parents may first be advised to keep a record of their child’s symptoms and activity for a week. This is followed by a week of appropriate first line asthma treatment with continued recording of symptoms. The child is then reviewed for longer term care.

BTS/SIGN guidelines suggest that for cases of mild intermittent asthma, bronchodilators should be trialled.<sup>10</sup> This will also give an idea of airway reversibility as is seen in asthma. However, in children who have frequent exacerbations and chronic symptoms a therapeutic trial of inhaled corticosteroids for 2-3 months may be useful. The treatment with inhaled corticosteroids should be stopped to ensure that the child’s symptoms have not improved coincidentally (e.g. post viral cough or prolonged post-mycoplasma infection). If symptoms recur after stopping treatment, a retrospective diagnosis of asthma can be made.<sup>2,7,10</sup>

In cases with moderate probability where symptoms are intermittent and not severe, it may be appropriate to wait and watch, although even in these cases a trial of treatment may be given and response reviewed. Spirometry may be done in children over five years of age in such cases, but is better done during an active exacerbation if possible, as normal spirometry results do not exclude asthma if performed when the child is asymptomatic.<sup>5,10</sup>

### ILLUSTRATIVE CASE STUDY

Bertie is a 2½ year old girl brought for consultation with the GP. She had had three episodes of viral induced wheeze in the last 12 months, and one of these episodes necessitated an overnight admission for nebulised bronchodilators. Focused history revealed interval symptoms of cough and wheeze induced by exercise and intermittent night coughs, which disturbed her sleep, needing frequent bronchodilators. There is also a strong family history of asthma in her mother and older sibling. Review of her medical records reveal that she had been prescribed regular emollients and occasional topical hydrocortisone cream for her eczema.

In view of her history and need for frequent bronchodilators, she was considered to have a high probability of asthma and started on a therapeutic trial of inhaled corticosteroids via a spacer. She was reviewed two months later and her mother reported complete resolution of symptoms. She had needed the bronchodilator only once during this time period.

After discussion with the family, inhaled corticosteroids were stopped for a month and this led to recurrence of her wheeze and cough, exercise intolerance and night coughs. A diagnosis of asthma was thus made and managed in accordance to BTS/SIGN guidelines.

*A combination of cough and wheeze most often gets diagnosed as asthma and in a large proportion of children actually gets treated as such*

If spirometry is not practical, a peak flow diary can be a useful tool. However, in the authors’ experience it is often not done properly at home and may suggest symptoms that are more severe than is actually the case. A peak flow diary should therefore be used only after proper training (e.g. by an asthma nurse), with the technique reviewed at subsequent visits before escalation of therapy is done.

If evidence of airway obstruction is demonstrated on spirometry, peak expiratory flow rate (PEFR) can be done pre- and post-bronchodilator treatment (trial of 2 – 4 puffs of 100 mcg of inhaled salbutamol administered via a space device) and an improvement of PEFR by more than 15% from baseline supports a diagnosis of asthma.<sup>10</sup>

Parents may also be asked to check PEFR. However, the caveats described above for use of a peak flow diary apply.

Chest X-ray is unnecessary in most cases seen in the community and should be reserved for situations where an alternate diagnosis is considered. However, it may also be considered in selected cases where there is a strong parental expectation and a chest X-ray is likely to provide reassurance and better adherence to treatment.<sup>2</sup>

**TABLE 4. DISEASES WHICH CAN PRESENT AS RECURRENT COUGH OR WHEEZE IN CHILDREN<sup>2,4,5, 7, 12</sup>**

■ Bronchiolitis – frequently seen in infants and young children up to the age of 2 years, may lead to increased airway reactivity over subsequent months and presents with recurrent wheeze <sup>12</sup>
■ Preschool episodic viral wheeze – presents with intermittent wheeze interspersed with periods of no symptoms <sup>6</sup>
■ Inhaled foreign body – can present with monophonic wheeze or on one side of chest wall
■ Gastro-oesophageal reflux disease – typical history may not always be present
■ Bronchopulmonary dysplasia
■ Bronchiectasis – (cystic fibrosis is mostly diagnosed in the neonatal bloodspot screening test) although other causes such as primary ciliary dyskinesia should also be considered
■ Congenital heart disease – may have a detectable murmur or signs of heart failure

Cases with a low probability of asthma should be monitored, and an alternative diagnosis should be sought out. In situations where the diagnosis remains unclear, or there is evidence of airway obstruction but reversibility, or beneficial response to treatment cannot be demonstrated, specialist referral should be considered. There are three indications for referral to specialist services:

- If the diagnosis is in doubt
- If the treatment is not working
- If there is a disagreement regarding the diagnosis either from the GP or the family.

## Differential diagnosis

A combination of cough and wheeze most often gets diagnosed as asthma and in a large proportion of children actually gets treated as such. It is important that primary care clinicians develop a wider understanding of the pathologies that may present with cough and wheeze and aim to rule these out if standard asthma therapies fail to show good response and escalation of therapy is contemplated.<sup>2</sup> Table 4 provides a summary guide to children presenting with cough and wheeze.

## Conclusion

Asthma in children can have long-term health implications. A careful focused history and physical examination (to rule out other serious associations) is the key to diagnosis. Chest X-ray and specialist investigations should be reserved for difficult cases and preferably be done by secondary care physicians. Once a diagnosis of asthma is established, judicious use of therapeutic trials (as suggested by the BTS/SIGN guidelines) via a spacer device should enable successful management of most children in the community.

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## KEY POINTS

- 1 Asthma is the most common chronic in children and is characterised by airway hyper-responsiveness and intermittent reversible airway obstruction.
- 2 Wheeze is the most common presenting symptom of asthma, but this may often be misreported by parents, and true wheeze is not always indicative of asthma
- 3 It is important to be familiar with risk factors and clinical features that increase the likelihood of a diagnosis of asthma
- 4 Physical examination for features such as clubbing in fingers, cyanosis and eczematous patches are an important part of diagnosis
- 5 A trial of first-line treatment is recommended in all cases with a high probability of asthma
- 6 Spirometry may be useful, but normal results do not exclude asthma if performed during an asymptomatic phase
- 7 A referral should be made if the diagnosis is uncertain or where there is disagreement about the diagnosis. Alternative diagnoses should be sought in these cases

**NEXT ISSUE  
PART 2: MANAGEMENT OF  
CHILDHOOD ASTHMA WILL  
APPEAR IN THE NEXT ISSUE  
OF BJFM**