

Relation between Morbidity and Current Treatment in Patients who present with Acute Asthma to Polyclinics

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ABSTRACT

Background: It has been suggested that resources for asthma intervention should be focused mainly on patients in the community who experience a high burden of disease. These are who patients who have acute exacerbations which require urgent treatment.

Aim: To assess the morbidity and identify deficiencies in the treatment of patients who present for urgent treatment of acute exacerbations to primary care clinics.

Patients: Adult patients who received urgent treatment for acute exacerbation of bronchial asthma

Setting: 4 primary care polyclinics

Methods: A cross-sectional survey of consecutive patients which related regular preventive treatment to current asthma activity. Poor asthma control was defined as step 2 or higher (American National Asthma Education and Prevention Program, report II, 1997) or ≥ 2 emergency room visits in 6 months.

Results: There were 116 patients of whom 53% were women. The mean (SD) age was 45(15) years and duration of current exacerbation 3 (3) days. The acute symptoms were successfully treated in 93% of patients. Quick relief medication was used regularly in 91% and inhaled corticosteroids (ICS) in 55%. Oral salbutamol was prescribed in 14% of patients. The asthma was poorly controlled in 54%. In the poorly controlled group 33% were not on regular ICS treatment and 64% were not receiving "add on" medication.

Conclusions: Patients treated for acute asthma in primary care clinics: (1) were older and had less acutely severe exacerbations than those who presented to emergency rooms, (2) over half had poorly controlled asthma and (3) a third of patients with poor asthma control were inadequately treated.

Keywords: asthma, treatment, guidelines, morbidity

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INTRODUCTION

Bronchial asthma is a common illness in Singapore. Asthma is diagnosed in up to one in 20 adults and one in 5 children^(1,2). It carries a substantial burden in terms of morbidity, mortality and economic cost^(3,4). A disproportionate disease burden however is experienced by the minority of patients whose symptoms are the most poorly controlled⁽⁵⁾. This subgroup of patients suffers from frequent acute exacerbations which require urgent medical attention. About 25% to 30% of acute asthma exacerbations will lead to hospitalization which accounts for the largest proportion of direct medical expenditure^(6,7). They are also at a higher risk to die from asthma and thus require more intensive treatment and monitoring⁽⁸⁾.

However, with a better understanding of the pathophysiology of this disease and recent advances in treatment, it is now possible to minimize this risk by applying appropriate management steps guided by consensus guidelines. In the presence of limited health resources however, it may be more cost-effective for new interventional programs at the primary care level to begin by focusing on these more high risk patients.

Hence, we aim to study the disease profile of a group of patients who attend primary care clinics for unscheduled management of acute attacks. The findings would provide a better understanding of this sub-group of high risk patients, and help to plan the overall management strategy for the disease.

METHODS

The study was conducted in four government polyclinics. They are located in Clementi, Queenstown, Toa Payoh and Tampines. Consecutive adult patients above the age of 14 years were recruited for the study when they attended these polyclinics for acute exacerbation of bronchial asthma which required treatment with nebulised salbutamol immediately. The recruitment was carried out between November 1998 and February 1999. The diagnosis of asthma was clinical and based on the consistent symptoms and/or evidence of reversible airways obstruction as well as historical information obtained from the medical records. Any

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patient whose diagnosis of asthma was uncertain or whose information was incomplete or who are smokers above the age of 40 years were excluded from the study.

After the management of the acute episode, each patient was evaluated in several areas. Basic information such as age, race, sex and educational level were obtained. History of smoking and duration of disease was asked. Information regarding the present episode was obtained through questions such as the duration of the present episode in terms of hours/ nights and any prior treatment before seeking the polyclinic doctor {e.g. attendance at emergency room (ER), other doctors and self-medication}. The severity of asthma was also assessed by the questionnaire. The patient was asked the frequency of his daytime and nocturnal symptoms per week for the past one to two months. Any admission to the hospital for bronchial asthma in the past one-year, the number of ER visits (in polyclinics, private clinics and hospital ER units) for the past 6 months and any near-fatal attacks (syncope, intubation, and intensive care) were also asked.

