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Epidemiology of neoplasms in the practice of Medical Rescue Teams in the northern part of the Lubelskie Voivodeship during the SARS-CoV-2-pandemic — a three-year observation

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ABSTRACT

Introduction. Functioning of the medical rescue team one year before the pandemic was compared to the two years of the pandemic outbreak in relation to specific intervention groups. Our observation focused on patients with oncological diseases.

Material and methods. The analysis was carried out in a county (powiat) in the Lubelskie Voivodeship (Province). The study included a 3-year retrospective analysis from March 2019 to the end of February 2022. The material consisted of departure order flow sheets and ambulance flow sheet records.

Results. In the 3-year period, 560 events met the criteria for inclusion in the analysis: 195 (period I), 165 (period II), and 200 (period III). By eliminating interventions that were repeated calls to the same patient, the population under study consisted of 510 people: 215 men and 295 women.

Conclusions. The COVID-19 pandemic did not have a significant impact on the number of MRT interventions among cancer patients, nor on the mean intervention time in patients diagnosed with ICD-10 CXX and DXX. EMSs participate in oncological calls only for symptomatic treatment (pain, dyspnea, diarrhea) and cannot stop or cure initial medical conditions.

Key words: COVID-19 pandemic, National Emergency Medical Team, neoplastic diseases

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Introduction

Neoplastic diseases are the second most frequently reported cause of death in Poland. Mortality in this group of patients is relatively high; the SARS-CoV-2 pandemic that has been present in Poland for 2 years constitutes

a significant obstacle in diagnosing new cases and the treatment of neoplasms already diagnosed. Yet, the care for oncological patients should be continued despite difficulties. Clinicians' observations show that due to the limitations caused by COVID-19, oncological diseases are more advanced at the time of diagnosis, the costs

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of treatment increase, and, as a result, patients with unrecognized neoplasms are aggregated in the first months of the year with epidemiological restrictions [1]. The increase in incidence and mortality due to neoplastic diseases results from the aging of the population — 70% of cases in men and 60% in women occur after the age of 60. In addition, the population is exposed to carcinogens, including lifestyle factors: smoking, excessive alcohol consumption, inadequate diet, and lack of physical activity [2, 3].

Due to an epidemiological threat, hospitals have introduced a total ban on visits to cancer patients, and in many facilities, by order of the management, hospitalized patients are prohibited from leaving hospitals due to an increased risk of contracting the virus. This isolation of patients has a negative impact on their mental state (lack of contact with the family), which also negatively affects the results of treatment of the primary disorder. New epidemiological procedures implemented in hospitals, which also make the work of medical staff more difficult, are needed because cancer patients often have reduced immunity.

The pandemic caused numerous burdens in the healthcare system: infections among staff, including specialists, a reduction in the number of preventive examinations and new diagnoses, and the transformation of hospitals into single-purpose “Covid facilities”. This resulted in the reduction of procedures, e.g. in the field of oncological surgery procedures, and the postponement of treatment and further diagnostics. In addition, patients did not receive up-to-date information on the possibility of continuing their treatment, and there were no uniform hospital procedures for cancer patients [4, 5].

The Medical Rescue Team (MRT) is a unit of the system, responsible for undertaking medical rescue procedures at the scene of an accident and for transporting qualified patients. The main goal of the National Medical Rescue System is to assist every person in a state of a sudden health emergency, which should be understood as a sudden deterioration of health whose direct consequence may be serious damage to the body, the bodily functions, or a loss of life, which requires medical emergency treatment (MET) and further treatment. A patient transported by MRTs most often goes to the hospital emergency department (HED), whose task is to ensure immediate examination by the doctor on duty, providing the patient with emergency nursing and medical care according to his/her condition, including the necessary examinations and administration of drugs, initial segregation of patients, stabilization of functions in life-threatening conditions. From the HED, patients are transferred to an appropriate department for hospitalization. The legal act currently governing the issues of MRT and HED is the Act of September 8, 2006 on the State Emergency Medical Service (EMS), with subsequent amendments [6].

Purpose

An assessment of the impact of the COVID-19 epidemic on the number of visits by National Medical Rescue Teams to patients with oncological diseases in Poland.

