

PAPER**GENERAL**

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The Knowledge Levels of Health Personnel in Turkey Regarding Forensic Evidence*

ABSTRACT: It is important that health personnel have extensive and adequate knowledge and practice regarding forensic evidence. This article describes the knowledge and practices of health personnel, who work in emergency rooms and health centers, regarding forensic evidence. The health personnel in a city in Central Anatolia, Turkey, constitute the population of this descriptive study and 233 personnel constitute its sample. It was determined that 31.3% stated that the practices of forensic evidence collection are inadequate. It was determined that average knowledge scores of health personnel with respect to forensic evidence are 23.5 ± 7.28 of 40. It was found that there was a statistically significant difference between knowledge scores on the subject of forensic with respect to duty ($p = 0.005$), level of education ($p = 0.005$), and institution of health personnel ($p = 0.015$). It was determined that the scores of the health personnel, who work in emergency services and health centers, on the subject of forensic evidence, are not at a desirable level.

KEYWORDS: forensic science, forensic evidence, emergency service, health center, health personnel, level of knowledge

Injuries that are caused by deliberate or incautious and reckless behaviors of others are described as a forensic case (1). All injuries that involve traumas are considered as potential forensic cases until their causes are confirmed (2). Health personnel provide treatment and care services to forensic cases, such as domestic violence, sexual assault, abuse, accidents, injuries, suicide attempts, alcohol and substance addiction, food and drug poisoning, criminal abortions, and malpractice, in a previous study (3).

In a study (4), it was stated that 31.9% of forensic cases that were applied to emergency room (ER) were traffic accidents, and 17.1% were poisonings. There is a considerable number of forensic cases seen in ERs, and therefore, health personnel need to have adequate knowledge of forensic procedures (4).

Health personnel, who work in emergency services and health centers, provide service to victims and criminals as well. Health personnel may be the first people to see suspects or victims to get in contact with their families or relatives, to touch their belongings during examination, and to come into contact with laboratory samples that are obtained from suspect or victim (2,5).

Health personnel should make a forensic evaluation when they come across a forensic case. Forensic evaluation includes recording the stories, physical examination, the identification, collection, preservation of evidence, the protection of evidence, documenting the evidence, and crisis intervention (2,5,6). Health personnel can endanger the evidence because a lack of knowledge can prevent the correct investigation of forensic cases and can be legally

regarded as guilty. Therefore, health personnel play an important part in the determination of forensic cases, the collection, preservation, and recording of evidence.

It is vital that health personnel have extensive and adequate education regarding forensic evidence. However, no studies, in which the knowledge levels of health personnel related to the forensic identification and the collection, preservation, and recording of forensic evidence were analyzed were found. The data that are obtained from this study will ensure the assessment of provided service and knowledge levels of health personnel, who work in ERs and health centers, related to this issue, and it will shed light on in-service education in this respect. The objective of this study was to determine the knowledge levels of health personnel, who work in ERs and health centers, concerning the forensic identification and the collection, preservation, and recording of forensic evidence.

Methods

Setting and Sample

In 2006, 1296 cases were seen by the emergency services in the study area, with 76.8% men, and 24.9% were between ages of 20 and 29. The study area population is 794,881. It was also reported that most of the forensic cases were caused by traffic accidents (30.8%), beating (26.4%), minor wounds (18.0%), poisoning (12.3%), and resulted mostly as head and neck injuries (44.9%) (7). The physicians, nurses, midwives, emergency medical technicians, and medical officers, who work in ERs and 19 health centers of three hospitals in a city center in Central Anatolia constitute the population of this study. A total of 425 health personnel work in these centers. Of 233 volunteers (54.8% of total population), who signed the whole data-collection form and were informed regarding the total population, were obtained before the sample selection process.

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Instruments

Study data were collected through the survey form, which was prepared by researchers, who used the literature (2,5,6). The questionnaire form was presented to two experts to get their view on the validity of the questions and revised as advised. No validity and reliability tests were made about the questionnaire. This form consists of two parts. In the first part, sociodemographic characteristics and introductory questions that include education and implementations, which are intended for forensic case were mentioned, and in the second part, statements, which are aimed at determining the knowledge and are intended for the forensic identification and the collection, preservation, and recording of forensic evidence were presented. The correct answers of health personnel to statements were scored as 1, wrong answers were scored as 0, and these were assessed of 40 points. There are four subheadings of those statements, and these subheadings and maximum points possible are 5 for "The forensic identification," 20 for "The collection of forensic evidence," 5 for "The preservation of forensic evidence," and 10 for "The recording of forensic evidence."

