



# Knowledge, attitudes, and behaviors of residents and specialists working in tertiary healthcare institutions about drug allergy

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## ABSTRACT

**Aims:** We evaluated the knowledge, attitudes, and behaviors of residents and specialists working in tertiary healthcare institutions about drug allergy.

**Methods:** Residents and specialist medical doctors working at a tertiary health institution were included in the study. A questionnaire consisting of questions evaluating occupational and demographic characteristics, knowledge, attitudes, and behaviors about drug allergy was prepared and administered to the participants.

**Result:** Only 26 (21.3%) of the participants had attended any training on drug allergies. Of the participants, 73 (59.8%) felt competent in taking and interpreting an accurate allergy history for drugs. Of the participants, 107 (87.7%) knew that it is often impossible to reach a definite conclusion about drug allergy based on anamnesis alone. Only half of the participants stated that they could spare enough time for detailed anamnesis about drug allergy in their daily practice. Only 19 (15.6%) of the participants stated that they referred patients with suspected drug allergies to an allergist at a rate of 90-100%. When the answers of the assistant and specialists were compared; the proportion of respondents to the question of the most important drug classes responsible for allergic reactions, including antibiotics and aspirin/other NSAIDs (28.9% vs. 67.7%;  $p<0.001$ ). And the rate of those who responded corticosteroids+antihistamines+adrenaline to the question of the most recommended drug classes to treat drug allergies was found to be higher in specialist physicians (19.8% vs. 71%;  $p<0.001$ ).

**Conclusion:** This cross-sectional study showed a low level of awareness, knowledge, and competency in the management of drug allergies among residents and specialists from different fields.

## Introduction

Drug allergy accounts for less than 10% of drug side effects (1). Drug allergies are seen in 1-2% of hospital admissions and 3-5% of hospitalized patients. However, the actual incidence of drug allergy in children and adults in the community is unknown. Because the diagnosis of allergic drug reactions is often based on history taking, diagnostic tests are not performed, past studies have been mostly conducted with selected patient groups or special reaction types and standardized questionnaires or tests

are not used in the evaluation, the data about the true frequency of hypersensitivity reactions due to drugs are limited (2-4).

It is often misleading to reach a diagnosis by only history taking in drug allergies. However, only 5-30% of cases with suspected drug allergies can be confirmed after the tests (5). However, both underdiagnosis (due to underreporting) and overdiagnosis (due to overuse of the term "allergy") are common, as the diagnosis of drug hypersensitivity is largely based on history (6).

Determining whether the drug is responsible for the allergic condition by applying an algorithmic approach using objective methods is an important practice in patients with suspected drug allergies. In this way, recurrent drug allergies can be prevented in patients, their anxiety about drug use can be reduced, and unnecessary drug restrictions can be avoided (7). Therefore, increasing the awareness of drug allergy among physicians in different specialties, especially among primary care and emergency physicians, is essential (8). Physicians should review the drug allergy history, particularly for the drugs they frequently recommend to their patients, to prevent potential drug reactions (9). Patients with a positive history should be informed to avoid using the related drug and other structurally similar drugs, along with a referral to an allergist for further evaluation (6,10).

Given the lack of sufficient data about the awareness of drug allergies among different specialties in the local context, this study evaluated the knowledge, attitudes, and behaviors of residents and specialists working in tertiary healthcare institutions about drug allergies.

## Methods

A cross-sectional survey was designed in accordance with the Declaration of Helsinki and the Good Clinical Practice Guidelines. The study was approved by the Ankara City Hospital Ethics Committee (protocol no: E2-21-270, date: 10.03.2021).

The study population included residents and specialists working in a tertiary healthcare institution, over the age of 18 who agreed to participate in the study. The following questionnaire was used to evaluate the knowledge, attitudes, and behaviors about drug allergy;

