

EVALUATION OF THE EXISTING KNOWLEDGE OF HOSPITAL TECHNICIAN CANDIDATES ABOUT NOSOCOMIAL INFECTIONS

HASTANE TEKNİSYENİ ADAYLARININ HASTANE İNFEKSİYONLARI HAKKINDA MEVCUT BİLGİLERİNİN DEĞERLENDİRİLMESİ

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ABSTRACT

Since nosocomial infections are secondary preventable infections and because health care staff have a precautionary role in the implementation of these measures, the knowledge of health technicians about hospital infections will affect their professional behavior and decisions regarding their activities in service units. This study was needed to determine the current knowledge of health technician candidates about nosocomial infections. This descriptive study involved a total of 522 volunteer students from Isparta Vocational School of Health Services, Süleyman Demirel University in Turkey. The data of this research was collected by a questionnaire prepared by the researcher based on the literature. Data were evaluated using crosstab, percentage and frequency distributions on the statistical package program (SPSS 16.0). As a result of the evaluation of the data obtained from the research, it was determined that the majority of the health technician students would report this to the infection unit in case of injury with a cutting device. In addition, the information about rational use of antibiotics, the importance of hand hygiene compliance and nail care and the role of alcohol-based cleaners in preventing nosocomial infections were found to be sufficient. However, standard preventive measures, which are essential for the prevention of nosocomial infections, the definition of nosocomial infection, the most frequently observed nosocomial infections and the causative microorganisms and the formation of nosocomial infections about the importance of temporary flora of health personnel were found to have insufficient knowledge.

Keywords: Patient technician candidates, hospital, hospital infections

ÖZET

Hastane enfeksiyonlarının sekonder önlenbilir enfeksiyonlar olması ve bu önlemlerin uygulanmasında sağlık teknikerlerinin önlemleri rollerinin olması nedeni ile sağlık teknikerlerinin hastane enfeksiyonlarına ilişkin bilgileri, hizmet birimlerindeki faaliyetleri ile ilgili kararlarını ve mesleki davranışlarını etkileyecektir. Bu çalışmaya, sağlık teknikeri adaylarının hastane enfeksiyonları hakkındaki mevcut bilgilerinin tespit edilmesi için gereksinim duyulmuştur. Tanımlayıcı nitelikte bir araştırma olan bu çalışma; Türkiye’de Süleyman Demirel Üniversitesi Isparta Sağlık Hizmetleri Meslek Yüksekokulu’nda öğrenim gören toplam 522 gönüllü öğrenci ile yürütülmüştür. Araştırmada veriler, araştırmacı tarafından ilgili literatür taranarak hazırlanan anket formu kullanılarak toplanmıştır. Veriler istatistiksel paket programı SPSS (16.0) yardımıyla çapraz tablo (Crosstab), yüzde ve frekans dağılımları yapılarak değerlendirilmiştir. Araştırmada elde edilen verilerin değerlendirilmesi sonucunda sağlık teknikerliği öğrencilerinin büyük bir bölümünün kesici delici bir aletle yaralanma durumunda bunu enfeksiyon birimine bildirecekleri tespit edilmiştir. Ayrıca antibiyotiklerin akılcı kullanımının, el hijyenine uyum ve tırnak bakımının ve alkol bazlı temizleyicilerin hastane enfeksiyonlarını önlemedeki rolleri konularında bilgilerinin yeterli olduğu tespit edilmiştir. Ancak hastane enfeksiyonlarının önlenmesi için elzem olan standart koruyucu önlemler, hastane enfeksiyonunun tanımı, en sık gözlenen hastane enfeksiyonu ve etkeni ile hastane enfeksiyonlarının oluşumunda sağlık personelinin geçici florasının önemi konularında yeterli bilgiye sahip olmadıkları tespit edilmiştir.

Anahtar kelimeler: Hasta teknisyeni adayları, hastane, hastane enfeksiyonları

JEL CODE: I10

INTRODUCTION

Nosocomial infection is evaluated as an infection which does not occur in the incubation period and at the time of admission to the hospital, but occurs within 48-72 hours after hospitalization or up to 10 days after discharge from the hospital (Uzun 1997; Çağlar 2002; Özdemir et al. 2004). In a study of 66 hospitals from 23 countries, it is detected that 7,1% of hospitalized patients have nosocomial infection (Zarb et al. 2012). Nosocomial infection is an important public health problem in developed and developing countries, as it causes high morbidity and mortality, and in terms of its economic consequences (Geyik et al. 2008; Gürsoy 2008; Yüceer and Demir 2009).

The causative factors of nosocomial infections are resistant microorganisms present in the hospital flora. The most important examples are; methicillin-resistant *Staphylococcus aureus*, infections caused by enterococci, multi-drug resistant Gram-negative bacilli. Therefore, nosocomial infections are difficult to treat and require long-term treatment with broad-spectrum and expensive antibiotics. They cause prolonged hospitalization duration and increase in cost (Çıragil 2016).

Microorganisms that cause nosocomial infections can also spread to the community through discharged patients, health staff or visitors (Ertek 2008; Cebeci vd. 2012) . In order to prevent the spread of nosocomial infectious agents, not only patients but also hospital staff should be considered as infectious as well and precautions should also be taken for the personnel (Çağlar 2002). When the necessary precautions are taken, more than half of the problems caused by nosocomial infection can be prevented (Bakkalcı 2005).

Since nosocomial infections are secondary preventable infections and because health care staff have a precautionary role in the implementation of these measures, the knowledge of health technicians about hospital infections will affect their decisions regarding their activities in service units. In addition, information about infections can be seen as a motivating feature that may affect their professional behavior. Therefore, evaluating the knowledge of health technician candidates about nosocomial infections may provide information about the quality of health services. This information is also important in determining the in-service training needs of health technicians in the public sector. Studies to determine the role and current knowledge of health technicians in preventing nosocomial infections are limited. This study was needed to determine the current knowledge of health technician candidates about nosocomial infections. Health technician candidates will be able to play an effective role in the prevention of nosocomial infections if they have sufficient knowledge about nosocomial infections.

