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Psychiatric conditions in the practice of National Emergency Medical Services teams in Eastern Poland during the SARS-CoV2 pandemic

Łukasz Dudziński[1], Mariusz Panczyk[2], Marcin Glinka[3]

[1] John Paul II University in Biała Podlaska, Biała Podlaska, Poland
[2] Medical University of Warsaw, Warsaw, Poland
[3] National Headquarters of the State Fire Service, Warsaw, Poland

Summary

Aim. To assess the impact of the covid-19 epidemic in the research area (Łuków county) on the number of visits by National Emergency Medical Services teams to patients with mental disorders.

Method. The study included a retrospective analysis of EMS departures from the Łuków county (northern part of the Lublin province) in the two-year period from March 2019 to the end of February 2021 (one year before the epidemic – period I, and the year of the epidemic in Poland – period II). The material consisted of Departure Request Cards and Medical Rescue Cards of EMS.

Results. In the 2-year period there were 862 events that met the criteria for inclusion in the analysis (442 in period I and 420 in period II). In both periods, men were analyzed more often (68.7% Pre-Pan; 71.1% Pan). Interventions were more frequent in cities (60.3% Pre-Pan; 60.7% Pan). The share of alcohol and psychoactive substances as a cause of EMS interventions in psychiatric conditions was higher during the pandemic.

Conclusions. The COVID-19 pandemic did not significantly affect the number of EMS interventions related to mental disorders in the area covered by the analysis, the average duration of EMS interventions to psychiatric conditions slightly increased during the epidemic period. In both analyzed periods, men were significantly more likely to be EMS patients. The age of the patients included in the analysis did not change significantly before and during the pandemic

Key words: COVID-19 pandemic, State Medical Emergency, psychiatric conditions

Introduction

The SARS-CoV-2 pandemic, the first case of which was confirmed in Poland in March 2020, caused many changes in the everyday life of the entire society and

the functioning of public institutions. Changes in workplaces, healthcare facilities, restrictions on private life, interference with the economy, culture, sport, and public life, related to the pandemic, had a negative impact on the mood of many people [1].

COVID-19 spread quickly and caused global concern. Fear of infection, concern for oneself and one's families, the risk of losing a job, and lower income of companies, which often go hand in hand with loans taken out, are the causes of stress on a continuous basis for many months. These are sufficient arguments for the occurrence of various mental disorders or the aggravation of the already existing ones. The situation also puts a mental burden on the medical community due to the intensity of work, the risk of transmitting infections to their families, the necessity to use uncomfortable but necessary personal protective equipment (PPE).

According to data from the World Health Organization (WHO), 80% of people infected with SARS-CoV-2 pass the infection mildly, 15% have moderate symptoms, and about 5% of those infected have severe disease. The group that developed severe pneumonia requires admission to a hospital, mainly an intensive care unit (ICU). Many patients with a more severe course of the disease died, while the rest, after recovery, suffer from numerous complications (arrhythmias, neurological disorders, a significant reduction in efficiency and exercise tolerance) [2]. The ubiquitous media reports on the daily number of cases and the number of deaths cause the deterioration of mental health and the aggravation of mental illnesses occurring in society. Healthcare facilities focused on treating patients infected with COVID-19 have frequently changed the profile of their activities, becoming "unanimous" centers treating only patients with SARS CoV-2 infection. This caused increasing problems with medical care for patients with other diseases, including mental disorders.

Aim

Assessment of the impact of the COVID-19 epidemic in Poland on the number of visits by National Emergency Medical Services teams to patients with mental disorders. For the purposes of achieving the goal, the authors defined research hypotheses:

1. The number of EMS departures to psychiatric conditions increased during the pandemic compared to the period preceding the pandemic.
2. The duration of the departure order has increased in the pandemic period compared to the period preceding the pandemic.
3. The structure of ICD-10 medical diagnoses differs in the analyzed periods.

Material and methods

The study included a 2-year retrospective analysis of departures by the EMS of the Łuków district in the period from March 2019 to March 2021. The article was prepared in May 2021, immediately after obtaining complete data for the first quarter of 2021.

