

## RESEARCH ARTICLE

# Trauma Survey of 476 Doctors: Now We know What We Do not know

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## RESUMEN

**Introducción:** En 2013, el Boletín del Instituto de Estadísticas de Turquía informó de 3.685 muertos y 274.829 heridos en 161.306 colisiones de tráfico. El objetivo de este estudio fue determinar las actitudes, la conciencia y los conocimientos generales de los médicos acerca del trauma.

**Métodos:** Se realizó una encuesta con un cuestionario entre febrero de 2015 y abril de 2015. Comprendía tres preguntas demográficas, siete de actitud y ocho de conocimiento sobre el trauma. Los médicos fueron estratificados como: Grupo 1 - médicos generales; Grupo 2 - residentes quirúrgicos; Grupo 3 - cirujanos; Grupo 4 - especialidades quirúrgicas académicas.

**Resultados:** Se completó y analizó un total de 476 (75%) de los 636 cuestionarios. La mediana de edad fue de 36 años. Los médicos generalistas (38,7%) y los cirujanos (38,7%) representaron la mayoría de los encuestados. El nivel medio de confianza de los encuestados en la realización de intervenciones de salvamento fue 98 (53%), 25 (34%), 44 (24%) y 8 (24%), respectivamente. Por otra parte, 161 (88%), 68 (92%), 162 (88%) y 32 (94%) de los encuestados no eligieron el orden correcto de priorización en un escenario de tres víctimas, respectivamente. Sólo 36 (20%) en el grupo 1, 22 (30%) en el grupo 2, 40 (22%) en el grupo 3 y 7 (21%) en el grupo 4 calcularon correctamente el porcentaje de pérdida de sangre en el shock hemorrágico clase III.

**Conclusiones:** El estudio actual sugiere que Turquía todavía requiere un sistema de trauma bien organizado. Se necesitan

más estudios para evaluar las capacidades del Sistema Turco de Emergencias.

**Palabras clave:** Encuesta; Médicos de urgencia; Sistema Turco de Trauma; Triage.

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**Métodos:** um questionário de pesquisa foi realizado entre fevereiro de 2015 e abril de 2015. Compreendeu três questões demográficas, de sete atitudes e oito de conhecimento sobre trauma. Os médicos foram estratificados como: Grupo 1 - médicos de clínica geral; Grupo 2 - residentes cirúrgicos; Grupo 3 - cirurgiões; Grupo 4 - especialidades cirúrgicas acadêmicas.

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**Conclusões:** O estudo atual sugere que a Turquia ainda exige um sistema de trauma bem organizado. São necessários mais estudos para avaliar as capacidades do Sistema de Emergência Turco.

**Palavras-chave:** Médicos de emergência; Pesquisa; Sistema de trauma turco; Triage.

## ABSTRACT

**Introduction:** In 2013, the Turkish Statistical Institute Bulletin reported 3,685 people killed and 274,829 injured in 161,306 traffic collisions. The aim of this study was to determine medical doctors' general attitudes, awareness, and knowledge regarding trauma.

**Methods:** A survey questionnaire was conducted between February 2015 and April 2015. It comprised three demographic, seven attitude, and eight knowledge questions on trauma. Physicians were stratified as: group I—general practitioners; group II—surgical residents; group III—surgeons; group IV—academic surgical specialties.

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**Results:** A total of 476 (75%) of the 636 questionnaires were completed and analyzed. Median age was 36 years. General practitioners (38.7%) and surgeons (38.7%) represented the majority of respondents. Respondents' medium level of confidence rate in performing life-saving interventions was 98 (53%), 25 (34%), 44 (24%), and 8 (24%) respectively. Moreover, 161 (88%), 68 (92%), 162 (88%), and 32 (94%) of respondents failed to choose the right order of prioritization in a three-casualty scenario respectively. Only 36 (20%) in group I, 22 (30%) in group II, 40 (22%) in group III, and 7 (21%) in group IV correctly estimated the percentage of blood loss in Class III hemorrhagic shock.

**Conclusions:** The current study suggests that Turkey still requires a well-organized trauma system. Further studies are required to assess the capabilities of Turkish Emergency System.