### Questionnaire

1. **How do you assess the clinical significance of drug allergies in your daily practice?**
  - a. Critical
  - b. Important
  - c. Less important
2. **How often do you encounter patients with drug allergies in your current clinical practice?**
  - a. Every day
  - b. 1-2 times a week
  - c. Every 2-3 months
  - d. Almost never
3. **Can you spare enough time for detailed anamnesis about drug allergy in your daily practice?**
  - a. Yes
  - b. No
4. **Do you feel competent to take and interpret an accurate history of allergy to drugs?**
  - a. Yes
  - b. No
5. **Do you think it is often possible to reach a definite conclusion about drug allergy based on anamnesis alone?**
  - a. Yes
  - b. No
6. **Have you attended any training on drug allergies?**
  - a. Yes
  - b. No
7. **In the presence of which of the following clinical conditions that develop after drug intake, do you suspect drug allergy? (you can tick more than one option)**
  - a. Urticaria plaques
  - b. Localized/generalized angioedema
  - c. Eczematous/maculopapular/bullous skin rashes
  - d. Bronchospasm (cough, shortness of breath, wheezing)
  - e. Gastrointestinal findings (nausea-vomiting, diarrhea)
  - f. Rhinitis, conjunctivitis
  - g. Laryngeal edema
  - h. Hypotension
  - i. Anaphylaxis
8. **What percentage of patients with suspected drug allergies have you referred to an allergist?**
  - a. <10%
  - b. 20-40%
  - c. 50-80%
  - d. 90-100%
9. **What is your first advice to a patient with a suspected drug allergy?**
  - a. I tell the patients to avoid the drug that causes the allergic reaction
  - b. I give information about drug allergy
  - c. I have placed a consultation at the allergic diseases department
  - d. I refer the patient to the dermatology department
  - e. I have suggested another drug that he can use orally without testing
  - f. I tell the patients to avoid the drug that causes the allergic reaction and provide information about drug allergy
  - g. I tell the patients to avoid the drug that causes the allergic reaction and refer them to the allergic diseases department

**10. Is there an allergic disease clinic in your workplace?**

- a. Yes
- b. No
- c. I don't know

**11. Would you ask a patient describing a drug allergy if he/she has a drug allergy promotion card/tag/necklace?**

- a. Yes
- b. No

**12. What are the most important classes of drugs that you consider responsible for allergic reactions?**

- a. Antibiotics
- b. Aspirin/Other NSAIDs
- c. Muscle relaxants
- d. Flu medications

**13. Proton pump inhibitors/H<sub>2</sub> receptor antagonists/ Radiocontrast agent**

- a. Local/General anesthetics
- b. Vaccines

**14. What are the most recommended classes of drugs for treating drug allergies?**

- a. Corticosteroids
- b. Antihistamines
- c. Adrenalin
- d. Alternative treatments
- e. I do not know

**15. How do you evaluate the effectiveness of alternative methods, such as acupuncture and homeopathy, in the diagnosis and treatment of drug allergies?**

- a. Very effective
- b. Effective
- c. Ineffective
- d. I don't know

**Statistical Analysis**

Statistical analysis was performed using the Statistical Package for Social Sciences 18 (SPSS) for Windows 20 (IBM SPSS Inc., Chicago, IL). The normality of the distribution was evaluated with the Kolmogorov-Smirnov test. Numeric variables showing normal distribution were displayed as mean  $\pm$  standard deviation, and skewed numeric variables were displayed as median (minimum-maximum). Categorical variables are expressed as numbers and percentages. The chi-square test was used to compare the differences between the categorical variables in the residents and specialists.  $P < 0.05$  was considered significant.

**Results**

The study population consisted of 122 participants, 91 residents, and 31 specialists. The mean age was  $30.3 \pm 6.4$  years (range: 24-65 years) and there was a 1:1 ratio between women and men. Most participants were medical doctors working in the internal medicine department (82.8%).

The answers given by the participants to the survey questions are shown in Table 1. Only 26 (21.3%) of the participants had attended any training on drug allergies. However, 73 (59.8%) of the participants felt competent/sufficient to take an accurate allergy history for drugs and interpret it. Of the participants, 107 (87.7%) knew that it is often impossible to reach a definite conclusion about drug allergy based on anamnesis alone. Only half of the participants stated that they could spare enough time for detailed anamnesis about drug allergy in their daily practice. Only 19 (15.6%) of the participants stated that they referred patients with suspected drug allergies to an allergist at a rate of 90-100%. When the responses from the residents and specialists were compared; the proportion of respondents to the question of the most important drug classes responsible for allergic reactions was different in the two groups, including antibiotics and aspirin/other NSAIDs (28.9% vs 67.7%;  $p < 0.001$ ). The rate of responses to corticosteroids+antihistamines+adrenaline as the most recommended drug classes to treat drug allergies, was also different and higher among specialists (19.8% vs. 71%;  $p < 0.001$ ). The proportion of participants who received training on drug allergies (26.4% vs. 6.5%;  $p = 0.022$ ) and the proportion of correct responses to the question of which clinical conditions that develop following exposure to a drug may suggest drug allergies were lower among the specialists (49.5% vs. 6.5%;  $p < 0.001$ ).

