

# ASSESSING OF PATIENTS' KNOWLEDGE OF ANAPHYLACTIC SHOCK AND ALLERGIES

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A – study design, B – data collection, C – statistical analysis, D – interpretation of data, E – manuscript preparation, F – literature review, G – sourcing of funding

## ABSTRACT

**Background:** The World Health Organization (WHO) identified allergy as one of the major problems of the 21<sup>st</sup> century. It was also stated to be a key issue for health protection and public health care activity in the White Book on Allergy published in 2011. An allergy or atopy is called type I hypersensitivity. It may take the form of immediate (anaphylaxis) or late symptoms including allergic rhinitis and eye diseases, atopic dermatitis, food allergies, anaphylactic shock, allergic asthma and hives. Anaphylaxis and anaphylactic shock can occur at any age.

**Aim of the study:** The goal of the study was to assess patient knowledge about allergies and appropriate actions to take in situations of severe allergic symptoms including anaphylactic shock.

**Material and methods:** The study was conducted in 2018 among 150 adult patients in a clinic of Allergy at Optima Medycyna SA in Opole. The author's survey questionnaire contained 27 closed single or multiple-choice questions.

**Results:** A satisfactory level of knowledge of the most life-threatening allergy exacerbations was found in 79.3% (119) of the examinees. 53.3% (80) had correct knowledge of how to act in the case of a severe allergic shortness of breath and symptoms that do not subside despite administering medications. In such instances, 46.7% did not know what to do. Only 84.7% (127) of respondents knew the definition of anaphylactic shock while 10% (15) did not know the concept at all.

**Conclusions:** Patients showed a significantly higher level of knowledge about allergy complications than about their causes and prevention. Knowledge about the diagnosis of allergy exacerbations, as well as steps to take in life-threatening situations associated with acute allergic disease and anaphylactic shock in home situations was insufficient. In addition, it was found that nursing staff insufficiently educate patients on allergies and associated complications.

**KEYWORDS:** anaphylaxis, hypersensitivity, nurses, patients

## BACKGROUND

Allergy is the third most common chronic disease in the world. In the White Book on Allergy published in 2011, the World Health Organization (WHO) identified allergy as a major problem of the 21<sup>st</sup> century and a key issue for health protection and public healthcare activity [1,2]. Allergic diseases have a negative impact on quality of life including reduced physical and professional activity which, consequently, can lower the social status of sufferers [3].

Data resources from the 2008 Epidemiology of Allergic Diseases (ECAP) program and the WHO show that around 40% of people in Poland and worldwide exhibit allergic symptoms. Adults most likely suffer from an inhaled allergy whereas children are most commonly affected by food allergies, atopic dermatitis and scabies [4–6]. In the ECAP studies, B. Samoliński et al. showed

that in the Polish population, 40–45% of people have allergic skin lesions, 22% suffer from allergic rhinitis and 12% have asthma symptoms [1].

According to the World Allergy Organization (WAO), the most common allergic diseases include allergic rhinitis (10–25%), allergic conjunctivitis (65–95%), urticaria and angioedema (25%). About 300 million people, including about 5 million of Poles, suffer from bronchial asthma. This condition contributes to the death of 250,000 people each year [7–9]. Asthma was defined by the Global Initiative for Asthma (GINA) as a chronic inflammatory respiratory disease characterized by respiratory over-activity, wheezing attacks, coughing and shortness of breath with variable bronchial obstruction, usually reversible spontaneously or after treatment [10]. Contact with the allergen may cause an instantaneous or delayed asthmatic reaction [11].

An allergy or atopy is referred to as type I hypersensitivity which may take the form of an immediate reaction (anaphylaxis) or late symptoms including allergic rhinitis and eye diseases, atopic dermatitis, food allergies, anaphylactic shock, allergic asthma and hives [12,13]. Anaphylaxis and shock can occur at any age [14,15].