MATERIAL AND METHOD

This descriptive study involved a total of 522 volunteer students from Isparta Vocational School of Health Services, Süleyman Demirel University in Turkey. The data in the study were collected through survey method by the researcher in April 2018 and official permission was gained from the university so that the study could be conducted. The study was conducted based on voluntariness and only those students who agreed to fill in a questionnaire form were involved in the study. Names and other identity information were not included in the forms and the study was conducted during the weekdays when there were not any exams. The students were informed about the study prior to the application.

The data of this research was collected by a questionnaire prepared by the researcher. The data collection tool used in the study was prepared by the researcher based on the literature (Aytaç et al. 2008, Tavolacci et al. 2008, Yamazhan et al. 2009, Voidea et al. 2012, Ojulung et al., 2013). The questionnaire consists of two parts. The first part includes the descriptive characteristics of the students; age, gender, marital status, type of high school, working status and duration of health care institution, information about hospital infection and participation in the training program. The second part consisted of 15 questions to reveal the level of knowledge of the students about nosocomial infections. There are open and closed-ended questions in the survey.

The data obtained were evaluated by a SPSS package program. In the statistical analyses, (f) represents frequency, (%) percentage. Chi-square (X^2) procedures were applied in order to test the differences and $p < 0,05$ was accepted significant.

Results

In this research conducted to determine the current knowledge of nosocomial infections of vocational health school students with associate degree education, the personal characteristics of the students who participated in the survey are presented in Table 1.

Table 1. Personal characteristics of the students participating in the research

The number of students (f) = 522			
Students characteristics	Variables	f	%
Enrolled program	Firs and Emergency Aid	182	34,9
	Medical Laboratory Techniques	162	31,0
	Elderly Care	61	11,7
	Medical Imaging Techniques	54	10,3
	Physiotherapy	27	5,2
	Anesthesia	26	5,0
	Oral and Dental Health	10	1,9
Gender	Female	349	66,9
	Male	173	33,1
Age range	17-18	170	32,6
	19-20	284	54,4
	21 and over	68	13,0
Grade	1th Grade	299	57,3
	2th Grade	223	42,7
Type of high school graduated	Vocational Health High Schools	250	47,9
	Others	272	52,1
Working status in health institutions	Yes	38	7,3
	No	484	92,7
Duration of work	< 6 months	10	26,3
	6-12 months	6	15,8
	1-3 Years	14	36,8
	> 3 years	8	21,1
Participating status in a training program on nosocomial infections and prevention	Yes	277	53,1
	No	245	46,9

As can be seen in Table 1, 182 (34,9 %) of the students participating in the survey are studying at First and Emergency Aid Program, 162 (31 %) of them are studying at Medical Laboratory Techniques Program, 61 (11,7 %) of them are studying at Elderly Care Program, 54 (10,3 %) of them are studying at Medical Imaging Techniques Program, 27 (5,2 %) of them are studying at Physiotherapy Program, 26 (5 %) of them are studying at Anesthesia Program and 10 (1,9 %) of them are receiving education on Oral and Dental Health Programs. 299 (57,3 %) of these students are in the first grade and 223 (42,7 %) of them are in the

second grade. It is found that 173 (33,18 %) of the students participating in the survey are male, 349 (66,9 %) of them are female and 170 (32,6 %) of these students are in the 17-18 age range, 284 (54,4 %) of them are in the 19-20 age range and 68 (13 %) of them are 21 and over. While 250 (47,9 %) of the students participating in the survey were graduated from vocational health high schools, 272 (52,1 %) graduated from other high schools. While 38 (7,3 %) of the surveyed students were working in health institutions, 484 (92,7 %) were not working. It was found that 10 (26,3 %) of the 38 students working in the health institution worked for less than 6 months, 6 (15,8 %) of them worked for 6-12 months, 14 (36,8 %) of them worked for 1-3 years and 8 (21,1 %) of them worked for more than 3 years. 277 (53,1 %) of the students who participated in the survey stated that, they participated in a training program on nosocomial infections and on prevention from nosocomial infections, 245 (46,9 %) of them stated that they did not receive any training.

When approaching a patient with infectious disease, 344 (40,9 %) of the students who participated in the survey stated that gloves should be worn, 331 (39,4 %) of them stated that a mask should be put on, 64 (7,6 %) of them stated that a box apron should be worn, 35 (4,2 %) of them stated that the hands should be washed, 26 (3,1 %) of them stated that a hair bonnet should be worn, 23 (2,7 %) of them stated that it was necessary to isolate the patient and 18 (2,1 %) of them stated that they should be vaccinated (Table 2).

Table 2. Distribution of students according to the precautions to be taken when approaching a patient with infectious disease

Precautions ^a	F	%
Wearing gloves	344	40,9%
Putting on a mask	331	39,4%
Wearing hair bonnet	26	3,1%
Wearing box apron	64	7,6%
Being vaccinated	18	2,1%
Washing hands	35	4,2%
Isolating the patient	23	2,7%
Total	841	100,0%

a. Since there is a multiple response, the number f exceeds the number of samples.

It was determined that 453 (86,8 %) of the students participating in the survey would report this to the infection unit in case of injury with a stabbing tool in the hospital environment, 30 (5,7 %) of them stated that they would ignore it and would not report this situation, 25 (4,8 %) of them stated that they did not know which unit they would apply in the hospital, and 14 (2,7 %) of them stated that they did not report because their vaccinations were complete (Table 3). According to the type of high school graduated, there was a statistically significant difference between students' answers to the questions ($p=0,000$). In case of injury with a stabbing device in the hospital environment, 24 (80 %) out of 30 student who do not care about this situation, 23 (92 %) out of 25 student who do not know which unit to apply, and only 4 (28,6 %) out of 14 student who stated that their vaccines are complete were only graduated from other high schools.