**Keywords:** Emergency physicians, Survey, Triage, Turkish trauma system.

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## INTRODUCTION

Trauma is the leading cause of death in the 1 to 44 years age group in developed countries.<sup>1</sup> Worldwide, over 1.2 million people die each year in traffic collisions and 90% occur in developing countries.<sup>2</sup> According to the Turkish Statistical Institute Bulletin, 3,685 people were killed and 274,829 were injured in 161,306 traffic collisions in 2013.<sup>3</sup> Furthermore, starting in the year 2000, terrorist attacks with explosives have increased significantly the number of trauma victims. The terrorists' expertise in the use of explosives has dramatically changed the injury profile faced by the military personnel, security forces, and civilians. High-velocity missile injuries from terrorist attacks in both rural and urban settings have caused significant challenges to both the civilian and military health systems in Turkey.<sup>4</sup>

In the last decade, Turkey has been focusing on improving its emergency medical care system that also provides trauma care.<sup>5</sup> Despite studies that have assessed the causes of traumatic deaths in Turkey and the need to improve overall trauma care,<sup>6</sup> the required components of level I trauma centers, such as providing leadership in trauma prevention and public education, providing training of the trauma team members, building a systematic teaching and research effort system to direct new innovations in trauma care, developing new strategies based on a trauma database, and others<sup>7</sup> are still lacking. Trauma mortality rates in the Turkish trauma system are

higher when compared with the mortality rates reported by trauma centers in the United States.<sup>5</sup>

Regardless of their specialty or field of interest, all doctors may encounter a trauma casualty that needs a life-saving intervention. The purpose of this study was to determine medical doctors' general attitudes, awareness, and knowledge regarding trauma.

## METHODS

War Surgery and Regional Blood Training Center and Blood Bank Departments at Gulhane Training and Research Hospital collaborated on developing this trauma survey. An independent medical doctor from the Department of Public Health provided the internal consistency and contributed to develop the survey questions in order to decrease the chance of bias.

The survey questionnaire comprised three demographic, seven attitude, and eight knowledge questions on trauma (Questionnaire 1). The Gulhane Military Medical Academy Ethical Committee for Surveys approved the study. In order to analyze the survey data, doctors were stratified into four groups as follows: group I—general practitioners, group II—surgical residents, group III—surgeons, and group IV—academic surgical specialties (including cardiovascular surgery, thoracic surgery, neurosurgery, ear, nose, and throat). The questionnaire was uploaded to a survey website for online participants, sent via e-mail, and delivered to doctors' offices by the authors of the study. Incomplete survey responses were excluded from analysis.

The survey was conducted between February 8, 2015 and April 8, 2015. Data analysis was performed using IBM Statistical Package for the Social Sciences Statistics 21.0 (Statistical Package for Social Sciences, IBM Corp., Armonk, New York). Chi-Square test, Marascuilo procedure, Kruskal–Wallis test, Friedman's two-way analysis of variance, and Bonferroni correction were used as appropriate. Statistical significance was accepted to correspond to a p-value of 0.05.

## RESULTS

A total of 476 (75%) of the 636 questionnaires were completed and included in the study analysis. Table 1 shows the demographic data and the distribution of the respondents into the four groups. The median age of respondents was 36 (range: 21–60) years. General practitioners (38.7%) and surgeons (38.7%) represented the majority of respondents (77.4%).

A total of 459 (97%) of 636 survey respondents identified the role of trauma surgery as "very important" or "important" among all factors that affect public health.

While a higher percentage of academic respondents (79%) identified the role of trauma surgery as "very

