Hemşirelerin Antibiyotikler, Hazırlama, Uygulama ve İzlemi Hakkında Temel Bilgi Düzeyleri: Anket Çalışması

Nurses About Antibiotics, Preparation, Administration and Follow-up Basic Knowledge Levels: Survey Study

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Öz

Amaç: Gönüllülük esasına dayalı bu kesitsel çalışmada amacımız, hemşirelerin antibiyotik tedavisi ve enfeksiyon kontrol önlemleri hakkındaki genel bilgilerini değerlendirmektir.

Gereç ve Yöntem: "Google Anket Formu'ndan 25 sorudan oluşan bir anket hazırlandı ve "WhatsApp" uygulaması üzerinden 142 hemşire ile paylaşıldı. Çalışmaya servis ve yoğun bakım hemşireleri dahil edildi. Katılımcılara sosyodemografik parametreler, el hijyeni, antibiyotiklerin hazırlanması ve uygulanması, takibi ve yan etkilerin bildirilmesi ile ilgili sorular soruldu. Sosyodemografik veriler, el hijyeni ve antibiyotik tedavisi karşılaştırılarak analiz edilmiştir.

Bulgular: Katılımcıların 29'u (%20.4) erkek, 113'ü (%79.6) kadındır. Katılımcıların yaklaşık %50'si 18-30 yaş aralığında idi. Hemşirelerin %66.9'unun antibiyotik tedavisi konusunda herhangi bir eğitim almadığı görülmüştür. Yoğun bakım ünitesi hemşireleri bilgi sorularına anlamlı düzeyde (OR:3.04; %95 CI; 21.9-0.2; p=0.013) cevap verdi. El hijyeni ile ilgili cevaplardaki doğruluk oranları %0-40 arasındaydı.

Sonuç: Günümüzde antibiyotik tedavi yönetiminin merkezinde kabul edilen hemşirelerin antibiyotik tedavi aşamaları ile ilgili ciddi bilgi eksiklikleri gözlendi. Eğitim programlarının bu yönde tekrar planlanması düşünülebilir. Antibiyotik tedavi aşamasının, antibiyotiğin etkinliğini etkileyip etkilemediğine dair prospektif, çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Antibiyotikler, enfeksiyon kontrol önlemi, hemşireler, sağlık araştırmaları

Abstract

Aim: In this voluntary cross-sectional study, our aim was to evaluate the general knowledge of nurses about antibiotic therapy and infection control measures.

Materials and Methods: A questionnaire consisting of 25 questions was prepared from the "Google Survey Form" and shared with 142 nurses via the "WhatsApp" application. Participants were asked questions about sociodemographic parameters, hand hygiene, preparation and administration of antibiotics, follow-up and reporting of side effects. Sociodemographic data, hand hygiene and antibiotic treatment were compared and analyzed.

Results: Of the participants, 29 (20.4%) were male and 113 (79.6%) were female. Approximately 50% of the participants were between the ages of 18-30. It was observed that 66.9% of the nurses did not receive any training on antibiotic therapy. ICU nurses answered the information questions at a significant level (OR: 3.04; 95% CI; 21.9- 0.2; p=0.013). Accuracy rates for answers related to hand hygiene were between 0-40%.

Conclusion: It was observed that nurses, who are considered to be at the center of antibiotic therapy management today, lacked serious knowledge about the stages of antibiotic therapy. Re-planning of training programs in this direction may be considered. Prospective studies are needed to determine whether the antibiotic treatment phase affects the efficacy of antibiotics.

Keywords: Antibiotics, enfectious control prevention, nurses, health research

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Introduction

Ensuring infection control is the main factor in preventing infections that develop in the hospital.[1] The effective treatment of the developing infection is the second basic element.[2] After the diagnosis and treatment decision of the physician in the clinic, the administration of the drugs to be used is done by the nurses. Within the scope of rational drug use, nurses have responsibilities such as observing the effectiveness of the drug and patient compliance by administering the right drug to the right patient, at the right time and dose, in the right way. It is called polypharmacy when nurses report abnormal developments during treatment to the physician. In cases where more than one drug is given to the patient; It has important responsibilities such as evaluating drug-drug, drug-food interactions before use and inspecting during use.[3] Regarding rational drug use, the most common drug administration errors are the administration of the drug at the wrong time and the administration of the wrong dose.[4] Nurses state that most of the medication errors made in hospitals are caused by problems such as excessive workload, insufficient personnel and lack of communication. In studies conducted in our country, the rate of contacting a doctor or pharmacist in physician orders that nurses think contain drugs that may be inaccurate or may interact with each other is over 94%. It is extremely important for nurses to contact the physician or pharmacist in any case of hesitation about drugs, to reduce and prevent drug administration errors.[5-7] One of the important issues that nurses should pay attention to is adverse drug reactions. Again, it has been found in studies that nurses know the definition of an adverse drug, but they are reluctant to report when an adverse drug reaction develops.[8,9] In this study, our aim is to evaluate the basic knowledge levels of nurses working in the service and intensive care units (ICU) of our hospital about antibiotics, preparation, application and follow-up by questionnaire method.

