

# Management of wheeze and cough in infants and pre-school children in primary care

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## Introductio

Management of wheeze and cough in children is a common problem in primary care. In this paper I aim to provide a few useful management tools with regard to diagnosis, the role of a trial of treatment, and the rationale for referral. For an in-depth review see the article in this journal two years ago by Bush<sup>1</sup>

## Presentation of Symptom

It is always worth asking parents what they mean by the term 'wheeze' or 'cough'. The high-pitched musical noise of a wheeze usually on expiration should not be confused with the sound of inspiratory stridor. The sound of airflow through secretions is different again, and parents may describe their child 'gromiting' when, in fact, the child has been coughing severely and bringing up phlegm or mucus.

An acute presentation requires immediate referral to hospital if appropriate. Probably the commonest cause in the infant is bronchiolitis, and in the pre-school child, viral induced wheeze or croup. Unilateral signs could represent an inhaled foreign body, and a febrile child with tachypnoea may well have a pneumonia. Pertussis may have to be considered, particularly if there is a relevant non-immunisation history. If immediate transfer to hospital is not required, for example after nebulisation, it is of course essential to review the situation closely and give parents clear instructions regarding review.

With a prolonged history, the pattern of symptoms will often give the clue to the underlying diagnosis (Figure 1). Episodic symptoms occurring solely with a viral infection should be differentiated from intermittent or chronic symptoms which may occur at night and after exercise, perhaps in the context of a personal or family history of atopy.

The concept of 'cough variant asthma' (asthma presenting solely as cough in the absence of wheeze

is well established in adults<sup>2</sup> though there remain some controversy about its diagnosis in children even since Spelman's uncontrolled study of children with chronic cough successfully treated according to an asthma protocol<sup>3</sup>. Without the ability to perform lung function tests in pre-school children, care must be taken to exclude other diagnoses. A persistent productive cough may be due solely to chronic catarrh with postnasal drip, but early referral may be needed. A persistent dry cough, worse at night and on exercise, and without evidence of other diagnosis warrants a trial of asthma treatment.

The younger the child, the longer the list of differential diagnoses and the more one has to consider possibilities other than 'asthma'. These include upper airways disease, congenital structural disease of the bronchi, bronchial or tracheal compression by cardiac enlargement or lymphadenopathy, foreign body or tumour, gastroesophageal reflux, laryngeal problems, causes of persistent productive cough such as cystic fibrosis or primary ciliary dyskinesia as well as immunodeficiency and miscellaneous causes such as bronchopulmonary dysplasia and pulmonary oedema<sup>1</sup>

## Longitudinal Studies and Wheezing Phenotype

Our understanding of the natural history of wheeze (and cough) has increased considerably over the last ten years. The British National Cohort Study<sup>4</sup> reported on 880 children given a label of asthma or wheezy bronchitis before the age of 7; two thirds grew out of symptoms by their late teens and a small number of these had a recurrence of their symptoms in mid adult life. The data from Tucson, Arizona<sup>5</sup> has provided us with more detailed data in the early years of life. 862 children have been followed up for over fourteen years. Using objective measurements such as IgE level, methacholine response, skin prick testing and prospective assessment of the presence of wheeze Martinez *et al* confirmed that there are several

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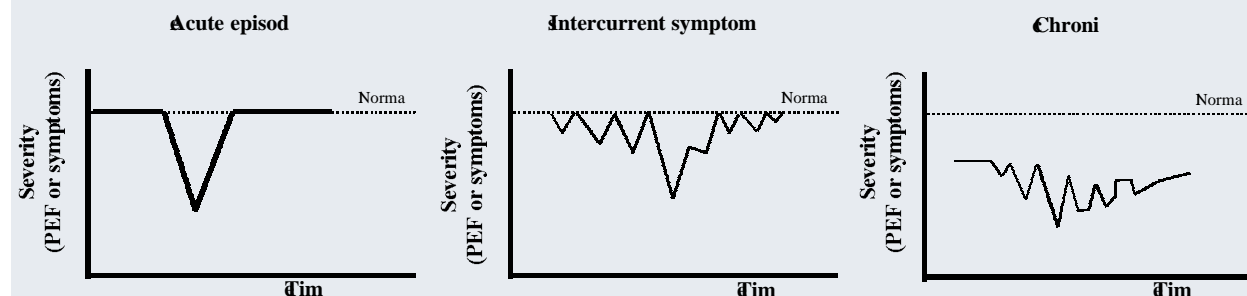
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Figure 1. Patterns of wheeze in young children (reproduced with kind permission of Professor M Silverman<sup>9</sup>)



different wheezing phenotypes

- Transient early wheezers, 60% of whom are not wheezing by the age of 6, show a strong association with maternal smoking during pregnancy. They have reduced lung function at least up to the age of 6, and their prevalence peak at around the age of 18 months to 2 years
- Non-atopic wheezers have no change in their IgE status, and their wheezing relates to viral-induced peak flow variability. Their prevalence peaks at about 4 years
- Persistent wheezers have raised IgE level at age 9 months and have methacholine responsiveness and peak flow variability. This group often have a significant family history of atopy particularly on the maternal side, have significantly reduced lung function at the age of 6 (presumably due to T-cell driven eosinophil-mediated chronic inflammation), and their prevalence gradually increases with the age of the cohort

These groups are not supposed to be exclusive nor are they clear-cut, but the representation of these three different wheezing phenotypes in terms of their hypothetical yearly peak prevalence is extremely useful.

