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## Frequency and type of emergency medical teams intervention of in oncological patients from selected areas the Lublin region

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### Summary

A steady increase in the incidence of most malignancies has been observed in the structure of Polish society. The National Medical Emergency Service has undergone a number of changes over the last two decades. The fundamental purpose of this system is to provide medical assistance in life-threatening emergencies to every human being. **Material and method:** The database for the Emergency Medical Team (EMT) interventions from randomly selected areas of the Lublin region was analysed. The data related to all emergency intervention provided by EMTs in the years 2008-2012 and 2004 in the areas of Łęczna, Kraśnik, Lublin, Świdnik. **Aim:** The aim of the article was to determine the incidence of EMT (Emergency Medical Team) interventions in cancer patients in the population of selected areas of the Lublin region.

**Keywords:** Emergency Medical Team, oncology patient, Lublin region, medical emergency service

## **Introduction**

The changes observed in the structure of the Polish society include both ageing and an increased number of cancer-related deaths. In addition, there is a steady increase in the morbidity of most malignancies. These problems constitute serious challenges to the health system since the number of emergencies in the cancer patient population increase steadily[1]. The professions linked with emergency human life saving have always been respected among the population, due to great responsibility and the necessity of professionalism required. According the Constitution of the Republic of Poland (Chapter 2, art. 68), everyone has the right for health protection and equal access to health care services, financed from public funds which should be ensured by public authorities to citizens. What is more, the authorities should provide special health care to children, pregnant women, handicapped people and persons of advanced age. Furthermore, the authorities are obliged to combat epidemic illnesses and prevent the negative health consequences of degradation of the environment [2]. The National Medical Emergency Services have overcome numerous changes over the past two decades. The design, the development and the improvement of the whole system resulted in a high level of medical services. The medical emergency system is a very important part of the health care system in Poland. The legal basis for the medical emergency system in Poland is the Act of 2006 which defines the standards of functioning and financing of the system and the guidelines for the organisation structure of Medical Emergency Service. The fundamental objective of this system is to provide medical assistance in health emergencies and life threatening emergencies to every human being [3, 4, 5, 6]. The aim of the article was to determine the incidence of EMT intervention in cancer patients in the representatives of the population of selected areas of the Lublin region.

## **Material and method**

The database for the Emergency Medical Team (EMT) interventions from randomly selected areas of the Lublin region was analysed. The data related to all emergency intervention provided by EMTs in the years 2008-2012 and 2004 in the areas of Łęczna, Kraśnik, Lublin, Świdnik. The collected data was analysed using Statistica 12. The tested qualitative parameters were compared with the use of Pearson's chi-square test. After the initial analysis with the distribution normality performed with the Shapiro-Wolf Test, the quantitative data (the age) was compared within the subgroups. Subsequently it was analysed with the application of the Kruskal-Wallis test with the assumption that the distribution test results were inconsistent with the normal ones. The borderline value proving the existence of differences between the subgroups was determined at the level of  $P < 0.05$ . The results are presented in the tables in numbers and percentages.

## **Results**

The data was collected from the EMT interventions occurring in selected locations in the Lublin region. Due to the fact that the documentation was frequently completed selectively by EMT members, the data remain incomplete. The total number of EMT interventions occurring in the discussed region and recorded in the database was 293.716. The highest number of interventions was recorded in the year 2008 ( $n = 64\ 734$ ) which represents more than 22.0% of all interventions taking place in the years 2008-2012. The least data was collected in 2011 since it included records from 8 months instead of 12 months (table 1).  
Table 1. Area and number of interventions.

Area	Interventions	
	n	%
<b>Łęczna</b>	18 907	6,4
<b>Kraśnik</b>	33 621	11,5
<b>Lublin</b>	206 283	70,2
<b>Świdnik</b>	34 905	11,9
<b>Ogółem</b>	293 716	100,0

The EMT Interventions occurred slightly more frequently in men (50.1%) than in women (49.6%) and the remaining 0.3% of cases did not provide the information concerning the gender (n = 833). Therefore, the further analysis of the total gender number is lessened by the number of unregistered gender cases (table 2).

Table 2. Gender of all respondents who were affected by ZRM interventions in 2008-2012 in the analyzed area.

