

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, over a thousand patients a year still die from their asthma. As well as those patients that suffer a fatal asthma attack, there is a cohort of patients that have suffered from a near fatal asthma attack and are subsequently at high risk of morbidity and mortality. Near fatal asthma is defined by the British Thoracic Society (BTS) as an asthma attack associated with a raised PaCO₂ and/or requiring mechanical ventilation.

Patients with fatal asthma have been hypothesised as falling into two distinct subgroups according to the onset of symptoms prior to death. Hyzy *et al.*¹ examined the autopsy findings of 37 subjects aged 2 to 34 years who had died from asthma and classified them as 'slow onset' (n=21) or 'rapid onset' (n=16). Subjects did not differ by age, race, sex, obesity or use of corticosteroids. People in whom the fatal attack developed slowly had substantial airway inflammation (eosinophilia with basement membrane thickening), and significant previous health care utilisation (accident and emergency attendances, hospital admissions) in comparison to those whose death occurred suddenly. Understanding and identifying the factors associated with fatal or near fatal asthma, permits appropriately targeted care towards individuals at greatest risk.

Incidence and prevalence of fatal and near fatal asthma

Specific data on fatal and near-fatal asthma in the UK has been hampered by the historical lack of a fatal asthma registry. Two studies have attempted to circumvent this problem in different ways.^{2,3} Harrison *et al.*² analysed 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 (60%) of 95 notified deaths were confirmed as being due to asthma. 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 keeping with the findings of Hyzy *et al.*¹ in 80% of cases the final attack developed slowly, suggesting that there may have been opportunities to intervene and prevent the death.

In 11 cases (20%), mostly males aged under 20, the final attack was sudden and 10 of these occurred between April and August.² A seasonal effect was also reported by Watson *et al.*³ using hospital data. 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 fatal and near-fatal asthma has been performed by Alvarez *et al.*⁴ Increased use of beta-agonists, oral steroids, theophylline and a history of hospital and/or intensive care admissions and mechanical ventilation due to asthma were significant predictors. The use of inhaled corticosteroids (ICS) protects against fatal asthma.⁵

Poor compliance with prescribed medication is a key issue; approximately 60% of patients who die from asthma are poorly compliant with medication, in particular to ICS. In the Eastern region review,² 81% of cases had significant behavioural and/or psychosocial problems such as poor compliance (61%), smoking (46%), denial (37%), depression (20%) and alcohol abuse (20%). In children deaths peaked in June to August, and were associated with atopy, overuse of relievers and non-combination long-

acting beta-agonists (LABA).⁶

Fungal sensitisation is an uncommon, but specific cause of severe and fatal asthma. Many airborne fungi are involved including species of *Alternaria*, *Aspergillus*, *Cladosporium* and *Penicillium*.

Preventing fatal asthma: lessons from the National Review of Asthma Deaths (NRAD)

The recently published NRAD report identified a concerning 'complacency about asthma, which can, and does, kill'.⁷ Key facts from the review included;

- The standard of care received was 'less than satisfactory' in a quarter of those who died and there was 'room for improvement' in the care received by 83% of those who died. There were deficiencies in both routine care and in the treatment of attacks.
- There was widespread under-use of preventer inhalers and excessive over-reliance on reliever inhalers. Some patients had not collected their prescriptions for preventative treatment or did not attend regular asthma check-ups.
- Over half of those who died were being treated for mild or moderate asthma at the time; experts concluded that this was often because neither doctors nor patients recognised how serious their asthma really was. A third had not sought medical attention during the final attack and in a further 11% medical care was too late.
- Ten per cent of those who died did so within one month of discharge from hospital following treatment for asthma; 21% had attended an emergency department at least once in the previous year.
- Nineteen per cent of those who died were smokers and others, including many children, were exposed to second-hand smoke in the home.

Strategies for reducing the risk of fatal asthma

Learning from the NRAD, there are a number of recommendations for reducing

the risk of fatal and near fatal asthma. Every general practice should have a designated, named clinician responsible for the quality of asthma services. Key points for their consideration are:

