The other drugs reach a steady state, and the blood concentrations are therefore substantially independent of the time of collection. Primidone is metabolised to phenobarbitone and the therapeutic range is judged by the phenobarbitone concentration. Some centres may want to use other gravimetric units—mg/100 ml or mg/l—in which case the nomogram may be adapted easily.

Guidance on doses

The table gives practical guidance for drug dosage, although there are wide differences between the doses needed by individual patients to attain similar blood concentrations. This table may be used as a guide for both adult and child dosages, though where these are significantly different both are shown. The starting dose quoted is per 24 hours and not the amount taken at each administration. This dose is given at the beginning of a drug regimen that would normally be continued for about

two weeks. Should it be necessary to adjust the dose after that period the recommended dose change is shown in column headed increments.

The frequency of fits and the presence of side effects are the best guides to management, and blood concentrations of drugs provide only additional indicators of rational treatment. A few patients will be well controlled when their blood concentrations are below the lower limit of the range and some may have no side effects when their blood concentrations exceed the upper limit of the range; conversely, others may have side effects within this range.

References

- ¹ Baron, D N, *British Medical Journal*, 1974, **1**, 509.
- ² Bold, A M, and Wilding, P, *Clinical Chemistry Conversion Scales for SI Units with Adult Normal (Reference) Values*. Oxford, Blackwell Scientific Publications, 1975.

(Accepted 6 July 1978)

Personal Therapeutics

Asthma

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British Medical Journal, 1978, **2**, 1208-1210

Recognising asthma may present few problems, especially if the patient is young and has typical episodes of intermittent breathlessness precipitated by exposure to allergens or exercise. Some patients, however, appear to be normal when they attend the surgery or clinic, and have symptoms only at night or in the early morning, whereas other, older patients may be misdiagnosed as having chronic bronchitis or emphysema. A careful history and examination, chest radiography, and appropriate pulmonary function testing should point to the correct diagnosis. Although we do not yet know the nature of the basic defect in asthma, and are not clear about how some drugs produce their beneficial effects, we now have a potent armoury of effective remedies that can, with correct application, keep most patients fairly well most of the time.

It is crucial to assess the patient's disability objectively. The general practitioner can obtain important information if he has a peak flow meter in his surgery. Patients with pronounced and persistent symptoms often have a peak expiratory flow rate (PEFR) less than 200 l/min, and values less than 100 l/min indicate very severe airway narrowing. Inhaling a sympathomimetic usually produces an increase in PEFR of 20% or greater in the asthmatic patient. Lack of such a response, however, does not exclude asthma, and a trial of corticosteroids may be necessary to show that the airway narrowing is reversible. If the doctor is uncertain he should refer the patient to a pulmonary function laboratory.

Records in the notes of PEFR every time the patient attends prove useful. In addition, a chart of PEFR completed by the patient on three or four occasions during the day over several days may be most valuable in establishing the individual pattern of airway narrowing. To attempt to manage asthma without frequent objective measurements of the amount of airway narrowing is analogous to managing diabetes without testing the urine.

Management of asthma

PATIENT EDUCATION

Many problems arise because patients, and sometimes their doctors, do not appreciate the nature of asthma. The chronicity and variability of the condition should be explained, and if prophylactic treatment is being used the patient must understand the purpose and basis of such treatment. Emotional aspects should be minimised; psychological factors are rarely very important aetiologically, and, indeed, much anxiety and depression can be relieved when asthma is properly controlled. Although the dangers of some of the treatments—for example, overuse of sympathomimetic inhalers—should be explained, equal emphasis should be given to the dangers of ignoring the onset of an acute severe attack. Patients should be educated to seek medical advice promptly when their usual remedies fail to control their asthma.

AVOIDANCE OF TRIGGER FACTORS AND DESENSITISATION

Removal from working environments where there are dust and irritant fumes will help all asthmatic patients, and they should be discouraged from smoking. Avoidance of specific

antigens after identification is essential in cases of occupational asthma. Similarly, those patients who are believed to have their asthma provoked by aspirin must be advised always to avoid analgesic mixtures that may contain aspirin or similar drugs.

Some allergic patients may benefit from taking precautions to minimise exposure to house dust, but it is never advisable to suggest moving house or similar major changes in life style in the hope of improving symptoms. Specific desensitising injections may be helpful if, for example, an extrinsic asthmatic patient is allergic only to grass pollen and has symptoms almost exclusively during the grass pollen season; otherwise the results of desensitisation are often disappointing.