Materıals and Methods

Study design and data collection

The study was planned as a cross-sectional, survey study. It was implemented between December 15-22, 2022. Participants were not asked to provide any name or identification. Thus, it was not possible to identify which participant the responses belonged to. Raosoft Calculator calculation method was used to determine the sample size. The confidence level was 95% and the margin of error was 5%.

The formula;

X = Z (c / 100) 2 r (100- r)

N = N x / ((N -1) E 2 + x)

e = Square[(N - n) x / n (N -1)] was used. In an institution with a total of 235 nurses, the minimum number of 142 people was reached. After obtaining the approval of the ethics committee of the study, a questionnaire consisting of 25 questions was prepared on the "Google Questionnaire Form" and the participants were reached through the "WhatsApp" application. In the first part of the questionnaire, a statement was made that the study was on a voluntary basis. A declaration of consent was required from all participants. The questionnaire form was shared with the volunteer participants for a week. Participation was made on a voluntary basis. In the first part, five questions about sociodemographic characteristics (age, gender, education status, department, working time) were asked to the participants. In the second part, 20 questions were asked to evaluate the general knowledge level about hand hygiene, disinfection-sterilization, antibiotic storage, reconstitution, administration, follow-up, and reporting and follow-up of antimicrobial adverse events. Participants were required to answer all questions. Service and ICU nurses were included in the study. Infection committee control nurses and administrative unit nurses were excluded from the study. Seventeen of the 20 questions about antibiotic treatment were evaluated separately as they were general information questions.[10-12] In order to measure the general knowledge level of the nurses, the correct answer was scored with 1 point and the wrong answer with 0 points, and the total success score was calculated for each participant. While preparing the questionnaire, questions were developed by making use of similar studies. In the calculation made out of 0-17 points, those who answered $\geq 70\%$ of the questions correctly were considered successful, and $<70\%$ were considered unsuccessful.[13-15] In addition, the level of knowledge was compared according to demographic parameters over the total success score.

Ethics Committee Permission

An application was made to Ordu University Faculty of Medicine Ethics Committee Unit for ethical approval of the study. The necessary permission was obtained by the decision taken at the meeting dated 09.12.2022 (decision no: 2022/284).

Data analysis

The relationship between the sociodemographic characteristics of the nurses participating in the study and their knowledge levels about antibiotics, their basic knowledge levels about preparation, administration and follow-up of antibiotics were evaluated. The study data collected as a result of the research were analyzed by transferring them to SPSS version 26.0 (IBM, Armonk, New York, USA) and the jamovi project (2022) (Version 2.3) [Computer Software]. Mean values (±standard deviation) for continuous variables, and values for categorical variables were expressed as frequency and percentage. The conformity of non-

categorical data to normal distribution was investigated using the Shapiro-Wilk Test, and nonparametric tests were used for non-normally distributed variables. Success status according to sociodemographic variables was analyzed by logistic regression analysis. In addition, the knowledge level according to demographic parameters over the total success score was compared with the Kruskal Wallis H test and the Chi-Square test (χ^2). $p<0.05$ (bilateral) was considered statistically significant.

Results

Demographic data

A total of 142 nurses voluntarily participated in our survey study. There were approximately equal numbers of participants from the 18-30 and 31-50 age groups. There were no participants over the age of 50. The majority were female (79.6%). The majority of the participants (79.6%) were undergraduate graduates. Service nurse participation was higher. The number of employees working for 2-5 years and over 10 years in the profession was high. The demographic parameters of the participants are indicated in Table 1.

