

EDUCATIONAL PROGRAMS

The awareness, practical approaches and attitude of health care professionals to drug hypersensitivity reactions in Armenia

KALIKYAN Zaruhi¹, HARUTYUNYAN Sona¹, HAKOBYAN Armine^{1,2}, TADEVOSYAN Artashes³, ALOYAN Tatevik², KOCHARYAN Seyran⁴, TADEVOSYAN Natalya⁵

Department of Clinical Immunology and Allergology, Yerevan State Medical University, Yerevan, Republic of Armenia. zkalikyan@yandex.ru

ABSTRACT

BACKGROUND: Drug hypersensitivity reactions (DHRs) is commonly encountered in clinical practice. This condition requires sufficient knowledge of health care professionals (HCPs) carrying for these patients.

OBJECTIVE: To assess the awareness, practices and attitudes to DHRs among HCPs in Armenia and to identify main problems and take appropriate measures.

MATERIALS AND METHODS: The 23-item questionnaire covering 3 domains - knowledge, practice and attitude - was developed and applied in an anonymous survey. Data were analyzed according to specialty, experience, type of medical facility and regions using Pearson's χ^2 and Fisher's exact tests.

RESULTS: A total of 381 respondents with response rate of 63.5 % took part in the survey. The gaps in knowledge/awareness about DHRs diagnosis and management, as well as in practical approaches were identified. The differences depending on specialty, duration of HCPs experience, working place both by geographical region and medical facility type were revealed. According to attitude rates the importance of creating a national registry of patients with severe DHRs (>95.0 %) and the need to introduce a clear algorithm for managing these patients (99.5 %) are highlighted.

CONCLUSIONS: Targeted educational programs are needed for better understanding of DHRs. The implementation of the national guidelines needs improvement. The approach used can be recommended for study of the problems in other areas of healthcare (*Tab. 4, Fig. 2, Ref. 15*). Text in PDF www.elis.sk

KEY WORDS: knowledge, awareness, attitude, practice, drug hypersensitivity reactions, health care professionals.

Introduction

Drug allergy (DA) is one of the most important public health issues because of the widespread growth in the medicine use, increased frequency of life-threatening cases and lack of unified principles for recognition and management of these patients (1–3). According to international recommendations, the term “allergy”

should be used in the case of proven immunological mechanism of drug reaction; therefore, it is preferable to use the definition – drug hypersensitivity reactions (DHRs) (4).

Current guidelines and protocols from the leading allergological associations facilitate the understanding of the problem, carrying out diagnostic procedures and managing patients in clinical practice. Nevertheless, these documents are mainly designed for narrow specialists – allergists-immunologists (5–8). Meanwhile, DHRs is a rather difficult problem for health care professionals (HCPs) who do not have specific knowledge on this issue that significantly affects clinical practice (5, 9, 10). We have found a number of works on knowledge level, attitude and practical approaches of HCPs to DHRs that revealed certain gaps in understanding the problem in the studied countries (11–14).

A National guideline for the management of patients with DHRs was adopted in Armenia in January 2019. Since this time the implementation of National guideline has been in process. The peculiarity of the healthcare system of Armenia is that allergology services are insufficient and almost entirely concentrated in the capital – Yerevan with lack of allergists-immunologists in the regions/marzes. This situation significantly complicates the management of patients with DHR and affects the effectiveness of

¹Department of Clinical Immunology and Allergology, Yerevan State Medical University after Mkhitar Heratsi, Yerevan, Armenia, ²Clinics of Allergy and Clinical Immunology, “Heratsi” No 1 University Hospital Complex, Yerevan, Armenia, ³Department of Public Health and Healthcare Organization, Yerevan State Medical University after Mkhitar Heratsi, Yerevan, Armenia, ⁴Science Department, Yerevan State Medical University after Mkhitar Heratsi, Yerevan, Armenia, and ⁵Scientific – Research Center, Yerevan State Medical University after Mkhitar Heratsi, Yerevan, Armenia

Address for correspondence: Zaruhi G KALIKYAN, MD, PhD, Department of Clinical Immunology and Allergology, Yerevan State Medical University, Koryun str. 2, Yerevan 0025, Republic of Armenia. Phone: +37493118845

Acknowledgements: The work was implemented by financial support of the Science Committee of Republic of Armenia, in the frames of the research project No 18T-3B157.

Tab. 1. Demographic characteristics of study participants.

