



LAPURAN AKHIR

STUDY ON CHARACTERISTICS OF PATIENTS WITH REPEATED ADMISSIONS FOR ASTHMA IN HOSPITAL TENGGU AMPUAN AFZAN, KUANTAN, PAHANG, MALAYSIA

GERAN JANGKAPENDEK USM



UNIVERSITI SAINS MALAYSIA

Nama Penyelidik: Dr. Shaiful Bahari Ismail
(Jabatan Perubatan Keluarga, PPSP, USM)

Nama Penyelidik-Penyelidik:
Dr. Mohd Aznan Md Aris (Universiti Islam Antarabangsa,
Pahang Darulmakmur)

Dr. Fauzi Mohamad (Hospital Tengku Ampuan Afzan,
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BAHAGIAN PENYELIDIKAN	
PUSAT PENELITIAN DAN PENGKajiAN	
KUALING	
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Tarikh: 16/2/05	

**BAHAGIAN PENYELIDIKAN & PEMBANGUNAN
CANSITORI
UNIVERSITI SAINS MALAYSIA**

Laporan Akhir Projek Penyelidikan Jangka Pendek

1) Nama Penyelidik: Dr. Shaiful Bahari Ismail

Nama Penyelidik-Penyelidik
Lain (Jika berkaitan) : Dr. Mohd Aznan MdAris
Dr. Fauzi Mohamad

2) Pusat Pengajian/Pusat/Unit : Sains Perubatan/Jabatan Perubatan
Keluarga

3) Tajuk Projek: **STUDY ON CHARACTERISTICS OF PATIENTS WITH
REPEATED ADMISSIONS FOR ASTHMA IN HOSPITAL TENGGU AMPUAN AFZAN,
KUANTAN, PAHANG, MALAYSIA.**

- 4) (a) Penemuan Projek/Abstrak
(Perlu disediakan makluman di antara 100 – 200 perkataan di dalam Bahasa Malaysia dan Bahasa Inggeris. Ini kemudiannya akan dimuatkan ke dalam Laporan Tahunan Bahagian Penyelidikan & Pembangunan sebagai satu cara untuk menyampaikan dapatan projek tuan/puan kepada pihak Universiti).

ABSTRACT

Objective To determine the characteristics in patients with repeated admissions for asthma compared to patients with no repeated admission for asthma over the same period of one-year duration.

Methods A cross-sectional comparative study among 30 patients with asthma who had repeated admissions and another 30 patients with asthma who had no repeated admission for exacerbation of asthma over the same period of one-year duration (2001). The socio-demographic, clinical characteristics and evaluation data were collected. The evaluation included measurement of peak expiratory flow (PEF), inhaler technique skills and questionnaires on knowledge of asthma.

Results There was no significant difference in socio-demographic characteristics, measurement of PEF and inhaler technique skills in both groups. In clinical characteristics, there was significant difference noted in history of atopy, history of absenteeism, asthma symptoms and use of medications. There was significant difference in the knowledge of asthma where the total mean scores was 14.8 in repeated admissions group and 17.7 in non - repeated admission group from the total score of 31.

Conclusions Patients with repeated admissions for asthma tend to have high past history of atopy, high history of absenteeism from work or school, more frequent nocturnal symptoms and more use of low dose inhaler corticosteroids. They also had poor inhaler techniques and less asthma knowledge.

- (b) Senaraikan Kata Kunci yang digunakan di dalam abstrak:

Bahasa Malaysia

Bahasa Inggeris

asthma, repeated admission

5) Output Dan Faedah Projek

- (a) Penerbitan (termasuk laporan/kertas seminar)
(Sila nyatakan jenis, tajuk, pengarang, tahun terbitan dan di mana telah diterbit/dibentangkan).

**International
Publication**

SB Ismail, AM Aris, Fauzi M,
Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang.
International Medical Journal (accepted for publication)

Presentation

SB Ismail, AM Aris, Fauzi M
Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang
12th Congress of Asia Pacific Association for respiratory care
(APARC 2004), 6-9th August, 2004, Terengganu, Malaysia

**National
Publication**

AM Aris, SB Ismail, Fauzi M,
Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang. The
Bulletin of Family Medicine Specialist Malaysia. Vol. 2, Issue 1, September 2004

Presentation

AM Aris, SB Ismail, Fauzi M
Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang
6th Family Medicine Scientific Meeting, Shah Alam, Selangor. August 2003

AM Aris, SB Ismail, Fauzi M
Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang
6th Teaching Course for General Practitioners on 12th September – 14th September 2003
at Lam Wah Ee Hospital, Penang

AM Aris, SB Ismail, Fauzi M

Characteristics of patients with repeated admission in HTAA, Kuantan, Pahang
9th AGM Persatuan Alumni Doktor USM (PADU) on 4th October
2003 at Renaissance Hotel Kota Bharu, Kelantan

- (b) **Faedah-Faedah Lain Seperti Perkembangan Produk, Prospek Komersialisasi Dan Pendaftaran Paten.**
(Jika ada dan jika perlu, sila guna kertas berasingan)

(c) **Latihan Gunatenaga Manusia**

i) **Pelajar Siswazah: Dr. Mohd Aznan Md Aris**

ii) **Pelajar Prasiswazah:**

ii) **Lain-Lain :**

JABATAN BENDAHARI
UNIVERSITI SAINS MALAYSIA

KAMPUS KESIHATAN KELANTAN
GERAN PENYELIDIKAN UNIVERSITI JANGKA PENDEK
PUSAT PENGAJIAN SAINS PERUBATAN
(304/PPSP/6131232)

PENYELIDIK : DR. SHAIFUL BAHARI ISMAIL

NAMA PROJEK : "CHARACTERISTICS OF PATIENTS WITH REPEATED ADMISSION FOR ASTHMA"

PENYATA PERBELANJAAN BAGI TEMPOH BERAKHIR PADA 31 DISEMBER 2004

PECAHAN KEPALA	PERUNTUKAN (RM)	PERBELANJAAN 2003	BAYARAN 2004	TANGGONGAN	PERBELANJAAN 2004	JUMLAH PERBELANJAAN	BAKI KESELURUHAN
11000 GAJI DAN UPAHAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14000 ELAUN LEBIH MASA	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15000 BONUS	0.00	0.00	0.00	0.00	0.00	0.00	0.00
21000 PERJALANAN & PENGANGKUTAN ORANG	2,490.00	1,523.00	0.00	0.00	0.00	1,523.00	967.00
22000 PENGANGKUTAN BARANG-BARANG	0.00	0.00	0.00	0.00	0.00	0.00	0.00
23000 PERHUBUNGAN DAN UTILITY	300.00	0.00	0.00	0.00	0.00	0.00	300.00
24000 SEWAAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25000 BAHAN-BAHAN MAKANAN & MINUMAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26000 BEKALAN BAHAN-BAHAN MENTAH & BAHAN PEMBAIKAN	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27000 BEKALAN BAHAN-BAHAN LAIN	200.00	200.00	1,608.00	0.00	1,608.00	1,808.00	(1,608.00)
28000 PENYELENGARAAN & PEMBAIKAN KECIL YANG DIBELI	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29000 PERKHIDMATAN IKTISAS & LAIN-LAIN PERKHIDMATAN & HOSPITALITI	2,916.00	200.00	0.00	0.00	0.00	200.00	2,716.00
35000 LAIN-LAIN HARTA MODAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00
JUMLAH BESAR	5,906.00	1,923.00	1,608.00	0.00	1,608.00	3,531.00	2,375.00

STUDY ON CHARACTERISTICS OF PATIENTS WITH REPEATED ADMISSIONS FOR ASTHMA.

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Introduction

Asthma is responsible for much morbidity and mortality with an increasing trend in many countries in the recent decade. This report describes the characteristics among patients with repeated admissions for asthma compared with patients with no repeated admission for asthma over the same period of one-year duration.

