RISK FACTORS FOR AND ADEQUACY OF SYMPTOM CONTROL AMONG CHILDREN WITH ACUTE ASTHMA PRESENTING TO THE EMERGENCY DEPARTMENT HOSPITAL USM

by

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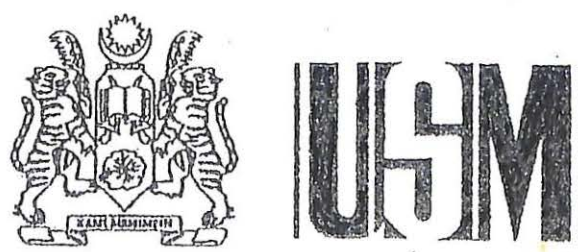

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ABSTRAK.

Objektif : Menentukan tahap kawalan asma di kalangan kanak-kanak yang datang mendapatkan rawatan kecemasan di Jabatan Kecemasan Hospital USM(HUSM), mengenalpasti faktor-faktor yang menyumbang kepada kekerapan mendapatkan rawatan kecemasan di Jabatan Kecemasan kerana serangan asma dan faktor-faktor yang menyumbang kepada tahap kawalan asma yang tidak memuaskan.

Metodologi : Ini adalah satu kajian yang melibatkan 260 kanak-kanak berumur 5 hinnga 12 tahun yang datang ke Jabatan Kecemasan HUSM pada September 2003 hingga Mei 2005 kerana serangan asma dan memerlukan ubat β2 agonist secara nebuliser. Penjaga yang bersetuju untuk menyertai kajian ini akan ditemuramah sama ada di Jabatan Kecemasan, wad kanak-kanak(6S) atau klinik kanak-kanak HUSM bergantung kepada kesesuaian masa penyiasat. Semua maklumat diperolehi menggunakan borang soal selidik (Appendiks 1)yang standard berkenaan data demografi, maklumat mengenai penyakit asma, ubat yang digunakan untuk penyakit asma dan factor-faktor risiko yang menyumbang kepada kekerapan mendapatkan rawatan kecemasan di Jabatan Kecemasan HUSM dan yang menyumbang kepada tahap kawalan asma yang tidak memuaskan.

Keputusan : Lebih kurang satu pertiga (27.2%, 71/260) daripada jumlah kanak-kanak yang terlibat mengalami simptom asma pada waktu siang lebih daripada sekali seminggu dalam tempoh sebulan yang lalu, (30.4%,79/260) mengalami batuk-batuk di malam hari dan 22.7% (59/260) mengalami pernafasan berbunyi di malam hari lebih daripada 2 kali sebulan dalam tempoh sebulan yang lalu. Penggunaan ubat sedut β2 agonist sekurang-kurangnya sekali seminggu dilaporkan oleh 34.9% (66/189) daripada kanak-kanak. Secara keseluruhannya, 15.4% (40/260) daripada jumlah kanak-kanak terlibat perlu dimasukkan ke wad kerana asma dalam tempoh setahun yang lalu di mana 2.5%(1/40) daripadanya memerlukan lebih dari sekali kemasukan ke wad. Rawatan kecemasan di Jabatan Kecemasan dilaporkan oleh 26.2% (68/260) kanak-kanak dalam tempoh setahun yang lalu di mana 73.9% (192/260) daripada jumlah kanak-kanak terlibat memerlukan lebih daripada sekali rawatan kecemasan dalam tempoh setahun yang lalu. Separuh (50.9%, 114/224) daripada kanak-kanak tidak dapat hadir ke sekolah sekurang-kurangnya sehari kerana asma dalam tempoh setahun yang lalu. Lebih kurang satu pertiga daripada kanak-kanak dilaporkan berada dalam kawalan asma yang baik tapi sebenarnya berada pada tahap kawalan asma yang tidak memuaskan berdasarkan Protokol GINA. Penggunaan ubat sedut β2 agonist yang kerap (OR=16.76; CI 95%6.36-42.83), sejarah keluarga eczema (OR=2.67;CI95%1.28-5.61), sejarah keluarga asma (OR=1.94; CI 95% 0.98-3.84) dan tidak mengambil ubat seperti disarankan oleh doctor (OR=2.56; CI 95% 1.37-4.77) adalah faktor-faktor risiko menyumbang kepada kekerapan mendapatkan rawatan kecemasan di Jabatan Kecemasan. Sejarah keluarga asma (OR=2.57; CI 95% 1.34-4.94), sejarah keluarga alergi rhinitis (OR= 2.05; CI 95% 1.03-4.08) dan kanak-

kanak mengalami resdung (OR=2.78; CI 95% 1.32-5.82) adalah merupakan faktor-faktor risiko menyumbang kepada tahap kawalan asma yang tidak memuaskan.

