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THE EXPERIENCE OF AN EDUCATION&RESEARCH HOSPITAL AFTER A TERRORIST ATTACK WITH BOMB

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Abstract

Background: The global terror is increasing day by day. On 10 October 2015 at 10:04 local time in Ankara, the capital city of Turkey, two bombs are detonated at the outside Ankara Central Railway Station, while the Labour, Peace and Democracy Rally which was organized by many civil society organizations. There were 106 deaths and more than 500 wounded civilians.

Material and Methods: There were 87 admissions including 6 deaths. The files and digital records of the patients are investigated. The wound part of the body, wound type, age, gender, applied radiologic tests, surgical records, hospital stay times and total costs are recorded.

Results: After the explosion, 87 of the patients were admitted to our ED; 57 of them (65.5%) were male. The median age was 33 (range 1-75). The most of them was in green scale (56.3%). There were 6 cases which were dead on admission. Additional 4 patients died in hospital. 33.3% of the patients were hospitalized in service; 16.1% of them were followed up in intensive care unit. The most frequent injury was soft tissue injury with abrasion or laceration (54.0%) caused by shrapnel injuries. 23.0% of the patients undergone major surgery. The most of the surgeries performed by orthopedics and 7 were performed by general surgeon. 11 patients (12.6%) had hearing loss. The total cost of the explosion only in our hospital was 271.369,12 TL (~91.124,62$). The median hospital stay time is 5.5 days (range 1-30 days).

Discussion: In case of mass casualty events, we have to prepare the hospital as soon as possible. There is still confusion over roles and responsibilities, poor communication, lack of planning and suboptimal training.

Conclusion: Many of the countries are not prepared enough for the mass causality events. We don't know the possible results of chemical, biologic, nuclear and radioactive (CBRN) assaults. We have to conduct CBRN drills intermittently to increase our preparedness.

Keywords: *bomb, explosion, terrorist attack, SWOT analysis, mass causality event.*

Резюме

ОПЫТ УЧЕБНО-ИССЛЕДОВАТЕЛЬСКОГО ГОСПИТАЛЯ ПОСЛЕ ТЕРАКТА С ПРИМЕНЕНИЕМ БОМБЫ

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Введение. Глобальный терроризм усиливается день ото дня. 10 октября 2015 года в 10:04 по местному времени в Анкаре, столице Турции, у центрального железнодорожного вокзала были взорваны две бомбы во время митинга труда, мира и демократии, организованого организациями гражданского общества. Из мирных жителей 106 человек погибли и более 500 получили ранения.

Материалы и методы. Поступило 87 пострадавших, в том числе 6 летальных случаев. В исследование были включены файлы и электронные записи пациентов. Регистрируются раневая часть тела, тип раны, возраст, пол, прикладные рентгенологические исследования, хирургические записи, время пребывания в больнице и общие затраты.

Результаты. После взрыва 87 пациентов поступили в отделение неотложной помощи; 57 из них (65,5%) были мужчинами. Средний возраст составлял 33 года (от 1 до 75 лет). Большинство из них соответствовали зеленой шкале (56,3%). В 6 случаях пострадавшие умерли при поступлении. Еще 4 пациента скончались в больнице. 33,3% пациентов госпитализированы в оперативную службу; 16,1% из них находились под наблюдением в отделении интенсивной терапии. Наиболее частыми травмами были травмы мягких тканей с ссадинами или разрывами (54,0%), вызванные осколочными ранениями. 23,0% пациентов перенесли серьезное хирургическое вмешательство. Большинство операций выполнено ортопедом, а 7 - хирургом общего профиля. У 11 пациентов (12,6%) была потеря слуха. Общая стоимость взрыва только в нашей больнице составила 271,369,12 TL (~ 91,124,62 $). Среднее время пребывания в больнице составляет 5,5 дней (от 1 до 30 дней).

Обсуждение: В случае массовых жертв мы должны как можно скорее подготовить госпиталь. По-прежнему существует путаница в отношении ролей и обязанностей, плохая коммуникация, отсутствие планирования и неоптимальная подготовка.

Вывод: Многие страны недостаточно подготовлены к событиям с массовым поражением людей. Нам не известны возможные результаты химических, биологических, ядерных и радиоактивных атак. Мы должны периодически проводить учения, чтобы повысить нашу готовность.

