

NOCTURNAL ASTHMA

J R Catterall, Colin M Shapiro

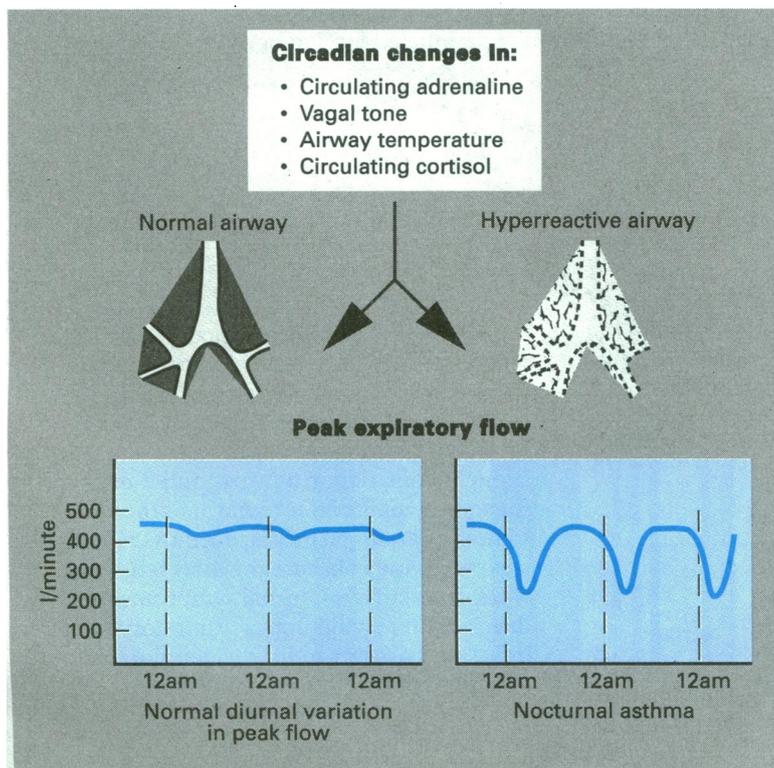
I have omitted to mention this, that my fits never feize me but in the Night, and then awake me with a heavinefs, and fo grow worfe and worfe immediately.

(Written by Dr (later Sir) John Floyer, himself asthmatic, in *A Treatise of the Asthma*, 1698)

Attacks of bronchial asthma are common during the night. In a recent survey in general practice of over 7000 asthmatic patients, 48% woke every night with asthma and 73% woke at least once a week, despite treatment. Coughing is common, and may be the only symptom.

Nocturnal asthma is potentially dangerous. There is an excess of deaths due to asthma during the night, and those patients most at risk are those whose peak flow rates fall furthest at night.

Pathogenesis

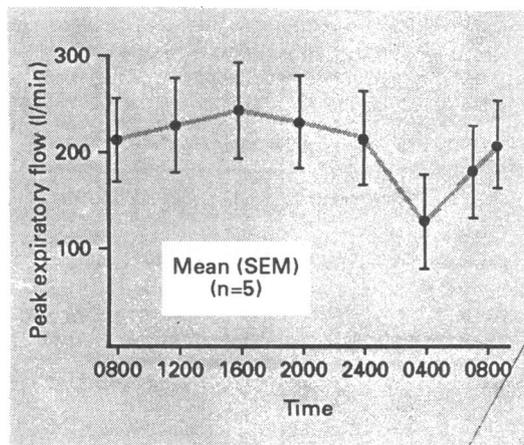


The pathogenesis of nocturnal asthma.

Nocturnal asthma is a manifestation of bronchial hyper-reactivity. It is normal for the airways to narrow slightly at night, but whereas normal people have an overnight fall in peak expiratory flow of 8% asthmatic patients have much greater falls, often in the region of 50%. The physiological changes that in normal people cause the airways to narrow at night have a greater effect on asthmatic patients because their airways are more sensitive to bronchoconstricting stimuli.

The causes of nocturnal bronchoconstriction are incompletely understood, but several factors probably coexist, including the early morning fall in circulating adrenaline, overnight changes in vagal tone and airway temperature, and circadian changes in plasma cortisol concentration. Sleep also plays a part by synchronising these circadian rhythms.

