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*The analysis of the cases of circulatory and respiratory arrest
in the work of the regional unit
of ambulance service – Śródmieście station*

The major causes of deaths all over the world are circulatory system diseases, neoplasms and injuries. Each man can become a participant of the event which results in life-threatening emergencies and the most immediate possible actions are essential. The period of time for starting efficient life-restoration actions is very short, estimated at 4–5 minutes (1). Ambulance Service is a medical organization created to apply aid in life-threatening emergencies. It has existed in Poland since 1891. Unfortunately, for many years it has been treated as a 'travelling clinic', which resulted in the fact that statistically only 30% of calls applies to serious life-threatening emergencies and thus also influences prolongation of the response time (7). The standards of the developed western countries determine the arrival time at 7–10 minutes from the call time (8). Both first-aid applied by the accident witnesses and efficient actions of ambulance service have significance for effective pre-hospital aid and increasing the chances of survival of people in need (3). The Programme of Integrated Medical Rescue System, which is currently being employed, offers the system of aid based upon the 'chain of survival' whose first link is early aid from the witnesses, followed by the arrival of the emergency service to the scene, applying indispensable aid, transport to the appropriate hospital offering medical emergency facilities within the 'Gold Hour', no longer than 30–40 minutes (10).

MATERIAL AND METHODS

The study analysed emergency records of the ambulance cars of the Regional Unit of Ambulance Service – Śródmieście Station in Lublin in the year 2000. 3,723 calls were recorded. In 142 cases complete resuscitation actions were carried out due to circulatory and respiratory arrest. The records selected this way went through a detailed analysis.

RESULTS

Among 142 casualties with circulatory and respiratory arrest 65.5% were male, and 34.5% female. The percentage of patients aged over 60 was 51.4%, while those under 60 accounted for 48.6%. (Fig. 1). The cases of circulatory and respiratory arrest most frequently occurred in July (15.5%), March (12.7%) and January (12%). The scene of the accident was home in 64.8% of the cases and public place, especially street in 35.2% (Fig. 2).

As far as the causes of circulatory and respiratory arrest are concerned, the largest percentage was constituted by circulatory system diseases (64.8%), followed by respiratory system diseases (14.8%),

communication accidents (8.5%), injuries (6.3%) and suicidal attempts (3.5%) (Fig. 3). First-aid prior to the arrival of rescue team was applied in 11.3% of the cases, including 2.8% of the cases in which first aid was applied by the witnesses, while in the remaining cases it was applied by the medical staff. The average time of the arrival of an ambulance car to the scene was 7.14 minutes. In 45.6% the arrival was within 5 to 10 minutes, while in 41.6% it was up to 5 minutes and in 11.9% of the cases the time of arrival exceeded 10 minutes (Fig. 4).