Characteristic	No (%)
Gender	
Male	124 (32.5)
Female	257 (67.5)
Age groups	
18–24	31 (8.1)
25–34	164 (43.0)
35–44	85 (22.3)
45–54	56 (14.7)
55–64	34 (8.9)
> 65	11 (2.9)
Specialty	
Allergology – immunology	15 (3.9)
Primary care	53 (13.9)
Therapeutic specialties (except for those mentioned above)	102 (26.8)
Surgery	55 (14.4)
Anesthesiology/intensive-care	41 (10.8)
Obstetrics – gynecology	21 (5.5)
Dentistry	44 (11.5)
Pharmacy	22 (5.8)
Nursing	20 (5.2)
Other (radiology, etc.)	8 (2.1)
Geographical feature	
Yerevan	265 (69.6)
Regions/marzes	116 (30.4)
Type of medical facility	
Multidisciplinary hospital	223 (58.5)
Outpatient hospital/ambulatory	82 (21.5)
First aid station	11 (2.9)
Dental clinic	46 (12.1)
Pharmacy	19 (5.0)
Duration of clinical practice	
< 1 year	51 (13.4)
1 – 5 years	108 (28.3)
6 – 10 years	81 (21.3)
> 10 years	141 (37.0)

implementation of National guidelines in clinical practice. Thus, the objective of this study was to identify the main problems in the management of patients with DHRs in Armenia that are needed for appropriate measures to solve by assessment of the awareness, practices and attitudes of HCPs.

Material and methods

This study has been approved by the Ethics Committee of YSMU (Approval No 5/13.12.2018). The questionnaire was developed by the project working group involving allergists and public health specialists with consideration of the generally accepted KAP (knowledge, attitude and practice) principle as an effective tool (15) and the specifics of the national health system to best fit the tasks of the study. A preliminary questionnaire was validated in a pilot study conducted among 20 health care professionals. The final version of questionnaire was grouped as follows – 6 personal questions and 17 core ones. The core questions covered 3 domains: knowledge/awareness contained from 5 questions, practice and working experience from 7 questions and the attitude pattern to the DHRs issue – 5 questions.

The main survey by the revised questionnaire has been carried out from December 2019 to February 2020. The questionnaire was sent by an e-mail to HCPs registered in the databases of YSMU and specialized consulting platforms operating in Armenia. The mailing was done on the basis of a random, blind and non-repeating sample with a weekly frequency – 50 mailings per week. The questionnaire was delivered to 600 email addresses, according to a pre-calculated sample size. A total of 381 respondents over the age of 18 with 63.5 % responses rate took part in the survey. The main demographic characteristics of the study participants HCPs are presented in the Table 1.

The findings were analyzed according to profession, self-reported experience, type of medical facility and regions. Data was entered into Microsoft Excel 2013, cleaned to detect any missing or invalid variable and then imported to SPSS ver. 16.0 (SPSS Inc., Chicago, IL, USA) for analysis. The ratios of correct answers in each domain were calculated in percentage (%). Comparison between the variables was done by Pearson's χ^2 test and Fisher's exact test was used in the case of small samples. A two-tailed test was performed and a probability value of less than 0.05 was considered statistically significant and less than 0.01 highly significant.

Results

The answers of the respondents by gender, age, specialty, geographic region, and type of medical facility, as well as by duration of clinical practice were analyzed.

Knowledge/awareness

In the first domain of questionnaire on the knowledge/awareness of HCPs about the DHRs problem, which is clearly reflected in the national guidelines, for 3 questions a choice of correct answers from 5 options was assumed, and for the remaining 2 questions the answers were “yes”, “no”, “I do not know”.

To the question of “who and when should carry out tests with medicines”, the correct answer - “only allergists should do it according to strict indications”, was given by 60.4 % of the respondents. The question on which drugs can be tested, was answered correctly by 36.5 % of the respondents – “these can be drugs that have caused reactions in the past, if there is no alternative to them and/or their analogues in order to find a safe alternative”, and 56.4 % of respondents gave the correct answer “epinephrine/adrenaline” to the question of which drug is the first line recommended medication for drug anaphylaxis (Fig. 1).

While analyzing the answers by the specialties the largest number of correct answers was by allergists-immunologists. The difference was statistically highly significant for questions A and C ($p < 0.01$) and insignificant for question B ($p > 0.05$). The smallest number of correct answers was received from the paramedical staff/nurses and other professionals. At the same time, the high rate of correct answers to question C was registered in anesthesiologists-intensive-care professionals, with reaching statistically high significance ($p < 0.01$) (Tab. 2).

Tab. 2. Prevalence of correct answers of health care professionals to the questions on knowledge about DHRs by specialty.