Anaphylaxis is the severest form of hypersensitivity with a sudden and devastating course. Its objective symptoms include accelerated heart rate, laryngeal edema, redness of the skin, bronchospasm, hives, headache and a decrease in blood pressure. Feelings of anxiety and impending death are subjective symptoms often described by patients [13,16]. The symptoms of early anaphylaxis are often associated with a site that was exposed to an allergen. They may appear a few minutes after exposure to the allergen and may resolve spontaneously, or after administration of antihistamines [17]. The late form (generalized) appears from 6 to 10 hours after contact with an allergen. Symptoms affect the upper respiratory tract and can lead to tissue damage and development of diseases such as asthma. The late form occurs in approximately 50% of people prone to early anaphylaxis and is characterized by strong symptoms [17].

The most severe form of anaphylaxis is anaphylactic shock, which is a violent systemic reaction of the immune system to an allergen that can lead to death [18]. The definition of shock is a sharp and sudden systemic disorder resulting from an immediate reaction. Anaphylactic shock is a life-threatening condition and requires prompt medical attention [19,20]. In people with hypersensitivity, it can be induced by ingested or inhaled allergens or venoms of animals [21].

The gold standard treatment for anaphylactic shock is the intramuscular administration of adrenaline [22]. Patients who experience anaphylactic shock should acquire an EpiPen with 0.3 or 0.15 mg of adrenaline for use in situations at home [23–25]. In the report titled ‘Anaphylaxis – health and medical problem,’ a three-fold increase in the causes of anaphylactic shock causes was observed [26]. The report showed that in 2008, 29,000 patients reported a need for assistance due to anaphylaxis, and in 2015, that number increased to 117,000. European statistics show that 1 in 300 people is affected by anaphylaxis [27]. The Polish National Health Fund reports that the number of patients applying for assistance due to anaphylaxis has increased six-fold in recent years. In 2014, 18,063 absenteeism causes were reported due to anaphylaxis. [28]. According to Prof. Dr Hab. N. Med. J.R Ładny, about 40–100 people die of anaphylactic shock annually [29]. From a safety point of view, people suffering from allergic diseases should be aware of how important education about allergies including how to act in cases of an allergic reaction.

## AIM OF THE STUDY

The aim of the study was to evaluate patients’ level of knowledge about allergies, anaphylaxis and appro-

priate handling of situations associated with allergic severity of symptoms including anaphylactic shock. Since the risk of anaphylactic shock in allergic diseases is higher than in healthy people, patients should be familiar with the risks associated with it. It was, therefore, important to check whether levels of knowledge are sufficient and what role nurses play in education on the subject.

## MATERIAL AND METHODS

### Study design

The study was carried out among patients suffering and being treated for allergic diseases in the outpatient allergology clinic at The Allergy Department in the medical clinic Optima Medycyna SA in Opole.

### Settings

The research was conducted using a questionnaire. The study was initiated after obtaining approval from the administration of Optima Medycyna SA and The Bioethical Commission at the State Medical Higher Vocational School in Opole (No. 19/PI/2018). The study was anonymous and consent to participate was voluntary. The research was conducted in accordance with good clinical practice and requirements of the 1975 Helsinki Declaration revised in 2000.

### Data sources/measurement

A diagnostic survey was used with an author’s survey questionnaire. It contained 27 closed single or multiple-choice questions. Questions 1 to 8 related to socio-demographic data, duration of the disease and treatment in The Allergy Department, as well as the pharmacological therapy used. To obtain data on the respondents’ knowledge of allergies, they were asked to define the notion of allergy (q. 9) and the causes of inhaled (q. 10), food (q.11) and contact (q.12) allergies. Knowledge about the most common symptoms of allergies was evaluated in q.13. Question 15 concerned the definition of anaphylactic shock. Question 16 assessed knowledge on how to act in the event of shortness of breath when at home (q. 14). Question 20 concerned the most life-threatening complications of allergies (q.20). The other questions were related to allergy prevention, self-assessment of knowledge, learning about allergies and the importance of health education.

### Participants

The research surveyed allergic patients who were between 18 and 65 years old. Criteria for participation in the research, apart from age, included having an allergic disease and voluntary consent to take part in the study. The exclusion criteria included age below 18 or above 65, treatment in a clinic other than the Allergy Department at Optima Medycyna SA or no consent to participate in the study.