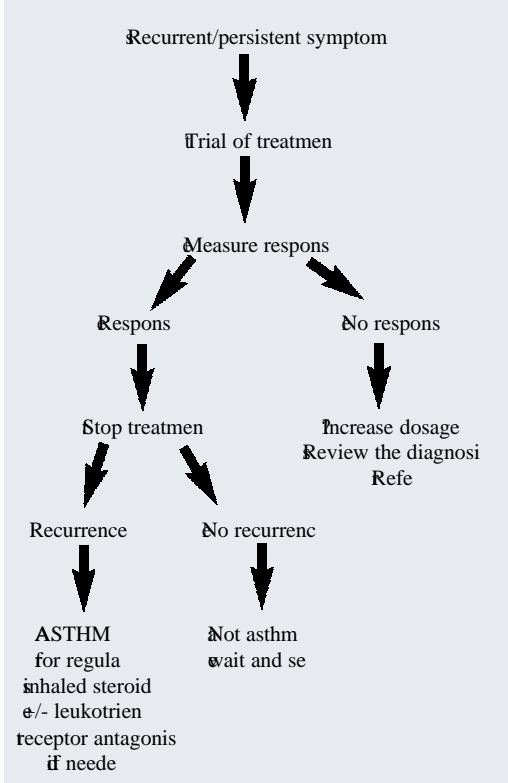
Evidence from other longitudinal studies (for example 7) suggests that there may be a genetic basis for this phenotypical difference. Amongst children of middle-aged patients with previously diagnosed asthma or 'wheezy bronchitis', the children of the 'wheezy bronchitis' adults had reduced lung function themselves, particularly in boys, at least raising the possibility of familial clusters of the 'wheezy bronchitis' 'early wheezer' phenotype

Knowledge of these different wheezing phenotypes in pre-school children is a useful tool in the consultation largely because of the implications for treatment. Children presenting with persistent symptoms, with personal and/or family history of atopy, with symptoms of wheeze and/or cough which are worse at night or on exercise, (the 'persistent wheezer' phenotype), are likely to respond to anti-inflammatory treatment. Similarly, children with the 'viral induced wheeze' phenotype, usually with no family or personal history of atopy and with no interval symptoms, are unlikely to have IgE-mediated atopic asthma, and are therefore unlikely to need regular treatment with inhaled steroids. Nevertheless, the situation is rarely this clear, since viral infections are the commonest trigger for exacerbations of 'true persistent atopic asthma

### The Role of a Trial of Treatment

A trial of treatment is therefore the next step (Figure 2). The rationale for a trial of treatment needs to be explained clearly to the child's parents. The important point is that the treatment will be stopped after three or four weeks, firstly to assess its success and secondly to see whether symptoms recur, thereby helping to establish the diagnosis

Figure 2. Management strategy



The dose of inhaled steroids needs to be sufficiently high in order to control the inflammatory process in the airways quickly. Adult studies using a trial of treatment as a diagnostic tool have used inhaled steroid dosages of 2000 mcg/day together with oral steroids if necessary. Therefore, one could use 200-400 mcg/day budesonide (or its equivalent) in the under 2's and 400mcg/day in the 2 to 5 year olds via metered dose inhaler, spacer and mask if needed. Whether or not to use oral steroid (at a dose of mg/kg/day or less) will naturally depend on the severity of symptoms, and may depend upon the degree of parental anxiety, and the need for 'something to be done now'

It is essential to have regular review during the trial of treatment and then a review as treatment ceases a month or 4 weeks. Beaming smiles on the parents, with an asymptomatic child in tow, signify a successful trial. Recurrence of symptoms needs further review and discussion about long-term low-dose inhaled anti-inflammatory steroid treatment

### When to Refer

If there has been no response to a good trial of treatment, with continuing parental anxiety, this inevitably casts doubt on a diagnosis of 'asthma' and referral is indicated. With only a partial response there may still be residual parental anxiety and doctor concern regarding dual pathology

As children get older and become capable of performing reproducible peak flow measurements and spirometry, it is important to rethink the diagnosis in later years if symptoms persist or recur. Inability to demonstrate variability with a beta-agonist challenge would cast some doubt on the diagnosis.

The younger the child, the wider the differential diagnosis, as discussed above, and the lower should be the threshold for referral to a respiratory paediatrician.

Finally, if the parents or GP are concerned about the child's progress in any way and things are 'not right', second opinion is always warranted.

### Why bother to make the diagnosis and treat when symptoms are mild

Children with a good response to a trial of treatment and then recurrence of their symptoms warrant regular treatment with inhaled steroids. Give a dose of inhaled steroids sufficient to control the symptoms and then bring the dosage down to the minimum level possible. The available inhaled steroids have different dose-response curves, and in my opinion, budesonide is the initial treatment of choice in pre-school children. One may need to consider adding in leukotriene receptor antagonist (montelukast is licensed from the age of two). When parents query the role of long-term treatment, it is probably fair to mention the data from older children which show that early treatment with inhaled steroids improve long-term lung function.<sup>8</sup> We are awaiting studies to see if these benefits can be extrapolated to the under 5's.

### Conclusion

In this paper, the first of our 'Personal Opinion' series have attempted to clarify aspects of history taking in infants and pre-school children presenting with cough and wheeze, with particular emphasis on recent longitudinal studies showing the hypothetical prevalence of different wheezing phenotypes. The younger the child, the more one should consider rarities that require referral to a respiratory paediatrician. A trial of treatment is a useful way of establishing the diagnosis and of differentiating between those children who warrant long-term inhaled steroids for atopic persistent asthma, and those who do not. ■

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