## Questionnaire 1: Survey questionnaire

1. Gender:
  - F
  - M
2. Are you a medical specialist of any kind (including working as a resident)?
  - Yes
  - No
3. If your answer to the second question is no, how long have you been working as a practitioner doctor?
  - First 5 years
  - 5–10 years
  - >10 years
4. If you are a specialist, you work on:
  - Internal medical disciplines
  - Other
5. How long have you been working as a specialist?
  - First 5 years
  - 5–10 years
  - >10 years
6. Considering all factors that affect community health, your assessment on the importance of trauma surgery is:
  - Very important
  - Important
  - Medium importance
  - Less important
  - Not important
7. Please grade your level of knowledge (from 0 to 10) to the below medical conditions:
  - Pediatric patients with high fever
  - Adult patient with chest pain
  - Young adult with severe abdominal pain
  - An adult with vomiting, diarrhea
  - Blunt whole body trauma
8. As a medical doctor, have you received any trauma training?
  - Yes (Please write the name of trauma training)  
.....
  - If yes, do you think it is adequate for appropriate approach to a trauma patient? Yes/No
  - No
9. When compared with other medical disciplines, please grade the difficulty of trauma surgery (working hours, stress level, legal responsibilities, etc.)
  - Very difficult
  - Difficult
  - No difference
  - Easy
  - Very easy
10. If you had an opportunity, would you choose being a trauma surgeon?
  - Yes
  - No
  - No idea
11. You are in a foreign country and your spouse is injured and needs an emergency surgery. Would you choose her/his surgical treatment to be performed in a trauma center or by the surgery department specific to the injured organ or anatomical site (brain surgery, thoracic surgery, or orthopedics)?
  - Trauma center
  - Specific surgery department
  - I do not know
12. Please grade from 0 to 10 the importance of below given preventive measures in order to decrease the trauma-related mortality and morbidities.
  - Focusing on preventing injuries first.....
  - Establishing specialized trauma centers.....
  - Separating the Turkish Trauma system as medical and surgical emergencies.....
  - Enhancing the number of patient beds and intensive care unit capabilities in all hospitals
  - Increasing the traffic accidents-related legal penalties by law
  - You are in a situation to respond to high-velocity missiles or high explosives-related scene with many casualties. How much do you trust yourself for performing live-saving initial on-site interventions?
    - A lot
    - I trust myself
    - I have a medium trust in myself
    - Low level of self-esteem
    - I do not trust myself
13. Within the trimodal distribution of trauma-related deaths, which period is effective in saving lives within hours?
  - Period
  - Period
  - Period
  - All
14. Do you have a trauma database for research at your institution?
  - Yes
  - No
15. Please grade the importance of national or institutional trauma database.
  - Very important
  - Important
  - We can live without it
  - Not important
  - Very unimportant
16. Which one is not correct for triage?
  - Triage is a process that should be repeatedly performed even to the same casualty
  - Triage should be constantly performed
  - A yellow triage code may turn to red code
  - Yellow codes first, red codes second, black codes are the third priority
  - Triage can be performed in every level of trauma care until to the ultimate treatment
17. Imagine there is a casualty with sacroiliac fracture + femur head fracture + fracture of 6 ribs on one side of thorax + grade 3 hemorrhagic shock and you have all the below fluids for resuscitation, which one would you choose?
  - Cross-matched fresh whole blood
  - Cross-matched whole blood
  - Cross-matched erythrocyte suspension
  - Ringer lactate
  - 0.9% NaCl
18. Which one of the below triage systems does not require a medical device and is easily performed in a triage situation?
  - Emergency Severity Index (ESI)
  - ATLS Field Triage System
  - START
  - PATI score
  - ISS score

19. You are the first responder to the trauma site and which one of the three scenarios would you evacuate first?			<input type="radio"/> 3-1-2 <input type="radio"/> 3-2-1 <input type="radio"/> 1-2-3 <input type="radio"/> 1-3-2 <input type="radio"/> 2-3-1
<b>Case 1</b>	<b>Case 2</b>	<b>Case 3</b>	20. Which of the below is not assessed first? <input type="radio"/> Respiration <input type="radio"/> Circulation <input type="radio"/> Mechanism of injury <input type="radio"/> Peripheral control <input type="radio"/> Neurological situation
A 10 cm purple discoloration on the abdominal wall and tenderness, deep cuts on the fingers and palm, cannot walk.	Profuse bleeding on the scalp laceration, purple discoloration on the back of ear, abundant blood on the torso dress, cannot walk.	An 15 cm purple discoloration on the right hemithorax, laceration of 7 cm on right forearm, cannot walk "(15 cm length), right forearm laceration (6-7 cm), right forearm laceration, right arm of the shirt is stained with blood and cannot walk	
Respiration: 24/min Pulse: 120/min Capillary refill: 3 sec Consciousness: cooperates well	Resp: 24/min Pulse: 96/min Capillary refill: 2 sec Consciousness: No response to verbal input, response to painful stimuli	Resp: 32/min Pulse: 108/min Capillary refill: 2 sec Consciousness: Lethargic and obey to inputs	21. Systolic pressure <90 mm Hg, pulse 130 beats/min, resp 35/min, confused casualty has lost at least ...% of total blood volume? <input type="radio"/> 10% <input type="radio"/> 20% <input type="radio"/> 25% <input type="radio"/> 30% <input type="radio"/> 40%