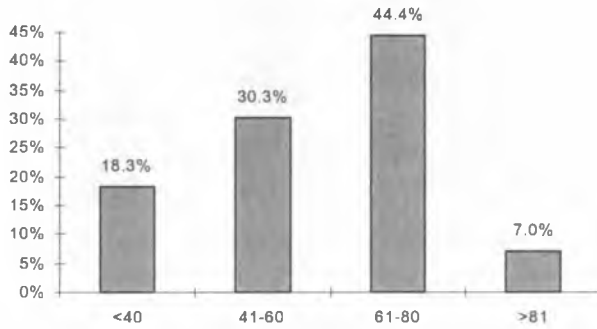


Fig. 1. Age structure



Fig. 2. Scene of accident

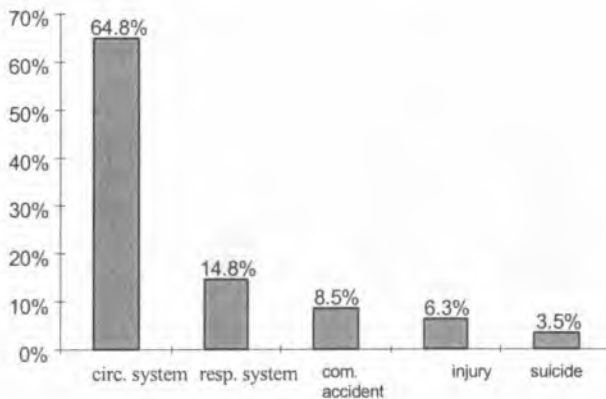


Fig. 3. Causes of circulatory arrest

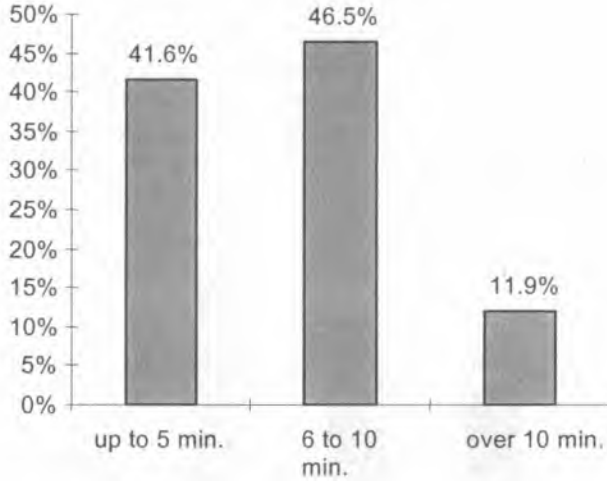


Fig. 4. Time of arrival at the scene of accident

The efficiency of resuscitation procedures was estimated at 51.4%. The chances of restoring life functions were diminishing as the time of arrival was prolonged. It was definitely less frequent to have succeeded with the resuscitation action when the cause was the injury, suicide or communication accident (Fig. 5, 6). Those patients were driven to the admission room for further treatment. In this group people under 60 accounted for 54.8%, and those over 60 accounted for 44.2%. The time of resuscitation procedures, concluded with the restoration of life functions, varied. In 38.4% of the cases the procedures took 21–30 minutes, in 21.9% – from 31 to 40 minutes, 16.4% – from 11 to 20 minutes. In 15.1% cases resuscitation actions lasted more than 40 minutes; in 2.7% – less than 10 minutes. The average time of resuscitation actions was 19.5 minutes. The time of arrival at the admission room from the moment of arrival at the scene of the accident was 21–30 minutes in 28.8%, 31–40 minutes in 26.1%, 41–50 minutes in 17.8%, 51 minutes in 10.9%, below 20 minutes in 16.4%. The average time was estimated at 33.5 minutes. In 48.6% resuscitation actions ended up with failure and the death of the patient was recorded. Out of this group, 42% was under 60; the remaining 58% were over 60. The average time of actions was 29.8 minutes in this group.

