

CBRN Incident Awareness of Healthcare Professional Working in Public and University Hospitals

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Abstract

Objectives: The aim of this study is to investigate the perception, information and experiences of healthcare professionals working in public and university hospitals who will respond to the CBRN incidents in order to raise awareness for requirements of knowledge, training and practice about this topic.

Materials and Methods: Our study was a survey study. Data acquisition was carried out between the dates 10.05.2021-10.11.2021. The questionnaire was applied to health care professionals working in public and university hospitals. There were 26 questions in our questionnaire. Questions were prepared to be short, clear and understandable. Each question was provided with 3 options as "Yes/No/Partially".

Results: A total of 103 people participated to the study. 65 (63.1%) of the participants were male, 38 (36.9%) were female. The ages of the participants were categorically evaluated and 44 (42.7%) were in age group 26-35, 38 (36.9%) were in 18-25, 17 (16.5%) were in 36-45, and 4 (3.9%) were above 46. When the answers were evaluated according to education status, people with bachelor's degree answered "Yes" to the question "Injured people with possible exposure to an CBRN agent are accepted to the emergency service after decontamination process in the health care facility I work in" significantly higher than the other groups (p:0.04). The question of "I have come across with hospitalized injured in the region I work" were answered as "No" by 17 doctors, 41 nurses, and "Yes" by 1 doctor and 1 nurse, while the majority of people answering "Yes" to this question were emergency medical technician and paramedics. The difference was statistically significant (p<0,001).

Conclusion: As a conclusion, we think that healthcare professionals do not have the required interest and awareness for preparation of CBRN incidents and it is crucial to determine and eliminate the deficiencies in this topic.

Keywords: Awareness, CBRN, disaster, emergency medicine.

Özet

Amaç: Bu çalışmanın amacı KBRN olaylarına müdahale edecek kamu ve üniversite hastanesinde görev alan sağlık çalışanlarının KBRN konusundaki algıları, bilgi ve deneyimlerini araştırarak bu konudaki bilgi, eğitim ve tatbikat ihtiyaçları konusunda farkındalık oluşturmaktır.

Gereç ve Yöntem: Çalışmamız bir anket çalışmasıdır. Veri toplama 10.05.2021-10.11.2021 tarihleri arasında gerçekleştirilmiştir. Anket kamu ve üniversite hastanelerinde çalışan sağlık profesyonellerine uygulanmıştır. Anketimizde 26 soru vardır. Sorular kısa, açık ve anlaşılır olacak şekilde hazırlanmıştır. Her soruya "Evet/Hayır/Kismen" şeklinde 3 seçenek sunulmuştur.

Bulgular: Çalışmaya toplam 103 kişi katıldı. Katılımcıların 65 (%63,1) kadın, 38 (%36,9) ise erkekti. Ankete katılanların yaş verileri kategorik olarak değerlendirilmiş olup 44 (%42,7) kişi 26-35 yaş arasında 38(%36,9) kişi 18-25 yaş arasında, 17(%16,5) 36-45 yaş arasında, 4 (%3,9) kişi de 46 ve üzeri yaş grubundaydı. Sorulara verilen yanıtlar eğitim durumu ile karşılaştırılarak değerlendirildiğinde, çalıştığım sağlık kuruluşunda olası bir KBRN ajanına maruz kalan yaralı/yaralıları dekontaminasyon işlemi gerçekleştirildikten sonra acil servise kabul edilmektedir ifadesine lisans mezunu olanların diğer gruplara kıyasla istatistiksel olarak anlamlı derecede daha çok evet cevabı verdiği belirlendi (p:0,04). Görev yaptığım bölgede KBRN ajanına maruziyet nedeniyle hastaneye başvuran yaralıları ile karşılaştım sorusuna 17 doktor hayır, 1 doktor evet, 41 hemşire hayır, 1 hemşire evet cevabını verirken evet cevabını verenlerin çoğunluğunun ATT ve paramedik olduğu belirlendi. Bu farklılık istatistiksel olarak anlamlı değerlendirildi (p<0,001).

Sonuç: Sonuç olarak KBRN olaylarına hazırlık konusunda sağlık çalışanlarının ihtiyaç duyulan ilgi ve farkındalığa sahip olmadığı bu konudaki eksikliklerin belirlenerek giderilmesinin oldukça önem arz ettiği düşünülmektedir.