Kesimpulan : Tahap kawalan asma di kalangan kanak-kanak di sini masih lagi rendah. Ramai kanak-kanak masih terganggu dengan symptom asma sama ada pada waktu siang atau pada waktu malam. Persepsi ibubapa mengenai tahap kawalan asma anak-anak mereka adalah bercanggah dengan persepsi yang digariskan di dalam Protokol GINA. Beberapa factor risiko menyumbang kepada kekerapan mendapatkan rawatan kecemasan di Jabatan Kecemasan dikenalpasti antaranya gagal mengambil ubat seperti disarankan, kekerapan menggunakan ubat sedut β2 agonist, riwayat keluarga asma dan eczema. Kanak-kanak yang mengalami resdung merupakan salah satu faktor menyumbang kepada tahap kawalan asma yang tidak memuaskan, di samping riwayat keluarga asma dan resdung.

ABSTRACT

Objective : To determine the adequacy of asthma control among children with asthma presenting to Emergency Department Hospital USM and to identify the risk factors for frequent visits to Emergency Department for acute asthma and the risk factors for poorly controlled asthma.

Method : This is a cross sectional study, of 260 children between 5 to 12 years old who presented to the Emergency Department (ED) for acute asthma between September 2003 until May 2005 who requiring nebulised β2 agonist and were enrolled in this study. Parents who consented for the children were interviewed in the ED, pediatric clinic or pediatric ward depending on the availability of the investigator. All information including the demographic data, asthma history, medication history and risk factors for frequent presentation at the Emergency Department and for poorly controlled asthma were listed using a standard Proforma and entered into a computer database.

Result : Almost one third (27.2%, 71/260) of the children reported daytime asthma symptoms more than one per week in the previous 4 weeks. Thirty percent (30.4%, 79/260) and 22.7% (59/260) of the children reported nocturnal cough and nocturnal wheeze more than twice per month during the previous one month, respectively. Inhaled β2 agonist was used at least once per week in 34.9% (66/189) of the children during the last one month. Overall, 15.4% (40/260) of the children required hospital admission in the previous one year and 2.5% (1/40) of them had more than one admission. Single emergency department visit was reported in 26.2% (68/260) of

children and 73.9% (192/260) required at least one revisit to ED for the last one year. About half (50.9%, 114/224)) of the children had school absenteeism at least one day in the previous one year. About one third of the children who reported having well controlled asthma were actually having persistent asthma according to the GINA guideline classification. The risk factors for frequent visit to ED were frequent use of β2 agonist bronchodilator (OR=16.76; CI 95% 6.56-42.83), family history of eczema (OR=2.67; CI 95% 1.28-5.61), family history of asthma (OR=1.94; CI 95% 0.98-3.84) and poor compliance to treatment (OR=2.56; CI 95% 1.37-4.77). The risk factors for poorly controlled asthma were family history of asthma (OR=2.57; CI 95% 1.34-4.94), family history of allergic rhinitis (OR=2.05; CI 95% 1.03-4.08) and presence of allergic rhinitis (OR=2.78; CI 95% 1.32-5.82).

Conclusion : The children who present with asthma symptoms to the ED at HUSM are overall not well controlled. Many of them still are disturbed by day or nocturnal symptoms. The perception of asthma control differs between the parents and GINA guideline. Several factors for frequent ED visits were identified such as poor compliance to treatment, frequent use of β2 agonist bronchodilator, family history of asthma and eczema. Presence of allergic rhinitis is also a risk factor for poorly controlled asthma along with family history of asthma and allergic rhinitis.

1.0 INTRODUCTION

Asthma is the most prevalent chronic childhood disease worldwide. It is estimated that about 300 million people of all ages and ethnic groups suffer from asthma. (Masoli et al., 2004) The patient may suffer a mild exacerbation or unexpected exacerbation of which may become a threatening live event. Asthma is also a known disease that can affect the quality of life of the patients and their families.

Since the 1980s there has been a worldwide increase in the prevalence of asthma in both children and adults. This prevalence has led to significant increases in morbidity and mortality due to the disease (Weis et al., 1993; CDC, 1998). For example, in the United States, asthma is the main reason for the hospitalization of children and for school absenteeism. Furthermore, the overall death rate from asthma has increased by 40% from 1982-1992. Additionally, the annual total cost of treating asthma in the United States is more than $6 billion (Weiss et al., 1992)

The reason for the increase in the prevalence of asthma in children is poorly understood. The increased prevalence of this disease was believed to be associated with increase in atopic sensitization and other atopic disorders such as eczema and allergic rhinitis. The rate of asthma also increased as the community adopted western life styles and became more urbanized. This may suggest strong environmental determinants in its causation although there are, too, undoubted and important genetic influences on both its incidence and presentation.

