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Calls for Emergency Medical Service and Synoptic Conditions in Stargard Szczeciński Province

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Abstract

The assessment of weather conditions on days with registered calls for emergency medical service (EMS) was made with the use of weather charts at the level of 850 hPa, 00 UTC provided by the German Weather Service (www.wetterzentrale.de/topkarten/tkfaxbraar.htm). Synoptic situations on days with registered calls for EMS were categorized into 13 weather types according to the German Weather Service. This paper analyses the number of calls for EMS recorded on individual days in Stargard Szczeciński province in the period of 2008–2011 to people suffering from coronary heart disease, including myocardial infarction, mental disturbances (mainly schizophrenia), epilepsy, stroke, arterial hypertension, asthma and emergency-related ambulance trips as well as death. The number of calls registered in Stargard Szczeciński province in the period of 2008–2011 amounted to more than 41 thousand, and the daily number ranged from 13 to 50 – the highest in March and January, lowest in September and October. From the analysed 13 weather types the following types were most predominant on days with calls for EMS: the centre of low pressure area (type 6), cold air advection in the retral part of low pressure area (type 7), and lingering centre of high pressure area (type 1, 2). 70–80% of the analysed days in a year were characterised by low pressure system and weather types connected with it: 4 (warm aid advection in the front part of low pressure area), 5 (warm sector of low pressure area), 6 (the centre of low pressure area), 7 (cold air advection in the retral part of low pressure area); and high pressure system and weather types: 1 (high pressure centre – no thermal inversions), 2 (high pressure centre – thermal inversions), 11 (cold high pressure area), 12 (warm sector of high pressure). From the remaining 5 types of weather (3, 8, 9, 10, 13) occurring on days with calls for EMS, the following weather types were predominant: type 3 (air slips at the edge of high pressure area) – 10.1%, followed by type 8 (waving front zone) – 9.4%. Depending on the type of illness, the sensitivity of patients to changing meteorological conditions, expressed by the number of calls for EMS, varied during a year. People suffering from asthma and COPD required EMS help in summer on days with low pressure systems – 64.7%, and in winter during lingering high pressure areas – 33.3%. Epileptic seizures were more common in summer during the transition of low pressure systems – 63%, and in autumn during high pressure systems – 20% of days under study. The frequency of calls for EMS to people suffering from arterial hypertension was the highest in autumn and winter – approximately 57% each, during transition of low pressure areas, and in winter during lingering high pressure – 25.4%.

Key words: **accidents, emergency medical, illnesses, synoptic conditions**

Słowa kluczowe: **choroby, pogotowie ratunkowe, warunki synoptyczne, wypadki**

Introduction

The climate of Poland is characterised by high variability of weather which is caused by low pressure area moving from the Atlantic Ocean towards Eastern Europe. This is particularly characteristic for the north-west of Poland where there is high occurrence of low pressure area centres and phenomena connected with it such as significant changes in cloudiness, temperature and relative humidity of air, atmospheric pressure and wind speed – often occurring within few hours [1–4]. Fast-moving deep low pressure systems can cause psychological discomfort in most people and in the case of the sick and the elderly may lead to exacerbation of medical problems and make medical intervention necessary [5–8]. According to Grzędziński et al. [9], emergency situations occur

with greater frequency during the transition of the cold front – 26–27% rather than the warm front – 10–12%. The frequency of emergency situations during the occluded front is 10–18%. Apart from atmospheric fronts, the inflow of new air masses contrastive with respect to the air they replace can cause adverse health effects in the sick and contribute to emergency situations [10]. The warming climate is said to increase the risk of human life and health caused by heat waves not only in Southern but also Central Europe [11]. The results of the clinical and questionnaire studies support the significant influence of atmospheric conditions on the nervous system in humans [6, 12–14]. Similarly, the statistical analysis of emergency hospital admissions and illness- or emergency-related calls for emergency medical service (EMS) indicates that patients' vulnerability to synoptic conditions is increased during the transition of atmospheric fronts and the changes of air mass types, as well as during the transition from high to low pressure system [15–17]. According to Kwiecień [18] the share of cyclonic circulation in the north-west of Poland amounts to more than 55% of days in a year, reaching the highest values in the period of November to April, and anticyclonic systems occur most frequently in May and September and demonstrate a rather favourable influence on human wellbeing. Waving fronts and occlusions frequently occur in the north of Poland in the warm half year (April-September) and depending on the degree of variation in physical features of air masses they can have either a positive or negative effect on human health [6, 15, 19–21].

