

Audit of Management of Acute Asthma Exacerbation in the Emergency Department

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ABSTRACT

Background: Acute asthma exacerbation is a frequent cause of emergency department visits and requires prompt, guideline-based management to reduce morbidity and prevent complications.

Objective: To assess the management of acute asthma exacerbations in the emergency department and evaluate adherence to established guideline-based standards.

Methods: This retrospective clinical audit was conducted at Mian Muhammad Trust Hospital Faisalabad from June 2024 to June 2025, and included 350 patients presenting with acute asthma exacerbation. Data were collected from medical records and emergency department charts. Management practices were evaluated against standard guidelines, including assessment of severity, administration of short-acting beta-agonists, timely use of systemic corticosteroids, oxygen therapy, and use of adjunct treatments.

Results: The mean age of patients was 36.8 ± 14.5 years, with 52.3% females. Moderate exacerbations were most common (48.6%), followed by mild (28.9%) and severe cases (22.5%). Oxygen saturation was documented in 92.0% of patients, while peak expiratory flow rate was recorded in only 41.7%. Short-acting beta-agonists were administered in 96.3% of cases. Systemic corticosteroids were given within the first hour in 68.9% of patients. Among moderate to severe cases, ipratropium bromide was used in 61.5%, while magnesium sulfate was administered in 18.2% of severe cases.

Conclusion: While adherence to bronchodilator therapy and oxygen assessment was high, gaps were identified in severity assessment, timely corticosteroid administration, and use of adjunct therapies....

Keywords: Acute asthma exacerbation, emergency department, clinical audit, guideline adherence, corticosteroids, bronchodilators..

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INTRODUCTION

Acute asthma exacerbation is frequent and potentially fatal manifestation in the emergency department (ED), which needs to be recognized immediately and managed in a timely manner to avoid morbidity and mortality [1]. Asthma is an inflammatory airway disease that is chronic, which is variable airflow obstruction and bronchial hyperresponsiveness, and acute exacerbation of symptoms including dyspnea, wheezing, chest tightness, and cough [2]. They tend to be precipitated by respiratory infections, exposure to allergens, or environmental pollutants, or inadequate adherence to maintenance therapy, which increases healthcare use and emergency room visits [3]. The

incidence of acute asthma exacerbations is still high globally, especially in the low- and middle-income nations where preventive care access and compliance with management as recommended by the guidelines might be restricted [4]. The emergency departments often become the first point of contact with patients having severe symptoms, and it is necessary to implement standardized and evidence-based treatment [5]. Proper and early management can go a long way in minimizing respiratory failure, hospitalization, and mortality.

The main objectives of the acute asthma exacerbation management are the prompt airflow blockage reversal, the restoration of hypoxemia, and the avoidance of relapse [6].

The first treatment involves the assessment of the severity of the exacerbation using clinical examination, such as respiratory rate, the use of accessory muscles, oxygen saturation, and peak expiratory flow rate where possible [7]. Depending on the severity, treatment is started immediately without delay on investigations. Salbutamol is the star of the acute management and administered either by nebulization or metered-dose inhalers using spacers. Early administration of systemic corticosteroids is used to minimize airway inflammation and forestall the course of the exacerbation [8]. An oxygen mask is used to keep the levels of oxygen at a sufficient level, usually over 94%. Additional treatment that might be needed in instances of severe or life threatening exacerbation include anticholinergics (ipratropium bromide), intravenous magnesium sulfate, or even mechanical ventilation [9]. Besides pharmacological treatment, ongoing observation is an important aspect of emergency treatment of acute asthma. Clinical improvement or deterioration should be frequently re-evaluated in patients based on the respiratory rate, heart rate, oxygen saturation, and peak expiratory flow parameters [10]. Nonresponse to initial therapy in the first hour is a significant predictor of serious disease and can lead to a need to escalate care, such as intensive monitoring or admission to a high-dependency or intensive care unit. It is necessary to identify patients who are at risk of deterioration early to avoid adverse outcomes [11]. The other dimension in ED management is the observation of the high-risk characteristics of severe exacerbation or lethal asthma [12]. These are history of prior intensive care hospitalizations, frequent hospitalizations, excess use of short-acting bronchodilators, lack of compliance with inhaled corticosteroids, comorbidities, including obesity, gastroesophageal reflux disease, or psychological illnesses. The identification of these factors will enable clinicians to customize management plans and focus on close monitoring [13].

Objective

To assess the management of acute asthma exacerbations in the emergency department and evaluate adherence to established guideline-based standards.