Keywords: Farkındalık, KBRN, afet, acil servis

Introduction

CBRN is a natural or man-made disaster which gives rise to dangerous and harmful situations for humans and environment and cannot be handled by local facilities, is happened by chemical, biological, radiological and nuclear materials and which affects the area it happens either in long or short periods¹.

Various CBRN incidents have happened from past to present². Societies are still in a position to be injured or dead due to any accident or attack resulting from any CBRN agent³.

Technology today has developed very much due to rapid progress of knowledge and equipment and has eased the human life⁴. Although it makes life easier, CBRN materials used and stored in nuclear energy power plants and industrial plants

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may accompany extensional disasters due to a mistake during the co-use of them with burnable and explosive materials⁵.

People exposed to CBRN agents during the incidents usually apply to health care services by themselves in the shortest time possible. Asymptomatic or people not exposed to agents might cause unnecessary use of hospital sources. Health care professionals working in the emergency services who are the first responders to the exposed or injured people are the riskiest ones in terms of secondary contamination.

Medical response to a possible CBRN incident after the provision of necessary occupational health and security, protection of health care professionals and injured people from possible harmful effects of CBRN agent, managing the scene, determination of the CBRN agent, triage of injured people exposed to CBRN agent, first aid in CBRN incidents, medical decontamination processes and further diagnosis and treatment of injured people exposed to CBRN agent have a significant importance.

It is predicted that CBRN incidents cause panic and disorder, and a burden to health services, it is time consuming and hard to respond to people exposed to the agent, the first responder healthcare professionals are under risk, and it is required to use PPE (personal protective equipment) in CBRN incidents and decontamination should be carried out. Possible CBRN incidents and conditions during the incidents can be predicted. Most real-like projection of possible situations, raising awareness about CBRN via trainings and practices, keeping the staff ready for emergency and disasters, and developing necessary knowledge, skills and attitude are very important⁶.

Relevant institutions and organizations must plan the things to be done during the incidents in advance and prepare to disaster plans which they can apply in case of extensional disasters via training.

Disaster management is a polity to be designed for the disasters as a whole, which requires specialized knowledge and which plans preparations prior to disasters, and correct actions in the course and after the disaster. As it is valid for modern disaster management, for CBRN incidents detailed and multidimensional plans should be prepared to carry out risk reduction, preparation, response and recovery practices affectively by taking possible damages into consideration and specially trained and kitted up crew should respond to the CBRN incidents⁷. In order to provide the fastest and most effective response to eliminate the negative effects of the CBRN agents which are highly dangerous for human and environmental health, CBRN trainings should be provided to the society and should be trained with CBRN educations, and enough number of well-equipped responder teams should be formed^{2,8}.

The aim of this survey study was to investigate the perception, information and experiences of healthcare professionals working in public and university hospitals who will respond to the any CBRN incidents in order to raise awareness for requirements of knowledge, training and practice about this topic.

Material and Methods

Our study was a survey study and ethical principles presented in Helsinki declaration were followed. Data acquisitions were carried out in between the dates of 10.05.2021-10.11.2021. The study was conducted as multi centered and applied to healthcare professionals working in public and university hospitals.

Informed consent forms were obtained from all participants prior to the questionnaire. There was a total of 26 questions in our questionnaire. Personal information was not asked from the participants while the first 4 questions were descriptive for socio-demographic information. Other questions were aimed for determination of knowledge and attitude. Questions were short, clear and understandable. Each question was provided with 3 options as "Yes/No/Partially". The questions were about: "what an CBRN agent is, applications to be carried out in hot, cool and cold zones during CBRN incidents, what the emergency plan and applications for CBRN incidents are, what "Orange Code" training is, whether the CBRN training and practices are enough or not, if ever encountered any CBRN injured people applying to hospital, whether taken part in an CBRN response team before or not, whether there are protective materials against CBRN incidents, enough antidotes and medications or not, decontamination process for an CBRN agent and where this process would be done, whether to accept CBRN emission injured people to emergency service after contamination control or not, where the locations and access paths to CBRN shelters are, what the warning and alarm signs (Yellow Warning, Red Alarm, Black Alarm, White Warning) used for CBRN incidents are, what the usage and planning of isolation and quarantine rooms used for CBRN exposed injured people are, decontamination process for equipment and dressing during hospital phase and in decontamination tent, whether improper collection of dangerous wastes spreading around after the CBRN decontamination process increases CBRN infection risk or not, whether there is any risky industrial plants proximal to settlements of the working place or not, planning and response phases for secondary disasters to occur as a result of a possible CBRN emission around the work place, whether a farmer knows what an organophosphate exposure, a worker of automobile industry knows what it is to be affected from exhaust gas or not, organizations and contact numbers in case of a possible CBRN incident". Questionnaires were delivered to the participants via internet.

