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PRACA ORYGINALNA
ORIGINAL PAPER

Seasonality of interventions in a psychiatric emergency department

Sezonowość interwencji w warunkach psychiatrycznej izby przyjęć

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ABSTRACT

INTRODUCTION: The mental health of individuals is influenced by a complex interplay of biological, social, environmental, and economic factors. Mental disorders such as depression, anxiety, and insomnia affect a significant proportion of the population in both the European Union and Poland. Previous research highlights that seasonality – particularly during autumn, winter, and heatwaves – can exacerbate psychiatric symptoms and raise demand for psychiatric services. This study examines the seasonal distribution of emergency psychiatric admissions.

MATERIAL AND METHODS: A retrospective analysis was conducted on 4,759 cases of emergency psychiatric admissions at the Katowice-Szopienice facility in 2019. The collected data included date of admission, admission mode, patient sex, age, and ICD-10 diagnosis. Statistical analysis was performed using Microsoft Excel 365, with the chi--square test being applied at a significance level of $\alpha = 0.05$.

RESULTS: A total of 2,285 emergency psychiatric admissions were analyzed. Seasonal fluctuations were observed, with the highest number of admissions occurring during the summer – especially in August – and the lowest in winter, particularly in February. Statistically significant differences were found in the total number of admissions, as well as among male patients and those with diagnoses related to psychoactive substance use (F10–F19). Other age and diagnostic groups did not demonstrate significant seasonal variation. Despite the lack of conclusive evidence across all groups, the findings suggest a potential influence of seasonal factors on the number of psychiatric interventions.

CONCLUSIONS: The peak of emergency psychiatric admissions occurs during the summer months, particularly among male patients and individuals with substance use disorders (F10–F19), while the winter months demonstrate the lowest admission rates. Seasonal diagnostic variations were also observed: in autumn, there are more admissions of patients with F70–F98 diagnoses, while the most pronounced seasonal fluctuations, comparing both calendar and meteorological seasons, were noted in schizophrenia spectrum disorders (F20–F29).

KEYWORDS

mental disorders, gender differences, seasonality, psychiatric admissions, psychoactive substances, medical statistics

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STRESZCZENIE

WSTĘP: Stan psychiczny człowieka jest kształtowany przez złożone czynniki biologiczne, społeczne, środowiskowe i ekonomiczne. Zaburzenia psychiczne, takie jak depresja, lęki czy bezsenność, dotyczą znacznej części populacji Unii Europejskiej i Polski. W badaniach wskazuje się również istotny wpływ sezonowości – szczególnie jesienią, zimą i podczas upałów – na pogorszenie stanu zdrowia psychicznego oraz wzrost liczby interwencji psychiatrycznych. W badaniu przeanalizowano sezonowy rozkład przyjęć na oddziały psychiatryczne w nagłych przypadkach.

MATERIAŁ I METODY: Przeprowadzono analizę retrospektywną 4759 przypadków przyjęć na psychiatryczną izbę przyjęć w Katowicach-Szopienicach w 2019 r. Zebrane dane obejmowały datę przyjęcia, tryb przyjęcia, płeć, wiek pacjenta oraz rozpoznanie ICD-10. Do analizy statystycznej wykorzystano program Microsoft Excel 365 oraz test chi-kwadrat przy poziomie istotności $\alpha = 0,05$.

WYNIKI: Przeanalizowano łącznie 2285 nagłych przyjęć psychiatrycznych. Zaobserwowano wahania sezonowe, z największą liczbą przyjęć latem – szczególnie w sierpniu – a najmniejszą zimą, zwłaszcza w lutym. Istotne statystycznie różnice stwierdzono w ogólnej liczbie przyjęć, a także wśród mężczyzn i osób, u których rozpoznania dotyczyły używania substancji psychoaktywnych (F10–F19). W pozostałych grupach wiekowych i diagnostycznych zauważalne sezonowości nie osiągały poziomu istotności statystycznej. Mimo braku jednoznacznych dowodów we wszystkich grupach wyniki wskazują na potencjalny wpływ czynników sezonowych na liczbę interwencji psychiatrycznych.

WNIOSKI: Szczyt przyjęć na oddziały psychiatryczne w trybie nagłym przypada na miesiące letnie, szczególnie wśród pacjentów płci męskiej i osób z zaburzeniami związanymi z używaniem substancji psychoaktywnych (F10–F19), natomiast w miesiącach zimowych wskaźnik przyjęć jest najniższy. Zaobserwowano również sezonowe różnice diagnostyczne – jesienią wzrasta liczba przyjęć pacjentów z rozpoznaniami F70–F98, natomiast największe wahania sezonowe, porównując zarówno pory roku kalendarzowego, jak i meteorologicznego, dotyczą zaburzeń schizofrenicznych (F20–F29).

