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EVALUATION OF EMERGENCY DEPARTMENT PERSONNEL'S PREPAREDNESS FOR CHEMICAL, BIOLOGICAL, RADIATION, AND NUCLEAR EMERGENCIES

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ABSTRACT

Objective: The aim of this study is to determine the chemical, biological, radiation, and nuclear (CBRN) emergency preparedness levels of emergency department (ED) personnel.

Materials and Methods: This cross-sectional descriptive survey study was conducted with 49 emergency department personnel (emergency medicine specialists, emergency medicine research assistants, nurses, and nursing staffs) working in the ED of a university hospital through face-to-face. The questionnaire was created by the researchers and consisted of 5 demographic and 30 CBRN preparation information, 12 questions questioning the previous practice and educational status of CBRN subjects, in total 47 questions. The preparedness level of the participants was determined by evaluating the CBRN preparedness level responses. The Cronbach Alpha coefficient was used to determine the reliability of the scale.

Results: The Cronbach's Alpha reliability index obtained for the CBRN scale was obtained as α=0,856 for the whole scale and this value shows that the reliability of the whole scale is at a good level. The mean preparedness level score of the ED personnel is 59,7 (min-max:24-81). The mean CBRN preparedness level score of emergency medicine specialists (38) was found to be lower than the other groups. The number of those who received training on CBRN situations and medical management of cases during their professional training (bachelor-master- doctorate education) is 18 (36,7%). Most of the participants didn't participate in any CBRN exercise during their professional life (n=43, 87,8%).

Conclusion: ED personnel's preparations for CBRN emergencies are insufficient. Their participation in training and exercises for the medical management of CBRN cases is low. Our study can be used as a tool to determine the CBRN preparations of ED personnel.

Keywords: CBRN, Emergency Department, Preparedness

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ACİL SERVİS PERSONELLERİNİN KİMYASAL, BİYOLOJİK, RADYASYON VE NÜKLEER ACİLLERE HAZIRLIK DÜZEYLERİNİN DEĞERLENDİRİLMESİ

ÖZ

Amaç: Bu çalışmanın amacı acil servis personellerinin kimyasal, biyolojik, radyasyon ve nükleer **(**KBRN) acillerine hazırlık düzeylerini tespit etmektir.

Gereç ve Yöntemler: Bu kesitsel tanımlayıcı anket çalışması bir üniversite hastanesinin acil servisinde çalışan 49 acil servis (AS) personeli (acil tıp uzmanı, acil tıp araştırma görevlisi, hemşire, hasta bakım personeli) ile yüz yüze uygulama ile gerçekleştirildi. Araştırmacılar tarafından oluşturulan anket 5 demografik veri ve 30 adet KBRN hazırlık bilgisi, 12 adet KBRN konularındaki önceki uygulama ve eğitim durumlarını sorgulayan toplam 47 sorudan oluşmaktaydı. KBRN hazırlık düzeyi cevapları değerlendirilerek katılımcıların hazırlık düzeyi tespit edilmiştir. Ölçeğin güvenilirliğinin belirlenmesi için Cronbach Alpha katsayısı kullanılmıştır.

Bulgular: AS çalışanlarının ortalama hazırlık düzeyi puanı 59,7 (min-max:24-81) dir. KBRN durumları ve vakaların tıbbi yönetimi konusunda meslek eğitimleri süresince (lisans-yüksek lisans-doktora) eğitim görenlerin sayısı 18 (%36,7)'dir. Katılımcıların çoğu meslek hayatı boyunca herhangi bir KBRN tatbikatına katılmamıştır (n=43, %87,8).

Sonuç: AS çalışanlarının KBRN acillerine hazırlıkları yetersizdir. KBRN vakalarının tıbbi yönetimine yönelik eğitim ve tatbikatlara katılımları düşüktür. Çalışmamız acil servis personellerinin KBRN hazırlıklarının tespitinde bir araç olarak kullanılabilir.

Anahtar Kelimeler: KBRN, Hazırlık, Acil Servis

INTRODUCTION

CBRN events result from the accidental or intentional release, spread, or effects of CBRN agents. The sarin gas attack carried out by Aum Shinrikyo in the Tokyo subway in 1994, the dirty bomb assembly found in a park in Moscow in 1995, the anthrax envelopes sent by post in the USA in 2001, the Fukushima Nuclear Power Plant accident that occurred in Japan in 2011, these are the most well-known examples of the CBRN events (Gawlik-Kobylińska, 2022:8315).

