

Assessing Knowledge of Vietnamese Nurses about Prevention and Treatment of Anaphylaxis: A Cross-Sectional Study

Phan Thi An Dung, MSN^{1*}, Nguyen Thi Thu Trieu², Do Thi Hoa³, Dau Thi Thuyet⁴

¹Faculty of Nursing, Vinh Medical University, Vinh city, Vietnam

²Faculty of Nursing, Da Nang University of Medical Technology and Pharmacy, Da Nang city, Vietnam

³The Faculty of Nursing and Midwifery, Nam Dinh University of Nursing, Nam Dinh city, Vietnam.

⁴Nghe An General Hospital, Nghe An province, Vietnam

*Corresponding author: Phan Thi An Dung, andung1987@gmail.com

ABSTRACT

Background: Anaphylaxis greatly affects the psychology of patients as well as medical staff. Therefore, knowing about the way of prevention and treatment of anaphylaxis by nurses plays a key role in improving patient's caring services.

Objectives: This study was conducted to describe the current state of nurse's knowledge about the prevention and treatment of anaphylaxis and collect some relative factors.

Methods: An analytical cross-sectional study was conducted with 82 nurses from March to May 2022. The questionnaire included 31 items to assess nurses' knowledge about anaphylactic state, anaphylaxis prevention, and treatment. The Chi-square test was used to compare categorical variables.

Results: Most nurses had correct knowledge about anaphylactic symptoms, and common causes, with 82.9% and 81.7%. The percentage of nurses with good knowledge about anaphylaxis prevention and treatment recorded a moderate level (76.8%). Only 27.2% of nurses did not know about the type of new drug used for anaphylaxis treatment, while 28.2% recognized adrenalin dosage being used for adults. There were significant differences in knowledge about anaphylaxis prevention and treatment of nurses and ages, years of work, and number of times being trained on anaphylaxis ($p < 0.05$).

Conclusion: Nursing knowledge about anaphylaxis prevention and treatment was a moderate level, in particular, knowledge about drugs for emergency treatment of anaphylaxis was limited. Therefore, training sessions need to focus on helping nurses for better understanding of the medicines and the way of using them to be proactive in emergency reactions.

Keywords: Anaphylaxis, Health knowledge, Nurse, Prevention, Treatment

1. Introduction

Anaphylaxis is an allergic reaction, which can appear immediately in a few seconds, a few minutes to a few hours after the body is exposed to an allergen, and causes various clinical conditions, which can be severe and lead to rapid death [1, 2]. Recent reports showed that a large number of cases of anaphylactic shock were fatal, which greatly affects the psychology of patients as well as medical staff. In Europe, the United States, and Australia, the statistical annual incidence of anaphylaxis accounted for 0.005% [3]. In Vietnam, anaphylactic shock accounts for 10% of drug allergies and 10% of deaths due to anaphylaxis every year [4].

There are many causes of anaphylaxis such as drugs, blood and blood products, chemicals, food, insect venom. Among them, anaphylactic shock is the most severe level of anaphylaxis due to dilation of the entire vascular system and sudden bronchospasm. Clinically manifested by a drop in blood pressure and reduced blood flow to the tissue, causing cell metabolism disorders. An anaphylactic emergency requires as urgent and quick a reaction as a circulatory emergency and must be performed on the spot [1]. Early recognition of worsening signs and symptoms due to anaphylaxis is

paramount to initiating timely management [5]. This requires the use of effective assessment skills and clinical experience to accurately identify and manage anaphylaxis [2].

Anaphylactic shock not only affects the patient's physical activity, mental health, and quality of life but also creates a significant burden on families and healthcare systems in developing countries like Vietnam [2]. Additionally, the signs and symptoms of anaphylaxis may vary from patient to patient, and the immediate timing of symptom onset is related to the severity of anaphylaxis [5, 6]. Therefore, effective response, accurate diagnosis, and timely intervention are essential to protect patient health and improve the quality of health care and treatment [5]. In 2017, the Ministry of Health of Vietnam issued guidelines related to the prevention, diagnosis, and management of anaphylactic shock [2], and encouraged nurses to use them to optimize their level of knowledge and increase their ability to respond to this life-threatening condition to improve patient care outcomes.

