

A study on clinical characteristics and management of anaphylaxis in Emergency Department

Le Xuan Duong*, Do Thanh Hoa*, Le Duc Duan*,
Nguyen Hai Ghi*, Duong Duc Anh**

*108 Military Central Hospital,
**College of Health Sciences, VinUniversity

Summary

Objective: The aim of this study was to describe clinical features and outcome of patients with anaphylaxis at the Emergency Department - 108 Military Central Hospital in 2021. **Subject and method:** A cross-sectional, retrospective descriptive study of 146 anaphylaxis patients who came to Emergency Department - 108 Military Central Hospital in 2021. **Result:** Drug-induced anaphylaxis accounted for 65.8%, of which: Antibiotics accounted for 17.7%, vaccines accounted for 27.1%, contrast agents accounted for 10.4%. Common symptoms were: Mucocutaneous lesion (98.6%), respiratory (16.4%), digestive (6.8%), cardiovascular (4.8%), neurological disorders (2.1%). Anaphylaxis of grade I accounted for 76.7%, grade II accounted for 18.5%, grade III accounted for 4.8% and there was no anaphylaxis of grade IV. There was no statistically significant relationship between the degree of anaphylaxis and the entry of the allergen. The fluid transfusion counted for 100%, corticosteroid use (91.1%), dimedrol (84.2%), adrenaline (23.3%), oxygen therapy (13.7%) and invasive ventilation (0.7%). **Conclusion:** The main cause of anaphylaxis was drug-related, the most common symptom of anaphylaxis was manifestation of mucosal skin, the anaphylactic subjects were mainly grade I. Most of patients was complete recovery.

Keywords: Anaphylaxis, Emergency Department, 108 Military Central Hospital.

1. Background

Anaphylaxis is a common medical emergency and is a life-threatening acute hypersensitivity reaction that can be defined as a rapid, systemic, multisystem allergic reaction. It quickly results in respiratory and circulatory collapse as well as death if untreated. Anaphylaxis is thought to occur at a rate of 1-3% worldwide, and this prevalence has been rising recently. Anaphylaxis occurs in all ages and countries and is frequently misdiagnosed or not diagnosed at the onset, that leads to delay diagnosis and increase risk of

disability and death. Because anaphylaxis can happen at any moment and in any specialization, it is always a pressing issue that requires attention in all fields of medicine. Current guideline for the prevention, diagnosis, and treatment of anaphylaxis has been published by the Ministry of Health of Vietnam in Circular 51/2017 and has been in use for many years [1]. However, there is currently a lack of research on anaphylaxis in Vietnamese hospitals. As a result, research on anaphylaxis is crucial for determining its prevalent origins, symptoms, severity. This will help patients have a quick diagnosis and receive treatment promptly. The study was conducted with the aim: describe the clinical characteristics and treatment of anaphylactic patients at the Emergency Department, 108 Military Central Hospital in 2021.

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Correspondence to: Le Xuan Duong - Emergency Department,
108 Military Central Hospital

Email: duongicu108@gmail.com

2. Subject and method

2.1. Study population

A cross-sectional, retrospective descriptive study was conducted on 146 anaphylactic patients treated at the Emergency Department - 108 Military Central Hospital from January 1, 2021 to December 31, 2021.

Inclusion criteria: All patients were diagnosed with anaphylaxis according to the standards of Circular 51 issued on December 29, 2017 on prevention, diagnosis and treatment of anaphylaxis of the Ministry of Health [1].

Exclusion criteria: All patients presented with clinical presentations similar to anaphylaxis but due to other causes such as: Shock, stroke, respiratory diseases (COPD, asthma...), urticaria, thyroid storm, hypoglycemia, local anesthetic systemic toxicity.

2.2. Variable and data processing

Information and exploitation filled in the research records include:

Age, gender, cause of anaphylaxis, allergen entry route, history of allergy.