Statistical Analysis

Obtained data were saved and analyzed with PASW Statistics 18.0 for Windows (Predictive Analytics Software) statistical package program. Prior to the study, approval from Namık Kemal University Faculty of Medicine Non-invasive Clinical Researches Ethical Council (decree no: 27.04.2021-31432) was obtained.

Results

A total of 103 people participated to the study. 65 (63.1%) of the participants were male, 38 (36.9%) were female. The ages of the participants were categorically evaluated and 44 (42.7%) were in age group 26-35, 38 (36.9%) were in 18-25, 17 (16.5%) were in 36-45, and 4 (3.9%) were above 46.

The first question "I have enough knowledge and practicum about CBRN agents" was answered as "partially" by 52 (52.5%) of the participants, as "no" by 29 (28.2%), and the ones answering "yes" was a minority.

The expression "I have enough information about emergency plans and applications for CBRN incidents in the healthcare organization where I work" was answered as "no" by 44 (42.7%) of the participants, while answered "partially" by 35 (34%) people.

The expression "Regular Orange Code trainings are carried out in the healthcare organization where I work" was answered as "no" by 72 (69.9%), while "partially" by 18 (17.5%).

Among the participants, 60(58,3%) "I think that CBRN training and practices carried out in the healthcare organization where I work are enough" answered as "no". The same question was answered as "partially" by 35 (34%) and "yes" by 8 (7.8%).

The expression "I have encountered injured people because of CBRN agent exposure in my working region" was answered as "no" by 79 (76.6%), while "I have participated in a CBRN response team" was answered as "no" by 90 (87.4%) people.

"There is protective material, enough antidote and medications in the healthcare organization where I work" was answered as "partially" by 44 (42.7%) and as "yes" by 33 (32%) participants.

4 (39.8%) of the participants answered to the expression "I have sufficient information about the decontamination process of a possible CBRN agent and how/where this process should be carried out" as "no", while 32 (31.1%) answered as "partially", and 30 (29.1%) as "yes".

The expression "The injured people exposed to a possible CBRN agent are accepted to the emergency service of the healthcare organization where I work after a decontamination process" was answered as "yes" by 56 (54.4%) participants.

"I have sufficient information about the locations and how to access to the CBRN shelters in the healthcare organization where I work" was responded as "no" and "partially" by 64 (62.1%) and 22 (21.4%) participants, respectively.

The question about the knowledge and awareness level of the participants about the warning and alarm signs (Yellow Warning, Red Alarm, Black Alarm, White Warning) was answered as "partially" by 39 (37.9%), "no" by 39 (36.9%), and "yes" by 26 (25.2%) participants.

"I have sufficient information about the usage and planning of isolation and quarantine rooms used for CBRN exposed injured people in the work place where I work" was responded as "no" by 54 (52.4%) participants. "I have sufficient infor-

mation about the decontamination process for equipment and dressing during hospital phase and in decontamination tent." was responded as "no" by 41 (39.8%) participants.

The expression "Improper collection of dangerous wastes spreading around after the CBRN decontamination process increases CBRN infection risk" was answered as "yes" by 77 (74.8%) participants.

"There are no risky industrial plants proximal to settlements of the working place" was replied as "no" by 42 (40.8%), and "yes" by 35 (34%) participants.

44(42.7%) of the participants expressed that they have partially sufficient information about planning and response phases for secondary disasters to occur as a result of a possible CBRN emission around the work place, while 43 (41.7%) expressed that they do not have sufficient information.

"Application of a farmer to the hospital after application of organophosphate pesticide and being affected by it is an example of an CBRN incident" expression was confirmed by 75 (72.8%) participants. "A worker in an automobile industry being affected by the exhaust gas is not an CBRN incident" expression was responded as "yes" by 48 (46.6%), and as "no" by 41 (39.8%). Moreover, 50 (48.5%) participants expressed that they do not have sufficient information about organizations and contact numbers in case of a possible CBRN incident, while 28 (27.2%) said they have "partial" information.