Ключевые слова: *бомба, взрыв, теракт, SWOT-анализ, массовая причинность.*

Түйіндеме

БОМБАНЫ ҚОЛДАНУМЕН ТЕРАКТАН КЕЙІНГІ ОҚУ – ЗЕРТТЕУ ГОСПИТАЛІНІҢ ТӘЖІРИБЕСІ

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Кіріспе. Жаһандық лаңкестік күн санап өсуде. 2015 жылдың 10 қазанында жергілікті уақыт бойынша таңғы 10: 04 -те Түркияның астанасы Анкара қаласында Орталық теміржол вокзалында азаматтық қоғам ұйымдары ұйымдастырған еңбек, бейбітшілік және демократия шеруі кезінде екі жарылыс болды. Жергілікті тұрғындардан 106 адам қаза тауып, 500 -ден астамы жараланды.

Материалдар және әдістер. Зардап шеккендер саны 87, оның ішінде 6 адам қайтыс болды. Зерттеуге пациенттердің файлдары мен электрондық жазбалары енгізілді. Дененің жара бөлігі, жараның түрі, жасы, жынысы, қолданбалы рентгенологиялық зерттеулер, хирургиялық жазбалар, ауруханада болу уақыты және жалпы шығындар тіркелді.

Нәтижелер. Жарылыстан кейін 87 науқас жедел жәрдем бөліміне түсті; олардың 57-сі (65,5%) ер адамдар болды. Орташа жасы 33 жас (1 жастан 75 жасқа дейін) болды. Олардың көпшілігі жасыл шкалаға сәйкес келді (56,3%). 6 жағдайда зардап шеккендер қабылдау кезінде қайтыс болды. Тағы 4 науқас ауруханада қайтыс болды. Пациенттердің 33,3% - ы жедел қызметке жатқызылды; олардың 16,1% - ы қарқынды терапия бөлімшесінде бақылауда болды. Ең жиі кездесетін жарақаттар жұмсақ тіндердің жарақаттануы немесе жыртылуы (54,0%) болды. Пациенттердің 23,0% - ы ауыр хирургиялық араласудан өтті. Көптеген операцияларды ортопед, ал 7 жалпы хирург жасады. 11 науқаста (12,6%) есту қабілетінің жоғалуы байқалды. Біздің ауруханадағы жарылыстың жалпы құны 271,369,12 лира (~91,124,62$) болды. Ауруханада болудың орташа уақыты-5,5 күн (1-ден 30 күнге дейін).

Талқылау: Жаппай құрбан болған жағдайда біз ауруханаңы мүмкіндігінше тезірек дайындауымыз керек. Рөлдер мен міндеттерге қатысты шатасулар, қарым-қатынастың нашарлығы, жоспарлаудың болмауы және оңтайлы дайындық әлі де бар.

Қорытынды: көптеген елдер жаппай жеңіліске ұшыраған оқиғаларға дайын емес. Біз химиялық, биологиялық, ядролық және радиоактивті шабуылдардың мүмкін нәтижелерін білмейміз. Біз дайындықты арттыру үшін мезгіл-мезгіл жаттығулар жасауымыз керек.

Түйінді сөздер*: бомба, жарылыс, террорлық шабуыл, SWOT-талдау, жаппай себептілік.*

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Introduction

Two bombs are detonated at the outside of The Ankara Central Railway Station, on 10 October 2015 at 10:04 local time in Ankara, the capital city of Turkey. There was a rally that was called “Labour, Peace and Democracy” which was organized by many civil society organizations (CSO) including the Turkish Medical Association (TTB), the Confederation of Public Workers' Unions (KESK), the Confederation of Progressive Trade Unions of Turkey (DİSK), the Peoples' Democratic Party (HDP) and the Union of Chambers of Turkish Engineers and Architects (TMMOB).

While the rally was walking in front of the Ankara Central Railway Station, the two bombs are exploded with three seconds interval. The ambulances are immediately reached the area and transported the patients to the nearest hospitals. The initial death toll was reported as 86, along with 186 wounded, on the day of the blasts [1]. The next day the total number of deaths was 97, and this number increased in the following days. The overall result was 106 deaths and more than 500 wounded civilians [2].

Our hospital was 3.9 km away from the railway station. We wanted to tell the admissions and the clinical results of the patients who was admitted to our emergency department (ED) and make a SWOT analysis of this event.

How was the hospital organization? What we did?