Clinical symptoms of anaphylaxis and severity of anaphylaxis (divided into 4 degrees) according to Circular 51/2017 [1].

Correlation between clinical symptoms and severity of anaphylaxis.

Rate of drug use and treatment measures used.

Treatment results: Complete recovery: Symptoms disappear quickly after taking the medicine; Incomplete recovery: Symptoms persist, need in-hospital monitoring and death.

Data analysis: Convenience sampling, describing characteristics using mean and standard deviation, percentages, and compare groups using the *Chi-square* test. A 2-sided p value <0.05 was considered statistically significant. Data collection and analysis by SPSS 22.0.

3. Result

3.1. General characteristics of research population

In 2021, the total number of patients admitted to the emergency room was 46312 patients, of which the number of anaphylactic patients was 146, accounting for 0.32%, equivalent to a ratio of 1/317.

Table 1. General characteristics of research population

Characteristics	(n = 146)	%
Age (year) ($\bar{X} \pm SD$)	44.5 $\pm$ 18.81	
Gender		
Male	52	35.6
Female	94	64.4
History of allergies		
Drug allergy	14	9.6
Food allergy	19	13.0
Allergic diseases	6	4.1
Other chronic diseases	12	8.2

Comment: Patients had an average age of 44.5 years. Female/male ratio = 1.77/1. There were 39 patients with a history of allergies, of which 13% had a history of food allergies, 9.6% had a history of drug allergies, and 4.1% had allergic diseases (asthma, eczema, allergic rhinitis).

3.2. Clinical presentations of anaphylaxis

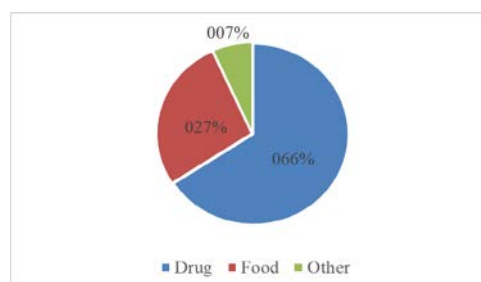


Figure 1. Causes of anaphylaxis

Comment: Among the causes of anaphylaxis, drugs accounted for the highest proportion, followed by food and other causes.

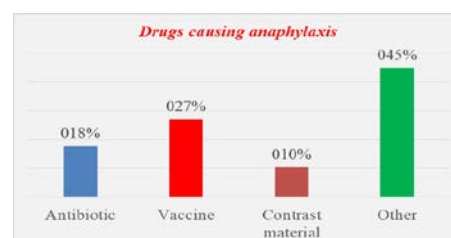


Figure 2. Common drugs causing anaphylaxis

Comment: Antibiotics made up 17.7% of the medication causes, vaccinations made up 27.1%, and contrast agents made up 10.4%. 44.8% was other medications.

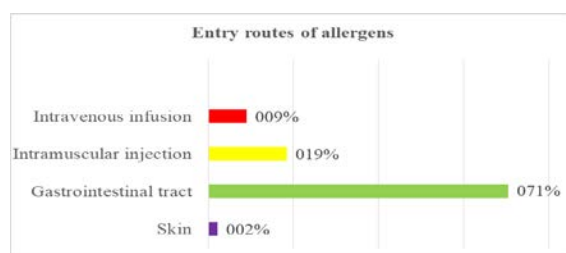


Figure 3. Allergen entry routes

Comment: The most common route of entry for allergens was the gastrointestinal tract, followed by intramuscular injection and intravenous infusion, with a small percentage due to topical application.

Table 2. Signs of anaphylaxis

Signs of anaphylaxis	(n = 146)	%
Skin, mucosal	144	98.6
Respiratory	24	16.4
Digestive	10	6.8
Cardiovascular	7	4.8
Neurological	3	2.1

Comment: The highest proportion of signs seen in anaphylaxis was skin and mucous membranes (98.6%), followed by respiratory symptoms (16.4%), and gastrointestinal symptoms (6.8%), cardiovascular (4.8%) and neurological (2.1%).

