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Evaluation of Knowledge Levels of Nurses Regarding Anaphylaxis Diagnosis, Treatment and Adrenaline Autoinjector Use

Hemşirelerin Anafilaksi Tanısı, Tedavisi ve Adrenalin Otoenjektör Kullanımı Konusunda Bilgi Düzeylerinin Değerlendirilmesi

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Abstract

Objective: Anaphylaxis is the most serious hypersensitivity reaction that begins suddenly, progresses rapidly and can cause death. Correct diagnosis and rapid treatment of anaphylaxis by all healthcare professionals is life-saving. The aim of this study was to assess the knowledge of nurses in our country regarding the diagnosis and treatment of anaphylaxis and the use of adrenaline autoinjectors.

Method: The study was designed as a cross-sectional descriptive study. An online survey was administered to participants to measure their knowledge of the diagnosis and treatment of anaphylaxis and adrenaline autoinjector use.

Results: Two hundred seventy-one nurses participated in the study, mean age was 30.5±8.4 years and mean professional experience was 9±8.7 years. 38.4% of the participants stated that the first-line treatment of anaphylaxis was adrenaline, 42.1% of the participants stated that the correct route of adrenaline administration was intramuscular, 29.5% of the participants knew that the right place of administering adrenaline, 33.6% of the participants knew the correct dose of adrenaline for children, 14.4% of them answered the adrenaline dose correctly for

Öz

Amaç: Anafilaksi, ani başlayan, hızla ilerleyen ve ölümcül olabilen en ciddi aşırı duyarlılık reaksiyonudur. Tüm sağlık çalışanları tarafından anafilaksinin doğru tanısı ve hızlı tedavisi hayat kurtarıcıdır. Bu çalışmanın amacı ülkemizdeki hemşirelerin anafilaksi tanısı, tedavisi ve adrenalin otoenjektörlerinin kullanımı konusundaki bilgi düzeylerini değerlendirmektir.

Yöntem: Çalışma kesitsel tanımlayıcı bir çalışma olarak tasarlandı. Katılımcılara anafilaksi tanısı, tedavisi ve adrenalin otoenjektör kullanımı hakkındaki anlayışlarını ölçmek için çevrimiçi bir anket uygulandı.

Bulgular: Çalışmaya 271 hemşire katıldı, ortalama yaş 30,5±8,4 yıl ve ortalama mesleki deneyim 9±8,7 yıldı. Katılımcıların %38,4'ü anafilaksinin birinci basamak tedavisinin adrenalin olduğunu, %42,1'i adrenalinin doğru uygulama yolunun intramüsküler yol olduğunu, %29,5'i adrenalinin doğru uygulama bölgesini, %33,6'sı çocuklarda doğru adrenalin dozunu, %14,4'ü yetişkinlerde doğru adrenalin dozunu biliyordu. Katılımcıların sadece %13,7'si adrenalin otoenjektörlerinin kullanımını bildiğini belirtti. Adrenalinin doğru uygulama yerini bilen hemşirelerin ortalama meslek yılları istatistiksel olarak anlamlı derecede daha düşük bulunmuştur

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Abstract

adults. Only 13.7% of the participants stated that they knew about the use of adrenaline autoinjectors. The average professional years of the nurses who knew about the correct place of administration of adrenaline were statistically significantly lower (p=0.041). Nurses who received post-graduation training on anaphylaxis; the rate of knowing that the all criteria of anaphylaxis, the correct way and place of administration of adrenaline, the rate of knowing the use of autoinjectors were significantly higher (p=0.003, p=0.008, p=0.019, p=0,022 respectively).

Conclusion: In our study, nurses' knowledge of anaphylaxis and adrenaline auto-injector was found to be insufficient. Nurses can be made more competent in anaphylaxis management by providing postgraduate training.