Previous studies have firmly established the relationship between nursing knowledge and preventable deaths of patients with anaphylactic shock during hospitalization [7,

8]. However, most recent studies found that nurses' knowledge about anaphylaxis prevention and management is not good. Specifically, Ibrahim's research showed that 76.9% of nurses misdiagnosed anaphylactic shock and up to 40.3% chose the wrong medication to treat anaphylactic shock [7]. Another study by Patnaik et al. (2020) in India found that nurses' knowledge about anaphylactic shock prevention and management was very low (6.69 ± 1.57) [9]. In Vietnam, research by Nguyen et al. (2024) indicated that only 47.9% of nurses had good knowledge about anaphylaxis, while up to 52.1% answered incorrectly about the treatment process when anaphylaxis occurred [4].

Currently, updating and improving professional knowledge and skills to prevent and handle anaphylaxes for all medical staff, especially nurses, has been carried out at all medical facilities in Vietnam. However, whether the ability of nurses at these medical facilities to prevent and handle anaphylaxis improved? Do nurses have enough knowledge in preventing and treating anaphylaxis as well as the ability to detect and handle anaphylactic cases according to instructions? Therefore, to ensure patient safety and improve the quality of care at the

hospital, we conducted research with two main goals, including 1) describe the current state of nurses' knowledge about the prevention and treatment of anaphylaxis, and 2) identify some factors related to nurses' knowledge of anaphylaxis prevention and treatment.

2. Methods

2.1 Study Area

Study was conducted at the Nghe An Hospital for Traumatology and Orthopedics, Vietnam from March to May 2022.

2.2 Sample size and sampling

The sample size was calculated using G*Power sample size software version 3.1.9.4 (Heinrich-Heine-Universität Düsseldorf, Düsseldorf, Germany; <http://www.gpower.hhu.de/>). In the case of the correlation test, the input was a Chi-square analysis, the effect size was 0.3, the α error probability was 0.05, and the power was 0.8, $df=1$. After putting these parameters into the software, a total of 88 students was suggested as a minimum sample size. Using a simple random sampling method, a response rate achieved 93.2%.

All participants in the study were taken from the Nghe An Hospital for Traumatology and Orthopedics, Vietnam from March to May

2022. Selection criteria include nurses who are working in all clinical departments where they participated directly in the patient care process, working on short- or long-term contracts or apprenticeships, getting a practicing certificate, and voluntarily agreeing to participate in the study. Excluded criteria for any nurses if they were sick or hospitalized, on maternity leave, or going to study far away.

2.3 Data Collection

The study questionnaire included two parts. The first part is the demographic characteristics that developed based on the existing literature and included six items, including gender, age, number of working years, education level, number of times being trained on anaphylaxis prevention and management, employment status, and witnessed anaphylaxis.

The second part was the Nursing knowledge of anaphylaxis questionnaire which was developed and validated by Le et al. (2021) [10]. The tool included 24 items that were divided into three subscales: 1) assessing general knowledge of nurses about anaphylaxis (seven items); 2) knowledge of nurses about anaphylaxis prevention (five items), and 3) knowledge about treatment of

anaphylactic patients (12 items). Specifically, the first subscale related to the definition, causes, signs, symptoms, classification, and effects of anaphylactic shock, based on the Anaphylactic shock guidelines of the Ministry of Health of Vietnam [2]. The second subscale was for anaphylaxis diagnosis and management, the number of drugs and new drugs being added to an emergency box, medical facility action, etc. Finally, the last subscale collected data for treating and monitoring anaphylactic patients. Each question was evaluated through four options, while each correct answer counts 1 point, 0 points for incorrect answer. The nurse's knowledge score was calculated by summing the maximum score of all answers. Accordingly, the level of knowledge of the prevention and emergency treatment of anaphylactic shock nurses was considered “good” if the maximum total score was equal to or over 12 points, and conversely, the “bad” knowledge level if the maximum total score was under 12 points. In the study, the internal consistency of the questionnaire of Cronbach’s alpha accounted for 0.89.

2.4 Data Analysis

The MedCalc statistical software version 20.0 was used for data analysis. Analysis,

description, calculation of percentages, and average values were used to process variables. Univariate and multivariate analysis were used to find out the relationship between the dependent variable and independent variable through the Chi-square test (χ^2) and Odds Ratio (OR) with definition level $\alpha=0.05$.