The authors decided to analyze the data from March instead of from January, because the first case of COVID-19 in Poland is dated at the beginning of March 2020. Thanks to this, the authors compared the 12 months of EMS activity in the Łuków district preceding the epidemic, and the 12 months of the epidemic in Poland. The data come from the documentation prepared after the intervention of the EMS, i.e., departure order cards (DOC) and medical rescue cards (MRC). The database was prepared in Microsoft Excel using MS Office 2016 for Windows 10.

The Medical Rescue Station (MRS) in Łuków is subordinate to the Independent Public Healthcare Center in Łuków. On February 3, 2020, the consent of the Director of Healthcare Center in Łuków for access to medical documentation was obtained. Data on the patients, personnel of EMS teams and cooperating services have not been obtained for the purposes of the analysis, the described cases are fully anonymous.

Statistical analysis

Descriptive statistics were used to characterize the variables. For interval variables, the following measures were calculated: mean (*M*) and standard deviation (*SD*). For categorical variables, the following measures were calculated: number (*n*) and frequency (%). Depending on the type of variable used to test the null hypotheses that there were no differences between the compared groups (pre COVID-19 vs. COVID-19) the following tests were used: Pearson's chi-square test, highest likelihood chi-square test (categorical variables) and Student's *t*-test (interval variables).

Two-tailed $p < 0.05$ was considered statistically significant for all null hypotheses tested. All statistical calculations were performed using the STATISTICA software version 13.3 (TIBCO Software, Palo Alto, California, United States).

Characteristics of the research area

The functioning of EMS units called for mental disorders before the epidemic and in the first year of the epidemic was analyzed. For the purposes of the analysis, the following phrases were used:

- period I – all EMS trips meeting the inclusion criteria in the year preceding the epidemic
- period II – all EMS trips that meet the inclusion criteria in the first year of the epidemic in Poland

The observations focused on calls with the hallmarks of mental states (disorders) and cooperation of the National Emergency Medical Services (NEMS) with other services, mainly with the police. The population living in the area of operation of MRS Łuków is 106 thousand county residents. The area of the region is 1,394 km². There are 4 EMS teams in MRS Łuków, all of them are on duty 24 hours a day. The most important center and population center is the city of Łuków with a population of just

over 29,000 inhabitants [3]. The main routes for transporting people and goods intersect in Łuków, as well as various offices and institutions of the city, commune and poviat level, which is why 2 EMS teams are stationed there. Two other EMS teams are located more than 25 km from Łuków in the largest population centers: Stoczek Łukowski (approx. 2.5 thousand inhabitants) and Adamów (>5 thousand inhabitants) [4].

Intervention records

The authors note that the EMS interventions carried out in their region did not concern only patients permanently residing in Łuków district. The analysis included people living in another poviat, voivodeship, as well as foreigners who needed EMS intervention. Importantly, the patient's place of residence was not analyzed. All the events recorded in the MRS Łuków documentation were analyzed, including events with residents from outside the poviat and orders for MRS Łuków to leave its area.

Criteria for inclusion in the analysis

Events related to psychiatric conditions were selected on the basis of:

(1) the reason for the intervention (information obtained from the person calling EMS suggesting mental disorders). Attention was paid to the terms used in the calls, which are potential for mental disorders:
   – "aggressive – psychiatrically treated",
   – "agitated – does not take medication",
   – "suicidal thoughts (S)",
   – "attempted suicide",
   – "depression",
   – "drug abuse",
   – "strong reaction to stress",
   – "strange behavior, difficult contact".

(2) ICD-10 (International Statistical Classification of Diseases and Related Health Problems) code entered by the leader of the EMS team – a system physician (team S), paramedic, emergency system nurse (team P). Attention was paid to the codes of diseases from the group "F – Mental and behavioral disorders," for example:
   – F09 unspecified organic or symptomatic mental disorder,
   – F20 schizophrenia,
   – F32 depressive episode, and disease codes from other groups ("X," "R") suggesting mental disorders, e.g.:
   – X70 Intentional self-harm by hanging, strangulation and suffocation,
   – X76 Intentional self-harm by smoke, fire and flames,

- X80 Intentional self-harm by jumping from a high place,
- R96 Other sudden death, cause unknown – when attempted suicide was suspected and the diagnosis of ICD-10 from group "F" or "X" was not entered, while in the area of DOC, "event description" or "medical interview," suicidal intentions were mentioned [5, 6].