Table I. The NAEPP classification of Asthma Severity

	Symptoms	Night-time symptoms
Step 4 Severe Persistent	Continual symptoms Limited physical activity Frequent exacerbation	Frequent
Step 3 Moderate Persistent	Daily symptoms Daily use of inhaled short-acting beta 2-agonist Exacerbation affect activity Exacerbation ≥ 2 times a week may last days	> 1 time a week
Step 2 Mild Persistent	Symptoms > 2 times a week Exacerbation may affect activity	> 2 times a month
Step 1 Mild Persistent	Symptoms ≤ 2 times a week Asymptomatic and normal PEF between exacerbation Exacerbation brief (from a few hours to a few days) intensity may vary	≤ 2 times a month

NAEPP: American National Asthma Education and Prevention Programme, report II 1997⁽⁹⁾

Table II. The severity of asthma in the patients studied

Asthma severity	Number of patients	Percentage
Step 1	63	54%
Step 2	6	5%
Step 3	31	27%
Step 4	16	14%
Total	116	100%

See Table for NAEPP definition of Steps 1 to 4

A poorly controlled (PC) sub-group of asthma patients was defined in terms of asthma severity based on the United States National Asthma Education and Prevention Program, expert panel II 1997⁽⁹⁾ (NAEPP) classification (Table I) and/or frequency of relapses⁽¹⁾. They include (1) those with two or more visits to the hospital emergency department for acute attacks for the past 6 months; (2) symptoms more than twice per week (NAEPP Step 2 and above) and (3) two or more days of nocturnal symptom per week (NAEPP Step 3 and above).

The current medications of the patient were obtained. The patient was also asked how many courses of oral steroid were used in the preceding six months. The interview concluded with the outcome of the present consultation – whether the patient was sent home or was referred to the ER for emergency treatment.

The results were expressed as mean (SD) values. Continuous variables were compared in unpaired Student's t-tests and the Chi-squared test was used to test for difference between proportions.

RESULTS

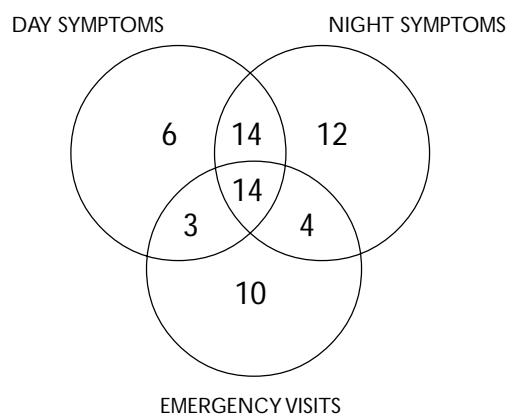
A total of 116 asthmatic patients were recruited from the four polyclinics in Singapore. There were 54 men (47%) and 62 women (53%), with a mean age of 45 years (range 13 - 76 years). There were 56 (48%) Chinese, 35 (30%) Malay and 25 (22%) Indians in this study. Their educational levels were as follows: 18% received no education, 35% primary education, 37% secondary education and 10% tertiary education.

The patients had long history of asthma, averaging 19 (± 4) years. The exacerbations of asthma symptoms had lasted an average of 3 (± 3) days before the patient sought treatment at the polyclinics.

Most of the patients (89%: 103/116) had not been hospitalized in the past six months. While only 6% (7/116) had experienced near-fatal or life-threatening exacerbations in the past one year. However, 27% (31/116) needed ER treatment in the past 6 months ≥ 2 times for acute exacerbations.

Using the NAEPP classification of asthma severity, 14% (16/116) of the study population would be of step 4 severity, 27% (31/116) step 3, 5% (6/116) step 2 and the remaining 54% (63/116) belonged to step 1 severity (Table II). Thus, 53 patients were Step 2 or higher in severity and considered poorly controlled. Another 10 patients had ≥ 2 visits to the emergency room in the past 6 months for acute asthma and were also considered to have poorly controlled disease. Overall, 54% (63/116) of our study population would belong to poorly controlled (PC) sub-group as defined under methodology (Fig. 1).

Table III shows the drugs the patients were receiving

Fig. 1 Distribution of symptoms in the poorly controlled subgroup of asthmatic patients.

Day symptoms: > 2 times per week
 Night symptoms: > 1 time per week
 Emergency visits: \geq 2 per 6 months
 Total number of patients = 63

prior to the acute exacerbations. The majority of the patients were receiving regular anti-asthma medication. The vast majority, 91% (91/116), were using inhaled salbutamol via metered-dose inhalers (MDI) and 55% (64/116) were using inhaled corticosteroids (ICS), of which 88% (56/64) was beclomethasone via MDI. Salbutamol was the most frequently prescribed oral medication, 14% (16/116). Of the study population, 16% (19/116) had one or more courses of oral prednisolone in the past 6 months for acute exacerbations.

Table IV shows the relation between the intensity of preventive asthma therapy and severity of asthma. One quarter of patients in step 4 and 35% in step 3 asthma severity were not receiving appropriate preventive treatment with inhaled corticosteroids. Moreover, 56% of step 4 and 68% of step 3 asthma severity were not receiving any 'add-on' medication such as slow-release theophylline or long acting beta-agonists. Overall, in the group of 63 patients with poorly controlled asthma, 33% (21/63) were not on regular preventive treatment with inhaled steroids and 64% (40/63) were not receiving "add on" medication.