After the explosion, ED is prepared to admit the patients immediately. The director of the hospital and the chief emergency physician planned the ED with coordination. The patients that were followed in the ED are transferred to

the service rooms. The empty stretchers are sorted at the entry point of ED; the wrist bands are prepared with numbers starting from 1 and an empty list was prepared to write the patients name. The automation program records are done by medical secretary while the patient was being examined, then the real patient barcode is applied to the wrist band. The doctors and the nurses are waited in the entrance point.

While the hospital stuff that were on duty were preparing the hospital, all other medical stuff who heard the explosions were moved to hospital thinking that extra stuff should be needed and also they informed the other stuff who didn't heard the explosions yet by social media group applications or telephone.

The patients are separated according to emergency triage rules as green, yellow and red. The greens are moved to green area by a doctor and nurse and examined here, after examination, allied health personnel transported and performed the required tests. The yellow ones were moved to yellow area also by a doctor and a nurse. The yellow area was a bit different from green area as "initial short examination", "orthopedic area" and "general surgeon area". The yellow area of our ED is divided into three parts; the patient capacity of all parts is nearly 20 patients. The first part called as initial short examination part. After the initial trauma evaluation; if the major trauma is related to orthopedic area, the patient was transferred to the orthopedic part including orthopedists, if the primary pathology was in abdominal region, the patient was transferred to general surgeon area including the general surgeons. The patients who didn't have any orthopedic or abdominal problem were evaluated in the initial short examination area. The other specialists like ophthalmologists, otorhinolaryngologists, plastic surgeons, urologists etc. was going to the all three parts where they are called.

In the first two hours, all of the patients are examined, first intervention was completed. The patients are transferred to surgery, service or stayed in ED for follow up. These patients who had not any pathology that require surgery or hospitalization are discharged from ED with suggestions.

Material and methods

There were 87 admissions but 6 of them were admitted with cardiac arrest which didn't respond to cardiopulmonary resuscitation. The files and digital records are investigated; the wound part of the body, wound type, age, gender, applied radiologic tests, surgical records, hospital stay times and total costs are recorded.

The data recorded to SPSS 17.0 for Windows program. The continuous variables are expressed as mean±sd if normally distributed; median (min-max) if the distribution is not normal. The normal distribution is determined by histogram and Kolmogorov Smirnov test. Spearman Rho correlation is used, $p<0.05$ accepted as significant.

Results

After the explosion, 87 of the patients were admitted to our ED; 57 of them (65.5%) were male. The median age was 33 (range 1-75). If we look at the triage scales of the patients the most of them was in green scale with a percent of 56.3% (n=49); the others was showed in Figure 1. As we can see in Figure 1, there were 6 cases which were dead on admission. Additional 4 patients died in hospital.

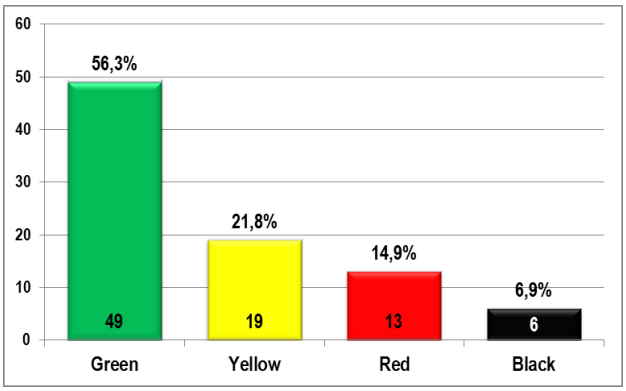

Figure 1. The triage distribution.

After the first evaluation in ED, 47 (54.0%) of the patients was discharged without hospitalization; 29 (33.3%) was hospitalized in service; 14 (16.1%) of them was followed up in intensive care unit. Among all patients, 5 (5.7%) of them was referred to another health center.

The most frequent injury was soft tissue injury with abrasion or laceration; n=47, 54.0%. There was long bone fracture in 14 (16.1%) of the patients; intra-abdominal organ injury in 7 (8.0%) of the patients, others were head trauma (n=4), burn (n=2), hearing loss (n=2), sternum fracture, urinary bladder injury, anxiety and thorax trauma. The injury frequency of the body parts is showed in Figure 2.

The 70.1% of the patients (n=61) was discharged without surgery but 20 (23.0%) of the patients undergone major surgery. The surgeries that were performed are listed in Table 1. Among these surgical operations, 6 (30%) of them were performed by two surgeons from different specialties. The most of the surgeries performed by orthopedics (n=10) and 7 were performed by general surgeons; other specialties that performed surgery was otorhinolaryngology (ENT), ophthalmology, urology, plastic and reconstructive surgery (PRC) and vascular surgery.