Material and methods

Research design

The analysis was carried out in a county (powiat) in the Lubelskie Voivodeship (Province). The local hospital does not have a medical oncology unit. Patients handed over by the MRT are sent to the area of medical segregation within the HED or, in certain cases, to the Admission Room (AR) if a specific ward has one. Patients also report on their own on the basis of a referral from a primary healthcare practitioner (PHC) or to obtain night and holiday medical care (N&HMC); they also appear without referrals in health and life-threatening conditions. Cases other than those reported by the MRT were not included in the analysis.

Research setting

The study included a 3-year retrospective analysis of the interventions by Łuków MRT (northern part of the Lubelskie Voivodeship) from March 2019 to the end of February 2022. The article was prepared in March 2022, immediately after obtaining complete data for period III (January and February 2022) [7, 8].

Data collection

The authors decided to analyze the data from March, instead of January, because the first case of COVID-19 in Poland was reported at the beginning of March 2020. As a result, the authors compared 12 months of MRT activity in the Łuków county preceding the epidemic and 24 months of the epidemic. The data come from the documentation prepared after MRT interventions i.e. departure order cards (DOC) and medical emergency treatment cards (MET Cards).

Ethical considerations

The Medical Rescue Department (MRD) in Łuków is subordinated to the Independent Public Healthcare Center (IPHC) in Łuków. On February 3, 2020, the consent of the Director of IPHC in Łuków to gain access to medical documentation was obtained. Data on the injured, the MRT personnel, or the cooperating services have not been obtained for the analysis. The described cases have been fully anonymized.

Criteria for inclusion in the analysis

The included events were based on

1. The reason for calling (information obtained from the requesting MRT). The terms for oncological diseases used in the call were emphasized:
 - a patient weakened, treated oncologically
 - dyspnea, lung carcinoma
 - abdominal pain, liver carcinoma
2. ICD-10 code (International Classification of Diseases) — from groups “C XX” and “D XX” where XX is the next number from the list of neoplastic diseases (Arabic numerals):
 - C34 — malignant neoplasm of bronchus and lung
 - D41 — a neoplasm of uncertain or unknown nature of the urinary organs [9].

Statistical analysis

A two-sided p value < 0.05 was considered statistically significant for all tested null hypotheses. All statistical calculations were performed using STATISTICA software version 13.3 (TIBCO Software, Palo Alto, California, USA).

Results

Using the inclusion criteria, 560 MRT interventions were selected for the analysis: 195 (period I), 165 (period II), and 200 (period III). MRD Łuków, in the 3-year period of the analysis, completed 22 135 orders for the departure of MRT: 7531 (period I), 7441 (period II), and 7163 (period III). Five hundred and sixty events included in the analysis accounted for 2.52% of all MRT interventions: 2.58% (period I), 2.21% (period II), and 2.79% (period III).

The number of performed MRT interventions that meet the criteria for inclusion in the analysis is not equal to the number of patients (Tab. 1). By eliminating MRT interventions which were repeated calls to the same patient, the population under study was reduced to 510 people: 215 men and 295 women.

Noteworthy is the medical diagnosis that generated the largest number of departures and the time that passed between the first and last call.

During the pandemic, there were significantly more interventions during the day compared with the pre-pandemic period. No statistically significant differences were observed for the remaining variables, and general data are presented in Table 2.

The mean age of the patients treated in the period before and during the pandemic is significantly statistically different. The mean age of patients in the second year of the pandemic was statistically significantly higher than in the first year and in the period before the pandemic. Detailed data are presented in Table 3 and Figure 1.

Additional data are described in the Supplementary material.

Discussion

As the results show, the number of MRT interventions in oncological patients did not differ significantly in any period. Numerous analyses and studies showed a decrease in the total number of preventive examinations, diagnostics, and new diagnoses during the pandemic and subsequent “lockdowns” for patients with suspected neoplasm with an oncological diagnostic and treatment card (OD&T Card) issued in Poland. This problem also concerned other countries (e.g., the USA, Spain, the Netherlands, Canada, and Italy) [10–13].