CBRN events are considered emergencies because they can affect large numbers of people at the same time, causing mass injury, illness, or mass death. Health workers, both in hospitals and in the field, including nurses, doctors, public health workers, and emergency medical personnel will be part of the first responder workforce in any disaster and emergency that affects the health of a community. Therefore, it is imperative that all healthcare professionals, especially frontline responders, know how to respond effectively in emergencies and disasters. However, numerous studies show that most healthcare personnel are inadequately

prepared to respond to such events (Becker and Middleton, 2008:174-84; Dobalian et al., 2020:1-9; Sheikh et al., 2012:34-38).

EDs are at the forefront of the hospital leg of the CBRN response and act as the gateway to optimal patient care (Ayvacı and Abuşka, 2019:9-16). ED personnel will also be among the first responders to CBRN incidents (Anathallee et al., 2007:12-17; Mitchell, et al., 2012:151-61). In addressing the issue of emergency room preparedness for a CBRN event, it is first necessary to distinguish two main areas in the current literature; department-level preparation, i.e. whether the necessary facilities and resources are available, and second; personal preparedness level of staff in emergency departments, eg triage, decontamination of patients and equipment, waste management, personal protective equipment (PPE) on chemical clothing or chain of command (Mitchell et al., 2012:151-61). For these reasons, it is recommended that ED personnel receive special training for CBRN emergencies, which are not common but force the hospital and ED capacity, and that these training should be supported by regular exercises (Olivieri et al., 2017:366-70). Careful planning, training and preparation of personnel are essential components for successful management of CBRN incidents, occupational safety, appropriate response and effective outcome, both in hospitals and in the field. However, EDs and ED personnel rarely have an acceptable level of CBRN preparedness(Kotora, 2015:431-46). The aim of this study is to determine the level of preparedness of ED personnel for CBRN emergencies.

1. MATERIALS AND METHODS

This study is a cross-sectional descriptive survey study. After obtaining the approval of Tekirdağ Namık Kemal University Non-Interventional Research Ethics Committee (Date: 31.05.2022, Protocol no: 2022.92.05.19), the study conducts with volunteers of 57 people, consisting of 3 emergency medicine specialists, 16 emergency medicine research assistants, 27 nurses, 11 nursing staffs. The study was made up between 01.06.2022 and 30.06.2022 and the whole universe was included in the study without choosing a sample, and a questionnaire was applied to a total of 49 volunteers who could be reached. Questionnaires were administered by one of the researchers to the participants who volunteered to participate in the study by face-to-face interview method.

The “CBRN Preparedness Level Questionnaire (CBRN PLQ)” was created by the researchers based on the current literature review and field expert opinions (Dobalian et al., 2020:1-9; Eyison et al., 2020:174-79; Hung et al., 2013:90-97; Kollek et al., 2009:337-42; Kotora, 2015:431-46; Mitchell et al., 2012:151-61; Rebmann et al., 2019:393-402). Volunteers

participating in the study were asked to answer a total of 47 questions in the questionnaire, which question 5 demographic data and 30 CBRN preparation information, and 12 questions about their previous practice and education on CBRN subjects. 30 CBRN preparation information questions have 5-point Likert answers (Strongly Disagree, Disagree, Undecided, Agree, Strongly Agree), and a total of a minimum of 30 and maximum of 150 points can be obtained from these questions. If the score obtained from the CBRN PLQ is 90 and above, the level of preparation is considered sufficient, and if it is below 90 points, the level of preparedness is considered insufficient. In 12 questions regarding the previous training and application status of the participants, "Yes" and "No" answers will be found, and the participants were asked to mark the appropriate option for them. Since there is no correct answer for previous training and application status questions, no scoring was done.

1.1. Statistical & Analytical Methods

IBM SPSS 25.0 (IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp,USA) program was used in the analysis of the data obtained from the research. Descriptive statistics methods were used in the data collected from the participants in the study. To determine the sub-dimensions of the CBRN PLQ, exploratory factor analysis was applied to the scale. The Cronbach Alpha coefficient was used to determine the reliability of the scale, in which factor analysis was applied. In the examination of the differences in the CBRN levels of individuals according to their socio-demographic characteristics; Independent sample t-test was used for the difference between the two groups, and the "One Way Anova" test was used to compare the parameters between groups when there were more than two groups. In the variables where there is a significant difference because of the Anova test; Using the Post-Hoc LSD test, the differences of each group compared to the other groups were determined.