There were 150 participants that qualified for the study of whom 46.7% (70) were aged 30–41 and 13.3% (20) were aged 54–65. Most of the respondents were women (61.3%; 90). The largest group of the respondents had higher education (52.7%; 79). 4.7% (7) of the respondents had primary education. Patients treated for allergies over a period of 1 to 3 years constituted the largest group (44.7%; 67). The smallest group was 15.3% (23), consisting of those treated for less than one year for allergies. People who suffered from allergies for over 6 years formed the largest group (39.3%; 59). Only 15.3% (23) were affected by allergies for less than a year. Treatment with tablets was most common and applied to 62.6% (93) of the examinees. Untreated patients constituted 14.7% (22) of all the respondents (Tab. 1). Due to perceived difficulty of some of the questions, two respondents decided not to complete the survey.

### Statistical methods

The analysis was performed in PQ Stat version 1.6.6 with calculations performed using Microsoft Excel 2010. The significance level was set at  $p = 0.05$ . Respondents' level of knowledge was determined based on evaluation of their responses. For indicating the correct answer, the subjects obtained 1 point and 0 points were awarded for indicating the incorrect answer or a non-response. The results were summarized and recalculated on a percent scale (0 to 100 percent). Based on this, three groups were identified: people with low knowledge (having no more than 75% correct responses), people with an average level of knowledge (above 75% but not more than 85% correct responses) and people with a high level of knowledge (above 85% correct responses). Knowledge was the main dependent variable. Variables at nominal and ordinal levels were analyzed using tests based on the chi-squared distribution with a correction for continuity for 2x2 tables.

## RESULTS

### Descriptive data

The definition of allergy was known by 72.7% (109) of the respondents. Most who knew the definition were in the age groups of 18–29 (82.8%; 29) and 30–41 (74.3%; 52). However, according to 23.3% (35) of participants, allergy was a respiratory disease. 4% (6) did not know the definition and they thought that allergy was either a gastrointestinal disease, rash or vomiting.

Causes of inhalation allergy were correctly identified by 80.7% (121) of participants, mostly in the age group of 18–29 (91.4%; 32); food allergy by 95.4% (143) with 100% (20) in the age group of 42–53; contact allergies by 66.7% (100) of which 22% (33) did not know the causes while 11.3% (17) indicated the wrong answer (Tab. 2). The most common allergic symptom in the multiple-choice question was correctly identified to be 'stuffy nose/runny nose' by 95.3% (143) of the respondents.

Table 1. Study group characteristics

Characteristics of the study group (n=150)		n	%
Age (years)	18–29	35	23.3
	30–41	70	46.7
	42–53	25	16.7
	54–65	20	13.3
Gender	women	92	61.3
	men	58	38.7
Education	basic	7	4.7
	secondary	43	28.7
	vocational	21	14
	higher	79	52.7
Place of residence	village	55	36.7
	city	95	63.3
Duration of allergic disease (years)	< 1	23	15.3
	1–3	54	36
	4–6	14	9.3
	> 6	59	39.3
Duration of allergy treatment (years)	< 1	42	28
	1–3	67	44.7
	4–6	12	8
	> 6	29	19.3
Type of treatment used	pills	93	62
	inhaled steroid drugs	55	36.7
	specific immunotherapy – vaccine	74	49.3
	ointments, skin creams	19	2.7
	eye drops	29	19.3
	ear drops	55	36.7
	not taking any treatment	22	14.7

n – number of respondents, % – percentage of all respondents, CI – confidence interval

The second and correct most common choice was 'conjunctivitis/tearing of the eyes' (80%; 120). Satisfactory knowledge of the most life-threatening allergy exacerbations was achieved by 79.3% (119) of the respondents who chose answers such as breathing disorders/shortness of breath/wheezing in the chest. Only 0.7% (1) thought that hives/itching could be a life-threatening symptom (Fig 1).

More than half of the respondents (53.3%; 80) had correct knowledge of how to act in the case of a severe allergic shortness of breath and symptoms that do not subside despite administration of medications. In the age group of 30–41, the management of very severe allergic dyspnea was known by 60% (42) of individuals. In the youngest age group, 42.8% (15) of respondents chose the correct answer, while 46.7% (78) did not know what to do in such a case, with most in the oldest age group 55% (11) (Tab. 3). Only 84.7% (127) of the examinees knew the definition of anaphylac-

Table 2. Knowledge about the causes and definition of allergies.