(3) transferring the patient to a medical facility with a psychiatric specialization. In the analyzed area there is a psychiatric ward (one of the branches of Healthcare Center Łuków). Other mental disorders treatment facilities with the shortest travel time for an EMS team with a patient are located in the neighboring districts:
- Radzyń Podlaski – 26 km,
- Siedlce – 32 km.

The analysis included events in which the EMS team could not refer the patient to the closest (above-mentioned facilities) due to the lack of references for treatment in certain situations:

- a minor patient with mental disorders,
- a patient with mental disorders with a positive SARS-CoV-2 result.

Criteria for exclusion from the analysis

Interventions, the cause of which was initially classified as the patient's mental disorder, were rejected after EMS verification at the scene:

- emergency call due to mental disorders – no patient at the place of call (EMS team cannot confirm symptoms),
- intervention regarding a patient in a state of intoxication at home or in a public place, not manifesting mental disorders, e.g., "lying – intoxicated," "after consuming alcohol lying at the entrance to the store",
- intervention regarding a patient with alcohol withdrawal syndrome (AWS) and alcohol dependence syndrome (ADS) when these syndromes caused somatic symptoms (e.g., palpitations, chest pain, tremors, vomiting, abdominal pain),
- calls saying: "drank denatured alcohol, feeling unwell" with a diagnosis of T51, "probably dead" with a diagnosis of F10, "without contact, under the influence of alcohol," "unconscious, smell of alcohol",
- a patient treated psychiatrically, but a specific call to the EMS was due to somatic reasons or an injury not related to mental disorders (e.g., "renal colic attack – patient treated for depression," "treated for schizophrenia, upper limb injury",
- behavioral disorders, agitation, illogical contact with the patient as a result of hypoglycemia diagnosed with group "E" or cerebrovascular dis-

eases diagnosed with group "I" (e.g., transient ischemia of blood vessels in the brain),

– the patient left the place of intervention before the arrival of the EMS team, false calls with information about mental disorders,
– redirection of the EMS team during the journey to mental disorders to another more urgent call with a higher priority.

Results

Using the inclusion and exclusion criteria from the analysis, 862 EMS interventions were included: 442 in period I and 420 in period II. MRS Łuków in the 2-year period of the analysis carried out 14,972 orders for EMS intervention, 7,531 (period I) and 7,441 (period II), respectively. 862 events included in the analysis accounted for 5.75% of the total number of interventions, 442 (5.86%) – period I and 420 (5.64%) – period II, respectively.

Table 1 presents the general characteristics of interventions related to psychiatric conditions. During the pandemic, interventions with the police were significantly more frequent than in the period before the pandemic (OR = 1.48, 95% CI: 1.11; 1.96). For the remaining variables, no statistically significant differences were observed.

Table 1. **General characteristics of EMS interventions to psychiatric conditions**

Variable		Pre-Pan (N = 431)		Pan (N = 415)		χ^2	p-value*
		N	%	N	%		
Medical team							
	P1	158	36.7	166	40.0	1.203	0.752
	P2	85	19.7	73	17.6		
	S1	90	20.9	84	20.2		
	S2	98	22.7	92	22.2		
Time							
	7.00–18.59	253	58.7	255	61.5	0.664	0.415
	19.00–6.59	178	41.3	160	38.6		
Gender							
	Female	135	31.3	120	28.9	0.582	0.446
	Male	296	68.7	295	71.1		
Place							

table continued on the next page

	Village	260	60.3	252	60.7	0.014	0.906
	City	171	39.7	163	39.3		
Procedure							
	PER	300	69.6	281	67.7	0.353	0.553
	EMC	131	30.4	134	32.3		
Pharmacology							
	No	389	90.3	365	88.0	1.157	0.282
	Yes	42	9.7	50	12.1		
Police							
	No	297	68.9	249	60.0	7.333	0.007
	Yes	134	31.1	166	40.0		
Alcohol							
	No	316	73.3	285	68.7	2.216	0.137
	Yes	115	26.7	130	31.3		
Drugs							
	No	395	91.7	370	89.2	1.515	0.218
	Yes	36	8.4	45	10.8		

* chi-square test, PER – psychiatric emergency room, EMC – emergency medical centre

Table 2 presents the mean age of the patients who underwent the intervention in the period before and during the pandemic. The age of the patients did not differ significantly in periods I and II.