Many research centres undertake the study on the quantitative assessment of the influence of various meteorological elements and pressure systems on human wellbeing and health during work and leisure time [8, 22–29]. However, the nature and mechanism of the influence of weather on human have not been clearly defined yet.

The aim of the present paper is to assess the frequency of illness-related and emergency-related calls for emergency medical service (EMS) in the province of Stargard Szczeciński depending on the of the movement low pressure systems and low pressure areas on a given day.

Materials and methods

The subject matter of the analysis is the number of illness- and emergency-related calls for EMS in the period 2008–2011 in Stargard Szczeciński province and the concurrent synoptic situations. Stargard Szczeciński province is located in the north-west of Poland (**Figure 1**). The assessment of synoptic situations on weather charts was facilitated by the data obtained from meteorological station of the Institute of Meteorology and Water Management (IMGW) located in Szczecin Dąbie for the period 2008–2011, namely: daily values of air temperature amplitude, relative humidity, wind speed and day-to-day changes in atmospheric pressure. The meteorological station in Szczecin Dąbie is located approximately 30 km to the west of the central part of Stargard Szczeciński province. From the total number of calls for EMS, a particular attention was paid to emergency

Figure 1. *Situation of Stargard Szczeciński voivodship. Source: Autors' own elaboration.*

ambulance trips which resulted in the following conditions being diagnosed in accordance to the International Statistical Classification of Diseases and Related Health Problems ICD-10: coronary heart disease including myocardial infarction, mental disorders (mainly schizophrenia), epilepsy, stroke, arterial hypertension and Chronic Obstructive Pulmonary Disease (COPD). The attack of bronchial asthma was classified as a form of COPD. The assessment of synoptic situation on the days of calls for EMS was made on the basis of the synoptic weather charts at the 850 hPa level, 00^{00} UTC[1]. The synoptic situations recorded during calls for EMS were assigned to the type of weather (**Figure 2**) and symptoms (**Table I**) according to the German Weather Service (DWD) [21]. Due to high total number of calls for EMS in the period 2008–2011 (over 41,000), the analysis comprises only the cases when the mean daily number of calls reached a minimum of 30 calls and therefore exceeded the mean daily number of calls in the period in question. The next stage of the research included the analysis of the weather types recorded during the days with at least 7 registered calls for EMS (that is exceeding the average number of calls in the period) to patients suffering from coronary heart disease, mental disorders, epileptic seizure, asthma and COPD. From the aforementioned illnesses the most predominant were: arterial hypertension, epileptic seizure, asthma and COPD. Therefore, the present study analyses the weather types on days with at least 3 calls for EMS to patients complaining of the aforementioned ailments.

In the analysis of weather conditions and concomitant calls for EMS, it was not always possible to determine the weather type clearly. Such situations accounted for 3–4% of the total number of cases under study.

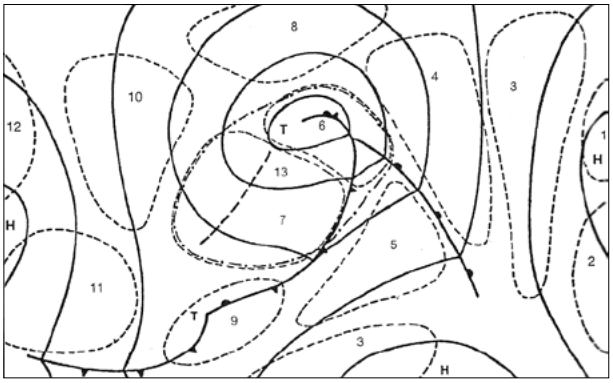

Figure 2. *Diagram of low pressure and biotropic zone according to the German Weather Service (DWD). Explanation of weather types 1–13 in Table I.*

Source: Jethon Z., Grzybowski A., Preventive and environmental medicine, Wyd. Lekarskie PZWL, Warsaw 2000 [30].

Figure 3 and **Tables III–VII** present the percentage share of days with particular weather types connected with moving low pressure systems and high pressure systems present on the days of calls for EMS.

