

An Approach to the Management of High Risk Asthmatic Patients

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Summary

This review briefly outlines an approach to the management of high risk asthmatic patients. This approach involves: (i) identification of such high risk patients; (ii) investigation of precipitating factors contributing to severe attacks; and (iii) the introduction of a management strategy based on a simple system of self-assessment and self-treatment.

1. Identification of High Risk Asthmatic Patients

An initial priority is to develop a clinical profile of patients with severe asthma who are at increased risk of a severe attack, leading to either a hospital admission or a fatal outcome. A number of clinical characteristics associated with such an increased risk have been identified, relating to either the presence of severe disease, or problems associated with the utilisation of medical care (table 1).^[1,2] Probably the most practical and useful ways in which clinicians can recognise high risk asthmatic patients within their practices is to identify:

- patients requesting repeat prescriptions of 2 or more β -agonist inhalers per month
- patients who have frequently visited their gen-

eral practitioner or hospital emergency department with severe asthma

- patients who have had a recent hospital admission. For example, a patient who has had a hospital admission for asthma in the previous year has a 16-fold increased risk of a fatal attack of asthma. Amongst such patients with a recent hospital admission, the marker associated with the highest risk of death is a previous intensive care unit admission for asthma, and in particular the requirement for mechanical ventilation, which has a 5-year mortality rate of about 20%.^[3]

2. Clinical Presentations of Life-Threatening Asthma

The clinical presentation of a severe attack of asthma may vary depending on the characteristics

Table I. Identification of high risk asthmatic patients

1. Adolescents
2. Disadvantaged racial groups
3. Psychological or psychosocial problems
4. Three or more asthma medications prescribed
5. Requirement for ≥ 2 β -agonist inhalers per month
6. Frequent visits to general practitioner with unstable asthma
7. One or more hospital emergency department visits
8. Recent hospital admission
9. Previous life-threatening attack ^a
a Patients with a previous life-threatening attack represent those at greatest risk.

of the asthmatic patient and the cause(s) of the exacerbation.^[4,5] Three main patterns have been recognised, and although any individual asthmatic patient may present in any of these ways, an individual's repeated episodes of severe asthma often follow one particular pattern.

The first presentation is that of a sudden precipitate attack in which the asthmatic patient may develop a life-threatening attack of asthma within minutes or hours of the onset of the first symptoms. The second type of presentation is characterised by a gradual worsening evolving over several days to weeks, leading to progressively more severe asthma. The third pattern is that of a severe attack which occurs quickly after a few days of unstable asthma. Clinical features, including the time course of the response to treatment, suggest that bronchospasm may play the primary role in the pathogenesis of precipitate asthma, whereas worsening airways inflammation with mucous plugging may be the predominant pathophysiological process involved in the more gradual presentations.

3. Precipitating Factors of Life-Threatening Asthma

A wide range of factors are being increasingly recognised as causes of near-fatal and fatal attacks of asthma. While it is difficult to predict the likely cause in an individual patient, certain observations are worthy of comment, as they have therapeutic implications.

The most common cause of a severe attack of asthma in childhood is a viral respiratory tract in-

fection, accounting for up to 80% of episodes.^[6,7] Viral respiratory tract infections are also important in adults, being associated with up to 30% of severe exacerbations.^[8] Although many different viruses may precipitate an attack of asthma, the most common are rhinoviruses and coronaviruses, which are responsible for the 'common cold'. The practical clinical implication of these observations is that asthmatic patients should be advised that symptoms suggestive of a viral respiratory tract infection should warn them of a likely deterioration of their asthma and probable requirement for increased asthma treatment.

One of the most common causes of a precipitate life-threatening attack is allergen exposure in a sensitised individual.^[4,9] The particular allergen responsible will often vary in different populations and individuals. However, it is not uncommon for outbreaks of severe asthma to occur in a community due to one specific allergen, as occurred in the soybean-induced epidemics of severe asthma in Barcelona,^[10] and in seasonal-related episodes of life-threatening asthma relating to *Alternaria* exposure in the US.^[11] Allergen exposure also plays an important role in the pathogenesis of chronic severe asthma. Patients with chronic severe asthma, and in particular severe brittle asthma, possess a greater degree of atopy when measured by either skin prick test or allergen-specific IgE.^[12,13]

A further feature is that there may be a number of related factors which interact in the development of severe attacks. For example, thunderstorms have been shown to cause the release of allergen-containing starch granules following the osmotic rupture of rye-grass pollen grains by rainwater, thereby provoking attacks of severe asthma in sensitised individuals.^[14] The relationship between other factors may be even less clinically obvious, as with the interaction between atmospheric ozone and inhaled allergen exposure.^[15] Regardless of the underlying cause, exercise may contribute to the severity of attacks.