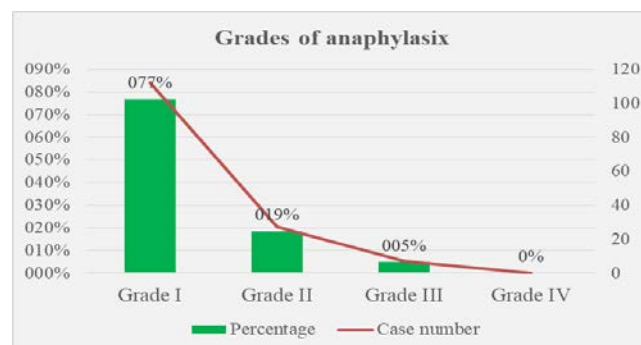


Figure 4. Grades of anaphylaxis

Comment: Grade I anaphylaxis accounted for the highest rate (76.7%), followed by grade II (18.5%), grade III (4.8%), and there were no cases of grade IV.

Table 3. The correlation between anaphylactic severity and its underlying causes

	Grade I (n = 112)	Grade II (n = 27)	Grade III (n = 7)	p
Medications	70 (62.5%)	18 (66.7%)	7 (100%)	0.143
Food	31 (27.7%)	9 (33.3%)	0 (0%)	0.272
Others	10 (6.8%)	0 (0%)	0 (0%)	0.322

Comment: There was no statistically significant correlation between the severity of anaphylaxis and the causes of anaphylaxis ($p > 0.05$).

3.3. Characteristics of anaphylactic treatment

Table 4. The correlation between the severity of anaphylaxis and the allergen entry route

	Grade I (n = 112)	Grade II (n = 27)	Grade III (n = 7)	p
Intravenous therapy	7 (6.25%)	4 (14.8%)	2 (28.6%)	0.054
Intramuscular injection	22 (19.6%)	5 (18.5%)	0 (0%)	0.66
Digestive	80 (71.4%)	17 (62.9%)	5 (71.4%)	0.703
Topical	2 (2.75%)	1 (3.8%)	0 (0%)	0.221

Comment: There was no statistically significant correlation between the severity of anaphylaxis and the allergen entry route ($p > 0.05$).

Table 5. Management of anaphylaxis

Management	Quantity (n = 146)	Rate (%)
Intravenous fluid	146	100
Dimedrol	123	84.2%
Corticosteroid	133	91.1
Adrenalin	34	23.3
Oxygen	20	13.7
Invasive ventilation	1	0.7

Comment: Management of anaphylaxis: 100% of patients received intravenous fluids, followed by corticosteroids for 91.1%, dimedrol for 84.2%, adrenaline for 23.3%, oxygen for 13.3% and invasive ventilation for 0.7%.

Table 6. Results of management

Results of management	(n = 146)	Rate (%)
Complete recovery	123	84.2
Incomplete recovery	23	15.8
Mortality	0	0

Comment: The rate of complete recovery was 84.2%, 15.8% of those with incomplete recovery require hospitalization; no patient died.

4. Discussion

4.1. Characteristics of age, gender and allergy history

In 2021, the Emergency Department admitted 46,321 patients, of which the number of anaphylactic patients was 146, accounting for 0.32% (corresponding to a ratio of 1/317). This rate was lower than some studies, such as the one by Lauritano EC [8] from 2013 (rate 0.7%), but similar to some studies, like the one by Brown AF [7] from 2001 (rate 1/439) or research by Michelle JVD from 2013-2015 in the emergency department of a hospital in the Philippines (rate 0.3%) [10], which found that anaphylaxis rates in Asian countries were 0.3%.