The final question in the questionnaire was "Investigation, search and rescue, and sampling are carried out in hot zone, decontamination (purification/washing/cleaning) is carried out in cool zone, and medical treatment is carried out in the cold zone during CBRN incidents" was answered as "yes" by 62 (60.2%) participants.

There was no statistically significant difference according to sex in any of the questions.

When the answers were evaluated according to the education status, the expression "The injured people exposed to a possible CBRN agent are accepted to the emergency service of the healthcare organization where I work after a decontamination process" was answered as "yes" significantly higher by participants with a bachelor's degree compared to the other groups (p:0.04). (Table 1)

When the answers were evaluated according to the occupational groups; "I have encountered injured people because of CBRN agent exposure in my working region" was replied as "no" by 17 doctors and 41 nurses, "yes" by 1 doctor and 1 nurse, while most of the participants answering "yes" were emergency medical technicians and paramedics. The difference was statistically significant (p<0.001).

In the same way, the occupational group who expressed to take place in an intervention team to an CBRN incident was composed of emergency medical technician and paramedics (p: 0.01).

"I have sufficient information about the decontamination process of a possible CBRN agent and how/where this process should be carried out" was answered as "no" by 13

Table 1: The relationship between the education status of the participants and the answers to the questions

Question	In the health institution where I work, the casualty exposed to a possible CBRN agent is admitted to the emergency room after the decontamination process is performed.				
Educational status	n(%)	yes	no	partly	p
secondary education	5(4.9)	3	1	1	0.004
associate degree	10(9.7)	6	4	0	
Bachelor's degree	68(66)	38	9	21	
Master degree	12(11.7)	4	6	2	
Doctorate	8(7.8)	5	0	3	
Questions:	Previously, I took part in the response team to the CBRN incident.				
Educational status	n(%)	yes	no	partly	p
secondary education	15(14.6)	5	10	0	<0.001
associate degree	50(48.5)	1	18	0	
Bachelor's degree	19(18.4)	1	47	2	
Master degree	9(8.7)	3	6	0	
Doctorate	10(9.7)	1	9	0	

and “yes” by 3 doctors; while it was answered as “yes” by 10 nurses and “no” by 21 nurses. Majority of the emergency medical technicians and paramedics answered “yes” to this question. The difference between the groups was statistically significant (p: 0.002).

In the same way, “I have sufficient knowledge and awareness level of the participants about the warning and alarm signs (Yellow Warning, Red Alarm, Black Alarm, White Warning) used in a possible CBRN incident” was answered as “yes” mostly by the emergency medical technicians. The intergroup differences were statistically significant (p:0.01). (Table 2)

When the healthcare department of the participants were compared according to the answers; “I have encountered injured people because of CBRN agent exposure in my working region” was answered as “yes” and “no” by 12 and 13 ambulance personnel, respectively. There was no “yes” answer among the emergency service personnel. There were no personnel from the hospitalization service, while 1 personnel working in intensive care unit answered “yes”. Difference among the groups was statistically significant (p<0.001). 9 out of 11 people answering “yes” o “I took place in an intervention team to an CBRN incident” were

Table 2: The relationship between the occupational of Participants and the answers to the questions

Questions:	In the region where I worked, I encountered injured people who applied to the hospital due to exposure to a CBRN agent.				
occupational	n(%)	yes	no	partly	p
Emergency medical technician	15(14.6)	6	9	0	<0.001
Nurse	50(48.5)	1	17	1	
Doctor	19(18.4)	1	41	8	
Paramedic	9(8.7)	5	4	0	
Other	10(9.7)	1	8	1	
Question	I have sufficient knowledge about the decontamination process in exposure to a possible CBRN agent and where/how this process will be done				
occupational	n(%)	yes	no	partly	p
Emergency medical technician	15(14.6)	10	1	4	0.002
Nurse	50(48.5)	3	13	3	
Doctor	19(18.4)	10	21	19	
Paramedic	9(8.7)	4	1	4	
Other	10(9.7)	3	5	2	
Questions:	I have sufficient knowledge about the warning and alarm signs (Yellow Warning, Red Alarm, Black Alarm, White Warning) used in a possible CBRN event.				
occupational	n(%)	yes	no	partly	p
Emergency medical technician	15(14.6)	8	1	6	0.001
Nurse	50(48.5)	4	13	2	
Doctor	19(18.4)	8	17	25	
Paramedic	9(8.7)	2	2	5	
Other	10(9.7)	4	5	1	

emergency ambulance service personnel. The intergroup differences were statistically significant ($p < 0.001$). (Table 3)