Definition and causes of allergies	Age (years)								n	%	p	95% CI	
	18-29		30-41		42-53		54-65					Low	Top
	n	%	n	%	n	%	n	%					
<b>What is an allergy?</b>													
Respiratory disease	5	14.3	17	24.3	8	32	5	25	35	23.3	< 0.001	0.168	0.309
Hypersensitivity of the immune system	29	82.8	52	74.3	16	64	12	60	109	72.7	< 0.001	0.648	0.796
Others	1	2.8	1	1.4	1	4	3	15	6	4	< 0.001	0.015	0.085
Total	35	100	70	100	25	100	20	100	150	100			
<b>What is an inhalation allergy?</b>													
It is a reaction to allergens found in food	0	0.0	6	8.6	1	4	1	5	8	5.3	< 0.001	0.023	0.102
It is a reaction to allergens in chemical substances	1	2.9	1	1.4	2	8	3	15	8	5.3	< 0.001	0.023	0.102
It is a reaction to airborne allergens	32	91.4	58	82.9	18	72	14	70	121	80.7	< 0.001	0.734	0.867
I don't know what inhalation allergy is	2	5.7	5	7.1	4	16	2	10	13	8.7	< 0.001	0.047	0.144
Total	35	100	70	100	25	100	20	100	150	100			
<b>What is a food allergy?</b>													
It is a reaction to allergens in foods	34	97.1	68	97.2	25	100	16	80	143	95.4	< 0.001	0.906	0.981
It is a reaction to allergens in chemical substances	0	0	1	1.4	0	0.0	1	5	2	1.3	< 0.001	0.002	0.047
It is a reaction to airborne allergens	1	2.9	0	0	0	0.0	1	5	2	1.3	< 0.001	0.002	0.047
I don't know what a food allergy is	0	0.0	1	1.4	0	0.0	2	10	3	2	< 0.001	0.004	0.057
Total	35	100	70	100	25	100	20	100	150	100			
<b>What do you think can be a contact allergy?</b>													
It is a reaction caused by house dust mites	2	5.7	7	10	2	8	1	5	12	8	< 0.001	0.042	0.136
It is a reaction to the food eaten	1	2.9	2	2.9	0	0.0	1	5	5	3.3	< 0.001	0.011	0.076
It is a reaction caused by chemical substances, e.g. hair dye, perfumes, creams	26	74.3	50	71.4	18	72	7	35	100	66.7	< 0.001	0.585	0.741
I don't know what contact allergy is	6	17.1	11	15.7	5	20	11	55	33	22	< 0.001	0.157	0.295
Total	35	100	70	100	25	100	20	100	150	100			

n – number of respondents, % – percentage of all respondents, CI – confidence interval.

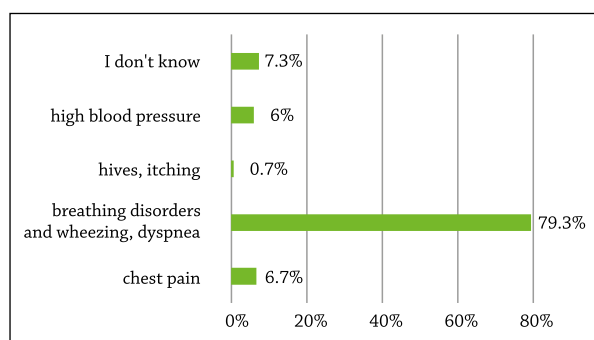


Fig. 1. Life-threatening complications of allergies

tic shock. All age groups showed a sufficient or high level of knowledge in this subject. The concept was more commonly known to women 90% (83) than to men 74.1% (43). 10% (15) did not know the definition (women 7.6%, 7; men 13.8%, 8) while 5.3% (8) chose the incorrect answer.