METHODOLOGY

This was a clinical audit conducted at Mian Muhammad Trust Hospital Faisalabad from June 2024 to June 2025. A total of 350 patients presenting with acute asthma exacerbation were included in the audit. The study population consisted of patients presenting to the emergency department with signs and symptoms suggestive of acute asthma exacerbation. Patients aged ≥ 12 years presenting with acute asthma exacerbation, diagnosed clinically based on history and examination, and managed in the emergency department were included. Patients with chronic obstructive pulmonary disease (COPD), cardiac asthma, or other causes of acute dyspnea, patients with incomplete medical record and those who needed to be transferred to ED without being attended to first were excluded.

Audit Standards:

The acute asthma exacerbation management was compared with standard practice recommendations including the Global Initiative for Asthma (GINA) recommendations. The main audit criteria were the severity at presentation, timely administration of short acting beta-agonists, use of systemic corticosteroids during the first hour, oxygen therapy to ensure saturation of 94 and 90 percent in severe cases respectively, adjunct therapy (e.g. ipratropium bromide, magnesium sulfate) use, documentation of peak expiratory flow rate, and proper discharge planning.

Data Collection

The retrospective data were gathered based on the patient records, emergency department records, and electronic databases, following the approval of the Institutional Review Board (IRB). A structured audit proforma was used to capture the information about the demographic characteristics, presentation of the illness, assessment of the severity, treatment given, timing of treatments and patient outcomes (discharge, admission, or referral). The auditor evaluated and reported compliance with every audit standard. The main result was the degree of compliance to the guideline-recommended acute asthma exacerbation management. The patient outcomes (rate of hospital admission, need for escalation of care, and identification of gaps in clinical practice) were the secondary outcomes.

Data Analysis

Data were analyzed using SPSS version 26.0. Descriptive statistics were used to present adherence rates and patient characteristics. Categorical variables were expressed as frequencies and percentages, while continuous variables were presented as mean $\pm$ standard deviation. Compliance with individual audit criteria was calculated, and areas of suboptimal practice were identified.

Results

Data were collected from 350 patients, study population showed a mean age of 36.8 ± 14.5 years, with a slight female predominance, as females constituted 52.3% and males 47.7% of the sample. In terms of severity, moderate exacerbations were the most common (48.6%), followed by mild (28.9%) and severe cases (22.5%). Oxygen saturation was documented in the majority of patients (92.0%), indicating good compliance with initial assessment, while only 8.0% had no documentation. Peak expiratory flow rate was recorded in 41.7% of patients, whereas it was not documented in 58.3%, reflecting suboptimal use of objective severity assessment. Continuous monitoring was documented in 74.6% of cases, while 25.4% lacked such documentation.

Table 1: Baseline Demographic and Clinical Characteristics (n = 350)

Variable	Category	n (%) / Mean $\pm$ SD
Age (years)	—	36.8 $\pm$ 14.5

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Gender	Male	167 (47.7%)
	Female	183 (52.3%)
Severity of Exacerbation	Mild	101 (28.9%)
	Moderate	170 (48.6%)
	Severe	79 (22.5%)
Oxygen Saturation Documented	Yes	322 (92.0%)
	No	28 (8.0%)
PEFR Recorded	Yes	146 (41.7%)
	No	204 (58.3%)
Continuous Monitoring Documented	Yes	261 (74.6%)
	No	89 (25.4%)

Treatment compliance showed that short-acting beta-agonists were administered in 96.3% of patients, indicating excellent adherence to first-line therapy. However, systemic corticosteroids were given within the first hour in only 68.9% of cases, while 31.1% did not receive timely administration. Among moderate to severe exacerbations, ipratropium bromide was used in 61.5% of patients, whereas 38.5% did not receive it.

Table 2: Treatment Compliance According to Guidelines (n = 350)

Variable	Category	n (%)
SABA Administration	Yes	337 (96.3%)
	No	13 (3.7%)
Corticosteroids within 1 Hour	Yes	241 (68.9%)
	No	109 (31.1%)
Ipratropium (Moderate–Severe Cases)	Yes	153 (61.5%)
	No	96 (38.5%)
Magnesium Sulfate (Severe Cases, n=79)	Yes	14 (18.2%)
	No	65 (81.8%)

Regarding patient outcomes, 62.9% of patients were discharged after initial management, while 37.1% were not discharged directly from the emergency department. Hospital admission was required in 30.3% of patients, whereas 69.7% did not require admission. A smaller proportion, 6.8%, required escalation of care or referral, while 93.2% were managed without escalation.