- **Routine care:** Many deaths occur in patients who receive inadequate treatment with inhaled or oral corticosteroids and/or inadequate objective monitoring of their asthma. Patients who have experienced a near-fatal asthma attack should be kept under specialist care indefinitely. A review with a specialist asthma nurse combined with liaison with primary care may also reduce unscheduled asthma care in a high risk population.⁸ Good practice post-discharge after an asthma admission is summarised in the *Post acute asthma care bundle* practice improvement worksheet available from <http://www.pcrs-uk.org/resource/post-acute-asthma-care-bundle>
- **Compliance:** Improving patient compliance is of key importance in preventing fatal and near-fatal asthma, though this is not 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 LABA in the absence of ICS; pragmatically this may be achieved by prescribing combination ICS/LABA inhalers.
- **At risk asthma:** To prevent asthma deaths it is of critical importance that health care professionals are able to identify people with high risk asthma. The BTS/SIGN guidelines⁹ include a helpful table to help identify high risk asthmatics (Table 1). A combination of severe asthma and adverse behavioural or psychosocial features identifies patients at risk of developing fatal and near-fatal asthma, and heavy or increasing use of β_2 -agonist therapy is an important marker of risk. A recent cluster randomised trial has evaluated an at-risk register in primary care in which patients identified as at risk of adverse asthma events were tagged on the practice computer system prompting opportunistic asthma checks and alerting clinical and reception staff to respond promptly to request for help.¹⁰ There was no effect on the composite primary outcome (which included both hospitalisations

Table 1. Identifying high risk asthmatics

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
- Heavy use of β_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, marital or legal stress

and emergency treatment), though an increase in prescriptions of oral steroids and reduction in hospital admissions suggested a shift to improved management of the acute attack.

- **Asthma action plans:** Nearly half the deaths occurred without medical care because assistance was not sought or was requested too late. All patients with severe asthma and/or a previous near-fatal asthma attack should have an agreed written asthma action plan and their own peak flow meter, and have regular checks of inhaler technique and compliance. They should know when and how to increase their medication and - crucially - when to seek medical assistance. Asthma action plans reduce hospitalisation for and deaths from asthma.¹¹

Conclusion

Patients continue to die from their asthma, many needlessly. The majority of fatal asthma attacks develop over hours to days, offering a window of opportunity to intervene and prevent these deaths. Crucial approaches include identifying people at high risk of fatal asthma, addressing both their disease and any adverse behavioural or psychological issues. Regular review, usually in both primary and secondary care, a strong emphasis on compliance and provision of asthma self-management are important components of care.

References

1. Hyzy RC, Travis WD, Hanna E, *et al.* Slow-onset asthma deaths have more eosinophils and health care utilization than rapid onset deaths. *Respir Med* 2008;**102**:1819-26.
2. Harrison B, Stephenson P, Mohan G, *et al.* An ongoing confidential enquiry into asthma deaths in the Eastern region of the UK, 2001-2003. *Prim Care Respir J* 2005;**14**:303-13.
3. Watson L, Turk F, James P, *et al.* Factors associated with mortality after an asthma admission: A national United Kingdom database analysis. *Respir Med* 2007;**101**:1659-64.
4. Alvarez GG, Schulzer M, Jung D, *et al.* A systematic review of risk factors associated with near-fatal and fatal asthma. *Can Respir J* 2005;**12**:265-70.
5. Suissa S, Ernst P, Benayoun S, *et al.* Low-dose inhaled corticosteroids and the prevention of death from asthma. *N Engl J Med* 2000;**343**:332-336.
6. Anagnostou K, Harrison B, Iles R, *et al.* Risk factors for childhood asthma deaths from the UK Eastern Region Confidential Enquiry 2001-2006. *Prim Care Respir J* 2012;**21**(1):71-77.
7. National Review of Asthma Deaths. 2014. Royal College of Physicians. <http://www.rcplondon.ac.uk/projects/national-review-asthma-deaths>
8. Griffiths C, Foster G, Barnes N *et al.* Specialist nurse intervention to reduce unscheduled asthma care in a deprived multi-ethnic area: the east London randomised controlled trial for high risk asthma (ELECTRA). *BMJ* 2004;**328**:144-50.
9. British Thoracic Society/Scottish Intercollegiate Guideline Network. British Guideline on the Management of Asthma. *Thorax* 2008;**63**(Suppl 4):i1-121 (update available from <http://www.sign.ac.uk> (accessed January 2014))
10. Smith JR, Noble MJ, Musgrave S, *et al.* The at-risk registers in severe asthma (ARRISA) study: a cluster-randomised controlled trial examining effectiveness and costs in primary care. *Thorax* 2012;**67**:1052-60.
11. Gibson PG, Powell H, Wilson A, *et al.* Self-management education and regular practitioner review for adults with asthma. *Cochrane Database Syst Rev* 2002; Issue 3, Art No. CD001117. DOI: 10.1002/14651858.CD001117

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