Table 3. Distribution of the responses about reporting to the infection unit in case of injury with a stab considering the type of high school graduated and gender

		Type of High School			
		Vocational Health High School	Others	Total	
Reporting to the infection unit in case of injury with a stab	I wouldn't report it because I didn't care	f %	6 2,4%	24 8,8%	30 5,7%
	I wouldn't report it to the hospital because I didn't know which department to apply to	f %	2 ,8%	23 8,5%	25 4,8%
	I wouldn't report it because my vaccines were full	f %	10 4,0%	4 1,5%	14 2,7%
	Yes, I would report	f %	232 92,8%	221 81,2%	453 86,8%
	Total	f %	250 100,0%	272 100,0%	522 100,0%

The students were asked to choose the correct definition among the definitions of nosocomial infection given in the survey. While 233 (44,6 %) of the students correctly defined nosocomial infection as infections that did not occur in the incubation period at the time of admission, developed 48-72 hours after hospitalization, or occurred within 10 days after discharge, 167 (32 %) of them identified incorrectly and 122 (23,4 %) of them stated that they do not know. Accurate definition of nosocomial infection according to gender and type of high school graduated was found to be statistically significant ($p=0,000$). Of the 233 student who correctly identified the nosocomial infection, 180 (77,3 %) of them were female and 142 (60,9 %) of them were vocational health high school graduates, while 53 (22,7 %) of them were male and 91 (39,1 %) of them were graduated from other high schools. In addition, 91 (74,6 %) of 122 student who do not know the answer was graduated from other high schools (Table 4).

While 113 (21,6 %) student correctly describe the most common nosocomial infection as urinary tract infections, 140 (26,8 %) of the students answered bacteremia, 113 (21,3 %) of them responded to surgical infection and 18 (3,4 %) of them responded to respiratory system infections. and the remaining 140 (26,8 %) student stated that they do not have any idea. The difference between the answers to the most common nosocomial infection according to gender and type of high school graduated was found to be statistically significant ($p=0,000$). Of the 113 people who identified the most common nosocomial infection correctly, 96 (85 %) were female and 73 (64,6 %) were graduates of vocational health high schools, while 17 (15 %) were male and 40 (35,4 %) were graduated from other high schools. In addition, 103 (73,6 %) of 140 people who have selected I do not have any idea have graduated from other high schools (Table 5).

Table 4. Distribution of the responses about the definition of nosocomial infection considering the type of high school graduated and gender

		Type of High School			Gender			
		Vocational Health High School	Others	Total	Male	Female	Total	
Definition of nosocomial infection	These are infections that occur during the incubation period at the time of admission and develop 48-72 hours after admission.	f	51	44	95	41	54	95
		%	53,7%	46,3%	100,0%	43,2%	56,8%	100,0%
	They are transmitted from one patient to the other and develop after 48-72 hours	f	21	26	47	14	33	47
		%	44,7%	55,3%	100,0%	29,8%	70,2%	100,0%
	These infections occur after discharge of the patient but when the patient is in hospital these infections have no symptoms.	f	5	20	25	12	13	25
		%	20,0%	80,0%	100,0%	48,0%	52,0%	100,0%
	These infections did not occur in the incubation period at the time of admission to the hospital, developed within 48-72 hours after hospitalization, or occurred within 10 days after discharge	f	142	91	233	53	180	233
		%	60,9%	39,1%	100,0%	22,7%	77,3%	100,0%
	I have no idea	f	31	91	122	53	69	122
		%	25,4%	74,6%	100,0%	43,4%	56,6%	100,0%
Total	f	250	272	522	173	349	522	
	%	47,9%	52,1%	100,0%	33,1%	66,9%	100,0%	

Table 5. Distribution of the responses about the question of "Which is the most common nosocomial infection?" considering the type of high school graduated and gender

		Type of High School			Gender			
		Vocational Health High School	Others	Total	Male	Female	Total	
The most common nosocomial infection	Urinary tract infections	f	73	40	113	17	96	113
		%	64,6%	35,4%	100,0%	15,0%	85,0%	100,0%
	Surgical infection	f	56	55	111	36	75	111
		%	50,5%	49,5%	100,0%	32,4%	67,6%	100,0%
	Respiratory system infections	f	12	6	18	8	10	18
		%	66,7%	33,3%	100,0%	44,4%	55,6%	100,0%
	Bacteremia	f	72	68	140	51	89	140
		%	51,4%	48,6%	100,0%	36,4%	63,6%	100,0%
	I have no idea	f	37	103	140	61	79	140
		%	26,4%	73,6%	100,0%	43,6%	56,4%	100,0%
Total	f	250	272	522	173	349	522	
	%	47,9%	52,1%	100,0%	33,1%	66,9%	100,0%	

430 (82,4 %) of the students who participated in the survey gave the correct answer as "we could carry the germs and infect germs to other people without catching any disease", while

64 (12,3 %) of them stated that they do not have any idea and 28 (5,4 %) gave the wrong answer.

362 (69,3 %) of the students who participated in the survey gave correct answers as "alcohol-based cleaners prevent nosocomial infections", while 83 (15,9 %) of them stated that they do not know and 77 (14,8 %) of them answered incorrectly. According to the type and class of high school graduated, the difference between the answers given to the question of "Do alcohol-based cleaners prevent nosocomial infections?" was found to be statistically significant ($p=0,000$ ve $p=0,003$). It was found that 196 (54,1 %) of 362 students who gave correct answers were graduated from other high schools ($p=0,000$) and 206 (56,9 %) of them were 1st grade students ($p=0,003$) (Table 6).