As a natural result of bomb shrapnel injuries are the most common injury types. The penetrating foreign substances were present in the 50.6% (n=44) of the patients. Among these patients, most of the injury side was upper extremity (n=25, 28.7%).

The radiographic examinations were applied many of the patients. The frequency of the usage and the frequency of pathologic findings were summarized in Table 2.

Another frequent pathology was hearing loss; 11 patients (12.6%) had hearing loss. The burn cases were present in 3 of the patients (3.4%) with a burn area of 5%, 10% and 20%.

The total cost of the explosion only in our hospital was 271.369,12 TL (~91.124,62$). The median hospital stay time is 5.5 days (range 1-30 days). As a natural result, the cost was significantly increasing while hospital stay time increases ($r=0.887$, $p<0.001$).

SWOT analysis is an acronym of strengths, weakness, opportunities and threats (3). Figure 3 shows the summary of SWOT analysis of our response to the mass causality event after bomb explosion.

Table 1.

The applied surgery types
• Colon perforation
• C3-Cervical vertebra fracture, mandible fracture and tracheostomy
• Distal femur fracture and tarsal bone fracture
• Femur fracture, eye injury, hemicolectomy, right nephrectomy, C2-Cervical vertebra fracture
• Femur, tibia and metatarsal fracture
• Small bowel resection
• Small bowel perforation and hemicolectomy
• Liver laceration and small bowel perforation
• Liver laceration and duodenal perforation
• Finger subtotal amputation
• Radius and metacarpal fracture, exploratory laparotomy
• Exploratory laparotomy and radius fracture
• Tibia shaft fracture (2 patient)
• Upper distal point of tibia fracture
• Tracheostomy, intracranial pressure control with intra-ventricular device
• Tracheostomy for facial burn
• Distal and proximal tibia fracture, distal fibula fracture, calcaneus fracture
• Femur shaft fracture, proximal tibia fracture and metacarpal fracture
* Each line indicates one patient

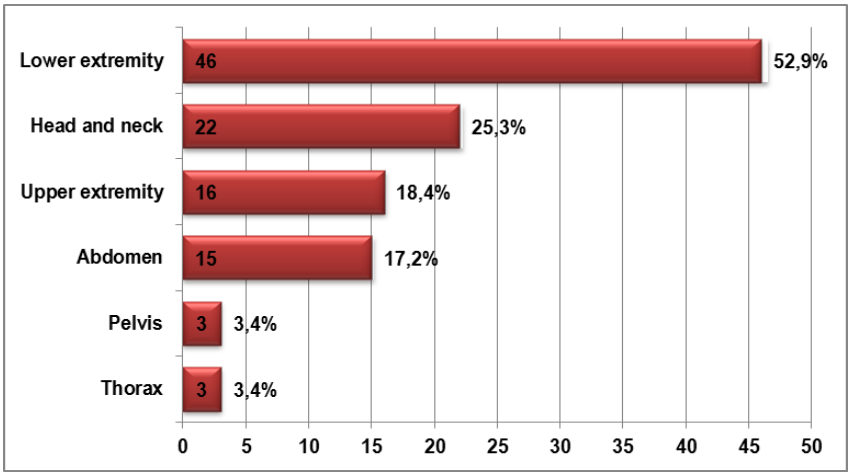

Figure 2. The injury frequency.

Table 2.

The radiographic tests and the frequency of pathologic findings

	Total number of tests	Positive tests	
		n	%
Direct x-ray	37	25	67.6
Abdominal ultrasonography	10	2	20.0
Vascular doppler ultrasonography	7	-	-
Cranial computed tomography	16	3	18.8
Thorax computed tomography	13	6	46.2
Abdominal computed tomography	17	8	47.1
Vertebral computed tomography	4	4	100
Peripheral vascular angiography	2	-	-

Strengths

The coordination between the hospital executives and ED stuff was good. Right from the start, the executives gave the management responsibility to the chief emergency physician. The triage of the patients carried out by an emergency physician, a nurse applied the wrist band and patient was transferred to examination and treatment area; meanwhile a secretary noted the patients name and take his/her id if possible and prepared the patient file and forensic file also. The emergency department and the departments work together in coordination; the first examination and triage is performed by an emergency physician, than the patient is transferred to the related department. The stuff that come to hospital voluntarily was integrated the required areas. The coordination of operating rooms, intensive care units and services was performed by chief nurse and hospital executives. Especially the orthopedists and general surgeons take the patients to operating room or services while waiting the surgery if all off the surgery teams are in other operations.