It is not uncommon for one specific factor to cause repeated severe attacks in an asthmatic individual, and as a result a serious attempt should be

made to identify the precipitating factor(s) causing a severe attack of asthma and to exclude the common factors outlined in table II. The potential role of aspirin (acetylsalicylic acid) and other nonsteroidal anti-inflammatory drugs, taken as medications or naturally present in foodstuffs, deserves special mention. In one series of asthmatic patients requiring mechanical ventilation, aspirin sensitivity was recognised in about 25% of cases;^[3] in another series, sensitivity to aspirin was considered to be the cause of the life-threatening attack in 11% of patients.^[5] In this latter study, sensitivity to food preservatives and additives was also identified, suggesting that an adverse reaction to these agents should also be sought in such patients.

Other series have suggested that allergic reactions to foodstuffs, such as peanuts and nuts, may precipitate severe attacks of asthma, particularly if features of anaphylaxis are present.^[16] Patients with known anaphylactic food sensitivity appear to be at high risk of death from severe asthma,^[17] and conversely both adults and children with a pre-existing diagnosis of asthma are at increased risk of fatal or near-fatal anaphylaxis.^[18]

4. Recognition of Management Problems Associated with Severe Asthma

The next priority is to recognise the management problems that have been associated with a life-threatening attack of asthma so that practical management strategies can be developed to prevent a fatal outcome. Investigations of the circumstances of death or near death from asthma have consistently identified several clinical features that

Table III. Management problems associated with life-threatening attacks of asthma

Long term
Lack of appreciation of chronic asthma severity and risk of death
Poor compliance with management
Discontinuity of medical care
Under-utilisation of inhaled corticosteroids
Fatal attack
Delay in seeking medical help
Inability to recognise the severity of the attack
Over-reliance on bronchodilator therapy
Insufficient systemic steroid use
Lack of written guidelines for management

relate to either long term management or the treatment of the life-threatening attack^[19,20] (table III). Problems associated with long term management include the lack of appreciation by both the patient and their doctor of the patient's chronic asthma severity, inadequate long term use of inhaled corticosteroids, and discontinuity of general practice care, with failure to attend a general practitioner between attacks.

Similar problems have been identified with the treatment of severe asthma attacks, in particular the inability of the patient, family or doctor to recognise the severity of the fatal attack, and over-reliance on inhaled bronchodilator treatment without additional therapy. These factors have been considered to be particularly important in leading to delay in seeking medical help despite the development of a life-threatening asthma attack. As a result, most deaths from asthma occur in the community; once the patient has presented to hospital a favourable outcome is likely.

5. Management Strategies

By considering the circumstances associated with fatal asthma, it is possible to devise management strategies that can potentially overcome many of the problems encountered. Since the major factor contributing to a fatal outcome is the inability of the patient or relatives to recognise worsening asthma and make the appropriate therapeutic response, a logical management strategy would be

Table II. Precipitating factors contributing to a life-threatening attack of asthma

Allergen exposure
Viral respiratory tract infections
Air pollution
Weather changes
Drugs (especially nonsteroidal anti-inflammatory drugs)
Emotional stress
Foods, including preservatives

to develop a system of self-assessment and self-management for the patient to follow, in accordance with predetermined written guidelines. Support for this approach is also strengthened with the knowledge that the majority of asthma attacks occur in the community and are self-managed by patients without immediate consultation with their general practitioner. The basic principles of such a system of self-management are outlined in table IV.

