Asthma Control and Prior Medical Care of Patients Presenting With Acute Asthma at the Emergency Department

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Summary

Seventy patients presented with acute asthma at the emergency department of the University of Malaya Medical Centre, Kuala Lumpur were recruited over a two-week period in July 2001. Fifty-one (73%) patients belonged to the poorly controlled group. Fifty-seven (81%) patients were using inhaled salbutamol but 21 (30%) were still using oral short acting salbutamol. Only 32 (46%) patients used inhaled corticosteroids. In the poorly controlled group, 22 (43.1%) patients were not on regular inhaled corticosteroids, 35 (68.6%) were not receiving "add-on" medication and 18 (35%) did not have regular follow up. The emergency department should implement a protocol for asthma management and follow up to achieve better long term patient care.

Key Words: Acute asthma, Control of asthma, Medication, Follow up, Emergency
             department

Introduction

Bronchial asthma is one of the commonest diseases that affects both adults and children. It has profound medical and social implications in terms of its morbidity and mortality and loss of productive working hours. The prevalence of asthma is increasing worldwide. The mortality and morbidity from asthma appear to be increasing despite changes in medical practice and advances in the treatment of asthma over the years[1,2,3].

Most deaths related to asthma are due to relatively acute attacks, usually with a background of poorly controlled asthma. Deaths and morbidity have been associated with over reliance on bronchodilators. It has been shown that both patients and doctors prefer a quick acting bronchodilator for its symptomatic efficacy for maintenance treatment of asthma in those who present with acute attack[4]. Oral salbutamol, despite its extremely poor clinical efficacy, is also commonly prescribed[5,6]. Worldwide, studies had shown an under utilization of inhaled steroid for asthma prevention[4,5,6,7,8,9,10]. Short courses of oral steroid for patients with acute exacerbation of asthma were also shown to be under prescribed[6,7]. All these contribute to poor asthma control.

It is important to follow up patients with asthma regularly[11]. These visits have positive effects on promoting periodic evaluation and review of asthma severity and treatment. The physician can monitor patient's lung function, improve compliance and proficiency of drug usage as well as educate patients and parents about preventive measures such as reducing exposure to allergens and irritants. Referral to an asthma specialist clinic after an acute attack of asthma in the emergency room visit appears to reduce asthma relapses and improve asthma outcome[12]. However, many asthmatic patients depend on the Emergency department for ad hoc asthma care, and are not properly followed up and reviewed in the primary care or specialist clinics [3,14,15]. Ordonez GA et al showed that 40% of children with frequent episodic and persistent asthma did not have a regular medical review[16]. Many patients who received acute care for asthma in the emergency department had previous attacks[17,18,19]. Dependence on the emergency department by frequent attenders may serve as a barrier to ongoing medical care provided by general practitioners or specialists in the community and may result in increased risk of poor control of the disease and admission[13,14,20].

Hence, this study aimed to examine prior asthma control and medical care of patients who attended the Accident and Emergency department with an acute asthmatic attack in order to gain an insight on the current status of this group of high risk patients.

Materials and Methods

This was a descriptive cross sectional study conducted at the emergency department of University of Malaya Medical Centre (UMMC), Kuala Lumpur. All patients above 12 years old who presented with acute exacerbation of bronchial asthma requiring nebuliser treatment were recruited. Patients with chronic obstructive pulmonary disease, whose diagnosis of asthma was uncertain or those with severe asthma

needing immediate resuscitation and admission were excluded.

The study was conducted over a two-week period in July 2001 on a 24 hour basis by the investigator and a research assistant (RA) on consecutive patients. A face to face interview with a structured questionnaire was carried out. The questionnaire was constructed from a review of literature followed by discussion with peers and specialists in the field of asthma care for construct and face validity. It was piloted to ensure internal consistency between the investigator and the RA.

Data Analysis: Data collected was analysed using SPSS version 10.0. Unpaired student's t-tests were used to compare continuous variables; Chi-squared test and Fisher exact test were used to test for differences between proportions. $P < 0.05$ was taken as the significance level.

Definitions: In this study, asthma severity is classified according to the American National Asthma Education and Prevention Programme (NAEPP), report II 1997 (see Table I). Patients with poorly controlled asthma are defined as those with two or more visits to the emergency department for acute attacks in the past 6 months and those with symptoms more than twice per week (NAEPP step 2 and above).