Data-Collection Procedures

Study data were collected by researchers between January and March 2009. Questionnaires were distributed to volunteers by researchers, and these were collected 1 week later. Volunteers who did not complete the form were taken out of the research. The forms were not tracked for completion.

Data Analysis

Study data were analyzed in computer using SPSS (V 13 for Windows; Cumhuriyet University, Sivas, Turkey) software. Percent calculation, the Kruskal–Wallis one-way analysis of variance, Mann–Whitney *U*-test, and chi-square test were used for the evaluation of data (8). The results were evaluated at $p < 0.05$ significance level and 95% confidence interval.

Human Subjects Protection/Ethics Review

Study approval was obtained from the Local Ethics Committee of Cumhuriyet University. Written permission for this study was obtained from provincial directorate of health, in which hospitals and health centers were subordinated to. Consent was taken from health personnel with informed consent form before implementation.

Results

Demographics

It was determined that the average age of health personnel, who participated in the study, was 32.8 ± 5.73 (minimum = 21.0, maximum = 50.0), and their average working time was 11.0 ± 6.20 (minimum = 1 year, maximum = 33 years). It was also determined that 71.2% ($n = 166$) of health personnel were women, 30.5% ($n = 71$) of the respondents were midwives, 36.1% ($n = 84$) were associate degree graduates, 72.1% ($n = 168$) of the respondents were working in health centers. Of the respondents, 73.0% ($n = 170$) had no formal education related to forensic cases, 17.5% found their education inadequate, 63.9% ($n = 149$) would like to get education related to the approach to forensic case, and 54.9% ($n = 128$) of them were not conversant with Article 280 of Turkish Penal Code.

The Practices of Health Personnel with Respect to Forensic Evidence

Health personnel were asked about their opinions on practices of forensic evidences. Of the health personnel, 33.5% stated that their practices concerning forensic identification were inadequate, 31.3% stated that their practices concerning the collection of forensic evidence were inadequate, 30.0% stated that their practices concerning the preservation of forensic evidence were inadequate, and 20.2% stated that their practices concerning the recording of forensic evidence were inadequate (Table 1).

The Knowledge Levels of Health Personnel with Respect to Forensic Evidence

The average knowledge score of health personnel regarding forensic evidence is 23.5 ± 7.28 (minimum = 1, maximum = 34), and their average knowledge score regarding forensic identification is 3.3 ± 0.9 . It was stated that 54.5% of health personnel did not know the definition of nonphysical evidence, and 82.4% of the respondents did not know how to prevent the loss of evidence after forensic identification (Table 2).

The average knowledge score of health personnel regarding the collection of forensic evidence is 12.0 ± 4.4 . It was determined that 91.0% of health personnel did not know who decides the internal examination of the organs, 90.6% did not know how to preserve hand swabs, and 73.8% of the respondents did not know how to take blood sample (Table 3).

The average knowledge score of health personnel regarding the preservation of forensic evidence is 1.3 ± 0.8 . It was found that 95.3% of health personnel had no knowledge regarding the preservation conditions of clothing, 91.0% had no knowledge about the preservation conditions of samples, and 67.8% of the respondents

TABLE 1—The practices of health personnel regarding forensic identification and the collection, preservation, and recording of forensic evidence.

	<i>N</i> = 233 (%)
Health personnel who deal with forensic evidence*	
Doctor	105 (45.1)
Nurse	23 (9.9)
Midwife	5 (2.1)
Emergency medical technician	6 (2.6)
Medical officer	28 (12.0)
Police	12 (5.1)
Medical secretary	8 (3.4)
No responsible personnel	57 (24.5)
Those who find their practices regarding forensic identification	
Adequate	45 (19.3)
Not adequate	78 (33.5)
Partially adequate	110 (47.2)
Those who find their practices regarding the collection of forensic evidence	
Adequate	45 (19.3)
Not adequate	73 (31.3)
Partially adequate	115 (49.4)
Those who find their practices regarding the preservation of forensic evidence	
Adequate	58 (24.9)
Inadequate	70 (30.0)
Partially adequate	105 (45.1)
Those who find their practices regarding the recording of forensic evidence	
Adequate	89 (38.2)
Inadequate	47 (20.2)
Partially adequate	97 (41.6)

**n* was doubled because multiple answers were given ($n = 244$).

TABLE 2—The knowledge of health personnel regarding forensic identification.

