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Emergency medicine

Analysis of the specialized emergency medical services interventions in Otwock district

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Summary:

Introduction
The National Emergency Medical Services Act of September 8th, 2006 facilitated the creation of a uniform system of emergency medical services in Poland, characterized by uniform equipment and staff standards. Quick arrival of the EMS team on scene, providing a patient with necessary medical care and qualified transport to a hospital are key elements of the pre-hospital care.
Aim of the study
The aim of this study was to compare the frequency, causes for summoning and response time of the EMS team and further care provided to a patient within the area of Otwock district in 2009.
Material and method
The study was based on the analysis of medical records, comprising dispatch order forms of the EMS team in Otwock for the period from 01.01.2009 to 31.12.2009. The final analysis included 1715 dispatch order forms.
Results
The main reason for calling the specialized EMS team were injuries (20%), and the second most common were cardiovascular diseases (19%). Most of the interventions concerned male patients (59%). The EMS team was dispatched to emergency situations mainly in the afternoon from 12.00 to 17.59 (33%) and in winter (28%). After receiving medical care from the ambulance staff, majority of the patients were admitted to a hospital (64%). In 10% of cases the ambulance response time was longer than 15 minutes.
Conclusions
The main reason for specialized EMS team interventions were injuries and cardiovascular diseases (19%).

Key words: emergency medical services, intervention, emergency medical services system.

Introduction

Emergency medical service is one of the most important elements of the modern health care system, and providing medical assistance to any person exposed to an acute health emergency is the task of the state [1]. A system of the National Emergency Medical Services, established under the Act of July 25th, 2001 has been created with the aim to undertake emergency response to any person whose life or health was at risk. The National Emergency Medical Services Act of September 8th, 2006 facilitated the creation of a uniform system of emergency medical services in Poland, characterized by uniform equipment and staff standards [2,3].

The legislator decided that the key element of the ground emergency medical services are to be specialized teams, comprising at least three professionals authorized to perform emergency medical interventions — an A&E doctor and an A&E nurse or a paramedic (hereinafter referred to as the "S" teams). In contrary to the paramedic teams the "S" teams involve an A&E doctor and thus provide more therapeutic options for people exposed to an acute health emergency.

In order to improve the EMS system operation, the Act also introduced the response time standards (corresponding to the UE standards in force) for providing medical pre-hospital care. According to these standards the response time of EMS team outside the city should not exceed 15 minutes [4,5].

The aim of the study was to evaluate the frequency of dispatching the specialized EMS team, taking into account the patient's gender and age, time and month of the intervention, the reasons for calling the ambulance and ambulance response time as well as further treatment of the patients within the area of Otwock district in 2009.

Material and methods

The present study employed a retrospective analysis of specialized EMS team interventions based on dispatch order forms of the EMS team securing the area of Otwock district.

Following parameters were analyzed: age and gender of the patients, time of day and year, reason for the intervention and further treatment of the patients.

The analysis involved the year 2009 and was based on medical records. It was carried out observing the provisions of the Law on Personal Data Protection.

For statistical analysis Student's t-test and chi-squared test were used. All analyzes were performed at the significance level $\alpha = 0.05$.

Results

The analysis included 1715 interventions of the specialized EMS team securing the area of Otwock district. This represented 25% of the total number of medical interventions in Otwock district in the analyzed period.

Most of the patients who required the intervention of the specialized EMS team were men (n = 1019, 59%). Women accounted for 41% of the patients (n = 696).

Mean age of the patients was 53.36±23.32 and was higher for women (56 years) than for men (51 years; Fig. 1).

Figure 1: Frequency of the "S" team interventions in relation to patient's gender.

Medical interventions of the specialized EMS team usually involved people aged 50-59 (n=303, 18%), 70-79 (n=251, 15%), and 40-49 (n=221, 12%) . The smallest group of patients involved those over 100 (n = 3). The analysis showed a statistically significant difference in mean age ($p < 0.01$; Fig. 2). Most intervention of the "S" team concerned women aged 80-89 and men aged 50-59.