Table 6. Distribution of the responses about the question of "Do alcohol-based cleaners prevent nosocomial infections?" considering the type of high school graduated and grade

		Type of High School			Grade			
		Vocational Health High School	Others	Total	1th Grade	2th Grade	Total	
Do alcohol-based cleaners prevent nosocomial infections?	Yes	f	166	196	362	206	156	362
		%	45,9%	54,1%	100,0%	56,9%	43,1%	100,0%
	No	f	61	16	77	34	43	77
		%	79,2%	20,8%	100,0%	44,2%	55,8%	100,0%
	I have no idea	f	23	60	83	59	24	83
		%	27,7%	72,3%	100,0%	71,1%	28,9%	100,0%
Total	f	250	272	522	299	223	522	
	%	47,9%	52,1%	100,0%	57,3%	42,7%	100,0%	

While 378 (72,4 %) of the students who participated in the survey answered correctly as "Rational use of antibiotics is important in the prevention of nosocomial infections", 108 (20,7 %) of them stated that they do not have any idea and 36 (6,9 %) of them answered incorrectly. According to the gender, class and type of high school graduated, the difference between the answers given to the question of "Is rational use of antibiotics important in the prevention of nosocomial infections ?" was found to be statistically significant ($p<0,05$). The rational use of antibiotics is important in the prevention of nosocomial infections. It was found that, 267 (70,6 %) of the 378 students who identified the question correctly were female ($p=0,01$), 200 (52,9 %) were graduated from vocational health high school ($p=0,000$), and 203 (53,7 %) were 1st grade students ($p=0,021$) (Table 7).

Table 7. Distribution of the responses about the question of "Is rational use of antibiotics important in the prevention of nosocomial infections?" considering the type of high school graduated, grade and gender

		Gender			Type of High School			Grade level			
		Male	Female	Total	Vocational Health High School	Others	Total	1th Grade	2th Grade	Total	
			f	111	267	378	200	178	378	203	175
Is rational use of antibiotics important in the prevention of nosocomial infections?	Yes	%	29,4%	70,6%	100,0%	52,9%	47,1%	100,0%	53,7%	46,3%	100,0%
	No	f	17	19	36	22	14	36	22	14	36
		%	47,2%	52,8%	100,0%	61,1%	38,9%	100,0%	61,1%	38,9%	100,0%
	I have no idea	f	45	63	108	28	80	108	74	34	108
		%	41,7%	58,3%	100,0%	25,9%	74,1%	100,0%	68,5%	31,5%	100,0%
	Total	f	173	349	522	250	272	522	299	223	522
	%	33,1%	66,9%	100,0%	47,0%	52,1%	100,0%	57,3%	42,7%	100,0%	

While 457 (87,5 %) of the surveyed students answered the question of "Does being long-nailed increases nosocomial infections?" correctly, 49 (9,4 %) of them stated that they do not know and 16 (3,1 %) of them answered incorrectly. According to the type and gender of high school graduated, the difference between the answers given to the question of "Does long nails increase nosocomial infections?" was found to be statistically significant ($p < 0,05$). Between the 457 respondents who gave correct answers, 327 (71,6 %) of them were women ($p = 0,000$) and 235 (51,4 %) of them were graduates of vocational health high schools ($p = 0,000$) (Table 8).

Table 8. Distribution of the responses about the question of "Does long nails increase nosocomial infections?" considering the type of high school graduated and gender

		Gender			Type of High School			
		Male	Female	Total	Vocational Health High School	Others	Total	
			f	130	327	457	235	222
Does long nails increase nosocomial infections?	Yes	%	28,4%	71,6%	100,0%	51,4%	48,6%	100,0%
	It doesn't change	f	12	4	16	5	11	16
		%	75,9%	25,0%	100,0%	31,2%	68,8%	100,0%
	I have no idea	f	31	18	49	10	39	49
		%	63,3%	36,7%	100,0%	20,4%	79,6%	100,0%
	Total	f	173	349	522	250	272	522
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	

47 (9 %) of the students who participated in the survey gave the correct answer as "Wearing a gown reduces nosocomial infections", 33 (6,3 %) of them stated that they do not know and 442 (84,7 %) of them answered incorrectly. The difference between the answers given to the question of "Does gowns reduce nosocomial infections?" was found to be statistically significant when considering the type of high school graduated and gender ($p < 0,05$). It was found that 25 (53,2 %) of the 47 people who gave correct answers as "wearing gowns reduce

nosocomial infections" were female ($p=0,000$) and 29 (61,7 %) of them were graduated from other high schools ($p=0,002$) (Table 9).

Table 9. Distribution of the responses about the question of "Does gowns reduce nosocomial infections?" considering the type of high school graduated and gender

		Gender			Type of High School			
		Male	Female	Total	Vocational Health High School	Others	Total	
Does gowns reduce nosocomial infections?	It doesn't change	f	128	314	442	225	217	442
		%	29,0%	71,0%	100,0%	50,9%	49,1%	100,0%
	Yes	f	22	25	47	18	29	47
		%	46,8%	53,2%	100,0%	38,3%	61,7%	100,0%
	I have no idea	f	23	10	33	7	26	33
		%	69,7%	30,3%	100,0%	21,2%	78,8%	100,0%
Total	f	173	349	522	250	272	522	
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	

493 (94,4 %) of the students who participated in the survey answered correctly by saying that hospital staff could reduce nosocomial infections with full compliance of health personnel with hand washing and hand hygiene, 26 (5 %) of them stated that they do not know and 3 (0,6 %) of them answered incorrectly. When the gender is considered, the difference between the responses to the statement of "nosocomial infections can be reduced by full compliance of health personnel with hand washing and hand hygiene" was statistically significant ($p=0,000$). Between the 493 respondents who gave correct answers, 339 (68,8 %) of them were women (Table 10).

