

Asthma Control in Patients Attending an Asthma Clinic

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Summary

A study was done on parameters of asthma control in 62 patients attending an Asthma Clinic between 1988 and 1994. Comparing assessment at last follow-up and at the first clinic visit, there was significant reduction in the proportion of patients with daily nocturnal symptoms, peak expiratory flow rate $\leq 80\%$ predicted, emergency use of nebulised bronchodilator, admission for acute attacks, time off work or school and use of rescue courses of oral steroids. Our results indicate that significant reduction in morbidity in patients with moderate and severe asthma can be achieved in an Asthma Clinic located in a small government hospital.

Key Words: Asthma, Morbidity, Asthma clinic

Introduction

There is lack of accurate data on the epidemiology of asthma in Malaysia, however, asthma is known to be a common cause of admission to hospital, attendance in hospital Accident and Emergency departments and hospital outpatients clinics¹⁻³. A previous study on outpatient management of patients with asthma has highlighted that considerable morbidity was associated with inadequate assessment and treatment of the disease³.

Between 1988 and 1990, Asthma Clinics were started in the 5 government hospitals in Penang State, with the aim of reducing morbidity in patients with poorly controlled asthma. The first Asthma Clinic was started in December 1988 in Balik Pulau Hospital, a 71 bedded hospital serving the South-West District of Penang Island. This study is an audit of outcome and asthma control in patients seen in this clinic between December 1988 and December 1994.

Materials and Methods

A retrospective study was done on patients seen in the Asthma Clinic, Balik Pulau Hospital, who had

been on follow-up for at least 6 months as of December 1994. Patients with chronic bronchitis and emphysema were excluded from the study. Patient characteristics and clinical data were obtained from review of the patients' medical records. The following parameters of asthma control were recorded: frequency of nocturnal symptoms, peak expiratory flow rate (PEFR) measured in the clinic at first visit and average PEFR recorded during the last 3 months of follow-up, frequency of visits for emergency use of nebulised bronchodilator, number of admissions for acute exacerbations of asthma, time off work or school because of asthma and need for rescue courses of steroid tablets. Details of the patients anti-asthmatic treatment before referral and at last follow-up were also noted. All patients had been assessed by the first author at the time of registration in the clinic using a uniform list of questions to determine asthma severity and peak expiratory flow rates were measured by the clinic nurse who was trained to record the best of three consecutive readings. The predicted values for PEFR were obtained from a nomogram based on a study of adult Chinese subjects⁴. Differences between proportions were tested using the Chi-square test of significance.

All patients were followed-up by the Medical Officer in charge of the Chest Clinic and overall supervision and training of doctors and staff running the clinic was undertaken by a Chest Physician (the first author) who visited the hospital monthly. Management was based on guidelines provided in an Asthma Clinic Manual. These guidelines emphasised the importance of education of patients and family members, avoidance of precipitating factors whenever possible and use of effective drugs in a stepwise manner. The approach to management resembled in many aspects that in guidelines published later by the British Thoracic Society³ and Ministry of Health, Malaysia⁶.

Results

A total of 70 patients were registered in the Asthma Clinic between December 1988 and June 1994. Eight patients were excluded because 4 had chronic bronchitis and emphysema, 3 had been followed-up for less than 6 months and the medical records could not be traced for 1 patient. Only patients with poorly controlled asthma were referred and this may account for the relatively small number of patients seen in the clinic during the study period. The characteristics of the 62 patients included in the study are shown in Table I. Analysis of statistics on hospital total outpatient attenders for 1990 until 1994 showed that

Table I
Patient characteristics

Characteristic	Number of patients (%)
Age Mean \pm SD(Range) 38.3 \pm 15.1(9 - 70) years	
Sex	
Male	30 (48.4%)
Female	32 (51.6%)
Ethnic origin	
Malay	45 (72.6%)
Chinese	15 (24.2%)
Indian	2 (3.2%)
Duration of asthma	
Mean \pm SD(Range) 11.7 \pm 10.1(0.25 - 50) years	
Positive family history	
Yes	30 (48.4%)
No	29 (46.8%)
Unknown	3 (4.8%)
Usual drugs for asthma	
Type of medication	
Oral beta ² agonist	54 (87.1%)
Inhaled beta ² agonist	19 (30.6%)
Theophylline	52 (83.9%)
Oral steroids	5 (8.1%)
Inhaled steroids	11 (17.7%)
Ipratropium bromide	1 (1.6%)
Ketotifen	1 (1.6%)
Nil	3 (4.8%)
Number of drugs	
Mean = 2.3 \pm 0.9	
Range = 0 - 5	