Furthermore, published epidemiologic data from Europe, the United States, and Australia demonstrated high prevalence of symptoms among current patients with asthma, reflecting suboptimal management and generally low adherence to guidelines (Burney, 2002). Both under prescribing by doctors and poor compliance with prescribed medications by patients have been implicated in suboptimal asthma management.

1.1 DEFINITION OF ASTHMA

It is not an easy task to give a precise definition of asthma. Experts groups and various individuals have proposed definitions of asthma but most of these definitions though helpful clinically, are of limited use in epidemiological studies.

Hippocrates defined asthma as "the condition which causes an excessive narrowing of the bronchi after a reaction with a provocative stimulus which usually does not produce any effect".

(Godfrey, 1985) defined asthma as "a disease characterized by wide variations in intra pulmonary airways resistance over short periods of time and manifest by recurrent attacks of cough or wheeze separated by symptom free intervals. The airflow resistance and obstruction and clinical symptoms are largely or completely reversed by treatment with bronchodilator drugs or steroids.

The working definition of asthma set forth in the Guidelines for the Diagnosis and Management of asthma prepared for the National Heart, Lung and Blood Institute's National

Asthma Education and Prevention Programme (NAEPP) indicates that asthma is a chronic inflammatory disorder of the airways characterized by recurrent episodes of wheezing, breathlessness, chest tightness and coughing ((NAEPP), 1997) .Furthermore these episodes are usually associated with widespread but variable airflow obstruction.

Although this definition of asthma is technically correct, it is not helpful in making diagnosis in young children. Chronic inflammation can be present in other lung diseases and can cause the same pattern of recurrent chest symptoms. Because there is no specific test for asthma, other diseases must be ruled out before a diagnosis of asthma can be made (Strunk, 2002)

Makino (1996) stated that asthma is characterized clinically with repeated episodes of wheezing and dyspnea, associated with at least a partially reversible airway narrowing, physiological increased airway responsiveness, a pathologically inflammation of the airway with the infiltration of eosinophils, T cells and mast cells and immunologically in around two third of the patients, there is increased production of Ig E antibodies to environmental allergens.

(Kemp & Kemp, 2001) also define asthma as a chronic inflammatory disorder that produces airway hyper-responsiveness, airflow limitation and persistent respiratory symptoms such as wheezing, coughing, chest tightness and shortness of breath. Acute bronchoconstriction, airway oedema, mucous plug formation and airway remodeling also contribute to airflow limitation.

In short, the important features that define asthma are airway hyper responsiveness and bronchoconstriction. Airway hyper responsiveness refers to an increased tendency of the asthmatic airway to react to a variety of stimuli that would not cause a response in a normal airway. These asthma triggers can cause an asthma attack in an inflamed airway. Bronchoconstriction refers to a narrowing of the airways that causes obstruction of airflow (sometimes termed airflow limitation).

The bronchoconstriction of asthma is partly reversible, either spontaneously or with treatment. When inflamed airways respond to an asthma trigger through bronchoconstriction, the characteristic symptoms of asthma appear namely wheezing, cough, and chest tightness or dyspnea. Wheezing is due to airflow limitation, causing a high-pitched whistling sound, which is usually heard on expiration, but it may also be heard on inspiration. Cough probably results from stimulation of sensory nerves in the airways by inflammatory mediators that are released by various inflammatory cells involved in asthma. Chest tightness or dyspnea is the sensation that patients often feel .associated with the increased work needed to breathe when the airways are constricted.

1.2 DIAGNOSIS OF ASTHMA

A number of studies have suggested that asthma is under diagnosed, particularly in children (Kaur et al., 1998). To make a diagnosis of asthma, a history of recurrent respiratory symptoms must be established, other alternative diagnoses must be ruled out and reversible airflow obstruction must be demonstrated. The problems in making the diagnosis of asthma in children include the frequent remission and exacerbation of symptoms, the inability to perform spirometry in young children and frequent symptoms of cough in the presence of viral infections.