- All patients suspected of having asthma should be asked about nocturnal symptoms
- Nocturnal cough is the only symptom in some patients
- Nocturnal bronchoconstriction should be quantified by peak flow measurements at home, especially in those patients without daytime symptoms
- Nocturnal asthma is often the first indication of an exacerbation of asthma



Peak flow measurements can be used to confirm the diagnosis of nocturnal asthma, to assess response to treatment, and to guide changes in treatment. An overnight fall of 15% or more from the baseline measurement is usually abnormal.

Many asthmatic patients become so used to waking up at night that they fail to report it to the doctor. All patients who are suspected of having asthma should be asked specifically about symptoms during the night and in the early morning. Disruption of sleep has important effects on daytime performance, and children commonly complain of nightmares at times of exacerbation of asthma, as well as being irritable and having difficulties in adapting.

Whenever possible nocturnal bronchoconstriction should be confirmed and quantified by measurement of the peak flow rate at home. Reported symptoms may correlate poorly with severity and should not be relied on exclusively. There is increasing evidence that perception of bronchoconstriction varies significantly among patients.

Exacerbations of asthma

Nocturnal asthma is often the first indication of an exacerbation. Diurnal swings in the peak flow rate become less severe as the exacerbation resolves.

Absence of signs and symptoms during the day

A patient with serious symptoms during the night and early hours of the morning may have no signs or symptoms, and a normal peak flow rate, when examined at 0900. Monitoring of the peak flow rate at home is particularly useful in these patients.

Nocturnal cough

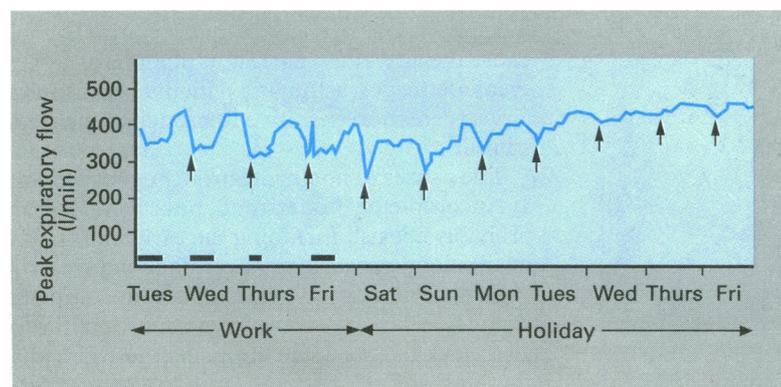
Nocturnal cough is the only symptom in some patients, particularly children. The diagnosis is not always easy to confirm by monitoring the peak flow rate, but most patients respond to a therapeutic trial of inhaled or oral corticosteroids. Any patient who has a nocturnal cough that persists for four weeks should have a chest radiograph.

"Cardiac" asthma

Paroxysmal nocturnal dyspnoea in a young person is more likely to be caused by asthma than by left ventricular failure. It is, however, common for asthma to present late in life, often with nocturnal wheeze.

Children

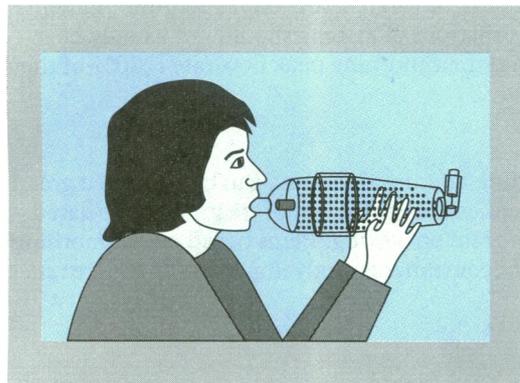
Recurrent nocturnal wheeze, cough, or dyspnoea in a child is caused by asthma unless proved otherwise. Isolated attacks, however, may have many causes, including infection or an inhaled foreign body.



Peak expiratory flow measurements in a 39 year old man with asthma induced by exposure to isocyanate. The arrows indicate the peak flow rates on waking and the bars the period of exposure to isocyanate. The nocturnal falls in peak flow took several days to resolve after exposure to isocyanate ceased and initially obscured the association with work.

Underlying cause

Nocturnal bronchoconstriction will occur whenever there is bronchial hyper-reactivity, irrespective of the underlying cause. In occupational asthma, for example, nocturnal bronchoconstriction may be more severe than bronchoconstriction at work, and it may persist for several nights after removal of the cause. Unless a careful history is taken the nocturnal symptoms may obscure the association with work. Similarly, nocturnal symptoms that develop after a viral upper respiratory tract infection probably indicate a temporary post-infective episode of bronchial hyper-reactivity and do not necessarily mean that the patient will develop lifelong asthma.