Table 1. Demographic parameters

Parameters		n	%
Age	18-30	70	49.3
	31-50	72	50.7
Gender	Male	29	20.4
	Female	113	79.6
Education status	High school	7	4.9
	Associate degree	10	7.0
	Licence	113	79.6
	Master's degree	12	8.5
Department	Service nurse	87	61.3
	ICU nurse	55	38.7
Working time	1 years	10	7.0
	2-5 years	48	33.8
	6-10 years	27	19.0
	Over the 10 years	57	40.2
Total		142	100

Antibiotic treatment and hand hygiene

The responses to the questions about the preparation of antibiotics before the treatment, the treatment process, hand hygiene and side effect follow-up were categorized as true, false or yes or no. After diluting the antibiotics, compliance with the treatment duration was observed at a high rate (99.3%). However, low accuracy rates (0-40%) were observed in the responses related to providing hand hygiene. The accuracy rates in the responses to the questions about general information about antibiotics and side effects were relatively higher (98.6-47.2%) (Table 2).

Table 2. Antibiotic treatment

Questions	Responses	N	%

1. How long after diluting antibiotics in patients do you apply them?	Correct	141	99.3
	Incorrect	1	0.7
2. How do you ensure hand hygiene before preparing antibiotics in patients?	Correct	0	0
	Incorrect	142	100
3. Is it necessary to disinfect the vial caps before preparing the antibiotics? If yes, how?	Correct	57	40.1
	Incorrect	85	59.9
4. What do you think about the storage conditions of antibiotics?	Correct	112	78.9
	Incorrect	30	21.1
5. How do you maintain hand hygiene before applying the antibiotics you have prepared?	Correct	45	31.7
	Incorrect	97	68.3
6. How do you maintain hand hygiene after diluting the antibiotics?	Correct	26	18.3
	Incorrect	116	81.7
7. How do you maintain hand hygiene after applying the treatment?	Correct	10	7
	Incorrect	132	93
8. Do you think the time taken until the application after diluting the antibiotic is important?	Correct	122	85.9
	Incorrect	20	14.1
9. Do you think the duration of administration of antibiotics is important?	Correct	132	93
	Incorrect	10	7
*10. Which group of drugs should be administered by infusion due to its time-dependent effect?	Correct	67	47.2
	Incorrect	75	52.8
*11. Which group of drugs should be administered in short periods due to their concentration dependent effect?	Correct	68	47.9
	Incorrect	74	52.1
12. How much do you think is enough to know about antibiotic treatment?	Correct	106	74.6
	Incorrect	36	25.4
13. Do you evaluate the efficacy of the antibiotics treatment in the patients?	Correct	85	59.9
	Incorrect	57	40.1
14. Do you think that you have enough knowledge about the drug interaction of antibiotics?	Yes	78	54.9
	No	64	45.1
15. Do you observe side effects during or after applying antibiotics?	Yes	140	98.6
	No	2	1.4
16. If your answer to the above question is yes, how do you follow up?	Correct	134	94.4
	Incorrect	8	5.6
18. Do you administer more than one antibiotic at the same time in patients taking multiple antibiotics?	Correct	85	59.9
	Incorrect	57	40.1
*19. What factors can affect the development of antimicrobial drug resistance?	Correct	113	79.6
	Incorrect	29	20.4

(*): Multiple-choice questions.

Frequency of training and medical order problems

When all service and ICU nurses were asked about the frequency of training on antibiotic therapy, it was understood that 66.9% of them did not receive any training. It was determined that 16.2% took it only once a year (Figure 1).
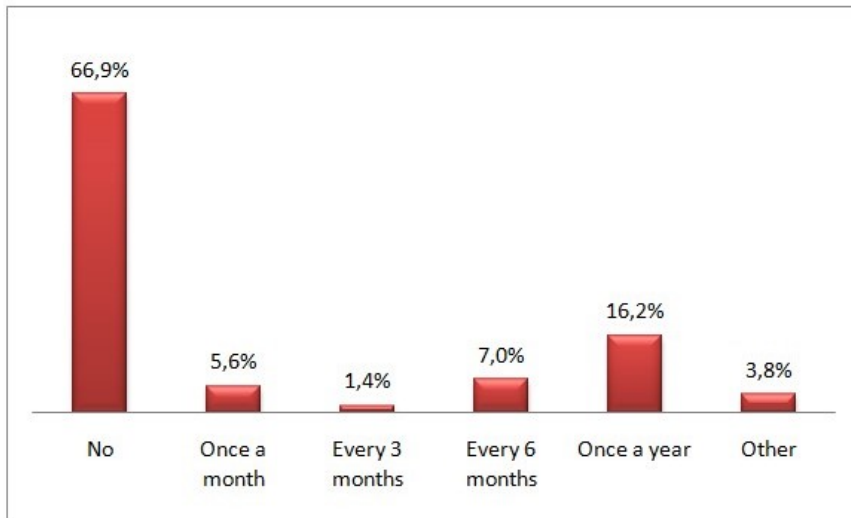