SŁOWA KLUCZOWE

zaburzenia psychiczne, różnice płciowe, sezonowość, przyjęcia psychiatryczne, substancje psychoaktywne, statystyka medyczna

INTRODUCTION

The mental state of individuals is determined by numerous factors, whether biological (genetic and sex-related), individual (past illnesses), familial and social (support or lack thereof), or economic and environmental (social status and living conditions, including climate) [1]. In 2011, the European College of Neuropsychopharmacology and the European Brain Council published a report indicating that each year, 164.8 million residents of the European Union (38.2%) experienced mental health problems. According to the data, the most common mental disorders were anxiety disorders (14%), insomnia (7%), and depression (6.9%). The EZOP II study conducted in Poland between 2011 and 2018 revealed that 26.46% of respondents had experienced at least one episode of any mental disorder in their lifetime. Among these, 16.07% were neurotic and related disorders, 4.65% were affective disorders, 11.63% were externalizing disorders, and 0.42% were experiences close to psychotic episodes unrelated to alcohol use or dreaming [2,3]. The literature describes many conditions associated with seasonal fluctuations. One of these is seasonal affective disorder, which typically occurs in autumn and winter, with remission in spring and summer [4,5]. The development of these disorders is linked to responses to day/night cycles and seasonal changes in day length, particularly in lifestyles that are independent of dawn and dusk cues [6]. In addition to reduced motivation and mood, the lower amount of sunlight also affects hormonal secretion and gene expression [6,7]. Patients' health can also deteriorate in summer, when temperatures are higher. Research on this correlation has shown that patients with depression and impaired cognitive function are more sensitive to high temperatures, which increases their risk of death [8]. The aim of our study was to determine the dynamics in the number of psychiatric interventions in a hospital emergency room throughout different times of the year and to possibly gain a better understanding of the seasonality of emergency psychiatric interventions in the hospital. Although seasonality is widely described in the international literature, our study adds novel evidence by focusing on Poland, disaggregating seasonal variation across the International Statistical Classification of Diseases and Related Health Problems (ICD-10) diagnostic groups, documenting sex-specific differences in timing and volume, and visualizing differences across age groups.

MATERIAL AND METHODS

The analysis was conducted using anonymized datasets obtained from the psychiatric emergency department at the K. Czumy Center of Psychiatry in Katowice-Szopienice. The collected data included date of admission, mode of admission, sex, age, and the preliminary primary diagnosis. All admissions and suicide cases from January 1, 2019 to December 31, 2019 were included. The total number of admissions was 4,759.

The data were analyzed using Microsoft Excel 365, and statistical calculations were performed with breakdowns by month, astronomical season, and meteorological season. For statistical analysis at a significance level of $\alpha = 0.05$, an interactive calculation tool for chi-square tests was used (https://www.medcalc.org/calc/chisquared-1way.php). The Bioethics Committee of the Medical University of Silesia in Katowice determined that it was not necessary to obtain consent in order to conduct this study.

RESULTS

Sample characteristics

Data from 4,759 admissions were analyzed, of which 2,474 (52%) were planned admissions. Only emergency admissions were included in the analysis, which totaled 2,285 (48%). Patients were additionally categorized by sex, age, and primary preliminary diagnosis according to the ICD-10 [9]. A detailed description of the study sample is presented in Table I.

Table I. Characteristics of the study group

Characteristics	Quantity	Percentages (%)
Sex		
Women	895	39.17%
Men	1,390	60.83%
Diagnosis according to ICD-10		
F00–F09	199	8.71%
F10–F19	828	36.24%
F20–F29	388	16.98%
F30–F49	658	28.80%
F50–F59	2	0.09%
F60–F69	46	2.01%
F70–F98	43	1.88%
F99	2	0.09%
Other	119	5.02%
Age		
18–44	1,401	61.31%
45–64	630	27.57%
65+	251	10.98%
Unspecified	3	0.13%

ICD-10 – International Statistical Classification of Diseases and Related Health Problems

Analysis of the total number of admissions and admissions by sex

The highest number of emergency admissions occurred in August, exceeding the number in February by 71 patients, which represents a 1.5-fold increase compared to that month; this difference was statistically significant. Summer, both in meteorological and calendar terms, was the season with the highest number of admissions.

A detailed overview of the seasonality of emergency admissions is presented in Figure 1.

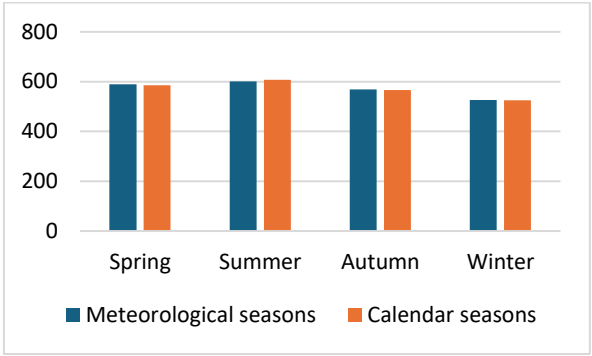

Fig. 1. Emergency admissions by meteorological and calendar season

Among female admissions, spring was the season with the highest number of admissions; however, this difference was not statistically significant. A detailed overview of the seasonality of female admissions is presented in Figure 2.