57.7% were Malay, 36.1% Chinese, 6.1% Indian and 0.1% were from other ethnic groups. These figures reflect the ethnic composition of the population of the South-west District of Penang Island which the hospital serves i.e., 57.8% Malay, 33.7% Chinese, 7.0% Indian and 1.5% from other races⁷. In contrast, the ethnic distribution of patients in this series showed that Malays accounted for a higher proportion of asthma cases (72.6%) with a correspondingly lower proportion of cases among the Chinese (24.2%) and Indians (3.2%).

At the time of referral, most patients were on a combination of an oral beta² agonist and oral theophylline. Only 11 (17.7%) were on inhaled corticosteroids. All these 11 patients were on inhaled beclomethasone dipropionate at a dose not exceeding 400 mcg per day. There were 5 patients on long term oral steroids i.e., prednisolone at a dose of 5 mg daily.

The commonest precipitating factors reported by this group of patients were exertion, smoke, dust and certain foods and it is interesting that 5 patients had symptoms which were made worse by exposure to soldering fumes at work.

At initial assessment, 2 patients had mild asthma with mild occasional symptoms and baseline PEFr of more than 80% of predicted value. Eight patients had moderate asthma with baseline PEFr of between 60% and 80% of predicted value; 5 of these patients also had nocturnal symptoms more often than twice a month. The remaining 52 patients had severe asthma based on the presence of one or more of the following features: frequent nocturnal symptoms, hospital admission for asthma in the past year and PEFr of less than 60% of predicted value. Figure 1 indicates that 26 patients had one of these features, 16 patients had two of the criteria and 10 patients had all the three features of severe asthma.

Duration of follow-up and outcome: The duration of follow-up ranged from 6 months to 5 years 11 months and the mean duration of follow-up was 3.4 ± 1.7 years. One patient, a smoker, died of squamous cell carcinoma of lung after having been on follow-up for 3 years 10 months. Nine patients were no longer on follow-up as of December 1994; 1 had emigrated, 1

had moved to another state and 7 had defaulted their clinic appointments of their own accord. The mean duration of follow-up for these patients was 2.5 years. The remaining 52 patients were still on follow-up after a mean duration of 3.6 years.

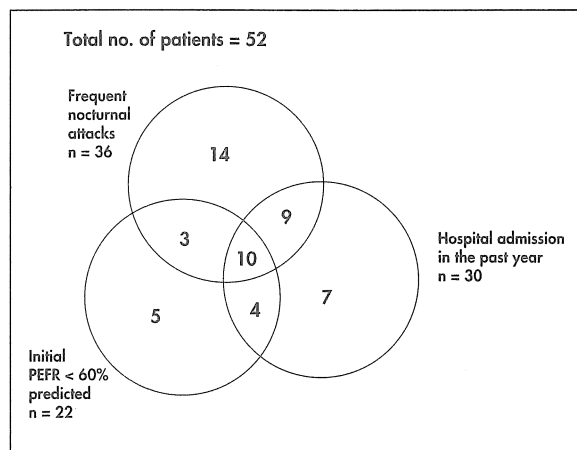


Fig. 1 Occurrence of features indicating severe asthma

Medication at last follow-up: At the time of last follow-up the mean number of medications taken for asthma was 2.6 ± 0.6 (Table II). Almost all the patients were on an inhaled beta² agonist as required and an inhaled corticosteroid (beclomethasone dipropionate or budesonide). Doses of inhaled corticosteroid exceeding 800 mcg per day were administered through large volume reservoir devices (Nebuhaler or Volumatic). Nearly two-thirds of the patients were on oral theophylline and 2 patients with severe asthma were still on long term oral steroids i.e., prednisolone at a dose of 5 mg daily in addition to high doses of inhaled corticosteroids.