In the multiple-choice questions, participants were asked to demonstrate their knowledge about actions to

take in the case of anaphylactic shock by choosing the answers: 'administering the EpiPen' 41.3% (62), with females having a higher knowledge level (30%; 45) than men (11.3%; 17) but not sufficient; and 'calling an ambulance' answered by 63.2% (95). In this group of respondents, only 40.7% (61) female and 26.7% (34) men chose the correct answer. Presented with such a situation, 16% (24) of the subjects did not know what to do (women 10%, 6.7; men 9.3%, 14), while 12.4% (15) had incorrect knowledge of how to act in this case (Tab. 4). Information about allergies and their causes and prevention was sufficiently known by most respondents (average: 37.3%, 56; high: 18.7%, 28), as well as the diagnosis of allergy complications (Tab. 5).

A statistically significant correlation between level of knowledge about allergies and knowledge sources was found for books as well as the internet and doctor's consultations ( $p < 0.05$ ). To obtain this information, 68.7% (103) spoke to their doctor but only 18% (27) spoke to a nurse (Tab. 6). In the self-assessment, 87.3% (131) of respondents believed that allergology education is use-

Table 3. Management of very severe allergic dyspnea.

Treatment in case of very severe shortness of breath related to allergies; constant symptoms despite the administration of drugs	Age (years)								n	%	p	95% CI	
	18-29		30-41		42-53		54-65					Low	Top
	n	%	n	%	n	%	n	%					
Going to bed and putting cold compress on the chest	1	2.9	3	4.3	0	0.0	0	0.0	4	2.7	<0.001	0.007	0.067
Opening the window	1	2.9	3	4.3	0	0.0	0	0.0	4	2.7	<0.001	0.007	0.067
Taking calcium	3	8.6	6	8.6	4	16	7	35	20	13.3	<0.001	0.083	0.198
Going to a family doctor's clinic	10	28.5	16	22.8	5	20	3	15	34	22.7	<0.001	0.162	0.302
Calling an ambulance	15	42.8	42	60	14	56	9	45	80	53.3	0.463	0.450	0.615
I don't know	5	14.3	0	0.0	2	8	1	5	8	5.3	<0.001	0.023	0.102
Total	35	100	70	100	25	100	20	100	150	100			

n - number of respondents, % - percentage of all respondents, CI - confidence interval.

Table 4. Knowledge about anaphylactic shock.

Definition of anaphylactic shock and management of its occurrence	Age (years)								Gender				n	%	p	95% CI	
	18-29		30-41		42-53		54-65		women		men					Low	Top
	n	%	n	%	n	%	n	%	n	%	n	%					
What is an anaphylactic shock?																	
The body's reaction manifested by high pressure	0	0.0	2	2.9	1	4	0	0	0	0	3	5.2	3	2	<0.001	0.004	0.057
The body's reaction to an allergen that can lead to death	32	91.4	61	87.1	20	80	14	70	83	90.2	44	75.8	127	84.7	<0.001	0.779	0.900
The body's reaction manifested as a decrease in blood glucose levels	1	2.8	1	1.4	2	8	1	5	2	2.2	3	5.2	5	3.3	<0.001	0.007	0.067
I don't know what anaphylactic shock is	2	5.7	6	8.6	2	8	5	25	7	7.6	8	13.8	15	10	<0.001	0.057	0.160
Total	35	100	70	100	25	100	20	100	92	100	58	100	150	100			
What should you do in case of shock?*																	
Administer antihypertensive drugs	0	0.0	2	2.1	0	0.0	1	3.7	2	1.3	1	0.7	3	2	0.25	0.292	1.000
Administer the EpiPen	18	38.3	22	23.6	13	40.6	9	33.3	45	30	17	11.3	62	41.3	<0.001	0.942	1.000
Give something sweet to eat	1	2.1	3	3.2	1	3.1	1	3.7	3	2	3	2	6	4	0.031	0.541	1.000
Give plenty of water to drink	1	2.1	5	5.4	0	0	1	3.7	4	2.7	3	2	7	4.7	0.016	0.590	1.000
I don't know what to do in this case	6	13.7	9	9.7	5	15.6	4	14.8	10	6.7	14	9.3	24	16	<0.001	0.858	1.000
Call an ambulance	21	44.7	51	54.8	12	37.5	11	40.7	61	40.7	34	26.7	95	63.3	<0.001	0.962	1.000
Other	0	0.0	0	0.0	1	3.1	0	0.0	1	0.7	0	0.0	1	0.7	1	0.025	1.000

n - number of respondents, % - percentage of all respondents, CI - confidence interval, \* - percentages do not sum up to 100% as it was a multiple-choice question.