Analysis and discussion

In the period of 2008–2011, the EMS of the Stargard Szczeciński Ambulance Station was called to illness- and emergency-related incidents (including deaths) 41,403 times in total, mostly in spring (March) and least in autumn (September and October). It should be observed that the number of calls for EMS per year was relatively stable in that period – from 10,082 in 2011 to 10,505 in 2008, which amounts to 8.3 to 8.7% of the total population of the province. Out of the total number of calls for EMS, the calls related to illnesses to which the ambulances were dispatched most often were analysed (**Table II**).

Type No.	Situation at isobaric level 850 hPa	Symptoms
1	high pressure (centre), no thermal inversions	slight meteotropic influence, decreased immunity to infection
2	high pressure (centre), thermal inversions	as above
3	air slips at the edge of high pressure area	decreased intellectual functioning, manifestations of apathy and depression, manifestations of vagotonia in the functioning of the circulatory system
4	warm air advection in the front part of low pressure area	exacerbation of artherosclerosis-related diseases with a tendency towards myocardial infarction and cerebral stroke, decreased immunity, metabolic and sleep disorders, decreased intellectual and physical functioning, increase in accidents, decreased wellbeing
5	warm sector of low pressure area	slight meteotropic influence, mainly neurosis-related, tendency to have lowered arterial blood pressure
6	the centre of low pressure area	exacerbation of neurotic depression symptoms, circulatory insufficiency, exacerbation of symptoms of rheumatoid disease
7	cold air advection in the retral part of low pressure area	exacerbation of symptoms of rheumatoid disease and ischaemic heart disease, digestive disorders
8	waving front zone	situation advantageous for health, occasionally exacerbation of rheumatoid disease symptoms
9	eastern flow of air (1 cyclonic, 2 anticyclonic)	situation advantageous for health
10	neutral pressure situation	malaise, tendency to have increased arterial blood pressure (migraine)
11	cold high pressure area	malaise, tendency to experience exacerbation of ischaemic heart disease
12	warm sector of high pressure	no distinct meteorotropic influence
13	upper cyclonic trough	malaise, exacerbation of arterial hypertension and kidney diseases

Table I. *Objective weather classification (according to the German Weather Service DWD) and symptoms.*

Source: Jethon Z., Grzybowski A., Preventive and environmental medicine, Wyd. Lekarskie PZWL, Warsaw 2000 [30].

The predominating cause of ambulance dispatch were symptoms of arterial hypertension – annual average was 758.1 in the years 2008–2011, followed by epilepsy – 536.9, significantly less frequent cause was death certification – 111.7, and mental disorders – 130.6. There were days on which the maximum number of calls for EMS depending on illness ranged from 3 to 11, and the number of EMS calls to death varied from 2 to 5 (Table II). The number of calls in individual months was highly varied. For example, calls for EMS to patients with arterial hypertension were predominant in January (on average 75.8) and February (71.5), and to patients with coronary heart disease the period of the greatest number of calls for EMS was from December to April (from 23.8 to 26.3). The number of illness-related EMS calls (excluding epileptic seizures) was the smallest in the period from May to August which is connected with more favourable bioclimatic conditions – large number of sunshine hours, small day-to-day fluctuations in atmospheric pressure, smaller wind speed etc., and more importantly with less frequent occurrence of low pressure systems in comparison with other months [2, 18, 20, 31, 32].

Out of 1,461 days in the analysed period of 2008–2011, 645 days were selected for the assessment of synoptic situations and determination of weather type, as on those days the number of calls for EMS to the aforementioned 6 illnesses and death was at least 7 in a day. Figure 3 presents the month-to-month and annual frequency of days with different weather types at the time of the aforementioned illness-related calls for EMS to patients suffering from the illnesses presented in Table II. Annually the EMS was summoned most frequently on days