Frequency of nocturnal symptoms: Data on presence of nocturnal symptoms at initial assessment was available in 55 patients: 36 had daily nocturnal symptoms, 9 had less frequent nocturnal symptoms and 10 had no nocturnal symptoms. Information on nocturnal symptoms at the last clinic follow-up was available in 52 patients: 3 had daily nocturnal symptoms, 17 had less frequent nocturnal attacks and 32 were free of nocturnal attacks. There was a statistically significant difference in the proportion of

Table II
Drugs taken for asthma at last follow-up

Type of medication	Number of patients (%)
Beta ² agonist	
oral	0 (0)
inhaled	61 (98.4)
Steroids	
oral	2 (3.2)
inhaled	60 (96.8)
Daily dose of inhaled corticosteroid	
≤ 400 mcg	34
401 - 800 mcg	16
801 - 2000 mcg	10
Theophylline	40 (64.5)
Nil	1 (1.6)

patients reporting nocturnal symptoms at initial assessment and at last follow-up (81.8% vs. 38.5%, $p < 0.01$).

Lung function tests: No spirometric measurements were done and patients did not monitor their peak expiratory flow rates at home, hence PEFr taken during clinic visits were the only measurements of the patients lung function available. The average PEFr at the first clinic visit as a percentage of the predicted value was $67.4\% \pm 19.3\%$. The average PEFr recorded during clinic visits for the 3 months preceding last follow-up as a percentage of the predicted value was $77.7\% \pm 16.3\%$. A higher proportion of patients had PEFr measurements greater than 80% of the predicted value when assessed at last follow-up compared to initial assessment (49.2% vs. 31.0%, $p < 0.05$). For 57 patients in whom paired data was available, the mean PEFr increased significantly from 308 l/min at first clinic visit to 361 l/min at last follow-up ($p < 0.001$, paired t test).

Emergency use of nebulised bronchodilator: With regard to emergency use of nebulised bronchodilator, at the first clinic visit, 24 patients reported that they were attending the Accident and Emergency department monthly or more frequently (7 were

attending more often than once a week), 26 patients less often than monthly, 10 were not requiring any use of emergency bronchodilator and no information on frequency of emergency nebuliser use was available for 2 patients. At the last clinic follow-up, 2 patients reported attending for emergency use of nebulised bronchodilator monthly or more often, 14 were attending less often than monthly and 46 were not attending for emergency nebulisation at all. Overall, the proportion of patients requiring emergency use of nebulised bronchodilator at last follow-up was much lower than at the first clinic visit (25.8% vs. 83.3%, $p < 0.01$).

Hospital admission for acute attacks: Data on the number of admissions for acute exacerbations of asthma was analysed for 55 patients who had been followed-up in the Asthma clinic for 12 months or more. At first presentation, 27 patients had been admitted in the preceding year for a mean of 3 times (range 1 to 12 admissions). When assessed at the last clinic visit, only 4 patients had been admitted in the past year i.e., 3 had been admitted once and 1 patient had been admitted twice in the preceding year. The proportion of patients requiring hospital admission in the preceding year was considerably less at last follow-up than at initial assessment (7.3% vs. 49.1%, $p < 0.01$). Furthermore, the total number of admissions for acute exacerbations of asthma in this cohort of 55 patients had declined from 81 admissions in the year preceding their first clinic visit to 5 admissions in the year preceding their last follow-up visit.

Time off work or school: Table III shows the amount of time taken off work or school because of asthma in the 55 patients who had been followed-up for at least a year. At the last clinic visit, a lower proportion of patients had taken time off work or school in the preceding year than at the first clinic assessment (23.5% vs. 58.6%, $p < 0.01$).

Rescue courses of steroid tablets: On enrollment at the clinic, 25 patients reported using rescue courses of steroid tablets in the preceding months (7 every 3 months or more frequently), 35 patients had not been on rescue steroids and no information was available for 2 patients. At the last follow-up visit, 13 patients

Table III
Time off work or school because of asthma

Time off in the past year	No. on enrollment	No. at last follow-up
More than 1 month	2	0
1 week - 1 month	8	2
Less than 1 week	7	6
Nil	12	26
Unknown	7	1
Not at work or school	19	20
TOTAL	55	55

had used rescue courses of steroid tablets in the preceding months (only 1 more often than every 3 months), whereas 49 patients had not been on any rescue courses of steroid tablets. These results indicate that the proportion of patients requiring rescue courses of steroid tablets had declined from 41.7% at initial assessment to 26.5% at the last clinic follow-up ($p < 0.02$)

Discussion

Asthma is a disease characterised by variable airflow obstruction, airway inflammation and airway hyperresponsiveness to various stimuli⁸. The aims of management of patients with chronic asthma are to recognise asthma, abolish symptoms, restore best possible long term airway function, reduce the risk of severe attacks and minimise absence from work or school.