Keywords: Adrenaline autoinjector, anaphylaxis, knowledge, nurse

Öz

(p=0,041). Anafilaksi konusunda mezuniyet sonrası eğitim alan hemşirelerde; anafilaksinin tüm kriterlerini bilme oranı, adrenalinin doğru uygulama yolu ve yerini, otoenjektör kullanımını bilme oranı istatistiksel olarak anlamlı derecede daha yüksek bulunmuştur (sırasıyla p=0,003, p=0,008, p=0,019, p=0,022).

Sonuç: Çalışmamızda hemşirelerin anafilaksi ve adrenalin otoenjektörü kullanımı hakkındaki bilgilerinin yetersiz olduğu bulundu. Hemşireler lisansüstü eğitim verilerek anafilaksi yönetiminde daha yetkin hale getirilebilir.

Anahtar kelimeler: Adrenalin otoenjektrü, anafilaksi, bilgi, hemşire

Introduction

Anaphylaxis is the most serious hypersensitivity reaction that begins suddenly and progresses rapidly and can cause death. It may occur through various mechanisms and present with different clinical presentations (1,2). Correct diagnosis and rapid treatment of anaphylaxis by all healthcare professionals is life-saving.

The prevalence of anaphylaxis has been reported to be up to 2% in various studies. Emergency department visits due to anaphylaxis are increasing all over the world. However, the mortality rate is extremely low and has not increased in recent years (2,3). A mortality rate of less than 0.5% is reported in those hospitalized or admitted to the emergency department with anaphylaxis (2).

Clinical findings are variable. The most common symptoms are skin and mucosal symptoms such as urticaria and angioedema. Respiratory, cardiovascular and gastrointestinal systems may be affected, with symptoms such as upper and lower respiratory tract symptoms, hypotension, tachycardia, loss of consciousness, vomiting or cramp-like abdominal pain (1,2). The frequency of causes of anaphylaxis varies by age or geographic region. While the most common cause of anaphylaxis in childhood is food, anaphylaxis due to venom and drugs is more common in adults (2,4,5).

There is a possibility of recurrence of anaphylaxis. Therefore, patients presenting with anaphylaxis should be prescribed an adrenaline autoinjector (AAI) and trained in its use (1). Nurses provide treatment services in healthcare institutions at all levels. They are in contact with the patient during and after treatment. It is important for nurses to recognize the signs and symptoms of rare but life-threatening anaphylaxis and know its treatment.

In this study, we aimed to evaluate the knowledge of nurses in Turkey about the diagnosis and treatment of anaphylaxis and the use of AAI.

Materials and Methods

The study was conducted as a cross-sectional descriptive survey between May 2021 and July 2021. The questionnaire was prepared by a pediatric allergist and a nurse who is a faculty member based on current information. The 30-question survey prepared online by the Google forms application was sent to nurses via social media (WhatsApp) and electronic mail. The first part of the survey included the purpose and content of the study and the information and consent part of the researchers. Participants who gave consent answered the survey questions fully.

The questionnaire included questions about demographic information such as gender, professional year, whether they received post-graduation education on anaphylaxis, knowledge and experience in recognizing and treating anaphylaxis, AAI and their knowledge and experience regarding its use. The questionnaire was presented as Supplementary Material 1.

Study Population

It was conducted with nurses working in Turkey. The sample size for the study was determined as a minimum of 198 participants at a 99.9% confidence interval using the t-test (t=3.291, α=0.001). The study was completed with 271 participants.

Statistical Analysis

The data was analyzed by IBM SPSS Statistics 22.0 program. Kolmogorov-Smirnov test was used for the normal distribution of the data. The mean differences of two groups with variables that are not distributed normally was assessed by Mann-Whitney U test. The distribution of categorical variables between groups was analyzed by χ^2 (chi-square) test. Mean, standard deviation, median (1st and 3rd quartiles), frequency and percentage values are given as descriptive statistics. The limit of statistical significance was regarded as $p<0.05$.

Ethical Issues

This study was approved by the Ethics Committee of Bezmialem Vakıf University (date: 30.03.2021, approval number: E.10866). The study was performed according to the Declaration of Helsinki. Consent was obtained from all participants participating in the study.

