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# **Evaluation of Anaphylaxis Patients Admitted to the Emergency Department**

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#### Abstract

Anaphylaxis is a life-threatening allergic reaction requiring rapid diagnosis and treatment, with epinephrine being the first-line treatment to manage symptoms and prevent complications. This study aims to increase awareness by evaluating anaphylaxis cases in the emergency department to guide patients and physicians in managing the condition. This retrospective study, conducted at Bezmialem Vakif University Hospital between 2018 and 2022, evaluated adult anaphylaxis patients using the National Institute of Allergy and Infectious Disease 2021 guideline. Patients' demographic and clinical data were analyzed, with ethics committee approval obtained for the study. Of the 77 patients studied, 9 required IV epinephrine treatment. More than half of the patients were started on epinephrine within 1 hour of exposure to the allergen. And the only person who was arrested had more than 1 hour to reach epinephrine treatment. When diagnosing anaphylaxis, we should not hesitate to start adrenaline and switch to IV infusion, and we should get the patient to the necessary care and treatment as soon as possible

Keywords: Anaphylaxis, Emergency, Epinephrine

# Introduction

Anaphylaxis is a potentially life-threatening, multisystem allergic reaction that can cause airway, respiratory, or circulatory collapse. (1) It requires rapid evaluation, diagnosis, and treatment. Anaphylaxis is a common problem in the United States, with a reported general population incidence of 21 per 100,000 person-year. (2)

Epinephrine is the main treatment for anaphylaxis and is accepted as the first-line treatment in major guidelines. (1) Numerous studies have shown that timely administration of intramuscular epinephrine is the preferred treatment for controlling anaphylaxis symptoms, preventing biphasic reactions, maintaining blood pressure, and preventing deaths. (3,4) In this study, we aimed to increase awareness of anaphylaxis by evaluating anaphylaxis patients who presented to the emergency department and to help patients and physicians approach anaphylaxis.

## **Method**

This study was conducted retrospectively in accordance with the Helsinki criteria. Our study was completed in the emergency department of Bezmialem Vakıf University Medical Faculty Hospital by examining patients aged 18 and over between 01.01.2018 and 31.12.2022.Patients under 18 years of age, those without a diagnosis of anaphylaxis, those with incomplete data, and those who had suffered trauma were excluded from the study.

Anaphylaxis was diagnosed according to the National Institute of Allergy and Infectious Disease 2021 guideline. Epinephrine was started intramuscularly in patients, and infusion epinephrine treatment was started in patients who did not respond to IM adrenaline. Demographic information, presentation, additional diseases, state of consciousness, and physical examination of the patients were recorded in the forms. Coronary artery disease, chronic renal failure, hypertension, and diabetes mellitus were defined as comorbidities. The approval of the Ethics Com-

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 Table 1. Anaphylaxis Criteria (National Institute of Allergy and Infectious Disease 2021)

Acute onset of illness involving skin, mucosal tissue, or both (hives, pruritis, flushing, swollen lips, tongue, uvula [including subjective symptoms of throat pain, itching, tightness]) and at least one of the following:

- Respiratory compromise (dyspnea, wheeze, stridor, hoarseness, reduced peak expiratory flow, hypoxemia)
- Reduced blood pressure (BP)b or associated symptoms of end-organ dysfunction (syncope, incontinence)

Two or more of the following that occur rapidly after exposure to a likely allergy:

- Involvement of the skin-mucosal tissue (described above)
- Respiratory compromise (described above)
- Reduced BP or associated symptoms (described above)
- Persistent gastrointestinal symptoms (crampy abdominal pain, vomiting)

Reduced BP after exposure to known allergen for that patient

mittee of the University (21/01/2020, issue 02/33) was obtained to conduct the study.

#### Outcomes

Outcomes were retrospectively assessed by reviewing of the hospital medical database. The primary study outcomes: IV adrenaline treatment should be started as soon as possible and any situations that may occur due to anaphylaxis should be intervened as quickly as possible. Secondary outcomes: To increase awareness of anaphylaxis.

### **Statistical analysis**

The data were analyzed in the IBM SPSS Statics 22.0 package program. The mean differences of continuous variables between groups were examined with the T test, and the distribution of categorical variables between groups was examined with the chi-square test. As descriptive statistics, mean standard deviation r (relation-ship coefficient), frequency and percentage values were given.

### Sample size determination

It was calculated online using the http://www.raosoft. com/samplesize.html program. The minimum number of patients was found to be 83, with a 97% confidence interval, a 5% margin of error, a standard deviation of 0.5 and a Z score of 1.96.

#### Results

A total of 77 patients were evaluated. Infusion was started in 9 of 77 patients (11.6%). Of the 68 patients who received IM adrenaline, 37 (54.4%) were female and 31 (45.6%) were male.

Of the patients who received infusion, 6 (66.7%) were female and 3 (33.3%) were male (p=723). The mean age was  $49.28 \pm 1.56$  in the IM group and  $55 \pm 5.34$  in the infusion group (p=0.09).

The most frequent visit time was between 18:00-24:00 with 29 people. The most frequent visit time of those in the IM group was between 18:00-24:00 with 26 people (38.2%). In the infusion group, 5 people (55.6%) applied between 12:00-18:00. (p= 0.340).