Methodology

This was a cross-sectional comparative study among 30 patients with asthma who had repeated admissions with another 30 patients with asthma who had no repeated admission for exacerbation of asthma over a same period of one-year duration (2001). The socio-demographic, clinical characteristics and evaluation data were collected. An evaluation included measurement of peak expiratory flow (PEF), inhaler technique skills and questionnaires on knowledge of asthma.

Results

Among sixty patients with asthma in this study, there were no significant differences in mean age ethnic origin, marital status, educational status, employment status, household income and smoking history between both groups.

Patients with repeated admissions had less mean duration of onset of asthma (10.07 years vs. 11.63 years; $p < 0.001$) and more past history of atopy or allergy (83.3% vs. 50%; $p < 0.001$). There were significant differences in mean history of absenteeism from work or schools (RA vs. NRA: 6.11 days vs. 1.87 days; $p < 0.001$) and nocturnal symptoms (RA vs. NRA: 100% vs. 53.3%; $p < 0.001$) between both groups. All patients with repeated admissions were using both B_2 agonist and corticosteroids inhalers. But, majority of them (63.3%; $p < 0.05$) were using low dose corticosteroids inhalers.

There was no significant difference seen in peak expiratory flow meter in between both groups. Patients with repeated admissions had less satisfactory score of inhaler techniques (73.3% vs. 93.3%; $p < 0.05$). But there was no significant difference in performed all inhaler technique steps correctly in both groups (RA vs. NRA: 16.7% vs. 36.7%). There was significant difference between groups in their knowledge of asthma where the total mean scores of both groups were 14.8 in repeated admissions group and 17.7 in non-repeated admission group.

Conclusion

Patients with repeated admissions for asthma tends to have less duration of asthma, high past history of atopy, high history of absenteeism from works or schools, more frequent nocturnal symptoms and more use of low dose inhaler corticosteroids. They also had poor inhaler techniques and lesser asthma knowledge.

INTRODUCTION

General introduction

Asthma is a chronic respiratory disease, characterized by increased responsiveness of tracheo-bronchial tree to variety of stimuli, which is characterized by sudden recurring attack of cough, wheezing or dyspnea, particularly at nights and early mornings (Malaysian Thoracic Society, 1996). These episodes are usually associated with widespread, but variable airflow obstruction that is often reversible, either spontaneously or with treatment. The inflammation also causes an associated increase on the existing bronchial hyper responsiveness to a variety of stimuli.

The primary physiological manifestation of this hyper responsiveness is variable airway obstruction. This can take in the form of spontaneous fluctuations in severity of obstruction, substantial improvement in the severity of obstruction following bronchodilators or corticosteroids or increased obstruction caused by drugs or other stimuli. Histologically patient with fatal asthma have evidence of mucosal oedema of the bronchi, infiltration of the bronchial mucosa or submucosa with inflammatory cells especially eosinophil and shedding of epithelium and obstruction of peripheral airway with mucosa.

Asthma is a major problem worldwide. It affects individuals, families and communities. Its consequences include need for medication, medical attendance, hospital admission and absence from work or school.

The impact of asthma on individual can be assessed to some degree from estimates of prevalence, health service use and mortality. Studies have been done in developed countries to estimate the prevalence of asthma in their populations. Studies done among school children in Great Britain, Australia, Germany and New Zealand found the prevalence of wheeze in the preceding 12 months to range from 20% to 33% while the prevalence of 'wheeze ever' ranged from 33% to 48% (Pearce *et al.* 1993; Kaur *et al.* 1998). A study done among Singapore children revealed a period prevalence of wheezing of 12% and a doctor diagnosed asthma of 20% (Goh *et al.* 1996). Among Singapore adults, the lifetime cumulative prevalence of physician-diagnosed asthma was 4.7% in men and 4.3% in women, while the twelve months period prevalence was 2.4% and 2% respectively (Ng *et al.* 1994).

In Malaysia, the prevalence of schoolchildren ever having asthma or wheeze was 8.2% in Kota Kinabalu (Leung and Ho, 1994), 13.8% in Kuala Lumpur (Azizi., 1990) and 9.4% in Kelantan (Quah *et al.* 1997). The Second National Health and Morbidity Survey carried

out by the Ministry of Health Malaysia in 1996 found that estimated prevalence of asthma in Malaysia was 4.2%. Among children 0 to 14 years old, the estimated prevalence was observed to be 4.5% and among adults, aged 15 years and above, it was 4.1% (Rugayah B, 1997). International Study of Asthma and Allergies in Childhood (ISSAC) revealed prevalence of 4 - 7% asthma in Malaysia.

Reasons for the increase in asthma prevalence include inappropriate management and underutilization of preventive medications (Goh *et al.* 1996). Two of the major factors for the inappropriate management of asthma are underdiagnosis and undertreatment of the condition by medical profession (Sleight *et al.* 1983).

Morbidity and mortality

It is known that asthma causes unacceptable morbidity and mortality related to inadequate treatment, under use of objective measurement of severity and inadequate supervision. The prevalence of asthma is on the increase (Nystad *et al.* 1997; Goh *et al.* 1996; Tirimanna *et al.* 1996). This is worrying because asthma is associated with significant morbidity.

A study done among 198 asthmatic patients attending a primary care clinic in Singapore revealed that 71 % of them had significant morbidity (Lee *et al.* 1995). In Malaysia, a study done more than 10 years ago on outpatient management of patients with asthma seen in two government – run hospitals in Pahang highlighted that considerable morbidity was associated with inadequate assessment, treatment and monitoring of the disease. Of the 70 patients studied, 86% had their sleep disturbed by asthma, 63% had their activities restricted by asthma and 60% had at least one exacerbation in the preceding 6 months. For patients who had their peak expiratory flow (PEF) measured, only 11% had normal values (more than 80% predicted) and 40% had values less than 50% predicted. Most patients were on an oral beta-agonist and oral theophylline, only 43% of these patients received inhaler therapy, none were on steroids, oral or inhaled and drug treatment was unrelated to the severity of asthma. Only 8.5% of patients had ever had their PEF recorded (Lim *et al.* 1992).

In a recent large population survey of patients with asthma in urban centers in 8 areas in the Asia – Pacific region (AIRIAP study), only about 13.6% of respondents were on inhaled corticosteroids despite almost half of them having symptoms of persistent asthma. Associated with undertreatment of asthma, widespread sub – optimal asthma control was found. Overall, 51.4% of all respondents reported daytime symptoms of asthma, and 44.3% reported sleep disruption from asthma in the past four weeks. In addition, 44.7% felt that asthma limited their normal physical activity and 52.7% felt that their sports/recreation activities were affected. As many as 26.5% of adults and 36.5% of children had missed work or school within the past year because of asthma and 43.6% had been hospitalized, attended a hospital emergency department or made unscheduled emergency visits to other healthcare facilities for acute asthma in the previous 12 months. As for monitoring, 60.3% of the respondents had never had their lung function tested. The majority of patients (56.3%) used a quick relief bronchodilator; only 18.2% of patients

with severe persistent asthma and 17.1% of patients with moderate persistent asthma were on inhaled corticosteroids (Lai, 2003).

Despite the progress in understanding of asthma and improved management protocol, asthma admission rate are also on increasing trend globally. There are very few countries that had reported a decline in admission rates. In Malaysia, respiratory illnesses including asthma rank as the fifth most common cause of admission in government hospital. In year 2000, there were 104,064 admissions in government hospital for respiratory illness including asthma (Ministry of Health Malaysia, 2000).