Table 1: Demographics

Characteristics	n (%)
<b>Gender</b>	
Female	66 (13.9)
Male	410 (86.1)
<b>Age</b>	
Median	36 (11.0)
Range	21–60
<b>Status</b>	
Group I	184 (38.7)
Group II	74 (15.5)
Group III	184 (38.7)
Group IV	34 (7.1)

important," the difference did not achieve statistical significance when the answers chosen by the four groups were compared.

The survey data revealed that 358 (75%) of the respondents had not participated in any approved trauma training program. There was no difference in the exposure to approved trauma training programs among the groups ( $\chi^2 = 4.659$ ,  $p = 0.199$ ).

Doctors' opinions regarding the difficulty of trauma surgery as a career choice among other surgical specialties showed that 445/636 (94%) doctors believed that trauma surgery was "difficult" or "very difficult" as a professional career.

A total of 101 of 184 (55%) general practitioners, 43/74 (58%) of surgical residents, and 128/184 (70%) surgeons stated that they would not choose trauma surgery as a subspecialty. Among the percentage of surgeons unwilling

to choose trauma surgery as a specialty was significantly higher when compared with the other groups ( $\chi^2 = 19.486$ ,  $p = 0.003$ ). Of note, 451 (95%) of all respondents agreed that they would prefer their injured family members be treated in a specialized center for trauma.

Respondents were asked to grade their self-confidence levels in performing life-saving interventions in a potential terrorist attack. On a 5-level Likert scale, the medium level of confidence rate was 98 (53%), 25 (34%), 44 (24%), and 8 (24%) in groups I to IV respectively ( $\chi^2 = 52.847$ ,  $p < 0.001$ ). Group I showed significantly higher level III confidence when compared with other groups ( $p = 0.02$ ), and the distribution of different levels of self-confidence was similar between the other doctor groups.

Injury-related mortality has classically been shown to present a trimodal distribution, known as immediate (seconds to minutes after the injury), early (minutes to hours), and late (days to weeks). The respondents were also asked to identify in which period the trauma teams could be most effective in decreasing preventable deaths. Overall, 271 (59%) of respondents chose the first period in which injury prevention policies are deemed most effective ( $p < 0.001$ ). Second period was selected by 51 (28%), 13 (17.6%), 23 (13%), and 4 (12%) doctors in groups I to IV respectively ( $p > 0.05$ ).

Although 435 (91%) of respondents stated that there were not any trauma databases in their current or past working hospitals, 461 (97%) agreed or strongly agreed for the necessity of a national and/or institutional database.

Particular importance was given to the triage knowledge in the survey. Triage color codes from Simple Triage and Rapid Transport (START) system was given as a wrong statement (yellows first, reds second) and the rest of the four choices were right statements about triage concept. In groups I to IV, 148 (85%), 53 (75%), 116 (78%), and 24 (75%) doctors answered incorrectly; there was no difference in the percentage of incorrect answers among the four groups ( $p = 0.12$ ). The respondents were also asked the appropriate triage system in a multiple casualty situation. Interestingly, a significantly higher percentage of Group I doctors (40%) chose START as the right answer, when compared with the other groups ( $p = 0.003$ ). Additionally, three different casualty scenarios were given in a different question. Besides the physical findings of multiple traumas, Glasgow Coma Scale, heart rate, capillary refill, and respiratory rate data were given for each scenario, and the respondents were asked to prioritize the casualties for early evacuation. One hundred sixty-one (88%), 68 (92%), 162 (88%), and 32 (94%) medical doctors in groups I to IV failed to choose the right order of prioritization respectively ( $\chi^2 = 2.105$ ,  $p = 0.551$ ; Table 2).

Only 54% of the respondents correctly identified the components of the primary survey of a casualty.