Table 10. Distribution of the responses about the statement of "Nosocomial infections can be reduced by full compliance of health personnel with hand washing and hand hygiene" considering the gender

		Gender			
		Male	Female	Total	
Can nosocomial infections be reduced by full compliance of health personnel with hand washing and hand hygiene?	Yes	f	154	339	493
		%	31,20%	68,8%	100,0%
	No	f	3	0	3
		%	100,0%	,0%	100,0%
	I have no idea	f	16	10	26
		%	61,5%	38,5%	100,0%
Total	f	173	349	522	
	%	33,1%	66,9%	100,0%	

26 (5 %) of the students who participated in the survey answered correctly by saying that "Permanent skin flora of health personnel is more important than temporary flora in

nosocomial infections", 270 (51,7 %) of them stated that they do not know and 226 (43,3 %) gave the wrong answer. According to the type of high school graduated, grade and gender, the difference between the answers given to the expression of "Permanent skin flora of health personnel is more important than temporary flora in nosocomial infections" was found to be statistically significant ($p < 0,05$). Between the 26 students who gave correct answers, 14 (53,8 %) of them were female ($p = 0,003$), 18 (69,2 %) of them were 1st grade students ($p = 0,000$) and 16 (61,5 %) were graduates of vocational health high schools ($p = 0,001$) (Table 11).

Table 11. Distribution of the responses about the statement of "Permanent skin flora of health personnel is more important than temporary flora in nosocomial infections" considering the type of high school graduated, grade and gender

		Gender			Type of High School			Grade level			
		Male	Female	Total	Vocational Health High School	Others	Total	1th Grade	2th Grade	Total	
		f	%	f	%	f	%	f	%	f	%
Permanent skin flora of health personnel is more important than temporary flora in nosocomial infections	True	f	57	169	226	126	100	226	104	122	226
		%	25,2%	74,8%	100,0%	55,8%	44,2%	100,0%	46,0%	54,0%	100,0%
	False	f	12	14	26	16	10	26	18	8	26
		%	46,2%	53,8%	100,0%	61,5%	38,5%	100,0%	69,2%	30,8%	100,0%
	I have no idea	f	104	166	270	108	162	270	177	93	270
		%	38,5%	61,5%	100,0%	40,0%	60,0%	100,0%	65,6%	34,4%	100,0%
Total	f	173	349	522	250	272	522	299	223	522	
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	57,3%	42,7%	100,0%	

28 (5,4 %) of the students responded correctly by saying that "It is necessary to wear gloves when measuring blood pressure, pulse and fever in order to reduce nosocomial infections", while 52 (10 %) of them stated that they do not know and 442 (84,7 %) of them gave incorrect answers. The difference between the responses to the statement that "It is necessary to wear gloves when measuring blood pressure, pulse and fever in order to reduce nosocomial infections" was found statistically significant according to the type of high school graduated and gender ($p < 0,05$). Between the 28 students who gave correct answers, 17 (60,7 %) of them were female ($p = 0,036$) and 17 (60,7 %) of them graduated from other high schools ($p = 0,003$) (Table 12).

Table 12. Distribution of the responses about the statement of "It is necessary to wear gloves when measuring blood pressure, pulse and fever in order to reduce nosocomial infections" considering the type of high school graduated and gender

		Gender			Type of High School			
		Male	Female	Total	Vocational Health High School	Others	Total	
			f					
It is necessary to wear gloves when measuring blood pressure, pulse and fever in order to reduce nosocomial infections	True	f	137	305	442	225	217	442
		%	31,0%	69,0%	100,0%	50,9%	49,1%	100,0%
	False	f	11	17	28	11	17	28
		%	39,3%	60,7%	100,0%	39,3%	60,7%	100,0%
	I have no idea	f	25	27	52	14	38	52
		%	48,1%	51,9%	100,0%	26,9%	73,1%	100,0%
Total	f	173	349	522	250	272	522	
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	

While 61 (11,7 %) of the students who participated in the survey gave the correct answer to the statement of "Most of the nosocomial infections occur with bacteria", 150 (28,7 %) of them stated that they do not know and 311 (59,6 %) of them answered incorrectly. The difference between the answers to the statement of "Most of the nosocomial infections occur with bacteria" was found to be statistically significant according to the type of high school graduated and gender ($p < 0.05$). Between the 61 student who responded correctly to the statement of "Most of the nosocomial infections occurred with bacteria" 38 (62,3 %) of them were female ($p=0,000$), 45 (73,8 %) of them were graduated from vocational health high school ($p=0,000$) and 35 (57,4 %) were 1st grade students ($p=0,031$) (Table 13).

Table 13. Distribution of the responses about the statement of "Most of the nosocomial infections occurred with bacteria" considering the type of high school graduated, grade and gender

		Gender			Type of High School			Grade			
		Male	Female	Total	Vocational Health High School	Others	Total	1th Grade	2th Grade	Total	
			f								
Most of the nosocomial infections occurred with bacteria	False	f	81	230	311	149	162	311	165	146	311
		%	26,0%	74,0%	100,0%	47,9%	52,1%	100,0%	53,1%	46,9%	100,0%
	True	f	23	38	61	45	16	61	35	26	61
		%	37,7%	62,3%	100,0%	73,8%	26,2%	100,0%	57,4%	42,6%	100,0%
	I have no idea	f	69	81	150	56	94	150	99	51	150
		%	46,0%	54,0%	100,0%	37,3%	62,7%	100,0%	66,0%	34,0%	100,0%
Total	f	173	349	522	250	272	522	299	223	522	
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	57,3%	42,7%	100,0%	

453 (86,8 %) of the students who participated in the survey responded correctly by saying that, "Stethoscopes and thermometers wiping with alcohol or soapy water between the examinations reduce nosocomial infections", while of them 56 (10,7 %) of them stated that

they do not know and 13 (2,5 %) of them gave incorrect answers. The difference between the answers given to the question "Does cleaning of stethoscopes and thermometers with alcohol or soapy water reduce nosocomial infections?" was found to be statistically significant according to the type of high school graduated and gender ($p < 0,05$). Between the 453 student, 319 (70,4 %) of them were women ($p = 0,000$) and 231 (51 %) of them were graduates of vocational health high schools ($p = 0,000$) who responded correctly to the statement of "To reduce nosocomial infections, wiping stethoscopes and thermometers with alcohol or soapy water between examinations reduces nosocomial infections" (Table 14).

