



Effects of the institutional structure and legislative framework on ambulance accidents in developing emergency medical services systems



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ARTICLE INFO

Article history:

Received 16 December 2014

Received in revised form

23 January 2015

Accepted 28 January 2015

Available online 17 November 2015

Keywords:

Ambulance accidents

Ambulance speeding

Intersection accidents

Light and siren protocols

ABSTRACT

Objective: Turkey is a developing country undergoing a system change in the prehospital emergency medical services (EMS). The purpose of this study was to evaluate the effects of the institutional structure and legislative framework on the number of ambulance accidents in Turkey.

Methods: During the first phase of the study, ambulance accident data was requested and obtained from the Ministry of the Interior. Similarly, data on ambulance numbers were requested and obtained from the Ministry of Health through the Right to Information law. During the second phase of the study, a survey consisting of 112 EMS personnel viewpoints about the effects of the institutional structure and legislative framework on ambulance accidents was conducted using a structured questionnaire. A total of 209 EMS personnel completed the survey.

Results: The number of ambulance accidents increased by 42.5% over the last five years, whereas the area of coverage increased by 57.3% during the same period. The rate of EMS personnel experiencing ambulance accidents was 69.4%. When age, sex, and profession variables were considered, the varying profiles of the ambulance operators were found to have no significant effect on the number of ambulance accidents following the system change.

Conclusion: The rise in the number of ambulance accidents in Turkey was not significant when compared with the increase in the area of responsibility. The present system change was also found to have no effect on the number of accidents. On the other hand, problematic areas in the institutional structure and the legislative framework increased the risk of accidents.

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1. Introduction

Ambulance accidents are one of the most significant occupational health risks for emergency medical services (EMS) providers. These incidents may also prevent healthcare services from being delivered. Despite the literature covering studies related to ambulance accidents for years, they are being addressed as a new phenomenon in developing EMS systems. With the expanding coverage and increasing number of ambulances, ambulance

accidents have become more frequent and are discussed more seriously in these systems. Speeding and misinterpreting the right-of-way at intersections are two of the most common causes of ambulance accidents. However, the lack of established standards in the institutional (*organizational*) structure and the service delivery in developing systems can also be considered possible contributing factors for increasing ambulance accidents.

The beginning of the modern era of prehospital EMS in Turkey dates back to 1994, where the services were delivered in an organized fashion in three major cities. In the 2000s, this coverage significantly increased across the country with the number of ambulance stations reaching 600. By the end of 2013, there were 2072 ambulance stations in the country. The average daily response numbers rose to 5000 at the end of 2013 in contrast to numbers in

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Peer review under responsibility of The Emergency Medicine Association of Turkey.

the 900s during the early 2000s.^{1,2} The change during this period was not only observed in the numbers, but also in the overall emergency medical care system model. In the early 2000s, the ambulances were staffed by doctors, nurses, and dedicated ambulance drivers similar to that of the Franco-German model of emergency care. However, in recent years, paramedics and emergency medical technicians (EMTs) have been introduced into the system, which is based on the Anglo-American model.^{3,4} With this expansion in the service delivery, an increase in the number of ambulance accidents has become more visible and questionable by the public. Some suggest that this increase is a direct result of the increased number of young and inexperienced paramedics and EMTs driving ambulances, the majority of whom are females.⁵ While there is a need to investigate whether the increase in the number of ambulance accidents in Turkey in recent years is truly significant, the re-organization of the overall EMS system and the effects of problems related to the institutional structure and legislative framework also need to be discussed in greater detail.

The primary purpose of the present study is to evaluate the increase in the number of ambulance accidents in Turkey, where prehospital EMS has seen rapid growth in recent years while undergoing system change. The effect of parameters such as: (1) performance evaluations, (2) interfacility transfer organization procedures, and (3) the determination of roles and responsibilities on ambulance accidents are also investigated.