	Informed N (%)	Uninformed N (%)
Definition of evidence	220 (94.4)	13 (5.6)
Definition of physical evidence	214 (91.8)	19 (8.2)
Definition of nonphysical evidence	106 (45.5)	127 (54.5)
The requirement to assess every case in terms of forensic evidence	194 (83.3)	39 (16.7)
How to prevent the loss of evidences	41 (17.6)	192 (82.4)
The average knowledge score	3.3 (0.9) min = 1, max = 5	

TABLE 3—The knowledge of health personnel regarding the collection of forensic evidence.

	Informed N (%)	Uninformed N (%)
Who decides the internal examination of the organs	21 (9.0)	212 (91.0)
Taking consent in physical examination and in taking sample	168 (72.1)	65 (27.9)
Who does the internal examination	189 (81.1)	44 (18.9)
The scope of internal examination	141 (60.5)	92 (39.5)
Who does the external examination	148 (63.5)	85 (36.5)
Health personnel of the same gender doing the examination of woman patient if she requests	140 (60.0)	93 (39.9)
Who collects the biological samples	142 (64.9)	91 (39.1)
Who collects the nonbiological samples	183 (78.5)	50 (21.5)
How to obtain smear	125 (53.6)	108 (46.4)
Which part of the body to obtain smear from	118 (50.6)	115 (49.4)
The preservation method of swabs	22 (9.4)	211 (90.6)
How to take gunpowder or smoke samples	81 (34.8)	152 (65.2)
How to take blood sample	61 (26.2)	172 (73.8)
The reason to wear gloves	207 (88.8)	26 (11.2)
The collection of evidence by tweezers	177 (76.0)	56 (24.0)
Protecting individual's privacy	146 (62.7)	87 (37.3)
Taking off clothes on paper	88 (37.8)	145 (62.3)
The necessity not to shake clothes	173 (74.3)	60 (25.7)
How to cut clothing with scissors	141 (60.5)	92 (39.5)
How to protect linens if there are any	163 (70)	70 (30.0)
The average knowledge score	12.0 (4.4) min = 1, max = 20	

TABLE 4—The knowledge of health personnel regarding the preservation of forensic evidence.

	Informed N (%)	Uninformed N (%)
The packaging conditions of samples	21 (9.0)	212 (91.0)
The preservation method of clothes, which are cut	170 (73.0)	63 (27.0)
Ensuring the security of clothing	191 (81.9)	42 (18.0)
The preservation conditions of clothing	11 (4.7)	222 (95.3)
The preservation of wet materials	75 (32.2)	158 (67.8)
The average knowledge score	1.3 (0.8) min = 1, max = 4	

had no knowledge regarding the preservation of wet materials (Table 4).

The average knowledge score of health personnel regarding the recording of forensic evidence is 6.8 ± 2.6. It was determined that 61.0% of health personnel had no knowledge related to the characteristics of statements that will be used during recording, and 79.8% of the respondents had no knowledge on how to create visual evidence (Table 5).

It was determined that the difference between knowledge scores was statistically significant with respect to the duty of health

TABLE 5—The knowledge of health personnel regarding the recording of forensic evidence.

	Informed N (%)	Uninformed N (%)
The points to consider in recording	109 (46.8)	124 (53.2)
The characteristics of statements that will be used in recording	91 (39.0)	142 (61.0)
How to record the identity information of forensic case	197 (84.5)	36 (15.5)
How to record the identity information of the one who collects the evidence	202 (86.7)	31 (13.3)
The necessity to record the identity information of the one who obtains the evidence	184 (79.0)	49 (21.0)
The one who keeps records can be a witness in courts	159 (68.2)	74 (31.8)
The recording of medical treatment	200 (85.8)	33 (14.7)
The recording of scar characteristics	203 (87.1)	30 (12.9)
How to create visual record	47 (20.8)	186 (79.8)
The recording of the case, in which surgical operation was made	205 (88.0)	28 (12.0)
The average knowledge score	6.8 (2.6) min = 1, max = 10	

TABLE 6—The knowledge levels of health personnel regarding forensic evidence with respect to some variables.

