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Evaluation of teaching forensic nursing course on undergraduate nursing student's forensic nursing knowledge

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Abstract

Background: The aim of the forensic nursing (FN) education is to provide nursing students with the basic knowledge of FN that they can use in the clinical area.

Objective: The study evaluated the effect of integrating forensic nursing into the undergraduate nursing curriculum on 2nd- and 4th-year students' knowledge level of FN.

Participants: The target population of this study was composed of 2nd- and 4th-year students in the nursing department at a foundation university in Istanbul. The study was conducted with 95 nursing students who agreed to participate in the study.

Methods: The research was planned as cross-sectional and descriptive. The questionnaire form was developed with the help of literature by experts in the field. Each correct answer was scored as 4 points, and the total score could range from 0 to 100.

Results: The average age was 21.64 ± 1.16, and 66.3% ($n = 63$) was female. Out of the 95 students, 50.5% ($n = 48$) were in 2nd year, and 49.5% ($n = 47$) were in 4th year. A total of 47.4% ($n = 45$) of the students took a FN course, and 52.6% ($n = 50$) did not take FN course. The average level of knowledge for those who took FN course was 52.09 ± 12.31 and for those who did not take FN course was 46.16 ± 12.18. According to the status of taking FN course, a significant difference was found between the average level of knowledge ($p < 0.05$).

Conclusions: These results emphasize the importance of integration of FN into the undergraduate nursing curriculum.

Keywords: Forensic nursing course, Nursing curriculum, Nursing education

Background

Forensic sciences are defined as the combination of the branches of science that enable the collection, examination, and evaluation of all kinds of evidence obtained during legal, administrative, and criminal investigations (Maras and Miranda 2014; Tygai and Grover 2014). Areas of expertise such as criminalistics, forensic molecular biology and genetics, forensic nursing, forensic toxicology, forensic document examination, forensic astronomy, forensic anthropology, forensic engineering sciences, and forensic informatics are under the umbrella of forensic sciences (Tygai and Grover 2014).

Forensic nursing (FN) is a sub-branch of forensic science that has emerged from clinical forensic medicine. This area of specialization ensures that healthcare problems with medicolegal content are evaluated, and the knowledge and experience of the nursing profession are available to the service of justice. The sophistication of the applications related to FN and the presence of its own

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professional knowledge have caused to evolve as a scientific discipline and become a field that requires expertise (Kent-Wilkonson 2009; Scannell 2018; Vries et al 2019).

Unlike clinical nursing, FN works in different areas of nursing practice. In countries where FN is accepted as a specialty today, there are areas of subspecialties such as sexual assault nurse examiner (SANE), clinical forensic nurse, forensic psychiatrist, legal nurse consultant, and nurse coroner/nurse death investigator (Kent-Wilkonson 2009). Looking at the examples of the trainings in these sub-specialties or undergraduate level courses in the world, it is observed that forensic nursing courses have been in undergraduate and graduate programs in many countries, especially in the United States of America (USA), since the mid-1990s (Scannell 2018; Lynch and Duval 2011). For the subspecialties of FN, there are educational approaches suggesting that master's or doctorate education specific to the relevant field or certification programs including practices specific to the subspecialty should be taken (Akköz Çevik and Başer 2012; Forensic Nursing n.d.; International Association of Forensic Nurses n.d.; Scannell 2018; Office for Victims of Crime n.d.; Vries et al 2019).

In Turkey, there are two master's programs for FN education. One of the programs is the forensic nursing master's program at Marmara University, Institute of Health Sciences, Department of Surgical Nursing, established in 2008. The other program is the forensic nursing/midwifery master's program in the Department of Forensic Sciences at Üsküdar University, Institute of Addiction and Forensic Sciences, established in 2016. In addition to these graduate programs, nurses can do their master's and doctorate degrees in the related departments of the graduate programs such as the Institute of Forensic Sciences and Forensic Medicine and Institute of Forensic Sciences in Istanbul and Ankara. There are master's programs in FN and master's and doctoral programs under the name of forensic sciences in institutes in Turkey. However, graduates of these programs are not defined as experts in FN as there are no legally and officially defined duties, powers, and responsibilities of forensic nurses. Nurses who have graduated from institutes that provide education in the field of forensic sciences are defined as experts in forensic sciences, not experts in the field of FN.