Following acute treatment at the polyclinics, 93% of the study group responded satisfactorily and were sent home while the remaining 7% were referred to hospital for further management.

DISCUSSION

This study examined the profile of patients seeking treatment for acute asthma in government polyclinics with emphasis on the appropriateness of their current pharmacological therapy in relation to their clinical severity.

Table III. Current Anti-asthma Medication

Medications	Number	% of 116
MDI salbutamol	106	91
MDI corticosteroid	64	55
Oral medication	46	40
Salbutamol	16	14
Theophylline	13	11
*Prednisolone	19	16

* one or more course of oral prednisolone in the past 6 months
 no patient was on long term oral prednisolone

MDI: metered dose inhaler

Table IV. Relationship between regular drug treatment and asthma severity

Asthma severity according to NAEPP	% patients on inhaled steroid	% patients on slow release theophylline
Step 1 (n=63)	48	29
Step 2 (n=6)	33	0
Step 3 (n=31)	65	32
Step 4 (n=160)	75	44

The study group from four polyclinics in various localities in Singapore consist mainly of middle-aged patients with a long history of asthma and of nearly equal proportion between the sexes (male 47%, female 53%). This is comparable to the study by Ng et al which showed that lifetime cumulative prevalence of physician diagnosed asthma was 4.7% in men and 4.3% in women⁽¹⁾.

There was a preponderance of Malay and Indian (ethnic minority) patients which account for more than half (52%) of the study population. By contrast, the local population is predominantly Chinese (Chinese 77%, Malay 14% and Indian 7%). Moreover, the majority (68.4%) of the patients who attended polyclinics are Chinese while 16.9% are Malays and 10.5% Indians⁽¹⁰⁾. Our observation is thus, consistent with the higher prevalence of asthma among the minorities reported in previous studies in Singapore^(1,2). However, this and previous data do not permit comparison of disease activity between racial groups.

This study focused on the group of patients whose asthma was deemed to be poorly controlled (Fig. 1). The criteria for poor control coincided partly with NAEPP guideline category of moderate to severe persistent asthma (Step 2 or higher) but was extended to include patients with 2 or more emergency room visits for acute asthma in the past 6 months. About half (54%) of the patients we studied belonged to this group. Nocturnal symptoms appear to be the most

sensitive marker for poor control of asthma. A cross-sectional study in 6 general practices in England showed a strong association between nocturnal asthma and severity⁽¹¹⁾. In our study, patients with nocturnal symptoms constituted 70% (44/63) of the poorly controlled sub-group (Fig. 1). In the busy polyclinic setting, quick and sensitive history taking is important to assess the quality of asthma control. Nocturnal symptoms, together with daytime symptoms and number of ER visits, can be used as convenient markers to quickly identify the poorly controlled patients. While the definition of "poor asthma control" is arbitrary, it should probably include as in this study, both persistent diurnal variations in asthma severity and frequent exacerbations⁽¹²⁾. We feel that this degree of morbidity in patients with long standing illness within easy access to medical care would be considered less than satisfactory in the face of major recent advances in asthma treatment.

The type of medications available at the polyclinic influences the prescribing habits of the doctors. Many of the medications were dispensed at subsidized prices. Salbutamol and beclomethasone MDIs are fully subsidized drugs commonly prescribed for asthmatic patients. Budesonide via the turbuhaler, which is only partially subsidized is much less commonly used. The oral medications available for asthma treatment at the polyclinic dispensary include salbutamol, slow-release theophylline and prednisolone.

The vast majority of patients (91%) were using inhaled salbutamol via MDI regularly. Both patients and doctors prefer a quick acting bronchodilator for its symptomatic efficacy. Further evidence of this over reliance on short term symptom relieving drugs by both doctors and patients is our observation that, despite the poor clinical efficacy of oral salbutamol it was the most commonly prescribed oral medication. The excessive use of inhaled short acting bronchodilators is increasingly accepted as an indication of inadequate control⁽¹³⁾. Nevertheless, there is little evidence to suggest that regular use of beta agonists may make asthma worse⁽¹⁴⁾. However, a negative consequence of the over-reliance on inhaled beta agonists for symptomatic relief is that it can delay the institution of more appropriate medical therapy. The NAEPP guidelines suggest that the use of a beta agonist more than twice per week is an indication for the introduction or increase in dose of prophylactic therapy⁽⁹⁾.

Numerous studies have delineated the role of inhaled corticosteroids in the long term preventive treatment of chronic persistent asthma⁽¹⁵⁾. This is in keeping with the notion that asthma is a chronic inflammatory disorder of the airways and that locally administered corticosteroids are safe and highly

effective anti-inflammatory treatment in adults. Inhaled corticosteroid therapy is recommended as first choice preventive treatment in all consensus guidelines on management of asthma^(9,16).