In our study, 38 people (49.4%) had anaphylaxis due to unknown causes, 12 people (15.6%) due to medication, 7 due to insect bites, and 9 due to food. Of the 9 patients who required IV infusion, 3 had anaphylaxis due to unknown causes, 4 due to medication, and 2 due to insect bites.

In our study, the number of patients applying with dermatological symptoms was found to be 60 (p=1.000). Of these, 53 (77.9%) were in the patient group that received only IM treatment, while 7 (77.8%) required IV infusion.

A total of 62 (80.5%) patients applied with respiratory symptoms. (p=0.680) 5 of these patients (79.4%) were in the group that received only IM treatment, and 8 (88.9%) were in the group that required IV treatment.Of the 51 individuals (66.2%) who presented with cardiovascular symptoms (p=0.259), 43 (63.2%) were in the group that received only IM treatment, while 8 (88.9%) were in the group that received IV treatment. GIS symptoms



Figure 1. IV/IM Female/Male Ratio



Figure 2. Causes of anaphylaxis

were present in 17 (22.1%) individuals (p=1.000). 15 of them received only IM epinephrine, while 2 required IV infusion.

A total of 10 patients presented with neurological symptoms (p < 0.001), 6 (66.7%) of whom required IV treatment, while 4 (5.9%) were from the group receiving only IM epinephrine. The rate of needing IV infusion was found to be dramatically higher in the group with neurological symptoms. For this reason, we should not forget that patients with neurological findings may have a severe course and require IV treatment at a higher rate, and we should take our precautions accordingly.

When we look at the comorbidity rates, 25 patients (36.8%) who received only IM treatment and 8 patients (88.9%) who required IV treatment had comorbid diseases. A total of 33 people (42.9%) had comorbidities (p=0.004). Coronary artery disease, chronic renal failure, hypertension, diabetes mellitus were defined as comorbidities.

In total, 57 patients (52 patients (76.5%) in the IM group and 5 patients (55.6%) in the infusion group received epinephrine treatment within 1 hour of symptom onset (p=0.01). Biphasic reactions were observed in 6 patients (p=1.00), all of whom were in the IM group. No biphasic reactions were observed in patients receiving IV infusion (p=0.004).

The number of patients requiring intensive care was 8 (10.4%), 6 of them (66.7%) were in the infusion group. (P<0.01). There was one person who died and that person

was in the group requiring IV infusion. The total mortality rate was found to be 1.3%.

### Discussion

In the emergency department, the diagnosis of anaphylaxis is often a critical decision and treatment should be started immediately. Timely intervention is life-saving. Initiating an infusion is the recommended approach after an inadequate response to the first two doses of intramuscular injection. Administering adrenaline in the form of an infusion provides a more stable hemodynamic response because it is continuous and titratable. The rate of patients with neurological complaints requiring IV infusion was found to be significantly higher. Initiating adrenaline infusion therapy in patients presenting with neurological symptoms may be a more effective approach. It is important for the follow-up of the disease that no biphasic reaction is observed in any patient receiving the infusion.

Rates of biphasic reactions and potential associated risk factors are not well understood. In a study of 430 patients 31 (7.2%) had biphasic reactions and 22 (5.1%) had clinically significant biphasic reactions. The median time from anaphylaxis onset to first epinephrine dose was longer for patients with biphasic (78 minutes) than uniphasic courses (45 minutes) (P = 0.005).

Biphasic reactions have been found to be related to the time from the first epinephrine administration. (5) In our study, there was only one person who died, and this patient's epinephrine treatment was initiated within a period longer than 1 hour. Among a cohort of patients in the United Kingdom with fatal anaphylactic reactions, the median time to respiratory or cardiac arrest was 30 minutes for foods, 15 minutes for venom, and 5 minutes for iatrogenic reactions. (6) This shows how important it is to start treatment early, to recognize patients with anaphylaxis as soon as possible, and how vital it is for individuals with a history of anaphylaxis to have personal epinephrine.

Of the 9 individuals who required IV treatment, 8 were individuals with comorbidities. Comorbidity can be seen as an important risk factor for the development of anaphylaxis. As a result of the data, it is thought that comorbidity increases the frequency of anaphylaxis.

The fact that 19.5% of patients who applied to our service were in poor general condition and 1.3% of patients

Table 2. IM/IV Symptoms					
	Dermatological	Respiratory	Cardiovascular	Neurological	GIS
IM	53	36	43	4	15
IV	7	8	8	6	2

died showed that anaphylaxis is a reaction that should be given great importance. The fact that respiratory findings were more than dermatological findings drew attention. The fact that drug-related applications were more than food-related applications also showed that drug-related anaphylaxis is more common in adults.

### Conclusion

Of the 77 patients studied, 9 required IV epinephrine treatment. More than half of the patients were started on epinephrine within 1 hour of exposure to the allergen. And the only person who was arrested had more than 1 hour to reach epinephrine treatment. When diagnosing anaphylaxis, we should not hesitate to start adrenaline and switch to IV infusion, and we should get the patient to the necessary care and treatment as soon as possible.

### Limitation

One of the most important limitations of our study is that patient data were obtained retrospectively. Another important limitation is that data belonging to only one center are included in the study.

#### **Declarations of Funding and Competing Interest**

There are no conflicts of interest. The authors received no financial support for the research

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