A similar confusion applies to undergraduate nursing departments at universities. It is striking that there are no undergraduate FN courses in the nursing department in many Turkish universities, and training on the applications that will be carried out in forensic cases in undergraduate nursing education is not given. Alternatively, the course is left to the initiative of the nursing department and offered as an elective course. However, giving the undergraduate FN course based on departmental preference results in nursing students having insufficient knowledge of forensic cases' forensic and medicolegal processes, which will be required in their future job. This leads to disruptions or negative consequences in the judicial and medicolegal processing of forensic cases.

Freedberg (2008) suggested an introductory course addressing the concepts and skills of FN education should be included in the undergraduate program. She also stated that this approach would contribute to nursing students' learning about the applications and approaches to be performed in forensic cases. For example, explaining the approach to evidence for a patient with a gunshot injury or teaching nursing practices and medicolegal processes in injection neuropathy will significantly contribute to the level of awareness about basic FN practices that students will perform in the clinic. Furthermore, the approaches followed in forensic cases or potential forensic cases will contribute greatly to the legal process. However, it should be kept in mind that FN education given at the undergraduate level is an introductory process, and it will not replace the practices of those who specialize in FN. The training aims to ensure that nursing students know the forensic and medicolegal processes of forensic events at a level they will use in the practical field. At the same time, it aims to prevent deficiencies and errors that may arise from a lack of information in forensic cases. Therefore, basic information about FN should be given to nursing students at the undergraduate level before graduation (Drake 2014; Özden et al 2019).

In line with this purpose, the study was carried out with 2nd- and 4th-year nursing students to evaluate the effect of integrating forensic nursing into the undergraduate nursing curriculum on 2nd- and 4th-year students' knowledge level on FN.

Methods
Research type
This research was conducted as a cross-sectional and descriptive.

Population and sample of the study
The target population of this study was composed of 2nd-year and 4th-year nursing students in the Nursing Department of the Faculty of Health Sciences at Istanbul Arel University during the 2019/2020 fall semester. As the "student information system" does not allow the forensic course to be added as an elective for 4th-year students, FN course was added as an elective course in the 2nd-year curriculum. The FN course was given by the corresponding author as a 2-h course every week for 14 weeks.

A total of 2nd-year students are 48 and total of 4th-year students are 81. It was intended to include the entire

population of the study (129 people). However, the number of students in the two tiers was unequal. Therefore, this study was targeted using equal numbers of 2nd- and 4th-year students. As the total of 2nd-year students were 48, equal number of 4th-year students was intended to be added in the study sample. The study was conducted with 95 nursing students who agreed to participate in the study. A total of 50.5% ($n = 48$) were 2nd-year students, and 49.5% ($n = 47$) was 4th-year students. Two students from 4th year were excluded from the sample because they did not fill out the data collection form completely.

Data collection
Data collection forms were printed and delivered to students by the researchers, and the students were watched as the forms were filled. All of the 2nd-year students agreed to participate in the study. It is intended to include equal number of 4th-year students. Therefore, researchers delivered the forms to 4th-year students as they came to the university for their lessons. When the equal number of 4th year was reached, the target population of this study was completed.

Data collection tools
The data collection tool consisted of two parts. In the first part, there were four questions about age, gender, and class and whether the participating students took the FN course in the department. In the second part, there are 25 multiple-choice questions regarding sexual assault and termination of pregnancy (3 questions); crime scene investigation, collecting, preservation, and documentation of evidence (7 questions); introduction to forensic science (2 questions); forensic psychiatry (2 questions); medical malpractice and legal procedure (1 question); introduction to forensic nursing (2 questions); death and natural death (2 questions); child abuse and neglect (2 questions); wounds and firearm injuries (2 questions); and alcohol and substance abuse (1 question). There was one correct answer for each question. Each correct answer was scored as 4 points, and the total score could range from 0 to 100. The literatures were searched to frame questions for the second part of the questionnaire (Elling and Elling 2007; Genge 2002; Lynch 1990; Pasqualone 1998; Riviello 2010; Rooms and Shapiro 2006). The corresponding author prepared the questions, a nursing graduate with seven years of clinical experience who completed her master's and doctorate in forensic sciences and teaches the FN course at the foundation university where the study was conducted. The questions were finalized after it was corrected in accordance with the suggestions given by two experts, a forensic expert and a forensic molecular biology and genetics specialist.