Results

Demographic data of the study population
A total of 70 asthmatic patients, 25 (36%) men and 45 (64%) women were recruited. The mean age of the patients was 42 years (range 12-80 years). There were 31 (45%) Malay, 15 (21%) Chinese, 23 (33%) Indians and 1 (1%) of other race. The mean duration of asthma was 16 (±6) years.

Hospitalization and emergency room visits
In the preceding six months, 17 (24.3%) patients had been hospitalized and the average number of hospitalizations was 0.4 times (range 0-4). There

was 5 (7.1%) patients who had experienced near-fatal or life-threatening exacerbations in the past one-year. Forty-one (58.6%) of them had visited the emergency room ≥ 2 times in the past 6 months for acute exacerbations. The average emergency room visits was 5.7 times (range 0-60) in the previous six months.

Severity of asthma

Using the NAEPP classification of asthma severity, 24 (34%), 12 (17%), 15 (21%) and 19 (27%) patients were in step 1,2,3,4 of asthma severity respectively. Forty-six (66%) patients belonged to step 2 or higher in severity and were considered poorly controlled. Another 5 patients were in step 1 but had ≥ 2 visits to the emergency room in the past 6 months for acute asthma and were considered to have poorly controlled disease. Overall, 51(73%) patients had poorly controlled asthma as defined by our methodology.

Demographic data of patients with good and poor control of asthma

Table II showed that the mean age of patients in the poorly controlled group was higher than those with good control of asthma. However, there was no significant difference found in the age, sex, race, duration of disease and smoking status between these two groups.

Current Asthma Medication

Table III shows the medication patients received prior to the current emergency room visits. The majority of patients were using inhaled salbutamol via metered-dose inhalers (MDI). Less than half of the patients were using inhaled corticosteroids (ICS), via MDI. Half of the study population was taking oral medication regularly. Salbutamol was the most frequently prescribed oral medication (30%).

A third of the patients had one or more courses of oral prednisolone in the past 6 months for acute exacerbations. None were on regular oral steroid.

Relationship between regular drug treatment and asthma severity

Figure 1 shows the relation between regular drug treatment and severity of asthma. About half of the patients in step 2 and 4, and two-thirds in step 3 received inhaled corticosteroids. Fifty-eight percent of patients in step 4 and 30% of patients in step 3 received 'add-on' medication such as slow-release theophylline or long acting beta agonist (some patients were on both oral theophylline and inhaled long acting β-agonist). However, 40% of patients in Step 3 and 4 were using regular oral short acting beta-agonist.

Overall, 28 (40%) patients were not receiving appropriate treatment according to the steps of asthma severity as per Malaysian Thoracic Society guidelines on management of adult asthma[22]. Among the 51 patients with poorly controlled asthma, 22 (43.1%) were not on regular preventive treatment with inhaled steroids and 35 (68.6%) were not receiving " add-on" medication.

Follow-up clinics

Thirty-two (46%) patients did not receive follow up for their asthma. Among the 38 (54%) who had regular follow-up, 17 (44%), 5 (13%), 6 (16%), 5 (13%), 4 (11%) and 1 (3%) were followed up at the asthma clinic, general out patient clinic of UMMC, private GP, health clinics, other hospital and family physicians respectively. The average interval of follow-up was 2.5 months (range weekly to 6 monthly).

Relationship of asthma control and follow-up

The majority of patients in step 2 and 3 of asthma severity had regular follow-up but of those in step 4, only half of them had regular follow-up. More than half of those in step 1 were also not followed up. A significant greater number of patients with poorly controlled asthma received regular follow up as compared to those with good control (p<0.01). All patients who were followed up at the asthma clinic received inhaled corticosteroids.