The proportion of participants expressing to have sufficient information about emergency plans and applications for CBRN incidents in the work place increased statistically significantly with increasing working experience ($p: 0.001$). In the same way, 13 out of 14 people expressing to encounter injured people because of CBRN agent exposure in the working region had a working experience of over 15 years which was statistically significant ($p: 0.001$). 10 out of 17

people expressing to have sufficient information about the locations and how to access to the CBRN shelters in the healthcare organization they work were determined to have a working experience of more than 5 years ($p: 0.02$). 28 out of 48 people finding the expression "A worker in an automobile industry being affected by the exhaust gas is not a CBRN incident" had more than 5 years of working experience and it was determined to be statistically significant ($p: 0.01$). 10 out of 12 participants with less than 1 year of working experience answered this expression as "no". (Table 4)

Table 3: The relationship between the department of Participants and the answers to the questions

Questions:	In the region where I worked, I encountered injured people who applied to the hospital due to exposure to a CBRN agent.				
departments of Participants	n(%)	yes	no	partly	p
ambulance	25(24.3)	12	13	0	<0.001
Emergency services	13(12.6)	0	9	4	
Polyclinics	5(4.9)	1	3	1	
Other services	32(31.1)	0	27	5	
Intensive care unit	12(11.7)	1	11	0	
Other	16(15.5)	0	16	0	
Questions:	Previously, I took part in the response team to the CBRN incident.				
departments of Participants	n(%)	yes	no	partly	p
ambulance	25(24.3)	9	16	0	<0.001
Emergency services	13(12.6)	0	13	0	
Polyclinics	5(4.9)	1	3	1	
Other services	32(31.1)	0	31	1	
Intensive care unit	12(11.7)	1	11	0	
Other	16(15.5)	0	16	0	

Table 4: The relationship between the Work experiences of Participants and the answers to the questions

Questions:	I have sufficient information about the emergency plan and practices for CBRN incidents in the health institution I work for				
Work experiences (year)	n(%)	yes	no	partly	p
1≥	19(18.4)	4	14	1	0.01
1-5	34(33)	10	15	9	
5-10	19(18.4)	5	6	8	
10≤	31(30.1)	5	9	17	
Questions:	I have sufficient information about the emergency plan and practices for CBRN incidents in the health institution I work for.				
Work experiences (year)	n(%)	yes	no	partly	p
1≥	19(18.4)	0	17	2	0.001
1-5	34(33)	1	28	5	
5-10	19(18.4)	8	9	2	
10≤	31(30.1)	5	25	1	
Questions:	I have sufficient information about the location of the CBRN shelters and the access routes to these shelters in the health institution where I work				
Work experiences (year)	n(%)	yes	no	partly	p
1≥	19(18.4)	5	12	2	0.02
1-5	34(33)	2	27	5	
5-10	19(18.4)	6	6	7	
10≤	31(30.1)	4	19	8	

Discussion

It should be evaluated as an important lesson that even the most common and equipped healthcare systems were unprepared for COVID19 pandemics therefore preparation process and corporate awareness for CBRN disasters should be started. World Health Organization called all the countries for preparation to the next "unavoidable and possible close" flu pandemics in the middle of 2004⁹.

Balicer et al. investigated the perceptions of healthcare professionals of 3 different hospitals to respond an influenza pandemic. According to the results, majority of the employee think that they would work under a serious personal risk, they would have a role without sufficient training about a topic which they do not have sufficient information, and this role would not have a significant effect on the general response of the organization¹⁰. In our study, perceptions of participants for responding to a possible CBRN disaster were evaluated. We think that positive feedback was obtained in the society of our study in case of a culturally need for help. Moreover, attitude of the healthcare professionals for helping to the disaster victims might change according to the characteristics of the disaster and their perceptions about the subject. For instance, volunteering for medical maintenance activities for the sufferers of an earthquake might not be the same with the volunteering for medical maintenance activities for a biological agent without information of factor and treatment.