1.2. Analysis of Data

To determine the validity and reliability of the "CBRN PLQ" and to determine the sub-dimensions of the scales, explanatory factor analysis was performed on the scales. In the explanatory factor analysis, KMO and Barlett tests were used to determine the suitability of the data for factor analysis, and the Rotated Component Matrix Varimax method was used to determine the sub-dimensions of the scale. The value obtained for the Kaiser-Meyer-Olkin (KMO) test is 0,683 which means that the sample size is at an acceptable level. The significance value (p value) obtained for the Barlett test is less than 5% (0,000), indicating the suitability of the data for factor analysis. The "KMO and Bartlett" test shows that the data in the CBRN preparedness scale are suitable for factor analysis (Table 1).

Principal Components Analysis Varimax Rotation was used to determine the factor structure of the CBRN PLQ. Items with close load values under more than one factor should be excluded from the analysis. For this reason, 8 items with close load values under more than one factor in the CBRN PLQ were excluded from the analysis. With the remaining items, the participants were able to get the lowest 22 points and the highest 110 points. With the latest regulations, if the score obtained from the CBRN preparation level scale is 66 and above, the preparation level is considered sufficient, and if the score is below 66, the preparation level is considered insufficient. As a result of the analysis, it was seen that the scale items were collected in 7 sub-dimensions, and the scale explained 74,9% of the variance. Obtained sub-dimensions "Decontamination Procedures Preparation Level" (4 items), "Hospital Disaster and Emergency Plan (HDEP) Preparation Level" (4 items), "Self-Efficacy Perception" (3 items), "CBRN Information Awareness" (3 items), "Operation Procedure Preparation" Level" (3 items), "Warning and Equipment Information" (3 items) and "Communication Information" (2 items) (Table 1).

Table 1. CBRN Preparedness Scale Explanatory Factor Analysis Results

Factors	Factor Weights	Factor's Explanation (%)	α
Factor 1: Decontamination Procedures Preparation Level		26,383	,796
• I know where the materials (antidotes, personal protective equipment, storage materials, etc.) that can be used in CBRN incidents are kept in the emergency department.	,789		
• Personnel assigned to carry out decontamination processes in the emergency department have been identified.	,773		
• I know that there are devices such as detectors and dosimeters in the emergency department for the diagnosis and follow-up of CBRN cases.	,760		
• For decontamination procedures, I know which patients should be directed and decontaminated by themselves, and which patients should be decontaminated by the staff.	,630		
Factor 2: HDEP Preparation Level		14,084	,788
• I know that our hospital has a disaster and emergency plan for CBRN incidents.	,771		
• I know my duty/responsibility in the emergency department in CBRN incidents.	,719		
• I know where our hospital's CBRN decontamination unit is.	,673		
• I know who is responsible for the CBRN incident within the scope of the hospital disaster and emergency plan.	,667		
Factor 3: Self-Efficacy Perception		9,570	,855
• I can recognize the symptoms of exposure to biological agents.	,873		

• I can recognize the symptoms of exposure to chemical agents.	,845		
• I can recognize the symptoms of exposure to radiation and nuclear agents.	,705		
Factor 4: CBRN Information Awareness		8,482	,769
• Sudden onset of lacrimation, runny nose, sore throat, redness and blistering on the skin, etc.	,821		
• I know that I should suspect CBRN events if there are abnormal numbers of sick or dead animals in the environment for unknown reasons.	,779		
• I know that I should suspect CBRN events in the presence of different odors that are not suitable for the environment, such as the smell of garlic, mustard, almond or grass.	,737		
Factor 5: Operation Procedure Preparation		5,900	,720
• I know that all personnel who will come to the hospital and start their duty in case of being called to duty, must follow the specified routes to access their services within the hospital.	,771		
• I know that personal belongings of patients affected by CBRN events must be appropriately packaged, labeled, and locked in designated areas.	,716		
• I know that in CBRN incidents, patient entrances and exits in the entire hospital should be made from a single area.	,685		
Factor 6: Warning and Equipment Information		5,507	,639
• I know that radiology devices used for medical purposes can cause radiation events as a radiation source.	,761		
• I can use radiation detectors.	,706		
• I know what chemical attack warning alarms and signs that can be given to the public by means of communication such as sirens, radio and television are and what they mean.	,704		
Factor 7: Communication Information		4,997	,623
• I know that I cannot give any information to the media unless I am assigned to CBRN events.	,872		
• In CBRN incidents, media workers cannot freely enter the emergency room or visit any place unless they are authorized; permission to visit…	,702		
Total		74,923	,856
Kaiser Meyer Olkin Scale Validity: ,683			
Bartlett Test of Sphericity Chi-Square: 527,818	**Sd:** 231	**p:** ,000	