Type of illness		I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I–XII
Coronary heart disease	A	29.8	25.3	26.3	26.3	21.8	19.5	19.5	19.3	21.0	19.3	19.8	23.8	271.7
	B	5	4	4	6	4	3	4	3	3	4	3	4	6
Mental disorders	A	15.3	10.5	11.3	10.8	9.5	5.8	10.5	10.0	9.8	14.5	12.8	9.8	130.6
	B	5	3	3	3	3	4	5	5	5	4	5	3	5
Epileptic seizures	A	37.8	42.8	53.8	48.8	47.5	42.5	54.3	48.0	44.3	42.0	38.3	36.8	536.9
	B	6	4	11	6	5	7	5	6	8	5	4	5	11
Death declared by ambulance service doctors	A	9.3	6.0	6.0	8.0	7.5	7.5	6.8	7.3	9.3	23.5	9.5	11.0	111.7
	B	3	2	2	3	2	4	2	2	3	5	2	3	5
Stroke	A	16.8	15.5	16.0	20.3	19.0	17.3	15.0	15.3	12.3	16.5	13.5	18.8	196.3
	B	3	3	3	3	4	4	4	3	3	3	3	4	4
Arterial hypertension	A	75.8	71.5	67.3	64.0	62.8	68.0	56.5	63.5	59.8	57.3	55.8	55.8	758.1
	B	10	8	8	8	7	7	6	8	6	5	7	5	10
Asthma and COPD	A	42.0	27.8	31.8	41.0	37.0	32.5	29.5	25.8	26.8	29.8	29.8	29.3	383.1
	B	5	5	5	11	5	5	4	4	5	4	4	5	11

Table II. *Monthly average (A) and maximum daily (B) number of calls for emergency medical service in Stargard Szczeciński province in the years 2008–2011.*

Source: Autors' own elaboration.

Weather types	1, 2, 11, 12	4	5	5	5	4 –7
Seasons – Year	High pressure areas	The front part of low	Warm sector of low	The centre of low	The retral part of low	Total
Winter December – February	21.7	8.4	6.0	22.9	18.1	55.4
Spring March – May	19.4	9.7	12.5	20.8	16.7	59.7
Summer June – August	14.8	6.8	5.4	25.7	13.5	51.4
Autumn September – November	25.6	7.7	11.5	19.2	14.1	52.5
Year January – December	20.2	8.1	8.8	21.8	15.0	53.7

Table III. *Frequency (%) of days ≥ 30 calls for emergency medical services to patients and emergency situations recorded in a 24-hour period in Stargard Szczeciński province during occurrence of different weather types of low pressure and high pressure in the years 2008–2011.*

Source: Autors' own elaboration.