Inhaled corticosteroids are the treatment of choice for nocturnal asthma, and should be taken either from a pressurised aerosol or a dry powder inhaler. Inhaled corticosteroids from a pressurised aerosol are more effective and less likely to cause local side effects when they are taken through a large volume spacer.



Patients should measure their peak flow whatever time they wake with asthma.

Instructions for using the peak flow meter

- 1 Measure the peak flow 2-3 times daily if possible. Always include a measurement first thing in the morning
- 2 If you waken during the night because of asthma, make an additional measurement then
- 3 Make the measurement before using your inhaler
- 4 To measure the peak flow:
 - Take a full deep breath in
 - Hold the peak flow meter horizontally and close your lips tightly round the mouthpiece
 - Blow out as hard and as fast as you can in a short sharp blow
 - Wait one minute between each blow.
 Take the best of three readings

In general good control of asthma during the day will mean good control of asthma during the night. Occasionally (in occupational asthma, or when a single removable allergen is the cause) the trigger of the bronchial hyper-reactivity can be identified and removed, but most people require drugs.

Inhaled anti-inflammatory drugs

Corticosteroids inhaled regularly are the mainstay of treatment. They reduce bronchial hyper-reactivity by suppressing inflammation of the airways. Response to treatment should be assessed by measuring the peak flow rate on waking every morning and the dose should be increased every two to three weeks until nocturnal symptoms resolve and the morning peak flow rate is within the reference range. Large doses should be delivered through a large volume spacer or a breath-actuated device for delivering dry powder. This will increase delivery to the lungs and reduce local side effects.

Other prophylactic drugs are less effective in nocturnal asthma. Sodium cromoglycate and nedocromil sodium may, however, be helpful in patients with mild symptoms and in patients who cannot tolerate large doses of inhaled corticosteroids.

Inhaled bronchodilators

The recent introduction of long acting inhaled bronchodilators has been an important development in the management of nocturnal asthma. These bronchodilators have the advantage over conventional inhaled β agonists and anticholinergic drugs in that they are active throughout the night while retaining a lower risk of systemic effects than oral drugs. They should be used in addition to inhaled corticosteroids when corticosteroids alone are insufficient.

Long acting oral bronchodilators

In general inhaled bronchodilators are preferable to oral ones as the same bronchodilator effect can be achieved with smaller doses. However, oral treatment is indicated: (a) in patients whose nocturnal asthma remains uncontrolled despite high doses of inhaled steroids and inhaled bronchodilators, and (b) in young children and in others incapable of using any inhaler device—for example, because of arthritis, involuntary movements, or mental disability.

In patients whose asthma remains uncontrolled despite maximal inhaled treatment, oral theophylline is the drug of choice since it has a different mode of action from the inhaled bronchodilators which can often give additional bronchodilatation. The dose should be adjusted according to plasma or saliva concentrations. In patients who are unable to use inhalers oral β agonists are usually the first choice as they have a safer therapeutic index than theophylline and disturb sleep less.

Children

Aged 5 years or more—Children who are old enough to use an inhaler should be treated in the same way as adults. Inhaled corticosteroids are more effective than sodium cromoglycate for nocturnal asthma.

Aged 18 months-5 years—Children who are unable to use an inhaler can take inhaled drugs through a mask attached to a large volume spacer or through the bottom of a plastic cup, but these methods demand cooperation and the efficacy varies from child to child. Nebulised bronchodilators taken before bed are helpful, but their action will not last all night. Controlled release β agonists and theophylline are available in paediatric formulations, but many children prefer syrups, which, like inhaled drugs, last only a short time.

Aged less than 18 months—Nocturnal asthma is difficult to treat in this age group. Children with mild symptoms require no treatment and the parents should be reassured. For those with more troublesome symptoms a β agonist or theophylline syrup should be tried followed if necessary by a trial of a nebulised β agonist with or without ipratropium. A distressed child who fails to respond should be admitted to hospital.

Peak flow rate	Action
> 70% of target	Continue maintenance treatment
50-70% of target	Double dose of inhaled corticosteroids
< 50% of target	Start course of oral prednisolone
< 150-200 l/minute	Seek medical help urgently

Self management of asthma based on morning peak expiratory flow measurements. The target peak expiratory flow is either the predicted value or the maximum consistent value achieved by the patient when well, whichever is the more appropriate.