Studies around USA resulted that healthcare professionals were found to be unwilling to intervene possible biological epidemic^{11,12}. In order to fix this situation, the importance of training for preparation to possible interferences was emphasized¹¹. There was no problem for willingness in our study, but there was a serious lack of experience and training.

COVID-19 pandemic caused by Sars Cov-2 virus is a candidate to appear in the debates about CBRN disasters. Kırçiçek et al. emphasized that states should mobilize their resources as if in a war, to quarantine the people with disease symptoms, to keep the non-serious cases separated from the ones suffering from serious illnesses, and to limit the mobility of people for the disease to wipe out itself¹³. Avcı et al. indicated that healthcare professionals were the highest risk group of workers to encounter the virus during the COVID-19 pandemic as they both encountered a high load of virus and they had to work in an insecure environment without sufficient rest due to high amount of working hours¹⁴.

The participants of our study were determined to lack sufficient information and implements about CBRN agents and did not get sufficient training about this topic. We think that the determined training and education requirement of healthcare professionals can be fulfilled with trainings given after the graduation under the law-makers and relevant institutions, and this situation would strengthen the hands of personnel and administrators.

Barış E. investigated the disaster medical training of 248 doctors in his thesis study. Among the doctors, 73% were practitioners, 27% were attending and resident doctors, and 49.6% of these worked in emergency service of the hospital and 50.4% worked in the ambulance service. General evaluation of the research population, 66.5% of them never attended training about disaster medicine¹⁵. In our study, the majority of the participants were detected not to have sufficient knowledge and emergency practicum about CBRN agents and incidents.

CBRN incidents are a concept starting to take part in the awareness among healthcare professionals. Medical intervention to such incidents is still not clear in many institutions. Moreover, many personnel join to the institution they work without a prior training about this topic. For this reason, the knowledge and training requirement of healthcare professionals should be fulfilled with platforms named as in-service trainings. In order to provide the active contribution of healthcare professionals to these trainings, the importance of the topic should be adapted well and the attitude of the participants as if the training is useless due to their already intense work load should be changed.

Emergency services of our country helped us to overcome the COVID 19 pandemics process relatively less troubled due to the experience of managing crowded emergency service and fast reflex of health system in obtaining PPE countrywide. However, possible coupling of CBRN with a disaster would increase the impact of destruction due to the affected the healthcare infrastructure and interrupted supply chain. For this reason, attitudes and needs of healthcare professionals who would take basic duties in intervention of CBRN disasters should be determined and redressed, which will contribute to the success of the aimed medical intervention.

Disasters including CBRN incidents acquire a different dimension. The agent in massive accidents might affect a lot of people in a short period via spreading due to possible couplings. Moreover, in case of intervention without being prepared and planned, prognosis of the sufferers would unavoidably be negatively affected as well as the number of sufferers. Okumura et al. indicated that in Tokyo metro attack, most of the PPE were distributed to police and firemen in the crime scene, there were almost no PPE left in medical institutions and that is why the attack caused many secondary exposures in these institutions after the attack. Furthermore, 23% of St. Luke's International Hospital personnel underwent secondary exposure, which led to many important inferences about hospital disaster preparations¹⁶. Sapira et al. inspected the willingness of healthcare professionals under the circumstance of a hypothetical rocket attack scenario. A total of 2650 questionnaires were distributed to personnel of 10 hospitals (42%) countrywide. 51% of the personnel responded to the questionnaire and the willingness of healthcare professionals to do their duties increased from 42% to 86% in case they were provided with proper

personal protecting equipment¹⁷. The thesis study of Sezigen mentioned the importance of organization structure in military hospitals, minimum opportunities and abilities, inside the behavioral model including active intervention of massive injuries resulted from CBRN³.

Recruitment of PPE forms an additional load to the institutions. Transfer of funds to incidents with low awareness and mostly not experiences, especially like CBRN incidents, might not be accepted as a proper approach by the institutions with limited budget. However, it is the responsibility of all authorities to prepare incidents which are not desired to happen at all but those with a probability all the time.