Table 5. Level of knowledge about allergies, causes, prevention and complications

Level of knowledge about:	n	%	p	95% CI	
				Low	Top
<b>Allergies, causes and prevention</b>					
Low level	66	44	0.165	0.359	0.523
Average level	56	37.3	0.002	0.296	0.456
High level	28	18.7	<0.001	0.128	0.258
<b>Allergy complications</b>					
Low level	65	43.3	0.121	0.353	0.517
Average level	36	24	<0.001	0.174	0.316
High level	49	32.7	<0.001	0.252	0.408

n - number of respondents, % - percentage of all respondents

ful to minimize the occurrence of allergies and complications. Only 4.7% (7) declared that such education has no influence on the occurrence of allergies.

The study found a correlation between respondents' self-assessment of knowledge about allergies and their actual knowledge of anaphylactic shock  $p < 0.05$  (Tab. 7). Of participants who responded that they had a high level of knowledge, 94.3% (50) answered the question about anaphylactic shock correctly.

## Discussion

There is limited research in the literature related to patient knowledge about allergies and associated preventative measures and complications. Only a few authors have attempted to conduct some research in this area. Therefore, the literature for this discussion was determined by the convergence of the scope of the study (knowledge level) and not the respondent group. The results of the study were compared with the work of researchers dealing with other diseases such as diabetes and hypertension.

## Key results

In this self-reported questionnaire study, participants exhibited a higher level of knowledge about allergic complications compared with causes of allergies and their prevention. Awareness about recognizing complications of allergies and the definition of anaphylactic shock was satisfactory, but not sufficient. What is more, respondents knew little about the steps to take in the case of anaphylactic shock in a home situation. Physician engagement in patient education was at a good level while engagement from nursing staff appeared to be abnormally low. In most cases, patients used the internet for information on allergies as they experienced difficulties associated with accessibility to the Allergy Department at the hospital.

## Interpretation

Knowing the basic definitions of a disease is a prerequisite for further health education. In the question about the definition of allergy, 72.7% (109) of the respondents confirmed their knowledge of it. The

Table 6. Sources of allergy knowledge and level of knowledge.

How do you learn about allergies?		Allergy Knowledge			Test result	
		Lowest level	Medium level	High level		
I read books	n	2	11	8	$\chi^2 = 9.819$ df = 2 p = 0.007	
	%	9.5	52.4	38.1		
I do not use this source	n	59	41	29		
	%	45.7	31.8	22.5		
I talk to a doctor	n	36	35	32		$\chi^2 = 8.146$ df = 2 p = 0.017
	%	35.0	34.0	31.1		
I do not use this source	n	25	17	5		
	%	53.2	36.2	10.6		
I talk to a nurse	n	7	13	7	$\chi^2 = 3.507$ df = 2 p = 0.173	
	%	25.9	48.1	25.9		
I do not use this source	n	54	39	30		
	%	43.9	31.7	24.4		
I use the Internet	n	30	39	29	$\chi^2 = 11.953$ df = 2 p = 0.003	
	%	30.6	39.8	29.6		
I do not use this source	n	31	13	8		
	%	59.6	25.0	15.4		

n – number of respondents, % – percentage of all respondents p – materiality;  $\chi^2$  – test statistics; df – degrees of freedom.

Table 7. Self-assessment of knowledge about allergies and anaphylactic shock.

What do you think an anaphylactic shock is?		How do you assess your knowledge of allergies?		Chi-square test result
		I know more than a little or a lot	I know little or do not know anything	
correct answer	n	50	77	$\chi^2 = 4.811$ df = 1 p = 0.028
	%	94.3	79.4	
invalid response	n	3	20	
	%	5.7	20.6	

n – number of respondents, % – percentage of all respondents, p – materiality;  $\chi^2$  – test statistics; df – degrees of freedom.

findings are consistent with a study that involved 100 patients hospitalized in the Gastroenterology and Hepatology Departments at the University of Warmia-Mazury hospital in Olsztyn in which 76% of respondents correctly defined an allergy to be 'an organism's response to an allergen – a sensitizer' [30].