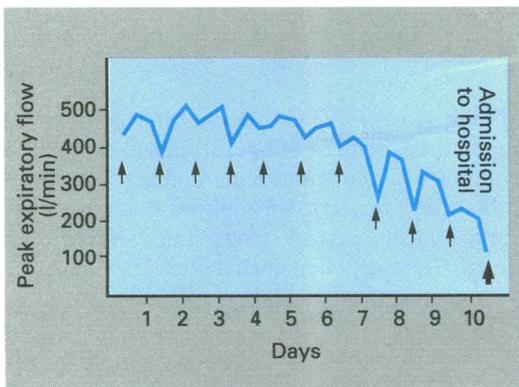
Emergency treatment

Severe nocturnal asthma should be treated with nebulised bronchodilators and oral corticosteroids. As in any acute attack of asthma admission to hospital may be necessary, particularly if the patient responds poorly to treatment or if the peak flow rate is less than 150 l/min. Patients recovering from severe exacerbations of asthma should not usually be discharged from hospital until their morning peak flow rate is 70% of their value when well.

Self management

Control of asthma, including nocturnal asthma, can be improved greatly by giving patients firm guidelines about changes of treatment associated with changes in the peak flow rate on waking. Plans based on the morning peak flow rates are likely to become increasingly important in the treatment of asthma.

Conclusion



Peak expiratory flow measurements in a 27 year old man at the beginning of an acute exacerbation of asthma. The arrows indicate peak flow rates on waking. The earliest features of the exacerbation were nocturnal symptoms and a fall in the peak flow rate in the morning.

Nocturnal asthma is common and underdiagnosed, and is a sign of inadequate control of asthma. Patients who have, or are suspected of having, asthma should always be asked specifically about symptoms during the night and in the early hours, and patients with unstable asthma should be encouraged to measure their peak flow when they wake up each morning.

The treatment of choice is inhaled corticosteroids, if necessary in high doses, supplemented by inhaled bronchodilators. The development of nocturnal asthma in a patient who has not previously had nocturnal symptoms, or the worsening of pre-existing nocturnal bronchoconstriction, should be regarded as serious and indicates that the treatment should be changed.

It should be kept in mind that night time is particularly important for asthmatic patients—many have symptoms only at night, and studies of severe cases show that a disproportionate number of deaths occur during the night.

The figure of self management of asthma is modified from Beasley R, *et al. Thorax* 1989;44:220-4, and is reproduced with permission.

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The ABC of Sleep Disorders has been edited by Professor Shapiro.

The trials of non-sexist language

I have been following the discussion about the use of non-sexist language in the *BMJ* and have tried to do my bit for the cause by deploying gender free pronouns with a reforming zeal. My writing has become studded with “they” instead of “he” or “she,” “their” instead of “his” or “hers,” and I have overused phrases such as “the patient” and “the doctor” so as not to let slip whether they possess a Y chromosome. I reasoned that inelegant prose was a small price to pay if I might help undo two millenia of masculine oppression.

But I am getting fed up with the whole business. In the first place every “he or she” or “s/he” draws attention to itself rather than to whatever I am trying to say. This is one cause of lost clarity. Worse than this, I now realise that in many instances non-sexist language is paradoxical, it actually sabotages the purpose of communication.

After all, why do we write about “the patient” or “the doctor” as individual people rather than keeping discussion at an abstract level? It is precisely because we

wish to be concrete—that is, we want to conjure up a picture in the reader’s mind. If this strategy is effective the reader will see an image of a person doing whatever has been described. That image must be either a man or a woman. If gender free language obtrudes it will thwart the formation of a concrete image by explicitly defeating the impulse to make a mental picture. A doctor cannot be a s/he, a patient cannot be a they. Either we wish to be concrete—in which case we specify the sex of the protagonist; or we wish to be abstract—in which case the more abstract the better, and we can be as sexless as we wish. But to give a concrete example only to sabotage it by insisting that the sex remains undefined is both confused and confusing.—BRUCE CHARLTON is a lecturer in epidemiology and public health in Newcastle upon Tyne.

We welcome contributions to fillers up to 600 words: *A patient who changed my practice; A paper that changed my practice; A memorable patient; The message I would most like to leave behind,* or similar topics.