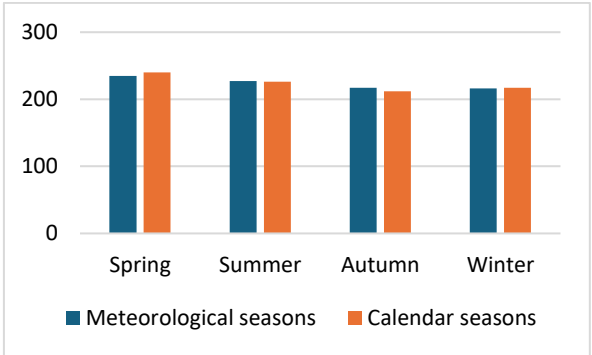

Fig. 2. Female admissions by meteorological and calendar season

Among male admissions, the lowest number was recorded in February, and the highest in August. There was an approximately 1.5-fold increase between these two months. The differences between months were statistically significant. While the differences between seasons were relatively smaller, they were also statistically significant. A detailed overview of the seasonality of male admissions is presented in Figure 3.

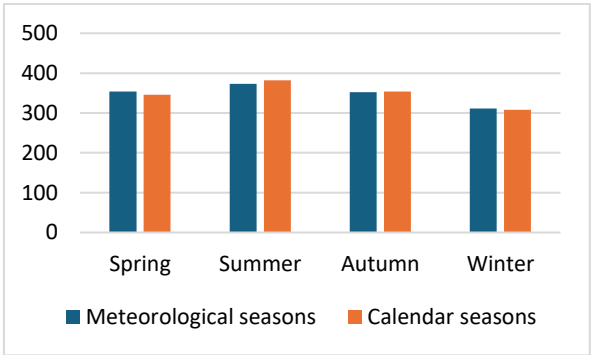

Fig. 3. Male admissions by meteorological and calendar season

The distribution of emergency admissions, including a breakdown by sex across individual months, meteorological seasons, and calendar seasons, is presented in Table II.

Table II. Distribution of emergency admissions by gender across individual months, meteorological seasons, and calendar seasons

Data		Number of emergency admissions	p	Number of female admissions	p	Number of male admissions	p
Months	December	207 (9.06%)	< 0.05*	75 (8.38%)	0.758	132 (9.50%)	< 0.05*
	November	177 (7.75%)		61 (6.82%)		116 (8.35%)	
	October	198 (8.67%)		77 (8.60%)		121 (8.71%)	
	September	194 (8.49%)		79 (8.83%)		115 (8.27%)	
	August	219 (9.58%)		82 (9.16%)		137 (9.86%)	
	July	181 (7.92%)		66 (7.37%)		115 (8.27%)	
	June	201 (8.80%)		79 (8.83%)		121 (8.71%)	
	May	191 (8.36%)		74 (8.27%)		117 (8.42%)	
	April	206 (9.02%)		87 (9.72%)		119 (8.56%)	
	March	192 (8.40%)		74 (8.27%)		118 (8.49%)	
	February	148 (6.48%)		68 (7.60%)		80 (5.76%)	
	January	171 (7.48%)		73 (8.16%)		99 (7.12%)	
Meteorological seasons	Spring	590 (25.82%)	0.825	235 (26.26%)	0.781	354 (25.47%)	0.117
	Summer	601 (26.30%)		227 (25.36%)		373 (26.83%)	
	Autumn	569 (24.90%)		217 (24.25%)		352 (25.32%)	
	Winter	526 (23.02%)		216 (24.13%)		311 (22.37%)	
Calendar seasons	Spring	586 (25.65%)	0.088	240 (26.82%)	0.568	346 (24.8%)	< 0.05*
	Summer	608 (26.61%)		226 (25.25%)		382 (27.48%)	
	Autumn	566 (24.77%)		212 (23.69%)		354 (25.47%)	
	Winter	525 (22.98%)		217 (24.25%)		308 (22.16%)	

* statistically significant

Analysis of admissions by diagnostic category

Seasonal differences in the number of admissions with diagnoses F00–F09 were particularly visible in meteorological seasons, with summer seeing the highest number of admissions, although the differences were not statistically significant.

Among admissions of patients with F10–F19 diagnoses, the highest numbers occurred in June and August, while the lowest were in January and February. This pattern is reflected in seasonal admissions, with the greatest number in summer and the fewest in winter. These differences were statistically significant. A detailed overview of the seasonality of admissions with F10–F19 diagnoses is shown in Figure 4.

The highest number of admissions of patients diagnosed with schizophrenia and schizotypal and delusional disorders occurred in September and March. The highest number of admissions with F20–F29 diagnoses was in spring, according to the meteorological seasons, and in summer according to calendar seasons. These differences were not statistically significant, but they seem interesting for the purposes of this article. A detailed overview of the seasonality of admissions with F20–F29 diagnoses is presented in Figure 5.