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 intermittent	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

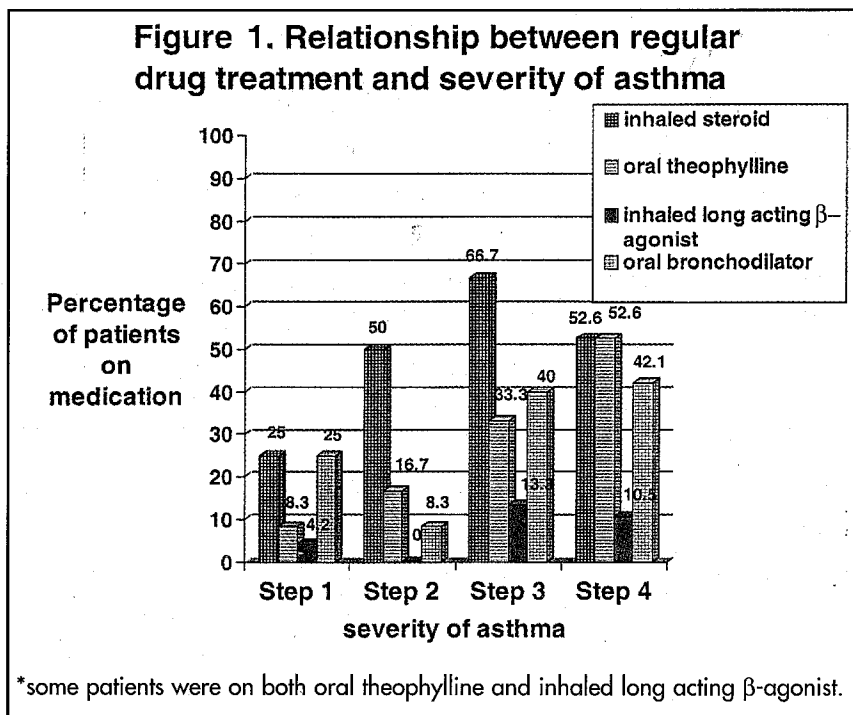NAEPP: American National Asthma Education and Prevention Programme, report II 1997

Table II : Demographic data of patients with good and poor control of asthma

		Good control (n= 19)	Poor control (n= 51)	P- value
Mean age		36.00 years (±19.83)	44.53 years (± 18.15)	0.093
Mean duration of disease		15.26 years (±10.97)	16.99 years (±12.41)	0.59
Sex	Male	7 (37%)	18 (35%)	1.00
	Female	12 (63%)	33 (65%)	
Race	Malay	7 (37%)	24 (47%)	0.58
	Chinese	6 (32%)	9 (18%)	
	Indian	6 (32%)	17 (18%)	
	Others	0 (0%)	1 (2%)	
Smoking status (active or passive)	Yes	10 (53%)	27 (53%)	1.00
	No	9 (47%)	24 (47%)	

Table III: Current Asthma Medication

Medications	Number	%
MDI Salbutamol	57	81.4
MDI corticosteroid	32	45.7
Inhaled Long acting β-agonist	5	7.5
Oral Medication	35	50
Salbutamol	21	30
Theophylline	16	22.9
*Prednisolone	27	38.6
Home nebuliser	2	0.03
Oral hydroxychloroquine	1	0.01
Monteleukast	1	0.01

* One or more course of oral prednisolone in the past 6 months
MDI: metered dose inhaler

Figure 1. Relationship between regular drug treatment and severity of asthma

*some patients were on both oral theophylline and inhaled long acting β-agonist.

Discussion

About two third of the patients studied had poorly controlled asthma. This figure is similar to studies done using similar criteria in the emergency room in Singapore where 63% of patients were found to belong to this group[5]. Another study done in polyclinics in Singapore found 54% of patients belonging to this group[4].

This study revealed a high proportion of patients in step 3 and 4 of asthma severity. 24.3% of patients had been hospitalized and 58.6% had frequent emergency room visit in the previous six months with an average emergency room visit of about 6 times. As a fair number of the study population was followed up at the asthma clinic in UMMC, their disease could have been more severe and they could have poorer control of their disease. During the study period, there was also a problem with haze in Kuala Lumpur that might have resulted in more severe symptoms in these patients.

Most patients were using regular inhaled salbutamol for its symptomatic efficacy[4]. Oral salbutamol was utilised by a third of these patients and was the most commonly prescribed oral medication despite its poor clinical efficacy. Over reliance on inhaled and oral short acting beta agonists by both doctors and patients may have negative consequences on asthma control. It may result in a delay in instituting prophylactic therapy[4]. The NAEPP guidelines suggest that if a beta agonist is used more than twice per week, it is an indication for the introduction or an increase in the dose of a prophylactic therapy[21].

