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Who is admitted to hospital with asthma?

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Abstract

Background: Asthma is an important cause of acute hospital admission. Previous studies have been largely hospital-based, focused on a single centre and have considered either adults or children. This nationwide study was based in primary care and covered all age groups.

Objective: To describe the characteristics of patients admitted to hospital with asthma compared to those asthmatics not admitted to hospital.

Method: 361 practitioners recorded data from 11249 patients. Data included age, sex, British Thoracic Society (BTS) treatment step, admission to hospital and number of in-patient days in the previous 12 months.

Results: Children under five were the most commonly admitted age group (20.8% of all admissions), but admissions were seen in all age groups (57.8% of patients admitted were over 16). Patients on BTS treatment step 4 accounted for less than half of all admissions (45.6%). Older patients had longer in-patient stays (age <5: mean 1.9 in-patient days; age >75: mean 7.7 in-patient days).

Conclusion: Admission to hospital with asthma is seen in all ages and at all levels of treatment. Acute severe asthma can occur in all age groups and in patients with minimal symptoms and on minimal treatment. There is, therefore, a need for surveillance of all asthmatics, not just those on higher levels of treatment.

Introduction

Admission to hospital has a significant impact on patients' quality of life, causes absence from school and work[1] and has implications for use of scarce health service resources.[2] Rates of admission for acute asthma appear to be rising[3] and asthma represents a major proportion of acute medical admissions.[4,5] Previous studies have originated from secondary care, and were often single centre-based and focused on either adult or paediatric populations.[6,7] There is, therefore, a need for a study based in primary care, where the majority of asthma sufferers receive most of their care,[8] covering the whole of the UK and encompassing all age groups. The National Asthma Management Studies 1994 and 1995 gave just such an opportunity. These were two large nationwide studies examining the management of asthma in primary care.[9]

The aim of this paper is to describe the characteristics of patients admitted to hospital with asthma in the UK compared to those patients with asthma who are not admitted.

Method

For the National Asthma Management Study 1994 a mailing invitation was sent to a random sample of 5000 of the 33000 general practitioners in the UK with the aim of recruiting 200 general practitioners and 5000 patients. Two hundred and twenty five practitioners responded providing data on a total of 6732 patients. The study was repeated in 1995 when a further 136 practitioners responded, providing data on an additional 4517 patients, giving a total of 11249 patients.

Data were collected on GP and nurse consultations, asthma attacks, emergency treatment, hospital attendance and symptom control over a 12 month period, together with demographic details for each patient. Response was voluntary and there was no financial incentive, but responders were offered the opportunity to enrol in a distance-learning package accredited for postgraduate education allowance. The practitioners involved were not a special interest group, but by participating they did demonstrate an enthusiasm to look at their asthma care.

Analysis of the responders showed them to be spread throughout the UK with good concordance with UK population distribution. Partnership size was typical of the UK as a whole. Instructions were given to participants on how to select a representative sample of patients and a

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Table 1: Characteristics of patients

	All patients n = 11249	No. of patients admitted to hospital n = 351 (3.1%)		No. of hospital admissions			Total no. of in-patient days	
Age	No.	No.	(%)	No.	mean per patient	(95% ci)	No.	mean per admission
0-4				100	1.37	(1.20 to 1.54)	189	1.9
Male	357	51	(14.3%)					
Female	195	22	(11.3%)					
5-15				98	1.31	(1.10 to 1.51)	243	2.5
Male	1861	45	(2.4%)					
Female	1246	30	(2.4%)					
16-44				120	1.46	(1.26 to 1.66)	492	4.1
Male	1791	23	(1.3%)					
Female	2159	59	(2.7%)					
45-74				139	1.39	(1.24 to 1.44)	892	6.4
Male	1378	41	(3.0%)					
Female	1825	59	(3.2%)					
75+				33	1.57	(1.04 to 2.10)	255	7.7
Male	191	9	(4.7%)					
Female	246	12	(4.9%)					
All ages				490	1.40	(1.31 to 1.49)	2071	4.2
Male	5578	169	(3.0%)					
Female	5671	182	(3.2%)					

project booklet was completed for each patient. Full details are published elsewhere.[9]

This paper focuses on data relating to age, sex, British Thoracic Society (BTS) treatment step,[10] number of admissions and number of in-patient days in the previous 12 months. The BTS treatment step was assigned from treatment recorded at the last review. BTS step 5 was difficult to establish from treatment pattern analysis and is, therefore, included with step 4 (see Box 1).

Results

The age and sex distribution of the total patient sample and of those patients admitted to hospital is shown in Table 1. The highest percentage of patients admitted was in the under-five age group (14.3% of males and 11.3% of females admitted were under-five), but at least 1% of each age group was admitted.

There was little variation in admission rates between sexes except in the 16 to 44 year-old age group where females were admitted twice as often as males (1.3% of males aged 16 to 44 compared to 2.7% of females). Sub-analysis of females within this young adult age group shows even distribution across each decade. The mean number of admissions per patient was similar for all age groups (mean number of admissions per patient: 1.3 in the under five age group and 1.6 admissions per patient in the over 75 age group). The mean number of in-patient days per admission increased steadily with age; from 1.9 days per admission in the under five age group to 7.7 days per admission in the over 75 age group. The vast majority of Intensive Care Unit (ICU) days were for adults (44 of a total of 50 ICU days were for patients over the age of 16).