Table 3: Patient Outcomes (n = 350)

Variable	Category	n (%)
Discharged	Yes	220 (62.9%)
	No	130 (37.1%)

Hospital Admission	Yes	106 (30.3%)
	No	244 (69.7%)
Escalation of Care / Referral	Yes	24 (6.8%)
	No	326 (93.2%)

Among patients who received corticosteroids within the first hour, 74.7% were discharged and 25.3% were admitted, whereas among those who did not receive timely corticosteroids, only 36.7% were discharged and 63.3% required admission, with a highly significant p-value of <0.001. Similarly, patients who received short-acting beta-agonists had better outcomes, with 64.7% discharged and 35.3% admitted, compared to those who did not receive SABA, among whom only 15.4% were discharged and 84.6% required admission, with a statistically significant p-value of 0.04.

Table 4: Association Between Guideline Adherence and Outcomes (n = 350)

Variable	Category	Discharged n (%)	Admitted n (%)	p-value
Corticosteroids within 1 Hour	Yes	180 (74.7%)	61 (25.3%)	<0.001
	No	40 (36.7%)	69 (63.3%)	
SABA Given	Yes	218 (64.7%)	119 (35.3%)	0.04
	No	2 (15.4%)	11 (84.6%)	

DISCUSSION

This clinical audit assessed the treatment of acute asthma attacks in the emergency department and the adherence to the guideline-based practice. The results indicate that although some elements of care, especially the administration of bronchodilators and measuring oxygen levels was highly adhered to, there are still many gaps in the overall management strategy. Short-acting beta-agonists were given to a large percentage of patients indicating good compliance with first-line therapy. This is in line with the previous studies that have established that bronchodilator therapy is the most frequently implemented aspect of acute asthma treatment as it has immediate and well-known clinical advantages. Equally, most patients recorded oxygen saturation, which is a good adherence to initial assessment measures [14].

Nonetheless, there was relatively poor recording of peak expiratory flow rate with less than half of the patients having registered their flow rates. This conclusion is consistent with the prior studies, that emphasize the fact that objective evaluation of airflow limitation is not frequently used in the emergency environment, although it is necessary to evaluate it to determine the severity and make treatment choices [15]. The absence of PEFR documentation could be because of time limitations, inadequate access to

equipment, or insufficient focus on objective monitoring in high workload emergency departments. Systemic corticosteroid administration during the first hour was not optimal and only approximately two-thirds of the patients were treated in time. Early corticosteroid therapy is an important aspect of recommended management as it decreases the airway inflammation, minimizes the chances of relapse, and decreases hospitalization. This is a crucial area of improvement because previous studies have always stressed that the longer the time taken to administer corticosteroids, the worse the outcome [16].

The use of adjunct therapies such as ipratropium bromide and intravenous magnesium sulfate was also inconsistent. Although a moderate percentage of patients with moderate to severe exacerbations was given ipratropium, its application was not universal, and magnesium sulfate was significantly underused in severe cases [17]. This is consistent with what has been reported in past studies, which have indicated inconsistent application of adjunct therapies though there is evidence to indicate that they can be beneficial in severe exacerbations. It could be explained by a deficit in awareness, disparity in clinical judgment, or the unavailability of drugs [18]. The outcomes of patients in this audit demonstrated that most patients were discharged following initial management, and a large percentage needed admission to the hospital or an increase in care. Notably, patients treated according to the guidelines, especially early corticosteroid doses showed better outcomes with reduced admission rates [19]. This observation supports the clinical significance of evidence-based protocols adherence, and it is justified by prior studies showing better results in response to quick and proper management [20]. The correlation between adherence to treatment guidelines and better patient outcomes underscores the importance of protocolized procedures in emergency departments [21]. Compliance with recommended practice can be improved by standardized management pathways, routine staff training, and access to the necessary medications and equipment. Moreover, the use of checklists or clinical decision support tools could be used to make sure that such important steps as severity assessment and early corticosteroid administration are not neglected. Although it has its strengths, this audit has its limitations. Being a retrospective audit, it depended on the completeness and accuracy of the medical records that could result in documentation bias. Also, the audit did not evaluate the impact of management practices on long-term patient outcomes because it evaluated compliance with guidelines, which was short-term. Nonetheless, the results are a good source of information about the existing practices and define certain aspects of quality enhancement.

CONCLUSION

It is concluded that while the management of acute asthma exacerbation in the emergency department demonstrates good adherence to key interventions such as bronchodilator therapy and oxygen assessment, significant gaps persist in critical areas including objective severity assessment, timely administration of systemic corticosteroids, and

appropriate use of adjunct therapies. Suboptimal documentation of peak expiratory flow rate and inconsistent application of guideline-recommended treatments highlight the need for improvement in clinical practice..

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