There is little data on asthma mortality in Malaysia, whether in the community or in the hospitals. In 1995, a study was done on asthma case fatality rate for government hospitals in 1994/1995. Information verified by physicians was obtained from 50 hospitals in 11 states. Four percent of the hospitals had a case fatality rate exceeding 1.5%, 18% had a case of over 1.0% and 46% of hospitals had a case fatality of more than 0.5% (Hooi L.N. *et.al.*,1996). It was felt that death from asthma should be a sentinel event since it is generally accepted that asthma death is preventable and that patients with acute asthma admitted to hospital should survive. Death from bronchial asthma has now been made a quality assurance indicator in government hospitals under the Ministry of Health's NIA (National Indicator Approach) quality assurance programmed for patient care services. Asthma deaths may be the result of poor inpatient and outpatient management hence outlier status should trigger to determine the contributory factors so that remedial measures can be taken.

Asthma is not only increasingly becoming a global problems, it also costs the nation a large amount of money when economic outcome is considered. If other factors such as reduction in productivity, loss of working hours, losses of schooling hours are considered, it actually costs the country much more.

Literature review

Risk factors for repeated admissions for asthma

The Asthma Insight and Reality In Asia Pacific (AIRIAP) studied in September to December 2000 in Malaysia had found that 14% of Malaysians lack knowledge in controlling the disease. Seventeen percent do not comply with medical instructions and 32% of adults have lost workdays and 53% of children have lost school days due to the disease. It was found the other reasons leading to the prevalence of the disease are smoking (29 %), pollution (60 %) and lifestyle (6 %). It was also found that 30 % of Malaysians have made unscheduled emergency visits to the hospital and 15 % were hospitalized last year.

In Quebec, Canada, Louis *et. al* (1996) study on frequent visits to the emergency department (ED) for asthma, found that there was a trend toward inferior socioeconomic status, education level and technical abilities (e.g. inhaler use) in the study group compared

to control group. They also had high absenteeism from work or school and insufficient asthma management knowledge and skills.

In USA, Kuo A. and Craig T.J. (1998) studied among patients with asthma that were hospitalized two times or more. The results demonstrated an equal male-to-female ratio, with mean age of 27 years, mean hospital admissions was 3.2, a history of depression existed in 25% of the patients, non-compliance was 38%, 25% were active tobacco smokers, high allergenic triggers and inhaled steroids were underused.

Smoking and atopy are known to have relationship with asthma. A retrospective study by Toren K. and Hermansson B.A. (1999) on 15813 Swedish adults concluded that atopic symptoms and family history of atopy were strongly associated with incidence of adult-onset asthma. Tobacco smoking may be associated with an increased rate of adult-onset asthma, especially among women.

Lung function measurements assess airflow limitation and help diagnose and monitor the course of asthma. Such objective measurements are important because patients and physicians often do not recognize asthma symptoms or their severity. Lung function measurements for asthma management are used in the same manner as blood pressure measurements for diagnosing and monitoring hypertension.

Peak flow meters measure peak expiratory flow (PEF), the fastest rate at which air moves through the airways during a forced expiration. PEF is the measurement more commonly done and not FEV1 (forced expiratory volume in one second) because spirometry is not commonly available in outpatient clinics and the findings are unlikely to differ, since previous research has shown good correlation between PEF and FEV1 (Arvidsson E, Dano G, 1973)

Mitchell E.A. and Burr D. (1987), study on comparison of the characteristics of children with multiple admissions to hospital for asthma with those with a single admission found that twenty-four percent of study populations were readmitted within six months. There were more number of parents who smoked and pets in the home in the multiple admission group than single admission group.

Micheal S. (2001) reported that the predicted factors for lack of asthma self-management knowledge were low educational level, smoking, lower socio-economic status and not on steroid use.

Inhalation techniques

Inhalation therapy is the main route of drug administration in patients with asthma. The efficacy of inhalation therapy depends on several factors including the individual choice of the device, its correct use and patients' compliance. There are many types of inhaler such as metered dose, dry powder and breath actuated pressurized.

Study at Bradford, United Kingdom by Brocklebank *et al.*(2001) showed that no evidence was found to prove that alternative devices (dry powder inhalers, breath actuated metered dose inhalers or hydrofluoroalkane pressurized metered dose inhalers) are more effective than the pressurized metered dose inhalers for delivery of inhaled corticosteroids. Pressurised metered dose inhalers remain the first line delivery devices and the most widely used of inhalation therapy. However, their use is complex and about 50% of the patients do not use it properly. The most frequent errors include inadequate coordination between actuation and inspiration, rapid inspiration, absence of breathhold and actuation of the aerosol on more than one occasion during the same inspiration (Labrune *et.al.*, 1994).

Omar *et. al* (2001) studied on metered-dose inhaler technique among 150 healthcare providers founded that only 15% performed all steps correctly, however only 19% performed essential steps correctly.

Hilton S.(1990) on study among 422 asthmatic patients founded that 25% of patients had inadequate technique. In Netherlands, studied by Van Beerendonk *et. al.* (1998) on assessment of inhalation technique in outpatients revealed that the most common skill error was not continuing to inhale slowly after activation of the canister (69.6%) and the non-skill item that most patients had difficulties with was exhaling before the inhalation (65.8%).

In Spanish, Golpe *et. al.* (2001) reported that only 31% of cases were observed to make no inhalation errors. There were no significant associations between improper use of inhaler and patients' age, sex or the setting (hospital or ambulatory ward) where the treatment was first prescribed. While in Dublin, Buckley D.(1989) studied among 71 patients who were using inhalers revealed that 25% had perfect technique, 37% had adequate technique and 38% had poor technique.

Knowledge about asthma

Many studies have demonstrated that most patients with asthma have poor knowledge about the disease and self-management.

Local survey by Norzila *et. al.* (2000) among medical students and paramedics in Kuala Lumpur found both groups' knowledge of childhood asthma increased significantly after intervention. Quah B.S *et al* (1997), survey on medical students using similar asthma knowledge revealed the asthma knowledge of medical students increased progressively during the five-year curriculum but their knowledge regarding trigger factors and preventive medications were deficient.

In a study at Buffalo, New York among 29 adults with asthma revealed there was a significant correlation between knowledge and attitudes and knowledge and self – efficacy. The more positive persons' attitude toward their asthma, the higher their knowledge and self-efficacy scores (Scherer, July 2001).

In Toronto, Canada, study on patients with frequent emergency department visits with asthma showed 23% of Emergency Department (ED) patients having a predetermined crisis plan vs. 79 % of Ambulatory Clinic (AC) patients. Measurements of airflow (% predicted FEV1) were significantly lower in the ED group (50%) than the AC group (78.4%). They also concluded that an ED group were more likely to have lower income, live alone and less knowledgeable about asthma (Hanania, Nicola, Feb 1997).

Gibson *et. al.* (1995) did a study regarding asthma among school students and found that 3.5% of the students have asthma, 0.3% of student do not have asthma and 13.8% of the teachers knew about the preventive drugs. However, between 50% and 75% of them could identify salbutamol as a treatment of acute asthma but only a few could name 3 others asthma treatment which can be used during an attack of asthma.

Omar and Michael (1999), surveyed on patients with asthma managed in general practice and in hospital clinic in Australia, found no significant difference between both groups in asthma knowledge but GP group were less likely to have written action plans and were less able to manage rapid onset attacks than hospital group.

In Ghana, 50% of house officers in a teaching hospital were found to have insufficient knowledge of asthma, while 25% had little or no knowledge of managing the disease. Their knowledge of the pathophysiology, drug therapy and international asthma management guidelines were insufficient (Hesse 1995).

In Melbourne, Abe E *et.al.*(1988) study on four hundred and twenty-one patients with asthma that attended pharmacies found that forty per cent of subjects had been hospitalized at least once for asthma and 15% of them were taking maintenance corticosteroids agents by mouth. Twenty per cent of subjects currently were smoking cigarettes (15 cigarettes per day on average) and 25% of were ex-smokers. When knowledge of asthma was examined by questionnaire, the median score of questions that were correctly answered were less than 50% of the total scores. Among the serious misconceptions which were evident in the area of use of medication were; the sustained-release theophylline agents acted quickly during acute attacks of asthma (62% of subjects); that antihistamine agents should be taken as soon as possible during an asthma emergency (72% of subjects); that six inhalations of beclomethasone were advisable during an asthma emergency (49% of subjects); that systemic corticosteroid agents were effective within 20 minutes of administration (87% of subjects); and that deaths of asthma usually were due to precipitous attacks without time for any intervention (73% of subjects). Only 42% of subjects considered that up to six puffs at once of a B-agonist aerosol for an asthma emergency may appropriate.