	$\bar{X} \pm SD$	<i>p</i>
The knowledge scores with respect to the jobs of health personnel		
Doctor	25.9 ± 6.5	0.015
Nurse	23.4 ± 5.9	
Midwife	22.4 ± 7.6	
Emergency medical technician	22.0 ± 8.6	
Medical officer	21.6 ± 9.0	
The knowledge levels with respect to education levels		
High school	21.7 ± 8.1	0.005
Associate degree	23.1 ± 7.0	
Bachelor's degree	23.2 ± 6.0	
Graduate degree	25.9 ± 6.4	
The knowledge scores with respect to the institutions of health personnel		
Health center	23.3 ± 7.1	0.015
State hospital	21.8 ± 6.9	
Sample hospital	27.3 ± 5.4	
University hospital	21.8 ± 10.7	
The knowledge scores with respect to familiarity with Article 280 of Turkish Penal Code		
Informed	25.9 ± 6.5	<i>Z</i> = -5.422
Uninformed	21.4 ± 7.2	

personnel (*p* = 0.015), and this difference stems from doctor group. It was found that the difference between knowledge scores was statistically significant with respect to the knowledge levels of health personnel (*p* = 0.005), and this difference stems from postgraduate group. It was also determined that the difference between knowledge scores was statistically significant with respect to the institutions of health personnel (*p* = 0.015), and this difference stems from personnel, who work in sample hospitals. It was also found that difference between knowledge scores was statistically significant with respect to the knowledge of health personnel about Article 280 of Turkish Penal Code (*p* = 0.000) (Table 6).

Discussion

The knowledge levels of health personnel with respect to the forensic identification and the collection, preservation, and recording of forensic evidence were determined in this study. These kinds of studies are scarce in Turkey. For this reason, findings of this study were debated in light of limited research and literature knowledge.

Hospitals can sometimes be the first place, where forensic evidences are collected. So, it is significant that health personnel, especially those who work in ERs, have knowledge about this. In this study, the average knowledge score of health personnel regarding forensic evidence is 23.5 of 40, and this is a really low score. If health personnel is not aware of evidence and do not know techniques and procedures of forensic identification, the evidence collection, and preservation, then they can overlook, lose, or destroy the evidence unintentionally, especially during treatment and care in ERs (2).

The correct and adequate practice comes with the correct and adequate knowledge. However, in this study, some of the health personnel found their practices adequate concerning forensic identification and the collection, preservation, and recording of forensic evidence. Bahar (9) stated that nurses have shortcomings in their practices with respect to the collection and preservation of forensic evidence, sending the evidence to respective authorities and forensic case assessment, and Saral (10) stated that nurses, who work in ERs, have inadequate education and approaches regarding forensic cases.

Health personnel fulfill the identification of evidences, which is the first step of forensic assessment when they come across a forensic case (2). It is important to have knowledge on the subject of physical and nonphysical evidences in forensic identification. But, in this study, the average knowledge score was determined as 3.3 of 5. It was found that more than half of health personnel have inadequate knowledge on how to prevent the loss of nonphysical evidence, and majority of health personnel have insufficient knowledge on how to prevent the loss of evidences after forensic identification. Additionally, it is striking that health personnel find their practices in institutions inadequate regarding forensic identification. After all, health personnel's awareness of little details related to forensic case can either reveal or destroy a forensic phenomenon. Especially, it is significant to understand its first signals in injuries that were caused by abuse or violence (7,11,12).

It is stated in "the regulation with respect to the determination of physical identity, genetic researches and somatoscopy in criminal judgement" that somatoscopy can be performed by physician, and the collection of biological samples can be carried out by physician or other health personnel under the supervision of a physician (13). However, it was determined in this study that nearly half of practices of health personnel regarding forensic identification and the collection, preservation, and recording of forensic evidence were carried out by physicians, and one-quarter of the respondents stated that there are no personnel who are responsible for forensic cases. In this regulation, victim's approval or permission of public prosecutor is required to do the internal examination. It was stated in this study that nearly all of health personnel do not know which authority decides the internal examination. According to 1994 records in the United States, 1.4 million patients who were injured in violence and identified forensically were treated in emergency services of hospitals. Forensic assessment could not be made to approximately 92% of those patients because the collection of forensic evidences was almost impossible after the first intervention in ERs (2).