Results

89.7% (n=243) of 271 participants are women, the average age is 30.5±8.4 years (min-max: 20-58 years) and the average professional experience is 9±8.7 years (min-max: 1-37 years, median: 5 years, Q1-Q3: 3-13 years). While 50.6% (n=137) of the nurses were license degree graduates, 21.4% (n=58) were master's degree graduates, 16.6% (n=45) were high school graduates and 11.4% (n=31) were associate degree graduates. Of the nurses, 22.5% (n=61) were working in primary care, 17.3% (n=47) in secondary care, 52% (n=141) in tertiary care institutions, and 8.1% (n=22) were not currently working as nurses but were involved in administrative and educational duties.

85.6% of the participants (n=232) had received training on anaphylaxis during their education. The rate of receiving postgraduate education on this subject was 29.9% (n=81). More than half of the participants (54.2%, n=147) were actively involved in the treatment of anaphylaxis patients. Demographic characteristics of the participants are given in Table 1.

The proportion of nurses who correctly characterized all three anaphylaxis criteria in the international guidelines [European Academy of Allergy & Clinical Immunology (EAACI) Guidelines] as anaphylaxis was 66.1% (n=179). Of the participants, 38.4% (n=104) stated that the first line drug to be administered in the treatment of anaphylaxis was adrenaline, 42.1% (n=114) stated that the correct route of administration of adrenaline was intramuscular, 29.5% (n=80) stated that the correct site of administration of adrenaline (anterolateral thigh, vastus lateralis muscle), 33.6% (n=91%) stated the correct adrenaline dose in children was 0.01 mg/kg, 14.4% (n=39) stated the correct adrenaline dose in adult patients was 0.5 mg. The correct position to be given to the patient during anaphylaxis (lying the patient on the back and elevating the feet at an angle

Table 1. Participants' demographic information and knowledge about anaphylaxis treatment and AAI

Age, year, mean ± SD	30.5±8.4
Median (Q1-Q3)	27 (24-36)
Professional years (mean ± SD)	9±8.7
Median (Q1-Q3)	5 (3-13)
Educational level, n (%)	
High school	45 (16.6)
Associate degree (2 years)	31 (11.4)
Licence (4 years)	136 (50.2)
Master's degree	58 (21.4)
Institution, n (%)	
Primary care	61 (22.5)
Secondary care	47 (17.3)
Tertiary care	141 (52)
Administrative or educational	22 (8.1)
Postgraduate education, n (%)	
Yes	81 (29.9)
No	190 (70.1)
Participation in anaphylaxis treatment, n (%)	
Yes	147 (54.2)
No	124 (45.8)
Anaphylaxis criteria, n (%)*	
Criterion 1	259 (95.6)
Criterion 2	206
Third criterion	184
Know it all	179 (66.1)
First drug in the treatment of anaphylaxis, n (%)	
Adrenaline	104 (38.4)
Antihistamine	119 (43.9)
Corticosteroids	43 (15.9)
No opinion	5 (1.8)
Adrenaline administration route, n (%)	
Intramuscular	114 (42.1)
Intravenous	101 (37.3)
Subcutaneous	32 (11.8)
No opinion	24 (8.9)
Place of adrenaline administration, n (%)	
IV through the vascular access I can find	96 (35.4)
Intramuscular from lateral thigh	80 (29.5)
Subcutaneous from upper arm	30 (11.1)
Intramuscular from the gluteal region	24 (8.9)
Intramuscular from the deltoid region	13 (4.8)
Subcutaneous from the abdominal area	3 (1.1)
No opinion	25 (9.2)
Knowledge of autoinjector use, n (%)	
Yes	37 (13.7)
No	254 (93.7)
Experience of autoinjector use, n (%)	
Yes	13 (4.8)
No	258 (95.2)