Sex	Interventions	
	n	%
<b>Man</b>	144 978	50,1
<b>Woman</b>	143 386	49,6
<b>Sortages</b>	833	0,3
<b>Altogether</b>	289 197	100,0

### The characteristics of patients diagnosed with cancer

In the ICD-10 international classification, the diagnosis of cancer refers to code markings from C00 to D48. A total number of 2442 intervention for C00 to D48 code indications was recorded in the database with the prevalence of interventions concerning malignant bronchial tumour and lung cancer (n = 675; 27.6%). Other EMT interventions were related to malignant cases of brain tumour (n = 131; 5.4%); prostate cancer (n = 104; 4.3%); colon cancer (n = 101; 4.1%); gastric cancer (n = 97; 4.0%); breast cancer (n = 96; 3.9%); pancreatic cancer (n = 73; 3.0%); malignant offshoots of different primary tumours (n = 70, 2.9%); and other non-specific malignancies (n = 72; 2.9%). Individual interventions concerned malignant ureteral cancer, tracheal tumour, gum tumour, paranasal sinus cancer, leukaemias of unknown and known aetiology and others.

The vast majority of interventions occurred in the place of residency of the patient - 83.6%. Other places where emergency medical intervention was required were the following: means of public transportation, streets, schools and others. In 318 cases, the location of EMT intervention was unspecified. (table 3).

Table 3. Place of assistance for diagnosing C00-D48 in ICD-10 classification.

Area	Intervencions	
	n	%
Home	2 042	83,6
Other	71	2,9
Communication	6	0,2
Street	4	0,2
School	1	0,0
Shortages	318	13,0

**The correlation of cancer patient age and the frequency of EMT intervention - overall and individual presentation of selected cases.**

The average age of patients included EMT interventions was 65.99 years ( $\pm 13.72$ ), the youngest patient was less than 1 year old, the oldest was 101. The majority of patients requiring an intervention were in the age between 50-80.

In the years from 2008 till 2011 an increase in the average age of patients requiring EMT interventions for the C00-D48 in the ICD-10 classification was observed. In 2012, the average age was significantly lower than in 2008. Interestingly, the number of interventions decreased as the average age increased. This correlation was statistically insignificant ( $p > 0.05$ ) (table 4).

Table 4. Average age of patients affected by interventions for diagnoses of C00 -D48 in ICD-10 classification in individual years.

	Year	Numer of intervencios	M $\pm$ SD	Me	Min-Maks
All cancers together	2008	122	63,1 $\pm$ 16,5	64,0	11-98
	2009	84	64,7 $\pm$ 16,8	68,0	18-96
	2010	60	65,2 $\pm$ 18,2	68,5	6-93
	2011	87	65,6 $\pm$ 16,3	64,0	8-91
	2012	80	62,4 $\pm$ 18,6	66,0	1-91
Stat.	Test Kruskala-Wallis: H=7,45; p =,114				

In the years between 2008-2012 and 2004, in the case of patients suffering from colon cancer (C18), the average age of patients requiring the interventions proved to be statistically significant ( $P < 0.05$ ) and varied from 63.7 to 66.3. The highest average age values were observed in 2010 and 2011 (73.3 and 72.8 years old respectively).

In the years between 2008-2012 and 2004 an upward tendency was observed in the average age of patient suffering from other malignancies of digestive organs (C26) and it increased from 57.9 to 76.5. What is more, in the cases of bronchial abd lung cancers (C34), the average age of patients requiring interventions increased from 65.6 to 68.1. It was observed that the number of interventions decreased as the age increased. This correlation proved to be statistically insignificant ( $p > 0.05$ ).

In the years between 2008 till 2012, the average age of cervical cancer (C53) patients requiring EMT interventions decreased from 61.3 to 57.0 years, and the lowest average age (55.6) was observed in 2011. In the cases of pancreatic cancer (C25) the average age decreased from 67 to 62.4 while in the cases of gastric cancer (C16) it decreased from 67.8 years to 64,1 (the lowest average age - 62.2 was reported in 2010, and the highest average age - 69.6 was observed in 2009). The number of interventions in all three groups fell with the decrease in the age of patients. This correlation was statistically insignificant ( $p > 0.05$ ).