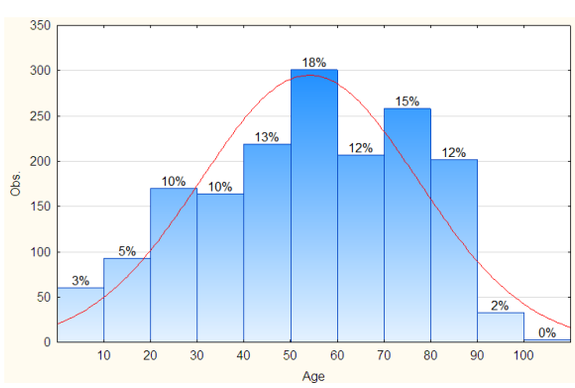

Figure 2: Frequency of the "S" team interventions in relation to patient's age.

The performed analysis included main reasons for the intervention, based on the International Statistical Classification of Diseases and Related

Health Problems ICD-10. This way 10 groups of patients were identified, depending on the cause of the specialized EMS team intervention (Fig. 3).

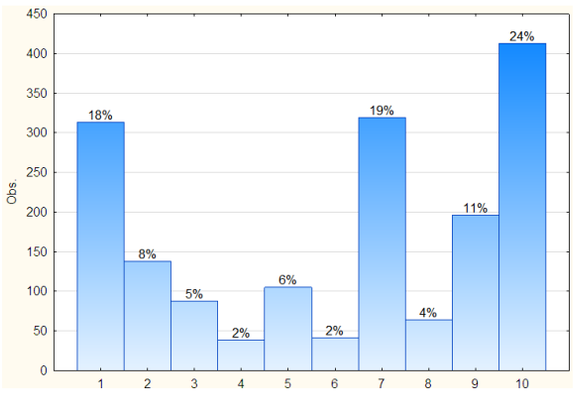

Figure 3: Reasons for the specialized EMS team intervention.

Legend:

1. Cardiovascular diseases
2. Respiratory diseases
3. Diseases of the nervous system
4. Diseases of the digestive system
5. Psychiatric and behavioral disorders
6. Traffic accident
7. Traumas
8. Poisoning
9. Death
10. Other

The most common cause of the "S" team interventions were injuries constituting 20% of all interventions (n=336), followed by cardiovascular diseases (n=320, 19%). In 225 cases the A&E doctor stated the patient's death (13% of all the "S" team interventions (p <0.01).

In 36% of cases (n=620) the patients remained at the place of call. The remaining 64% of the patients were transported to the hospital, of whom 242 patients (14% of the total number of the specialized team interventions) were transported to hospitals outside Otwock district operating area (p <0.01).

The analysis also accounted for the frequency of the specialized team interventions depending on the time of day. Statistics show that the specialized team interventions were most often between 10.00 and 11.59 (n=201, 12%). Lower frequency of the interventions was observed at night between 22.00 – 23.59 and 2.00 – 3.59 (n=53, 3% decrease each). The analysis showed a statistically significant correlation between the specialized team intervention and time of day (p <0.01; Fig. 4).

Additional analysis of medical interventions was performed for four separate time intervals:
0.00 – 5.59, 6.00 – 11.59, 12.00 – 17.59,
18.00 – 23.59.

The largest number of interventions took place in the afternoon. The time interval of 12.00 – 17.59 accounted for 563 cases, representing 33% of all analyzed interventions. Between 0.00 (midnight) and 5.59 the "S" team was dispatched to to 221 medical interventions (10%). Statistically significant correlation was found for the frequency of medical interventions and time of day (p <0.01; Fig.5), similarly as for hourly distribution.

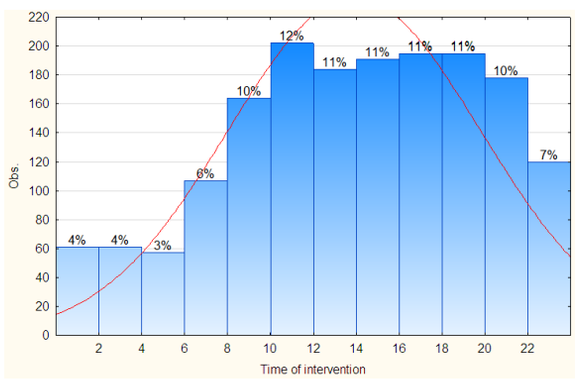

Figure 4: Frequency of the specialized EMS team intervention in relation to time.

