



## High Risk Asthma

### Introduction

Asthma affects more than 5 million people in the United Kingdom and for the majority it is a disease that can be well managed with readily available current therapies. Sadly, in the region of 1,500 patients continue to die from their asthma every year. As well as those patients that suffer a fatal asthma attack (FA), there is a cohort of patients that have suffered from a near fatal asthma attack (NFA) and are subsequently at higher risk of morbidity and mortality. NFA is defined by the British Thoracic Society (BTS) as an asthma attack associated with a raised PaCO<sub>2</sub> and/or requiring mechanical ventilation with raised inflation pressures.

Patients with fatal asthma have been hypothesised as representing two distinct subgroups according to the onset of symptoms prior to death<sup>1</sup>. Hyzy *et al* examined the autopsy findings of 37 subjects aged 2 to 34 years dying from asthma and classified them as slow onset (Type 1) (n=21) or rapid onset (Type 2) (n=16). Subjects did not differ by age, race, sex, obesity or use of corticosteroids. Type 1 mortalities were hospitalised more and made more emergency room visits in the year prior to death than type 2 mortalities. Slow onset patients had a predominance of eosinophils and basement membrane thickening along with higher health care utilisation.

### Incidence and prevalence of fatal and near fatal asthma

Specific data on FA and NFA in the UK are hampered by the lack of a fatal asthma registry. Two studies have attempted to circumvent this problem in different fashions<sup>2,3</sup>. Harrison *et al* attempted to analyse all asthma deaths in the Eastern region between 2001 and 2003 by means of a confidential enquiry and compared it with previous Norwich and East Anglian data. Between 1998 and 2003 there was a downward trend in the asthma mortality rate. Misclassification on the death certificate was common. Only 57 of 95 notified deaths (60%) were confirmed as asthma deaths. 311 asthma deaths were studied between 1998 and 2003. In 2001-3

the male: female ratio was 3:2. 53% of patients had severe asthma and 21% moderately severe disease. In 19 cases (33%) at least one significant co-morbid disease was present. Monthly death rates peaked in August, with a smaller peak in April, suggesting a seasonal allergic cause. In 11 cases (20%), mostly males aged under 20, the final attack was sudden and 10/11 occurred between April and August. Therefore in 80% of deaths the final attack was not sudden, and may have been preventable. In 81% of cases there was significant behavioural and/or psychosocial factors such as poor compliance (61%), smoking (46%), denial (37%), depression (20%) and alcohol abuse (20%). The overall medical care was appropriate in only 33% of cases, leading the authors to conclude that 'at-risk' registers in primary care may improve recognition and management of 'at-risk' patients.

Watson *et al*<sup>3</sup> analysed data from the CHKS database, which provides data on 70% of in-patient coverage in the UK. Between 2000-2005 the mortality rate was 1063 patients from 250,043 asthma admissions. December and January had the peak number of deaths post asthma admission, which were nearly all in adults. Women and those over 45 years had the highest rate of death.

These 2 studies demonstrate that in the UK there is a peak in asthma deaths in young people (aged up to 44 years) in July and August and in December and January in older people.

### Risk factors associated with fatal and near fatal asthma

A systematic review of the risk factors associated with NFA and FA has been performed by Alvarez *et al*. Increased use of beta-agonists, oral steroids, theophylline and a history of hospital and/or ICU admissions and mechanical ventilation due to asthma were predictors of NFA and FA. The use of inhaled corticosteroids (ICS) demonstrated a trend toward a protective effect against FA. Poor compliance with prescribed medication is a key issue; approximately 60% of patients

that die from asthma demonstrate evidence of poor compliance to medication, in particular to ICS.

Severe asthma and FA may also be associated with fungal sensitization. Many airborne fungi are involved including species of *Alternaria*, *Aspergillus*, *Cladosporium* and *Penicillium*, and exposure may be indoors, outdoors or both.

### Prevention of fatal and near fatal asthma

What can be done to prevent FA and NFA attacks? The majority of severe asthma attacks develop relatively slowly with more than 80% developing over greater than 48 hours. There are many similarities between patients with FA, NFA and control patients with asthma that are admitted to hospital, indicating that better management of high risk patients including early intervention has the capacity to prevent asthma deaths. Improving patient compliance is of key importance in preventing FA and NFA, but this is never easy in clinical practice.

Effective measures to improve compliance include patient-directed consultations and addressing patients' fears of ICS side effects. It is critical that patients do not use long acting bronchodilators (LABA) in the absence of ICS; pragmatically this is best achieved, in those patients who need both drugs, by prescribing combination ICS/LABA inhalers, thus guaranteeing ICS delivery to the patient.

All patients with severe asthma and/or a previous NFA attack should have an agreed written asthma action plan and their own peak flow meter, with regular checks of inhaler technique and compliance. They should know when and how to increase their medication and when to seek medical assistance.

Asthma action plans can decrease hospitalisation for and deaths from asthma.