2.5 Ethical Clearance

Decision No. 1681/GCN-HDDD, dated August 2nd, 2021, from the Medical Ethics Council of Nam Dinh University of Nursing and the Protocol Approval Council both authorized the study. Subjects were clearly informed about the purpose and content of the study. Subjects participated completely voluntarily and then willing to sign a consent form. They could quit studying whenever they wanted. Information about research subjects would be kept completely confidential. This research helps improve the

health, quality of care, and treatment for patients. These data are for research purposes only, the research results are proposed to improve the quality of health care and patient safety, not for other purposes.

3. Results

3.1. General characteristics of the participants

Among 82 participants, most of the nurses were women (67.4%), and under 35 years old (75.0%). Nurses with intermediate or college degrees account for the majority (58.7%), and up to 61.3% have worked for less than five years with short-term contracts (48.9%). In addition, 80.4% of nurses had participated at least two time of training sessions on anaphylactic shock prevention and treatment, and more than 64% had witnessed cases of anaphylactic shock occurring in patients (Table 1).

Table 1: General participant’s characteristics

Variable	Number (n)	Percentage (%)
Gender		
Male	61	75.0
Female	21	25.0
Age		
≤ 35 years	61	75.0
> 35 years	21	25.0
Education level		
Intermediate or college	48	58.7
Post-graduate	34	41.3
Years of work		
≤ 5 years	50	61.3
> 5 years	32	38.7

Variable	Number (n)	Percentage (%)
Number of times being trained on anaphylaxis		
≤ 2 times	16	19.6
> 2 times	66	80.4
Employment status		
Apprentice	14	17.4
Short term contract	41	48.9
Long term contract	27	33.6
Witnessed anaphylaxis		
Yes	59	64.1
No	33	35.9

3.2 General knowledge of nurses about anaphylaxis

Most of nurses had correct knowledge about anaphylactic shock. Among them, time of occurrence of anaphylactic symptoms, and

common causes of anaphylaxis were two contents that accounted for the highest proportion of nurses giving correct answers, with 82.9% and 81.7%, respectively (Table 2).

Table 2: General knowledge of nurses about anaphylaxis

No.	General knowledge of nurses about anaphylaxis	Right answers	
		n	%
1	Concept of anaphylaxis	65	79.3
2	Common cause of anaphylaxis	67	81.7
3	Level of anaphylaxis	59	72.0
4	Clinical characteristics of anaphylaxis	58	70.7
5	Symptoms suggestive of anaphylaxis	56	68.3
6	Time of occurrence of anaphylactic symptoms	68	82.9
7	Identified the patient's level of anaphylaxis after taking the drug and facing with two manifestations in many organs	43	52.4

3.3 Knowledge of nurses about prevention and treatment of anaphylaxis

Table 3 shows that the rate of nurse has a good knowledge about anaphylaxis prevention and treatment was at a moderate level (76.8%). For knowledge about anaphylaxis prevention, the percentage of nurses who answered correct questions ranged from 27.2% to 78.3%. In particular, the content “Activities that medical facilities

need to do to prevent anaphylaxis” accounted for the highest rate, while the correct answer of the nurse about the type of new drug being added to anaphylaxis emergency medicine box took the lowest rate only reaching 27.2%. In addition, the study also found that the percentage of nurses given correct answers about anaphylaxis treatment had significant fluctuations depending on the content of each question. Specifically, most of nurses

answered right about the time to monitor patients after being treated (81.5%), while only 28.2% participants have given correctly

answer questions about Adrenalin dosage of 1/10.000 is used for adults.

Table 3: Knowledge of nurses about anaphylaxis prevention and treatment

Total knowledge of nurses about anaphylaxis prevention and treatment			
Good		76.8% (n=63)	
Poor		23.2% (n=19)	
No	Contents	Right answers	
		n	%
Knowledge of nurses about anaphylaxis prevention (for each question)			
1	Adrenaline is equipped in the anaphylaxis emergency medicine box	61	73.9
2	Name of new drug is added in anaphylaxis emergency medicine box	23	27.2
3	Minimum medical equipment and drugs for anaphylactic emergency at medical facilities	44	53.3
4	Activities that medical facilities need to do to prevent anaphylaxis	64	78.3
5	It is necessary to carefully explore the patient's drug allergy history before using the drug	59	71.7
Knowledge of nurses about anaphylaxis treatment			
1	Principles of anaphylactic emergency	60	72.8
2	When a patient shows signs of severe or critical anaphylaxis, immediate treatment is required	37	44.6
3	First aid for patients with mild anaphylaxis	61	73.9
4	Adrenalin injection applied for anaphylactic patients at level 2	55	67.4
5	Adrenalin dosage for adults	60	72.8
6	Adrenalin dosage for children	31	38.0
7	Time to repeat Adrenalin injection when BP and pulse is not stable	56	68.5
8	How to dilute Aderalin solution for intravenous injection	30	36.9
9	How to dilute Aderalin solution for intravenous infusion	34	41.3
10	Adrenalin dosage of 1/10.000 is used for adults	23	28.2
11	Time to monitor patients after Adrenalin injection	35	42.4
12	Time to monitor patients after being treated	67	81.5