Ambulance equipment, including pharmacology and procedures used by MRT teams, are not dedicated directly to the treatment of oncological diseases. The activities of MRT are focused on emergencies that threaten life and health. MRT interventions among oncological patients result from an exacerbation of symptoms, deterioration of health and well-being, often pain complaints, and as shown by the results of our analysis ailments, with dyspnea being the most frequently defined reason for calling an MRT. In foreign studies and international guidelines, it has been ascertained that in the practice of MRTs, interventions among chronically ill patients (including neoplastic diseases) appear more and more often, and the frequent cause of the call is cancer pain. In anamnesis and examination, paramedics measure pain by using the Numerical Rating Scale (NRS) and then apply an analgesic treatment in accordance with the analgesic ladder recommended by

Table 1. Patients included in the analysis with multiple medical rescue team interventions (data for $n \geq 3$)

MRT interventions	Gender/age	ICD-10	Time between first and last call (days)
7	F38	C72	562
6	F26	C72	522
4	F86	C34	23
3	F72	C34	92
3	F70	C34	12

F — female; MRT — medical rescue team

Table 2. General characteristics of medical rescue team interventions in patients with oncological diseases

Variable n	Pre-Pan (n = 195)		Pan_1 (n = 165)		Pan_2 (n = 200)		χ^2	p-value*
	%	n	%	n	%	n		
MRT								
P1	54	27.69	46	27.88	47	23.50		
P2	31	15.90	27	16.36	28	14.00	8.652	0.194
S1	62	31.79	43	26.06	80	40.00		
S2	48	24.62	49	29.70	45	22.50		
Day period								
7.00–18.59	127	65.13	112	67.88	112	56.00	216.469	< 0.001
19.00–6.59	68	34.87	53	32.12	88	44.00		
Sex								
Women	83	42.56	63	38.18	84	42.00	0.820	0.664
Men	112	57.44	102	61.82	116	58.00		
Location								
Village	123	63.08	107	64.85	143	71.50	3.475	0.176
City	72	36.92	58	35.15	57	28.50		
Procedure								
HED	124	63.59	108	65.45	118	59.00		
AR	1	0.51	3	1.82	4	2.00	3.425	0.489
Other	70	35.90	54	32.73	78	39.00		
Pharmacology								
No	106	54.36	85	51.52	87	43.50	4.985	0.083
Yes	89	45.64	80	48.48	113	56.50		
Death								
No	182	93.33	157	95.15	182	91.00	2.446	0.294
Yes	13	6.67	8	4.85	18	9.00		

*a chi-squared test; AR — admission room; HED — hospital emergency department; MRT — medical rescue team

Table 3. Age characteristics of patients in particular periods

	Pre-Pan (n = 195)		Pan_1 (n = 165)		Pan_2 (n = 200)		F _(2, 557)	p-value*
	M	SD	M	SD	M	SD		
Age	66.32	14.46	66.24	12.68	69.85	10.11	5.217	0.006

M — mean; SD — standard deviation; *one-way ANOVA

the World Health Organization (WHO) [14–16]. In our study, pharmacological treatment was applied on average in 50% of cases. They included medical oxygen for patients with dyspnea and bronchodilators. Analgesics were administered in 10% of all cases under analysis.

Lung cancer was the most frequently diagnosed neoplasm in the study group in each period, and the diagnosis of dyspnea with the ICD-10 code was one of the most frequently used. In the group analyzed, 3 patients were infected with SARS-CoV-2 during the MRT intervention, and this information was provided by the caller. Coronavirus infection in a cancer patient often makes the course of the infection worse. Because of the weakened immune resistance caused by cancer, chronic patients more often require mechanical ven-

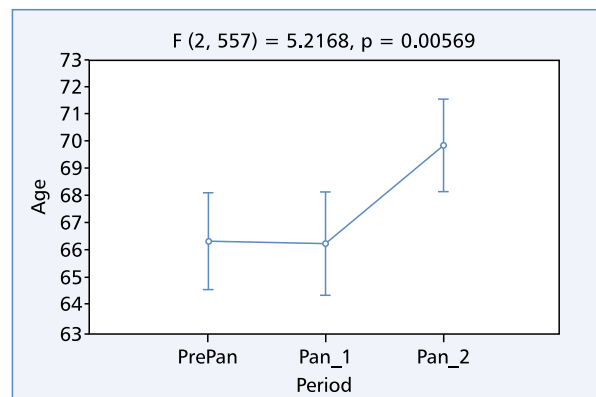


Figure 1. Age of the analyzed patients (Fisher's NIR test; age pairwise comparison)

tilation during COVID-19 treatment. In our study, there were some limitations due to the lack of access to medical records from hospital wards, and therefore the authors have no information on whether those suffering from Covid-19 infections at the time of the MRT intervention needed subsequent ventilation during their hospitalization. In the 2020 analysis of MRT departures Nadolny et al. [17], found many events with the call of dyspnea and the medical diagnosis R06. The study does not distinguish between patients with lung cancer and others, but it corroborates our observations of dyspnea as a common cause for calling MRT. Foreign studies by Massicotte [18] and Brenes Sanchez [19] confirm that this type of cancer is very common.