Justification of this study

There were many studies have been published to improve management and quality of life among asthma patients, but only several studies have been done in Malaysia in terms of determination on the risk factors of frequent admissions to hospital especially among adults. Asthma is one of the ten most common admissions in hospital for the past ten years. The number of admissions is increasing since several years ago. Majority of them had

multiple admissions and absenteeism for exacerbation of asthma. This will lead to more burden to the country and poor quality of life in patients with asthma.

Hopefully this study will help the health care workers especially primary care physician in handling patients with asthma especially in those who have high risk factors for repeated admissions. The aim of this study is to look at patients with asthma with repeated admissions compared with those without repeated admission based on hypothesis formulated as follows:-

- 1) Patient with low socioeconomic status have repeated admissions.
- 2) Patient with poor inhaler technique skills have repeated admissions.
- 3) Patient with poor asthma knowledge have repeated admissions.

OBJECTIVES

General objective:

To study the characteristics of patients with repeated admissions for asthma.

Specific objectives:

- 1) To determine and compare the demographic, socioeconomic and clinical characteristics among patients with repeated admissions and without repeated admission for asthma.
- 2) To assess and compare the inhaler technique among patients with repeated admissions and without repeated admission for asthma.
- 3) To assess and compare the level of knowledge regarding asthma among patients with repeated admissions and without repeated admission for asthma.

METHODOLOGY

Study area/background

Kuantan district is one of eleven districts in Pahang Darul Makmur. The district area is 2,960 km square with population of 358,261 out of 1,098,290 in Pahang. The population comprised of Malay (76.8%) , Chinese (17.8%), Indian (5.0%) and others (0.5%) with the growth rate of 1.9%. There were three hospital in Kuantan , one government hospital (Hospital Tengku Ampuan Afzan) and two private hospitals.

Study design and sampling

This is a cross sectional comparative study and been conducted at Hospital Tengku Ampuan Afzan , Kuantan. Sixty patients with asthma were selected from asthma clinic HTAA and they had been divided into two groups.

The first group was the repeated admissions group that consisted of thirty patients with asthma that had multiple admissions in year 2001 for exacerbation of asthma. The second group was the non-repeated admission group that consisted of thirty patients with asthma that had no admission or only one admission for exacerbation of asthma during year 2001. Both groups were chosen from first sixty consecutive patients with asthma in Asthma Clinic lists that fulfill the inclusion and exclusion criteria.

Inclusion criteria

1. All patients with asthma that on Asthma Clinic HTAA follow-up.
2. Patients on metered dose inhaler treatment.
3. Age of patients within 12 years to 45 years olds.
4. Agreeable to involve with the study.

Exclusion criteria

1. Patients who known to have other concurrent medical illness such as congestive cardiac failure, chronic obstructive airways diseases, pneumonia and pulmonary tuberculosis.
2. Patients who were unable to comprehend the questionnaires.
3. Patients who were not on metered dose inhaler medications.

Study instruments

The questionnaire used in this study was designed based on various reading of literature research. This questionnaire was grouped into a few categories that consists of the demographic and socioeconomic data, clinical characteristics and knowledge of asthma.

The demographic and socioeconomic data are gender, age, educational levels, marital status, occupations and household income.

The clinical characteristics consists of duration of asthma, history of atopy, smoking, absenteeism, nocturnal symptoms, number of emergency departments or clinic visits for exacerbation of asthma, number of hospital admission for the past one year duration, medications and assessments.

The assessments were done on inhaler technique skills and peak expiratory flow (PEF) measurement tests. The accuracy of PEF measurement depends on patient effort and correct technique. Several kinds of peak flow meters are available; the technique use in this study is as below (Global Initiative for Asthma):

- a) Stand up and hold the peak flow meter without restricting movement of the marker. Make sure the marker is at the bottom of the scale.
- b) Take a deep breath, put the peak flow meter in your mouth, seal your lips around the mouthpiece, and breathe out as hard and fast as possible. Do not put your tongue inside the mouthpiece.
- c) Record the result. Return the marker to zero.
- d) Repeat twice more. Choose the highest of the three readings.

This peak expiratory flow meter has been categorized into mild (PEF measurement more than 80%), moderate (PEF measurement in between 60% and 80%) and severe (PEF measurement less than 60%) according to their gender, age and height using PEF normogram for adult Chinese in Singapore (Da Costa J.L. *et.al.*,1973)

The inhaler techniques for metered dose inhaler consisted of nine steps. This steps were recommended by most manufacturers and had been proposed by Zainuddin *et. al* (1990) with slight modifications. These were :-

1. Remove cap and shake inhaler vigorously.
2. Hold inhaler in upright position.
3. Breathe out slowly and completely.
4. Tilt head slightly back.
5. Place lip tightly around mouthpiece, or two fingers width from the mouthpiece.
6. Actuate inhaler at start of inhalation.
7. Begin slow deep inhalation.
8. Hold breath for as long as comfortable (5 to 10 seconds)
9. Single actuation with each inhalation

Each step was scored zero (0) for incorrect use and one (1) for correct use. Scores were then summed. If patient were given zero (0) for essential steps 2, 5 or 6, their score will

automatically become zero for the whole survey. Those who scored less than five were considered insufficient.

The knowledge of asthma was determined by interview using standard questionnaires. This questionnaires had been widely used by local studies on assessment of asthma knowledge such as Norzila *et. al.* (2000) and Quah B.S. *et.al.*(1997). This questionnaire was proposed by Fitzclarence *et. al.*(1990) for questionnaire on knowledge of childhood asthma with slight modification to fit on adult's knowledge on asthma.

It consisted of 29 questions that include asthma symptoms and its recognition, trigger factors, basic pathophysiology, types of medication and their indications, daily activity and general knowledge.

Pilot study was done among 30 patients with asthma attended out patient clinic of Hospital Tengku Ampuan Afzan Kuantan , Pahang in December 2001. Reliability analysis of both inhaler technique skills and modified knowledge on childhood asthma were done. The Cronbach's Alpha on both assessment forms were 0.751, whereas the Cronbach's Alpha on each assessment was 0.6723 for inhaler techniques skills and 0.6974 for knowledge on asthma.

Data collection and handling

The survey was undertaken in January 2002 to May 2002 where the patients were called for assessment after they were discharged and relatively well. The questionnaires were filled-up by interview with the researcher, then their inhaler techniques and peak flow meter were performed.

Data analysis

Analysis of the data was done using SPSS version 10.0 for Windows and scoring were based on the inhaler technique skills and knowledge. Continuous data was analyzed by Student t-test and ANOVA, while the categorical data was analyzed by Chi-square. The test was considered significant if $p < 0.05$

RESULTS

Demographic data

Table 1 showed the demographic characteristics of 60 patients with asthma who completed the study. Majority of them were female, Malay and married.

Table 1 The demographic characteristics of 60 patients with asthma who completed the study.

Variables	Repeated admissions group	Non-repeated admissions group	p- value^a
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	n (%)	n (%)	
1. Sex			
a) Male	11 (36.7%)	11 (36.7%)	NS
b) Female	19 (63.35)	19 (63.35%)	
2. Age * (Range)	27.97 (14 – 44 years) SD : 10.17	30.3 (14 – 44 years) SD : 10.16	NS
3. Race			
a) Malay	26 (86.7%)	23 (76.7%)	NS
b) Non-Malay	4 (13.3%)	7 (23.3 %)	
4. Marital Status			
a) Single	11 (36.7 %)	11 (36.7%)	NS
b) Married	19 (63.3 %)	19 (63.3 %)	

^a – Student t-test for Age and Chi-square test for others

* - mean , SD – standard deviation

NS – Not significant

There were no significant differences seen in demographic characteristics between both groups.