It is important that establishing the content validity is vital to support the validity of an assessment tool such as questionnaires, especially for research purpose. For this reason, the content validity index (CVI) was evaluated for the questionnaire according to the following steps. Content validation form was prepared for panel of experts to review the questionnaire. Rating scale of relevance has been used for scoring individual items. The selection of experts to review and critique the questionnaire was made based on the experts' expertise with the topic to be studied (Yusoff 2019). For content validation, the minimum acceptable expert number is two (Davis 1992). For this reason, questionnaire was evaluated by two experts. In these two experts, one of the experts is specialized in forensic medicine, and the other expert is specialized in crime scene investigation. Online content validation form is sent to the experts. In the content validation form, the items and rating scale of relevance are clearly provided to the experts. The experts are requested to provide score on each item independently based on the relevant scale which is ranging from 1 to 4. The relevance rating was recoded as 1 (relevance scale of 3 or 4) or 0 (relevance scale of 1 or 2) (Yusoff 2019). According to two experts, acceptable CVI values must be at least 0.80 (Davis 1992). Based on the calculation, it is concluded that I-CVI, S-CVI/Ave, and S-CVI/UA meet satisfactory level (Table 1).

Data analysis
Data were analyzed using the Statistical Package for Social Sciences (SPSS) 21.0 Windows software program, and the statistical significance value was accepted as $p < 0.05$. Normality distributions of the mean scores in the form of determination of knowledge level were analyzed using skewness and kurtosis test (-1.5 to $+1.5$), and the scales showed a normal distribution in this study. The skewness value of those who took the FN course in the department is 550, and the Kurtosis value was 1.214. The skewness value of those who did not take the FN course in the department was 102, and the Kurtosis value was -0.617. Frequency, percentage, arithmetic mean, standard deviation, t-test, and chi-square were used in the analysis of the data.

Ethical considerations
Approval for the study was obtained from the Ethics Committee of Istanbul Arel University with the ethics committee decision dated 26 February 2020 and numbered 2020/02.

Respondents were informed about the purpose of the research verbally, and they read the written consent at the beginning of the questionnaire. They were assured that their answers would be treated confidentially, and

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Table 1 The relevance ratings on the item scale by two experts

	Expert 1	Expert 2	Experts in agreement	I-CVI	UA
Q1	1	1	2	1	1
Q2	1	1	2	1	1
Q3	1	1	2	1	1
Q4	1	1	2	1	1
Q5	1	1	2	1	1
Q6	1	1	2	1	1
Q7	1	1	2	1	1
Q8	1	1	2	1	1
Q9	1	1	2	1	1
Q10	0	0	0	0	0
Q11	1	1	2	1	1
Q12	1	0	1	0.5	0
Q13	1	1	2	1	1
Q14	1	1	2	1	1
Q15	1	1	2	1	1
Q16	1	1	2	1	1
Q17	1	1	2	1	1
Q18	1	1	2	1	1
Q19	1	1	2	1	1
Q20	1	1	2	1	1
Q21	1	1	2	1	1
Q22	1	1	2	1	1
Q23	1	1	2	1	1
Q24	0	0	0	0	0
Q25	0	0	0	0	0
			S-CVI/Ave	0.86	
			S-CVI/UA		0.84

Table 2 Nursing students' gender, class, and status of taking the forensic nursing course ($n = 95$)

Characteristic	*n* (%)
Gender	
Female	63 (66.3%)
Male	32 (33.7%)
Class	
2	48 (50.5%)
4	47 (49.5%)
Taking the forensic nursing course	
Yes	45 (47.4%)
No	50 (52.6%)

found between the mean scores on the knowledge level test in terms of gender ($t = 1.374$, $p > 0.05$) (Table 3).

The mean score on the knowledge level test of the 2nd-year students was 49.83 ± 13.90 and that of 4th-year students was 48.09 ± 11.04. There was no statistically significant difference between the mean scores on the knowledge level test in terms of years ($t = 0.678$, $p > 0.05$) (Table 3).

Among the participating nursing students, the mean score on the knowledge level test of those who had the FN course in the department was 52.09 ± 12.31 and that of those who did not take the course was 46.16 ± 12.18 (Table 2). A significant difference was found between the mean score on the knowledge level test on subjects

that their participation was voluntary and no incentives were provided. Participants were informed that their answers would be used for research; consent was implied by completion and return of the questionnaire.

