

Characteristics and Prognosis of Near-Fatal Asthma Exacerbations

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Abstract: *Background:* Asthma remains a major public health concern because of its high prevalence and the costs it generates. Near-fatal asthma (NFA) episodes represent the most severe forms of the disease after fatal asthma with significant variations in their incidence between different populations. *Objective:* To analyze the episodes of NFA over a period of 11 years in the hospital. *Methods:* The authors retrospectively reviewed all admissions due to asthma exacerbation in our hospital between 2000 and 2010 for patients over 18 years of age. *Results:* The study included 400 NFA episodes of 285 patients (74% women; mean age 66 years). Of these patients, 228 (80%) had a single episode of NFA and 57 had more than 1 episode during the study period. The authors observed no clear upward or downward trend during the study period. Readmitted patients had more comorbidities, poorer lung function, more severe forms of asthma and more admissions in the year before the index admission. There was a mortality rate of 3.1%. More than 20% of patients were not given controller treatment and more than 40% of patients were not treated with inhaled corticosteroids (ICS). *Conclusions:* NFA episodes are still prevalent in the population of patients with asthma. Reasons for this could be related to improper management in the stable phase, as suggested by the low rate of patients treated with ICS. It also seems necessary to optimize patient management during hospitalization because stays appear prolonged in comparison with studies in other countries.

Key Indexing Terms: Asthma; Near-fatal; Exacerbations; Prognosis; Hospital admissions. [Am J Med Sci 2015;350(2):98–102.]

Asthma remains a major public health concern because of its high prevalence and the costs it generates, especially in poorly controlled patients.^{1,2} In the present population, a slight downward trend in asthma mortality has been observed³ although hospital admissions continue to rise especially in women.⁴

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Near-fatal asthma (NFA) episodes are relatively infrequent events that represent the most severe forms of the disease after fatal asthma.^{5–7}

Significant variations have been observed in the incidence of NFA between different populations although in most studies NFA admissions constitute between 10% and 21% of all asthma admissions.^{5,6,8,9} The definition of NFA is inconsistent across studies.^{5,6,8–10} Furthermore, the definition of an intensive care unit (ICU) and the availability of beds in these units vary between countries.¹¹ These differences make it difficult to extrapolate results across countries.

The aim of this study was to analyze the episodes of NFA for more than a period of 11 years. The authors recorded patient demographics, clinical characteristics on admission, disease management in stable condition and the clinical course of episodes of severe exacerbation. Documenting the incidence of episodes of NFA may be helpful to identify weaknesses in the health care system and to make proposals for improvement.

MATERIALS AND METHODS

All admissions due to asthma exacerbation in the hospital between 2000 and 2010 for patients younger than 18 years were retrospectively reviewed. The data were obtained by 2 members of the research team by medical record review (U.C.-A., M.-T. G.-S.). Discrepancies in data analysis and interpretation were resolved by consensus with the other members of the group.

Admissions due to other specific causes of asthma exacerbation, such as pulmonary embolism or pneumonia, were excluded.

NFA was defined based on the need for mechanical ventilation, ICU admission, respiratory arrest, hypercapnia with PaCO₂ greater than 50 mm Hg or acidosis with a pH lower than 7.30, according to the criteria used by Plaza et al.¹⁰ Hospital stay was defined as the period from patient arrival at the hospital emergency department to discharge.

The analysis included clinical characteristics exhibited at the time of the 1st NFA episode. Blood gas data were taken from the 1st arterial blood gas test available after patient arrival at the hospital emergency department.

Comorbidities were evaluated according to the Charlson's index only. The authors did not collect data on the specific pathologies for all the patients admitted during the 11-year study period.

The etiology of asthma exacerbation was established on the basis of clinical criteria and the results of physical examinations and complementary tests by consensus of the research team. Cases of respiratory infection presenting new or worsening cough, new or worsening dyspnea and fever >38°C or a temperature that was abnormal for that individual in the absence of other sources of infection.¹² Specifically, bacterial infection was considered probable if the patient also presented

increased amount of sputum or purulence and probably viral in the absence of these criteria.¹³

The period of admission was stratified according to season: Spring, Summer, Autumn and Winter, which include, respectively, April to June, July to September, October to December and January to March.