Question	Specialty									
	AI (n=15)	PC (n=53)	T (n=102)	S (n=41)	IC (n=55)	OG (n=21)	D (n=44)	PH (n=22)	N (n=20)	Oth (n=8)
Who and when must hold tests of drugs?	14 (93.3)*	28 (52.8)	69 (67.6)	27 (65.9)	33 (60)	11 (52.4)	24 (54.6)	11 (50)	11 (55)	2 (25)
Which drugs can be hold test with?	7 (46.7)	18 (34)	43 (42.3)	15 (36.6)	19 (34.6)	9 (42.9)	13 (29.6)	9 (40.9)	2 (10)	1 (12.5)
Which is the first line drug in case of anaphylaxis?	14 (93.3)*	28 (52.8)	62 (60.8)	20 (48.8)	50 (90.9)*	5 (23.8)	22 (50)	8 (36.4)	3 (15)	3 (37.5)

Values are presented as number (%). AI – allergology-immunology, PC – primary care, T – therapeutic specialties, S – surgical specialties, IC – anesthesiology – intensive care, OG – obstetrics – gynecology, D – dentistry, PH – pharmacy, N – nurses, Oth – other specialties. * The difference was statistically highly significant ($p < 0.01$).

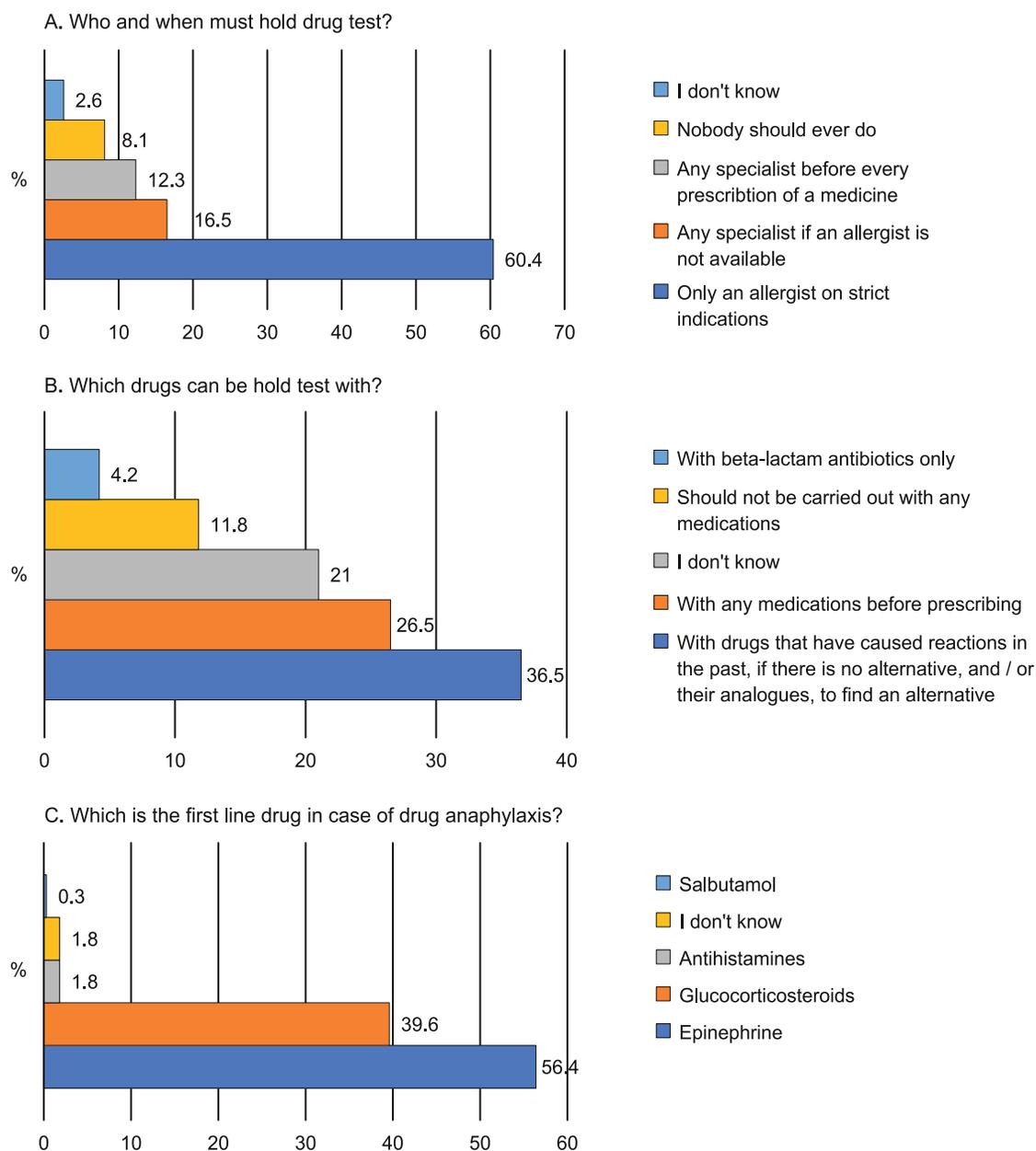


Fig. 1. Prevalence of answers of health care professionals to the questions on knowledge about DHRs

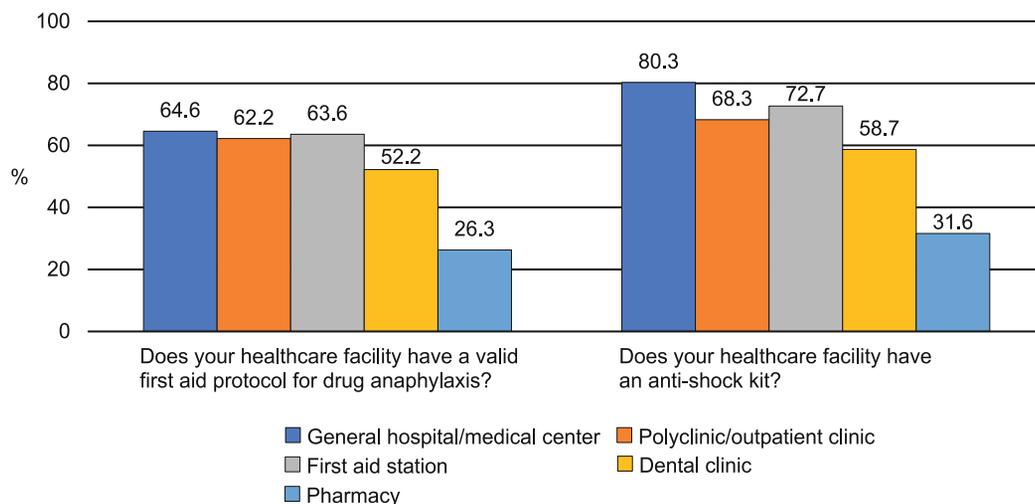


Fig. 2. Awareness of health care professionals about the existence of a valid first aid protocol for drug anaphylaxis and an anti-shock first-aid kit by type of medical facility.

Depending on the regions, the answers (correct and incorrect) of the questioned HCPs working in Yerevan ($n = 265$) and marzes ($n = 116$) were distributed as follows:

- Correct answers to the question of “who and when should carry out drug test” were provided by 66.4 % and 46.6 % of HCPs, respectively in Yerevan and marzes; the difference was highly significant in Yerevan, $p < 0.01$. The incorrect answer that “drug tests should be done by any doctor if an allergist is not available” was chosen by 13.2 % and 24.1 % of the respondents, correspondingly, with highly significant difference in values ($p < 0.01$).
- 35.5 % and 38.8 % of respondents, respectively in Yerevan and marzes, answered correctly to the question of “which drugs can be used for testing”, but the difference was insignificant ($p > 0.05$).
- While asking “which drug is the first-line drug for anaphylaxis”, the correct answer was given by 59.6 % and 49.1 %, respectively in Yerevan and regions, with no significant difference in values ($p > 0.05$). At the same time, “glucocorticoids” as the incorrect answer were chosen by 35.8 % of HCPs in Yerevan, and 48.3 % of respondents from regions with significant differences in values ($p < 0.05$).

The positive answers to the questions on the awareness about the valid first aid protocol in drug anaphylaxis and existing anti-shock kit in medical facility were provided by 60.6 % and 72.4 % respondents, correspondingly. 54.9 % of the respondents answered positively to both questions. Analysis by type of medical facility showed that positive responses predominated in hospital staff – 64.6 % and 80.3 %, as well as at first aid stations – 63.6 % and 72.7 %, accordingly, with no statistical significance ($p > 0.05$) (Fig. 2). Meanwhile, of 231 respondents who answered positively to the question on valid protocol, only 58.9 % knew that epinephrine is the first-line medication for drug anaphylaxis ($p > 0.05$).