Table 1. Continued

SD: Standard deviation, AAI: Adrenaline autoinjector, *: Clinical criteria for diagnosing anaphylaxis[1]
1. Criteria: Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue or both (e.g., generalized hives, pruritus or flushing, swollen lips–tongue–uvula and at least one of the following)
a. Respiratory compromise [e.g., dyspnoea, wheeze–bronchospasm, stridor, reduced peak expiratory flow (PEF) and hypoxemia]
b. Reduced blood pressure (BP) or associated symptoms of end-organ dysfunction [e.g., hypotonia (collapse), syncope, incontinence]
2. Criteria: Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):
a. Involvement of the skin–mucosal tissue (e.g., generalized hives, itch-flush, swollen lips–tongue–uvula)
b. Respiratory compromise (e.g., dyspnoea, wheeze–bronchospasm, stridor, reduced PEF, hypoxemia)
c. Reduced BP or associated symptoms [e.g., hypotonia (collapse), syncope, incontinence]
d. Persistent gastrointestinal symptoms (e.g., crampy abdominal pain, vomiting)
3. Criteria: Reduced BP after exposure to known allergen for that patient (minutes to several hours):
a. Infants and children: low systolic BP (age specific) or >30% decrease in systolic BP*
b. Adults: systolic BP of <90 mmHg or >30% decrease from that person's baseline

of 30-45 degrees if there was no respiratory distress) were known by 60.8% of the nurses (n=165).

Antihistamines were the most frequently selected first-line drug in the treatment of anaphylaxis (43.9%, n=119). More than one third of the nurses (37.3%, n=101) stated that they would administer adrenaline intravenously in the treatment of anaphylaxis. Only 13.7% (n=37) of the participants stated that they knew how to use AAI, 4.8% (n=13) stated that they had used an autoinjector before, and 6.3% (n=17) stated that they had received training on this subject. In our study, there were only 3 school nurses, none of them had experience using AAI, and only one of them stated that she knew how to use AAI. 13.7% (n=37) of the nurses knew that AAI preparation was available in 0.15 and 0.3 mg forms within the scope of reimbursement. The knowledge of the participants regarding anaphylaxis treatment and AAI is presented in Table 1.

There was no statistically significant relationship between the rates of knowing all anaphylaxis criteria, knowing that adrenaline is the first line drug to be used in the treatment of anaphylaxis, knowing the correct route of administration of adrenaline, knowing the correct place of administration of adrenaline, knowing the correct dose of adrenaline in children and adults, and knowing the use of AAI with age, educational level or institution of employment. The mean duration of professional experience of the nurses who knew that adrenaline should be administered anterolateral to the thigh was significantly shorter than those who did not know (p=0.041). There was no statistically significant relationship between professional experience and correct answers to other questions. The rate of nurses who had previous experience in the treatment of anaphylaxis knowing that adrenaline should be administered IM was significantly higher (p=0.012). There was no statistically significant relationship between anaphylaxis treatment experience and correct answers to other questions. Nurses who received postgraduate training on anaphylaxis had significantly higher rates of knowing all anaphylaxis criteria, knowing the correct administration route for adrenaline, knowing the correct administration site for adrenaline, and knowing how to use an AAI (respectively, p=0.003, p=0.008, p=0.019, p=0.022). The statistical relationship between nurses' anaphylaxis diagnosis-treatment knowledge and their age, professional years, education level, institution of employment, postgraduate training on anaphylaxis and involvement in anaphylaxis treatment is presented in Table 2.

Discussion

Anaphylaxis, an acute life-threatening emergency condition, requires immediate treatment in order to prevent further progression and complications. It is important that nurses who are in contact with patients during and after treatment recognize the signs and symptoms of anaphylaxis, which is rare but life-threatening, and know how to treat it.

66% of the participants in our study described all three definitions in the EAACI guide as anaphylaxis (1). These results indicate that the multisystem manifestations of anaphylaxis are not sufficiently known. There may be deficiencies in the diagnosis and treatment of anaphylaxis due to lack of knowledge. Indeed, many studies report that anaphylaxis is underdiagnosed and undertreated (6,7).