STATISTICAL ANALYSIS

The data were tested for normal distribution using Kolmogorov–Smirnov test. Categorical variables are expressed as frequencies and absolute values. Continuous variables with a normal distribution are expressed as mean \pm standard deviation. The median and interquartile range were used for non-Gaussian data distribution.

Student's *t* test was used for the comparison of the continuous variables with a normal distribution. Mann–Whitney's *U* test was used when these variables had a nonparametric distribution. Categorical variables were compared using χ^2 test.

Temporal trends in hospital admissions were explored using a Poisson's generalized additive model.

All statistical analyses were performed using SPSS 15.0 for Windows (version 15.0; SPSS Inc, Chicago, IL).

The study was approved by the research ethics committee of the author's institution.

RESULTS

The study included 400 NFA episodes of 285 patients (74% women; mean age 66 years). Of these patients, 228 (80%) had a single episode of NFA and 57 had more than 1 episode during the study period (Table 1).

There was wide variation in the annual proportion of NFA episodes of all asthma-related admissions from a maximum of 24.6% in 2001 to 12.6% in 2003. No clear upward or downward trend during the study period was observed (Figure 1).

Of these patients, 43% were obese and 25% were smokers or exsmokers (Table 1). Readmitted patients had more comorbidities, poorer lung function, more severe forms of

TABLE 1. Patient characteristics

	Total patients	Single admission	Readmitted	<i>P</i>
Total, n (%)	285	228 (80)	57 (20)	
Age, mean (SD)	66.4 (17.3)	66.2 (17.9)	67.5 (14.7)	NS
Gender, n (%)				NS
Male	75 (26.3)	64 (28.1)	11 (19.3)	
Female	210 (73.7)	164 (71.9)	46 (80.7)	
FEV1%, mean (SD)	61.2 (24.0)	64.2 (23.8)	48.0 (20.5)	0.003
Obesity				NS
Normal weight	28 (24.3)	24 (25.0)	4 (21.1)	
Overweight	37 (32.2)	31 (32.3)	6 (31.6)	
Obesity	50 (43.5)	41 (42.7)	9 (47.4)	
Smoking				NS
Never smoker	213 (74.7)	169 (74.1)	44 (77.2)	
Former smoker	26 (9.1)	20 (8.8)	6 (10.5)	
Current smoker	46 (16.1)	39 (17.1)	7 (12.3)	
Charlson's index, n (%)				0.001
0	60 (21.1)	58 (25.4)	2 (3.5)	
1	105 (36.8)	75 (32.9)	30 (52.6)	
2	62 (21.8)	50 (21.9)	12 (21.1)	
≥ 3	58 (20.4)	45 (19.7)	13 (22.8)	
Asthma severity, n (%)				0.000
Intermittent	26 (9.1)	25 (11)	1 (1.7)	
Mild	25 (8.8)	23 (10.1)	2 (3.5)	
Moderate	46 (16.1)	41 (18.0)	5 (8.8)	
Severe	133 (46.7)	90 (39.5)	43 (75.4)	
Unclassified	55 (19.3)	49 (21.5)	6 (10.5)	
Emergency last year, n (%)				NS
0	170 (59.6)	140 (61.4)	30 (52.6)	
1–3	103 (36.3)	81 (35.5)	22 (38.6)	
≥ 4	12 (4.2)	7 (3.1)	5 (8.8)	
Hospital admissions last year, n (%)				0.002
0	190 (66.7)	160 (70.2)	30 (52.6)	
1	62 (21.8)	49 (21.5)	13 (22.8)	
≥ 2	33 (11.6)	19 (8.3)	14 (24.6)	

Comparison between patients with a single hospital admission versus readmitted patients (only 1st admission).

Body mass index data available for 115 patients.

FEV1, forced expiratory volume in 1 second; NS, nonsignificant; SD, standard deviation.

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