Table 2. **Age of the patients from the interventions included in the analysis**

	Pre-Pan (N = 431)		Pan (N = 415)		$t_{df = 844}$	p-value*
	M	SD	M	SD		
Age	43.84	17.22	43.95	16.91	-0.093	0.926

M – mean, SD – standard deviation, * Student's t-test

Figure 1 shows the percentage share of interventions in the period before (Pre-Pan) and during the pandemic (Pan) in the subsequent months of the year ($\chi^2 = 28.094$, $p = 0.003$).

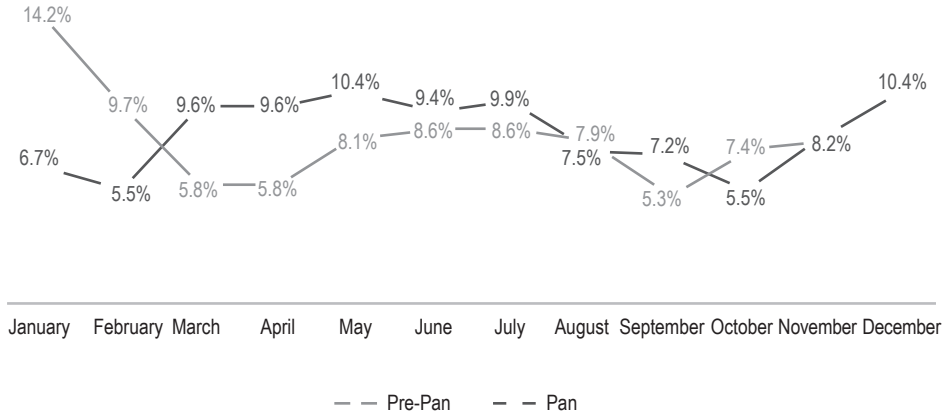

Figure 1. **Contribution of EMS interventions to psychiatric conditions in individual months in the 1st and 2nd period of the analysis**

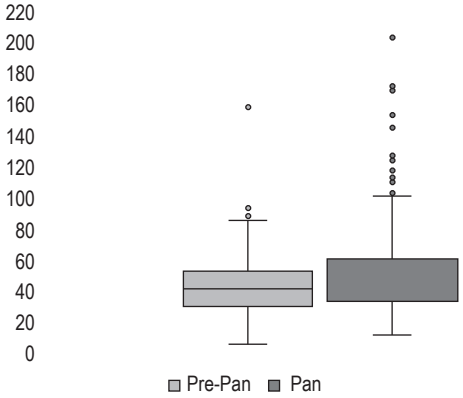

Figure 2. **Average time of intervention in the period before and during the pandemic (M: 42.6 vs. 50.2; t = – 4.797; p <0.001)**

The data presented in Figure 2 illustrate the average time of EMS intervention to events with calls that meet the study inclusion criteria. EMS intervention time consists of the following: arrival from the receipt of the notification, the time of the appropriate intervention (interview, medical procedures, decision on the procedure, time of possible transport to the medical facility, time of patient transfer). In both periods, most of the interventions are within the average duration of 40–60 minutes.

Data in Figure 3 and Table 3 present the most frequently used medical diagnoses of ICD-10 during EMS interventions in period I and II. Table 4 relates to the structure of the frequency of diagnoses in the studied groups. The number of classified diagnoses in both period I and II is higher than the total number of EMS interventions in both periods. The *N* numbers shown in the graphs (Figure 3) do not equal the number of

events as some events had two ICD-10 codes entered. The most frequently used ICD-10 codes in the events included in the analysis are:

- F10 – Mental and behavioral disorders due to use of alcohol,
- F20 – Paranoid schizophrenia,
- F99 – Mental disorders, not otherwise specified.