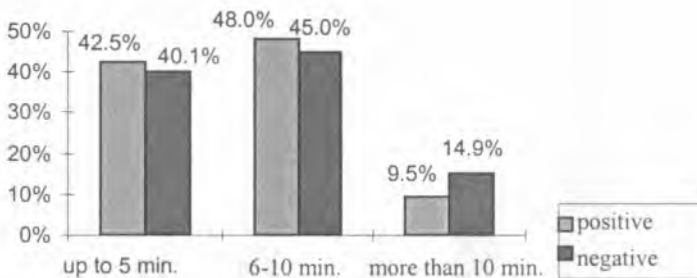


Fig. 5. Ambulance arrival time vs. resuscitation efficiency

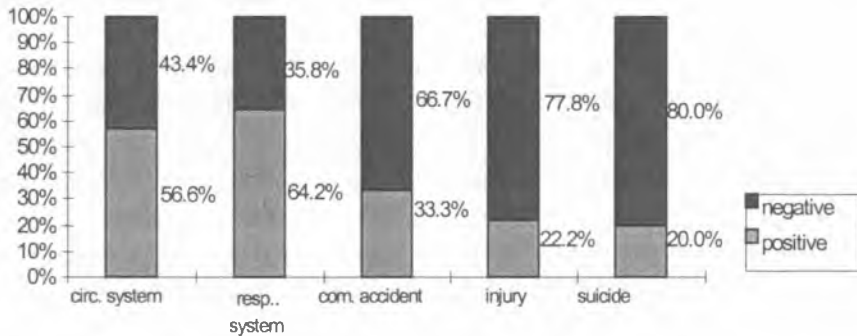


Fig. 6. Causes of circulatory arrest vs. resuscitation efficiency

DISCUSSION

Among all the responses of emergency teams, circulatory and respiratory arrest was recorded in 3.8%. Advance life support was applied. Its efficiency was estimated at 51.4%. The sex and age structures of people with circulatory and respiratory arrest are no different from the results obtained by Rasmus and Gaszyński (8) and Witzak (12). The structure of the causes of circulatory and respiratory arrest is also similar to that of the studies mentioned above. Blood circulation system diseases are dominant. The factor that varied most was first-aid application prior to the arrival of the emergency team. In the study presented here such aid was recorded in 11.3% of cases, including aid applied by the people connected with medical service, who happened to be at the scene of the event. In the study performed by Witzak witnesses started premedical aid in 2.4% (12), in Jłowicki's study in 20%, and in the study by Rasmus in 24.1% (8). It should also be mentioned that although a large percentage of Polish society, approximately 80% claim to have participated in various first-aid trainings, their knowledge, skills and willingness to act are not sufficient (6). What is regarded as decisive for the prognosis as to life in circulatory and respiratory arrest is the time passing from the moment of cerebral blood flow arrest to the moment of starting basic life support (BLS) as well as advanced life support (ALS). When the first-aid is applied within 4 minutes from the circulatory and respiratory arrest and professional aid within 8 minutes – the chance of survival is estimated at approximately 43%. When it is delayed, the chances are reduced to 19% (4). The National Health Programme for 1996–2005 and Ambulance Service Reform in Poland assume reducing life-threatening emergency arrival time to 15 minutes. In cities the time should be 10 minutes in 80%, in the country areas – 15 minutes in 80% cases. In cities the operating region of a single team should not be larger than 30 km² while in the country – 300 km² (5). The average ambulance arrival time was 7.14 minutes from the call. In the study by Rasmus and Gaszyński it was 17.4 minutes (7). Resuscitation efficiency was relatively high (51.4%), in the study by Witzak 28.5% (12). The time of arrival at the hospital was approximately 33.5 minutes, which also seems to be a positive score as it proves the opportunity to take up advanced treatment within the 'gold hour'. Such satisfactory results of the operation of the Śródmieście Station teams may be the consequence of the size of the operating area. It is predominantly an urban area within a radius of about 10 km. That proves the purposefulness of the guidelines of the National Health Programme and Ambulance Service Reform raising the standard of efficiency in applying aid to people in need.

CONCLUSIONS

1. In 3.8% of the emergency teams interventions the necessity of applying advanced life support was observed.

2. The time of arrival at the scene, transport of the patient to the admission room as well as the efficiency of resuscitation comply with the European standards.

3. The efficiency of resuscitation actions estimated at 51.4% depended on the age of the patient, the cause of circulatory and respiratory arrest and ambulance arrival time.

4. Taking up basic life support by witnesses of the event was observed in 2.8% of cases, in 8.5% aid was applied by the medical staff members who happened to be at the scene.

5. The essential element raising the efficiency of ambulance actions is the location and the size of the operating area.

REFERENCES

1. Bałkota M.: Szkolenie w zakresie pomocy przedmedycznej, *Ratown. Pol.*, 2,48, 1999.
2. Brismar B., Linder B.: Disaster medicine – reflections on goals and developments. The future of emergency and disaster medicine. *Eur. J. Emerg. Med.*, 8,137, 2001.
3. J. De Boer: Order in chaos: modelling medical management in disasters. *Eur. J. Emerg. Med.*, 6,141, 1999.
4. Krajewski W., Kolasiński P.: Chory po nagłym zatrzymaniu krążenia w materiale OIOM i PSK AM w Łodzi. *Medycyna ratunkowa i medycyna katastrof*, pod red. W. Gaszyńskiego, A. Rasmusa, 346, Łódź 2001.
5. Lewandowski R.: Projekt systemu wyjazdowej pomocy doraźnej w województwie łódzkim. In: *Medycyna ratunkowa i medycyna katastrof*, pod red. W. Gaszyńskiego, A. Rasmusa, 354, Łódź 2001.
6. Rasmus A., Czekajło M. S.: A national survey of the Polish population «s cardiopulmonary resuscitation knowledge. *Eur. J. Emerg. Med.*, 7, 39, 2000.
7. Rasmus A., Gaszyński W.: Jaka pomoc doraźna. *Ratown. Pol.*, 1,20, 1996.
8. Rasmus A. et al.: Udział świadków zdarzenia w czynnościach resuscytacyjnych (BLS-CPR) na terenie łódzkiej aglomeracji miejskiej w 1997 roku. *Materiały z Konferencji naukowo-szkoleniowej "Medycyna ratunkowa i medycyna katastrof"*, 111, Łódź 2000.
9. Rasmus A. et al.: Udział świadków zdarzenia w czynnościach resuscytacyjnych BLS-CPR na terenie łódzkiej aglomeracji miejskiej w latach 1996-1998. In: *Medycyna ratunkowa i medycyna katastrof*, pod red. W. Gaszyńskiego, A. Rasmusa, 401, Łódź 2001.
10. Rasmus A. et al.: *Medycyna ratunkowa i medycyna katastrof – podobieństwa i różnice. Med. Intens. i Rat.*, 4, 1, 15, 2001.
11. Thoren A. B. et al.: Measurement of skills in cardiopulmonary resuscitation – do professionals follow given guidelines? *Eur. J. Emerg. Med.*, 8, 169, 2001.
12. Witczak W. et al.: Zawał serca. Analiza pracy karetki R. *Kard. Pol.*, 10, 218, 1991.