In this study, it is worrying that the average knowledge score of health personnel is 12.0 of 20. The absence of knowledge of nearly all health personnel regarding swab protection methods and more than half of them on how to take blood samples, gunpowder, or smoke samples, also their absence of knowledge regarding taking clothes on brown/white paper can cause the loss of evidence, and accordingly forensic assessment cannot be made, courts cannot come to a conclusion, or they decide erroneously (12). Furthermore, according to Article 281 of Turkish Penal Code, the person

who destroys, erases, hides, changes, or damages the evidence is regarded as committing a crime. If this person is a public official, then the punishment will be increased by one-half (14).

The preservation of evidence is generally problematic in health institutions (2). In forensic cases, the evidences, which were collected from individuals, should not be exposed openly and randomly, and they should be preserved in a locked safe until their submission (2,5,6,15). In a completed study, it was stated that 56% of nurses, who work in ERs, experience difficulties related to the preservation of forensic evidence (16). In that study, it was found that nearly all health personnel had no knowledge concerning the preservation conditions of samples and clothes, and more than half of them had no knowledge with respect to the preservation of wet materials. Those findings were also supported by the fact that health personnel found their practices inadequate regarding the preservation of evidence.

One of the essential steps of the approach to forensic case is proper record keeping. It was found in this study that more than half of health personnel had no knowledge with respect to the characteristics of statements to use during recording, and the vast majority of them had no knowledge on how to create visual recording. Health personnel's opinion on finding their practices inadequate regarding the recording of evidences can cause damage on evidences and can cause erroneous record of evidences. Treatment process can change the appearance of scar, and this can cause confusion in subsequent examinations. For this reason, it is essential to create visual recording before surgical intervention on scar.

Most of the faculties of medicine in Turkey have forensic science course, and some nursing departments have forensic nursing course in their curriculums. The vast majority of the education programs, in which other health personnel graduated from, have no course for this subject. In this study, it was determined that nearly one-quarter of the respondents had formal education related to forensic case, and very few of them found their education adequate. The conclusions of studies, which were made by Saral (10), Bahar (9), and Gunaydin et al. (17) are compatible with the conclusions of this study. In this study, the reason why the average knowledge scores of physicians, who hold master's degree, were high with respect to job and education level of health personnel may be their education, which was intended for this subject.

In this study, it was found that the average knowledge scores of health personnel, who were working in state hospitals, were high when the knowledge scores of health personnel considering the institutions, where they were working in, were analyzed. The reason behind this might be that state hospitals are located in the city center, and these are the secondary health care institutions, where individuals can access with ease.

According to Article 280 of Turkish Penal Code in Turkey, health personnel are liable for notifying patients, who are regarded as forensic case and were treated or are being treated medically, to forensic authorities; otherwise, they are regarded as committing a crime (14). In this study, it was determined that nearly half of the respondents were not conversant with Article 280 of Turkish Penal Code. In the study by Tugcu et al. (18), it was stated that 52.6% of the respondents had no knowledge with respect to their obligation related to the notification of forensic phenomena. The absence of knowledge of ER personnel on this notification obligation can make the identification and determination of forensic phenomena harder. This opinion is supported by the fact that the difference between the average knowledge scores with respect to health personnel's familiarity with Article 280 of Turkish Penal Code statistically matters.

In this study, more than half of health personnel's desire for getting an education related to the approach to forensic case is significant in terms of showing awareness of their shortcomings. Desire for education is an endeavor to overcome the shortcomings, and it is really important to support this endeavor.

Limitations

This research was made in only one city, so the results cannot be generalized for Turkey.

Conclusion

As a result of this study, it was found that health personnel, who work in ERs and health centers, have inadequate knowledge and practices regarding forensic evidence. This situation can cause personnel to overlook, lose, or destroy the evidences during treatment and care.

Based on these conclusions, it is recommended that the education programs, which are intended for health personnel, who work in ERs and health centers that were evaluated by this study, should be organized, and there should be a course related to the approach to forensic case in every curriculum of education programs in the field of health, the participation to certified trainings after graduation should be encouraged, and this subject should be incorporated into in-service education.

It is significant that health personnel's knowledge and practices regarding forensic identification and the collection, preservation, and recording of forensic evidence should be assessed by observational studies, and based on the results, appropriate education programs should be planned to overcome the shortcomings on this subject.

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