Approaches and experience

The second domain of questionnaire consisting of 7 questions: 4 of which were on practical approaches to DHR patients’ management and 3 questions on clarifying how often these patients in general and with severe DHRs in particular, occur in clinical practice. The responses of allergists-immunologists were excluded from analysis of these questions to obtain a more precise pattern. The biggest differences were revealed when analyzed by the level of experience but with no statistical significance ($p > 0.05$) (Tab. 3).

Attitude

The third domain of the questionnaire consisted of 5 questions on the attitude of HCPs to some aspects of DHR. The responses were estimated on 4-point Likert scale. The analysis of the results did not reveal statistically significant differences in any of the distributions – by specialty, region, and type of medical facility and duration of clinical practice. The Table 4 presents the results obtained on attitude study.

Discussion

Our study was aimed at identifying the level of HCPs knowledge on the key principles of DHR patient management stated in the national guidelines and, particularly, on DHR issue, mechanisms, diagnostic methods and treatment (11–14).

The analysis of the responses to the question of “who and when should carry out drug tests” showed that the basic principle as “only allergists should do this and according to strict indications” knew only about 60 % of questioned (4, 6, 7). Analysis by specialty showed that more than 93 % of allergists-immunologists answered correctly, which is completely logical. In other specialties the number of correct answers ranged from 25 % (other

Tab. 3. Approaches and experience of health care professionals in management of DHR patients by the duration of clinical practice.

Question	Duration of clinical practice				Total (n=366)
	>1 year (n=48)	1–5 years (n=105)	6–10 years (n=80)	<10 years (n=133)	
Do you ask if the patient is allergic to drugs?					
Always	40 (83.3)	92 (87.6)	66 (82.5)	112 (84.2)	310 (84.7)
Sometimes	6 (12.5)	13 (12.4)	14 (17.5)	20 (15.0)	53 (14.5)
Never	2 (4.2)	0 (0)	0 (0)	1 (0.8)	3 (0.8)
Do you refer your patients to an allergist if it turns out that they have DHR?					
Always	14 (29.2)	30 (28.6)	15 (18.8)	29 (21.8)	88 (24.0)
Often	5 (10.4)	10 (9.5)	6 (7.5)	13 (9.8)	34 (9.3)
Sometimes	15 (31.3)	39 (37.1)	38 (47.5)	39 (29.3)	131 (35.8)
Never	14 (29.2)	26 (24.8)	21 (26.3)	52 (39.1)	113 (30.9)
Do you perform /prescribe drug test?					
Always	2 (4.2)	3 (2.9)	2 (2.5)	9 (6.8)	16 (4.4)
Sometimes	9 (18.8)	24 (22.9)	19 (23.75)	41 (30.8)	93 (25.4)
Occasionally	25 (52.1)	53 (50.5)	34 (42.5)	60 (45.1)	172 (47.0)
Never	12 (25.0)	25 (23.8)	25 (31.25)	23 (17.3)	85 (23.2)
What is your main approach to manage DHR patients?					
Interruption of treatment and referring to allergist	10 (20.8)	21 (20.0)	12 (15.0)	30 (22.6)	73 (19.9)
Replacement of the causative drug, self-prescribing antiallergic treatment or consultation with an allergist-immunologist	32 (66.7)	73 (69.5)	57 (71.25)	88 (66.2)	250 (68.3)
Self-prescription of antiallergic treatment with not replacing the causative drug	3 (6.25)	4 (3.8)	8 (10.0)	9 (6.8)	24 (6.6)
Difficult to response	3 (6.25)	7 (6.7)	3 (3.75)	6 (4.5)	19 (5.2)
How many DHR patients do you have per year?					
More than 5 patients	14 (29.2)	38 (36.2)	17 (21.25)	46 (34.6)	115 (31.4)
3–5 patients	12 (25.0)	27 (25.7)	32 (40.0)	30 (22.6)	101 (27.6)
1–2 patients	17 (35.4)	33 (31.4)	27 (33.75)	51 (38.3)	128 (35.0)
No one	5 (10.4)	7 (6.7)	4 (5.0)	6 (4.5)	22 (6.0)
How many patients with anaphylaxis have you had in clinical practice?					
More than 2 patients	0 (0)	12 (11.4)	6 (7.5)	6 (4.5)	24 (6.6)
1–2 patients	8 (16.7)	15 (14.3)	19 (23.75)	39 (29.3)	81 (22.1)
No one	40 (83.3)	78 (74.3)	55 (68.75)	88 (66.2)*	261 (71.3)
How many patients with other forms of severe DHRs, non-anaphylactic ones (Stevens-Johnson Syndrome, Lyell's Syndrome, etc.) have you had in clinical practice?					
More than 1 patient	1 (2.1)	6 (5.7)	3 (3.75)	12 (9.0)	22 (6.0)
1 patient	5 (10.4)	12 (11.4)	12 (15.0)	13 (9.8)	42 (11.5)
No one	42 (87.5)	87 (82.9)	65 (81.25)	108 (81.2)	302 (82.5)

Values are presented as number (%). The responses of allergists-immunologists were excluded (n = 15). *The difference was statistically significant (p < 0.05).

specialists) to almost 68 % (general practitioners), which can be considered a rather low value.