The diagnosis of asthma is based on a good history and physical examination. The diagnosis of asthma should be considered in any child presenting with recurrent episodes of cough, wheeze and/or dyspnoea. The diagnosis of asthma is supported by symptoms of wheeze and/or cough that are episodic, nocturnal or following exercise or allergen exposure. Asthmatic symptoms may be mistaken for recurrent respiratory infections. Chronic cough is usually due to asthma although other causes need to be excluded. Some children may present only with symptoms following exercise. The presence of atopy (eczema, allergic rhinitis and conjunctivitis) in the child or family also supports the diagnosis of asthma. However, the absence of these conditions does not exclude the diagnosis. Physical examination of the respiratory system may reveal normal findings if a patient is not experiencing an asthma exacerbation. During an asthma exacerbation, contraction of the bronchial smooth muscle, edema and increased mucus secretion which narrow or close the small airways, result in the inability to exhale completely and increase the work of breathing in these patients.

Usually investigations are not necessary to confirm asthma. Response to bronchodilator therapy, that is, symptomatic improvement in the younger child or improvement in peak expiratory flow (PEF) or forced expiratory volume in one second (FEV_1) of greater than 15% in the older child is usually diagnostic. Peak flow readings may also show diurnal variability.

In atypical cases, investigations may be necessary to exclude other conditions. These investigations include chest and sinus X-rays, reflux studies, Mantoux test, immune function studies, sweat electrolytes, bronchoscopy and pulmonary function tests. PEF and FEV_1 measurements should be based on standards for local children.

1.3 PREVALENCE OF ASTHMA

Asthma is currently a worldwide problem, with increasing prevalence in both children and adults. Total prevalence is estimated to be 7.2% of the world's population (6% in adults, 10% in children). There can be some variation between the prevalence of asthma in different countries and even within different areas of a country.

Recent international comparisons of asthma prevalence, particularly those from the European Community Respiratory Health Survey (ECRHS) of asthma prevalence in adults, and the International Study of Asthma and Allergies in Childhood (ISAAC), have led to a better understanding of the worldwide distribution of asthma. As been reported, Western Europe showed the highest prevalence rates of asthma in the world, the ISAAC study found that the prevalence of wheezing is particularly high in English-speaking countries and in some Latin American countries, such as Peru and Costa Rica. (The International Study of Asthma and Allergies in Childhood (ISAAC), 1998)

The prevalence of asthma among children and young adults is reportedly increasing, (Burr, 1987; Kaur et al., 1998; Burney et al., 1990) particularly in affluent countries and it is now called a disease of the industrialized 20th century. There is also evidence to suggest that asthma is an emergent disease in urban areas of developing countries like Africa and Asia too.

Previously, asthma was not generally considered to be a fatal illness. However, this statement has changed when there was a rise in the number of deaths worldwide due to asthma in the 1960s. The increasing death rate during the 1980s has been particularly alarming. For example, in United States about 5500 asthmatics died across all age-groups in 1994. Deaths

approximately doubled in each age range from 1980-1995 [CDC, 1998]. Mortality rates were consistently higher in blacks than in Caucasians, regardless of age, from 1980-1994.

1.3.1 Prevalence of asthma in Western countries and 'westernised' countries.

In general, reported asthma rates are higher in affluent, western countries than in developing countries. Few researchers also classified asthma as a disease of developed countries.

The world-wide prevalence of allergic diseases was assessed in 1990s by the large scale International Study of Asthma and Allergy in Childhood (ISAAC) reported in 1998. A total of 463,801 children in 155 collaborating centers in 56 countries were studied. Children self-reported, through one-page questionnaires, symptoms of three atopic disorders. The highest 12-month prevalence of asthma symptoms were reported from centres in UK, Australia, New Zealand, Republic of Ireland then followed by centres in North. Similar patterns were also illustrated by the European Community Respiratory Health Survey (ECRHS) findings in 1996 in which the rates for wheezing in the last 12 months were considered. The median prevalence for ECRHS study was 20.7%, with a range in the Western countries of 8.5%(Pavla) to 32.0% (Dublin). (European Community Respiratory Health Survey(ECRHS), 1996)

As mentioned before, asthma appears to have increased in frequency in more 'westernised' or urbanized countries. For example, in China, the prevalence of asthma and other allergies in children living in Hong Kong were compared to those of children living in mainland China; Beijing and Urumqui. (Zhao et al., 2000). Beijing children reported significantly more asthma

symptoms than those living in Urumqui and Hong Kong children had the highest prevalence of asthma and other allergies symptoms. Urumqui, Beijing and Hong Kong represent communities at different stages of industrialization and the results from these three cities reflect a worldwide trend for an increasing prevalence of allergies as industrialization intensifies.

Another example, (Hsieh & Shen, 1988) noted the prevalence of allergic diseases in school children of 7 and 15 years of age in Taipei, Taiwan and found that prevalence of childhood asthma increased from 1.3% in 1974 to 5.1% in 1985 and 5.8% in 1991.