3.4 Difference between the knowledge of nurses about anaphylaxis prevention and treatment and nurses' demographic characteristics

There were significant differences in knowledge about anaphylaxis prevention and treatment of nurses and ages, years of work, and number of times being trained on anaphylaxis ($p < 0.05$) (see Table 4).

Specifically, nurses being under or equal 35 years old expressed the highest level of knowledge about anaphylaxis prevention and treatment. However, the knowledge of nurses who worked more than five years was higher than others, with $p = 0.01$. Moreover, participants who joined anaphylaxis training more than two times indicated a higher level of knowledge ($p = 0.02$) (Table 4).

Table 4: Difference between knowledge of nurses about anaphylaxis prevention and treatment and nurse’s demographic characteristics

Contents	Level of knowledge about anaphylaxis prevention and treatment		p-value
	Good	Poor	
Age			0.01
≤ 35 years	51	12	
> 35 years	4	15	
Education level			> 0.05
Intermediate or college	39	12	
Post-graduate	24	7	
Years of work			0.01
≤ 5 years	24	14	
> 5 years	38	5	
Number of times being trained on anaphylaxis			0.02
≤ 2 times	8	7	
> 2 times	55	12	

4. Discussion

Anaphylactic shock is an acute systemic allergic reaction that can be life-threatening. Diagnosing and treating anaphylaxis is challenging because reactions can be rapid, severe, and lack of clear definition can lead to misdiagnosis. Therefore, assessing the level of knowledge, thereby providing solutions to support the improvement of nurses' skills in preventing and treating anaphylactic shock, plays an essential role in improving the quality of care services [11].

The study result indicated that most of nurses had correct knowledge about anaphylaxis shock. Specifically, time of occurrence of anaphylactic symptoms, and common causes of anaphylaxis were two contents that accounted for the highest proportion of nurses giving correct answers, with 82.9%

and 81.7%, respectively. This finding was similar to the research of Ayşe Baççıoğlu et al. conducted in India (84.7%) [11], and the study of Ibrahim et al. in Singapore (89.4%) [7]. This result could be explained by the fact that the hospital regularly organizing training courses on anaphylaxis prevention and treatment for all nurses frequently. Besides, some nurses have poor knowledge about detecting symptoms suggestive of anaphylaxis (34.8%) and recognizing the severity of anaphylaxis (38.8%). Anaphylaxis is an acute condition, clinical symptoms change continuously, affecting the nurse's ability to detect clinical symptoms and assess the severity of anaphylaxis (9). In our study, as the same Ibrahim’s study (9), some nurses still lacked awareness of anaphylactic symptoms such as abdominal pain, diarrhoea, shortness of breath, chest

tightness, hoarseness, runny nose, and there was confusion between the level II, and III of anaphylaxis. This is an important content that requires nurses to have good knowledge to detect and treat promptly, thereby reducing the mortality rate for patients.

According to the research results in Table 3, the percentage of nurses who answered correct questions about anaphylaxis prevention was ranges from 27.2% to 78.3%. In particular, the content “Activities that medical facilities need to do to prevent anaphylaxis” accounted for the highest rate, while the correct answer of the nurse about the type of new drug being added to anaphylaxis emergency medicine box took the lowest rate only reaching 27.2%. In contrast, the study by Lange J et al. (2020) showed that up to 95% of nurses knew about new drugs used clinically to treat anaphylactic shock [12]. This result could be explained due to the fact that the hospital regularly organizes training sessions on anaphylaxis every year, so the rate of nurses trained more than twice was high (80.4%). Through training sessions, the above contents were repeated many times. In addition, 75% of nurses were under 35 years old, so the ability to remember and recognize correct knowledge will be better. Besides, our

research found that 28.3% of nurses have incorrect knowledge about checking the patient's drug allergy history before using the drug. Even asking about allergy history is mandatory when using medicine for patients, some nurses do not pay attention to this issue, along with work overload that creating a heavy burden on nurses and causing them to skip some steps in the patient care process [12]. The role of the nurse occupies a very important position in the patient's health care process, so hospitals need to understand and regularly remind nurses to thoroughly explore the history of allergies first. In addition, Diphehyramine has been introduced to treat mild cases of anaphylaxis in recent years [2]. However, only a small number of 27.2% of participants have correct knowledge about new drugs. Because Diphehyramine is an uncommon drug for anaphylactic emergencies, and only a few nurses know about it, training courses need to regularly update and remind nurses to master the drugs related to the anaphylactic emergency process.