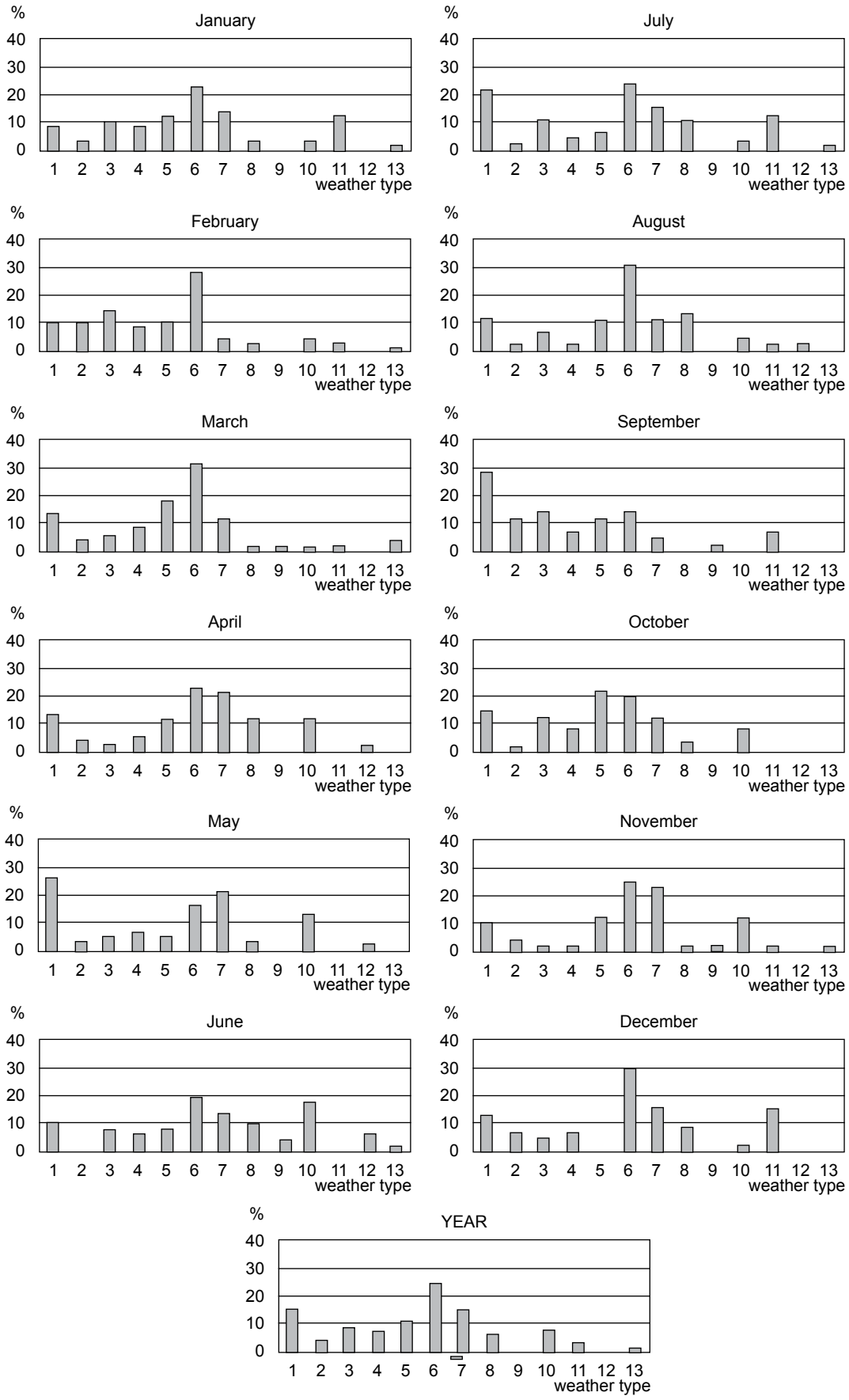

Figure 3. *Frequency (%) of days with ≥ 7 calls for emergency medical service recorded in a 24-hour period in Stargard Szczeciński province to patients suffering from coronary heart disease, mental disorders, epileptic seizures, stroke, arterial hypertension, asthma and COPD, and death according to 13 weather types. Years: 2008–2011.*

Source: Autors' own elaboration.

Weather types	1, 2, 11, 12	4	5	5	5	4 –7
Seasons – Year	High pressure areas	The front part of low	Warm sector of low	The centre of low	The retral part of low	Total
Winter December – February	26.7	8.1	8.1	24.4	10.5	51.1
Spring March – May	22.0	6.4	11.3	23.1	17.7	58.5
Summer June – August	18.7	4.2	9.0	24.3	13.2	50.7
Autumn September – November	22.4	7.7	14.0	18.9	16.1	56.7
Year January – December	22.6	6.7	10.4	23.7	14.1	54.9

Table IV. *Frequency (%) of days ≥ 7 calls for emergency medical services recorded in a 24-hour period to patients suffering from coronary heart disease, mental disorders, epilepsy, stroke, arterial hypertension, asthma and COPD and deaths in Stargard Szczeciński province during occurrence of different weather types of low pressure and high pressure in the years 2008–2011.*

Source: Autors' own elaboration.

Weather types	1, 2, 11, 12	4	5	5	5	4 –7
Seasons – Year	High pressure areas	The front part of low	Warm sector of low	The centre of low	The retral part of low	Total
Winter December – February	25.4	8.7	9.4	27.5	11.6	57.2
Spring March – May	23.3	6.7	6.7	23.5	15.0	51.9
Summer June – August	16.0	9.2	7.6	21.0	14.3	52.4
Autumn September – November	21.3	10.7	13.7	18.4	14.6	57.4
Year January – December	21.4	8.7	9.2	22.7	13.7	54.3

Table V. *Frequency (%) of days ≥ 3 calls for emergency medical services recorded in a 24-hour period to patients suffering from arterial hypertension in Stargard Szczeciński province during occurrence of different weather types of low pressure and high pressure in the years 2008–2011.*

Source: Autors' own elaboration.

