

Treatment of status asthmaticus in Emergency Medical Systems practice

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Summary:

Status asthmaticus may develop within minutes or hours and could jeopardize life and health of the patient. It constitutes one of the challenges of the modern Emergency Medical System. The aim of this study was to evaluate the relationship between age and sex of patients, a time of the day, season and the incidence of status asthmaticus.

Material and Methods: The research was conducted on the group of 84 patients (41 women and 43 men) aged from 20 to 101 years (average age 64.92 years) in status asthmaticus. We analyzed exit cards of Medical Rescue Teams from the administrative district of Piaseczno and Otwock.

Results: The prevalence of status asthmaticus was comparable in male and female. The average age of women was slightly lower than the average age of men (63.37 years vs. 66.4 years). Most interventions took place for patients aged from 60 to 69 years.

Discussion: Status asthmaticus is a life-threatening condition. Salbutamol administered intravenously or via inhalations is a first-choice drug for patients with status asthmaticus. Most medical interventions due to the status asthmaticus take place in the afternoon and in the autumn.

Key words: emergency medicine, status asthmaticus, risk factor

Introduction

Being one of the most difficult to define image of asthma, status asthmaticus is considered to be a life-threatening condition. It is described as severe, extensive narrowing of bronchial tubes which lasts over an hour despite the use of the standard treatment.

There are many factors that cause status asthmaticus including exposure to allergens and infectious agents, inadequate treatment, a significant physical exertion or the use of NSAIDs and beta-blocker drugs.

In most cases status asthmaticus develops in a few days or weeks and is caused by the above-mentioned factors. In such cases patients require immediate medical aid. Medical Emergency Teams arriving to the site should possess full knowledge of symptomatology and the principles of proceeding with a patient with status asthmaticus

One of the most crucial element of proceeding in every case is to collect appropriate medical history from the patient himself or from the people from his environment. Medical history should include information about previous incidents of

asthma exacerbations, comorbidities, number of interventions of Medical Emergency Teams and hospitalisations in the last period and currently taken medications.

Patients with status asthmaticus usually complain of dyspnoea persisting despite administration of higher dosages of medicines, irritability and anxiety, escalation of dyspnoea on exertion and nocturnal dyspnoea. Symptoms observed in the physical examination depend on the level of the severity of asthma exacerbation. These levels are described in Table 1.

In patient with status asthmaticus several symptoms may be observed including increased respiratory rate (>25/min), tachycardia (>120/min), declined arterial oxygen saturation, hypertonia of additional respiratory muscles. During auscultation additional murmurs can be heard in the form of numerous wheezes and crackles above the lung fields. Lack of respiratory murmurs indicates substantial bronchial obstruction and thus a significant reduction of the airflow through the bronchial tubes.

Recent guidelines concerning diagnosis and treatment of asthma were published by Global Initiative for Asthma in 2010 (GINA 2010).

First stage of proceeding with a patient with status asthmaticus is the administration of the oxygen through nasal catheter or oxygen mask by medical personnel. It is the best method improving arterial oxygenation what results in the increased SaO₂

above 90%. The next stage is establishment of intravenous route and administration of β₂-adrenergic agonists via inhalation with use of nebulisation (2.5-5 mg of Salbutamol), subcutaneously in a dose of 0.5-1mg or intravenously (2.5-5 mg diluted in 500 ml 0,9 % NaCl). Sabutamol is a first-choice drug in treatment of asthma exacerbations or status asthmaticus in the conditions of pre-hospital care performed by emergency medical services.

Another group of applicable drugs include corticosteroids, which representative generally used in health care is hydrocortisone. It is administered in a dose of 200-300 mg in the form of intravenous injection. The other drugs are methylprednisolone administered IV in the dose of 62.5-125 mg or prednisolone administered IV in the dose of 25-50mg.

Second-line drug is Atrovent, a type of anticholinergic drug, which dilates bronchi. It should be used in nebulisation in the dose of 0.25-0.5mg.

During the period of hospitalization magnesium sulphate may be also administered in the dose of 2.0 g IV bolus over 20 minutes.

In cases when the patient's condition deteriorates despite the treatment implemented by the medical personnel, tracheal intubation may be considered.