Table 2: Distribution of patients by BTS treatment step

The highest percentage of patients admitted to hospital was seen in those on BTS treatment step 4: 55/849 (6.5%) in those aged under 16 on step 4 and 105/1031 (10.2%) in those aged over 16 on step 4 were admitted (see Table 2). However, admissions were seen for patients at all treatment steps. Further analysis of patients not admitted showed that 278/3511 (7.9%) of those aged under 16 and 569/7387 (7.7%) of those aged over 16 were on step 0 (i.e. diagnosed asthmatic, but currently not receiving therapy), and 849/3511 (24.2%) of patients under 16 and 1031/7387 (14.0%) of patients over 16 were receiving step 4 medication. In comparison to patients admitted, where 2/148 (1.35%) of those under 16 and 7/203 (3.4%) of those over 16 were on step 0, and 55/148 (37.2%) of patients under 16 and 105/203 (51.7%) of patients over 16 were on step 4. The proportion of patients admitted was greater among those patients on higher steps of treatment; however, admissions occurred at all levels of treatment.

Discussion

The findings of this study are consistent with previous studies on hospital admissions with acute asthma which show that children form the largest single group.[3,11] Patients on the highest level of treatment, implying the most severe asthma, are admitted more commonly than those patients on lower levels of treatment.

The important finding from this study is that acute asthma requiring hospital admission is seen in all age groups and in patients on all levels of treatment.

Of those patients admitted, only 37.2% of those under-16 and 51.7% of the over 16 age group were on BTS step 4. Thus, more than half of patients admitted were receiving less than maximal therapy at last review. Therefore, although patients on BTS step 4 were more frequently admitted than patients on other steps of treatment, patients with so-called mild asthma on very little medication were still at appreciable risk of requiring admission. Vigilance in monitoring these patients should be maintained.

It is possible that admission of patients on lower levels of treatment is a reflection of under-treatment. However, if this is a factor, it does not change the underlying message of the need for surveillance of all asthmatics. From this study it is not realistic to predict who will be admitted to hospital because all ages and all severities of disease, implied by level of treatment, are at risk, albeit to differing degrees.

Although 148 (42.2%) of the patients admitted were under 16, they accounted for only 432 (20.9%) of in-patient days. The results show that greater age is associated with longer in-patient stay. Any intervention that can prevent older patients being admitted will have not only quality of

life implications for these patients, but potentially important savings for health service resources.

One problem with this study was that the participating general practitioners were self-selected and as such were likely to show an 'enthusiast bias'. However, they were not a special interest group. The sample showed good correlation with the UK population distribution and is representative of practices throughout the UK with regard to practice size. There was no evidence of bias in patient selection at those practices that were visited to confirm compliance with patient selection and data recording.[9]

The data presented are for the total number of admissions, but do not include re-admission data. It is possible that the figures for number of admissions and total number of in-patient days might have been distorted by a small number of patients with frequent re-admissions, but there is no evidence of this from inspection of the raw data.

A weakness of the study is that the BTS treatment step recorded was that at the last consultation, not that at the time of admission.

However, the step at the last recorded consultation should reflect the patients' usual level of symptoms and control and therefore does provide important information. However, it does not provide any information on compliance which could be an issue in all admissions, regardless of treatment step. In addition, this study does not take account of social factors which could have influenced the results.

A further study would be required to look at the influence of social factors, such as occupation, housing and smoking, on risk of admission to hospital with acute asthma.

Box 1: British Thoracic Society treatment steps[10]

Adult	Child
Adult step 1 Inhaled short-acting ß2-stimulant as required (up to once daily)	**Child step 1** Short-acting ß2-stimulant as required (not more than once daily)
Adult step 2 Inhaled short-acting ß2-stimulant as required ***plus*** Regular standard-dose inhaled corticosteroid ***or*** Regular cromoglycate or nedocromil	**Child step 2** Inhaled short-acting ß2-stimulant as required ***plus*** Regular inhaled cromoglycate (powder or large-volume spacer)
Adult step 3 Inhaled short-acting ß2-stimulant as required ***plus*** Regular high-dose inhaled corticosteroids (large-volume spacer)	**Child step 3** Inhaled short-acting ß2-stimulant as required ***plus*** Regular inhaled corticosteroid in standard paediatric dose (large-volume spacer)
Adult step 4 Inhaled short-acting ß2-stimulant as required ***with*** Regular high-dose inhaled corticosteroids (large-volume spacer) ***plus one or more of*** Inhaled long-acting ß2-stimulant Modified-release oral theophylline Inhaled ipratropium or oxitropium Modified-release oral ß2-stimulant High-dose inhaled bronchodilators Cromoglycate or nedocromil	**Child step 4** Inhaled short-acting ß2-stimulant as required ***plus*** Regular inhaled corticosteroid in standard paediatric dose (large-volume spacer or dry powder device) ***consider*** Soluble prednisolone tablets 1-2 mg/kg daily for 5 days (max. 40 mg daily) Regular inhaled long-acting ß2-stimulant
Adult step 5 Inhaled short-acting ß2-stimulant as required ***with*** Regular high-dose inhaled corticosteroids (large-volume spacer) and with one or more long-acting bronchodilators ***plus*** Regular prednisolone tablets (as single dose)	**Child step 5a** Inhaled short-acting ß2-stimulant as required ***with*** Regular inhaled corticosteroid in standard paediatric dose (large-volume spacer or dry powder device) ***consider*** Soluble prednisolone tablets ***with*** Regular inhaled long-acting ß2-stimulant ***plus*** Regular modified-release oral theophylline or nebulised ß2-stimulant
	Child step 5b As step 5a ***plus*** Prednisolone 5-10 mg on alternate days ***consider*** Regular inhaled ipratropium or subcutaneous infusion of short-acting ß2-stimulant

Conclusion

The major conclusion from this study is that general practitioners should not neglect patients with so-called 'mild symptoms' of asthma or on so-called 'minor treatment steps', assuming them to be at little risk of an acute episode requiring admission. Acute severe asthma can occur in all age groups and in patients with minimal symptoms and on minimal treatment.

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