with moving centre of low pressure area (type weather 6) – 23.7% and the centre of high pressure area (type 1) – 14.6% and cold air advection at the rear of the low (type 7) – 14.1%. The calls for EMS were less frequent during airflow from the east (type 9), warm sector of high pressure (type 12) and upper cyclonic trough (type 13) – from 0.6 to 1.6%. With respect to individual months in a year the increased share of days with at least 7 illness-related calls for EMS was connected with moving centre of low pressure (type 6) – in August (31.8%), March (31.1%), December (29.8%) and February (28.4%). Additionally, calls for EMS were frequent on days with present centre of low pressure (Figure 3) – types 1 and 2 (September 27.9%, May 25.8% and July 21.3%), and warm sector of low pressure area – type 5 (March 18%, November 21.6%). Figure 3 presents the frequency of days with different weather types during which the calls for EMS were recorded. To a certain extent it was determined by high and low pressure systems recorded at that time and atmospheric fronts connected with them. In Poland the warm front is observed most frequently in winter – average 22.1 days, whereas the cold front in autumn – 34.1 days, and occlusion in summer – 27.7 days [3]. Atmospheric fronts as well as changes of types of air masses have a significant influence on human wellbeing and health [6]. According to Więcław [32] the arctic air mass in the north-west of Poland occurs mostly in spring (25.7%), the arctic-maritime in summer (78.7%), and polar-continental in winter (13%).

Tables III–VII present the percentage share of days with registered illness- and emergency-related EMS calls and weather types 1, 2, 11 and 12 – connected with recorded high pressure systems, and weather types 4, 5, 6 and 7 – connected with moving low pressure systems;

against all 13 weather types under study. According to data presented in Figure 3 on days with at least 30 calls for EMS, moving low pressure systems was most frequent (types 4, 5, 6, 7) – from 51.4% in summer to 59.7% in spring. However, from all the situations of low pressure and concomitant calls for EMS, weather type 6 was most predominant – from 19.2 % in autumn to 25.7% in summer. Days with the warm sector of low pressure area (type 5) often occurred in the transitional seasons of a year – spring 12.5% and autumn 11.5%. The occurrence was more than two times lower in summer – 5.4%. In turn, days with cold air advection in the retral part of low pressure area (type 7) occurred most frequently in winter – 18.1% and spring – 16.7%. The frequency of days with warm air advection in the front part of low pressure area (type 4) was highest in spring – 9.7%. The frequency of the latter weather type was least diverse in all the four seasons of a year on days with registered calls for EMS. High frequency of EMS calls was also connected with the presence of high pressure systems – mostly in autumn 25.6%, and summer 14.8% (Table III). Overall, on days with at least 30 illness- and emergency-related calls for EMS, low and high pressure systems amounted to 66.2% in summer and 79.3% in spring of the total number of days with the 13 weather types under study.

From the remaining 5 weather types (3, 8, 9, 10, 13) occurring during calls for EMS the following weather types were most predominant: type 3 (air slips at the edge of high pressure area) – 10.1%, and type 8 (waving front zone) – 9.4% which caused changes of the physical properties of air mass: air pressure, air temperature and humidity, and wind speed. Sudden increase or drop in air temperature against the optimal temperature in a given climatic zone increases the risk of myocardial infarction [33].

The increase of calls for EMS in Stargard Szczeciński province related to coronary heart disease, mental disorders, epilepsy, stroke, arterial hypertension, COPD and death was recorded mainly during rapidly moving low pressure areas. In such cases there were high day-to-day and interdaily increase in atmospheric pressure (more than 8 and 12 hPa), changes of mean daily air temperature (over 6^{o}C) and in relative humidity (over 10%) as well as high wind speed, particularly during transitions of atmospheric fronts. The deep low pressure systems (below 980 hPa) as well as strong high pressure centres (over 1030 hPa) had an unfavourable influence on health. According to Goerre et al. [34] there is a statistical relationship between the incidence of myocardial infarction and the changes in atmospheric pressure and high wind speed. The study by Panagiotakos et al. [16] holds that 1^{o}C drop in air temperature in Athens resulted in an increase of hospital admissions of elderly women in particular by 5%. Tyczka in: [20] states that the reaction of most people to changes in atmospheric environment is of physiological and adaptive nature, yet the reactions themselves are not identical as they depend on an individual's general health, age, physical and psychological condition and on general accordance or inconsistency with human biological rhythm. Therefore cold stimuli in summer and warm in winter provoke the strongest reaction. Rapid changes in the types of air masses as a rule caused an increased number of calls for EMS in Stargard Szczeciński province.