The indications which appeal for this method of mechanical restoration of respiratory tract is respiratory muscle exhaustion manifested by paradoxical movements of the diaphragm, disturbances of

Table 3: Table 1 – Levels of severity of asthma exacerbations

| Level | Signs | Symptoms |
|-------|--|--|
| I | Wheezes Heart rate 100/min Respiratory rate <15/min | Limitation of full physical activity by shorter breath Patient may assume recumbent position |
| II | Wheezes Heart rate 111/min Respiratory rate 18/min | Shortness of breath while climbing stairs Limitation of full physical activity through shorter breath Discomfort in the recumbent position Night awakenings due to dyspnoea |
| III | Wheezes Heart rate 120/min Respiratory rate 19-20/min | Breathlessness preventing a patient from assuming recumbent position The use of additional respiratory muscles Exacerbation of exertional dyspnoea |
| IV | Less intensified wheezes Heart rate >125/min Respiratory rate 20-25/min SpO ₂ 91-92% | Sitting position with bent (the use of additional respiratory muscles) Single word speech Exacerbation of exertional dyspnoea Patient is agitated (conscious) |
| V | Rapid, shallow breathing Heart rate >130/min Respiratory rate >25/min SpO ₂ <90% | Dyspnoea Disturbances of consciousness/Agitation No wheezes |

consciousness occurring in the form of confusion or coma, cardiac and hemodynamic disturbances.

Every patient with status asthmaticus or whose condition improved thanks to the appropriate treatment in a hospital setting require ultimately an observation and further treatment in a hospital setting.

The aim of the study

The aim of this study was to analyze the frequency of ambulance trips paying special attention to the patients presenting status asthmaticus symptoms.

Materials and methods

The study was conducted on the basis of the exit cards of Medical Rescue Teams from the administrative district of Piaseczno and Otwock. The analysis of exit cards allowed for distinguishing 84 cases of interventions due to status asthmaticus on the basis of International Classification of Diseases (ICD-10)

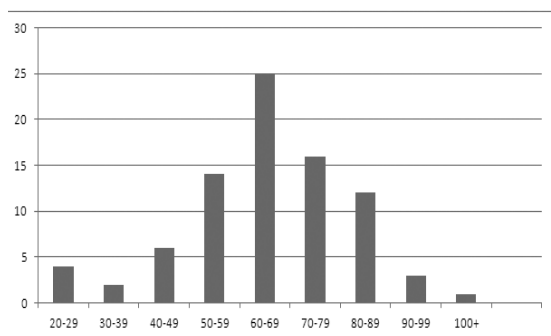


Figure 2: The relationship between prevalence of status asthmaticus and age.

Method of analysis of medical documentation (trip commission cards of medical emergency services) was incorporated in the study. The following factors were subjected to the analysis: age and sex of patients, a time of the day, season, time from symptoms onsets to calling emergency medical services and symptoms associated with the cerebral stroke.

The analysis covered 2009 and was based on the medical documentation. It was conducted in accordance with the provisions of the Law on Personal Data Protection exercising due diligence.

T-student test, chi-square test, Wilcoxon signed-rank test, Cramer's V were used for the analyses. All tests were performed at significance level $\alpha = 0.05$.

Results

The study showed no significant difference in occurrence of status asthmaticus in relation to sex. Men constituted 51.19% of all medical interventions due to the status asthmaticus in the period considered (43 cases). Status asthmaticus was reported in 41 women ($p = 0.3336$).

The age of the group researched was from 20 to 101 years. The average age amounted 64.92 years and was slightly higher for men than for women (66.40 years vs. 63.37 years). Status asthmaticus occurred most frequently in patients within the age group of 60-69 years constituting 25 cases (29.76%), followed by the age group of 70-79 years making up for 16 cases (19.05%). The least cases (not counting a single case of status asthmaticus in a person at age 101) were observed in patients aged from 30 to 39 years accounting for 2 cases. (2.38%) (Fig. 1) ($p = 0.2554$).

The analysis was also conducted on the basis of the type of called medical rescue team. Basic rescue teams were far more often dispatched to the patients with status asthmaticus constituting 65 cases (77.38%), while special teams were dispatched in 19 cases (22.62%).