The average age of the study patients was 44.5 ± 18.8 years, of which women accounted for 64.4%. This result was similar to Nguyen Anh Tuan's study

on 204 anaphylactic patients at Bach Mai hospital with an average age of 42 ± 18 years [3]. Our results were similar to Aleena Banerji's study, the average age was 48 ± 19 and women account for 71% [5], but higher than the study of Yuka Asai (2014) with an average age of 31.5, the proportion of men accounts for 33.7% [4]. Among 146 patients, 39 (accounting for 26.7%) had a history of allergies, 13% had a history of food allergies, 9.6% had drug allergies, and 4.1% had atopic diseases (asthma, eczema, allergic rhinitis). This result was similar to the study of Nguyen Thi Thuy Ninh [2] conducted on 275 patients with a history of allergies accounting for 31.3%, food allergy was 13.8%, and drug allergy was 13.1%. Research by Nguyen Anh Tuan [3] on 204 anaphylactic patients, 33 patients (accounting for 16.2%) had a history of allergies, of which 7.3% had a history of drug allergies, 5.9% had a history of food allergies, 0.5% of patients was allergic to blood products, 2.5% of patients was allergic to other causes. According to research by Yuka Asai, history of food allergy was 24.5%, allergic disease was 24.5% [4]. These patients often had hypersensitivity reactions after a second or subsequent exposure to allergens and can cause IgE-mediated anaphylaxis. Patients with a history of allergies were also more likely to be sensitive than patients without a history of allergies, so it was necessary to explore the patient's allergy history before prescribing medication.

4.2. Clinical manifestations of anaphylaxis

The most common cause of anaphylaxis was medicines (65.8%), followed by food (27.4%), and other factors account for the remaining cases. Anaphylaxis was caused by medications 49.5% of the time, food 38.95% of the time, and insects 8% of the time, according to Nguyen Thi Thuy Ninh's study [2], with the beta-lactam antibiotic group accounting for the majority of this, or 80%. According to Nguyen Anh Tuan's research, food made up 9.3%, and medications made up 49.5%. The percentage was different from the research by Yuka Asai and colleagues (2014) because food was more common than medication as causes of anaphylaxis (63.3%) [4]. It can be accounted for by the fact that medication-induced anaphylaxis was a common occurrence in Vietnam due to the high

prevalence of non-prescription drug usage and patients' arbitrary drug use.

Research results also show that in the group of drug causes, there were many different drugs that cause anaphylaxis. In addition to antibiotics (17.7%), contrast agents (10.4%), there was a significant rate of anaphylaxis due to vaccination (27.1%). According to research data, anaphylaxis was caused by COVID-19 vaccines. In the context of the COVID-19 pandemic, vaccination against COVID-19 has been expanded, so the rate of anaphylactic reactions to these vaccines were inevitable.

In the study, the main route of entry of allergens was the gastrointestinal tract (70.5%) followed by intramuscular injection (18.5%), and intravenous route 8.9%. It was worth mentioning that topical agents can also cause anaphylaxis. According to research results by Nguyen Anh Tuan [3], anaphylactic allergens accounted for 61.3% intravenously, 20.6% through food, 8.3% intramuscularly, and 3% from insect bites. Research by Nguyen Thi Thuy Ninh [2] showed that anaphylaxis through the gastrointestinal tract was 54.4%, intravenous was 38.9%, insect was 8.7%, and intramuscular injection was 6.6%. The intramuscular injection in our study was related to COVID-19 vaccination.