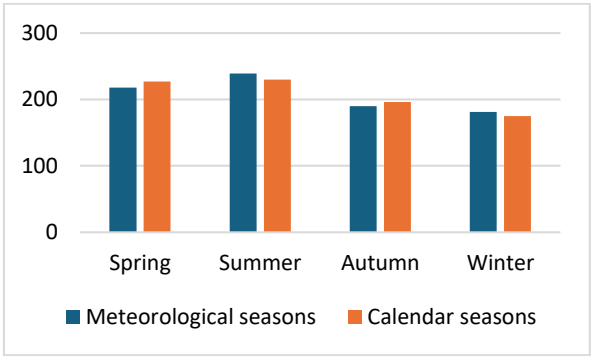

Fig. 4. Admissions of patients with F10–F19 diagnoses by meteorological and calendar season

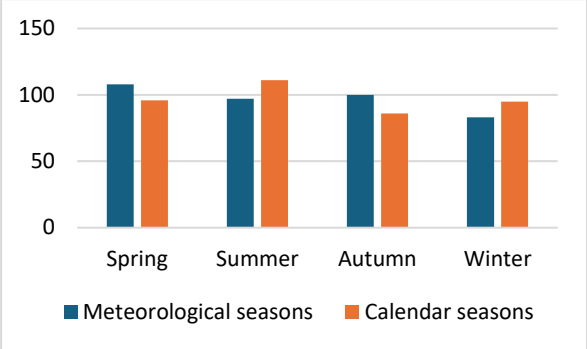

Fig. 5. Admissions of patients with F20–F29 diagnoses by meteorological and calendar season

Among admissions of patients with F30–F48 diagnoses, no clear seasonality was observed and the differences were not statistically significant.

Among admissions of patients with F60–F69 diagnoses, the highest numbers occurred in summer and autumn, while the lowest occurred in winter; however, these differences were not statistically significant.

The most admissions of patients with F70–F98 diagnoses occurred in November, which is reflected in both the meteorological and calendar seasons, with the greatest number of admissions coming in autumn. However, the differences were not statistically significant.

Among admissions of patients with other diagnoses, the lowest numbers occurred in spring, with a 1.5-fold increase compared to the meteorological season with the highest number: autumn. Although this difference appears large, it was not statistically significant.

The distribution of admissions by diagnosis across individual months, meteorological seasons, and calendar seasons is presented in Table III.

Analysis of admissions by age group

The highest number of admissions among patients aged 18–44 occurred in October, while in terms of seasons, the lowest number of admissions occurred in winter and the highest in summer. However, these differences were not statistically significant. A detailed overview of the seasonality of admissions among patients aged 18–44 is presented in Figure 6.

Among admissions of middle-aged patients, the lowest number was observed in October, with a 1.5-fold increase compared to the month with the highest number: August. In terms of seasons, the results differed between meteorological and calendar seasons. However, these differences were not statistically significant. A detailed overview of the seasonality of admissions of patients aged 45–64 is presented in Figure 7.

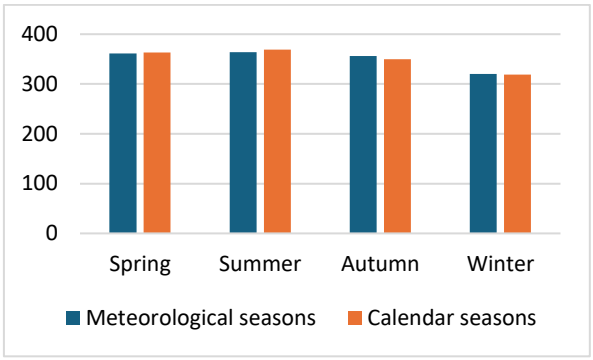

Fig. 6. Admissions of patients aged 18–44 by meteorological and calendar season

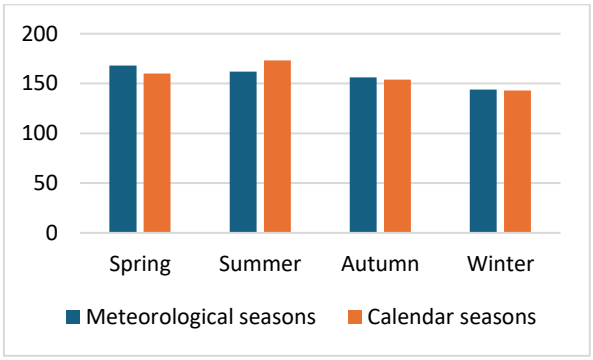

Fig. 7. Admissions of patients aged 45–64 by meteorological and calendar season

The highest number of admissions among patients aged 65 and over occurred in August and was 1.5 times higher than in February – the month with the lowest number. In terms of seasons, the fewest admissions occurred in autumn. However, these differences were not statistically significant. A detailed overview of the seasonality of admissions of patients aged 65 and over is presented in Figure 8. The distribution of admissions by age group across individual months and meteorological and calendar seasons is presented in Table IV.