The average age of patients requiring the EMT interventions due to breast cancer (C50) decreased from 67.4 years to 61.4, and in 2011, the average age of patients was the highest - 70.1 (higher than 2008). In these cases, the number of EMT interventions rose as the patient age decreased. This correlation was statistically insignificant ( $p > 0.05$ ).

In the cases of prostate cancer (C61), the average age of patients subjected to EMT interventions in the years 2008, 2010 and 2011 was significantly higher as compared to the average age of patients requiring interventions in the years 2009 and 2012. This correlation was statistically insignificant ( $p > 0.05$ ).

In the above selected 25 types of cancers, male patients required EMT intervention most frequently. Thus, female patients required the EMT interventions in the cases concerning the following cancers: hepatic and intrahepatic bile ducts cancer (C22), colon cancer (C18), pancreatic cancer (C25), other malignancies of various organs (C26), cancers in the region of respiratory track and thoracic track (C39), breast cancer (C50), secondary malignancies in other areas of the body (C79), malignancies of unknown location (C80), multiple malignancies of primary tumours (C97), and malignancies of unspecified primary location or multiple locations. The gender analysis of the interventions taking place in the case of cancer patients, the results proved to be statistically significant ( $P < 0,00001$ ).

### **The correlation between time of day and season, and the incidence of EMT interventions in selected cancers and an overall presentation.**

The EMT interventions for C00-D48 have occurred most frequently in the morning and in the early afternoon (31.4%), and least frequently at night (21.0%). Female patients required the highest number of interventions in the afternoon and evening. On the other hand, male patients required the interventions in the early morning, at noon and at night. This correlation was statistically insignificant ( $p > 0.05$ ) (table 5).

Table 5. EMT interventions in relation to the time of day and sex.

Time of day		Together	Sex		
			Man	Woman	
<b>Morning (hour:6-12)</b>	n	<b>736</b>	446	290	
	%	<b>31,4</b>	32,1	30,3	
<b>Afternoon (hour: 12-17)</b>	n	<b>559</b>	328	231	
	%	<b>23,8</b>	23,6	24,1	
<b>Evening (hour:17-21)</b>	n	<b>560</b>	329	231	
	%	<b>23,9</b>	23,7	24,1	
<b>Night (hour: 22-5)</b>	n	<b>492</b>	287	205	
	%	<b>21,0</b>	20,7	21,4	
<b>Together</b>		n	<b>2347</b>	1390	957
Stat. Chi <sup>2</sup> , "p"		-	Chi <sup>2</sup> =0,85; p=,836		

A slight increase in the EMT intervention was reported in the spring (25.7%) and the autumn (25.7%) as compared to the summer (24.2%) and the winter (24.4%) (tab. 6).

Table 6. Number of interventions including the seasons in which assistance was provided

Time of year	Interventions	
	n	%
Winter (month: 12,1,2)	597	24,4
Spring(month: 3,4,5)	627	25,7
Summer (month: 6,7,8)	591	24,2
Autum (month: 9,10,11)	627	25,7
Together	2 442	100,0

### Discussion and overview of test results

The observation of the incidence of EMT interventions concerning the health problems of the patients, the diagnosed disease, gender, age and place of intervention aids the observation of the general tendencies occurring in the population as well as design changes in the developing system of Emergency Medical Services, so that actual need are taken into account. The increasing incidence of cancer cases in the Polish population in the near future will be reflected both in an increased demand for healthcare services and emergency medical care for cancer patients. Radical antineoplastic, local and systemic, combination therapies, trigger a number of adverse reactions and complications in patients. These adverse effects may occur already in consequence to early surgical procedures and then chemotherapy and include cardiomyopathy, hepatotoxicity, or renal damage[7]. The patients in the advanced or terminal stages of cancers should also be taken into account since they present a great range of serious life-threatening conditions. They mainly concern patients who wish to stay and die at home and not at a hospice, thus they require the presence and intervention EMTs.

The total number of interventions registered in the database of the Emergency Medical Teams analysed in this research was 293 716 interventions.

The overall number of interventions included in the study reached 293 716. There were 2 442 interventions for the C00-D48 (ICD-10 classification) and men comprised 58.8% and women 41.2% in this group. In 2013, 78 236 men and 78 251 women were diagnosed with malignant cancer. The numbers for male and female patients were similar yet the incidence rate based on the actual disease incidence in the population indicated a higher crude (and standardised) ratio for men than women, that is 419.8 and 393.9 respectively. Additionally, the number of cancer deaths in 2013 was significantly higher in men than in women, that is 52 201 and 41 924 respectively [8]. Basing on the analysed indicators, it can be stated that the male oncological patients constitute a greater problem than women (numeral). This data is reflected in numerical distribution of EMT interventions required by men and women and discussed in the present paper.