Table 14. Distribution of the responses about the statement of "To reduce nosocomial infections, wiping stethoscopes and thermometers with alcohol or soapy water between examinations reduces nosocomial infections" considering the type of high school graduated and gender

		Gender			Type of High School			
		Male	Female	Total	Vocational Health High School	Others	Total	
		f	f	f	f	f	f	
Does cleaning of stethoscopes and thermometers with alcohol or soapy water reduce nosocomial infections?	Yes	f	134	319	453	231	222	453
		%	29,6%	70,4%	100,0%	51,0%	49,0%	100,0%
	It doesn't change	f	6	7	13	8	5	13
		%	46,2%	53,8%	100,0%	61,5%	38,5%	100,0%
	I have no idea	f	33	23	56	11	45	56
		%	58,9%	41,1%	100,0%	19,6%	80,4%	100,0%
Total	f	173	349	522	250	272	522	
	%	33,1%	66,9%	100,0%	47,9%	52,1%	100,0%	

Discussion and Conclusion

The World Health Organization states that 20% of nosocomial infections in developed countries and more than 40% in developing countries are preventable (Noskin 1997; Edmond and Wenzel 2000). The human factor is extremely important in the development and prevention of nosocomial infections and the behavior of health personnel constitute the basis of the program. Health staff members have important responsibilities to protect themselves and other people in the hospital environment from nosocomial infections. Therefore, the place of staff training is indisputably crucial for their knowledge of nosocomial infections and prevention.

When the demographic characteristics of the surveyed students were examined, it was found that more than half (54,4%) were between 19-20 years old, female staff were 66,9% more in number and 57,3% were 1st class students. It was found that 47,9% of the students surveyed were graduates of vocational health high schools and only 7,3% worked in a health institution.

Standard precautions should be routinely applied in the care of all patients. Standard precautions include factors such as; hand washing, wearing gloves, wearing masks and gowns, sterilization or disinfection of patient care devices, taking environmental control measures, collecting cutting and piercing materials, proper placement of patients (Bakır 2003). Protection equipment such as masks, eyewear, and face protectors provide protection

against the passage of large particulate contagious droplets that are spread during the close contact (Dokuzoğlu 2003). Healthcare staff should protect their own eyes, nose and mucous membrane from contagious blood, bodily fluids and secretions that may be splashing during the health examination. Mouth and nose should be completely covered by protecting mask (Afkanoguz 2003; Dokuzoğlu 2003). As well it is important to say that Hand Hygiene which includes whether hand washing or hand disinfection is the most important, easiest but minimal criterion for preventing nosocomial infections. However, the discovery of antibiotics and the introduction of modern disinfectants and usage of gloves have created false confidence and people had started to ignore handwashing. This neglect resulted in the change of the patient's flora and the placement of high mortality resistant strains within the hospital environment. Gloves should be worn for purposes of prevention of hands contamination, blood-borne pathogens reproduction as well as for purposes of prevention of patient-staff and staff-patient microorganisms passage. Usage of same gloves for each patient may result in cross-contamination (Bakır 2003). For that reason, healthcare professionals should be trained not to consider the use of gloves necessary only for their own safety, but to be aware of gloves exchange between two health examinations as well as to wash their hands after removing them. The basis of nosocomial infections control rely on; hand hygiene compliance and use of gloves, barrier measures, sterilization and disinfection of instruments used in patients, as well as trained and sufficient staff. When approaching a patient with infectious disease, 40,9% of the students who participated in the survey stated that gloves should be worn, 39,4% of them stated that a mask should be put on, 7,6% of them stated that a box apron should be worn, 4,2% of them stated that the hands should be washed, 3,1% of them stated that a hair bonnet should be worn, 2,7% of them stated that it was necessary to isolate the patient and 2,1% of them stated that they should be vaccinated. It was seen that the majority of the students who participated in the survey did not have any knowledge about the subject. In another study, it was reported that only 16,61% of the health workers who participated in the survey had knowledge about standard prevention measures (Okechukwu and Motshedisi 2012). Health staff are health workers who should have the most information about standard prevention measures and possible risks. It is thought that they need to be informed more about the importance of the issue as well.

Injuries and infections with stabbing tools, which can be prevented by taking the necessary precautions, are among the leading occupational risks for health staff. Various studies in Turkey show that the frequency of injury with a stabbing device (23,0-89,4%) was found to be high among health staff (Gürbıyık and Kaya 2007). As well it was determined that 86,8% of the students participating in the survey would report the problem to the infection department in case of injury with a cutting device in the hospital environment, and according to results it was concluded that the importance of the subject was understood by future health technicians. It was determined that there was a statistically significant difference between the answers of the students who graduated from vocational health high school and other high schools ($p=0,000$). 80% of students, who stated that they would not report the situation of injury with a cutting tool in the hospital environment, claim that they did not know which department to apply 92% of students were graduated from other high schools. As well, it was found that the majority of the students (71,4%) who stated that they would not report the problem because their vaccines were full, were graduated from vocational school of health. In a study done at Ankara University Hospital, the rate of those who were not given any medical advice after injury was 67% (Azap et al. 2005). In another study, 87,3% of health staff stated that they would not report stab wounds. The most common reasons for that were lack of knowledge (48%) and having no fears (17%) (Altıok et al. 2009). According to the results of

both this study and other studies, it is seen that some of the health staff and candidate students still have insufficient knowledge about standard precautions as well as the necessary procedures to be applied after contact with patients. This leads to delay in adequate medical evaluation after contact with patient, delay in post-contact prophylaxis, or loss of chance of prophylaxis, making it impossible to monitor blood-borne diseases (Erbay et al. 2002). It is stated that it is an effective and cost effective way to inform the employees about the occupational risks in health institutions, to establish personnel health units to deal with routine examination and, if necessary, post-contact treatment and follow-up, and to coordinate all necessary procedures (Korkmaz 2008).