While analyzing the responses to this issue by the regions the following pattern was obtained. On the one hand, only less than half of HCPs working in the regions gave the correct response that was significantly lower in comparison with Yerevan. On the other hand, in regions, when compared with Yerevan, almost twice as many respondents chose the incorrect response – “drug tests should be done by any specialists if an allergist is not available”. Thus, the results obtained for the regions showed a low level of

knowledge/awareness of one of the basic principles reflected in the guidelines. At the same time, the study demonstrated that there is a shortage in professionals with competent understanding of DHRs – allergists-immunologists in regions.

Summarizing the responses to the question of “what drugs can be used for testing” showed a very low level of knowledge both in general (36.5 %) and depending on specialties – from 10 % in nurses to about 42 % in therapeutic specialties, including allergists-immunologists (almost 47 %). The correct response to this question can be given not only based on the level of experience of allergists-immunologists, but also knowledge of the principle: “tests can be carried out with drugs experienced reactions in the past and they have no alternative by effectiveness and/or with their analogues to find alternative safe medicines” that is stated in the national guidelines (4, 6, 7). It was identified that almost two-thirds of HCPs in general and more than half of allergists are not familiar with the national guidelines.

The correct responses to the third question of this domain “the first-line drug for drug anaphylaxis is epinephrine/adrenaline” was given only by 56.4 % of all questioned HCPs, which can be considered a rather low level compared to the results of other studies (8, 11–14). Analysis of responses by the specialty of HCPs showed that significantly higher level of correct answers was obtained both in questioned allergists-immunologists (more than 93 %) and anaesthetists/intensive-care professionals (almost 91 %), which reflects the specifics of these specialties. Meanwhile, the number of correct answers in other specialties was rather low ranging from 15 % (paramedical staff) to about 61 % (therapeutic specialties). Summarizing the data by regional feature showed that the difference between the number of correct answers in Yerevan

and the regions was also rather large, but not statistically significant; only about half of the respondents from the regions answered correctly. The second most frequent incorrect answer “glucocorticoids” was given by more than a third of HCPs in different specialties and almost half of the respondents from the regions, but in some specialties this answer was chosen as a first one (paramedical staff, pharmacy, obstetrics and gynecology). The difference between questioned HCPs in Yerevan and regions was statistically significant with high level of incorrect responses from regions. According to the results of the study, it was revealed that there

Tab. 4. Attitude of health care professionals to the DHR issue.

Question	Strongly agree	Agree	Uncertain	Strongly disagree
Do you agree that your knowledge on DHR is not sufficient and trainings are needed?	154 (40.4)	161 (42.3)	52 (13.7)	14 (3.7)
Do you agree that DHR is often out of attention and not diagnosed?	159 (41.7)	147 (38.6)	71 (18.6)	4 (1.1)
Do you agree that DHR affects the patients' quality of life?	202 (53)	152 (39.9)	27 (7.1)	0 (0)
Do you agree that to establish a national registry of patients with severe DHR is necessary?	106 (27.8)	258 (67.7)	17 (4.5)	0 (0)
Do you agree that all healthcare facilities should have a clear algorithm for managing DHR patients?	301 (79)	78 (20.5)	2 (0.5)	0 (0)

Values are presented as number (%).

is a rather large gap in knowledge about the use of epinephrine/adrenaline as a first-line drug for anaphylaxis. The same results were obtained as well as in other works (11–14). The resulting picture testifies to the stereotypical adherence of HCPs to the use of glucocorticoids that still is a priority in the clinical practice, especially in the regions.

The majority of correct responses were revealed when analyzing the awareness of HCPs about the existence of a valid first aid protocol for drug anaphylaxis and anti-shock kit in medical facility. Analysis of the data by the type of medical facility showed that correct responses prevailed in specialists working in hospitals and first aid stations, which is quite understandable.