Results

When the demographic characteristics of the nursing students participating in the study were analyzed, the lowest age was 20, the highest age was 25, and the mean age was 21.64 ± 1.16. Of the participants, 66.3% ($n = 63$) were female, 33.7% ($n = 32$) were male, 50.5% ($n = 48$) were 2nd-year students, and 49.5% ($n = 47$) were 4th-year students (Table 1). Of the students, 47.4% ($n = 45$) took the FN course in the department, and 52.6% ($n = 50$) did not take it (Table 2). As 2nd-year students were 48, it is found that 3 students took the other elective course.

The mean knowledge level test score of the female nursing students participating in the study on issues related to FN was 50.22 ± 12.78 and that of male nursing students was 46.5 ± 11.83 (Table 3). No significant difference was

Table 3 The mean knowledge level test scores on forensic nursing according to gender, class, and status of taking the forensic nursing course ($n = 95$)

	Nursing students' mean knowledge level test score on forensic nursing	
	Mean $\pm$ SD (*n*)	Min-max.
Gender		
Female	50.22 ± 12.78 (63)	24–88
Male	46.5 ± 11.83 (32)	24–68
$t = 1.374$, $p = 0.173$		
Class		
2	49.83 ± 13.90 (48)	24–88
4	48.09 ± 11.04 (47)	24–68
$t = 0.678$, $p = 0.500$		
Taking the forensic nursing course		
Yes	52.09 ± 12.31 (45)	24–88
No	46.16 ± 12.18 (50)	24–76
$t = 2.35$, $p = 0.021*$		

t t-test, *SD* standard deviation, *Min* minimum, *Max* maximum

* $p < 0.05$

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related to FN ($t = 2.35$, $p < 0.05$) in terms of taking the FN course in the department (Table 3).

On analyzing the results of the questions regarding the knowledge level test on issues related to FN and the status of taking the FN course in the department, a statistical difference was found between the questions "Blood should first be drawn into the gray tube for blood alcohol analysis. Which of the following is the preservative substance in the gray tube?" ($\chi^2 = 13.024$, $p < 0.05$) and "Which of the following is the English abbreviation for nurses specializing in sexual assault in the USA?" ($\chi^2 = 10.443$, $p < 0.05$) (Table 3). There was no significant difference for other questions ($p > 0.05$) (Table 4).

Discussion

In the practical field, nurses inevitably encounter issues such as violence, trauma, prevention of trauma, harassment, abuse, and medical malpractice, which include the field of forensic sciences (Amar and Sekula 2015; Ribeiro and Dixe 2020). Nurses who have not received training in forensic and medicolegal processes can overlook evidence in a case, destroy the evidence, and fail to implement preventive forensic and nursing practices that prevent risky cases from turning into lawsuits. This leads to negative consequences for the healthcare worker, the patient and his family, and the future judicial process. Therefore, nurses, who are the backbone of the health system, must have sufficient knowledge to carry out forensic and medicolegal processes in each unit they will work (Amar and Sekula 2015; Eldredge 2008; Lynch 2011; Özden et al 2019; Özden and Yıldırım 2009).

FN development in Turkey is not at the desired level, and it is not defined as a subspecialty in the nursing profession today. And the tasks defined as subspecialties of FN are performed by forensic doctors. In addition, nurses working in institutions and organizations where forensic cases are evaluated are employed without the requirement of any certification or training regarding FN or forensic sciences. In addition to the lack of specialization in this field in Turkey, a FN course is among the elective courses in undergraduate nursing curriculum. Thus, it is taught according to the preference of the administration of the relevant nursing school to include this course in the curriculum, and the course is usually taught by forensic medicine experts or nursing faculty members at the relevant university who do not have sufficient knowledge about FN.

If nursing students have the level of knowledge they will use in the practical field of forensic and medicolegal processes in the health institutions they will work, it will yield positive outcomes for the healthcare worker, patients, family, and possible future judicial processes. In Turkey, there are studies on FN conducted with nurses working in health institutions and organizations and nursing students. However, no study has been conducted to measure and compare the knowledge level of the students who are at the early stage of nursing education and took the FN course and who are at the stage of graduation and did not take the FN course in Turkey.