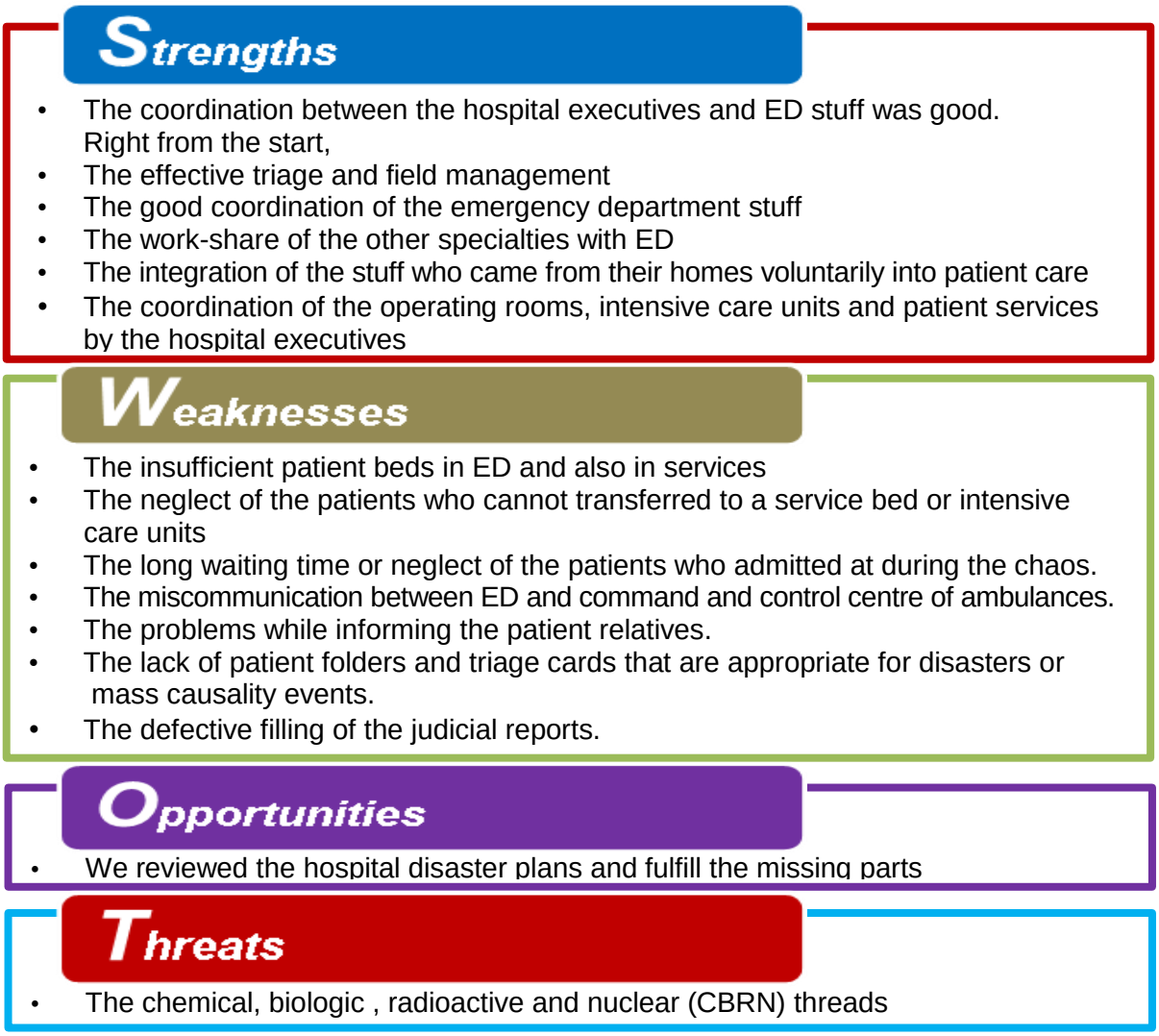

Figure 3. SWOT Analysis of the Emergency Department.