1.3.2 Prevalence of asthma in Asia-Pacific and Asia region.

In the Asia-Pacific region, asthma prevalence is generally lower than that reported in Western countries, as revealed by the recent findings of the International Study of Asthma and Allergies in Childhood. The 12-month prevalence of wheezing in teenagers in the Asia-Pacific regions is less than half of that reported in Western Europe (8.0% and 16.7%, respectively).

Information gathered from the ISAAC study showed that the prevalence of asthma in Asia ranged from 1.5% in Nepal to 6.2% in Hong Kong and United Arab Emirates. They also noticed that the prevalence of asthma was higher in an old fashioned, congested cities than clean, modern cities in South Asia. Pakistan and Bangladesh were reported to have high prevalence of asthma which were 4.3% and 3.8% respectively (as reported by ISAAC study)

1.3.3 Prevalence of asthma in Malaysia.

There were not many studies done to obtain the epidemiological data for Malaysia. However, asthma is quiet a common disease affecting children in Malaysia.

The prevalence of asthma in Malaysia is estimated to be 4.2% based on findings of the Second National Health and Morbidity Survey conducted by the Ministry of Health, Malaysia in 1996. The prevalence is estimated to be 4.5% in children aged up to 14 years and 4.1% in individual above15 years.

In 1987, Azizi (1990) studied the respiratory symptoms and asthma in 1,621 primary school children aged 7 to 12 years old in Kuala Lumpur. His result showed that the prevalence of persistent wheeze and doctor-diagnosed asthma were 8.0 and 8.7% respectively. He also found that Malays had been diagnosed as having asthma more often than other ethnic groups (Malays 45.7%, Chinese 31%, Indians 23.3%). Asthma was significantly more common among boys than girls.

In our local set up(Kota Bharu) in 1995, a study by (Quah et al., 1997) using written ISAAC questionnaire administered to 7055 school children in 1995 reported a prevalence of 'ever wheeze', 'wheeze in the last 12 months' and 'doctor-diagnosed asthma' of 9.4%, 6.0% and 9.4% respectively

Asthma is a common condition that gives rise to considerable morbidity and mortality. Its prevalence is increasing and a local study found 13.8% of primary school children in Kuala

Lumpur to be asthmatic (Azizi, 1990). It is under-diagnosed and often not managed optimally (Speight et al., 1983).In an ongoing surveillance of death in children due to asthma, 9 deaths have been reported in the past two years; and all of them have been due to inadequate assessment of the severity of the attack and hence under-treatment. There is an over reliance on symptomatic and oral therapy and an under-use of anti-inflammatory therapy leading to inadequate control and, in some cases, death (Sears et al., 1986; Sears MR, (1986) It is also recognized that disparities in management exist due to lack of access to appropriate information, drugs and resources.

1.4 STATUS OF THE ASTHMA CONTROL.

In parallel with an overall increase in the prevalence rates of asthma, there is also some evidence to suggest an increase in the severity of the disease. For example, studies in the UK, Australia and New Zealand have shown an increase in the use of the quick relief-bronchodilator drugs and inhaled steroids between 1975 and 1981.

Because of these current problems guidelines have been produced, for example Australian, Canadian and British documents in 1989 and 1990 for the assessment and management of asthma in adults. Then, paediatric guidelines and American guidelines were published. These guidelines were further modified by the International Consensus Group and more recently the Global Initiative for Asthma (GINA) was published.

The GINA guidelines established diagnostic and management strategies that are now generally accepted worldwide. The Global Initiative guidelines, which were updated in 2002 and 2003, represent a comprehensive plan for managing asthma, with the goal of reducing chronic disability and premature deaths while allowing patients with asthma to lead productive and fulfilling happy lives.

Asthma has a large of impact on the patients' life and their families. Asthma symptoms and exacerbations are associated with significant morbidity. More than 14.5 million workdays and 14 million schooldays are missed because of asthma. About 60% of all asthmatics in the United States visit their physician at least once a year regarding their condition. Annually

there are nearly 2 million emergency department (ED) events and 500,000 hospitalizations for this disease worldwide.

Asthma also affects an individual's quality of life to the extent that it may restrict the normal daily activities. A survey conducted by the American Lung Association (ALA) reported that asthma significantly disrupts the patient's life. They found that 84% of adult patients and 87% of parents reported that asthma has had a negative impact on their or their child's life; 23% of adult patients and 36% of parents of asthmatics missed work during the past year because of their asthma or their child's asthma.