Anaphylaxis was a systemic hypersensitivity reaction so anaphylactic symptoms can appear in many organs, with diverse symptoms. In our study, the most common symptoms were in the skin and mucous membranes (98.6%), followed by respiratory symptoms (16.4%), digestion (6.8%), and cardiovascular symptoms (7%) and neurological (3%). Research by Nguyen Thi Thuy Ninh [2] showed that skin and mucous membrane manifestations were 97.1%, cardiovascular was 96%, neurological was 33.1%, respiratory failure rate was 18.5%, circulatory failure was 12%. Research by Nguyen Anh Tuan [3], skin and mucous membrane symptoms accounted for 82.3%, respiratory symptoms were 62.7%, circulatory symptoms were 48.3%, gastrointestinal symptoms were 38.2% and nervous system was 31.8%. Research by Poziomkowska-Gęsicka I and colleagues (2020), mucocutaneous symptoms were the most common

(76.96%), followed by cardiovascular (73.04%), respiratory (67.54%) and digestion (29%) [12]. Thus, the rate of manifestations on different organs was different, but the rate of symptom manifestations on the skin and mucous membranes accounts for the highest rate. It can be said that symptoms in the mucous membranes often appear the earliest, so they were easy to recognize, and were an important criterion for early diagnosis of anaphylaxis. Symptoms in other organs may appear later, depending partly on whether emergency treatment is given early or not.

According to the classification of the grades of anaphylaxis in Circular no 51/2017/TT-BYT of Vietnam ministry of health, our anaphylactic subjects focused on mild grade - grade I (76.7%), followed by severe grade - grade II (18.5%) and critical - grade III (4.8%), especially no patient with circulatory arrest - grade IV. This result was lower than Nguyen Anh Tuan's study [3,] with the rate of mild (36.8%), severe being 43.1%, and critical being 20.1%. Research by Nguyen Thi Thuy Ninh [2] patients were 34.9% mild, 43.3% of severe, and 21.8% of critical. When there were manifestations in the skin and mucous membranes, if detected and treated immediately at this grade, it will prevent anaphylaxis from progressing to more severe grades. Data from Tables 4 and 5 show that there was no statistically significant relationship between the grade of anaphylaxis and the causes of anaphylaxis, between the grade of anaphylaxis and the entry route of the allergen (with $p > 0.05$).

4.3. Treatment

Treatment measures for anaphylaxis: 100% of patients received intravenous fluids, followed by corticosteroids for 91.1%, dimedrol for 84.2%, adrenaline for 23.3%, oxygen for 13.3% and invasive ventilation 0.7%. Research by Nguyen Anh Tuan [3] the rate of adrenalin use was 71.1%, of which 10% of patients with severe and critical grades used it, 21.3% of patients when first admitted to the hospital had anaphylactic grade. Mild severity, after monitoring, adrenalin was used. Research by Nguyen Thi Thuy Ninh [2] showed that the rate of patients using adrenaline was 58.5%. The rate of adrenaline use in our study was lower due to the

lower rate of patients with severe and critical anaphylaxis.

The rate of using H1 antihistamine and corticosteroids were 91.1% and 84.2%, respectively, this result was similar to the study of Beyer et al. (the rate of using histamine was 82% and corticosteroids was 96.6) [6] and research by Nguyen Anh Tuan [3] using dimedrol was 91.2%, Solu-medrol was 80.9%. According to EAACI, the only effective treatment recommended was adrenaline injected into the thigh; Multiple doses and delays increase the risk of disability and death. There was no evidence to support the use of corticosteroids and antihistamines to treat symptoms of severe anaphylaxis and to prevent biphasic anaphylaxis [11].

In the study, 1 patient needed intubation and invasive ventilation, 20 patients, accounting for 13.7%, needed oxygen. These were patients with respiratory symptoms such as breathing difficulty, bronchospasm, and wheezing.

Treatment results included a complete recovery rate of 84.2% and an incomplete recovery rate of 15.8%; mortality rate of 0%.

5. Conclusion

The main causes of anaphylaxis were drugs (65.8%) and food (27.4%). The main route of entry was through the digestive tract (70.5%), and mucous membrane symptoms were the majority (accounting for 98.6%), respiratory symptoms (16.4%). The severity of anaphylaxis was mainly at grade I (accounting for 76.7%), grade II of 18.5%, and grade III of 4.8%. The rate of adrenaline use was 23.3%; The complete recovery rate was 84.2%.

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