**Discussion**

We conducted this study to evaluate the level of knowledge about drug allergies among residents and specialists in a tertiary healthcare institution. Drug allergies are not considered direct drug side effects. Moreover, they account for a small proportion of unwanted side effects associated with drugs. Several risk factors take part in the development of drug-induced allergic reactions. These are primarily the drug-related, personal, immunogenic, and pharmacogenetic factors and comorbidities. Considering these risk factors, it is often unpredictable whether a drug-induced allergic reaction may develop or not. Therefore, health teams working in emergency departments, outpatient services, clinics, or intensive care units should be well-equipped about drug allergies.

During the COVID-19 pandemic, when the vaccines, a glimmer of hope at the end of the pandemic, came into use, allergic reactions related to vaccines undoubtedly came to the fore in the whole society. Vaccines were not given due to the fear of an allergic reaction due to the vaccine in many cases.

**Table 1. Questionnaire on knowledge, attitudes and behaviors of residents and specialists about drug allergy**

Questions	Total (n=122)	Assistants (n=91)	Specialists (n=31)	p value
<b>How do you assess the clinical significance of drug allergies in your daily practice?</b>				
Very important	69 (56.6%)	50 (54.9%)	19 (61.3%)	0.545
Important	48 (39.3%)	36 (39.6%)	12 (38.7%)	
Less important	5 (4.1%)	5 (5.5%)	0 (0)	
<b>How often do you encounter patients with drug allergies in your current clinical practice?</b>				
Every day	0	0	0	0.249
1-2 times a week	19 (15.6%)	16 (17.6%)	3 (9.7%)	
Every 2-3 months	79 (64.8%)	60 (65.9%)	19 (61.3%)	
Almost never	24 (19.7%)	15 (16.5%)	9 (29.0%)	
<b>Can you spare enough time for a detailed anamnesis about drug allergy in your daily practice?</b>				
Yes	61 (50.0%)	48 (52.7%)	13 (41.9%)	0.406
No	61 (50.0%)	43 (47.3%)	18 (58.1%)	
<b>Do you feel competent/competent to take and interpret an accurate history of allergy to drugs?</b>				
Yes	73 (59.8%)	59 (64.8%)	14 (45.2%)	0.060
No	49 (40.2%)	32 (35.2%)	17 (54.8%)	
<b>Do you think it is often possible to reach a definite conclusion about drug allergy based on anamnesis alone?</b>				
Yes	15 (12.3%)	12 (13.2%)	3 (9.7%)	0.758
No	107 (87.7%)	79 (86.8%)	28 (90.3%)	
<b>Have you attended any training on drug allergies?</b>				
Yes	26 (21.3%)	24 (26.4%)	2 (6.5%)	0.022*
No	96 (78.7%)	67 (73.6%)	29 (93.5%)	
<b>What percentage of patients with suspected drug allergies have you referred to an allergist?</b>				
<10%	54 (44.3%)	45 (49.5%)	9 (29.0%)	0.036*
20-40%	25 (20.5%)	13 (14.3%)	12 (38.7%)	
50-80%	24 (19.7%)	18 (19.8%)	6 (19.4%)	
90-100%	19 (15.6%)	15 (16.5%)	4 (12.9%)	
<b>Urticaria plaques</b>				
Localized/generalized angioedema	103 (84.4%)	83 (91.2%)	20 (64.5%)	0.999
<b>Eczematous/maculopapular/bullous skin rashes</b>				
Bronchospasm (cough, shortness of breath, wheezing)	83 (68.0%)	73 (80.2%)	10 (32.3%)	<0.001*
<b>Gastrointestinal findings (nausea-vomiting, diarrhea)</b>				
Rhinitis, conjunctivitis	119 (97.5%)	89 (97.8%)	30 (96.8%)	0.999
<b>Rhinitis, conjunctivitis</b>				
Laryngeal edema	82 (67.2%)	67 (73.6%)	15 (48.4%)	0.018*
<b>Laryngeal edema</b>				
Hypotension	55 (45.1%)	48 (52.7%)	7 (22.6%)	0.007*
<b>Hypotension</b>				
Anaphylaxis	118 (96.7%)	87 (95.6%)	31 (100.0%)	0.546
<b>Anaphylaxis</b>				
Hypotension	108 (88.5%)	79 (86.8%)	29 (93.5%)	0.49
<b>Anaphylaxis</b>				
Anaphylaxis	117 (95.9%)	89 (97.8%)	28 (90.3%)	0.197