Because of the disease, the children with asthma try to adapt their lifestyle to accommodate their asthma. As a consequence they do not lead a "normal" life. As reported in this survey, 61% of all asthma patients and 73% of children reported that they limit sports participation or exercise. They also have difficulty sleeping through the night, and make unplanned trips to the physician or ED.

Similar problems are faced by the families with members who have asthma. They try to adapt their life to accommodate asthma and lead to restriction of their "normal" family life. As reported by ALA, 70% of parents and patients agreed that the whole family is affected by one member's asthma, and nearly 50% said that asthma limits the range of activities the family can do together.

Although there is no cure for asthma, appropriate management most often leads to control of the disease and to a better quality of life. However, the appropriate asthma treatment is not an easy task especially when dealing with the paediatric age group. It is really a challenge to

achieve long term control in pediatric asthma and in order to achieve good control, it is essential to establish the treatment goals acceptable to both parent and care giver.

As outlined by the GINA guidelines, the goals of asthma management are to:

1. Achieve and maintain control of symptoms (defined as the absence or minimization of chronic symptoms)
2. Prevent asthma exacerbations/ only minimal exacerbation (avoidance of asthma related visits to emergency healthcare facilities; minimal or no requirement for quick-relief, short-acting â2-agonist medication)
3. Maintain pulmonary function as close to normal level as possible as measured by peak expiratory flow(PEF) and PEF circadian variation below 20%.
4. Maintain normal activity levels including exercise
5. Avoid adverse effects from asthma medications
6. Prevent development of irreversible airflow limitation
7. Prevent asthma mortality.

According to the GINA guidelines, patients with asthma can be classified depending on their severity of the symptoms. The four groups of asthma classification are mild intermittent, mild persistent, moderate persistent and severe persistent. Although airway inflammation increases with asthma severity, patients at any level of severity can have mild, moderate, or severe exacerbations. Some patients with intermittent asthma can experience a severe and life-threatening exacerbation. Because symptoms of asthma vary and are unpredictable, physicians may have difficulty in assessing the severity of airways obstruction. This could lead to under

classification of the severity of a patient's asthma with subsequent poor asthma control. It has been estimated that about 2.5 million people with asthma in the United States are under classified and under treated. Under classification and under treatment may have contributed to the increased morbidity and mortality rates for asthma over the past two decades (Bousquet et al., 1996)

Many studies worldwide showed that most of patients with asthma were not well controlled. The time of year and time of day might cause some changes in asthma control. Furthermore, individual perception of asthma control differs and might be modified by activity level or the use of reliever medication. The changing pattern of asthma disease control reflects both the exposure to triggers and adherence with controller medications. The clinical expression of the disease is altered by multiple factors either to enhance or diminish control and might contribute to asthma being more commonly a persistent rather than an intermittent disease.

The Asthma Insights and Reality (AIR) surveys were done to assess the actual variations in symptoms severity and control of asthma. These surveys were conducted in US, Europe, Asia Pacific, Japan and Central and Eastern Europe. The results showed that the percentages of children with lost schooldays because of asthma were as follow: 49% in US; 43% in Western Europe; 37% in Asia Pacific; 53% in Japan and 54% in Central and Eastern Europe. (Rabe et al., 2004)

The Canadian National Survey, Asthma in Canada, reported that only 43% of the patients polled in the survey had their asthma under control. A study of Swiss-German children showed that only 18% of pediatric asthma had excellent control, 33% had satisfactory control

(having episodic symptoms) and 49% had unsatisfactory control with disturbed sleep, restricted activities and school absences (Kuehni & Frey, 2002)

(Neffen et al., 2005) reported in their study in Latin America that the asthma symptoms were not well controlled among their patients. They also noted that the patients' perception of asthma control did not match symptom severity, even in patients with severe persistent asthma, 44.7% of whom regarded their disease as being well or completely controlled. Only 2.4% (2.3% adults and 2.6% children) met all criteria for asthma control.

As reported by Children and Asthma in America (2005), more than half (54%) of all children with asthma had a severe asthma attack in the past year. Among them, about one quarter (27%) had a live threatening asthma attack. The survey results underscore the severity of asthma in children in the United States and the significant impact of the disease on children and their families. The survey findings suggest that the United States is still falling far short of the national treatment goals established for asthma by the National Heart, Lung, and Blood Institute .The majority of children with asthma were not well controlled which may cause a variety of consequences, including frequent symptoms leading to missed school, restrictions on activities, emotional distress, hospitalization, and even life threatening asthma attacks.