DRUG TREATMENT

Drug treatment is the mainstay of the management of asthma, and the aim must be to achieve optimum control with the minimum of side effects. Just as it is important not to overtreat the mild asthmatic patient, it is equally important to recognise the more severely affected patients and to begin the appropriate treatment at the correct time. Generally I prefer to start with the simple remedies (bronchodilators) and progress to the other treatments (cromoglycate, corticosteroids) if these fail. Sometimes, however, intensive treatment including a short course of oral corticosteroids is needed to achieve sufficient improvement before a simpler regimen can be substituted to provide effective maintenance.

BRONCHODILATORS

Intermittent use of a metered-dose inhaler containing a β_2 -adrenergic receptor stimulant may be all that is needed by the mild asthmatic patient. There is little to choose between the available agents, and I generally use salbutamol for most patients; occasionally I find rimiterol useful for patients who prefer a rapid onset but relatively short duration of action. More regular treatment—for instance, salbutamol two puffs four times daily—with the option of taking an additional four or six puffs in 24 hours, may suffice for patients with persistent symptoms whose PEFR is around 200 l/min. Side effects are seldom troublesome when these agents are given by metered-dose inhaler, and this is the preferred method of treatment. For those patients who cannot use metered-dose inhalers satisfactorily, the new Rotahaler may be effective, although its assembly requires dexterity and practice; otherwise oral sympathomimetic preparations are available, although these may cause tremor or tachycardia. Some new oral preparations of theophylline and aminophylline now available seldom cause stomach irritation. Oral slow-release aminophylline may be a useful adjunct to regular treatment with inhaled β_2 -adrenergic receptor stimulants, especially if the oral sympathomimetics cause unwanted effects.

Ipratropium is an anticholinergic (atropine-like) drug, which is available as a metered-dose inhaler, and it may be useful in patients who cannot tolerate sympathomimetics even by inhalation. There is some evidence that this type of drug is more effective in patients with chronic bronchitis than in asthmatic patients, but more long-term clinical studies are needed.

If the effectiveness of a bronchodilator appears to be waning there is little point in changing to another bronchodilator; the whole problem needs to be reassessed, and cromoglycate or corticosteroids may be indicated.

ANTI-ALLERGIC DRUGS

If a bronchodilator alone fails to control symptoms it is worth while performing a therapeutic trial of disodium cromoglycate (DSCG). This drug is non-toxic, and, although children and young allergic adults are those most likely to benefit, it is

hard to predict exactly who will respond. A proper trial should be performed with frequent PEFR readings, several weeks before and several weeks after starting treatment with 20 mg four times daily inhaled from a Spinhaler. If there is no clear improvement the treatment should be discontinued.

The compound preparation should never be used because the isoprenaline that it contains confuses the assessment of benefit. If there is persistent airway narrowing, or wheezing is provoked by the powder, a sympathomimetic should be inhaled 15 minutes before inhaling DSCG. This will achieve useful bronchodilatation, thereby improving the distribution of the DSCG throughout the airways and airway irritability will also be reduced. It is important to explain to patients and to their relatives that DSCG is for regular prophylaxis, and that it is safe. It is not intended for treatment of the acute attack, and it is not desirable to reduce the daily dose to a minimum when symptoms are few.

CORTICOSTEROIDS

If a trial of DSCG fails, symptoms are persistent, and especially if the PEFR is often less than 150 l/min corticosteroids should be considered. The availability of effective inhaled preparations has greatly reduced the risk of unwanted effects, but it is still advisable to be satisfied that other methods are ineffective before beginning corticosteroid treatment on a long-term basis. Any asthmatic patient may, of course, need a short course of oral corticosteroids as part of the treatment for an acute attack of asthma, but this does not mean that they will ever need long-term corticosteroids.

INHALED CORTICOSTEROIDS

In most cases I start with beclomethasone 100 μ g (two puffs) four times a day, and review the patient weekly, including PEFR measurements. If improvement does not occur, and in any case if the PEFR is persistently less than 150 l/min, I add prednisolone 10 mg three times a day to the treatment for one week, and then reduce the dose to 10 mg twice daily, followed by 5 mg a day reductions in dosage every five days. This short course enables the maximum benefit of corticosteroids to be quickly achieved, and in most cases the inhaled beclomethasone will eventually suffice to maintain the patient symptom free. As with DSCG the prophylactic nature and safety of the treatment must be explained.

Inhaled sympathomimetics, if needed, should be taken 15 minutes before inhaling beclomethasone, so that optimal reversal of airway narrowing is obtained and wide distribution of the inhaled corticosteroid within the airways is achieved. Some patients develop oropharyngeal candidiasis when taking regular beclomethasone, and this should be treated by amphotericin lozenges, one four times daily. Candidiasis is seldom a major problem and may be minimised by reducing the dosage of beclomethasone or by washing out the mouth after taking beclomethasone.