In our study, the general knowledge of nurses regarding the treatment of anaphylaxis was found insufficient. Only 38.4% knew that the first-line drug in treatment was adrenaline, 42.1% knew the correct route of administration of adrenaline, 29.5% knew the correct administration place of adrenaline, 33.6% knew the correct dose of adrenaline in pediatric patients, and 14.4% knew the correct application route of adrenaline in adults. In a study conducted with pediatric nurses at a university hospital in our country, the rate of knowing that adrenaline is the first-line drug in the treatment of anaphylaxis was found to be 87-90% in two

Table 2 Comparison of the knowledge levels of nurses according to age, years of employment, educational status, institution of employment, postgraduate education on anaphylaxis and participation in the treatment of anaphylaxis

		All anaphylaxis criteria knowing n=179	Knowing that the first line drug is adrenaline, n=104	Knowing the way to administer adrenaline, n:=14	Knowing the place of administration of adrenaline, n=80	Knowing the dose of adrenaline in a child, n=91	Knowing the dose of adrenaline in adults, n=39	Knowing how to position, n=165	Knowing how to use an autoinjector, n=37
Age (mean ± SD)	Correct	31±8.4	30.4±8.7	29.9±7.3	29.5±6.9	29.9±7.4	29.4±7.7	30.4±8	28.7±6.4
	Incorrect	29.5±8.3	30.5±8.2	30.8±9.1	30.9±8.9	30.7±8.8	30.6±8.5	30.6±9	30.7±8.6
	p*	0.167	0.990	0.362	0.205	0.463	0.392	0.810	0.167
Year of profession (mean ± SD)	Correct	9.5±8.9	9.3±8.9	8±7.3	7.3±7	8±7.7	8.2±7.6	8.8±8.4	7.4±6.1
	Incorrect	8±8.4	8.8±8.7	9.7±9.6	9.7±9.3	9.5±9.2	9.1±8.4-9	9.3±9.4	9.2±9.1
	p*	0.200	0.664	0.121	**0.041**	0.206	0.536	0.670	0.235
Education level n (%)	1. High school, n:45	32 (71.1)	17 (37.8)	16 (35.6)	10 (22.2)	13 (28.9)	3 (6.7)	28 (62.2)	6 (13.3)
	2. Associate degree (2 years), n=31	22 (71)	10 (32.3)	13 (41.9)	6 (19.4)	9 (29)	3 (9.7)	19 (61.3)	4 (12.9)
	3. Licence (4 year), n=136	92 (67.2)	56 (40.9)	62 (45.3)	47 (34.3)	52 (38)	23 (16.8)	81 (59.1)	21 (15.3)
	4. Master's degree, n=58	33 (56.9)	21 (36.2)	23 (39.7)	17 (29.3)	17 (29.3)	10 (17.2)	37 (63.8)	6 (10.3)
	p**	0.378	0.807	0.684	0.241	0.497	0.289	0.936	0.829
Workplace n (%)	Primary care, n=61	39 (63.9)	24 (39.3)	29 (47.5)	17 (27.9)	23 (37.7)	5 (8.2)	41 (67.2)	7 (11.5)
	Secondary care, n=47	36 (76.6)	15 (31.9)	19 (40.4)	12 (25.5)	11 (23.4)	4 (8.5)	24 (51.1)	10 (21.3)
	Tertiary care, n=141	89 (63.1)	54 (38.3)	56 (39.7)	44 (31.2)	48 (34)	26 (18.4)	85 (60.3)	19 (13.5)
	Administration-training, n=22	15 (68.2)	11 (50)	10 (45.5)	7 (31.8)	9 (40.9)	4 (18.2)	15 (68.2)	1 (4.5)
	p**	0.386	0.550	0.747	0.876	0.363	0.148	0.328	0.249
Postgraduate education n (%)	Yes	64 (79)	35 (43.2)	44 (54.3)	32 (39.5)	32 (39.5)	16 (19.8)	53 (65.4)	17 (21)
	No	115 (60.5)	69 (36.3)	70 (36.8)	48 (25.3)	59 (31.1)	23 (12.1)	112 (58.9)	20 (10.5)
	p**	**0.003**	0.285	**0.008**	**0.019**	0.177	0.101	0.317	**0.022**
Participation in anaphylaxis treatment	Yes	99 (67.3)	58 (39.5)	72 (49)	49 (33.3)	54 (36.7)	24 (16.3)	85 (57.8)	24 (16.3)
	No	80 (64.5)	46 (37.1)	42 (33.9)	31 (25)	37 (29.8)	15 (12.1)	80 (64.5)	13 (10.5)
	p**	0.624	0.691	**0.012**	0.134	0.231	0.323	0.261	0.163
Total n (%)		179 (66.1)	104 (38.4)	114 (42.1)	80 (29.5)	91 (33.6)	39 (14.4)	162 (59.7)	37 (13.7)