The number of emergency admissions, excluding patients diagnosed with F10–F19, was analyzed; however, no statistically significant differrences were found. Detailed data are presented in Table V.

Table III. Distribution of admissions by diagnosis across individual months, meteorological seasons, and calendar seasons

Data		Number of admissions of patients with F00–F09 diagnoses	p	Number of admissions of patients with F10–F19 diagnoses	p	Number of admissions of patients with F20–F29 diagnoses	p	Number of admissions of patients with F30–F48 diagnoses	p	Number of admissions of patients with F60–F69 diagnoses	p	Number of admissions of patients with F70–F98 diagnoses	p	Number of admissions of patients with other diagnoses	p
Months	December	15 (7.54%)	0.211	84 (10.14%)	< 0.001*	27 (6.96%)	0.164	64 (9.73%)	0.825	5 (10.87%)	0.737	1 (2.33%)	0.287	11 (9.24%)	0.803
	November	21 (10.55%)		58 (7.00%)		23 (5.93%)		51 (7.75%)		4 (8.70%)		8 (18.60%)		12 (10.08%)	
	October	13 (6.53%)		71 (8.57%)		33 (8.51%)		55 (8.36%)		6 (13.04)		6 (13.95%)		14 (11.76%)	
	September	11 (5.53%)		61 (7.37%)		44 (11.34%)		60 (9.12%)		3 (6.52%)		4 (9.30%)		11 (9.24%)	
	August	24 (12.06%)		88 (10.63%)		34 (8.76%)		54 (8.21%)		5 (10.87%)		2 (4.65%)		12 (10.08%)	
	July	12 (6.03%)		62 (7.49%)		38 (9.79%)		53 (8.05%)		5 (10.87%)		4 (9.30%)		6 (5.04%)	
	June	22 (11.06%)		89 (10.75%)		25 (6.44%)		47 (7.14%)		3 (6.52%)		3 (6.98%)		11 (9.24%)	
	May	17 (8.54%)		77 (9.30%)		34 (8.76%)		53 (8.05%)		2 (4.35%)		2 (4.65%)		6 (5.04%)	
	April	12 (6.03%)		86 (10.39%)		31 (7.99%)		60 (9.12%)		5 (10.87%)		1 (2.33%)		9 (7.56%)	
	March	19 (9.55%)		55 (6.64%)		43 (11.08%)		58 (8.81%)		4 (8.70%)		5 (11.63%)		8 (6.72%)	
	February	12 (6.03%)		48 (5.80%)		29 (7.47%)		44 (6.69%)		0 (0%)		4 (9.30%)		11 (9.24%)	
	January	21 (10.55%)		49 (5.92%)		27 (6.96%)		59 (8.97%)		4 (8.70%)		3 (6.98%)		8 (6.72%)	
Meteorological seasons	Spring	48 (24.12%)	0.584	218 (26.33%)	< 0.05	108 (27.84%)	0.339	171 (25.99%)	0.806	11 (23.91%)	0.812	8 (18.60%)	0.087	23 (19.33%)	0.345
	Summer	58 (29.15%)		239 (28.86%)		97 (25%)		154 (23.40%)		13 (28.26%)		9 (20.93%)		29 (24.37%)	
	Autumn	45 (22.61%)		190 (22.95%)		100 (25.77%)		166 (25.23%)		13 (28.26%)		18 (41.86%)		37 (31.09%)	
	Winter	48 (24.12%)		181 (21.86%)		83 (21.39%)		167 (25.38%)		9 (19.57%)		8 (18.60%)		30 (25.21%)	
Calendar seasons	Spring	52 (26.13%)	0.892	227 (27.42%)	< 0.05	96 (24.74%)	0.345	169 (25.68%)	0.876	9 (19.57%)	0.218	6 (13.95%)	0.193	25 (21.00%)	0.449
	Summer	47 (23.62%)		230 (27.78%)		111 (28.61%)		164 (24.92%)		15 (32.61%)		10 (23.26%)		29 (24.37%)	
	Autumn	47 (23.62%)		196 (23.67%)		86 (22.17%)		169 (25.68%)		15 (32.61%)		16 (37.21%)		37 (21.09%)	
	Winter	53 (26.63%)		175 (21.14%)		95 (24.48%)		156 (23.71%)		7 (15.22%)		11 (25.58%)		28 (23.53%)	

*statistically significant

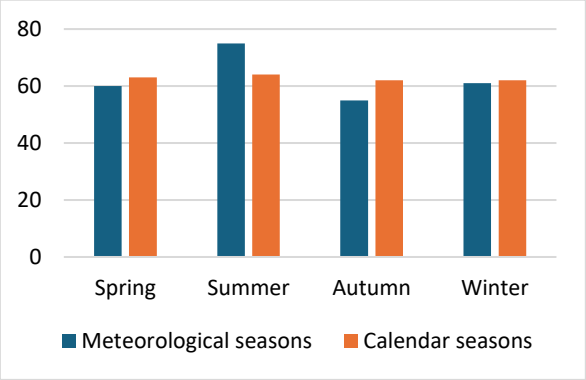

Fig. 8. Admissions of patients aged 65 and over by meteorological and calendar season