In order to analyze the prevalence of status asthmaticus in the daily cycle, the test group was divided into 24 hourly intervals. Status asthmaticus occurred most frequently at 3 p.m. accounting for 9 cases (10.71%). In addition, the allocation into four six hour cycles was incorporated. According to this division of the day, cases of status asthmaticus was most common in the afternoon - 35 cases, while from 12 p.m. to 6 a.m. there were only 5 cases (Fig. 2).

Analysis of the seasonal occurrence of status asthmaticus showed the greatest escalation of incidence in September - 20 cases (23.81%), followed by February - 10 cases. (11.9%).

An analysis regarding seasons revealed that asthmatic conditions occur most frequently in the autumn - 31 cases., and the least frequently in summer - 12 cases (fig.3). The analysis showed a statistically significant relationship between the occurrence of status asthmaticus and seasonality ($p = 0.0041$) (Fig. 4).

Among the study group the most common symptoms reported by patients during status asthmaticus were increased demand for corticosteroids reported by the majority i.e. 53 people (63.10%), 20 people indicated physical effort intolerance as the symptom signifying exacerbation of asthma and 11 presented themselves with nocturnal dyspnoea

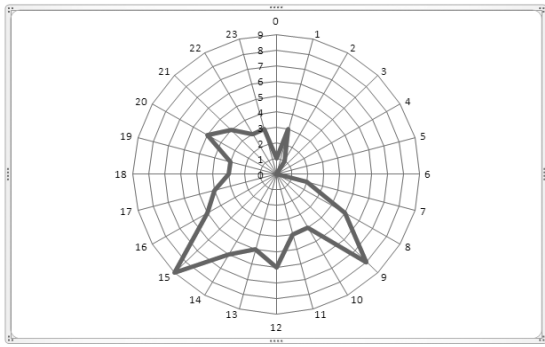


Figure 3: The relationship between frequency of status asthmaticus occurrence and hour.

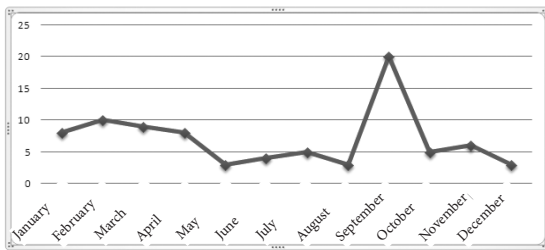


Figure 4: The relationship between the incidence of status asthmaticus and month.

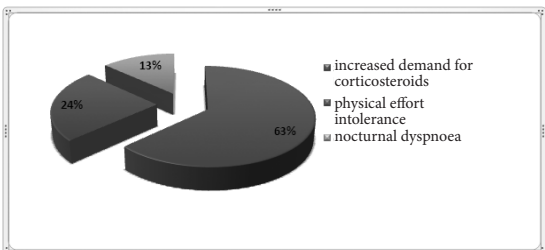


Figure 5: The most common symptoms reported by patients in asthma.

making sleep impossible. Fig. 4 - The relationship between the incidence of status asthmaticus and season.

Discussion

Status asthmaticus due to respiratory disorders may constitute a threat for the health and life of patients. Treatment is based on the restoration of proper ventilation of the lungs, resolution of clinical signs and restoring and maintaining the efficiency of the respiratory and circulatory systems, and transport to a medical facility.

Our analysis indicated the relationship between occurrence of status asthmaticus and season. Similar results were reported in other studies.

The analysis showing the relationship between the occurrence of status asthmaticus and time of day has not been published yet. This analysis shows that the peak incidence occurs around 3 p.m.

Global studies indicate that the most common symptoms of exacerbation include physical effort intolerance, an increased demand for corticosteroids, nocturnal dyspnoea. These results are consistent with the results of the analysis presented herein.

Conclusions

- 1) Status asthmaticus is a life-threatening condition.
- 2) Salbutamol administered intravenously or via inhalation is a first choice-drug.
- 3) Most medical interventions due to status asthmaticus take place in the afternoon and in the autumn.
- 4) With the average age being 66.4 years, men requesting medical rescue teams due to status asthmaticus are older in comparison with women, the average age being 63.37 years.

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