Respondents were also given the features of Class III hemorrhagic shock and asked to estimate the percentage of blood loss. Only 36 (20%) in Group I, 22 (30%) in Group II, 40 (22%) in Group III, and 7 (21%) in Group V were able to correctly estimate the percentage of blood loss ( $\chi^2 = 3.252$ ,  $p = 0.354$ ; Table 2). We have also investigated the current knowledge about the use of blood, blood components, and crystalloids in a blunt trauma victim with hemorrhagic shock. Interestingly, 185 (39%) respondents in all groups recognized using warm fresh whole blood as their first choice. However, there was no statistically significant difference among the groups (Table 3).

Another question involved tracheal deviation, low arterial oxygen saturation, hypotension, asymmetry of respiratory sounds, and paradoxical chest movements as multiple choices and the respondents were asked to choose the most critical finding in a trauma patient. The rate of choosing tracheal deviation as the right answer was 67 (37%), 21 (29%), 46 (25%), and 17 (50%) in groups I to IV respectively ( $\chi^2 = 17.426$ ,  $p = 0.134$ ; Table 4).

**Table 2:** Answers to trauma knowledge questions

	<i>General practitioner</i>	<i>Surgical residents</i>	<i>Surgeons</i>	<i>Academic surgical specialties</i>	<i>Total</i>
<i>Triage knowledge</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>
<i>Color codes<sup>1</sup></i>					
Wrong answer	27 (15)	17 (23)	39 (21)	8 (24)	91 (19)
Right answer	157 (85)	57 (77)	145 (79)	26 (77)	385 (81)
<i>Triage system<sup>2</sup></i>					
Wrong answer	110 (60)	55 (74)	142 (77)	26 (77)	333 (70)
Right answer	74 (40)	19 (26)	42 (23)	8 (24)	143 (30)
<i>Prioritization for evacuation<sup>3</sup></i>					
Wrong answer	161 (88)	68 (92)	162 (88)	32 (94)	423 (89)
Right answer	23 (13)	6 (8)	22 (12)	2 (6)	53 (11)
<i>Initial assessment<sup>4</sup></i>					
Wrong answer	73 (40)	39 (53)	89 (48)	17 (50)	218 (46)
Right answer	111 (61)	35 (47)	95 (52)	17 (50)	258 (54)
<i>Estimation of blood loss<sup>5</sup></i>					
Wrong answer	148 (80)	52 (70)	144 (78)	27 (79)	371 (78)
Right answer	36 (20)	22 (30)	40 (22)	7 (21)	105 (22)

<sup>1</sup>( $\chi^2 = 4.003$ ,  $p = 0.261$ ); <sup>2</sup>( $\chi^2 = 14.981$ ,  $p = 0.002$ ); <sup>3</sup>( $\chi^2 = 2.105$ ,  $p = 0.551$ ); <sup>4</sup>( $\chi^2 = 4.933$ ,  $p = 0.177$ ); <sup>5</sup>( $\chi^2 = 3.252$ ,  $p = 0.354$ )

**Table 3:** Results on fluid choices in hemorrhagic shock patients

	<i>General practitioner</i>	<i>Surgical residents</i>	<i>Surgeons</i>	<i>Academic surgical specialties</i>	<i>Total</i>
<i>Resuscitation fluids<sup>1</sup></i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>	<i>n (%)</i>
Cross-matched fresh whole blood	67 (36)	32 (43)	72 (39)	14 (41)	185 (38)
Cross-matched whole blood	27 (15)	2 (3)	10 (5)	3 (9)	42 (9)
Cross-matched erythrocyte suspension	36 (20)	15 (20)	36 (20)	8 (24)	95 (20)
Ringer lactate	44 (24)	21 (28)	51 (28)	8 (24)	124 (26)
Normal saline	10 (5)	4 (5)	15 (8)	1 (3)	30 (6)