Table IV. Distribution of admissions by age group across individual months, meteorological seasons, and calendar seasons

Data		Number of admissions of patients aged 18–44	p	Number of admissions of patients aged 45–64	p	Number of admissions of patients aged 65+	p
Months	December	131 (9.35%)	0.083	54 (8.57%)	0.398	21 (8.37%)	0.208
	November	101 (7.21%)		57 (9.05%)		19 (7.57%)	
	October	136 (9.71%)		43 (6.83%)		19 (7.57%)	
	September	119 (8.49%)		56 (8.89%)		17 (6.77%)	
	August	122 (8.71%)		67 (10.63%)		30 (11.95%)	
	July	114 (8.14%)		51 (8.10%)		16 (6.37%)	
	June	128 (9.14%)		44 (6.98%)		29 (11.55%)	
	May	119 (8.49%)		53 (8.41%)		19 (7.57%)	
	April	125 (8.92%)		62 (9.84%)		19 (7.57%)	
	March	117 (8.35%)		53 (8.41%)		22 (8.76%)	
	February	90 (6.42%)		45 (7.14%)		13 (5.18%)	
	January	99 (7.07%)		45 (7.14%)		27 (10.76%)	
Meteorological seasons	Spring	361 (25.77%)	0.311	168 (26.67%)	0.572	60 (23.90%)	0.318
	Summer	364 (25.98%)		162 (25.71%)		75 (29.88%)	
	Autumn	356 (25.41%)		156 (24.76%)		55 (21.91%)	
	Winter	320 (22.84%)		144 (22.86%)		61 (24.30%)	
Calendar seasons	Spring	363 (25.91%)	0.235	160 (25.40%)	0.395	63 (25.10%)	0.998
	Summer	369 (26.34%)		173 (27.46%)		64 (25.50%)	
	Autumn	350 (24.98%)		154 (24.44%)		62 (24.70%)	
	Winter	319 (22.77%)		143 (22.70%)		62 (24.70%)	

Table V. Distribution of emergency admissions by sex and age category, excluding patients with diagnosis F10–F19, across individual months, meteorological seasons, and calendar seasons

Data		Number of emergency admissions	p	Number of female admissions	p	Number of male admissions	p	Number of admissions of patients aged 18–44	p	Number of admissions of patients aged 45–64	p	Number of admissions of patients aged 65+	p
Months	December	123 (8.44%)	0.602	60 (8.19%)	0.976	63 (8.70%)	0.289	71 (8.48%)	0.398	35 (8.66%)	0.068	17 (7.91%)	0.149
	November	119 (8.17%)		54 (7.37%)		65 (8.98%)		61 (7.29%)		43 (10.64%)		15 (6.98%)	
	October	127 (8.72%)		61 (8.32%)		66 (9.12%)		83 (9.92%)		28 (6.93%)		16 (7.44%)	
	September	133 (9.13%)		61 (8.32%)		72 (9.94%)		79 (9.44%)		38 (9.41%)		15 (6.98%)	
	August	131 (8.99%)		67 (9.14%)		64 (8.84%)		58 (6.93%)		46 (11.39%)		27 (12.56%)	
	July	119 (8.17%)		58 (7.91%)		61 (8.43%)		72 (8.60%)		35 (8.66%)		12 (5.56%)	
	June	112 (7.69%)		64 (8.73%)		48 (6.63%)		64 (7.65%)		22 (5.45%)		26 (12.09%)	
	May	114 (7.82%)		59 (8.05%)		55 (7.60%)		73 (8.72%)		24 (5.94%)		17 (7.91%)	
	April	120 (8.24%)		66 (9.00%)		54 (7.46%)		66 (7.89%)		40 (9.90%)		14 (6.51%)	
	March	137 (9.40%)		64 (8.73%)		73 (10.08%)		83 (9.92%)		35 (8.66%)		19 (8.84%)	
	February	100 (6.86%)		53 (7.23%)		47 (6.49%)		61 (7.29%)		26 (6.44%)		13 (6.05%)	
	January	122 (8.37%)		66 (9.00%)		56 (7.73%)		66 (7.89%)		32 (7.92%)		24 (11.16%)	
Meteorological seasons	Spring	371 (25.46%)	0.625	189 (25.78%)	0.862	182 (25.14%)	0.233	222 (26.52%)	0.334	99 (24.50%)	0.718	50 (23.26%)	0.292
	Summer	362 (24.85%)		189 (25.78%)		173 (23.90%)		194 (23.18%)		103 (25.50%)		65 (30.23%)	
	Autumn	379 (26.01%)		176 (24.01%)		203 (28.04%)		223 (26.64%)		109 (26.98%)		46 (21.40%)	
	Winter	345 (23.68%)		179 (24.42%)		166 (22.93%)		198 (23.66%)		93 (23.02%)		54 (25.12%)	
Calendar seasons	Spring	361 (24.78%)	0.490	194 (26.47%)	0.723	167 (23.07%)	0.258	213 (25.45%)	0.090	92 (22.77%)	0.159	56 (26.05%)	0.943
	Summer	382 (26.22%)		187 (25.51%)		195 (26.93%)		210 (25.09%)		116 (28.71%)		55 (25.58%)	
	Autumn	372 (25.53%)		178 (24.48%)		194 (26.80%)		214 (25.57%)		108 (26.73%)		50 (23.26%)	
	Winter	342 (23.47%)		174 (23.74%)		168 (23.20%)		200 (23.89%)		88 (21.78%)		54 (25.12%)	