Apart from the above finding, the survey also showed that, the majority (71%) of parents disagreed about their children's overall health status. Parents, in general, seemed to think that their child's asthma was far better controlled than the children reported. The parents seemed unaware of the symptoms the children reported.

The main aim of this study was to get the baseline data regarding the status of symptom control among our children attending the ED at HUSM here. Apart from that we also wanted to find out the reasons why patients were unable to achieve well symptom control.

1.4 MANAGEMENT OF ASTHMA

Asthma is a chronic illness with significant impact on the individuals, families and also the society. There is no definite cure to asthma but appropriate management should be emphasized so that the children with asthma can adopt a healthy and normal life style as the normal children. The goals for successful management of asthma (as outline by GINA) already mentioned above.

The management of asthma can be approached in many ways, not only depending on the availability of the variables form of asthmatic drugs in the markets. The thorough asthma management including:

a) Educate patients to develop a partnership in asthma management
b) Assess and monitor asthma severity with symptoms and if possible with the measurement of the lung function
c) Avoid exposure to the risk factors
d) Establish individual medication plans for long term management.
e) Establish individual plans for managing exacerbations
f) Provide regular follow up care.

Patient education is a continual process. The educations not only been limited to the patients only but need to include the family, peer and may be the teachers. They must be provided with enough and suitable information. They should know what are the alarm symptoms and sign of asthma, what can trigger the asthma and why the need to avoid those triggering factors and the

important of comply to medication and regular follow up. If they capture enough information of asthma. they can successfully achieve control, adjust medication as needed according to a management plan developed with the health care professional and maintain satisfactory quality of life.

As mentioned earlier, asthma is characterized by bronchial hyperreactivity, airway inflammation and reversible airway obstruction. Inhaled beta adrenergic agonist remains the initial treatment of choice for acute bronchospasm in asthma. However, with the increased in understanding of the importance of inflammation in the disease process, there is also recognition of the role of cholinergic- mediated airway obstruction.

Inhaled beta adrenergic agents are the mainstay of acute asthma therapy (Global Initiative For Asthma, Revision 2002). Inhalation delivers the medication directly to the target organ. Thus the side effects are minimal. The duration of bronchodilator depends on the dose and the initial physiologic state of the smooth muscle. If the baseline smooth muscle tone is increased, the intensity and duration of bronchodilator is decreased. Albuterol is currently the beta adrenergic of choice in the treatment of acute pediatric asthma (Global Initiative For Asthma, Revision 2002).It has high beta2 selectivity and minimal toxicity. It has duration of activity of 4 to 6 hours when delivered by inhalation.

When an asthmatic child in impending respiratory failure despite on aggressive inhalation therapy, IV administration of a beta adrenergic is reasonable to avoid mechanical ventilation. When beta adrenergic are delivered by IV route than by inhalation, the selectivity is

diminished and side effects are increased. (Browne et al., 1997) have published 2 Australian pediatric studies suggesting more rapid improvement and shorter hospitalization in children with acute severe asthma with the use of parenteral beta adrenergic.

Short acting beta agonist inhalation therapy are the most excellent bronchodilators available and the preferred treatment for acute asthma (Evidence A). Long acting beta agonist inhalation therapy such as salmeterol are primarily used as add on therapy in combination with inhaled glucocorticosteroids, either as maintenance treatment or as single dose therapy before vigorous exercise.

Inhalation therapy with anticholinergic agents was less popular in the first half of the 20th century (Gross & Skorodin, 1984). However, advances in the understanding of the role of parasympathetic bronchomotor tone and the development of less toxic anticholinergic agents have renewed interest in inhaled anticholinergic drugs as therapeutic agents in the treatment of asthma. The bronchodilating effect of nebulised ipratropium begins 5 to 15 minutes after administration, plateaus at 45 to 60 minutes and lasts for up to 6 hours (Gross, 1975). Anyway, ipratropium does not replace the role of beta adrenergic agents in the acute treatment of pediatric asthma but repetitive dosing as an adjuvant to beta adrenergic therapy does appear to have a significant role in the treatment of severe acute pediatric asthma.

Corticosteroids have been used in the treatment of asthma for more than 50 years (Carryer et al., 1950). The exact mechanisms of their anti-asthmatic effects are not well clear. A theory suggests that they initiate their effect by modifying protein synthesis at the nuclear level.

Inhaled corticosteroids are the mainstay of chronic asthma management in children. For the child with an acute asthma exacerbation who responds to ED treatment and is able to be discharged to home, a short course of high dose oral steroid should be strongly considered to help prevent clinical relapse. If the child is hospitalized, steroids are indicated to facilitate more rapid improvement of airway obstruction (Global Initiative For Asthma, Revision 2002).