<b>Table 1. Continued</b>				
<b>Questions</b>	<b>Total (n=122)</b>	<b>Assistants (n=91)</b>	<b>Specialists (n=31)</b>	<b>p value</b>
<b>What percentage of patients with suspected drug allergies have you referred to an allergist?</b>				
<10%	54 (44.3%)	45 (49.5%)	9 (29.0%)	0.036*
20-40%	25 (20.5%)	13 (14.3%)	12 (38.7%)	
50-80%	24 (19.7%)	18 (19.8%)	6 (19.4%)	
90-100%	19 (15.6%)	15 (16.5%)	4 (12.9%)	
<b>What is your first advice to a patient with suspected drug allergy?</b>				
I tell the patient to avoid the drug that causes the allergic reaction	91 (74.6%)	78 (77.2%)	13 (61.9%)	0.173
I give information about drug allergy	12 (9.8%)	10 (9.9%)	2 (9.5%)	
I place a consultation at the allergic diseases department	10 (8.2%)	7 (6.9%)	3 (14.3%)	
I refer the patient to the dermatology department	1 (0.8%)	0	1 (4.8%)	
I suggest another drug that he can use orally without testing	5 (4.1%)	3 (3.0%)	2 (9.5%)	
I tell the patient to avoid the drug that causes the allergic reaction and give information about drug allergy	2 (1.6%)	2 (2.0%)	0	
I tell the patient to avoid the drug that causes the allergic reaction and refer to the allergic diseases department	1 (0.8%)	1 (1.0%)	0	
<b>Is there an allergic diseases clinic in your workplace?</b>				
Yes	92 (75.4%)	69 (75.8%)	23 (74.2%)	<0.001*
No	9 (7.4%)	1 (1.1%)	8 (25.8%)	
I don't know	21 (17.2%)	21 (23.1%)	0 (10%)	
<b>Would you ask the patient describing a drug allergy if he/she has a drug allergy promotion card/tag/necklace?</b>				
Yes	54 (44.3%)	48 (52.7%)	6 (19.4%)	0.001*
No	68 (55.7%)	43 (47.3%)	25 (80.6%)	
<b>What are the most important classes of drugs you consider responsible for allergic reactions?</b>				
Antibiotics	114 (93.4%)	83 (91.2%)	31 (100.0%)	0.198
Aspirin/Other NSAIDs	55 (45.1%)	34 (37.4%)	21 (67.7%)	0.006*
Muscle relaxants	15 (12.3%)	8 (8.8%)	7 (22.6%)	0.089
Flu medications	8 (6.6%)	5 (5.5%)	3 (9.7%)	0.695
Proton pump inhibitors/H <sub>2</sub> receptor antagonists/ Radiocontrast agent	4 (3.3%)	3 (3.3%)	1 (3.2%)	0.999
Local/General anesthetics	68 (55.7%)	40 (44.0%)	28 (90.3%)	<0.001*
Vaccines	27 (22.1%)	16 (17.6%)	11 (35.5%)	0.047*
Antibiotics	35 (28.7%)	26 (28.6%)	9 (29.0%)	0.999
<b>What are the most recommended classes of drugs for treating drug allergies?</b>				
Corticosteroids	68 (55.7%)	51 (50.5%)	17 (81.0%)	0.021*
Antihistamines	93 (76.2%)	73 (72.3%)	20 (95.2%)	0.049*
Adrenalin	57 (46.7%)	44 (43.6%)	13 (61.9%)	0.196
Alternative treatments	3 (2.5%)	3 (3.0%)	0	0.980
I do not know	1 (0.8%)	1 (1.0%)	0	0.999
<b>How do you evaluate the effectiveness of alternative methods such as acupuncture and homeopathy in the diagnosis and treatment of drug allergies?</b>				
Very effective	0	0	0	0.502
Effective	9 (7.4%)	7 (7.7%)	2 (6.5%)	
Ineffective	27 (22.1%)	18 (19.8%)	9 (29.0%)	
I don't know	86 (70.5%)	66 (72.5%)	20 (64.5%)	
NSAIDs: Non-steroidal anti-inflammatory drugs				

For this reason, we planned the current study to determine how much knowledge healthcare teams had about drug allergies.