Besides, the study indicated that the percentage nurses given correct answers about anaphylaxis treatment were significant fluctuations. Specifically, most of nurses answered right about the time to monitor

patients after being treated (81.5%), while only 28.2% participants have given correctly answer questions about Adrenalin dosage of 1/10.000 used for adults. Among them, 44.6% of nurses misunderstand that immediately stopping exposure to drugs/allergens and injecting Adrenalin intramuscularly according to the protocol is the first thing that needs immediate treatment. This may be because many nurses were still quite young, do not have much experience, having a psychologically dependent on doctors, and lack confidence in themselves, those problems leading to a fear when treating anaphylaxis emergencies for patients. The results of this study were similar to the research of Le et al. (2021) [10]. In addition, the rate of nurses with incorrect knowledge about how to mix and make a dose of Adrenalin 1/10,000 used for adults were quite high (71.7%). Up to 80.4% of nurses have been trained on anaphylaxis prevention and management more than 2 times, and most of them having master the basic knowledge of treatment at the time of anaphylaxis occurred. Most nurses often have a mentality of depending on the doctor, waiting for the doctor to give orders and carry out the treatment, so the administration of cough medicine to the patient after initial treatment is not noticed or performed well by

many nurses [13]. Therefore, in training sessions, apart from providing knowledge, the trainer needs to consider instructing nurses how to dilute medicine by intuitive methods and creating conditions for them to practice many times to increase their initiative and confidence when encountering actual clinical cases.

Our study found a statistically significant difference between knowledge about anaphylaxis prevention and treatment of nurses and ages, year of work, and number of times being trained on anaphylaxis ($p < 0.05$). Specifically, nurses being under or equal 35 years old expressed the highest level of knowledge about anaphylaxis prevention and treatment; and this finding was similar to the study of Le HL that conducted in other hospital of Vietnam, with the group under 30 years old has a better rate of correct knowledge than the group over 30 years old ($p < 0.05$) [10, 14, 15]. This is quite understandable, because the younger the nurse, the more quickly and flexibly the ability to learn, remember and update new knowledge. However, the knowledge of nurses who worked more than five years was higher than others. Working experience plays a very important role in the process of managing anaphylaxis. Accordingly, the

longer nurses work, the more opportunities they have to approach and participate in handling anaphylactic cases, so they often know what they need to do and have a calmer attitude during the care process. Compared with previous study, our findings was the same [10, 15]. Moreover, participants who joined anaphylaxis training more than two times indicated a higher level of knowledge. The hospital focuses on regular training for all staff. This helps nurses have a good awareness of anaphylaxis, making an important contribution to the process of prevention and emergency treatment, reducing the mortality rate for patients.

Our study also has certain limitations. First, the study was only conducted on 82 nurses, so the sample size of our study was quite small. Additionally, only one hospital was used for data collection, so these findings may not be generalizable to all nurses in Vietnam or to nurses in other countries. Therefore, future research will need to include a multihospital design and large participants to evaluate the generalizability of the results of this study. Another limitation of our study is the small number of staff who have examined children and even the response rate to survey questions about the management of anaphylaxis in children (brand names and adrenaline dose) is even

lower. It is possible that the nurse's lack of response is due to unfamiliarity with the management of anaphylactic shock in children.

5. Conclusion

Even though most of nurses had correct general knowledge about anaphylaxis shock, especially about symptoms and common cause, their knowledge about anaphylaxis prevention and treatment accounted as a moderate level. Few nurses knew about the type of new drug being added in anaphylaxis emergency medicine box and check the patient's drug allergy history when checking their knowledge about anaphylaxis prevention. For anaphylaxis treatment, most of them did not know about the way to dilute Adrenalin for children and even for adult. Therefore, training sessions need to conduct regularly and focus on helping nurses better understand the drugs and the way of use to be proactive in emergency reaction.

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