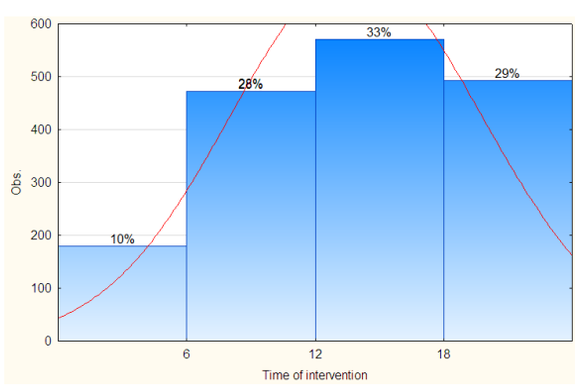

Figure 5: Frequency of the specialized EMS team intervention in relation to time of day.

The analysis of the specialized team interventions in Otwock district revealed the highest increase (by 10%) in the number of interventions in January and December (164 and 166 cases, respectively). The lowest number of the interventions took place in November (n = 132), April and September (n = 133 each), May (n = 134) and June (n = 135, Fig. 6).

Additional analysis of the study data covered the seasons. It showed the highest frequency of the specialized EMS team interventions in winter (n=477, 28%), and in summer (n=422, 25%). Spring and autumn accounted for 24% of the

interventions (411 in spring and 405 in autumn). Similarly as for the month to month analysis, a statistically significant correlation was found between the season and the frequency of medical interventions (p <0.01; Fig. 7).

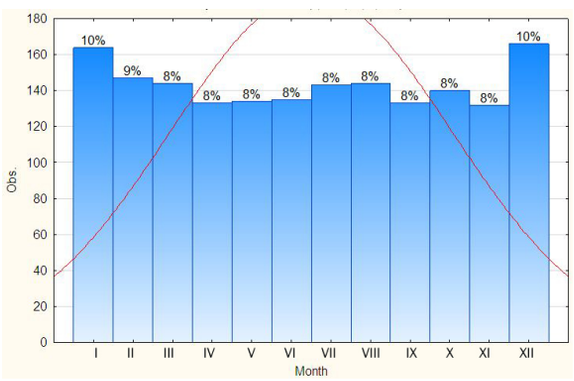

Figure 6: Frequency of the specialized EMS team intervention in relation to the season of the year.

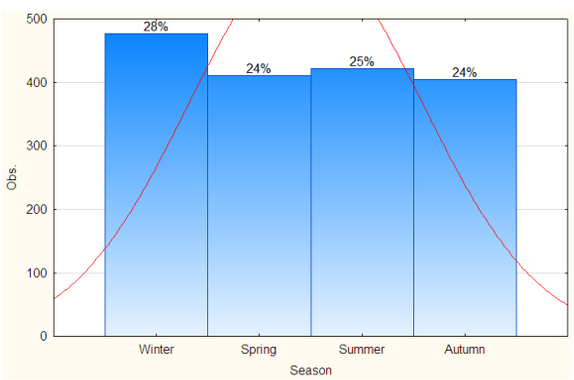

Figure 7: Frequency of the specialized EMS team intervention in relation to a month.

The analysis accounted also for the average response time of the EMS team. Most often the response time was 4 minutes (n=254, 15%), followed by 5 minutes (n=210, 12%) and 6 min (n=205, 12%). The response time of 15 minutes set in the National Emergency Medical Services Act was exceeded in 166 cases, representing 10% of the "S" team interventions, and the maximum response time was 79 minutes. A statistically significant difference in the EMS team response time was found (p <0.01, Fig. 8).