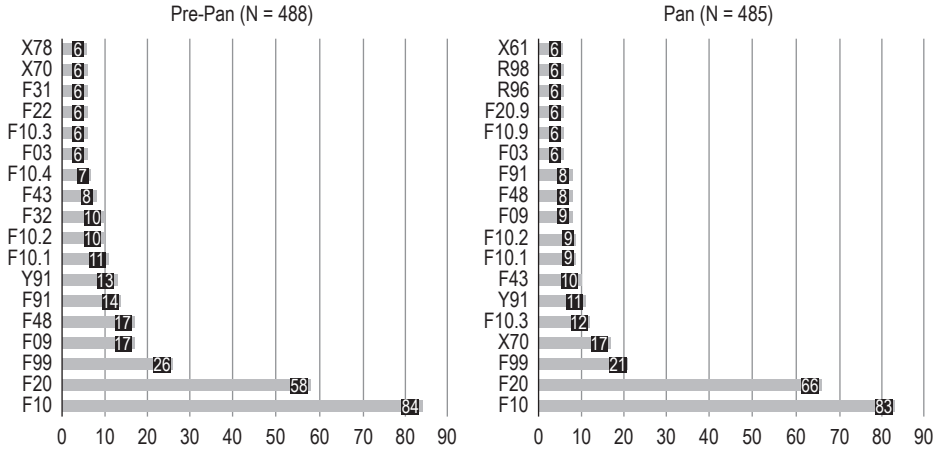

Figure 3. **ICD-10 diagnosis categories in the period before and during the pandemic (data for N >5)**

Table 3. **Analysis of the structure of the frequency of ICD-10 diagnoses in the studied groups**

ICD-10	Pre-Pan (N = 489)		Pan (N = 485)		$\chi^2_{df=27}$	p-value*
	N	%	N	%		
F10	84	17.18	83	17.11	41.626	0.036
F20	58	11.86	66	13.61		
F99	26	5.32	21	4.33		
F09	17	3.48	8	1.65		
F48	17	3.48	8	1.65		
F91	14	2.86	8	1.65		
Y91	13	2.66	11	2.27		
F10.1	11	2.25	9	1.86		
F10.2	10	2.04	9	1.86		
F32	10	2.04	3	0.62		

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F43	8	1.64	10	2.06	41.626	0.036
F10.4	7	1.43	2	0.41		
F03	6	1.23	6	1.24		
F10.3	6	1.23	12	2.47		
F22	6	1.23	2	0.41		
F31	6	1.23	4	0.82		
X70	6	1.23	17	3.51		
X78	6	1.23	2	0.41		
F10.8	5	1.02	4	0.82		
F10.9	5	1.02	6	1.24		
F69	5	1.02	2	0.41		
Z03.2	5	1.02	2	0.41		
R96	3	0.61	6	1.24		
R98	3	0.61	6	1.24		
F20.9	2	0.41	6	1.24		
X61	2	0.41	6	1.24		
F06.3	1	0.20	5	1.03		
Other	147	30.06	161	33.20		

The data presented in Table 3 represent the total number of $N = 489$ and $N = 485$, which differs from the number of cases as some patients were assigned two ICD-10 codes in MRC. ICD-10 codes appearing less frequently than 5 times were assigned to the group "other" in both compared cohorts. The most common are diagnoses from the "F" group, constituting 80.5% of all diagnoses in the Pre-Pan period and 77.9% in the Pan period. In this group, mental illnesses, depression and alcohol use disorders are diagnosed. Diagnoses from the "R" group accounted for 3.8% in the Pre-Pan period and 5.7% in the Pan period, they are mainly related to the patient's death before the arrival of the EMS, somatic disorders and pain complaints entered in the second position as a supplementary code. Diagnoses from the "X" group accounted for 4% in the Pre-Pan period and 4.51% in the Pan period. Diagnoses from other groups accounted for <12% in the Pre-Pan and Pan period.

