An Emergency Department Management on Acute Asthma Exacerbations in Children Younger than 12 Years

Abstract

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 Bahawal Victoria Hospital, Bahawalpur during January 2020 till June 2020. We retrospectively revised all the files of children aged 0–12 years who were visited for acute asthma in the Paediatric 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.

Key word: Acute Asthma, Children, Emergency, pediatric, allergy

Introduction

Asthma is one of the most common pediatric emergencies among children throughout the world, where an estimated 300 million individuals are affected. The pervasiveness of asthma in Saudi Arabia is 23% as per Alfrayeh. Most asthma is uncontrolled and Jahdali assessed

that up to 64% of patients have uncontrolled asthma. Dreariness related to asthma has likewise expanded lately. Moreover, hospitalization for asthma has increased[1].

Nonetheless, mortality because of asthma is diminishing around the world. Asthma is one of the fundamental driver of health care usage and the costs related to asthma are expanding. Around half of pediatric asthma cases are as yet uncontrolled in Saudi Arabia, even in tertiary places. Various rules are accessible on the web and the rules of the Saudi Initiative for Asthma (SINA), which were refreshed in 2016, are extremely helpful for the pediatric age group[2]. The accessibility of asthma rules can work on the results of asthma in kids.

Beginning treatment (beta-agonist treatment and oral glucocorticoids) of intense asthma intensifications is some of the time gave in the essential care setting or even at home[3]. Nonetheless, kids with moderate-to-serious intensifications require close perception for clinical crumbling, continuous therapies, and rehashed assessment. Hence, most youngsters with moderate or serious asthma intensifications ought to be overseen in a crisis division (ED) setting[4]. The overall way to deal with treatment of an intense asthma compounding incorporates organization of breathed in bronchodilators (eg, albuterol), just as foundational glucocorticoids in many patients.

Pediatric asthma has various examples as indicated by the kids' age. In the preschoolers (0–5 years of age), intense wheeze is frequently incited by diseases of the lower aviation routes, while in the school-matured kids (6 years and more established) it as a rule means fundamental asthma and allergy[5]. These distinctions represent explicit occasional examples in the quantity of ED visits for asthma. In the calm scopes of the Northern Hemisphere, a top in intensifications is portrayed in the period of September: this notable substance is known as the "September asthma plagues," corresponds with the beginning of the school year, and is

possible because of a mix of irresistible, hypersensitive, ecological, and climatic triggers[6]. Understanding the occasional varieties of ED visits because of asthma might have significant restorative ramifications as far as a proactive treatment of in danger 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 Bahawal Victoria Hospital, Bahawalpur during January 2020 till June 2020. 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 revaluation after treatment, diagnosis, discharge modality, and home therapy prescription when applicable. For children requiring a short-stay observation, prescribed examinations, therapy, and subsequent re-evaluations 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 & Discussion

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.

Implication

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.

Ethical Approval:
As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

References

1. Kahwa E, Younger N, Waldron N, Wint Y, Knight-Madden J, Bailey K, et al. The prevalence of asthma and allergies among the elderly in Jamaica; Paper presented at "Advancements in Medicine 2009: A US and Caribbean Perspective; Transforming Research into Policy and Practice" Conference; Feb 23-Mar 1 2009; Ocho Rios, Jamaica.
2. Ortiz-Alvarez, O., Mikrogianakis, A., & Canadian Paediatric Society, Acute Care Committee (2012). Managing the paediatric patient with an acute asthma exacerbation. *Paediatrics & child health*, *17*(5), 251–262. https://doi.org/10.1093/pch/17.5.251
3. Indinnimeo, L., Chiappini, E., Miraglia del Giudice, M. *et al.* Guideline on *management* of the acute asthma attack in children by Italian Society of Pediatrics. *Ital J Pediatr* **44,** 46 (2018). https://doi.org/10.1186/s13052-018-0481-1.
4. Linares PT, Campos A, Torres M, Reyes J. Medical audit on asthma in an emergency department. Allergol Immunopathol. 2006;34:248–251.
5. Lee, MO, Sivasankar, S, Pokrajac, N, Smith, C, Lumba-Brown, A. Emergency department treatment of asthma in children: A review. *JACEP Open*. 2020; 1: 1552–1561. https://doi.org/10.1002/emp2.12224

6. Bognár, L., Borgulya, G., Benke, P. *et al.* Analysis of CSF shunting procedure requirement in children with posterior fossa tumors. *Childs Nerv Syst* **19,** 332–336 (2003). https://doi.org/10.1007/s00381-003-0745-x

7. Fuchs O, Bahmer T, Rabe KF, et al. Asthma transition from childhood into adulthood. Lancet Respir Med 2017; **5**: 224–234. doi:10.1016/S2213-2600(16)30187-4