<sup>1</sup> $\chi^2 = 16.302$ ,  $p = 0.178$

Table 4: Answers to critical findings

Finding <sup>1</sup>	General practitioner	Surgical residents	Surgeons	Academic surgical specialties	Total
	n (%)	n (%)	n (%)	n (%)	n (%)
Tracheal deviation	67 (36.4)	21 (28.4)	46 (25.0)	5 (14.7)	139 (29.2)
Low SaO <sub>2</sub>	15 (8.2)	10 (13.5)	14 (7.6)	6 (17.6)	45 (9.5)
Hypotension	22 (12.0)	9 (12.2)	24 (13.0)	6 (17.6)	61 (12.8)
Asymmetrical respiratory sounds	7 (3.8)	2 (2.7)	11 (6.0)	0 (0.0)	20 (4.2)
Paradoxical chest movement	73 (39.7)	32 (43.2)	89 (48.4)	17 (50.0)	211 (44.3)

<sup>1</sup> $\chi^2 = 17.426$ ,  $p = 0.134$

## DISCUSSION

Lessons learned at times of war have been adopted by the civilian trauma systems and have led to dramatic advances in trauma care in many countries.<sup>5</sup> However, trauma care including the development of trauma centers within integrated trauma systems is at its infancy in Turkey. Currently, emergency medicine specialists provide the initial assessment and medical care of trauma patients, which is followed by consultations with the surgical disciplines for definitive treatment.<sup>5</sup>

In contrast to the Turkish civilian emergency system, there are several combat support hospitals in the military field that are specifically designed to provide combat trauma care.<sup>4</sup> The only accredited trauma training program in Turkey is the War Surgery Program as a subspecialty under the General Surgery Department in Gulhane Training and Research Hospital. Surgical Critical Care training is not distinct from trauma, and trauma is only one section of the whole general surgery program. However, the trauma teams are comprised of large number of surgeons of different specialties with trauma experience from low trauma volume hospitals. Accordingly, Izmir Trauma Group<sup>8</sup> reported in their field guide that a trauma team whose sole mission is to provide trauma care did not exist in our country. Authors of that study frequently refer to the American trauma system as an ideal trauma care model. Interestingly, it has been reported that only a small percentage of trauma victims require operations by trauma surgeons in the United States. Due to the decreased incidence of penetrating trauma in the United States, most trauma surgeons perform relatively few trauma-related operations per year.<sup>9,10</sup>

In the United States, trauma system development and establishment of the Advanced Trauma Life Support (ATLS®) courses was prompted by the increased awareness of medical care professionals.<sup>1</sup> In 1998, Travma Resusitasyon Kursu (TRK) training was implemented in Turkey. Since then, 10,186 doctors have been trained and certified by TRK courses.<sup>11</sup> However, 75% of the doctors in our study stated that they were not certified by any of the national or international trauma training courses.

Despite the national prominence of the American College of Surgeons and the American College of Surgeons Committee on Trauma and the need for more trauma surgeons in the United States, Green<sup>10</sup> has documented a decline in the number of medical students interested in pursuing a surgical career and even more importantly, a career as trauma surgeons.

Ciesla et al<sup>12</sup> and Rodriguez et al<sup>13</sup> have defined trauma surgeons as an “endangered species” and “gasping for air” in their reports respectively. Our data corroborate the declining interest of doctors in becoming trauma surgeons. Residents’ lower response rates to this survey may also be a reflection of their low interest levels toward trauma surgery. In our study, only 25% of all doctors would pursue a trauma surgery fellowship program. To put in the way they say it, Why should we work harder and risk more to earn the same money? Despite the aversion to choose trauma surgery as a profession, 95% of all doctors surveyed were in agreement that they would wish to have one of their family members or close relatives to be treated at a trauma center by a trauma surgeon. Of note, general practitioners were more likely to want this choice.

Respondents displayed awareness that to decrease trauma-related morbidity and mortality rates, attention should be directed at prioritizing injury prevention, establishing trauma centers, and increasing legal enforcements.

In order to improve the Turkish system for trauma care, research is required. The key component of trauma research is the development of a dedicated trauma database. Unfortunately, Turkey and other developing countries have rudimentary and incomplete trauma databases.<sup>14,15</sup> These findings transpire from the fact that 91% of our respondents were unaware of a database in their hospitals. Of note, 97% of all doctors were in agreement that a national trauma database should be established.