We observed that approximately 20% of our study population had seldom encountered drug allergies. This is a significant finding because drug allergies are rare, contrary to what is known. It was determined that approximately 50% of the population did not have enough time to question their drug allergies while taking anamnesis. However, it was also determined that approximately 40% of the study population did not consider themselves sufficient to take anamnesis about drug allergies and interpret the results. Overall, these results did not differ between residents and specialists, suggesting the lack of anamnesis which is a fundamental practice to identify potential drug allergies in a tertiary healthcare institution. With the help of detailed anamnesis, whether the developing-allergic reaction is related to a drug hypersensitivity reaction and whether it is an immunogenic reaction or a non-immunogenic reaction can be evaluated (11,12). Additionally, information about the severity of the reaction, systemic involvement, and which organs are involved can be obtained through history taking (13-15). Nevertheless, approximately 87% of the study population thought that it was insufficient to draw a firm conclusion about drug allergies based on anamnesis alone. Considering the collected information, there seems an open area in the local context to increase the awareness of relevant history taking to assess past-allergic reactions to estimate potential future events.

We observed that specialists reported a lesser involvement in training in drug allergies compared with residents. Blurring of consciousness, tachycardia, tachypnea, hypotension, arrhythmia, urticaria plaques, general, or local angioedema, rhonchi, wheezing, wheezing, fixed drug eruptions and sweating are the frequently encountered findings in drug allergies. Concerning the responses, signs and symptoms of anaphylaxis, such as urticaria plaques, hypotension, laryngeal edema, and bronchospasm, were similarly marked by the two groups. However, the awareness of residents was higher in findings such as localized/generalized angioedema, gastrointestinal findings, rhinoconjunctivitis, and skin rashes (16,17).

Concerning the behavior of referring a patient to an allergist in case of a suspicious drug allergy, approximately 44% of the study population was identified with the lowest 10% positive responses. The rate of referral of the residents to allergy specialists was slightly higher than that of the specialist doctors. This finding suggests another point for improvement among physicians as such the need for an allergy specialist to determine the type of reaction through diagnostic tests, as well as to recommend safer alternatives and, in some cases, to perform desensitization.

The participants selected recommendations of “stopping the drug that causes an allergic reaction” and “referring to the allergy department” in case of allergic reactions related to a drug. Although this was a satisfactory finding, fewer than half of the participants did prepare a “drug allergy identification card, tag and necklace” for their patients. As such tags can be life-saving in patients presenting with confusion or severe symptoms (14), the information and awareness in this regard need to be improved.

Antibiotics, aspirin and other NSAIDs, and radiocontrast were the most selected agents responsible for allergic reactions, which is consistent with the general practice (10,18-20). The participants responded satisfactorily to the most commonly used medications to treat drug allergies, such as corticosteroids, antihistamines, and adrenaline. The awareness of specialists is higher in this regard. Knowledge and awareness of acupuncture and homeopathy for treating drug allergies were limited in the study group.

The main limitations of our study are its cross-sectional design and small sample size. The major strength is the inclusion of specialists at a high-level care facility. It should also be emphasized that the study provides a comparison between postgraduate specialists and fellows in training, enabling the determination of gaps in experience in early career medical doctors.

## Conclusion

In conclusion, the current study showed a low level of awareness and knowledge on the role of history taking about drug allergies, a low level of competency in the interpretation of an accurate drug allergy, and insufficient experience in recognizing the clinical conditions that may develop after taking a drug and guiding a patient with suspected drug allergy.

## Ethics

**Ethics Committee Approval:** The study was approved by the Ankara City Hospital Ethics Committee (protocol no: E2-21-270, date: 10.03.2021).

**Informed Consent:** A cross-sectional survey study.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Surgical and Medical Practices - Concept - Design - Data Collection or Processing - Analysis or Interpretation - Literature Search - Writing: H.A., E.S.Ş.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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