Another analyzed parameter was the duration of the medical intervention. Average intervention time was 43.33 minutes. The shortest time of medical assistance was 3 minutes, and the longest 215 minutes (Fig. 9). Usually the medical intervention lasted for 37 minutes (p<0.01).

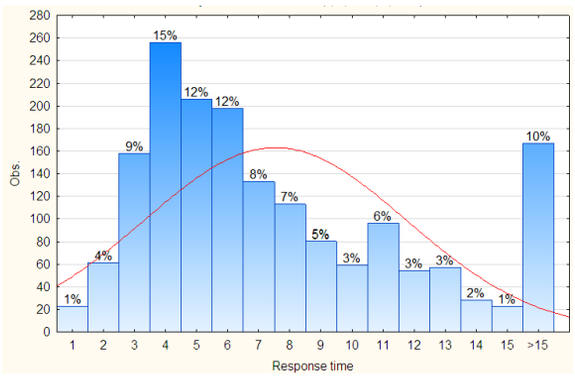

Figure 8: Response time to the scene.

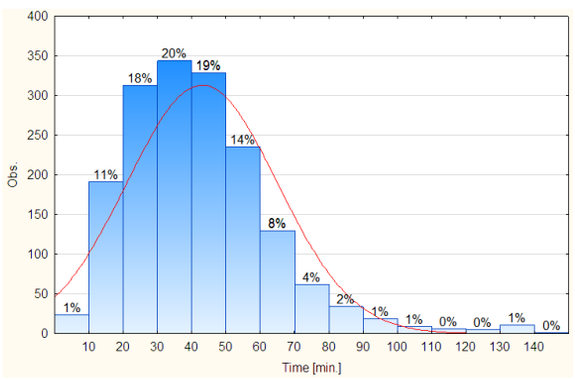

Figure 9: Duration of the medical intervention.

Discussion

Otwock district covers an area of 615 sq km. Total number of people living in the district, including the city of Otwock, on June 30th, 2009 was 119 181. 52% of the total population were women. The organizational structure of the district comprises two urban municipalities — Otwock and Józefów, urban and rural municipality Karczew and rural municipalities: Celestynów, Kołbiel, Osieck, SobienieJeziory and Wiązowna.
The National Emergency Medical Services Act specifies the EMS team response time standards within a city of more than 10 thousand inhabitants and outside the city of more than 10 thousand inhabitants. Median response time can not exceed 8 minutes in the city and 15 minutes outside the city [3-5].

Large operating area of the Otwock Emergency Medical Services, covers the radius of several dozen kilometers and has only one specialized EMS team, which was the reason for extended response time and time to providing qualified medical care. The functioning of only one "S" type EMS team located in Otwock resulted in

extending the response time to the scene up to the maximum response time of 79 minutes.

The analysis showed that the specialized EMS team usually provided medical care to men (59%). However, the women's average age was 56 and they were 5 years older than men.

Analyzed medical records revealed that the most common cause of dispatching a specialized EMS team were injuries (20%), followed by cardiovascular diseases (19%). Other authors obtained different results. Kózka *et al.* reported that the most common reason for the specialized EMS team intervention were traffic accidents (21%), followed by cardiovascular diseases (19%) [6]. Injuries accounted for 7% of the interventions. Disparate results were also published by Chemperek *et al.* who claimed that the most common reason for the EMS team intervention was poisoning – 43.8% [7] (in my material poisoning accounted for only 4% of all medical interventions).

The frequency pattern of the specialized EMS team intervention over a day found in the analyzed material coincides with the results of other authors. Kózka *et al.* also noted that the specialized EMS teams were most often dispatched in the afternoon, i.e. between 12.00 – 17.59 (32% of the interventions). [6]

The percent of patients who were provided with medical assistance on site and then transported to the hospital was 64%, which is slightly lower than the number found by Kózka *et al.* (68.3%) [6].

Conclusions

Functioning of only one specialized EMS team in 2009 resulted in prolonged response time for the qualified medical assistance within Otwock district.
The main reason for specialized EMS team interventions were injuries and cardiovascular diseases (19%).

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