In 1982, the trimodal distribution of deaths was described. The second peak occurs within minutes to hours and can be addressed by emergency medical systems, as mortality may significantly be decreased by rapid assessment and resuscitation.<sup>15</sup> Despite this known paradigm, only 19% of all doctors accurately selected the

second period for decreasing trauma-related deaths by performing rapid life-saving interventions, implying a possible knowledge gap.

Casualty data from recent military conflicts showed that most of the deaths (78%) have occurred in the prehospital period, and 18% of these are potentially survivable if the victims were triaged appropriately.<sup>16,17</sup> Same principles may apply to terrorist bombings in civilian settings. Eighty-one percent of the doctors surveyed in our study were unable to triage mass casualty victims correctly.

The most alarming result was that only 13% of general practitioners, 8% of surgical residents, 12% of surgical specialists, and 6% of academic personnel succeeded in selecting the right order of triage in a complicated three-casualty scenario.

The ability to diagnose life-threatening thoracic injuries and the use of simple techniques, such as needle or tube thoracostomy performed expeditiously to alleviate tension pneumothorax have reduced mortality.<sup>18,19</sup> In the present study, a single case scenario of thoracic trauma was presented, and the identification of tracheal deviation as the most critical finding to select the right treatment was missed by the majority of the respondents.

The ATLS® classification of hemorrhagic shock is based on the estimated blood loss.<sup>15</sup> However, it is criticized as not being sensitive and specific enough, estimation may not be accurate and it may be unhelpful and difficult to apply.<sup>20</sup> However, there is no disagreement that a 30% of loss of blood volume causes hypotension.<sup>21</sup> Only 30% of respondents were able to identify correctly class III hemorrhagic shock. This finding raises major concerns regarding the ability of the doctors who were surveyed to treat appropriately patients in hemorrhagic shock. Obviously, given the relative small sample size of doctors surveyed, one cannot generalize this knowledge gap to our country as a whole, yet it raises the question of whether our doctors receive some basic fundamental knowledge and skills training to provide the initial stabilization of trauma patients.

In conclusion, the current study suggests that Turkey still requires a well-organized trauma system. We strongly believe that one of the most critical step to improve the system is to show that everything is not okay. This survey is one of the few steps to initiate efforts for a unified trauma system. We suggest implementing changes to the Turkish emergency medical system that should include didactic and hands-on training trauma courses, with emphasis on triage training. Additionally, the implementation of triage scenarios done at least twice each year at the hospitals more likely to receive mass casualty victims may be beneficial in decreasing the early mortality of trauma victims. The implementation of a comprehensive national trauma database with mandatory reporting by

the designated trauma centers may provide the additional information needed to develop an ideal country-wide trauma system.

Our study has the following limitations: (1) the number of completed survey was low at 75%, therefore some of our conclusions may not be generalizable; (2) the sample size was too small to analyze the different geographic locations of the country, including the type and locations of the institutions and specifically doctors working in more urban versus rural hospitals, hence, we cannot know whether the knowledge and skills gaps identified are a country-wide issue or a local or regional issue. Additionally, while we have offered some possible solutions with respect to how to correct some of the perceived deficiencies highlighted by our survey, we must caution the reader that these are merely suggestions and not strong recommendations. With this article, we sincerely hope to establish the first step to create a unified trauma system and trauma research in Turkey.

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## INVITED COMMENTARY

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### Trauma Survey of 476 Doctors: Now We know What We Do not know

The authors are presenting the results of a trauma survey among several groups of doctors in the country of Turkey. It compiles preliminary data about knowledge, skills, and attitudes related to trauma care. I applaud the author's intent for acquiring important data necessary for developing healthcare and prevention policy. I think the information provides a distinctive picture of the trauma care outlook among physicians in Turkey. I have some recommendations and questions for the authors: (1) Actually, the response rate of 75% to the survey is a good one. Majority of surveys among physicians in the US show an average response rate between 40 and 60%. (2) I was intrigued by the low response rate by the surgical residents. Usually, they are constantly involved with the care of the trauma patient.

These are some of the questions that come up: Why a trauma specialty is not desirable for the surgical residents in Turkey? Same reasons as the US? How many trauma training programs are currently available in Turkey? What is the accreditation process? Is the surgical critical care training and management distinct from trauma? It looks like trauma education is a key factor to improve based on the survey results. Any ideas how to start this process locally and regionally?

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