The number of EMS interventions that meet the criteria for inclusion in the analysis is not the same as the number of patients (Table 1, variable: Gender). In the analyzed period, EMS teams intervened some patients several times. 11 interventions to the same patients occurred in the Pre-Pan period, and 5 in the Pan period. Of the 16 interventions to the same patients, 13 regarded males. Of these, 10 were related to

patients diagnosed with F20 (paranoid schizophrenia), 4 to patients diagnosed with F10 (mental disorders due to use of alcohol), and 1 to a patient diagnosed with F12 (psychiatric disorders due to use of cannabinoids).

Discussion of the results

The mental health consequences of declaring a panepidemic and sustaining it for a long time seem obvious. Isolation, limitations, restrictions introduced and maintained for a long time, and the lack of a specific end date of burdens, can lead to significant changes in the psyche, from anxiety, depressed mood to depression and exacerbation of previously diagnosed mental illnesses. Going back almost 10 years to the MERS (Middle East Respiratory Syndrome) epidemic in 2012–2014 of a disease also caused by a coronavirus, it was confirmed that the development of the disease had an impact on the mental health of many people in the areas affected by the epidemic. It should be noted that the development of the MERS epidemic was not as dynamic as SARS-Cov-2, although it covered many countries, it did not cause as many infections and deaths [7].

The dynamics of the increase in EMS interventions to psychiatric patients is not the same as the pandemic waves occurring in Poland. The peak of the first wave of cases was in September 2020, and the peak of the second wave of the pandemic was in November 2020. In the period from March 2020 to March 2021, 1,683,524 cases of SARS-CoV-2 infection were reported in Poland [8]. In our analysis, the months related to the so-called subsequent waves of the epidemic account for no more than 10% of the analyzed events. The number of mental disorders did not increase according to the analysis from 2020. Nadolny et al. [9], based on ICD-10 diagnoses, found that the number of mental disorders in patients during the pandemic did not increase compared to 2018 and 2019. In our study, there are no significant differences in the frequency structure of ICD-10 medical diagnoses in the 3 most frequently used groups – "F," "R" and "X."

In 2021, Babicki and Mastalerz-Migas [10] noticed the negative impact of the pandemic on the mental condition of Polish society. Based on an author's questionnaire, they showed that many Poles experience anxiety. Women are statistically more common in this group. Similar observations were made by Izdebski and Mazur [11] in a study published in 2021. The author concluded that the deterioration of mental health affects women more often, and the main aggravating factor is having a true vision of the deterioration of one's professional situation. In our own analysis, mental symptoms in NEMS practice were manifested more often by men both during the pandemic and before, while the occupation and economic situation of patients was not the subject of the study.

During the epidemic, there has been an increase in the number of younger psychiatric patients. This may be due to the fact that younger people cope with isolation worse when they cannot be active in sports and social terms. Older people probably adapt to restrictions more easily, and the subjective feeling of threat among older people is

lower. The age of majority is an important factor in admitting to hospital and consenting to hospitalization. Manowska and Gałecki [12] discuss this important aspect of hospital treatment, when, in practice, the admission of a minor to a psychiatric hospital is associated with numerous doubts. In our analysis, there were 40 interventions to patients under 18 years of age, in 7 cases requiring transport to a distant juvenile center.

During the pandemic, the process of admitting a patient with a disease other than COVID-19 to hospital was often difficult. This applies not only to mental disorders, but also to people with other diseases. In many places, hospital wards with different specializations have been reorganized into wards for patients with COVID-19. Łuc et al. [13] mention numerous consequences of the pandemic for the elderly with dementia, with Alzheimer's disease, who are often residents of long-term care facilities. The authors point out that people with dementia increase the risk of virus transmission, mainly due to non-compliance with sanitary and epidemiological requirements, so they require special care. For patients in care facilities, therapy should be adjusted to the patient taking into account the mental state and existing chronic diseases (e.g., chronic heart failure, metabolic diseases) [14].

Stress and general anxiety related to COVID-19 affecting healthcare workers are described by Pearman et al. [15]. In their work from 2020, they concluded that healthcare workers were at increased risk of experiencing a range of negative outcomes for mental well-being. Negative effects on mental health among medical personnel have been observed all over the world [16, 17]. In the report on the Wielkopolska Voivodeship from 2020, it was found a common experience among the respondents was a greater than usual experience of psychosomatic ailments as a consequence of stress. The study concerned employees of social assistance institutions [20]. Our own analysis did not include cases of COVID-19-related mental illness in healthcare professionals. Each patient qualified for analysis (EMS intervention) was anonymous (which means no data on education and profession).