The main cause of an increase in the death rate in Poland in 2020 was the SARS-CoV-2 pandemic; the peak of infections occurred in the last months of the year, and among the prevalent causes of death were cardiovascular diseases (38% in 2019 and 36% in 2020) followed by cancers (26% in 2019 and 22% in 2020) [20]. In our analysis, death occurred in 39 cases (13-period I, 8-period II, 18-period III). In each case, a patient had died before the arrival of the MRT at the destination, after having suffered from cancer for a long time, often disseminated with general cachexia. Other studies indicate that the clinical course of COVID-19 in the group of oncological patients may be more severe, and the risk of death in this group increases by approx. 50–66%, but it significantly correlates with the age of patients [21]. According to the data of the National Health Fund (NHF) in Poland, a cancer diagnosis is associated with a significantly higher mortality rate in the group infected with SARS-CoV-2, and patients with cancer in many ICD-10 CXX groups did not survive 90 days from the date of diagnosis of the infection [22].

Conclusions

The COVID-19 pandemic did not have a significant impact on the number of MRT interventions in cancer patients or the mean intervention time in patients diagnosed with ICD-10 CXX and DXX. The lack of uniform oncological procedures for MRTs results in an occasional, local prolongation of MRT interventions, caused by looking for a place for a patient in a hospital. Telemedicine and online consultations are convenient and safe for family doctors, but not very effective in the treatment of cancers or diagnosis of subsequent diseases. Patients should be better protected at home from the onset of dyspnea through drugs and emergency equipment (e.g. home oxygen concentrators). EMSs in oncological calls offer symptomatic treatment (pain, dyspnoea, diarrhea) without the possibility of stopping or curing the initial medical condition.

Conflict of interest

None declared.

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Supplementary material

The monthly distribution of events (Tab. S1) ranged from 4–14% in each period, no month differed statistically significantly in terms of a significant increase in events,

even in the months X–XI in the Pan-1 and Pan-2 periods in which there were increases in infections in Poland (successive waves of the epidemic) (Fig. S1–S4)

Table S1. Percentage share of interventions in the period before and during the pandemic in the subsequent months of the year ($\chi^2 = 36.067$, $p = 0.030$)

Month	Pre-Pan (n = 195)		Pan_1 (n = 165)		Pan_2 (n = 200)		$\chi^2_{df=22}$	p-value*
	n	%	n	%	n	%		
March	14	7.18	15	9.09	15	7.50	36.067	0.030
April	21	10.77	10	6.06	12	6.00		
May	11	5.64	8	4.85	15	7.50		
June	21	10.77	19	11.52	11	5.50		
July	9	4.62	16	9.70	28	14.00		
August	14	7.18	13	7.88	18	9.00		
September	12	6.15	9	5.45	13	6.50		
October	18	9.23	20	12.12	10	5.00		
November	21	10.77	20	12.12	24	12.00		
December	9	4.62	16	9.70	19	9.50		
January	28	14.36	12	7.27	22	11.00		
February	17	8.72	7	4.24	13	6.50		

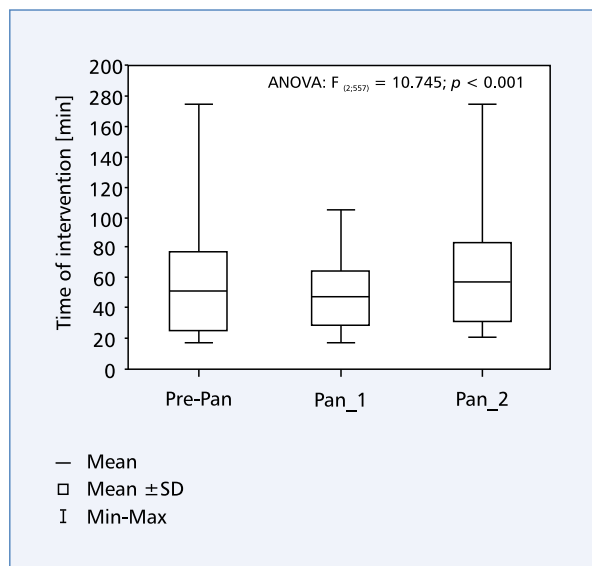


Figure S1. Analysis of the mean time of medical rescue team interventions in each study period; SD — standard deviation