Leukotriene modifiers , the cysteinyl leukotriene 1 receptor antagonists are a new class of anti asthma drugs. It is used as add-on treatment for moderate persistent and severe persistent asthma in children whose asthma is insufficiently controlled by a low dose of inhaled glucocorticoteroids. Moderate improvements in lung function (in children 6 and older) and in asthma control (in children 2 and older) have been demonstrated with leukotriene receptor antagonist monotherapy in patients with severe disease (Knorr et al., 1998) and in patients with moderate disease (Knorr et al., 2001) Their clinical effect of leukotriene modifiers begins a few hours to days after they been administered, so they been considered as a prophylactic medications.

In order to make sure that the medication is delivered effectively to the target organ, the route and the technique of administering the medication should be assessed properly. Medications for asthma can be administered via different ways, including inhaled, oral (ingested) and parenteral (subcutaneous, intramuscular or intravenous). The advantage of delivering drugs directly into the airways via inhalation is that high concentrations can be delivered more effectively to the airways with minimal systemic side effect.

For maximum convenience, an inhaler device should be freely portable with no power requirement and technically simple to operate with minimal maintenance requirements. Cooperation and coordination required to use a device should be minimal. For small children, in whom active cooperation cannot be expected, the inhaler (MDI) with a spacer and face mask is the device of choice for maintenance treatment. From the age of 6 and above, if the child has the good ability to inhale , a dry powder inhaler, breath activated MDI and turbohaler is the device of choice. Nebulisers are not preferred for maintenance treatment. Current nebulisers are expensive, bulky, time consuming to use and need maintenance.

Although pharmacological intervention to treat established asthma is highly effective in controlling symptoms and improving quality of life, every intention should be given to measures to prevent this chronic, lifelong and incurable disease. Asthma exacerbations maybe caused by a variety of risk factors including allergens, pollutants, foods and drugs.

Three levels of prevention have been described as following:

Primary prevention is introduced before exposure to risk factors known to be associated with a disease. The goal is to prevent the onset of disease in susceptible individuals. However, this is not yet possible in asthma. Increasing evidence indicates that allergic sensitization is the most common precursor to the development of asthma.

Secondary prevention is employed after primary sensitization to allergens have occurred but before there is any evidence of disease. The aim is to prevent the establishment of chronic,

persistent disease in people who are susceptible and who have early signs of the disease. Secondary prevention of asthma is likely to focus very specifically on the first year or two of life. Two studies have suggested that pharmacologic intervention with H1 antihistamines may reduce the onset of wheezing in young children who present initially with atopic dermatitis (Iikura et al., 1992).

Observations of occupational allergy suggest that early cessation of exposure to an offending allergen, after there is evidence of sensitization and symptoms, is more likely to lead to a total resolution of symptoms than if the exposure continues.

Tertiary prevention involves avoidance of allergens and nonspecific triggers when asthma is established. The goal is to prevent exacerbations or illness that would otherwise occur with exposure to identified allergens or irritants. It is considered that tertiary prevention should be introduced when the first signs of asthma have occurred. However, increasing evidence would suggest that the histopathology of the disease is fully established by the time asthma symptoms occur (Iikura et al., 1992).

1.5 ACUTE ASTHMA AND EMERGENCY DEPARTMENT

Emergency Department(ED) is a known place for treating acute exacerbation of asthma or sometimes for chronic asthma in any age group. A study done by Cleveland et al in New Orleans showed that more than 50% of pediatric patients use the emergency unit as their primary care physician. . In reality, ED care actually is expensive and some of the paediatric asthma was preventable. For example, in Pittsburgh, Pennsylvania, in 1990, emergency care was estimated to cost over $200 million.

Acute asthma exacerbations that required visits to the Emergency Department(ED) and admission to hospital were usually attributable to the failure of long term management and contributed to asthma severity and poor control (Dales et al., 1995). A study done by (Farber et al., 1998) found that young children visiting the ED had poorly managed and poorly controlled chronic asthma. In certain condition, some of the patients need to go to ED repeatedly for asthma exacerbation. As reported by Friday et al (1997), in their study done in Pittsburgh, Pennsylvania, out of 36% of the visits to ED for asthma, 16% of them came from the patients who made repeat visits.

Eroglu et al (2000) did a study to find out the criteria for patients with repeated visits to ED at the Medical Center of Louisiana (MCLNO) in New Orleans The results showed that about 60% of the patients visited the ED 1 to 4 times, 30% 5 to 9 times, 7% 10 to 14 times and 3% 15 to 19 times in the previous one year. More than half of the patients (63%) just relied on B2-