Weaknesses

At the time of explosion, the emergency department was already full also the services were nearly full. But we had to empty the emergency department in any case. Therefore, some of the patients that we transferred to the services are followed on stretchers in the service corridors for a few days. Some of the patients that have to be followed closely as if they are in intensive care unit, cannot be transferred to an intensive care unit, thus they followed in a separated area with an emergency nurse. Also some of the patients whose diagnosis are not defined yet due to the new admission to the emergency department, are also transferred that separated area. Although there is a separated area, some of the patients are neglected due to the insufficient allied health personnel. Also some of the patients that are admitted apart from trauma at the time of surge waited for a long time or were neglected sometimes. There is a big risk with these patients due to the possibility of life threatening disease.

The other problem was miscommunication between ED and command and control centre of ambulances. In case of mass casualty event, the first ambulance team makes the triage but the transporter ambulances have to coordinate with command and control center because patients have to be distributed equally to the nearest hospital. But, the patients that don't have serious life threatening injuries could be transferred to farther hospitals.

The patient folders and judicial reports are not integrated and filled separately, therefore most of the patients judicial folders were written defectively. Also we noticed that we don't have disaster triage cards in our emergency department.

The interview with patient relatives is an important point. We generally neglect the patient relatives, therefore agitation of the relatives become an additional problem for us.

Opportunities

The day after the surge, every department in our hospital and also executives reviewed the disaster plans and take the action to fulfill the missing parts.

Threats

In Turkey we didn't faced with a big chemical, biologic, radioactive or nuclear (CBRN) assaults. There is a serious preparation programs for these types of possible attacks but we don't know whether we are ready. The big question may be "Is it possible to be ready completely?"

Discussion

The global terror is increasing day by day. The terrorists use varying types of explosives. Mayo et al. (4) described the five mechanisms of blast injury; one of them is the use of additional materials like metallic particles such as nuts,

bolts or balls to the charge. So the wounding potential of the bomb is amplified, and also they cause penetrating injuries which are the leading cause of death and injury.

World Health Organization published a guideline about the mass casualty management systems defining the pre-hospital and in-hospital management of surge (5). They underline that every health centre have to prepare their own Hospital Emergency Incident Command System that is compatible with the national Emergency Management System. In Turkey, every hospital prepared their Disaster Management Plans according

In case of mass casualty events, the major problem is not the number of admission; the major problem is the admission time. In case of a disaster or an explosion all patients admit generally in the first hour. At that time even 87 patients could be a huge number of admissions for an ED. Before the first patient come to the hospital we have to prepare the ED as soon as possible. In the first step we have to empty the ED for the new admissions. As many EDs in Turkey, our ED was fully blocked before the explosion. So we immediately transferred the patients to the related services. At the same time, the non-commissioned stuff is informed about the situation and they came within possibility.

Some surveys reported that hospitals are not prepared sufficiently to disaster; there is confusion over roles and responsibilities, poor communication, lack of planning and suboptimal training (6-8). After a disaster that result with a mass causality event, hospitals have to provide essential medical care (9). When we think about our preparedness, we cannot say that we are completely ready. In Turkey, the hospital disaster plans are first started with the low no. 6331 titled “Occupational Health and Safety” in 20th June 2012; it is modified in 2013 and finally “Hospital Disaster and Emergency Situation and Application Regulations” is published in official gazette in 20th March 2015 with the low no. 663 titled “Decree Law Concerning The Organization And Duties Of The Ministry Of Health And Subsidiary”

Shah AA et al. (10) reported a similar experience from Pakistan. Similar with this report, most of the victims were admitted to the hospital within an hour; also most of them had not received fluid resuscitation or basic life support measures during the transport. Additionally, penetrating shrapnel injury was the predominant mechanism of injury both in the Shah AA et al.’ s report and our study.

In conclusion, many of the countries including us are not prepared enough for the mass causality events. We do not know the possible results of chemical, biologic, radioactive and nuclear (CBRN) assaults which we didn’t come across in Turkey. With the new obligations forced by The Ministry Of Health including the preparations against CBRN attacks, appropriate center hospitals are determined and prepared for CBRN attacks but we don’t know whether it will be enough. We have to conduct CBRN drills intermittently to increase our preparedness.

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Author contribution statement:

Selim Genç, Macit Aydın, Serkan Ceritli - conceived the presented idea. Seda Özkan developed the theory and performed the computations. Selim Genç, Cemil Kavalcı, Seda Özkan - verified the analytical methods, Selim Genç, Cemil Kavalcı - supervised the findings of this work. All authors discussed the results and contributed to the final manuscript. All authors provided critical feedback and helped shape the research, analysis and manuscript.

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