In the study conducted by Özden et al (2019), in which the effect of a FN course on knowledge level was measured, a total of 98 students took a FN course in 2nd year, and their knowledge levels, were measured before and after the course. As a result of the study, the mean knowledge level scores of the 2nd-year students were significantly higher after taking the FN course (Özden et al 2019). This result is similar to our study and shows the positive effect of a FN course on the level of knowledge. Ribeiro and Dixe (2020) analyzed the mean scores of 3rd- and 4th-year nursing students before and after structured FN training, mean scores according to different variables, and the statistical analysis results before and after the training. The study found that the participants' mean score increased after the training compared to the pre-education, which is similar to our study.

The reason why the mean scores of those who took the FN course and those who did not were close to each other on the knowledge level can be interpreted as follows. Students in their 2nd year have just started to take courses including clinical practices, so it is thought that these students have difficulty comprehending the technical knowledge described in the FN course. Subjects covered within the scope of the FN course also include topics covered in surgical diseases nursing (2nd year—spring semester), women's health and disease nursing (3rd year—fall semester), mental health and disease nursing (3rd year—spring semester), and child health and disease nursing (3rd year—fall semester) courses. According to the undergraduate nursing curriculum, 2nd-year students had not taken any of these courses yet. In addition, although nursing students take courses of basic medical sciences such as anatomy, physiology, pathology, biochemistry, and microbiology in two semesters (spring and fall) of the first year, they can reinforce these courses only with clinical practice courses starting from the second semester (fall) of the first year. On the other hand, 4th-year students were at the graduation stage and had taken courses on basic medical sciences, consolidated their knowledge in clinical practice, and completed all clinical practice courses. Therefore, these students might have responded to the questions using reasoning as they were familiar with some of the topics covered in FN, and perhaps they had encountered forensic cases during their clinical practice.

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Table 4 Results of the questions on the knowledge level test on forensic nursing and the status of taking the forensic nursing course