SUMMARY

The major causes of deaths all over the world are circulatory system diseases, neoplasms and injuries. Each man can become a participant of the event which results in life-threatening emergencies and the most immediate possible actions are essential. The period of time for starting efficient life-restoration actions is very short, estimated at 4–5 minutes. Ambulance Service is a medical organization created to apply aid in life-threatening emergencies. The standards of the developed western countries determine the arrival time at 7–10 minutes from the call time. Both first-aid applied by the accident witnesses and efficient actions of ambulance service have significance for effective pre-hospital aid and increasing the chances of survival of people in need. The study analysed emergency records of the ambulance cars of the Regional Unit of Ambulance Service – Śródmieście Station in Lublin in the year 2000. 3,723 calls were recorded. In 142 cases complete resuscitation actions were carried out due to circulatory and respiratory arrest. The records selected this way went through a detailed analysis. In 3.8% of the interventions of emergency teams the necessity of applying advanced life support was observed. The time of arrival at the scene, transport of the patient to the admission room as well as efficiency of resuscitation comply with the European standards. The efficiency of resuscitation actions estimated at 51.4% depended on the age of the patient, the cause of circulatory and respiratory arrest and ambulance arrival time. Taking up basic life support by witnesses of the event was observed in 2.8% of cases, in 8.5% aid was applied by the medical staff members who happened to be at the scene.

Analiza przypadków zatrzymania krążenia i oddychania w pracy Wojewódzkiej Stacji Pogotowia Ratunkowego – Podstacja Śródmieście

Głównymi przyczynami zgonów na świecie są choroby układu krążenia, nowotwory i urazy. Każdy człowiek może stać się uczestnikiem zdarzenia, w którego wyniku jest zagrożone życie ludzkie i niezbędne jest jak najszybsze podjęcie czynności ratowniczych. Czas na podjęcie skutecznego działania przywracającego funkcje życiowe jest krótki i wynosi 4–5 minut. Organizacją medyczną powołaną do niesienia pomocy w stanach zagrożenia życia jest Pogotowie Ratunkowe. W pracy poddano analizie karty wyjazdowe karettek reanimacyjnych Wojewódzkiej Stacji Pogotowia Ratunkowego, Podstacji Śródmieście w Lublinie w roku 2000. Zanotowano 3723 wezwania. W 142 przypadkach wykonano pełne zabiegi reanimacyjne ze względu na zatrzymanie krążenia i oddychania. Wyłonione w ten sposób karty poddano szczegółowej analizie. W 3,8% przypadków interwencji zespołów reanimacyjnych obserwowano konieczność prowadzenia zaawansowanych zabiegów reanimacyjnych. Czas dotarcia na miejsce zdarzenia, transportu chorego do Izby Przyjęć, skuteczność reanimacji spełniają wymogi standardów europejskich. Skuteczność zabiegów reanimacyjnych, oceniona na 51,4%, zależała od wieku pacjenta, przyczyny zatrzymania krążenia i oddychania oraz czasu dotarcia karetki. Rozpoczęcie udzielania pomocy przedmedycznej przez przypadkowych świadków zdarzenia obserwowano w 2,8% przypadków, w 8,5% przez znajdujący się w pobliżu personel medyczny. Istotnym elementem podnoszącym skuteczność pracy pogotowia jego położenie i rozmiar obszaru objętego opieką.