Figure 1. Frequency of training

The most common response (34%) of the participants to the question asked about the problems encountered with the doctor's orders was that the type of treatment and its indication were not clearly stated. Irregular (24%) and delayed (20%) ordering were other common causes (Figure 2).
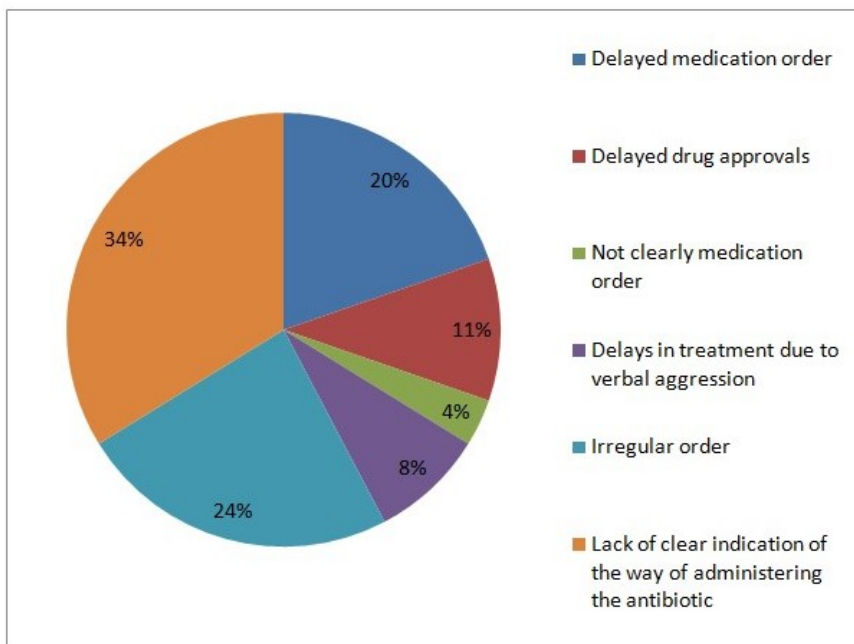

Figure 2. Medical order problems

Knowledge measurement

Success status according to sociodemographic variables was analyzed by logistic regression analysis. According to age group (OR:1.9; 95%CI; 2.1-(-0.8); p=0.385), gender (OR:0.3; 95%CI; 0.1-(-2.3); p=0.323), educational status and working time, there was no statistically significant relationship between success status. Only ICU nurses were significantly related to their achievement status (OR:3.04; 95%CI; 21.9-0.2; **p=0.013**) (Table 3).

Table 3. Logistic regression analysis of success status according to sociodemographic variables

Variables	95% CI		p-value	Odds ratio
	Lower	Upper		
Age				
30-50 - 18-30	-0.835	2.163	0.385	1.942
Gender				
Male – Female	-2.392	0.131	0.079	0.323
Education Status				
*A. Degree - High School	-3.915	1.640	0.422	0.321
Degree - High School	-2.106	1.571	0.776	0.765
**M. Degree - High School	-3.298	1.519	0.469	0.411
Department				
ICU – Service	0.239	1.990	**0.013**	3.049
Working Time				
2-5 years - 1year	-2.217	1.065	0.492	0.562
6-10 years -1year	-1.967	1.968	0.999	1.001
>10 years - 1year	-3.810	0.639	0.162	0.205

(*):Associate Degree; (**):Master's Degree; CI: Confidence Interval.

When the total knowledge scores of the participants (0-17 points) were compared with the demographic variables, statistically significant differences were found only between the departments (χ^2: 9.73; ε^2: 0.069; **p=0.002**) compared to other variables (Table 4).

Table 4. Knowledge score relationship according to demographic variables

Knowledge points (0-17)	χ^2	p-values
Age	2.31	0.128
Gender	2.26	0.133
Education Status	1.10	0.776
Department	9.73	**0.002**
Working Time	3.94	0.269

χ^2: Chi-Square test.