HDEP: Hospital Disaster and Emergency Plan **CBRN:** Chemical, Biological, Radiation, Nuclear

The Cronbach's Alpha reliability index obtained for the CBRN PLQ was obtained as α=0,856 for the whole scale. This value shows that the reliability of the whole scale is at a good level. When the Cronbach's Alpha reliability index values for the sub-dimensions of the scale were examined; α=0,796 for decontamination procedures preparation level, α=0,788 for HDEP readiness level, α=0,855 for self-efficacy perception, α=0,769 for CBRN information

awareness, α=0,773 for operation procedure preparation level, α=0,639 for warning and equipment information and α=0,623 for contact information. These values show that the reliability of the sub-dimensions of the scale is good and at an acceptable level (Table 2)(Aktuna, 2017:138).

Table 2. Cronbach's Alpha Reliability Index Values for the Sub-Dimensions of The CBRN Preparedness Scale

Scale	Sub-Dimensions	Cronbach's Alpha
CBRN Preparedness Scale α=0,856	Decontamination Procedures Preparation Level	0,796
	HDEP Preparation Level	0,788
	Self-Efficacy Perception	0,855
	CBRN Information Awareness	0,769
	Operation Procedure Preparation	0,773
	Warning and Equipment Information	0,639
	Communication Information	0,623

CBRN: Chemical, Biological, Radiation, Nuclear **HDEP:** Hospital Disaster and Emergency Plan

2. RESULTS

86% (n=49) of the 57 people in the study population answered the questionnaire. Answered questionnaires were included in the study.

2.1. Demographic Data

The demographic data of the participants are summarized in Table 3. Participation in the survey was 85,9% (n=49). 57,1% (n=28) of the participants were between the ages of 26-35, 51% (n=25) were female, 59,2% (n=29) were university graduates, 44,9% were (n=22) nurses and 28,6% (n=14) were working in the emergency department for 3-4 years (Table 3).

2.2. CBRN Preparedness Level

The mean preparedness level score (MPLS) of the ED personnel' is 59,7 (min-max:24-81). The MPLS' of emergency medicine specialists, emergency medicine research assistants, nurses, and nursing staffs were respectively; 38(min-max:24-62), 66,7(min-max:48-81), 58,4(min-max:40-70), and 58,6(min-max:29-70).

Decreased education level with increasing age and increasing tenure was associated with a decrease in CBRN preparedness levels (Table 4).

JPH, December 2023, 8(3), 236-251

Table 3. Demografic Data of The Participants

		N	%
Age	18-25	17	34.7
	26-35	28	57.1
	36≤	4	8.2
	Total	49	100.0
Gender	Female	25	51.0%
	Male	24	49.0%
	Total	49	100.0%
Education Level	High school	8	16.3%
	Bachelor	29	59.2%
	Master	8	16.3%
	Doctorate	4	8.2%
	Total	49	100.0%
Occupation	EM specialist	3	6.1%
	EM research asistant	15	30.6%
	Nurse	22	44.9%
	Nursing Staff	9	18.4%
	Total	49	100.0%
Years of practice in ED	<1	8	16.3%
	1-2	12	24.5%
	3-4	14	28.6%
	5-9	12	24.5%
	10≤	3	6.1%
	Total	49	100.0%

EM: Emergency Medicine, **ED:** Emergency Department

Table 4. Differences of Mean Preparedness Level Scores (MPLS) According to Demographic Data

		N	MPLS (Mean ± SD)	F	p
Age	18-25	17	59,17±11,44	5,639	**,002**
	26-35	28	62,53±8,75		
	36 -45	3	49,33±18,58		
	46-55	1	24,0		
	Total	49	59,77±11,80		
Gender	Female	25	61,32±7,95	,872	,355
	Male	24	58,16±14,81		
	Total	49	59,77±11,80		
Education Level	High school	8	57,12±12,43	,557	,646
	Bachelor	29	60,17±10,60		
	Master	8	63,25±10,89		
	Doctorate	4	55,25±21,46		
	Total	49	59,77±11,80		
Occupation	EM specialist	3	38,0±20,88	7,349	**,000**
	EM research asistant	15	66,73±9,57		