Variables	Result	Taking the forensic nursing course $n = 95$			Statistical analysis
		Yes	No	Total	Test
Which of the following options is one of the findings showing that the patient who comes for emergency intervention may be a victim of domestic violence?	Correct	33 (73.3%)	33 (66%)	66	$\chi^2 = 0.601$
	Incorrect	12 (26.7%)	17 (34%)	29	$p = 0.438$
After removing the patient's clothes at the scene, the emergency medical team should put clothes.........	Correct	14 (31.1%)	12 (24%)	26	$\chi^2 = 0.603$
	Incorrect	31 (68.9%)	38 (76%)	69	$p = 0.438$
If a person is found hanged but death has not occurred and the emergency medical team will resuscitate, the team should wear gloves, and how should the patient be taken down?	Correct	17 (37.8%)	18 (36%)	35	$\chi^2 = 0.032$
	Incorrect	28 (62.2%)	32 (64%)	60	$p = 0.858$
Which of the following compromises the reliability of the crime scene?	Correct	28 (62.2%)	25 (50%)	53	$\chi^2 = 0.1.434$
	Incorrect	17 (37.8%)	25 (50%)	42	$p = 0.231$
The evidence delivery chain refers to everyone who seized evidence and the process of evidence from the time the evidence is collected from the scene and sent for analyze until it is presented in court	Correct	39 (86.7%)	38 (76%)	77	$\chi^2 = 0.1.755$
	Incorrect	6 (13.3%)	12 (24%)	18	$p = 0.185$
Which one is correct if there is a gun next to the patient and it is an obstacle to intervening with the patient?	Correct	35 (77.8%)	33 (66%)	68	$\chi^2 = 0.1.615$
	Incorrect	10 (22.2%)	17 (34%)	27	$p = 0.204$
If the victim says he/she scratched the attacker.......	Correct	16 (35.6%)	15 (30%)	31	$\chi^2 = 0.333$
	Incorrect	29 (64.4%)	35 (70%)	64	$p = 0.564$
Which of the following is the official expert body in Turkey?	Correct	27 (60%)	24 (48%)	51	$\chi^2 = 0.1.372$
	Incorrect	18 (40%)	26 (52%)	44	$p = 0.242$
Blood should first be drawn into the gray tube for blood alcohol analysis. Which of the following is the preservative substance in the gray tube?	Correct	19 (42.2%)	5 (10%)	24	$\chi^2 = 0.13.024$
	Incorrect	26 (57.8%)	45 (90%)	71	$p = .000*$
Which of the following is one of the sub-topics of forensic medicine?	Correct	36 (80%)	32 (64%)	68	$\chi^2 = 0.2.980$
	Incorrect	9 (20%)	18 (36%)	27	$p = .084$
What is it called to investigate whether there is a factor, mental illness, or mental retardation that causes a mental disorder to a degree and quality that affects the behavior of the perpetrator and whether the perpetrator has a condition that prevents the perpetrator from being completely punished?	Correct	29 (64.4%)	27 (54%)	56	$\chi^2 = 0.1.068$
	Incorrect	16 (35.6%)	23 (46%)	39	$p = 0.301$
The Forensic Medicine Institute works under the Ministry of Internal Affairs	Correct	13 (28.9%)	15 (30%)	28	$\chi^2 = .014$
	Incorrect	32 (71.1%)	35 (70%)	67	$p = 0.906$
In which field do the 7th and 8th Specialized Boards of Forensic Medicine, which were opened in 2018, evaluate the allegations?	Correct	17 (37.8%)	24 (48%)	41	$\chi^2 = 0.1.009$
	Incorrect	28 (62.2%)	26 (52%)	54	$p = 0.315$
Who is one of the founders of forensic nursing and the first nurse who became a member of the Forensic Sciences Academy?	Correct	18 (40%)	28 (56%)	46	$\chi^2 = 0.2.428$
	Incorrect	27 (60%)	22 (44%)	49	$p = 0.119$
Which of the following is the English abbreviation for nurses specializing in sexual assault in the USA?	Correct	32 (71.1%)	19 (38%)	51	$\chi^2 = 0.10.443$
	Incorrect	13 (28.9%)	31 (62%)	44	$p = .001*$
An autopsy is carried out by opening two cavities in Turkey	Correct	16 (35.6%)	18 (36%)	34	$\chi^2 = .002$
	Incorrect	29 (64.4%)	32 (64%)	61	$p = 0.964$
Brain death means that the patient is in a vegetative state	Correct	16 (35.6%)	17 (34%)	33	$\chi^2 = .025$
	Incorrect	29 (64.4%)	33 (66%)	62	$p = 0.874$
In what terms is it important whether physical violence is used in sexual assault?	Correct	13 (28.9%)	10 (20%)	23	$\chi^2 = 0.1.020$
	Incorrect	32 (71.1%)	40 (80%)	72	$p = 0.313$
In cases where the gestation period exceeds 10 weeks, depending on the person's wish, pregnancy may be terminated if it threatens the life of the mother or will cause severe disability for the child to be born and the generations to follow	Correct	38 (84.4%)	39 (78%)	77	$\chi^2 = 0.640$
	Incorrect	7 (15.6%)	11 (22%)	18	$p = 0.424$
It is sufficient to look at whether a child is under the age of 18 in order to determine the amount of punishment to be given for sexual abuse	Correct	30 (66.7%)	31 (62%)	61	$\chi^2 = 0.224$
	Incorrect	15 (33.3%)	19 (38%)	34	$p = 0.636$
The depth of the wound is greater than the length in cutting and piercing injuries	Correct	33 (73.3%)	38 (76%)	71	$\chi^2 = 0.089$
	Incorrect	12 (26.7%)	12 (24%)	24	$p = 0.765$
Can an abrasion collar be seen on a person injured by a firearm injury?	Correct	11 (24.4%)	14 (28%)	25	$\chi^2 = 0.154$
	Incorrect	34 (75.6%)	36 (72%)	70	$p = 0.694$

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Table 4 (continued)

| Variables | Result | Taking the forensic nursing course $n = 95$ | | | Statistical analysis |
		Yes	No	Total	Test
The penalty is reduced when a child under the age of 12 commits a crime	Correct	6 (13.3%)	11 (22%)	17	$\chi^2 = 0.1.211$ $p = 0.271$
	Incorrect	39 (86.7%)	39 (78%)	78	
In which situations can a person be made/regarded mature/adult before the age of 18?	Correct	10 (22.2%)	12 (24%)	22	$\chi^2 = .042$ $p = 0.837$
	Incorrect	35 (77.8%)	38 (76%)	73	
One of the most prominent findings in a person in a heroin coma is mydriasis (the dilation of the pupil)	Correct	40 (88.9%)	39 (78%)	79	$\chi^2 = 0.2.005$ $p = 0.157$
	Incorrect	5 (11.1%)	11 (22%)	16	

χ^2*ki kare*

* *p* < 0.05

In examining the mean FN knowledge level scores of the students in the studies by Ribeiro and Dixe (2020) and Özden et al (2019), the mean scores of the females were higher than that of the males, which is similar to the results of our study.