ORAL CORTICOSTEROIDS

Although many patients will need only occasional courses of oral corticosteroids for part of the year when their symptoms are bad, some individuals, having failed to respond to other treatment, will need long-term oral corticosteroids. After an initial high-dose course as outlined above, it may be found that quite low doses give adequate control, especially if combined with inhaled beclomethasone. In any case, every effort should be made to keep the total daily dose lower than the equivalent of 10 mg of prednisolone a day. A regimen of taking double the daily requirement on alternate mornings has been found useful in avoiding suppression of growth in children. Patients who suffer indigestion may find the enteric-coated forms of

prednisolone useful. Patients who have been controlled by oral corticosteroids for a long time and are then successfully weaned off these on to beclomethasone alone should continue to carry their steroid card and should have a supply of steroid tablets at home in case they develop an acute attack of asthma.

OTHER TREATMENTS

The β -adrenergic receptor blocking drugs are absolutely contraindicated in asthma. I do not use corticotrophin, antihistamines, expectorants, antitussives, psychotropic drugs, sedatives, or mixtures of ephedrine, theophylline, and a barbiturate in the management of asthma. I have no experience of acupuncture, biofeedback, breathing exercises, hypnotherapy, or group therapy, and, although some individuals might obtain benefit from these, I would not generally recommend them to patients.

Exercise should be encouraged so far as is practicable, especially in children. Exercise-induced asthma may usually be controlled by prior inhalation of DSCG or a sympathomimetic, and it is preferable to prescribe these agents and allow exercise than to have a child feel isolated and handicapped.

ACUTE SEVERE ATTACKS OF ASTHMA

It is foolish to apply any definition of "status asthmaticus" which requires symptoms to be present for more than 24 hours; patients with acute symptoms may die within a few hours of the

onset of an attack. Patients *must* be aware that they must seek medical advice if they develop an attack that fails to improve after treatment with their usual drugs. This is especially important if the attack is severe enough to confine them to a chair during the day or to keep them awake at night. In such cases the pulse rate will usually be greater than 120/min and the PEF less than 100 l/min. Such an attack is best treated in hospital, but before transferring the patient 250 mg of aminophylline may be injected slowly intravenously, together with a bolus intravenous injection of 300 mg hydrocortisone. In hospital the spirometry and blood gases can be monitored and treatment continued with bronchodilators, corticosteroids, oxygen, and rehydration. Eventually ventilation may be required if there is exhaustion and carbon dioxide retention.

Conclusion

To manage asthma correctly frequent clinical and physiological assessment may be necessary. Although simple, the peak flow meter can give valuable information when following progress. Treatment should be the minimum necessary to control attacks, but the more effective remedies must not be withheld when the clinical condition deteriorates.

Further reading

Clark, T J H and Godfrey, S, editors, *Asthma*. London, Chapman and Hall, 1977.

How to do it

Take an examination paper

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British Medical Journal, 1978, 2, 1210-1211

Examinations in medicine today include an increasing variety of written papers. The answers required range from lengthy essays to the candidate's marks on specially prepared answer sheets which indicate his responses to multiple-choice questions. First, I will consider those questions that require from the candidate an attempt to convey his thoughts to the examiners in continuous prose. Later, I will briefly consider questions requiring short answers, and multiple-choice questions.

Essay papers

The traditional essay paper consists of 4-6 questions, on each of which you are expected to write for 30-45 minutes; recently, papers have sometimes included a much larger number of questions, perhaps 15 or 20, to which the answers must be

correspondingly shorter. Sometimes these two types of question appear in the same paper and, for this reason (and for many others), it is essential that you read through the instructions printed on the paper so that you are quite clear about what is wanted. Having read the whole paper through and, incidentally, noted whether any, or all, of the questions are compulsory, you should spend a moment or two planning your campaign. If possible, it is clearly desirable to decide at the outset which of several optional questions you will answer but, if the choice is difficult and the minutes are ticking away, it may well be wise to start writing answers to the questions that you have definitely decided to attempt. While you are writing, and however hard you may be concentrating on one question, you may find that ideas and facts about other questions spring to mind, and, if you make a note of them as they arise, you may be able to decide more easily which of the remaining questions to answer.

Whether or not you have to choose which questions to answer, you must be certain, before you start to write, how much time you can afford to spend on each question. At all costs you must answer the right number of questions, and examiners are rarely impressed by the answer consisting of one or two lines and ending in mid-sentence—a ploy that seems designed to give the impression that, had five minutes more been available, a brilliant vignette of the topic under discussion would not have been lost to posterity.