The level of knowledge of patients' about the diagnosis of allergic complications was satisfactory but not sufficient. The question that assessed this revealed that only 32.7% (49) of respondents had a high level of awareness, 24.0% (36) average, while 43.3% (65) had a low level of knowledge. Given that 73% (109) of the study group was treated for allergies for more than a year and 86% (129) had some treatment, greater awareness and knowledge of allergic complications was expected. The author, in asking this question in the survey, assumed that subjects who were being treated and those under specialized treatment would have a good understanding of complications. In subsequent studies, it may be considered whether a low level of patient knowledge on the subject may have a negative impact on the development of allergic diseases, irrespective of treatment.

The study also found that respondents showed a higher level of awareness of allergic complications than about their causes and prevention. In the group, 79.3% (190) reported the complications to be acute and life-threatening, which was correct, and 81.3% (120) identified them as late complications. In comparison, in a 2017 study that looked at type II diabetes complications, 97.1% of diabetics in the study demonstrated knowledge of early complications of the disorder and 98.6% about late complications [31]. Knowledge among diabetics about complications of their disease was thus much higher than that of allergies. Allergy is a more common disease than diabetes and both early and late complications can pose a risk to life, hence, it is necessary to more closely investigate causes of knowledge deficits in this disease area.

This study showed that level of knowledge pertaining to the definition of anaphylactic shock was insufficient as 14.5% (33) of the respondents did not know the concept. In a study by Jędrusek-Golińska et al. conducted among 222 non-allergic patients, 68% of them knew the concept of anaphylactic shock. A lower knowledge level of its definition in this study seems to support the assumption that people with the hypersensitivity have greater knowledge of the concept than those that are healthy [32].

In the same study, a question about management of anaphylactic shock before the arrival of an ambulance revealed that 12% of respondents would give adrenaline, 36% anti-allergic medicines, 51% would sustain vital functions and 18% did not know what to do in such a case [32]. Comparably, in this research study, in the case of a shock, respondents reported little knowledge of how to deal with the situation while at home. Only 63.3% (95) of subjects would call an emergency team, while 41.3% (62) would give an EpiPen. Of those

surveyed, 16% (24) would not know how to respond in such a situation. The results obtained in both studies show that the level of knowledge about shock and rescue is abnormally low. It is worrying that so few people would give adrenaline, which is now considered to be the standard of care in treating people undergoing anaphylactic shock [33].

The respondents indicated that conversation with a doctor 68.7% (103), followed by the internet 65.3% (98), were their main sources of medical knowledge. Nursing interviews were only a source of knowledge for 18% (27) of all subjects. The results were compared with a 2015 study titled 'Knowledge on Gluten and Gluten-Dependent Diseases' where nursing staff provided information to 2% of patients while 88% of participants received knowledge from the internet [34]. In studies from 2012 by Cichońska et al. in which nursing staff provided support to women with breast cancer, it was shown that for 86% of women, nurses were a source of knowledge on prophylaxis and prevention of chemotherapy complications. Nurses' knowledge of treatment was at a level of 78% [35]. Based on these studies, it may be speculated that whether nursing staff serve as a source of information about a disease largely depends on the disease itself.

According to self-reported studies, there is a clear deficit of nurses' participation in educating patients about allergies. It can be assumed that low accessibility to health care services might result in educational deficits among patients, leading them to obtain knowledge from the most available sources (i.e. the internet). After filling in the questionnaire, respondents explained the phenomenon of searching for information on the internet. As the main reason for turning to the internet, they pointed to doubts and questions they had about symptoms and exacerbation of the disease, which required immediate specialist consultation but was impossible because of accessibility issues. Research published by Hesse in the US revealed that 'Dr. Google' "treats more American patients than real doctors do," and that this internet phenomenon is perceived positively [36]. Similarly, Morrison et al. found that asthma patients, more often than others, looked for online information. Knowledge obtained this way significantly improved the quality of their lives, increased the feeling of safety and was complementary to information found on medications [37]. In their studies, Kłak et al. found that 97% of asthma and allergy patients obtain knowledge from the internet [38].