To prevent asthma deaths it is of critical importance that health care professionals are able to identify high risk asthmatics. The majority of patients that die of asthma have chronically severe asthma and should therefore be regularly followed up by both their General Practitioner and Respiratory Physician. Many deaths occur in patients that receive inadequate treatment with inhaled or oral corticosteroids and/or inadequate objective monitoring of their asthma. Heavy or increasing use of  $\beta_2$ -agonist therapy is associated with asthma death. These patients should all have written management plans for their asthma and be under regular follow up. Behavioural and adverse psychological factors are recorded in the majority of patients that die with asthma, which may help to explain why they are not under regular follow up or following self-management plans.

Thus a combination of severe asthma and adverse behavioural or psychosocial features identifies patients at risk of developing NFA or FA. The BTS/SIGN guidelines<sup>5</sup> have produced a very helpful table to help identify high risk asthmatics (see table 1).

Studies comparing NFA with FA have concluded that patients with NFA have identical adverse risk factors to those listed in Table 1. Compared to patients that die, those with NFA are younger, more likely to

**Table 1: Identification of High Risk Asthma<sup>5</sup>**

A combination of **Severe Asthma** recognised by one or more of:

- Previous NFA
- Previous admission for asthma, especially if in the last year
- Requiring 3 or more classes of asthma medication
- Excess use of  $\beta_2$  agonist
- Repeated attendances at ED for asthma care, especially if in the last year

And **adverse behavioural or psychosocial features**, recognised by one or more of:

- Non-compliance with treatment or monitoring
- Failure to attend appointments
- Self discharge from hospital
- Psychosis, depression, other psychiatric illness or deliberate self harm
- Current or recent major tranquiliser use
- Denial
- Alcohol or drug abuse
- Obesity
- Learning difficulties
- Employment problems
- Income problems
- Social isolation
- Childhood abuse
- Severe domestic, martial or legal stress

have had a previous NFA, less likely to have concurrent medical conditions, less likely to have experienced delay in receiving medical care and more likely to have ready access to acute medical care. Clearly, patients with NFA should be kept under specialist care indefinitely.

The use of an 'at-risk asthma register' in primary care may be of benefit in this patient population.

Noble *et al*<sup>6</sup> have published a controlled retrospective pilot study of an at-risk register in primary care. Twenty six patients (3% of the practice's asthmatics) were identified as at risk of adverse asthma events and electronically tagged on the practice computer system as well as the written notes being marked. The register led to fewer admissions, out of hour's attendances, GP attendances and courses of

Asthma specialist nurse intervention may also reduce unscheduled asthma care in a high risk population.

oral steroids in the subsequent 12 months.

Griffiths *et al*<sup>7</sup> reported that patient review in a nurse led clinic and liaison with general practitioners and practice nurses including educational outreach and promotion of guidelines for high risk asthma delayed time to first presentation with acute asthma and reduced the percentage of participants attending with acute asthma.

#### Conclusion

In summary, despite significant advances in asthma therapy and objective monitoring, patients continue to die from their asthma, many needlessly. The majority of fatal asthma attacks develop over hours to days, making it possible to prevent these deaths. High risk asthmatics need to be identified at both primary and secondary care levels. Any adverse behavioural or psychological features should be addressed using a multi-disciplinary approach and at the same time an asthma management plan put in place. High risk asthmatics should be reviewed at regular intervals by a respiratory physician with a special interest in severe asthma.

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#### Commentary: Dying from asthma What more needs to be done? Asthma UK's Chief Executive, Neil Churchill January 2009

I have just seen the results of a confidential enquiry into asthma deaths in one NHS region.

The number of people who died was small and I don't want to be alarmist. Three people die a day from asthma but the numbers have been coming down in recent years. Nevertheless, the findings are shocking and do suggest that more could be done to prevent deaths.

The majority of people who died in this one region had mild to moderate asthma. Only about half had a previous hospital admission for asthma.

Those are people who may very well not have realised how serious asthma can be. As I have said before, we need to get that message across much more clearly to all of us with asthma.

The majority of deaths also occurred among people who were being looked after solely in primary care. So they would not have been seeing a specialist and may not have identified their triggers or the risks they were facing. Indeed, only a tiny number of people who died had a Personal Asthma Action Plan.

There was also a link between asthma deaths and allergies, especially in children. Three deaths occurred during thunderstorms, when environmental factors increase the risk for some.

Do you find this news surprising? Do you think it rings true of the national experience? Unfortunately we only have data for one NHS region and we are recommending that a national enquiry be undertaken so we can learn more.

What does the evidence mean? Well, it shows clearly that we all need to take asthma more seriously. And it suggests that some people are vulnerable who do not realise either they are at risk. Giving people a Personal Asthma Action Plan, access to a specialist and allergy testing, where required, would help reduce risk.

We are going to give the data to the Department of Health working group on asthma and I know they will take it very seriously.

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