*: Mann-Whitney U test, **: Chi-square test, SD: Standard deviation

groups divided according to professional experience. These rates are significantly higher than the rates in our study. In the same study, the rate of knowing that adrenaline should be administered intramuscularly was found to be 64-71%, the rate of knowing the correct application site of adrenaline was 48-77%, and the rate of knowing the correct dose was 51-58% (8). In another study conducted with nurses working in a tertiary hospital, their knowledge levels were evaluated before and after in-service training; Before the training, the rate of knowing that the first-line drug in the treatment of anaphylaxis was adrenaline was 84.4%, the rate of knowing the correct application route of adrenaline was 80%, the rate of knowing the correct application site of adrenaline was 50%, and the rate of knowing the correct dose was 64% (9). The knowledge levels in our study are lower than these studies. While approximately half of our participants worked in tertiary healthcare institutions, the inclusion of nurses working in primary and secondary healthcare institutions, as well as in administrative and educational roles may have contributed to this finding. Our study included nurses who had previously been active in nursing but were also in administrative or educational roles at the time the study was conducted. This is one of the limitations of our study. In a study conducted with 1.172 participants, including different healthcare professionals working at different levels in our country, 44.7% of healthcare professionals stated that they would administer adrenaline when they suspected anaphylaxis, 29% specified the correct application route of adrenaline, 23.5% identified the correct application site, and 28.9% of them knew the

correct dose (10). The knowledge levels in this study and our study are relatively similar. In a study conducted in Singapore, 40.3% of emergency room nurses' first choice drug in anaphylaxis was adrenaline, while 47.4% stated that they used the intramuscular route for adrenaline. The rates are similar to our study. In the same study, 50% of nurses knew the correct dose of adrenaline for adults, and this rate was higher than the rate found in our study (11). In our study, the average professional experience of nurses who knew the correct application site of adrenaline was shorter. Professional experience did not have a statistically significant relationship with correct answers to other questions. Contrary to our study, in a similar study by Güneş et al. (8) nurses with more professional experience were more likely to know the correct application site of adrenaline.

There is a possibility of recurrence of anaphylaxis. Therefore, AAI must be prescribed to those that experience anaphylaxis and they should be trained on how to use it. The healthcare professionals that care for the patients at risk for anaphylaxis should also be educated on the use of AAI. Only 13,7% of the nurses in our study stated they knew how to use AAI and 6,3% had undergone training on the use of AAI. Our survey was conducted online and was based on the statements of the nurses so their proficiency in practice could not be evaluated. Therefore comparison with other studies is not aplicable. The rate of knowledge about the presence of AAI was 54% among nurses in Özkul Sağlam and Özkars' (9) study, and 20% among different groups of healthcare professionals in Baççıoğlu and Yılmazel Uçar (10) study.

In studies conducted on healthcare professionals working in primary, secondary or tertiary healthcare centers, it was found that knowledge about the correct use of AAI's was insufficient (12-15). The rate of prescription of adrenaline to patients experiencing anaphylaxis is still inadequate although it has increased in time (16-22).