The ability of the patient to recognise changes in asthma control is essential to the success of the asthma self-management strategy. For this to be effective, objective assessment of asthma severity through the educated interpretation of key symptoms and measurements of lung function is required. The development of symptoms suggestive of a viral respiratory tract infection, or of nocturnal waking with asthma, are recognised as good markers of worsening asthma, while a poor response to increased use of inhaled β -agonist therapy is an important marker of a severe attack requiring medical treatment.^[21,22]

Domiciliary measurements of peak expiratory flow, with values expressed as a percentage of predicted or previous best achieved recordings, represent the most practical method of obtaining objective measurements of lung function. Peak flow monitoring, therefore, can be considered to represent an essential basis of any system of self-assessment, being of particular importance in patients with severe asthma, as they have been shown to have the worst perception of asthma severity.^[23,24] Spirometry or peak flow measurements should also form the basis of the physician's assessment of asthma

severity, as interpretation of symptoms and signs of asthma are notoriously difficult, even for the experienced physician.^[25]

Regular high dosage inhaled corticosteroids, with inhaled β -agonists used as required for relief of symptoms, are recognised as the basis of long term treatment of the high risk asthmatic patient.^[21,26] Accepted essential features of the treatment of high risk asthmatic patients experiencing a severe attack include the administration of oxygen, high dose inhaled β -agonists and oral corticosteroids, together with medical review.^[21,26]

6. Asthma Self-Management Plans

The self-management plan outlined in table V integrates many of the features of the different self-management systems that have been developed for use by high risk asthmatic patients.^[20,26-31] In many respects the first two stages can be considered to provide guidelines for overall long term management of asthma. In particular, the instruction to vary the dosage of inhaled corticosteroid treatment in a stepwise manner in accordance with changes in asthma severity represents one practical method whereby the recommendations for the long term treatment of chronic persistent asthma in adults can be implemented. As well as being advised to increase the dosage of inhaled corticosteroids in appropriate circumstances, the patient may also reduce the dosage after a prolonged period of good control.

The third and fourth stages of the plan provide guidelines for the treatment of severe asthma, with intensive treatment started by the patient in an attempt to prevent the development of a life-threatening attack. Thus, self-management plans represent one way in which the recommendations for acute severe and chronic persistent asthma can be brought together within the framework of one system.

Since the requirements of individual asthmatic patients will vary considerably, no single plan is likely to be suitable for every patient. Certain features may need to be varied, depending on the needs of the patient for whom the plan is devel-

Table IV. Basic principles of self-management for high risk asthmatic patients

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|---|
| 1. Requirement for the objective assessment of asthma severity with the educated interpretation of key symptoms and peak flow recordings |
| 2. Use of regular inhaled corticosteroids and intermittent β -agonists for the long term treatment of asthma; use of oral corticosteroids, high dose inhaled β -agonists, oxygen therapy and medical review for severe asthma |
| 3. Integration of self-assessment and self-management with written guidelines for both the long term treatment of asthma and the treatment of acute severe asthma |

Table V. Self-management plan for high risk asthmatic patients: what to do and when

Step	Peak flow ^a (% of best)	Symptoms	Action ^b
1	80-100	Intermittent/few	Continue regular inhaled corticosteroid; inhaled β -agonist for relief of symptoms; \pm oral theophylline
2	60-80	Waking at night with asthma or coughing; symptoms suggestive of respiratory tract infection	Increase the dose and frequency of inhaled corticosteroid
3	40-60	Increasing breathlessness or poor response to increased use of bronchodilator	Start oral corticosteroids and contact a doctor
4	<40	Severe attack	Self-administer high dose inhaled β -agonist, continuous oxygen therapy; call emergency doctor or ambulance urgently

a The peak flow values recommended for each stage can be altered in accordance with physician preference and the patient's individual needs.

b At all stages, take inhaled bronchodilator for relief of symptoms.

oped. These features include: (i) the amount of detail provided; (ii) the number of stages used; (iii) the specific drug treatment recommended at each stage; and (iv) the precise level (or range of levels) of peak flow (whether pre- or post-bronchodilator) at which patients are advised to modify therapy or seek medical assistance. For example,^[5] it has been suggested that for patients who have had previous near-fatal attacks, each stage is set at a higher level, particularly for self-referral to hospital. For such patients more aggressive self-management has been proposed, involving the self-administration of oxygen and nebulised β -agonists by the patient at home during life-threatening attacks.^[5]

All patients with a previous attack of life-threatening asthma should have direct access to an acute medical ward at their local hospital, even if this requires prior arrangement with the ambulance service. The existence of such facilities has not only been shown to reduce the number of fatal asthma attacks, but also provides a degree of continuity of care for the patient.^[32,33]

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