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ACUTE ASTHMA EXACERBATIONS IN CHILDREN YOUNGER THAN 12 YEARS: EMERGENCY DEPARTMENT MANAGEMENT

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Abstract:
Background: *Asthma is one of the most common pediatric emergencies among children throughout the world, where an estimated 300 million individuals are affected.*
Objectives: *The main objective of the study is to clinically audit and analyse the acute asthma exacerbations in children younger than 12 years regarding management of emergency department.*
Methods: *This clinical audit was done in Indus Hospital Manawan, Lahore during June 2019 to December 2019. We retrospectively revised all the files of children aged 0–12 years who were visited for acute asthma in the Pediatric ED of Hospital. All the patients with a diagnosis of "acute asthma," "wheezing bronchitis," and "bronchospasm" were included.*
Results: *A total of 864 patients were seen in the Emergency Department during the study. Of these, a total of 293 patients were seen for a presentation of acute asthma. As some patients had multiple visits, the 293 records represented 278 unique patients. For assessing age and gender distribution of the patients, only data from the first visit were used. Otherwise, each record was treated independently for the purpose of analyses.*
Conclusion: *It is concluded that acute asthma management still remains an area of medical practice that continues to have long-standing difficulties.*

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BACKGROUND:

Asthma is one of the most common pediatric emergencies among children throughout the world, where an estimated 300 million individuals are affected. The prevalence of asthma in Saudi Arabia is 23% according to Alfrayeh. Most asthma is uncontrolled and Jahdali estimated that up to 64% of patients have uncontrolled asthma. Morbidity related to asthma has also increased in recent years. In addition, hospitalization for asthma has increased[1].

However, mortality due to asthma is decreasing worldwide. Asthma is one of the main causes of health care utilization and the costs related to asthma are increasing. Approximately 50% of pediatric asthma cases are still uncontrolled in Saudi Arabia, even in tertiary centers. Numerous guidelines are available online and the guidelines of the Saudi Initiative for Asthma (SINA), which were updated in 2016, are very useful for the pediatric age group[2]. The availability of asthma guidelines can improve the outcomes of asthma in children.

Initial treatment (beta-agonist therapy and oral glucocorticoids) of acute asthma exacerbations is sometimes provided in the primary care setting or even at home[3]. However, children with moderate-to-severe exacerbations require close observation for clinical deterioration, frequent treatments, and repeated evaluation. Thus, most children with moderate or severe asthma exacerbations should be managed in an emergency department (ED) setting[4]. The general approach to treatment of an acute asthma exacerbation includes administration of inhaled bronchodilators (eg, albuterol), as well as systemic glucocorticoids in most patients.

Pediatric asthma has different patterns according to the children's age. In the preschoolers (0–5 years old), acute wheeze is often induced by infections of the lower airways, whereas in the school-aged children (6 years and older) it usually signifies underlying asthma and allergy[5]. These differences account for specific seasonal patterns in the number of ED visits for asthma. In the temperate latitudes of the Northern Hemisphere, a peak in exacerbations is described in the month of September: this well-known entity is called the "September asthma epidemics," coincides with the start of the school year, and is likely due to a combination of infectious, allergic, environmental, and climatic triggers[6]. Understanding the seasonal variations of ED visits due to asthma may have important therapeutic implications in terms of a proactive treatment of at-risk subjects[7].

Objectives

The main objective of the study is to clinically audit and analyse the acute asthma exacerbations in children younger than 12 years regarding management of emergency department.

Standards

This audit mainly focus on strategy to improve asthma care is to identify those with a high exacerbation risk and assess whether their treatment and self-management strategies are appropriate.

METHODS:

This clinical audit was done in Indus Hospital Manawan, Lahore during June 2019 to December 2019. We retrospectively revised all the files of children aged 0–12 years who were visited for acute asthma in the Pediatric ED of Hospital. All the patients with a diagnosis of "acute asthma," "wheezing bronchitis," and "bronchospasm" were included. For each patient presenting to the Pediatric ED, a record form is filled in by the nurse and medical staff, including demographic data, anamnestic information, vital signs, physical examination, treatment performed in the ER (if done), clinical reevaluation after treatment, diagnosis, discharge modality, and home therapy prescription when applicable. For children requiring a short-stay observation, prescribed examinations, therapy, and subsequent reevaluations are also noted on the same form.

