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## Lessons from UK asthma deaths: Improving asthma care

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Studies in the United Kingdom over the last 50 years have repeatedly demonstrated that between 60-90% of asthma deaths are associated with major preventable factors.<sup>1-5</sup> Known asthma risk factors include: previous attacks, past admission to intensive care, excess use of short-acting reliever medication, insufficient use of preventer medication, poor lung function, raised eosinophil count, pregnancy and poor inhaler technique.<sup>6</sup>

### The NRAD commission

In high income countries worldwide, New Zealand, the United States and the UK have the highest age-standardized mortality rates for asthma in people age 5 to 34 years.<sup>7</sup> Consequently, the Healthcare Quality Improvement Partnership (HQIP) on behalf of the four governments of the UK (England, Ireland, Scotland and Wales) commissioned the National Review of Asthma Deaths (NRAD).<sup>8</sup> The aim of NRAD, a confidential enquiry, was to learn from UK asthma-related deaths and to take appropriate action to prevent future events.

### Selection of cases

With ethical committee approval, details of all 3,544 deaths in the UK with the word "asthma" on death certificates during a 12-month period beginning in February 2012 were obtained. Those people (n=2,644) whose deaths were either not classified with asthma as the underlying cause of death or who were over age 75 when asthma was recorded in part II of their medical

certificate of asthma death were excluded. The remaining 900 people for whom asthma was classified as the underlying cause of death (ICD-10, J45)<sup>9</sup> were selected for further consideration, and detailed medical information was requested from the doctors caring for them. After excluding 352 cases (39%) in which people clearly did not die from asthma, and a further 272 cases (30%) in which insufficient data had been returned by the doctors, 276 cases (31%) were considered in detail by panels of clinicians and pharmacists from primary, secondary and tertiary care. On the basis of the medical records, the review panels agreed whether those people had asthma or died from asthma (195 cases) and if so, what lessons could be learned. These details cast serious doubt on the accuracy and validity of the current system for classifying asthma deaths. The UK is planning to introduce a system whereby, in the future, doctors will have to provide sufficient clinical evidence to confirm the accuracy of the certified cause of death.

### Disappointing similar results

Considering that the UK has had asthma guidelines since 1990, the results were disappointingly similar to those of the aforementioned studies of the last five decades (references 1-5). Sixty percent of the 195 confirmed asthma deaths had at least one major preventable factor present across the primary/secondary healthcare interface. NRAD findings

included problems related to prescribing, medical reviews, personal asthma action plans (PAAPs), recognition of risk and severity, and a significant minority of people who were diagnosed in their 30s, as follows.

### Preventable factors

**Prescribing:** The number of doses (puffs) per week of short-acting bronchodilator (SABA) reliever medication is a marker for current asthma symptom control.<sup>6,10</sup> A person using four or fewer puffs per week is considered to have good current control (i.e., less than two SABA 200-dose inhalers per year). Of the 195 deaths investigated, 39% and 56% of those who died were prescribed more than 6 SABA inhalers and 12 SABA inhalers respectively in the year before death. Conversely, most were prescribed insufficient preventer medication (inhaled corticosteroids). In the 128 patients for whom details were available, prescriptions for a median of only 5 inhaled corticosteroid inhalers were given in the final year. Patients prescribed inhalers containing 4 and 12 weeks of medication respectively, would have required 4 or 12 of these devices per year.

**Medical reviews:** An asthma review aims to ascertain the level of control and risk in patients with asthma, including their inhaler technique, which if poor contributes to poor asthma control.<sup>11-13</sup> Less than half of those who died had evidence in their medical record of an asthma review in the year before death.

**Personal asthma action plans (PAAPs):** There is good evidence that people who have been provided with a PAAP (which gives information on asthma, medication, how to recognize attacks and how to respond, are less likely to be admitted to the hospital. Yet 77% of those who died from asthma had no evidence in their notes of provision of such a plan. The lack of a PAAP may explain, in part, why about half of those who died did not call for or receive medical help during their final, fatal attack.

**Recognition of risk and severity:** The risk factors for asthma attacks and deaths have been well documented in national and international guidelines.<sup>6,10</sup> Some of these are detailed above and many were evident in the conclusions drawn by the panels. Two examples of failure to recognize and act on risk evident in the NRAD were 1) 10% of the deaths occurred within 28 days of hospital discharge for attacks; and 2) at least 21% of the asthma deaths occurred in people who had attended emergency departments in the year before they died. These well-known risk factors were not acted upon; very few of these people were reviewed after treatment for their attacks. Asthma severity is defined by the amount of treatment required to gain control<sup>14</sup> and was found by the NRAD to be underestimated. While asthma in 58% of those who died was classified as mild or moderate, less than 20% overall had an assessment of their asthma control; therefore the classification in these cases was unreliable.