2. Material and methods

During the first phase of the study, data on ambulance accidents was requested from the Ministry of the Interior and the General Directorate of Security based on the Right to Information law. Similarly, data on the number of ambulances and services were obtained from the Ministry of Health. Data covering the five-year period between 2009 and 2013, when the most significant growth in ambulance services was observed nationwide, were used for the purposes of this study. During the second phase of the study, a survey consisting of 112 EMS personnel's viewpoints about the effects of the institutional structure and legislative framework on ambulance accidents was conducted using a structured questionnaire. The questionnaire included questions on demographics and professional background, personal experiences of ambulance accidents, opinions on causes of accidents, and prevention strategies. Close-ended questions were used for demographic properties, personal experiences, and opinions on ambulance accidents. However, the 5-point Likert scale was used for opinions regarding 'the cause of the accident' and recommendations for 'reducing the number of accidents in the survey.' The study population consisted of EMS personnel working in the City of Izmir. The reason for choosing this particular city was based on Izmir being one of first three cities where the organized EMS system was established in the country in the 1980s. The city has a fairly optimized service with one ambulance per 45,000 citizens. As of January 2014, 1142 EMS personnel were employed in the service.² The initial plan was to conduct the survey in a face-to-face fashion. However, the required

permission could not be obtained from the institution, and therefore was carried out via emails. The target population was invited to take part in the survey using email groups and social media platforms. Two hundred eighty three people agreed to participate in the survey and were sent the survey questions. Of those, 209 completed the survey via email. The data were analyzed using SPSS software (version 16). Frequency distribution and percentages were used to interpret the data, while the chi-square test was used for testing the differences between the variables. A *p*-value of less than 0.05 was considered significant in the study.

3. Findings

Based on the data obtained from the General Directorate of Security, 1886 ambulance accidents occurred, and resulted in 1857 injuries and 55 fatalities between 2009 and 2013. Interestingly, the frequency of ambulance accidents increased by 42.5% during that same five-year period. The most significant increases were observed in 2011 and 2013, with a rises of 23.2% and 21.2%, respectively. It is worth noting that the General Directorate of Security does not track incidents that only involve property damage (Table 1).⁶

The total number of Ministry of Health ambulance crews employed across Turkey was 1317 in 2009, which increased to 2072 by 2013 (a 57.3% increase). The most significant increase in the number of annual ambulance responses were seen in 2011 by 24.3%, in 2012 by 8.9%, and in 2013 by 11.2%. The overall number of annual ambulance responses was 1,869,277 in 2009, while there were 3,980,464 responses in 2013 (a 112.9% increase) (Table 2).²

The average age of the participants who completed the questionnaire survey was 28.18 (s.d. = 7.748, range 19–54). Of those, 47.4% (n = 99) were female and 52.6% (n = 110) were male. When work locations were considered, 56.5% (n = 118) of the participants were working in an urban environment, whereas the 43.5% (n = 91) were employed at rural stations. The professions of the survey participants were as follows: 41.1% (n = 86) EMTs, 40.7% (n = 85) paramedics, 10.5% (n = 22) ambulance drivers, 5.7% (n = 12) doctors, and 1.9% (n = 4) nurses. The average experience of the participants was 6.63 years (range 1–26), while 48.3% stated their experience was less than three years.

More than half of the participants (57.4%, n = 120) stated that they had operated ambulance vehicles during their professional work. This figure indicates not only those whose primary responsibility was driving ambulances (n = 22), but also those driving ambulances along with their primary responsibility as medical providers [EMTs (n = 50) and paramedics (n = 48)]. Of those who drove ambulances, 54.2% (n = 65) stated that they have attended "Ambulance Driving Skills Training," and 28.3% stated that they knew the legal responsibilities and rights with regards to ambulance drivers. More than two-thirds (69.4%, n = 145) of the study participants stated that they were involved in an ambulance accident at least once during their professional life. Of those accidents, 82.1% (n = 119) were classified as property damage, whereas 17.9% (n = 26) were classified as injuries. None of the participants were

Table 1
Ambulance accidents in Turkey between 2009 and 2013.⁴

	Fatal accidents	Number of fatalities	Injury accidents	Number of injured	Annual total
2009	3	3	265	595	268
2010	6	9	304	698	310
2011	5	10	377	846	382
2012	7	17	456	1.222	463
2013	8	16	455	1.128	463
Total	29	55	1857	4.489	1886

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