In our survey the rate of knowledge of the correct route and site of administration of adrenaline and the rate of knowing the use of AAI were higher in the nurses that had undergone postgraduation training on anaphylaxis. This finding clearly displays the need for post-graduate education programs on anaphylaxis for the nurses to update their knowledge. Less than one-fifth of our participants had postgraduate training in anaphylaxis. This was considered to be inadequate. According to these results, the necessity of periodic and comprehensive training to update information should be taken into consideration. In the study of Özkul Sağlam and Özkars (9) nurses' knowledge levels about anaphylaxis diagnosis and treatment were compared before and after training on anaphylaxis, and it was found that their knowledge levels increased after the training. In the study conducted by Sipahi Cimen and Sayili (23) with different groups of healthcare professionals, it was found that participants who received training on anaphylaxis and had experience of anaphylaxis cases responded correctly to questions about adrenaline doses at a higher rate.

Sudy Limitations

The most significant limitation of our study is that it was an online survey. Therefore, participants' knowledge levels could not be verified through a face-to-face interview or practice. While approximately half of the participants worked in tertiary healthcare institutions, there were also nurses working in primary and secondary healthcare institutions, and less than a tenth of the participants were nurses working in educational or administrative roles. This was a limitation of our study even though we found no statistically significant differences in knowledge levels about anaphylaxis across institutions.

Conclusion

As a result of our study, we found that nurses' knowledge regarding the diagnosis and treatment of anaphylaxis is insufficient. The knowledge levels are better in nurses who received postgraduate education. Therefore, implementing post-graduate training programs can help nurses become more competent in dealing with life-threatening anaphylaxis. Nurses' knowledge about AAI treatment is insufficient, and nurses need to be trained on the use of this essential and life-saving drug for people at risk of anaphylaxis.

Ethics

Ethics Committee Approval: This study was approved by the Ethics Committee of Bezmialem Vakıf University (date: 30.03.2021, approval number: E.10866). The study was performed according to the Declaration of Helsinki.

Informed Consent: Informed consent was obtained from all participants participating in the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: L.B., Ö.E., Concept: L.B., M.Y., G.K.E., S.S.Ç., M.A.N., Design: L.B., M.Y., G.K.E., S.S.Ç., M.A.N., Data Collection or Processing: L.B., Ö.E., M.Y., Analysis or Interpretation: L.B., M.A.N., Literature Search: L.B., G.K.E., S.S.Ç., Writing: L.B., M.A.N.