In the topic titled crime scene investigation, collecting, preservation and documentation of evidence, the importance of the gray tube, especially in blood alcohol analysis, and the reasons for the presence of protective substances in the tube from which the blood was taken in alcohol analysis were frequently mentioned. The reason why this subject was focused on was that in emergency rooms admissions for forensic cases, blood samples taken for blood alcohol analysis must be kept in gray tubes. This requirement is also stated in the terms of Forensic Medicine Institution, one of the official expert institutions in Turkey for the blood alcohol test. As it is inevitable for students to encounter forensic cases in their working life after graduation and blood collection is the duty and responsibility of nurses, they should fulfill FN practices by learning this knowledge. Nursing students are expected to act by knowing what kind of scientific and legal consequences the practices that are implemented incompletely or incorrectly will create. Otherwise, the blood taken as evidence may deteriorate and lead to incorrect results (Adli Tıp Kurumu Başkanlığı n.d.; Karadayı et al 2013). For this reason, the students who took FN answered the question, "Blood should first be taken into the gray tube for blood alcohol analysis. Which of the following is the preservative substance in the gray tube?" significantly correct.

Among the students who took the FN course answered the question "Which of the following is the English abbreviation for nurses specializing in sexual assault in the USA?" significantly correct (71.1%). This information is addressed in the course under the subject titled Introduction to FN. The reason why the students taking the FN course in the department gave more correct answers to this question was that this information is only given in the FN course in the department. The number of correct answers to this question among those who did not take the FN course in the department was low (38%) because these students were not given this information in other courses in the nursing curriculum.

It is noteworthy that the importance of forensic nursing is not understood in Turkey compared with practices around the world, and this is reflected in education. Although forensic nursing education is given as graduate level applications or courses, these are not officially valid because forensic nursing is not regarded as an area of expertise in Turkey. A similar deficiency occurs in undergraduate nursing education, and people who do not have experience and competence in the field of forensic nursing teach forensic nursing courses.

Therefore, including forensic courses in undergraduate nursing education is a growing necessity. Forensic nursing education should be provided by experts who have experience and competence in the field. And continuing further education with graduate education or officially certified courses will make essential contributions to the acceptance of the field of forensic nursing as an area of specialization. Moreover, these will be crucial steps in terms of performing forensic nursing practices in the clinics within the framework of their duties, powers, and responsibilities. Therefore, the importance of forensic nursing should be shown with scientifically based justification by conducting more comprehensive studies on this subject with nurses and nursing students in Turkey.

Strengths and limitations

This study was conducted with a small sample from only one Turkish university. Larger experimental studies using randomized samples are still needed. Another limitation concerns the way the questionnaire was designed. When

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designing the questionnaire, it was prepared with the help of literature by the instructor who is an expert in the forensic field. But in future research, it is preferable that validated instruments should be applied.

Conclusions

In the study, taking the FN course in the department had a positive effect on the knowledge level of the students on FN. These results emphasize the importance of the integration of the course of FN into the curriculum of undergraduate education of nursing students who will become healthcare professionals in the future. The fact that a FN course is included in nursing education, especially starting from the undergraduate education, will allow nursing students to have the practical knowledge about the forensic and medicolegal process of forensic cases and prevent deficiencies and errors caused by the lack of knowledge in forensic cases.

Abbreviations

FN: Forensic nursing; SANE: Sexual assault nurse examiner; USA: United States of America; CVI: Content validity index.

Authors' contributions

MBD, conceptualization, methodology, formal analysis, writing—original draft, and project administration. ÖE, formal analysis, writing—review and editing, and writing—original draft. AY, writing—review and editing and writing—original draft. BG, project administration. MÇ, project administration. SMT, project administration. The authors read and approved the final manuscript.

Availability of data and materials

Data available on request from the authors

Declarations

Ethics approval and consent to participate

Approval for the study was obtained from the Ethics Committee of Istanbul Arel University with the ethics committee decision dated 26 February 2020 and numbered 2020/02.
Respondents were informed about the purpose of the research verbally, and they read the written consent at the beginning of the questionnaire. They were assured that their answers would be treated confidentially, and that their participation was voluntary and no incentives were provided. Participants were informed that their answers would be used for research; consent was implied by completion and return of the questionnaire.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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