	Nurse	22	58,45±7,43		
	Nursing Staff	9	58,66±12,09		
	Total	49	59,77±11,80		
Years of practice in ED	<1	8	61,62±14,94	4,852	**,002**
	1-2	12	62,50±5,96		
	3-4	14	64,50±7,79		
	5-9	12	55,75±9,64		
	10≤	3	38,0±20,88		
	Total	49	59,77±11,80		

EM: Emergency Medicine, **ED:** Emergency Department

2.3. CBRN Education Level

Most of the ED personnel (n=42, 85,7%) knew the definition of CBRN (Table 5). While 73,5% of personnel receive training on medical interventions and medical management in disasters, the number of those who receive training on CBRN situations and medical management of cases during their vocational training (bachelor-master-doctorate) is 18 (36,7%). The data about personnel's CBRN training status is summarized in Table 5.

Table 5. The data of participants' CBRN training status

		N	**%**
Received training on medical response and medical management in disasters	Yes	36	73,5
	No	13	26,5
	Total	49	100,0
Knowing the meaning of CBRN	Yes	42	85,7
	No	7	14,3
	Total	49	100,0
Receive any training in the medical management of CBRN situations and cases during professional education (bachelor-master-doctorate)	Yes	18	36,7
	No	31	63,3
	Total	49	100,0
Response in a CBRN case in accordance with job description throughout professional life	Yes	10	20,4
	No	39	79,6
	Total	49	100,0
Participate in a CBRN exercise throughout professional life	Yes	6	12,2
	No	43	87,8
	Total	49	100,0
Receive CBRN training in accordance with job description in the institution/institutions work for	Yes	17	34,7
	No	32	65,3
	Total	49	100,0
Received training on emergency management of CBRN situations	Yes	21	42,9
	No	28	57,1
	Total	49	100,0
Received training on disaster triage	Yes	34	69,4
	No	15	30,6
	Total	49	100,0
Received training for decontamination	Yes	16	32,7

procedures	No	33	67,3
	Total	49	100,0
Received training on antidote knowledge and use	Yes	17	34,7
	No	32	65,3
	Total	49	100,0
Received training on the use of personal protective equipment	Yes	39	79,6
	No	10	20,4
	Total	49	100,0
Received training on the hospital disaster and emergency plan	Yes	28	57,1
	No	21	42,9
	Total	49	100,0

CBRN: Chemical, Biological, Radiation and Nuclear

3. DISCUSSION

CBRN events are rare but high-impact events (Olivieri et al., 2017:366-70). CBRN events present a significant risk to public health and safety, and healthcare professionals such as doctors and nurses, play a critical role in providing medical care to affected individuals and preventing the spread of hazardous substances (Razak et al., 2018:543-49). They are responsible for a range of tasks, including; *Assessment and triage:* Evaluating patients to determine the extent and type of exposure and prioritizing care based on the severity of symptoms, *Treatment:* Providing medical care to individuals with symptoms related to exposure, such as administering decontaminating solutions or medications, and managing symptoms such as respiratory distress, *Containment:* Preventing the spread of hazardous substances by following infection control and decontamination procedures and wearing personal protective equipment, *Surveillance and monitorin*g: Monitoring the health of exposed individuals and tracking the spread of any infectious agents to help prevent further spread, *Public health response:* Working with public health agencies to coordinate a response to the CBRN event, including distributing information about the event, providing treatment and support to affected individuals, and helping to contain the spread of hazardous substances (Jama and Kuisma, 2016:392-96; Sheikh et al., 2012:34-38; Veenema et al., 2019:1-8; World Health Organization and The International Labour Office, 2018). In a CBRN event, the actions of healthcare professionals can have a significant impact on the outcome. They must be properly trained and equipped to respond effectively to such incidents.

In our study, the CBRN preparedness level of the ED personnel' was not sufficient. In addition to the low level of the CBRN preparedness of the ED personnel, the low participation in trainings and exercises in accordance with the in-house job description is worrying.

In his study, Kotora found that emergency care providers in a city hospital ED were not adequately prepared to manage CBRN incidents (Kotora, 2015:431-46). There are studies showing a correlation between the amount of education and personal confidence levels, with a lower percentage of knowledge in handling CBRN events indicating a poor level of CBRNE readiness (Hung et al., 2013:90-97; Kotora, 2015:431-46; Sheikh et al., 2012:34-38) Since CBRN events are not recurrent events, it is necessary to periodically repeat and remind current and realistic theoretical and practical information about these issues.