Socioeconomic data

In educational background, there was equally divided from secondary school or lower and tertiary school or above. Majority of them have household income more than RM1000 per month. Table 4.2 showed the socio-economic characteristics in both groups of patients.

Table 2 Socioeconomic characteristics of 30 patients in repeated admissions group and 30 patients in non-repeated admission group

Variables	Repeated admissions group n (%)	Non-repeated admission group n (%)	p-value ^a
1. Education			
a) Secondary	16 (53.3 %)	14 (46.7%)	NS
b) Tertiary	14 (46.7%)	16 (53.3 %)	
2. Occupation			
a) Student	8 (26.7%)	7 (23.3 %)	NS
b) Not working	11 (36.7 %)	7 (23.3 %)	
c) Government	6 (20.0 %)	7 (23.3 %)	
d) Private sector	5 (16.7 %)	9 (30.0 %)	

Table 4.4, continued

3. Household income			
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a) < RM 1000	12 (40 %)	10 (33.3 %)	NS
b) > RM 1000	18 (60 %)	20 (66.7 %)	

^a – Chi –square test

NS – not significant

There were no significant differences seen in socio-economic characteristics between both groups.

Clinical characteristics

Table 4.3 showed the clinical characteristics in both groups of patients where mean duration of asthma in both groups was more than 10 years. Majority of them in this study were non-smoker. There were 62.5% of patients in repeated admissions group had severe persistent asthma (daily nocturnal symptoms) whereas only 12.5% patients in non-repeated admission group had severe persistent asthma.

Table 3 Clinical characteristics of 30 patients in repeated admissions group and 30 patients in non-repeated admission group

Variables	Repeated admissions group n (%)	Non-repeated admission group n (%)	p- value ^a
1 .Duration of asthma * (Range)	10.07 (1-21 years) SD : 5.84	11.63 (2 – 35 years) SD : 8.77	0.000
2.History of atopy a) Yes b) No	25 (83.3 %) 5 (16.7 %)	15 (50 %) 15 (50 %)	0.006
3.History of smoking a)Smoker b) Ex- smoker c) Non–smoker	4 (13.3 %) 3 (10 %) 23 (76.7 %)	2 (6.7 %) 1 (3.3 %) 27 (90 %)	NS
4. Absenteeism from work/school (days)*	6.11	1.87	0.003

(Range)	(0 – 20 d) SD : 5.66	(0 – 10 d) SD : 2.88	
5. Nocturnal symptoms a) Yes b) No	30 (100%) 0	16 (53.3%) 14 (46.7%)	0.001
6. Frequency of nocturnal symptoms a) < 2 X / month b) > 2 X /month c) every night	4 (13.3%) 7 (23.3%) 19 (62.5%)	10 (62.5%) 4 (25%) 2 (12.5%)	0.001
7. Hospitalization a)Yes b) No	30 (100 %) 0	6 (20 %) 24 (80 %)	0.001

Table 3, continued

8. Frequency of previous admission * (Range)	2.63 (2-6 admissions) SD : 1.07	1.0 (0-1 admission) SD: 0	0.001
9. Use of medications			
a) B2 agonists	30 (100%)	7 (23.3 %)	NS
b) MDI Steroids a) Yes b) No	30 (100%) 0	23 (76.7%) 7 (23.3 %)	0.005
c) Doses of MDI Steroids i- < 800 mcg /day ii- > 800 mcg /day	19 (63.3 %) 11 (36.7 %)	23 (100 %) 0	0.001

^a – Student t-test for duration of asthma and Chi-square test for others

* - mean, SD – standard deviation

There were significant differences observed in all variables in clinical characteristics in both groups except for history of smoking.

Peak flow meter and inhaler techniques

Table 4.4 showed the peak expiratory flow measurements and inhaler technique skills in both groups. Thirty six of patients with asthma in both groups had mild peak flow meter. There were only nine out of sixty patients with asthma managed to perform all steps correctly in inhaler technique as seen in figure 4.4.

Table 4 Peak expiratory flow rate (PEFR) and inhaler techniques of 30 patients in repeated admissions group and 30 patients in non-repeated admission group

Variables	Repeated admissions group n (%)	Non-repeated admission group n (%)	p- value ^a
1). PEFR			
a) Mild	21 (70 %)	15 (50 %)	NS
b) Moderate	7 (23.3 %)	15 (50 %)	
c) Severe	2 (6.7 %)	0	
2). Inhaler technique Steps (Number of Correct).			
1. Remove cap and shake inhaler vigorously.	27 (90%)	29 (96.7%)	NS
2. Hold inhaler in upright position	30 (100%)	30 (100%)	NS
3. Breath out slowly and completely	21(70%)	28 (93.3%)	0.02
4. Tilt head slightly back	5 (16.7%)	10(33.3%)	NS
5. Place lip tightly around mouthpiece, or two fingers width from the mouthpiece	28 (93.3%)	29 (96.7%)	NS
6. Actuate inhaler at start of inhalation	25 (83.3%)	29 (96.7%)	NS
7. Begin slow deep inhalation	25 (83.3%)	29 (96.7%)	NS

8. Hold breath for as long as comfortable (5 to 10 seconds)	22 (73.3%)	22 (73.3%)	NS
9. Single actuation with each inhalation.	17 (56.7%)	26 (86.7%)	0.01

Table 4.4, continued

3) Total scores of inhaler techniques			
a. Satisfactory	22 (73.3 %)	28 (93.3 %)	0.038
b. Not satisfactory	8 (6.7%)	2 (6.7%)	