Yıldırım et al. inspected about PPE in a survey study with 541 pre-hospital healthcare professionals and determined that 61.0% of the participants get personal protection methods training, and 39% did not get it. Also, they emphasized the ability of healthcare professionals to use PPE by indicating that PPE have an important role in intervening to CBRN incidents⁸. In our study, although, the pre-hospital healthcare professionals are more trained about PPE and CBRN consistently with the literature, most of the participants were seen not to have sufficient information about where and how to decontaminate PPE intended to use in CBRN incidents. We link the reason of this situation to the widened risk perceptions of pre-hospital healthcare professionals to be the first people to be in touch with CBRN incidents, as happens in many other incidents. Healthcare professionals working in the hospitals do not frequently come across with CBRN incidents and therefore have a lower perception of risk for the topic, and are not willing enough to benefit from the in-service trainings. However, it should not be forgotten that healthcare professionals working in the hospitals are under direct risk due to the patients reaching out to the hospitals themselves, and due to secondary contamination in case of CBRN incidents.

Dogan et al. conducted a survey study to measure the requirements of knowledge, training and practice for CBRN incidents. They investigated 425 civil servants working in some public institutions which play a role as a basic solution partner and support solution partner in the disaster intervention plan in a local level in the cities of Gumushane and Trabzon with the criteria they designed. A positively weak and significant correlation between preparation point variable and attitudes of the participants about knowledge, training and practice requirements for CBRN incidents was found. As a result, they indicate that emergency situations with high risk and threats like CBRN incidents require multi-institutional intervention, and public institutions and their partners should consider preparation activities such as training and practices more importantly⁴.

In our study, majority of the participants share the opinion that trainings for CBRN incidents were insufficient in their work places. This opinion of the participants is sup-

ported with the insufficient knowledge of the participants about decontamination process for equipment and dressing during hospital phase and in decontamination tent, about the usage and planning of isolation and quarantine rooms used for CBRN exposed injured people in the work place.

The thesis of Dönmez mentioned that as a result of an CBRN incident, addition of new and complicated loads to the already chaotic structure of the emergency services would be unavoidable which are the first application place in case of traumatic incidents affecting the society and they investigated the interest and attitude of emergency service personnel towards CBRN incidents. The study indicated that the hospital has a determined role in the city wide CBRN Incident Management System and the ratio of emergency service clinical chiefs who express that there are protocols between relevant CBRN service managing institutions is 17.2%. Moreover, it was emphasized that emergency service personnel who are cognizant of the importance of preparation for CBRN incidents should be supported by trainings and practices, funding should be provided to the emergency services for CBRN capacity, they should be supported with equipment and diagnostic apparatus, and the coordination of in and inter-institutional CBRN should be increased¹⁸.

Şahin et al. investigated the attitudes and abilities of the personnel of the public institutions who would take place in the first intervention in case of a CBRN incident. The study revealed that institutions and their personnel included in the CBRN incidents should have a upper-level preparation from the point of their duties and perspectives; firemen, policemen, healthcare professionals and doctors would consider CBRN incidents in different perspectives, the reason of which would be the different experiences and trainings they attended aimed for their duties. The majority of the participants were detected not to be experienced about CBRN and did not attend any relevant practice. Moreover, the importance of organizing frequent in service and inter institutional trainings and providing the attention in a high level in an efficient way in order to provide institution planning efficiencies and to overcome the deficiencies of the institutions was emphasized¹⁹. The results of our study revealed that most of the participants were not experienced about CBRN incidents and there were not enough trainings for them to gain experience. Moreover, they were not sufficiently informed about the contact numbers and institutions in case of a possible CBRN incident. Since there are not frequent massive applications to emergency services, it can be accepted that healthcare professionals do not have enough experience about CBRN cases. This situation can even negatively affect the attitude of the personnel for this topic. It is desired that no CBRN incident would ever happen, but the requirement of experience should be fulfilled with frequent and current trainings and this would be effective in the redress and attention of personnel about this topic.

Limitations

The low number of participants to our study was the most important limitation. Moreover, our study was applied as multi centered because of the scarcity of participants. This situation forms a significant limitation to what extend the obtained data can be generalized or to which region can the data can be accepted as specific. Lack of an equal sampling in the lower categories was another limitation.

Conclusion

As a result, it is obvious that healthcare professionals do not have required level of attention and awareness in all categories like training, equipment and awareness for preparation of CBRN incidents, however; it is strategically crucial to determine and eliminate the deficiencies in this topic.

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