**Age when asthma was diagnosed:** Seventy percent of those who died from asthma in the NRAD were diagnosed after 15 years of age and the mean age of diagnosis was 37 years. This was a surprise finding and the authors of the review considered three possible explanations: 1) These people may have had true late-onset asthma; 2) their diagnosis may have been delayed or 3) they may have gone into remission temporarily after having had childhood asthma. This is clearly a subject for future research: determining whether late diagnosis is

a risk factor for asthma severity, attacks and death.

## NRAD's 19 recommendations

The NRAD concluded by making 19 recommendations, which are listed in Table 1. Time will tell whether these will have made an impact on asthma care in the UK. Sadly, although the NRAD was commissioned by the four UK governments, only one of these 19 recommendations has been implemented nationally throughout the UK. A national asthma audit has been commissioned, though it is unclear when the results will be reported. Hopefully it will not take another 50 years!

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## Table 1

### Key Recommendations of the National Review of Asthma Deaths (NRAD) Reproduced with kind permission of the Royal College of Physicians, London, UK

#### Organization of NHS Services

1. *Every NHS hospital and general practice should have a designated, named clinical lead for asthma services, responsible for formal training in the management of acute asthma.*
2. *Patients with asthma must be referred to a specialist asthma service if they have required more than two courses of systemic corticosteroids, oral or injected, in the previous 12 months or require management using British Thoracic Society (BTS) step-wise treatment 4 or 5 to achieve control.<sup>1</sup>*
3. *Follow-up arrangements must be made after every attendance at an emergency department or out-of-hours service for an asthma attack. Secondary care follow-up should be arranged after every hospital admission for asthma, and for patients who have attended the emergency department two or more times with an asthma attack in the previous 12 months.*
4. *A standard national asthma template should be developed to facilitate a structured, thorough asthma review. This should improve the documentation of reviews in medical records and form the basis of local audit of asthma care.*
5. *Electronic surveillance of prescribing in primary care should be introduced as a matter of urgency to alert clinicians to patients being prescribed excessive quantities of short-acting reliever inhalers, or too few preventer inhalers.*
6. *A national ongoing audit of asthma should be established which would help clinicians, commissioners and patient organizations work together to improve asthma care.*

#### Medical and Professional Care

1. *All people with asthma should be provided with written guidance in the form of a personal asthma action plan (PAAP) which details their own triggers and current treatment, and specifies how to prevent relapse and when to seek help in an emergency.*
2. *People with asthma should have a structured review by a healthcare professional with specialist training in asthma, at least annually. People at high risk of severe asthma attacks should be more closely monitored, ensuring their personal asthma action plans (PAAPs) are reviewed and updated at each review.*
3. *Factors that trigger or make asthma worse must be elicited routinely and documented in the medical records and personal asthma action plans (PAAPs) of all people with asthma, so that measures can be taken to reduce their impact.*
4. *An assessment of recent asthma control should be undertaken at every asthma review. Where loss of control is identified, immediate action is required including escalation of responsibility, treatment change and arrangements for follow-up.*
5. *Health professionals must be aware of the features that increase the risk of asthma attacks and death, including the significance of concurrent psychological and mental health issues.*

#### Prescribing and Medicines Use

1. *All asthma patients who have been prescribed more than 12 short-acting reliever inhalers in the previous 12 months should be invited for urgent review of their asthma control, with the aim of improving their asthma through education and change of treatment if required.*
2. *An assessment of inhaler technique to ensure effectiveness should be routinely undertaken and formally documented at annual review, and also checked by the pharmacist when a new device is dispensed.*
3. *Non-adherence with preventer inhaled corticosteroids is associated with increased risk of poor asthma control and should be continually monitored.*
4. *The use of combination inhalers should be encouraged. Where long-acting beta-agonist bronchodilators are prescribed for people with asthma, they should be prescribed with an inhaled corticosteroid in a single combination inhaler.*

#### Patient Factors and Perception of Risk

1. *Patient self-management should be encouraged to reflect their known triggers, e.g., increasing medication before the start of the hay fever season, avoiding non-steroidal anti-inflammatory drugs or by the early use of oral corticosteroids with viral or allergic-induced exacerbations.*
2. *A history of smoking and/or exposure to second-hand smoke should be documented in the medical records of all people with asthma. Current smokers should be offered referral to a smoking-cessation service.*
3. *Parents and children, and those who care for or teach them, should be educated about managing asthma. This should include emphasis on "how," "why" and "when" they should use their asthma medications, recognizing when asthma is not controlled and knowing when and how to seek emergency advice.*
4. *Efforts to minimize exposure to allergens and second-hand smoke should be emphasized especially in young people with asthma.*