Table IV presents the weather types and frequency of days with at least 7 calls for EMS to patients suffering from: coronary heart disease, mental disorders, epilepsy, stroke, arterial hypertension, asthma and COPD as well as calls for EMS to certify death. On days with registered calls for EMS the most frequent weather type was type 6 (the centre of low pressure area) – from 18.9% in autumn to 24.4% in winter. It should be taken into account that the warm sector of the low pressure area (type 5) and cold air advection in the retral part of low pressure area (type 7) occurred more frequently in autumn – 14.0% and 16.1% respectively, and in spring – 11.3% and 17.7% respectively. The frequency of warm air advection in the front part of the low pressure area (type 4) on days with calls for EMS in winter (8.1%) was two times higher than that recorded in summer – 4.2%. Favourable bioclimatic conditions in summer and less frequent, in comparison with winter, low pressure systems were the reasons behind 50.7% frequency of weather types 4, 5, 6 and 7 connected with low pressure. The frequency recorded in the transitional seasons (autumn and spring) was 56.7% and 58.5% respectively, against all 13 weather types. The weather types 1, 2, 11 and 12 connected with high pressure were most frequent in winter – 26.7 % and least in summer – 18.7% (Table IV).

On days with recorded ambulance dispatch to patients suffering from arterial hypertension, the centre of the low pressure area (type 6) was the prevailing weather type – from 18.4% in autumn to 27.5% in winter (Figure 5) against all 13 analysed weather types. Advection of cold air in the retral part of low pressure area (type 7) occurred frequently on days with calls for EMS – from 11.6% in winter to 15% in summer. Weather connected with high pressure systems (type 1, 2, 11 and 12) had a negative influence on health of people suffering from arterial hypertension as in winter the frequency of calls for EMS amounted to 25.4% against 16% in summer (Table V). The study by Grzędziński et al. [35] holds that the most onerous weather conditions for patients with arterial hypertension occurred during deep and fast moving low pressure systems. The literature on the subject takes note of the significant influence of atmospheric fronts and high variability of weather on arterial blood pressure, particularly in patients with artherosclerotic hypertension [6, 12, 25, 34].

The analysis of the frequency of weather types on days with calls for EMS to patients with epileptic seizures shows the prevalence of the centre of the low pressure area (type 6) over the other weather types – from approximately 25.3% in spring and autumn to approximately 32.6 % in winter (Table VI). From the remaining weather types connected with moving low pressure areas, the type 7 stands out – from 12.2% in winter to 18.3% in summer, which may be connected with increased sensibility to decrease in temperature in summer rather than in winter, Tyczka in: [20]. In comparison with calls for

Weather types	1, 2, 11, 12	4	5	5	5	4 –7
Seasons – Year	High pressure areas	The front part of low	Warm sector of low	The centre of low	The retral part of low	Total
Winter December – February	14.3	8.2	4.1	32.6	12.2	57.1
Spring March – May	13.8	6.9	8.0	25.3	16.1	56.3
Summer June – August	12.6	5.7	9.2	29.9	18.3	63.0
Autumn September – November	20.0	5.7	12.8	25.7	14.3	58.5
Year January – December	16.3	6.1	13.5	27.8	15.9	63.3

Table VI. *Frequency (%) of days ≥ 3 calls for emergency medical services recorded in a 24-hourperiod to patients suffering from epileptic seizures in Stargard Szczeciński province during occurrence of different weather types of low pressure and high pressure in the years 2008–2011.*

Source: Autors' own elaboration.

Weather types	1, 2, 11, 12	4	5	5	5	4 –7
Seasons – Year	High pressure areas	The front part of low	Warm sector of low	The centre of low	The retral part of low	Total
Winter December – February	33.3	4.6	11.6	22.5	13.9	52.6
Spring March – May	30.8	9.6	13.5	19.2	11.5	53.8
Summer June – August	18.5	7.1	17.8	25.0	14.8	64.7
Autumn September – November	20.6	7.4	14.8	18.5	11.1	51.8
Year January – December	27.9	7.5	14.4	20.6	12.9	55.4

Table VII. *Frequency (%) of days ≥ 3 calls for emergency medical services recorded in a 24-hour period to patients suffering from asthma and COPD and in Stargard Szczeciński province during occurrence of different weather types of low pressure and high pressure in the years 2008–2011.*

Source: Autors' own elaboration.