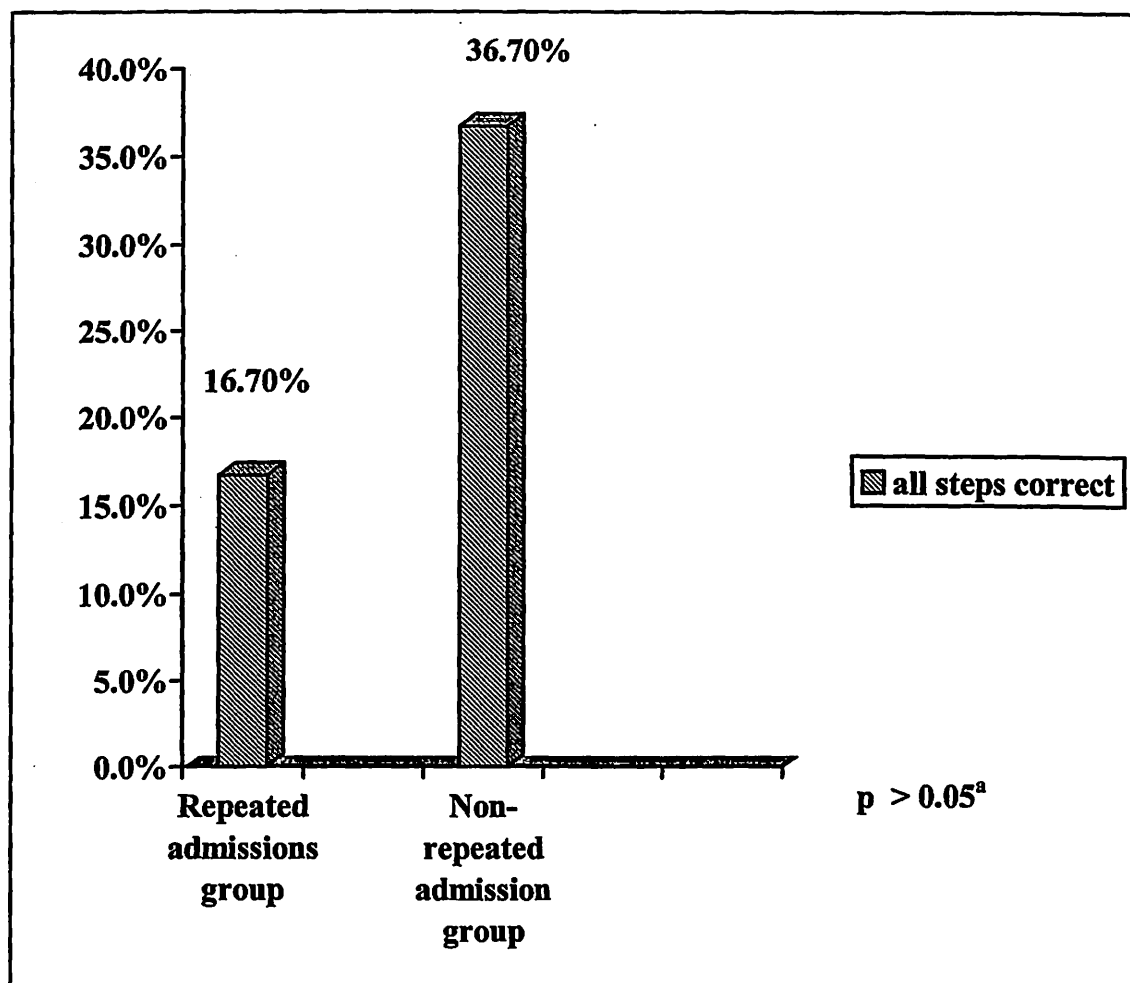
^a – Chi –square test

NS – not significant

There was no significant difference seen in peak expiratory flow (PEF) between both groups. For inhaler techniques, there were no significant differences in inhaler technique steps except in steps three and nine. But there was significant difference seen in total score of inhaler techniques between both groups.

Figure 4.4 showed the percentages of patients with asthma that performed all inhaler technique steps correctly.

^a – Chi –square test



There was no significant difference in performed all inhaler technique steps correctly in both groups.

Asthma knowledge

Table 5 showed the knowledge on asthma between both groups. Ten percent in repeated admissions group recognized wheezing as one of the symptoms, and 22.3% in non-repeated admission group. Figure 4.5.1 showed the score in both groups regarding asthma symptoms whereas in figure 4.5.2, it showed the score in both groups regarding trigger factors in asthma. Figure 4.5.3 showed the total means scores on asthma knowledge in both groups.

Table 5 Comparison of scores in each question on asthma knowledge in both groups (please see appendix 2 for the questions).

Questions No.	Repeated admission group n(%)	Non-repeated admission group n(%)	p value ^a
1.	2 (6.6 %)	2 (6.6%)	NS
2.	6 (20 %)	15 (50 %)	0.015
3.	21 (70 %)	24 (80 %)	NS
4.	22 (73.3 %)	26 (86.7 %)	NS
5.	22 (73.3 %)	20 (66.7 %)	NS
6.	3 (10 %)	2 (6.7 %)	NS
7.	20 (66.7 %)	26 (86.7 %)	NS
8.	13 (43.3 %)	16 (53.3 %)	NS
9.	7 (23.3 %)	20 (66.7 %)	0.001
10.	4 (13.3 %)	1 (3.3 %)	NS

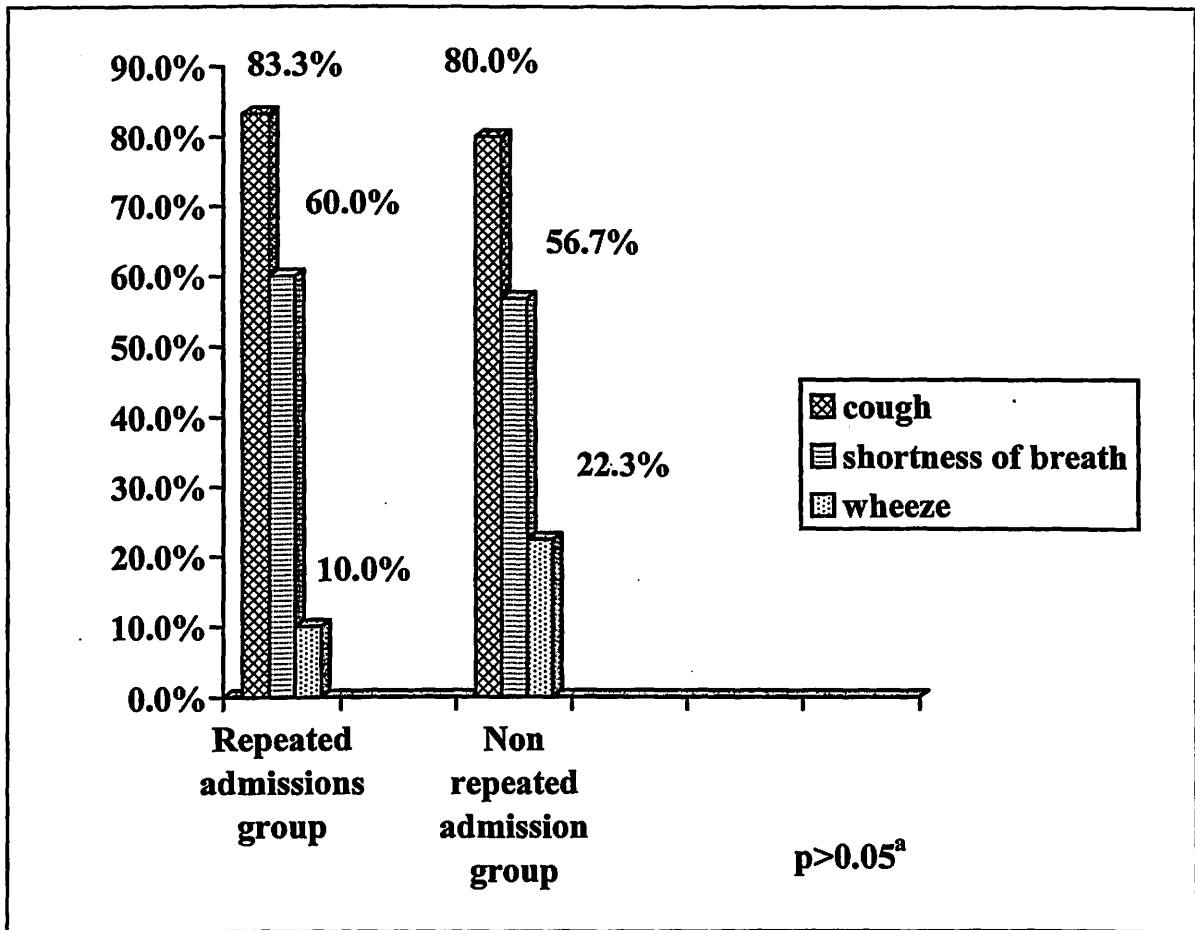
Table 5, continued

11.	4 (13.3 %)	1 (3.3 %)	NS
12.	6 (20 %)	15 (50 %)	0.015
13.	14 (46.7 %)	23 (76.7 %)	0.017
14.	14 (46.7 %)	14 (46.7 %)	NS
15.	3 (10 %)	3 (10 %)	NS
16.	24 (80 %)	28 (93.3 %)	NS
17.	22 (70 %)	27 (90 %)	NS
18.	21 (70 %)	27 (90 %)	NS
19.	9 (30 %)	15 (50 %)	NS
20.	15 (50 %)	21 (70 %)	NS
21.	2 (6.6 %)	3 (10 %)	NS
22.	17 (56.7 %)	14 (46.7 %)	NS
23.	30 (100%)	30 (100 %)	NS
24.	24 (80 %)	25 (83.3%)	NS
25.	13 (43.3 %)	23 (76.7 %)	0.008
26.	30 (100 %)	29 (96.7 %)	NS
27.	25 (83.3 %)	28 (93.3 %)	NS
28.	2 (6.7 %)	3 (10 %)	NS
29.	30 (100 %)	29 (96.7 %)	NS
30.	20 (66.7 %)	22 (73.3 %)	NS
31.	30 (100 %)	30 (100 %)	NS

^a -Chi-square test

There were significant differences seen in total scores of asthma knowledge and questionnaires number 2, 9, 12, 13, and 25.