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References

1. Muraro A, Worm M, Alviani C, Cardona V, DunnGalvin A, Garvey LH, et al; European Academy of Allergy and Clinical Immunology, Food Allergy, Anaphylaxis Guidelines Group. EAACI guidelines: Anaphylaxis (2021 update). Allergy. 2022;77(2):357-377.
2. Tejedor Alonso MA, Moro Moro M, Múgica García MV. Epidemiology of anaphylaxis. Clin Exp Allergy. 2015;45(6):1027-1039.
3. Turner PJ, Gowland MH, Sharma V, Ierodiakonou D, Harper N, Garcez T, et al. Increase in anaphylaxis-related hospitalizations but no increase in fatalities: an analysis of United Kingdom national anaphylaxis data, 1992-2012. J Allergy Clin Immunol. 2015;135(4):956-963.e1.
4. Francuzik W, Ruëff F, Bauer A, Bilò MB, Cardona V, Christoff G, et al. Phenotype and risk factors of venom-induced anaphylaxis: a case-control study of the European Anaphylaxis Registry. J Allergy Clin Immunol. 2021;147(2):653-662.e9.
5. Aurich S, Dölle-Bierke S, Francuzik W, Bilo MB, Christoff G, Fernandez-Rivas M, et al. Anaphylaxis in elderly patients-data from the European Anaphylaxis Registry. Front Immunol. 2019;10:750.
6. Kastner M, Harada L, Waserman S. Gaps in anaphylaxis management at the level of physicians, patients, and the community: a systematic review of the literature. Allergy. 2010;65(4):435-444.
7. Waserman S, Chad Z, Francoeur MJ, Small P, Stark D, Vander Leek TK, et al. Management of anaphylaxis in primary care: Canadian expert consensus recommendations. Allergy. 2010;65(9):1082-1092.
8. Güneş H, Özkars MY, İpek S. Pediatri hemşirelerinin anafilaksi konusundaki bilgi düzeyi. STED. 2020;29(2):118-130.
9. Özkul Sağlam N, Özkars MY. Evaluation of the knowledge level of the nurses of the pediatrics clinic about the diagnosis and treatment of anaphylaxis. Jour Umraniye Pediatr. 2023;3(2):110-118.
10. Baççıoğlu A, Yılmazel Uçar E. Level of knowledge about anaphylaxis among health care providers. Tuberk Toraks. 2013;61(2):140-146.
11. Ibrahim I, Chew BL, Zaw WW, Van Bever HP. Knowledge of anaphylaxis among emergency department staff. Asia Pac Allergy. 2014;4(3):164-171.
12. Arga M, Bakırtaş A, Türktaş I, Demirsoy MS. Pediatri asistan ve uzmanları adrenalin otoenjektör kullanımını biliyor mu? Asthma Allergy Immunol. 2009;7:26-31.
13. Mehr S, Robinson M, Tang M. Doctor--how do I use my EpiPen? Pediatr Allergy Immunol. 2007;18(5):448-452.
14. Grouhi M, Alshehri M, Hummel D, Roifman CM. Anaphylaxis and epinephrine auto-injector training: who will teach the teachers? J Allergy Clin Immunol. 1999;104(1):190-193.
15. Sicherer SH, Forman JA, Noone SA. Use assessment of self-administered epinephrine among food-allergic children and pediatricians. Pediatrics. 2000;105(2):359-362.
16. Clausen SS, Stahlman SL. Food-allergy anaphylaxis and epinephrine autoinjector prescription fills, active component service members, U.S. Armed Forces, 2007-2016. MSMR. 2018;25(7):23-29.
17. Clark S, Bock SA, Gaeta TJ, Brenner BE, Cydulka RK, Camargo CA; Multicenter Airway Research Collaboration-8 Investigators. Multicenter study of emergency department visits for food allergies. J Allergy Clin Immunol. 2004;113(2):347-352.
18. Clark S, Long AA, Gaeta TJ, Camargo CA Jr. Multicenter study of emergency department visits for insect sting allergies. J Allergy Clin Immunol. 2005;116(3):643-649.
19. Sclar DA, Lieberman PL. Anaphylaxis: underdiagnosed, underreported, and undertreated. Am J Med. 2014;127(1 Suppl):S1-S5.
20. Fuzak JK, Trainor J. Comparison of the incidence, etiology, and management of anaphylaxis over time. Pediatr Emerg Care. 2013;29(2):131-135.
21. Tuncel T, Sancaklı O, Bag O, Cetin HS, Özdoğru EE. Physicians' approach to anaphylaxis in childhood. Pediatr Emerg Care. 2021;37(12):e1425-e1428.
22. Bülbül L, Yazıcı M, Elitok GK, Çimen SS, Toprak A, Arıca S. Evaluation of knowledge of family physicians on the diagnosis and treatment of anaphylaxis and adrenaline auto-injector use in Türkiye. Med J Bakirkoy. 2024;20(3):196-202.
23. Sipahi Cimen S, Sayili SB. Level of knowledge among healthcare professionals regarding anaphylaxis. Asia Pac Allergy. 2022;12(4):e41.

Supplementary Material 1. Hemşirelerde Anaflaksi Farkındalık Düzeyi

https://d2v96fxpocvxx.cloudfront.net/1e8a7eae-47cf-4a4e-a540-9cee47620b04/content-images/9c8cc639-4fd5-4186-b4d2-7d55bbc07591.pdf