The phenomenon of the universality of internet knowledge, apart from its widespread benefits, carries a number of serious threats such as information overload, unreliability of the information, overuse of over-the-counter drugs, looking for alternative treatments, as well as decreased authority of contemporary health care institutions. A detailed analysis revealed the 'highest' and 'high' levels of knowledge about allergies came from consulting a doctor for 67% of respondents, and from using the internet for 68%. Such negligible dif-

ferences may suggest that patients in the study value both doctors and the internet as reliable sources of information.

The risk of allergic reactions and allergy exacerbations depends on public awareness on the subject of allergies, including causes of gastrointestinal, inhaled and contact hypersensitivity. In the study, patients were asked to self-assess their knowledge of allergies. Results showed that 32% (48) answered that 'they know a lot, but must complete the knowledge', while 56.7% (85) decided they have the knowledge but at an insufficient level. Only 2.7% (4) of respondents chose the option that they know nothing about it. In comparable studies in 2016 conducted among a group of 110 hypertensive patients, it was found that 55.4% answered that they know a lot about hypertension but need to complete their knowledge and 30% claimed to know nothing about the disease [39,40]. Therefore, it might be assumed that people suffering from allergic diseases reflect a higher level of self-assessed knowledge about their disorders compared with those with hypertension.

The studies showed that high self-assessment of allergy knowledge was confirmed by knowledge of life-threatening allergic symptoms. Patients who assessed their knowledge as 'high' or 'very high' also demonstrated a high level of knowledge of life-threatening symptoms 92% (138). However, a correlation between self-assessment levels and general symptoms was not found. The second confirmation of respondents' high knowledge levels was provided by the fact that they knew the definition of anaphylactic shock, with 94.3% (141) knowing what the shock is. However, among the group of patients whose self-assessed knowledge was low, 79.3% (118) knew its definition. These results give rise to the assumption that patients are fully aware of their knowledge deficits. Lack of knowledge about anaphylactic shock in the study group was alarming. Additionally, while examining the correlation between self-assessed knowledge about allergies and knowledge of how to proceed in the case of anaphylactic shock, it turned out that those who assess their knowledge as high did not always know how to act properly in the event of shock in home conditions (24.5%; 36).

### Limitations of the study

Limitations of the study included rigid patient admittance hours and the time devoted to allergic procedures. The findings in this study pertaining to knowledge about anaphylactic shock and allergic complications in people suffering from high-risk allergies, warrant further research on the subject.

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### Recommendations

The study was intended to show whether patients of the allergy clinic have knowledge of allergies and related conditions.

1. Causes of knowledge deficits in the diagnosis of conditions associated with exacerbations of allergies, including the handling of life-threatening situations, should be further investigated.
2. The risk of anaphylactic shock in allergic diseases is much higher than in healthy people. It is advisable to increase nursing educational activities in this area and to carry out a social educational campaign, particularly with respect to rescue procedures in the event of anaphylactic shock.
3. In subsequent studies, it should be evaluated whether low patient knowledge levels of allergy complications can have a negative impact on the development of allergic diseases, despite the treatment used.

### CONCLUSIONS

1. The overall level of patient knowledge of allergies, including their causes and prevention, is sufficient and allows for the identification of associated complications. On the other hand, knowledge about the diagnosis of complications of allergies is at a satisfactory but insufficient level.
2. Respondents showed a significantly higher level of knowledge about allergy complications than their causes and prevention. Level of knowledge about causes and how to prevent allergies is not reflected in the knowledge about the complication and how to act in cases of their occurrence.
3. High self-assessed knowledge levels did not predict subjects' identification of the most common symptoms of allergies and the management of their exacerbations, but was positively correlated with knowing the definition of anaphylactic shock.
4. Knowledge of the diagnosis of allergic exacerbations in allergy sufferers was insufficient. An understanding of the proper proceedings in life-threatening situations associated with an acute allergic disease and anaphylactic shock in home conditions was also poor.
5. Source of information is a significant factor that influences knowledge levels about allergies. Nurses were found to have an abnormally insufficient impact on patient knowledge of allergies and their complications.



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