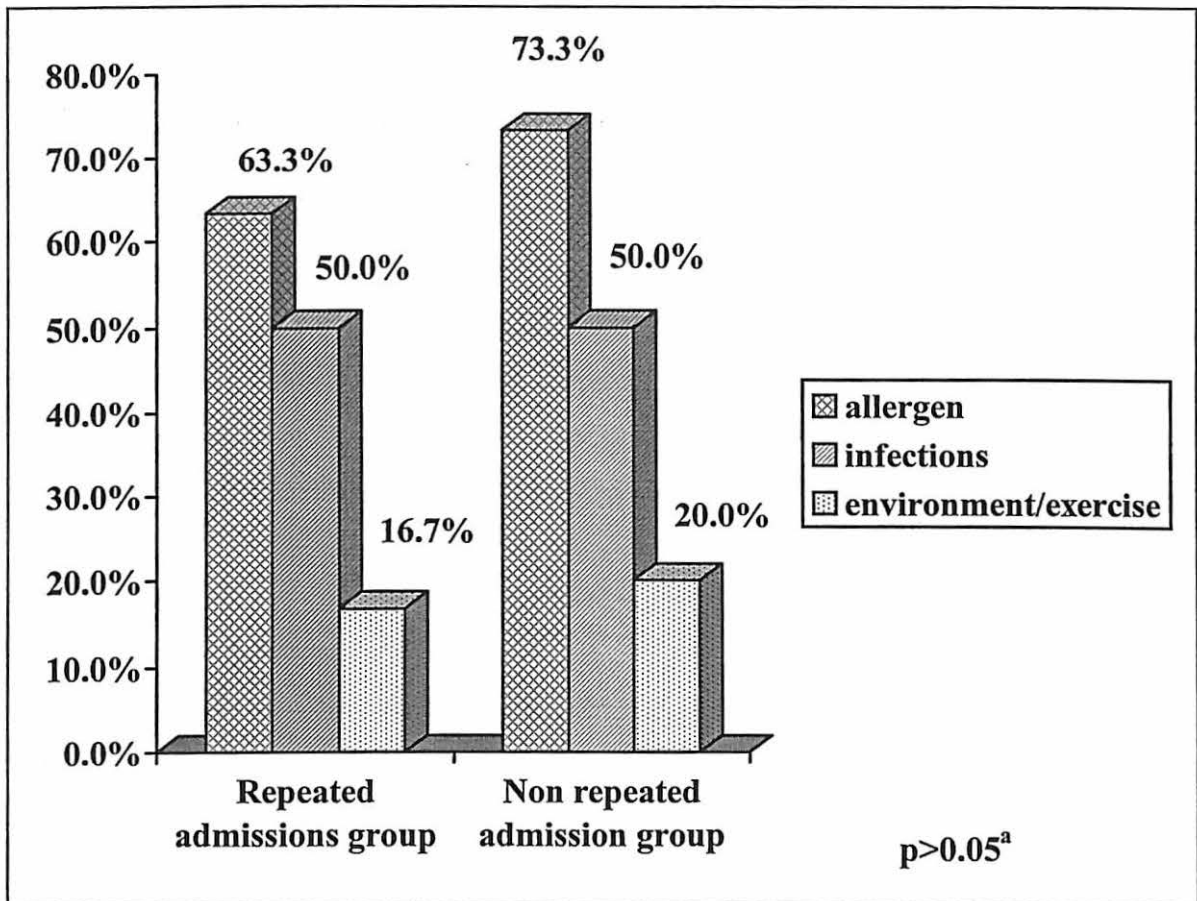
Figure 4.5.1 Score on asthma symptoms in both groups



^a – Chi-square test

There was no significant difference seen in score of asthma symptoms.

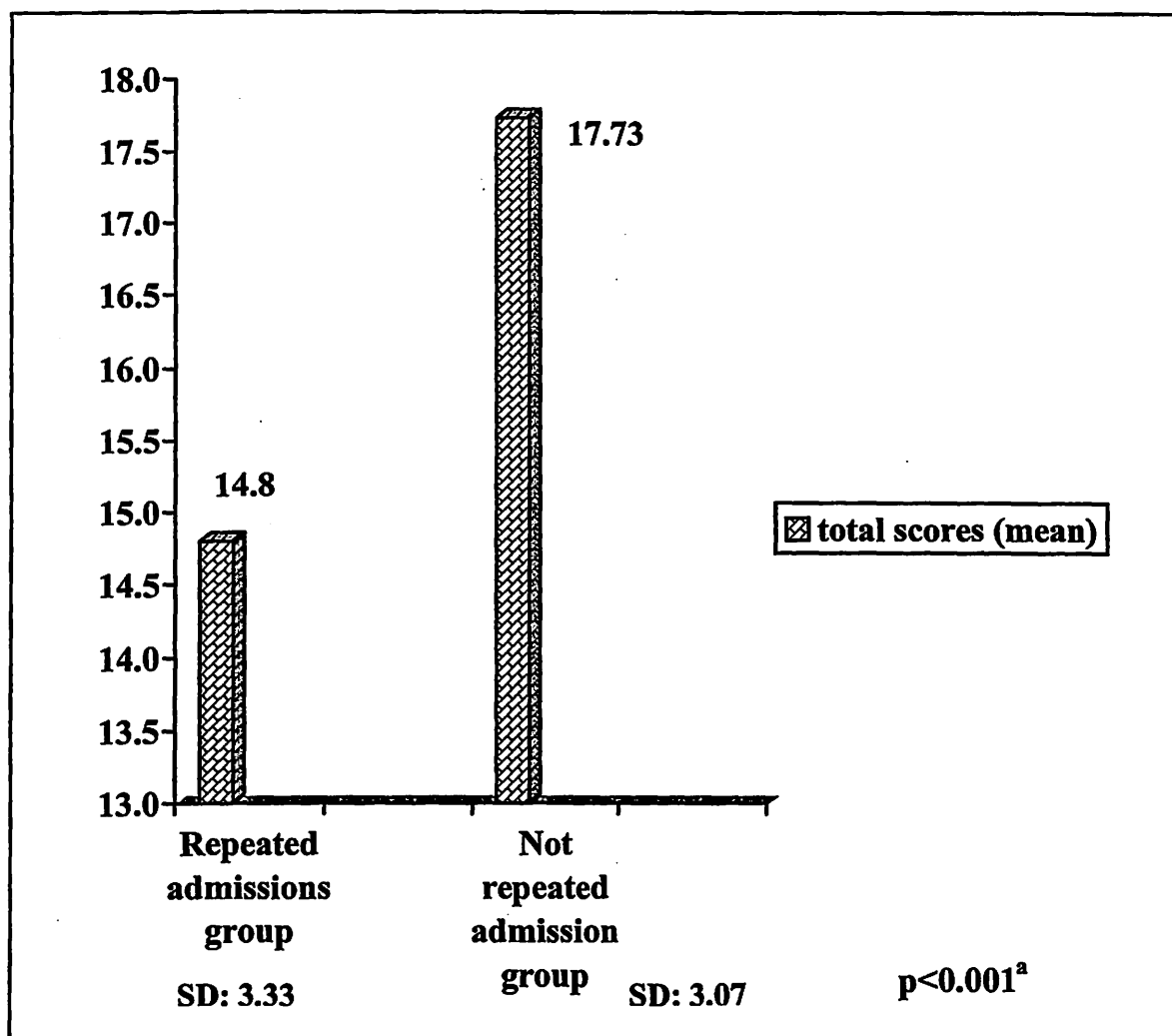
Figure 4.5.2 Score on trigger factors for asthma in both groups.