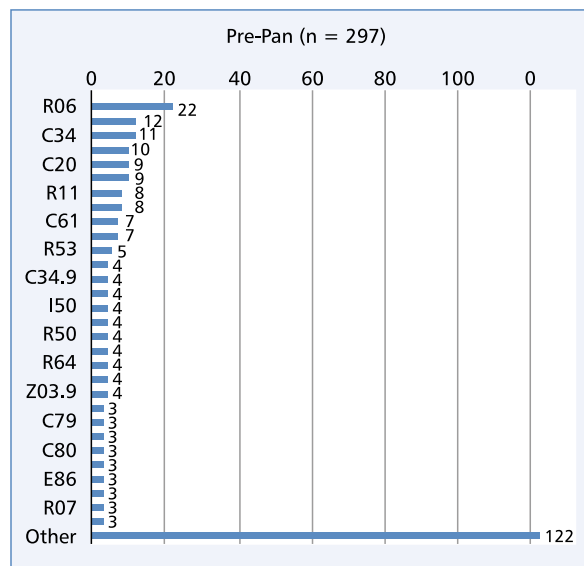


Figure S2. ICD-10 diagnosis categories in the pre-pandemic period (data for $n \geq 3$)

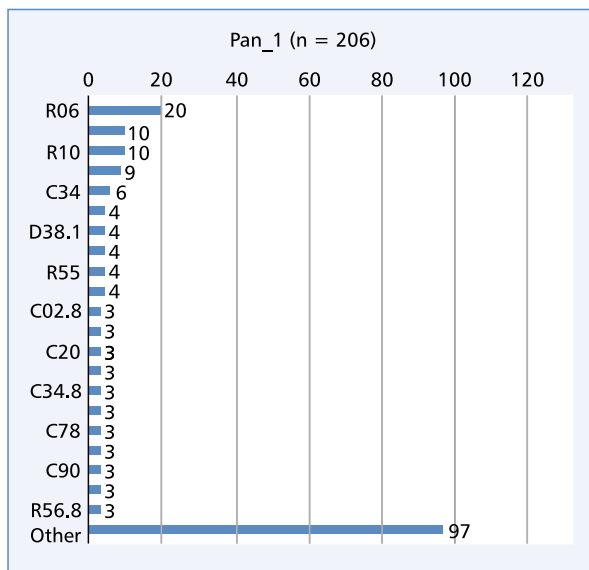


Figure S3. ICD-10 diagnosis categories in the period: 1-year pandemic (data for n ≥ 3)

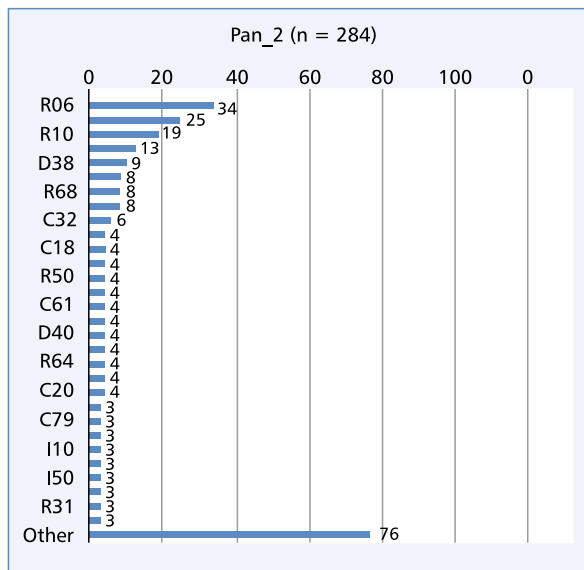


Figure S4. ICD-10 categories of diagnosis in the period: Year 2 of the pandemic (data for n ≥ 3)