Discussion

It has recently been recognized by the American Nurses Association and the Centers for Disease Control and Prevention (CDC) that broadening the scope of antibiotic management activities to include nurses is critical to the success of antibiotic management programs.[16,17] Nurses have a very important role in antibiotic management. In a study conducted abroad, it was reported that the nurses' evaluation would not be appropriate whether the drug allergy expressed by the patients actually existed. In the same study, it was stated that nurses could help physicians in antibiotic management, switching from IV antibiotic use to oral, and prolonged treatments.[18-21] In a study in our country in which 392 nurses actively participated, the rate of administration of the drug at the wrong time was reported as 66% and dose skipping 57%. A significant relationship was found between education level and reporting of adverse effects. Again, in the same study, nurses stated that they generally have "good" and "moderate" knowledge about the duration of action of drugs, side effects, contraindications, interactions with other drugs and nutrients, warnings/precautions and special situations. On the other hand, 20.7% of the nurses answered "bad" to the level of knowledge about the interactions of drugs with other drugs and foods.[22] In another study, nurses' knowledge of antibiotic treatment times was evaluated. It was determined that the duration of antibiotic treatment was not answered correctly by 13.9% of the nurses and there was a time inconsistency in 22% of the nurses.[23]

In our study, the level of knowledge was examined according to sociodemographic variables. According to age group, gender, educational status and working time, there was no statistically significant relationship between success status. However, a significant relationship was found between ICU nurses. In other words, it was determined that the knowledge level of ICU nurses on antibiotics and hand hygiene was more successful. In addition, when the analysis was made on the total participant score, a statistically significant difference was found only between the service and ICU staff . Almost all of the participants stated that they followed up on side effects. However, 45% of the participants reported that they did not have enough information about antibiotic-drug interaction. The frequency of education on antibiotic therapy and hand hygiene may be an important factor influencing this. Because it was determined that 66.9% of the participants did not receive any training, and 16.2% of them only took it once a year. 79.6% of the participants were undergraduate licenses and 40% had more than 10 years of work experience. Despite this, the lack of significant difference in terms of knowledge level shows that there is a need for training programs. At this point, disruptions in the medical order issued by the doctors may be an extra factor that complicates the nurse's treatment concentration. Barrier measures to prevent the transmission of infection, such as hand hygiene and the use of personal protective equipment, are essential elements of preventing transmission

by contact or various body secretions and extracts.[24] In a study, it was observed that 37% of healthcare workers' hands were contaminated after removing gloves.[25] In another simulation study, gloves and apron removal simulations were performed and skin or clothing contamination was observed in 46% of the simulations.[26] In another study on the compliance of healthcare workers with contact and droplet precautions, errors were detected in 283 of 325 observations. Entering the room without wearing basic protective equipment or not wearing an apron fully accounted for 102 of these mistakes. In 44 of the observations, an error was detected during the change of protective equipment.[27]

In our study, after diluting the antibiotics, compliance with the treatment period was observed at a high rate (99.3%). We think that this is an important element in the efficacy of treatment. However, low accuracy rates (0-40%) were observed in the responses related to providing hand hygiene. It is interesting that none of the participants could give a correct answer to the correct hand hygiene, especially before antibiotic treatment preparation. This may have a role in the preparation of antibiotic therapy, contamination and reduced treatment efficacy. The important reason why the results we reached in the study differ between demographic variables is that the participants were limited to 142 people. More meaningful results will be achieved in multicenter studies to be carried out by increasing the number of participants.

Study Limitation

This study has some limitations. First; includes single-center data. It does not reflect the whole country. Second; The majority of the participants are females. Third; the total number of participants was 142 people. Studies carried out by reaching a multi-center, large participant population with appropriate proportions of men and women will yield more valuable results.

Conclusion

As a result of our questionnaire study, it was observed that there was a difference in the answers given when the duration, dose, time interval and side effect management of antibiotic treatment were questioned. In addition, hand hygiene awareness among nurses was found to be lower than we expected. Nurses working outside the ICU lack knowledge about nursing practices. Prospective studies are needed to determine whether the stage of antibiotic therapy affects the efficacy of antibiotics. It is necessary to pay attention to the ICU-service distinction in the frequency of training. It was understood that especially ward nurses need more frequent training. Multicenter studies including a larger population will provide a more objective evaluation opportunity.

Conflict of Interest

All authors declare that there is no conflict of interest for this study.

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