Morbidity and mortality from asthma seem to be increasing in many countries⁹⁻¹¹. Although the use of anti-asthmatic drugs has been rising it is probable that underdiagnosis and underuse of preventive treatment still contribute significantly to the morbidity from asthma¹². Significant morbidity has been reported in a number of studies on asthma patients attending outpatient clinics and general practice^{3,13,14}. At initial assessment, patients in our series were also suffering considerable morbidity from the disease, and this was associated with underuse of prophylactic medication. Since asthma is an inflammatory disease, most recent

guidelines on the management of chronic asthma have recommended the use of inhaled steroids in all patients except those with mild asthma^{5,6,8}, and there is ample evidence that morbidity associated with asthma can be reduced by anti-inflammatory drug therapy, particularly inhaled corticosteroids¹⁵⁻¹⁷. These drugs have also been shown to have a protective effect in preventing the risk of fatal and near-fatal asthma¹⁸. Furthermore, high doses of inhaled corticosteroids have been shown to have an oral corticosteroid-sparing effect; their use has been shown to enable patients to reduce the dose or stop long term oral steroids altogether, thus avoiding the many unwanted effects of prolonged systemic steroid therapy¹⁹.

By the time of their last follow-up visit, 60 patients in this study (96.8%) had been put on regular inhaled corticosteroids; most patients were on relatively low doses of these drugs and only 10 (16.7%) were on daily doses exceeding 800 mcg. The results demonstrate that inhaled corticosteroids are extremely cost-effective drugs since their use can produce significant improvement in parameters of asthma control with reduction in occurrence of nocturnal symptoms, need for emergency use of nebulised bronchodilator, admission for acute attacks, time off work or school, requirement for long term and rescue courses of oral steroids as well as improvement in overall lung function. Since these benefits could be achieved in a small government hospital in a group of patients with mainly moderate and severe asthma, it can be concluded that reduction in morbidity in

patients attending hospital outpatients departments is a realistic goal.

With respect to the proportion of patients belonging to the major ethnic groups, a preponderance of Malay patients and reduced prevalence of asthma in the Chinese have been reported in 2 previous studies from this region^{1,20}. More studies will be needed to elucidate the factors, environmental or genetic, responsible for these ethnic differences in asthma prevalence.

Many causes of occupational asthma have been identified, and a high index of suspicion is needed to avoid overlooking the diagnosis. In this study, exposure to soldering fumes was reported as a precipitating factor by 5 patients who worked in electronics factories. Although the diagnosis of occupational asthma was not confirmed by serial PEFr recording at work and away from the working environment or specific inhalation challenge tests²¹, all these patients reported improvement in their symptoms when removed from work exposure to soldering fumes. A report from Singapore on cases of occupational asthma seen between 1983 and 1990 only included 3 cases caused by soldering fumes²². Penang State has been industrialising rapidly in recent years and occupational asthma from the electronics and other industries may increase in the future, hence it is important for doctors to be aware that asthma can be caused by occupational factors.

Poor compliance with prescribed inhaled therapy is known to be an important cause of persistent morbidity from asthma^{23,24}. It has also been shown that psychosocial factors and negative attitudes to asthma are correlated with higher levels of morbidity²⁵ and more information is needed on methods to alter attitudes and behaviour so as to improve compliance. Education of patients and their families is an essential part of management of patients with chronic asthma in order to obtain cooperation of patients with their treatment. The use of self management plans with home peak flow monitoring is a strategy which is being increasingly employed to ensure that patients participate actively in the management of their own asthma.

Conclusion

Our study has shown that significant reduction in morbidity can be achieved in patients with moderate and severe asthma by implementing management guidelines and training doctors in the setting of an Asthma Clinic in a small government hospital. Establishing special clinics for patients with asthma under the supervision of a physician will be helpful in attaining the objective of improving asthma control in patients attending hospital outpatients departments.

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ASTHMA CONTROL IN PATIENTS ATTENDING AN ASTHMA CLINIC

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