DISCUSSION

The division of seasons into calendar-based and meteorological (climatic) categories proposed in our study resulted from the incomplete overlap of these periods and the differing rationales behind their classifications. The former takes into account the positions of sunrise and sunset on the horizon, while the latter was established by meteorologists and climatologists in order to calculate statistical averages – ensuring that the same time period is always compared – since astronomical and thermal seasons, whose dates vary, did not meet these requirements [10,11].

One such study was conducted in Perugia, Italy between 2011 and 2014. The results indicated that the most-represented group of patients presenting to the emergency department suffered from neurotic, stress--related, and somatoform disorders [12]. The findings from that study differ somewhat from ours. In Katowice, the highest number of acute admissions involved patients presenting with substance use disorders, whereas in Perugia, neurotic, stress-related, and somatoform disorders were the most prevalent. These discrepancies may be attributed to sociocultural differences between the two countries. The seasonality observed in our study – peaking during the spring and summer months – was strongly influenced by the previously mentioned predominant group of patients with diagnoses from the F10–F19 category. After recalculating the statistics to exclude this group, the seasonality for the remaining diagnostic categories shifted toward meteorological autumn, while remaining in calendar summer. These changes were particularly evident among the men. For the women, the peak remained consistently in the spring. The highest numbers of patients aged 45–64 appeared during meteorological spring and calendar summer. However, after excluding patients with F10–F19 diagnoses, this trend shifted toward meteorological autumn, while remaining in calendar summer. The higher number of interventions during this time of year may be related to changes in daylight exposure, which influence the regulation of circadian rhythms and thus may influence neurobiological processes [13].

Another study conducted between January 2021 and February 2023, also in Italy, examined the impact of heatwaves on emergency department admissions due to mental disorders [14]. The results revealed a clear pattern, showing a higher number of patients during hot months and significantly fewer during colder months. Such correlations were particularly evident among patients diagnosed with major depression, bipolar affective disorder, personality disorders, and schizophrenia. Aside from the increased number of patients with personality disorders during the summer months, our findings do not align with these results. In Katowice, the highest number of emergency hospital admissions for depressive disorders and bipolar affective disorder occurred in December, while the largest number of patients with schizophrenia and delusional disorders were admitted in September. These differences may be explained by differences in latitude. In Poland, which is located further from the equator, the fewer daylight hours during winter may play a key role, contributing to the development of seasonal depression. The correlations identified by the Italian researchers were particularly prominent in the 50–59 age group, whereas in our findings, the largest number of patients aged 65 and older was observed during the meteorological summer.

A study conducted in the state of Georgia, in the southern United States, aimed to investigate whether the switch to daylight saving time, which disrupts circadian rhythms, has an impact on mental and behavioral health [15]. Although no such relationship was found, another equally important aspect was noted – namely, an increase in the number of patients with depressive disorders in emergency departments during the spring and summer seasons. Similar findings were reported by the aforementioned researchers from Italy, suggesting a deterioration in the condition of patients with affective disorders during periods of elevated temperatures in the Northern Hemisphere at similar latitudes. Our results are consistent with the observed increase in the number of patients with depressive disorders during the spring period; however, during the meteorological summer, this group of patients was the least represented.

A nationwide study conducted in South Korea examined the impact of rising temperatures between June and September on the mental health of individuals with intellectual disabilities, autism, and psychiatric disorders such as schizophrenia, bipolar affective disorder, recurrent depressive disorder, schizoaffective disorder, obsessive-compulsive disorder, Tourette syndrome, and narcolepsy. During this period, a higher number of patients was observed compared to other times of the year, which may indicate poorer adaptation to rising temperatures among the aforementioned groups. The Korean researchers suggest that individuals with these disorders should be included in the high-risk group for heat exposure. However, these findings cannot be directly applied to the Polish context, where the seasonality of patients with those diagnoses varied across different times of the year [16]. In our study, we did not observe an increase in the number of patients with schizophrenia and delusional disorders during the summer; such an increase occurred in the winter period. Similarly, for affective and neurotic disorders, our results did not indicate a higher number of patients during the summer. The peak in visits for patients with the aforementioned conditions occurred during the meteorological spring.