The role of inhaled corticosteroids in the long-term preventive treatment of asthma is important. The Malaysian guidelines on the management of adult asthma and the NAEPP guidelines recommend inhaled corticosteroid therapy to be used as a first choice in preventive treatment of asthma[21,22]. In this study, 46% of patients were using inhaled corticosteroid and among patients with poor control of the disease, 57% were on them. This

finding is similar to studies done worldwide [4,5,6,7,8,9,10] and locally[23,24] where there is still an underutilization of inhaled steroids. However, comparing to studies done in the emergency department in Muar[6] and Singapore[5], where only 10% and 23% respectively of their patients were on inhaled steroids, more patients were receiving inhaled steroids. There appears to be an increase in awareness among the doctors in its usage, taking into account the number of patients on follow up with the specialist clinic.

Among the poorly controlled group, although 57% of them were on regular inhaled corticosteroid, they were still experiencing recurrent attacks. This could be due to non-compliance, under-dosage, ineffective delivery of the drug through poor inhaler technique or poor steroid responsiveness and a need for the stepped up therapy. Other factors could be ineffective patient management where their severity of asthma had not been properly reviewed and their drug dosage not stepped up accordingly. These factors were beyond the scope of this study but would be interesting to look at in future.

A Cochrane review had found that a short course of corticosteroids significantly reduced the number of relapses to additional care and decreases beta agonist use without an apparent increase in side effects for patients with acute exacerbation of asthma[25]. The NAEPP guidelines and Malaysia guidelines on Asthma management also suggest that, a short course of systemic corticosteroids can reverse an otherwise refractory asthma exacerbation and preclude the need for emergency care and possible hospitalization[21,22]. In this study 38.6% of the patients were given one or more short course of corticosteroids in the past six months for acute exacerbation of asthma.

The NAEPP guidelines and Malaysian guidelines of asthma management recommended that "add on" medication should be considered in patients with a severity of step 3 or higher[21,22]. Oral slow release theophylline was the main "add on" medication used as it is cheap and cost effective. Other "add

on" medications are oral or inhaled long acting beta agonists. Oral theophylline was prescribed to 22.9% of patients and inhaled long acting beta-agonist was only prescribed to 7.5% of patients. Some of these patients were on both medications. It is surprising to find that only a third of the poorly controlled group were on "add on" medications but 40% of patients in step 3 and 4 were given regular oral short acting beta-agonist which was inappropriate.

It appears that there was still a failure among the doctors in following the stepwise approach in asthma management. Forty percent of patients did not receive appropriate treatment. This pattern of under treatment reflects the lack of emphasis on long-term preventive treatment. The practice of prescribing regular oral Salbutamol as a 'reliever' should be discouraged. Patients' over reliance on short acting beta-agonists reflects poor patient education and their physician may not have offered them action plans for management of acute exacerbation. It appears that evidence based approach to asthma management is still lacking and continuous medical education is needed. Doctors need to be trained and updated so that they are familiar with the proper asthma management guidelines.

Almost half the study population and 35% of the poorly controlled patients did not have regular follow up. This is disappointing as it has been shown that regular follow up can promote better patient care[11]. The arrangement for follow up after an acute exacerbation of asthma was inadequate as is shown in other study[15]. As asthma is a chronic condition, it needs regular evaluation and monitoring to ensure proper treatment, compliance and drug proficiency. Therefore, protocols must be implemented at the emergency department to ensure that these patients are followed up and referred to the asthma clinic or their own general practitioners when appropriate. The goal one strives to achieve as was in the GINA asthma management programme 2002 [26] will be no emergency visits at all for these patients.

This study has been limited by a small sample size. However, it does give an indication of the current state of asthma management in the emergency department. An awareness of the weakness and shortcomings faced will hopefully bring about strategic planning and change for better patient care.

Conclusion

Patients' asthma control and follow up have been sub-optimal in those presenting with acute exacerbation at the emergency department. There was an over reliance on short acting beta agonist for acute symptomatic relief and an under-usage of preventive treatment. As the emergency department plays an active role on asthma management, it is essential that asthma protocol and appropriate referral of follow up care be instituted for all patients with asthma.