According to Gawelko J. in the years 2010-2013 and 2005, the Regional Emergency Services in Rzeszow registered 87 580 EMT interventions and 88.0% of the cases were urgent. The EMTs were required most frequently at the place of residence of the patient (n = 51 637; 59.0%). The EMTs had to react usually during the day (n = 56 056 of the intervention, representing 64% of all interventions). In 39% of the cases, the cause of the intervention was the symptoms, disease characteristics, as well as unclassified and abnormal laboratory test results [9].

Our own research has proved that the high number of interventions reflects the fact that patients in an advanced stage of cancer are more likely to stay at home and not a medical facility. Therefore, the vast majority of EMT interventions concerning the C00-D48 occurred at the place of residence of the patient, and they constituted almost 84.0% of all interventions. The presented results show that the EMT interventions for the C00-D48 cases occurred most frequently in the morning and in the early afternoon (31.4%), and less frequently at night

(21.0%). Some EMT interventions for particular kinds of cancer were reported slightly more often in the spring (25.7%) and autumn (25.7%) vs summer (24.2%) and winter (24.4%). *The analysis of changes in the profile of calls to Emergency Medical Teams at Regional Ambulance Station in 2010–2013* by Gawełko J. and Wolf K. state that in winter and summer the number of interventions was slightly higher than in autumn and spring. The above mentioned article proves that in 2011, the highest number of interventions was reported in February, December and in the period between May and August [9]. Interestingly, the data presented by Gawełko J. and Wolf K. is inconsistent with the results obtained in our own studies.

The highest number of EMT interventions for C00-D48 cases concerned malignant bronchial tumour and lung cancer (almost 28.0%). Other EMT interventions concerned tumours of the brain (5.4%); tumours of the prostate gland (4.3%); and colon cancer (4.1%). The Central Statistical Agency declared that in 2012 the number of people aged over 65 accounted for 12% of the population of Poland and the future prognosis is that people in this age group will constitute up to 21% by 2025. In 2011, tumours constituted the second most frequent cause of deaths in Poland (25.6%) and Europe (25.6%). What is more, it is predicted that in the next decade, cancer will constitute the most common cause of deaths in Poland. In 2013, the number of registered cancer cases in Poland reached 156 500. Men were most likely to suffer from lung cancer (18.7%), prostate cancer (15.5%), and colon cancers (12.2%) whereas in the case of women the most common malignancies were breast (21.9%), colon (10.1%) and lung cancer (8.8%) [8].

A more detailed comparison of our results and the results obtained by other authors cannot be conducted due to the lack of adequate material in the analysed literature. Nevertheless, it should be noted that the EMT database used in this study was incomplete due to mistakes made while collecting patient information. Probably, it can be associated with mistakes taking place in data transfer from paper to computers situated in the Regional Emergency Service Centre.

Collection and analysis of the information allows a better organisations of patient care, improved coordination of the access to patient care, and it aids a better interdisciplinary team collaboration at every stage of oncology treatment. The presented studies should constitute an initial stage to further analyses, which consequently will provide solutions to the functioning of the Emergency Medical System in Poland.

## **Conclusions**

1. EMT interventions were more likely to affect men than women in the cases of selected cancers and in the overall analysis.
2. The most common EMT interventions concerned patients with lung and bronchial cancers.
3. A change in the dynamics of the average patient age of requiring EMT interventions was observed. In the case of interventions concerning malignant tumours C34, C26, C18, C56 the average patient age increases and in the case of C53, C25, C61, C16, C50 it decreases in successive years.
4. The highest number of EMT interventions required by oncological patients was reported in the morning and at noon.
5. In the years 2008-2012, in the case of colon cancer (C18), the average age of patients requiring EMT interventions indicated a statistically significant ( $P < 0.05$ ) increase from 63.7 to 66.3. The highest average age, the highest average age values was observed in the years 2010 and 2011 years (73.3 and 72.8, respectively).

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