The analysis revealed a similar overall seasonal pattern in men and women, but the severity of the changes varied between the sexes. During the autumn and winter period, the increase in admissions was more pronounced in men in the younger age group (18–24

years), while for women, it was particularly pronounced in the first quarter of the year (January–March), especially in the 25–64 age group. In the oldest age group (> 65 years), seasonal patterns were similar for both sexes, with minor differences in severity [17]. In the entire population, marked seasonal fluctuations were observed, with peaks in January and June and a trough in December. However, for individuals with schizophrenia, no significant differences were found between men and women [18]. Our results indicate the presence of seasonality in psychiatric emergency rooms among men, with a peak during the summer season, specifically in August. However, no statistically significant results were obtained for women. Among patients with F10–F19 diagnoses, statistical significance was observed at the level of $p < 0.001$. The highest number of cases was observed in summer months – June and August – in both calendar and meteorological seasons. In both analyses, statistical significance was achieved at the level of $p < 0.05$. The higher seasonal fluctuations in psychiatric admissions among men during the summer may be due to a combination of biological, environmental, and social factors [19]. High temperatures and prolonged exposure to daylight can lead to disruptions in circadian rhythms, increased irritability, and impulsivity, which affects men more severely [20]. Furthermore, the summer months are associated with greater consumption of alcohol and other psychoactive substances, as well as a higher incidence of risky behaviors, which are more common in men than in women [21]. Unlike autumn, which tends to promote depressed mood and withdrawal (more often observed in women), summer is associated with an escalation of agitation, interpersonal conflicts, and emergency crises, which may explain the peak in hospitalizations in this group [22].

Every study has its limitations. An important factor in the context of seasonality in psychiatric emergency departments is the holidays falling at certain times of the year. This issue was addressed by researchers from Israel, who found in their study that the demand for urgent psychiatric services in hospital emergency departments may be associated with seasonality, particularly among the Israeli population, which is predominantly of Jewish origin [23]. In Poland, the majority of the population (91.9%) are members of the Roman Catholic Church, and 98% declare that they maintain Catholic holiday traditions and customs, which may influence hospital admissions during those times of the year – a factor that was not accounted for in our study [24,25]. Another limitation of the study is that the empirical material was obtained exclusively from a single psychiatric emergency department located in a densely populated urban area, which precludes generalization of the results to populations living in rural regions. Furthermore, the analysis did not consider the potential influence of environmental or socioeconomic factors. It should also be emphasized that some diagnostic groups, such as F50–F59 and F99, are characterized by small numbers, limiting their representativeness. The study area is located in southern Poland in the temperate climate zone, experiencing meteorological conditions typical of this type of climate. Furthermore, the analysis did not account for the potential influence of environmental or socioeconomic factors. Additionally, admissions were analyzed over the course of a single year; a broader perspective might be gained by examining seasonality over multiple consecutive years. A strength of the study is the large number of interventions during the study period. Furthermore, the study period falls outside the COVID-19 pandemic, which appears to be advantageous in the context of the variables under discussion.

The frequency of interventions in psychiatric emergency rooms should be analyzed in multi-year studies encompassing multiple psychiatric facilities. Such an approach would enable more generalized conclusions, provide data on seasonal variations in patient numbers, and allow for an assessment of the psychiatric care system's preparedness for potential changes in service demand.

CONCLUSIONS

1. The largest proportion of emergency interventions involved patients admitted due to mental and behavioral disorders resulting from psychoactive substance use. The peak number of patients with these diagnoses occurred during the summer.
2. A distinct peak in the number of patients with F70–F98 diagnoses was observed in the autumn, during which the number of cases doubled compared to other seasons.
3. Throughout the year, the men were more frequently admitted to the emergency department, accounting for over 60% of all patients, which was particularly evident in the summer. Among the women, no significant seasonal fluctuations were observed.
4. Summer had the highest number of emergency admissions, while the fewest admissions occurred during the winter.
5. The most significant fluctuations between calendar and meteorological seasons were observed in patients with schizophrenia and schizotypal and delusional disorders.
6. The highest number of patients aged 65 and older appeared during the meteorological summer, and the lowest during the meteorological autumn. For calendar seasons, the number of patients in this age group remained nearly the same.
7. The months with the highest number of emergency admissions were December and April (206 patients each), while February had the lowest number of such admissions (148 patients).

Authors' contribution

Study design – M. Stencel, B. Pilarski, S. Florek, R. Pudlo, M. Pudlo
Data collection – M. Pudlo
Data interpretation – M. Stencel, B. Pilarski, S. Florek
Statistical analysis – M. Stencel, S. Florek
Manuscript preparation – M. Stencel, B. Pilarski, S. Florek, R. Pudlo
Literature research – B. Pilarski

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