Acknowledgement

References

1. Burney PG. Asthma mortality in England and Wales: evidence for a further increase. 1974-1984. Lancet 1986; 2: 323-26.

2. Evans R, Mullally DI, Wilson RW, et al. National trends in the morbidity and mortality of asthma in the US. Prevalance, hospitalization and death from asthma over two decades: 1965-1984. Chest. 1987; 91: 65S-74S.

3. Asthma-United States, 1980-1987. MMWR. 1990; 39: 493-97.

4. Tan NC, Goh S, Leong H et al. Relation between morbidity and current treatment in patients who present with acute asthma to polyclinics. Singapore Med J 2000; 41: 259-63.

5. Abisheganaden J, Sin Fai Lam KN, Lim TK. A profile of acute asthma patients presenting to the emergency room. Singapore Med J 1996; 37: 252-54.

6. Nivedita N. An audit on the assessment and management of acute bronchial asthma in the accident and emergency department of a district hospital. Med J Malaysia 1996; 51: 89-92.

7. Hartert TV, Windom HH, Peebles RS, Jr et al. Inadequate outpatient medical therapy for patients with asthma admitted to two urban hospitals. Am J Med 1996; 100: 386-94.

8. Cooke NJ, Crompton GK, Grant IWB. Observations on the management of acute bronchial asthma. Br J Dis Chest 1979; 73: 157-63.

9. Jobanputra P, Ford A. Management of acute asthma attacks in general practice. Br J of Gen Prac, 1991; 41: 410-13.

10. Kumana CR, So SY, Li KY, Kou M. Pattern of anti asthmatic drug utilization in Hong Kong compared to other parts of the world. Respiratory Med 1989; 83: 343-8.

11. Dales RE, Kerr PE, Schweitzer I, et al. Asthma management preceding an emergency department visit. Arch Intern Med 1992; 152: 2041-4.

12. Zeiger RS, Heller S, Mellon MH et al. Facilitated referral to asthma specialist reduces relapses in asthma emergency room visits. J Allergy Clin Immunol 1991; 87: 1160-8.

13. Garrett JE, Mulder J, Wong-Toi H. Characteristics of asthmatics using an urban accident and emergency department. N Z Med J 1988; 101: 359-61.

14. Garrett JE, Mulder J, Veale A. Trends in the use of an urban accident and emergency department by asthmatics. N Z Med J 1988; 101: 253-5.

15. M J Epton, Skidmore C, O'Hagan JJ et al. An audit and international comparison of asthma management in the emergency department . N Z Med J 1994; 107: 26-29.

16. Ordonez GA, Phelan PD, Olinsky A, Robertson CF. Preventable factors in hospital admissions for asthma. Arch Dis. Child 1998; 78: 143-47.

17. Rea HH, Garett JE, Mulder J et al. Emergency room care of asthmatics: a comparison between Auckland and Toronto. Ann Allergy 1991; 66: 48-52.

18. Edben P, Carey OJ, Quinton D, Cookson JB. A study of acute asthma in the accident and emergency department. Br J Dis Chest 1988; 82: 162-7.

19. Reed S, Diggle S, Cushley MJ et al. Assessment and management of asthma in an accident and emergency department. Thorax 1985; 40: 897-902.

20. Kwong T, Town I, Holst PE, Beasley R. A study of the management of asthma in a hospital emergency department. N Z Med J 1989; 102: 647.

21. National asthma and prevention programme. Expert panel report 2: Guidelines for the diagnosis and treatment of asthma. Bethesda, Md.NIH, Pub 1997.

22. Malaysian Thoracic Society. Guidelines on management of adult asthma: a consensus statement of the Malaysian Thoracic Society. 1996.

23. Lim TO, Suppiah A, Ismail F et al. Morbidity Associated with asthma and audit of asthma treatment in out patient clinics. Singapore Med J 1992; 33: 174-76.

24. Malaysia National Health and Morbidity Survey 1997.

25. Rowe BH, Spooner CH, Ducharme FM et al. Corticosteroids for preventing relapse following acute exacerbation of asthma (Cochrane Review). The Cochrane Library, Issue1, 2001.

26. GINA Pocket Guide For Asthma Management And Prevention Revised 2002. Updated from the NHLBI/WHO Workshop Report: Global Strategy for Asthma Management and Prevention issued January 1995) National Heart, Lung, And Blood Institiute. National Institutes of Health.