Interestingly, only about 60 % of respondents who answered positively about the existence of a first aid protocol for drug anaphylaxis knew that epinephrine is a first-line drug. These data suggested that the awareness level on valid protocol existence might somewhat be overestimated. At the same time, it was found that awareness on the availability of first aid measures for drug anaphylaxis cannot ensure their correct performance because of low level of knowledge.

The approaches and experience of HCPs in the management of DHR patients were analyzed depending on the duration of the clinical practice. However, allergists-immunologists were excluded from the analysis to obtain more accurate data. It was revealed that 96 % of respondents-physicians have from one or more DHR patients (usually 1–2 persons) during the year and about a third of HCPs have more than 5 patients. These data confirm that DHR is a problem complicating the clinical practice of doctors of all specialties (5, 9, 13).

With the longer clinical practice the number of patients both with anaphylaxis (the difference is statistically significant) and other severe DHRs such as exudative erythema multiforme, Stevens-Johnson syndrome, toxic-epidermal necrolysis, etc. increased which seems to be predictable. Data regarding the approaches of HCPs to the management of DHRs patients showed that the overwhelming majority of questioned professionals always (more than 80 %) find out whether the patient is hypersensitive to drugs and about 15 % of the respondents do it sometimes which correlates with similar studies (13). Nevertheless, it is alarming that more than 30 % of respondents never refer patients to an allergist-immunologist, if the DHRs is revealed. At the same time, HCPs with clinical practice for more than 10 years used this approach more frequently in comparison with others, but the difference did not reach statistical significance.

In analysis the responses to the question about performing/prescribing drug tests no significant differences were found depending on the duration of clinical practice. Thus, about 38 % of HCPs with clinical practice more than 10 years perform/prescribe drug test themselves which is much more frequently than others. Meanwhile, more than a third of them still know that such a procedure should be only done by an allergist and strictly according to indications. At the same time, 47 % of HCPs were referred patients to an allergist for performing/prescribing drug test and this number is higher for novice specialists with clinical practice less than 1 year. It should be noted that a number of studies have also addressed the issue of performing skin drug test, and it was concluded that this is a rather complicated issue, both in terms of knowledge and in terms of practical approaches (13, 14).

When analyzing the responses to question regarding the main approach to the management of patients with a reaction to a prescribed drug, it was found that about 70 % of HCPs themselves changed the drug and have prescribed antiallergic therapy or consulted an allergist; and only about 20 % of doctors have interrupted treatment and referred the patient to an allergist. A comparative analysis revealed that the number of referrals to an allergist-immunologist is rather low both if patient has DHR or to perform drug test. However, the problem of referring DHR patients to narrow specialists was also discussed in other studies (9, 10).

The third part of study was to identify the attitude of HCPs to some important aspects of DA for taking certain measures. Thus, more than 80 % of questioned agreed with the statement that knowledge in DHRs is insufficient and targeted multidisciplinary education of staff treating these patients is needed to improve gaps, which is also confirmed by the low level of knowledge based on the analysis results of the first domain of questions. The results obtained served as the basis for revising the training courses for both doctors and paramedical staff, with a more focus on the DHR, which was in line with similar conclusions of other studies (11–14). Further analysis showed that more than 80 % of respondents agreed that DA is often underestimated and not diagnosed that prompted measures on improving the recognition of DHRs. More than 90 % of the questioned HCPs agreed that DHRs significantly affects the quality of patient life, which correlates with the data from other studies and served as the basis for the development of appropriate recommendations (13).

The issue on creating a national registry of patients with severe DHRs was of equal importance in present study and this approach was accepted by more than 95 % of the respondents. Given this

position, relevant work within the framework of a research grant is already carried out. As a key aspect of the study, the issue of introducing a clear algorithm for managing DHRs patients in all medical facilities was highlighted, which was agreed by 99.5 % of the questioned HCPs, thereby confirming the urgent need to develop and perform such an algorithm. The results obtained also showed the need to take measures to improve the effectiveness of the implementation of both the national recommendations and the first aid protocol in drug anaphylaxis.

Conclusion

The findings of present study conducted with HCPs of different medical facilities revealed a wide range of problems associated mainly with a low level of knowledge/awareness on various aspects in DHR diagnostics, therapy and management, including providing a first aid in drug anaphylaxis, as well as the practical approaches to diagnostic measures and referral of patients to an allergist-immunologist. Considering the attitude of the questioned HCPs to certain aspects of DHR, a number of measures were pointed out, the implementation of which will be helpful in solving the identified problems. Targeted educational programs are needed for better understanding and filling the gaps that exist in knowledge and clinical practice of DHRs.