In a study from 2020, Heitzman [19] points to a group of people who do not cope with the trauma of the COVID-19 pandemic and later reveal severe symptoms. These are people without social support, suffering from other mental and somatic disorders, previous traumas, without access to reliable information. Different groups of people reveal different mental needs, different symptoms of mental discomfort, mental fatigue and stress. Among the various groups, the author lists the group of people over 60 and residents of nursing homes as particularly at risk. This is confirmed by another study from 2020 [20] in which the authors refer to public health emergencies in which the safety and well-being of both individuals and the entire population affected by the COVID-19 pandemic are at risk. The elderly are mentioned as an example. In our study, interventions to people aged 60 and over occurred 78 times in the pre-pandemic period and 85 times in the pandemic period. No significant differences were found in the two compared periods: before the pandemic and during the pandemic, both in terms of the age of patients and other criteria (the number of calls, reasons for calls).

Based on the analysis of the causes of interventions in period II, it was found that psychiatric patients, due to changes caused by the disorder, become less vigilant to other threats related, for example, to the effects of the SARS-CoV-2 epidemic. In many cases the medical dispatcher (MD) found it difficult to collect the epidemiological interview. As a result, he/she placed a warning in the comments for the EMS: "COVID interview difficult to collect", "COVID interview ???". Similar observations come from another work from 2020 [21]. People prone to mental disorders are particularly vulnerable to the effects of a pandemic, it is more difficult for them to adapt to these threats as they are not fully aware of the threat.

Tappenden et al. [22] showed that the overwhelming sense of isolation or loss of social relationships has an impact on the deterioration of cognitive functions, mood and sensitivity to the threat of a pandemic. An interesting statement can also be found in the 2020 WHO report [23] on mental health: "Stigmatization related to mental health problems may result in a reluctance to seek help for both COVID-19 and mental health disorders."

EMS interventions in the analyzed periods were partially associated with psychological disorders leading to a direct threat to life and loss of life. Our study found an increase in this type of disorders during the pandemic (period II). This is evidenced by the ICD-10 diagnosis codes presented in Table 4 concerning suicide attempts with the diagnosis, e.g., X61 (intentional drug abuse), X70 (intentional self-harm by hanging), X78 (self-harm), and successful suicides. In the latter group, the diagnoses R96, R98 (sudden death, unexpected before the arrival of the EMS) were entered, and in two cases there was a farewell letter left in a visible place. This shows the determination of the person who took his/her own life.

Among the most frequently typed ICD-10 diagnoses during EMS interventions were F10 – associated with alcohol abuse (in both compared periods), F20 – schizophrenia, exacerbation of symptoms, often caused by the lack of access to a doctor on an outpatient basis, lack of proper family care, and irregular intake of prescribed medications. The frequency of the above-mentioned medical diagnoses does not differ significantly before and during the COVID pandemic, which shows that these are serious threats to the mental health of this region of Poland, and the burden and stress associated with the epidemic are not the cause of the intensification of these problems.

Conclusions

The COVID-19 pandemic did not have a significant impact on the number of EMS interventions related to mental disorders in the analyzed area, the average duration of EMS interventions to psychiatric conditions slightly increased during the epidemic period. In both analyzed periods, men were significantly more likely to be EMS patients. The age of the patients included in the analysis did not change significantly before and during the pandemic. Events caused by alcohol abuse and exacerbations of schizophrenia symptoms both before and during the pandemic have the largest share

in both analyzed periods. The structure of medical diagnoses does not differ in the analyzed periods, diagnoses from the "F" group before the "R" and "X" groups dominate. Diagnoses from other groups indicate current ailments, they appear in medical records as a supplement to the initial disease. When the emergency call concerned the same patient, only the diagnoses from the "F" group were used.

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Address: Łukasz Dudziński
John Paul II University in Biała Podlaska
21-500 Biała Podlaska, Sidorska Street 95/97
e-mail: lukasz_dudzinski@o2.pl