The etiology of asthma exacerbations was considered as infectious if the episodes were concomitant to a respiratory tract illness documented by the clinical examination and/or laboratory or radiologic investigations; as allergic when there had been a clear exposition to a likely triggering allergen in a susceptible individual (known atopic or with a family history of allergic disease or with previous asthma episodes) and with no concomitant respiratory infection; as exercise-induced when the exacerbation had been precipitated by physical activity.

ED management objectives for acute asthma exacerbations include:

- An immediate and objective assessment of their severity.
- Prompt and effective medical intervention to decrease respiratory distress and improve oxygenation.
- Appropriate disposition of the patient after emergency management.
- Arranging proper follow-up.

Asthma Severity Assessment

Persistent asthma is diagnosed if the child has any of the following:

- Symptoms more than twice per week during the day.
- Symptoms twice per month at night.
- Any exercise limitation.
- FEV1 less than 80% predicted (for children over 5 years).
- Two or more steroid bursts for asthma in 12 months

Data were coded and entered in Microsoft Excel 2007 and statistical analyses conducted using Stata version 10. Frequency tables and histograms were generated to display univariate distributions. Chi-squared (or Fisher's exact where appropriate) tests of associations were used to examine bivariate analyses for categorical variables and Student's *t* -tests used for analyses involving age and PEFR.

RESULTS:

A total of 864 patients were seen in the Emergency Department during the study. Of these, a total of 293 patients were seen for a presentation of acute asthma. As some patients had multiple visits, the 293 records represented 278 unique patients. For assessing age and gender distribution of the patients, only data from the first visit were used. Otherwise, each record was treated independently for the purpose of analyses.

There were 42.7% male and 57.3% female patients. Among the 278 unique patients, ages ranged from two to 11 years with mean (SD) of 3.53 years. Furthermore, the coefficient of skewness was 0.515 and coefficient of kurtosis as 2.510 with respective *p*-values being 0.001 and 0.049 for the Skewness-Kurtosis tests for normality, suggesting that the distribution of age deviated from normality.

Table 01: **Frequency distribution of patient visits the Emergency Department for an acute asthma attack**

Last visit (months)	Frequency (n)	Percentage
Less than 1 month	41	14.0
1–3 months	10	3.4
3–12 months	15	5.1
> 12 months/never	65	22.2
No data available	162	55.3

Of the 293 patients, 148 (50.5%) had a PEFR recorded after a set of nebulizations. A total of 53/293 (18.1%) patients had both pre and post PEFR done. Out of the 293 patients, 13 (4.4%) and four (1.4%) patients received magnesium sulphate ($MgSO_4$) and intravenous aminophylline, respectively during the four-month study period. The majority of the patients treated for acute asthmatic attacks, 86.7% (254/293), were discharged home after initial treatment in the emergency department.

CONCLUSION:

It is concluded that acute asthma management still remains an area of medical practice that continues to have long-standing difficulties. Our clinical audit demonstrated that despite availability of evidence-based guidelines in management, the receiving emergency room teams continue to fail to assess the severity of the attack and manage the patient appropriately. Educational campaigns and regular re-auditing may help to improve this situation.

Recommendations

All patients who have been prescribed more than three SABA inhalers in the last three months should be contacted and offered a comprehensive asthma review to:

1. Enhance their understanding of asthma
2. Develop their self-management skills
3. Determine if their current treatment is appropriate

The Asthma Control Test is recommended to assess the patient's level of symptom control. The asthma review should include an assessment for potential treatable traits, i.e. overlapping disorders, co-morbidities, environmental and behavioural factors that may be modified to improve asthma care.

Action plan

Despite the several limitations, our paper points out some important differences in asthma exacerbations between preschool- and school-aged children concerning etiology and seasonal trends, specific for our climate.

Re-audit

In addition to regular reviews of progress with the practice team, a second audit cycle should be completed in order to quantify progress on closing the gaps in performance. It is recommended that the second cycle be completed within 12 months of completing the first cycle.

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