Contrary to previous studies, the increase in the age of the participants and the time spent in the profession did not cause an increase in the level of knowledge and preparation about CBRN (Eyison et al., 2020:174-79; Kotora, 2015:431-46; Yahya et al., 2022:103235). This may be related to factors such as increasing age, reluctance to participate in in-service training, the time elapsed since formal education, decreased professional interest and decreased performance (Ozyar, 2003:85-88; Patchen Dellinger et al., 2017:967-71) Professional performance increases can be achieved through practices such as encouraging participation in evidence-based medical education, providing performance feedback, and in-service proficiency exams.

The use of PPE is essential for the protection of healthcare professionals themselves and the patients they care for. The Covid 19 pandemic has shown how effectively healthcare workers can and cannot be protected with the use of PPE (Liu et al., 2020:6-11). All the participants had received training on the use of PPE. This situation was thought to be related to the Covid 19 pandemic practices in which all healthcare professionals worldwide participated.

Proficiency in decontamination procedures and training on this subject are important for an emergency room health worker. In CBRN incidents, patients can be brought to the emergency services by being decontaminated at the scene, or they can reach the emergency services by their own means by carrying the contamination findings (Okumura et al., 1998:613-17). An emergency department must be prepared for decontamination processes with both personnel and equipment preparation.

Participation of ED personnel in CBRN exercises were at a low level. CBRN events are infrequent and require periodic reminders (Kotora, 2015:431-46). Healthcare professionals may need exercises to be informed about these applications, which they may encounter rarely, and to reinforce their existing knowledge. CBRN preparations can be supported by different approaches such as scenario-based CBRN trainings, desk exercises, virtual reality applications, and high-modality simulation dummies for healthcare workers (Eyison et al., 2020:174-79).

A survey study was conducted to determine the CBRN awareness and knowledge levels of health workers who previously worked in emergency services in Türkiye (Eyison et al., 2020:174-79). In this study, it was determined that a low part of the participants (11.9%) had full awareness and they had less dominance of information about radiation-nuclear than chemical and biological events(Eyison et al., 2020:174-79). Türkiye is in a geography open to CBRN hazards, the most important examples of this in the past are the Chernobyl nuclear power plant accident and the chemical attacks carried out in Syria in different years (Ozyar, 2003:85-88; Council of Higher Education, 2017). With the changing terrorist attacks and technological structures, the probability of healthcare professionals to encounter CBRN incidents that occur intentionally or accidentally is increasing. In addition, the existence of a nuclear power plant under construction in Türkiye necessitates increasing the knowledge of emergency care providers about nuclear medical emergencies(Republic of Türkiye Ministry of Energy and Natural Resources, 2022). For these reasons, By increasing the topics related to disaster medicine and CBRN, which are insufficient in the medical and nursing education curricula in Türkiye, can contribute to increasing the CBRN knowledge and preparedness levels of the ED personnel (Bıçakçı, et al., 2022:59-73).

It is inevitable that an inadequate response will emerge in the medical management of these events in the emergency services where there is a health workforce that does not have sufficient knowledge, preparation, and experience about CBRN. For the entire healthcare workforce caring for CBRN casualties in the EDs, drills that include a standardized curriculum and roles in line with job descriptions may be optimal for preparation.

The main limitation of the study is that the data were obtained from a single institution and the study population was relatively small. Another limitation is that since participation in the study is voluntary, people who think they are good at disaster preparedness and CBRN may have chosen to participate in the study. We also collected participants' self-assessments of what they knew, as in other studies of this style. This may have led to an erroneous assessment. Finally, since the study was not a scale development study, confirmatory factor analysis was not performed for the CBRN PLQ. With the application of CFA, the validity of the structure we discovered after the exploratory factor can be demonstrated.

CONCLUSION

Emergency department personnel's preparations for CBRN emergencies are insufficient. Their participation in training and exercises for the medical management of CBRN cases is low. In addition to standard basic training for emergency service personnel responding to CBRN

emergencies, training specific to job descriptions and exercises involving appropriate roles may be appropriate for CBRN emergencies. Our study can be used as a tool to determine the CBRN preparations of emergency department personnel.

Author Contributions

Concept NB, SB; Design NB; Supervision SB; Data Collection and/or Processing NB,SB; Analysis and/or Interpretation NB,SB; Literature Search NB; Writing Manuscript NB; Critical Review NB,SB.

Conflict of Interest

There is no conflict of interest between the authors.

Presented in Congress

This study was presented in 8th Eurasian Congress on Emergency Medicine in Antalya on December 01-04, 2022.

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