EMS related to other illnesses, the share of high pressure weather on days with EMS calls to patients with epileptic seizures was relatively small – from 12.6% in summer to 20% in autumn. Slightly different results were obtained by doctors from the Clinic of Neurology in Katowice [13] on the basis of the analysis of EEG records of epileptic seizures. Paroxysmal changes in EEG were recorded most frequently in winter (43.3% in women and 63.3% in men). In summer the influence of changes in atmospheric conditions on the incidence of seizures was recorded only in 7% of patients. In spring, autumn and winter variable atmospheric conditions caused an increase in the incidence of seizures in almost half of the patients suffering from epilepsy.

Patients suffering from asthma and COPD exhibit high sensibility to changes in air temperature as well as to pollution of atmosphere and allergens [33, 36]. Among the four weather types (4, 5, 6, and 7) connected with moving low pressure areas the following were most frequently recorded on days with calls for EMS to patients suffering from asthma and COPD: type 6 – from 18.5% in autumn to 25% in summer, and type 5 – from 11.6% in winter to 17.8% in summer (Table VII). According to Więcław [32], such high frequency of weather types 5 and 6 in summer, as compared with other seasons in a year, can result from the prevailing inflow of contrastive maritime-polar air masses – from 73.5% in June to 81.4% in August, and tropical air masses – from 1.7% to 3.7% respectively. The share of high pressure weather at times of ambulance dispatch to patients suffering from asthma and COPD is higher than to patients suffering from other illnesses in question – from 18.5% in summer to 33% in winter. The fact that high pressure weather in winter is onerous can result from low temperatures as

well as from an increase (twofold, fourfold) in concentration of air pollutants as compared with the summer period [37].

Summary

The analysis of illness- and emergency-related calls for EMS in Stargard Szczeciński province in the period of 2008–2011 shows the large impact of changing weather conditions on the frequency of calls for EMS in particular days in a year. The number of daily calls for EMS ranged from 13 to 50; the highest number of calls was recorded in March and January, and the lowest in September and October. Out of the 13 weather types analysed in this paper, the highest frequency of calls for EMS was recorded during the transition of low pressure system (on average 53.7% in a year) and weather types connected with it (4, 5, 6, 7). The frequency of calls for EMS was markedly lower (20.2%) during lingering high pressure areas – weather types 1, 2, 11 and 12. Increased frequency of calls for EMS was observed on days with transition of deep low pressure systems, particularly its centres (weather type 6) – from 19.2% in autumn to 25.7% in summer, and also during cold air flow following cold front (type 7) – from 13.5% in summer to 18.1% in winter. The share of days with high pressure (weather type 1, 2, 11 and 12) occurring during calls for EMS ranged from 14.8% in summer to 25.6% in autumn. From the remaining 5 weather types (3, 8, 9, 10, 13) recorded on days with calls for EMS, type 3 (air slips at the edge of high pressure area) was the most frequent – 10.1%, followed by type 8 (wavy front zone) – 9.4%. The days on which the number of illness- or emergency-related calls for EMS was small were mainly characterised by shallow low pressure area and weak high pressure area. Depending on the type of illness, the sensitivity of patients to changing meteorological conditions, expressed by the number of calls for EMS, varied during a year. People suffering from asthma and COPD required EMS help in summer on days with low pressure systems – 64.7%, and in winter during lingering high pressure areas – 33.3%. Epileptic seizures were more common in summer during the transition of low pressure systems – 63%, and in autumn during high pressure systems – 20% of days under study. The frequency of calls for EMS to people suffering from arterial hypertension was the highest in autumn and winter – approximately 57% each, during transition of low pressure areas, and in winter during lingering high pressure – 25.4%.

The prognosis concerning deep and fast-moving low pressure systems and resulting increased number of calls for EMS may be used in scheduling the work of the Emergency Department.

Note

[1] www.wetterzentrale.de/topkarten/tkfaxbraar.htm.

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