Only 44,6% of the students answered the question about the definition of nosocomial infections as: "an infection which does not occur in the incubation period and at the time of admission to the hospital, but occurs within 48-72 hours after hospitalization or up to 10 days after discharge from the hospital." In addition, the number of those who do not know the definition of nosocomial infections (55,4%) is considerable. Based on this data, it is observed that the majority of students do not know what nosocomial infections are and what is the time interval of their occurrence. In one of the studies, the rate of correct response of nurses to the definition of hospital infections was shown as 78,1% (Aytaç et al. 2008). Accurate definition of nosocomial infection according to gender and type of high school graduated was found to be statistically significant ($p=0,000$). The majority of the students who correctly identified the nosocomial infection were female (77,3 %) and vocational health high school graduates (60,9 %). In addition, 74,6 % of student who have selected I do not have any idea have graduated from other high schools. In the light of the data, it is detected that; the majority of students are not capable to define nosocomial infections and, in case of occurrence, in what time intervals it can be defined as nosocomial infection.

Urinary infection is the most common nosocomial infection in non-intensive care department (Akalın et al. 1999; Biberöglü 2003). It is answer for 40-60% of nosocomial infections (Kaleli 2003). On a question asking "What is the most common nosocomial infection?", only 21,6% of the students were able to give correct answer, by saying that it is urinary tract infection. In one of the studies, 40,3% of nurses responded correctly to the question about the most common nosocomial infection by calling them "urinary tract infections" (Demir 2013). As previously mentioned in our study, it was observed that the correct answers given by nurses to this question were not at the desired rate. The difference between the answers to the most common nosocomial infection according to gender and type of high school graduated was found to be statistically significant ($p=0,000$). The majority of the students who identified the most common nosocomial infection correctly, were female (85 %) and were graduates of vocational health high schools (64,6 %). In addition, 103 (73,6 %) of 140 people who have selected I do not have any idea have graduated from other high schools.

Hand cleaning with alcohol-based cleansing agents, which can be termed as dry hand washing, is the most important way in the control practice of nosocomial infections (Hacımustafaoğlu 2005). It was determined that 69,3% of the students who participated in the questionnaire responded correctly that alcohol-based cleaners prevent hospital infections. Similarly, in a study conducted on 268 medical students, 76% of participants reported that alcohol-based cleaners were suitable for the prevention of nosocomial infections (Kulkarni et al. 2013). According to the type and class of high school graduated, the difference between the answers given to the question of "Do alcohol-based cleaners prevent nosocomial infections?" was found to be statistically significant ($p=0,000$ ve $p=0,003$). It was found that

54,1% of students who gave correct answers were graduated from other high schools ($p=0,000$) and 56,9% of them were 1st grade students ($p=0,003$).

Appropriate and limited use of antibiotics is very important in the control of infections which have the potential to cause epidemics quite frequently in hospitals (Demirel 2019). It was found that 72,4% of the students who responded to the survey correctly by saying that "rational use of antibiotics is important in preventing hospital infections". According to the gender, class and type of high school graduated, the difference between the answers given to the question of "Is rational use of antibiotics important in the prevention of nosocomial infections?" was found to be statistically significant ($p<0,05$). The rational use of antibiotics is important in the prevention of nosocomial infections. It was found that, 70,6% of the students who identified the question correctly were female ($p=0,01$), 52,9% were graduated from vocational health high school ($p=0,000$), and 53,7% were 1st grade students ($p=0,021$). In another research, it was found that 66,7% of nurses stated that controlling antibiotic use had a place in the prevention of nosocomial infection (Aytaç et al. 2008). With increasing use of an antibiotic for both nosocomial and community-acquired infections, bacteria resistant to this drug are increasing and resistance decreases with reduced antibiotic usage. For example, MRSA (Methicillin Resistant *Staphylococcus aureus*) and methicillin-resistant coagulase-negative staphylococci rates have increased gradually in recent years. This problem increased the use of vancomycin and increased vancomycin use also increased vancomycin resistant enterococci rates (Bakır 2003). This makes the antibiotic control committees an important part of the hospital infections control committee which should be established in hospitals.

87,5% of the students surveyed responded correctly by saying that: "being long-nailed increases nosocomial infections". In another study in which 215 neonatal intensive care department health staffs' knowledge, beliefs and practices related to nosocomial infections were evaluated, it was reported that 48% of the participants stated that being long-nail increases nosocomial infections (Kennedy et al., 2004). According to the type and gender of high school graduated, the difference between the answers given to the question of "Does long nails increase nosocomial infections?" was found to be statistically significant ($p<0,05$). Between the 457 respondents who gave correct answers, 71,6% of them were women ($p=0,000$) and 51,4% of them were graduates of vocational health high schools ($p=0,000$).

Protective gowns are worn in the hospital to provide a mechanical barrier that reduces the passage of microorganisms. As it prevents dress contamination, it is worn to prevent contamination of blood and body secretions to the skin as well (Çağatay 2007). Protective gowns are also used to protect the environment and other patients during the examination of patients infected with epidemiologically important microorganisms (Dokuzoğlu 2003). It is determined that 9% of the students who participated in the questionnaire responded correctly stating that wearing a gown reduces nosocomial infections. The difference between the answers given to the question of "Does gowns reduce nosocomial infections?" was found to be statistically significant when considering the type of high school graduated and gender ($p<0,05$). It was found that 53,2% of the students who gave correct answers as "wearing gowns reduce nosocomial infections" were female ($p=0,000$) and 61,7% of them were graduated from other high schools ($p=0,002$).