The approach used can be recommended for studying and identifying existing problems in other areas of healthcare and to suggest the ways to solve them.

References

1. Warrington R, Silviu-Dan F, Wong T. Drug allergy. *Allergy Asthma Clin Immunol* 2018; 14 (Suppl 2): 60. DOI: 10.1186/s13223-018-0289-y.
2. Gomes ER, Demoly P. Epidemiology of hypersensitivity drug reactions. *Curr Opin Allergy Clin Immunol* 2005; 5 (4): 309–316. DOI: 10.1097/01.all.0000173785.81024.33.
3. Demoly P, Pichler W, Pirmohamed M, Romano A. Important questions in allergy: 1-drug allergy/hypersensitivity. *Allergy* 2008; 63(5): 616–619. DOI: 10.1111/j.1398-9995.2008.01693.x
4. Demoly P, Adkinson NF, Brockow K, Castells M, Chiriac AM, Greenberger PA et al. International Consensus on drug allergy. *Allergy* 2014; 69: 420–437. DOI: 10.1111/all.12350.
5. Mirakian R, Ewan PW, Durham SR, Youten LJ, Dugue P, Friedmann PS et al. BSACI guidelines for the management of drug allergy. *Clin Exp Allergy* 2009; 39(1): 43–61. DOI: 10.1111/j.1365-2222.2008.03155.x.
6. Brockow K, Garvey LH, Aberer W, Atanaskovic-Markovic M, Barbaud A, Bilo MB et al. Skin test concentrations for systemically administered drugs – an ENDA/EAACI Drug Allergy Interest Group position paper. *Allergy* 2013; 68: 702–712. DOI: 10.1111/all.12142
7. Aberer W, Bircher A, Romano A, Blanca M, Campi P, Fernandez J et al. Drug provocation testing in the diagnosis of drug hypersensitivity reactions: general considerations. *Allergy* 2003; 58: 854–863. DOI: 10.1034/j.1398-9995.2003.00279.x.
8. Simons FE, Arduoso LR, Bilò MB, Dimov V, Ebisawa M, El-Gamal YM et al. Update: World Allergy Organization Guidelines for the assessment and management of anaphylaxis. *Curr Opin Allergy Clin Immunol* 2012; 12: 389–399. DOI: 10.1097/ACI.0b013e328355b7e4.
9. Doña I, Caubet JC, Brockow K, Doyle M, Moreno E, Terreehorst I, Torres MJ. An EAACI task force report: recognising the potential of the primary care physician in the diagnosis and management of drug hypersensitivity. *Clin Transl Allergy* 2018; 8: 16. DOI: 10.1186/s13601-018-0202-2
10. Kasternow B, Karim MY. Introduction to drug allergy, and whom to refer for specialist assessment? *Clin Med (Lond)*. 2016 Dec; 16(6): 588–592. DOI: 10.7861/clinmedicine.16-6-588
11. Grossman SL, Baumann BM, Garcia Peña BM, Linares MY, Greenberg B, Hernandez-Trujillo VP. Anaphylaxis knowledge and practice preferences of pediatric emergency medicine physicians: a national survey. *J Pediatr* 2013; 163(3): 841–846. DOI: 10.1016/j.jpeds.2013.02.050.
12. Ibrahim I, Chew BL, Zaw WW, Van Bever HP. Knowledge of anaphylaxis among Emergency Department staff. *Asia Pac Allergy* 2014; 4(3): 164–171. DOI: 10.5415/apallergy.2014.4.3.164.
13. Wang Y, Zhu R, Huang N, Li W, Yang L, Zhang Sh, Liu G. Knowledge, attitudes, and practices survey of drug allergy among healthcare practitioners in central China: a multicenter study. *Asia Pac Allergy* 2016; 6(2): 105–111. DOI: 10.5415/apallergy.2016.6.2.105.
14. Mazzoni D, Tee HW, de Menezes SL, Graudins LV, Johnson DF, Newnham ED et al. A Survey on Knowledge Gaps in Assessment and Management of Severe Drug Hypersensitivity Reactions: Multicenter Cross-Sectional Study of Australian Health Care Providers. *J Clin Pharmacol* 2021; 61 (1): 25–31. DOI: 10.1002/jcph.1692.
15. World Health Organization. Advocacy, communication and social mobilization for TB control: A guide to developing knowledge, attitude and practice surveys. Geneva, Switzerland 2008; 68p. https://apps.who.int/iris/bitstream/handle/10665/43790/9789241596176_eng.pdf?sequence=1&isAllowed=y

Received October 20, 2021.
Accepted November 19, 2021.