We found that about one third of patients with poorly controlled asthma were not using any inhaled corticosteroid. This inadequate use of preventive medication had been observed in many other studies. Horn and Cochrane⁽¹⁷⁾ reported that inhaled steroids were prescribed to only one-third of patients. Even for the group of patients who reported severe breathlessness or life-style restriction, only half of them were prescribed inhaled steroids. Similarly, Tine et al⁽¹⁸⁾ and Walsh et al⁽¹⁹⁾ revealed that less than half of the patients with moderate to severe asthma had been prescribed inhaled anti-inflammatory therapy.

Furthermore, those remaining two thirds of patients in the PC group who were already receiving regular inhaled corticosteroid treatment and yet experience recurrent symptoms and relapses must be deemed to have failed the steroid therapy. This could be attributed to non-compliance, under-dosage, ineffective delivery of the drug through poor device technique or poor steroid responsiveness and the need for stepped up ("add on") therapy.

We did not assess the dose of inhaled steroids used, compliance nor proficiency with delivery devices. However, we were able to relate the asthma severity to prescription of "add on" medication. The NAEPP guidelines recommend that "add on" medication should be considered in patients with severity of Step 3 or higher⁽⁹⁾. Oral slow release theophylline was the main "add on" medication used by our patients. Slow release theophylline preparations were prescribed to 11% of patients. Only 28% of the PC sub-group were on theophylline. In particular, 68% of patients in step 3 and 56% of patients in step 4 severity were not receiving theophylline.

Thus, not only was the use of ICS less than appropriate, there was also failure to follow the stepped care approach in introducing long acting bronchodilators in patients who remain unstable despite ICS treatment. This pattern of under treatment was not restricted to steroid medication and reflects a lack of emphasis on long term preventive treatment. This is contrary to current standards of asthma treatment and in sharp contrast with the over 90% use of quick acting beta agonist via the MDI. Even oral salbutamol, despite its extremely poor clinical efficacy, was more commonly prescribed, presumably for rapid symptoms relief, than oral theophyllines. The practice of depending primarily on regular oral and inhaled salbutamol as a 'reliever' should be discouraged. SR theophylline is a better alternative if patients prefer an oral bronchodilator.

Oral theophylline is a cost-effective 'add-on' medication for patients, who remain symptomatic despite on maximal doses of ICS⁽²⁰⁾.

The results of this study suggest that a concerted effort is needed to optimise the long-term maintenance treatment of asthma in the community. There should be greater emphasis on long-term preventive treatment rather than short term symptom relief. This requires a broad shift in understanding, attitude and behaviour for both doctors and patients.

We compared the clinical profiles of patients in this study with that of patients; who presented with acute asthma to the emergency department of a local hospital as described by Abisheganadan et al at⁽⁷⁾ (Table V). These 2 studies were collated by a single investigator (TKL), with similar methods in order to better define the different sub groups of high risk asthmatic patients. In comparison with patients seen in the emergency department, the patients in this study were significantly older, their exacerbations had lasted much longer (3 days Vs 6.5 hours) and initial treatment was more successful (93% Vs 63% response rate). This suggests that acute asthma in the polyclinic may be more indolent and responsive to intervention than that seen in the emergency departments. This observation provides some insight into how different groups of patients select health resources appropriate to their needs. Different approaches may therefore be needed for each group.

The diagnosis of asthma in this study was based on current symptoms and the medical records. Although every attempt was made to exclude patients in which the diagnosis of asthma was uncertain, there was no objective testing to verify the diagnosis in every case. This is especially so with the more elderly patients and smokers although smokers above the age of 40 years had been excluded from the study. The small sample size may not be representative of the population. In addition, the restriction of the study population to those with acute asthma may under-represent those patients who have poorly controlled asthma. There may be a significant group of patients who "tolerated" their symptoms and do not attend the clinic for nebulisation. A larger study including all asthma patients who attend the polyclinics may be necessary to ascertain the size of this problem. The doctors' decision to treat the patients with nebulisation was also subjective. Thus, any differences observed between results from the emergency department and this study should be interpreted with caution.

In conclusion, more than half of the subjects who presented with acute asthma in the polyclinics had poorly controlled disease and 70% of this subgroup had regular nocturnal symptoms. One third of this subgroup of patients was not receiving MDI steroids and over half

Table V. Comparison of patients seen in the Polyclinic with those in the Emergency department

	Polyclinic	Emergency ⁽⁷⁾	p value
Number of patients	116	70	
% of patients with near fatal attacks	6%	10%	ns
Age (years)	45	37	p < 0.05
Duration of Attack	3 days	6.5 hours	p < 0.05
Outcome	7% referred to ER	37% admitted	p < 0.05

were not taking long acting bronchodilators ("add on" medication) although they were having moderate to severe persistent asthma.

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