^a – Chi-square test

Both groups fare poorly to recognize all trigger factors for asthma such as allergens, infections, environment and exercise. There was no significant difference seen between both groups in recognized these trigger factors.

Figure 4.5.3 Total mean scores on asthma knowledge for both groups.



^a – student t-test

SD – standard deviation

There was significant difference seen in total mean scores of asthma knowledge.

DISCUSSIONS

Demographic characteristics

Majority of patients in both groups were female, Malay and married. Their mean age were 28 years old in repeated admissions group and 30 years old in non-repeated admission group. Previous study by Skobeloff *et.al.* (1992), showed that female patients with asthma had higher incidence of asthma admissions than male patients. There was no significant

difference in demographic characteristics between both groups. This study demonstrated similarity in demographic characteristics between both groups.

Socioeconomic characteristics

There was no significant difference in socioeconomic characteristics between both groups. Fifty three point three percent in repeated admissions groups had education background from secondary school or lower. Majority of the patients in both groups had household income of more than RM 1000 per month. Watson *et.al.* (1996), a retrospective study between those admitted in two region of hospital in England showed that asthma admissions were strongly associated with deprivation in the community. But this study showed that there were no relationships between poor socioeconomic status with multiple admissions for asthma.

Clinical characteristics

In repeated admissions group, the mean duration of asthma was 10.07 years with maximum duration of asthma of 21 years. Whereas in non-repeated admission group the mean duration of asthma was 11.63 years with maximum duration of asthma of 35 years. There was significant difference in duration of asthma between both groups, in which those with repeated admissions group had less duration of asthma.

There were 83.3% patients with repeated admissions had previous history of atopy compared to only 50% in non-repeated admission group. This was statistically significant with p-value < 0.001. In New Zealand, Rasmussen *et.al.*(2002), where study among 766 patients who reported wheezing symptoms revealed that those with frequent respiratory symptoms, airway hyper responsiveness, history of atopy and low lung function were at high risk for hospitalization for asthma particularly with respect to multiple admissions.

Smoking was known to be trigger factor for exacerbation of asthma. In this study, majority of subjects in both groups were non-smoker. In repeated admissions group, there were 13.3% smoker and 10% of ex-smoker. This could be due to majority of the subjects in each groups were female.

The maximum periods of absenteeism from work or school in repeated admissions group was 20 days per year with mean periods of 6.11 days whereas only 1.87 days in non-repeated admission group. Rugayah B. (1997) on Report on Second National Morbidity and Health Survey in 1996 concluded that duration of days ill due to asthma was 4.2 days per episode while school/work days lost due to asthma was 2.4 days per episode.

The questions that were most useful for rapid assessment of asthma control were those related to nocturnal symptoms, daytime symptoms and interference with usual activities such as work/school. For assessment of exacerbations, it is useful to inquire regarding unscheduled emergency department visits and admission to hospital for asthma. But in

order to have an objective measure of asthma severity, peak expiratory flow rate (percentage of best value) should be elicited.

This study revealed that all patients in repeated admissions group had nocturnal symptoms with 62.5% of them had severe persistent asthma. They had nocturnal symptoms almost every night. In non-repeated admission group, only 53.3% of them had nocturnal symptoms with majority of them with symptoms of less than 2 times per month. The Second National Morbidity and Health Survey (1996) concluded that majority of patients (87%) in the community study had mild asthma with episodes in the past year at least 4 – 8 weeks apart, 9.9% had moderate asthma with episodes less than 4 weeks apart and 2.7% had severe asthma with weekly episodes or daily symptoms. The maximum admission for exacerbation of asthma for patients with repeated admissions in the past one-year were six times with mean admission of 2.63 times.

Overall in this study the asthma control in both group were still not achieved the goal of asthma management for symptom control. According to GINA guidelines, symptom control is defined as the absence or minimization of chronic symptoms; reduction of exacerbations; avoidance of asthma – related visits to emergency health care facilities; minimal or no requirement for as-needed (quick relief) medication; no asthma – related limitation of normal physical activity; near-normal lung function and minimal or no adverse effects from asthma medications. Malaysia Thoracic Society guidelines (revised in 2002) states the aims of management as follows: to abolish day and night symptoms of asthma, restore normal or best possible long term airway function, prevent most acute attacks and prevent mortality.

In use of metered dose inhaler, all patients with asthma in repeated admissions group used both metered dose inhaler bronchodilator and corticosteroids. While in non-repeated admission group, 76.7% of patients using both types of metered dose inhaler. Thirty-six point seven percent in repeated admissions group used high dose corticosteroids (>800mcg/days) and none of them in non-repeated admission group. Even though majority of patients (62.5%) with asthma in repeated admissions group had severe persistent asthma, there were still lacked uses of high dose inhaler corticosteroids.

The Second National Morbidity and Health Survey (1996) also concluded that majority of mild (65.3%) and moderate (52.1%) asthmatics were on non-inhaled treatment. Among those with severe asthma, only 24.5% were on an inhaled beta2 - agonist and 19.4% were on both inhaled beta2 – agonist and inhaled steroid. Only 36.1% of adult patients in that survey ever had their PEFr measured.

In general, there were many clinical characteristics showed significant differences in between both groups. But a larger sample sizes are needs to correlate these characteristics as the risk of repeated admissions for asthma.

Peak flow meter

There was no significant difference between both groups in peak flow meter measurement. Majority of the patient in repeated admissions group had mild peak expiratory flow (PEF) measurement and 6.7% of them have severe peak expiratory flow (PEF) measurement. In non-repeated admission group, majority of the patients had either in mild or moderate peak expiratory flow (PEF) measurement and there was no patient with severe peak expiratory flow (PEF) measurement. In this study, both groups have better PEF most probably due to the assessment were done when they were stable and the other reasons probably because their asthma symptoms had settled after been discharged from hospital.

Inhaler techniques

Pressurised metered dose inhaler deposits only a small fraction of the dose within the lungs. Most studies estimate around 10% lung deposition. This fraction may be further reduced if the inhaler technique was poor resulted in lower bronchodilatation. This study showed that only 9 (15%) patients from both groups managed to perform all inhaler steps correctly. Patients with repeated admissions had less satisfactory score of inhaler techniques than those with non - repeated admission group. There were 73.3% satisfactory score in repeated admissions group compared to 93.3% in non-repeated admission group. Steps two, five and six were the essential steps and there was no mistake in steps 2 (hold inhaler upright position), 93.3% correct in step 5 (place tightly around mouthpiece) and 83.3% correct in step 6 (coordination). Otherwise there was no significant difference between both groups in all of essential steps. Zainudin *et. al.*(1990) on study among 93 patients with asthma attended respiratory out patient clinic found that 62.4% of the patients used the inhalers incorrectly. Forty three percent made more than one errors. The commonest error observed was the failure to actuate and inhale the aerosol together in 41.9%. There was no difference in the occurrence of incorrect performance between different sexes, age groups, duration of inhaler used and previous supervision or no supervision by the doctors.

There were significant differences between both groups on the breath out slowly (step 3) and using single inhalation in each inhalation (step 9). The highest mistake in both groups was not tilt head slightly back while performing the inhaler maneuvers (repeated admissions versus non-repeated admission; 83.3% vs. 66.7%).

Overall, the techniques of metered dose inhaler in both groups were still inadequate with only 15% out of 60 patients had all steps done correctly. Both groups of patients were on asthma clinic follow-up and majority of them had previously been supervised on the use of the inhaler by their doctors. This may imply inadequate supervision or possibly wrong supervision. Limited time in each consultation, junior doctors run in each clinic session and too many patients in asthma clinic could contribute to lack of supervision on patients' inhaler technique.

Knowledge on asthma