It was found that 94,4% of the students in this survey responded correctly in the form that nosocomial infections can be reduced by their complete compliance with hand washing and hand hygiene by health personnel. When the gender is considered, the difference between the responses to the statement of "nosocomial infections can be reduced by full compliance of

health personnel with hand washing and hand hygiene" was statistically significant ($p=0,000$). Between the respondents who gave correct answers, 68,8% of them were women. In another research, to the question "which precaution plays the most important role in preventing nosocomial infection and which precaution should be definitely implemented in", 84,8% of nurses has given correct answers as 'hand hygiene' (Aytaç et al. 2008). In the study, "Evaluation of Hand Hygiene Knowledge of Nurses at the 19 May University Medical Faculty Hospital" Çetinoğlu et al. state that 94,9% of the nurses preferred hand washing as the most effective way to prevent infections (Çetinoğlu et al. 2005). Although the morbidity and mortality rates of hospital infections are very high, the fact that these infections can be prevented by 30% with simple, basic applications such as hand hygiene increases the importance of infection control applications (Tuncer et al. 2001).

Personnel involved in the treatment and care of the patient play an important role in the occurrence and spread of nosocomial infections. Although they are healthy, microorganisms and many infectious agents in the hands, mouth and nasal cavities of the personnel can easily be transmitted to the patients (Akyıl ve Uzun 2007). In normal skin, continuous infection by flora bacteria does not occur, but if a defect occurs in one of the natural resistance mechanisms, these bacteria can become pathogenic. Comparative studies of flora of hospitalized and healthy individuals show that high levels of antibacterial resistance and significant numerical changes in bacterial flora were detected in hospitalized patients (Engin and Kurukahvecioğlu 1998). It was determined that exogenous staphylococci and potential pathogens were carried by hands of health staff. While the health workers have temporarily contaminated hands and with a proper hand hygiene and removal of microorganisms, it is reported that contamination can be prevented (Aytaç et al. 2008). Only 5% of the students who participated in the survey answered correctly by saying that "the temporary flora of the health staff is more important than the permanent flora of the health staff in nosocomial infections", 51,7% of them stated that they do not know the answer on the question, while 43,3 % of them answered incorrectly. According to the type of high school graduated, grade and gender, the difference between the answers given to the expression of "Permanent skin flora of health personnel is more important than temporary flora in nosocomial infections" was found to be statistically significant ($p<0,05$). Between the students who gave correct answers, 53,8% of them were female ($p=0,003$), 69,2% of them were 1st grade students ($p=0,000$) and 61,5% were graduates of vocational health high schools ($p=0,001$). Health care providers are the main sources of infection. Bacteria which is found in these people as they have a disease or as they are the vector, as well as bacteria that are mechanically carried from one patient to another by their hands or belongings are the most important sources of nosocomial infections. The healthcare professionals who are in contact with the patients should be informed more about the importance of the subject.

It was examined that 11,7% of the students who participated in the survey responded correctly by stating that most of the hospital infections occur with bacteria. In another study, it was reported that 21,4% of the surveyed students stated that the major factor responsible for nosocomial infections was bacteria (Ojulung et al. 2013). The difference between the answers to the statement of "Most of the nosocomial infections occur with bacteria" was found to be statistically significant according to the type of high school graduated and gender ($p <0.05$). Between the students who responded correctly to the statement of "Most of the nosocomial infections occurred with bacteria" 62,3% of them were female ($p=0,000$), 73,8% of them were graduated from vocational health high school ($p=0,000$) and 57,4% were 1st grade students ($p=0,031$).

It was found that 86,8% of the students who participated in the questionnaire gave correct answers by saying that wiped stethoscopes and thermometers with alcohol or soapy water between the examinations reduces nosocomial infections. In another study, when the nurses were asked what solution to use for degree disinfection, it was found that 26,7% responded correctly (Aytaç et al. 2008). The difference between the answers given to the question "Does cleaning of stethoscopes and thermometers with alcohol or soapy water reduce nosocomial infections?" was found to be statistically significant according to the type of high school graduated and gender ($p < 0,05$). Between the 453 student, 70,4% of them were women ($p = 0,000$) and 51% of them were graduates of vocational health high schools ($p = 0,000$) who responded correctly to the statement of "To reduce nosocomial infections, wiping stethoscopes and thermometers with alcohol or soapy water between examinations reduces nosocomial infections".

30% of nosocomial infections are thought to be preventable by education and strict control (Beltrami et al. 2000). In this study, it was seen that 53,1% of the students participating in the survey participated in a training program on nosocomial infections and prevention. In another study, it was found that 63,3% of the nurses received education about nosocomial infections (Aytaç et al. 2008). Education is important in preventing nosocomial infections. Qualified and regular trainings related to nosocomial infections should be planned for all health students and their participation should be ensured.

As a result of the evaluation of the data obtained from the research, it was determined that the majority of the health technician students would report this to the infection unit in case of injury with a cutting device. In addition, the information about rational use of antibiotics, the importance of hand hygiene compliance and nail care and the role of alcohol-based cleaners in preventing nosocomial infections were found to be sufficient. However, standard preventive measures, which are essential for the prevention of nosocomial infections, the definition of nosocomial infection, the most frequently observed nosocomial infections and the causative microorganisms and the formation of nosocomial infections about the importance of temporary flora of health personnel were found to have insufficient knowledge.

Nosocomial infection rates are directly related to the behavior of healthcare staff members. Health professionals in contact with patients need to be more informed about the importance of the issue. In order to be able to use during clinical practice, students may receive training on nosocomial infections, transmission routes for specific infections, universal precautions, post-infection prophylaxis and reporting. Preventing nosocomial infections is a team work. It is more important for students to become aware that they have the greatest responsibility individually, than any legal and administrative measures to be taken. The more students adopt the importance of these measures, the more successful they will be at the clinic. In addition, it should be ensured that nosocomial infections are prioritized in the orientation training subjects during employment and in-service trainings for graduates. It is important that health personnel should see the relationship between their own errors in infection control and infection rates. Hospital management is required to provide evidence-based information to their staff on prevention and control of nosocomial infections. The whole health team needs to apply universal prevention methods to prevent nosocomial infections.

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