ORIGINAL PAPERS

Analysis of factors that determine hospitalization of emergency department patients

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A – Study Design, **B** – Data Collection, **C** – Statistical Analysis, **D** – Data Interpretation, **E** – Manuscript Preparation, **F** – Literature Search, **G** – Funds Collection

Summary **Background.** Optimization of health care financing under current standards of treatment can be achieved by determining the factors that affect the number of hospital admissions at emergency departments (ED), and their significance.
Objectives. Identification of factors determining hospitalizations at emergency department.
Material and methods. The study involved 150 emergency department patients in Kedzierzyn-Kozle. An original questionnaire, the Health Behaviors Inventory, and a modified version of the Camberwell Assessment of Need Short Appraisal Schedule (CANSAS) were used.
Results. At greatest risk of hospitalization are those patients who: take more than 4 drugs (OR 12.17, 95% CI 2.97–73.67); are being treated for chronic diseases (OR 5.37, 95% CI 2.56–11.62); are above 44.5 years of age (OR 3.14, 95% CI 1.54–6.51); are being treated at an outpatient specialist clinic (OR 3.87, 95% CI 1.85–8.32); have a BMI above 27.1 (OR 2.84, 95% CI 1.39–5.88); have at most average material status (OR 0.42, 95% CI 0.20–0.87); have symptoms of severity greater than 5 (OR 2.23, 95% CI 1.11–4.55); and have a low index of unsatisfied needs (a Camberwell index lower than 0.825: OR 0.36, 95% CI 0.17–0.72).
Conclusions. Any program to prevent hospitalization should be based on the measurement of health behavior, should focus on promoting knowledge of chronic diseases and the means of preventing them, and should involve patient education on the purpose of emergency departments. It is necessary to strive for increase responsiveness of healthcare to patients' needs and to support the area of primary-care-oriented services in the field of 'small surgery'.
Key words: emergency department, hospitalization, prevention.

Background

Lengthening average lifespans, technological development, and the expected increase in the demand for medical services all mean that effective management of healthcare expenses is becoming a necessity [1, 2]. The National Health Fund predicts that if technology, wages, and prices remain at their 2014 levels and the base cost for healthcare is 53 bn zlotys, then in 2020, these costs in Poland will have increased by 2.6 bn zlotys (i.e., 5%) and in 2030 by nearly 6.4 bn zlotys (12%) compared to 2014. The highest nominal growth will be observed in expenses on hospital treatment, and will reach over 3 bn zlotys by 2030 [3]. Maintaining the currently mechanism will lead to a noticeable deficit in health service funds. This will occur as early as 2020 and will amount to 0.57% of the gross domestic product (GDP), in 2040 to 2.21% of the GDP, and in 2060 to 3.11% of the GDP [2]. At the same time, patients' access to medical technologies, as part of current therapeutic standards, is determined by the optimization and adequate financing of the healthcare system [4].

Primary care providers act as so-called 'gatekeepers' to the higher levels of the healthcare system, and decide what services are the most appropriate for the patient on the basis of medical indications [5]. In the situation where there is limited access to specialist examinations and consultations at the outpatient care level, and considering an inability to restrict the inflow of patients to emergency departments (EDs), we

can expect that the number of patients reporting to emergency departments will increase [6]. All actions aimed at cutting health care expenditure should mainly focus on reducing hospitalization in other wards (including wards to which patients are sent after visiting the emergency department), because the cost of a hospital stay is much higher than the cost of treatment in the emergency department [7].

Poland has one of the highest levels of expenditure on hospital treatment (30.64%) in the EU, taking fourth place after Austria (31.40%), Romania (34.70%), and Greece (45.88%) [8]. The main causes of hospitalization in Poland are cardiovascular disease (18%), neoplasms (11.4%), digestive (10.6%) and respiratory (9.3%) diseases, injuries (9.1%), and infectious diseases (2.3%) [9].

It is true that, in the economic sense, not every expense is a cost, but every cost is an expense. Costs include both expenditures incurred for given resources, and alternative costs, i.e., opportunity costs incurred as a result of certain choices [10]. An expense, on the other hand, is every disbursement associated with payment for specific goods and services resulting from the necessity of settling various financial obligations [11].

It is estimated that the average annual direct cost of treatment for heart failure (HF) in Poland ranges from 3373.23 to 7739.49 zlotys per patient (2011), the main component of which is the cost of hospitalization; this comes to a total cost to the health care system of 1703 mln zlotys, or 3.16% of the National Health Fund budget [12]. The costs of hospitalization for chronic obstructive pulmonary disease (COPD)

exceeded the cost of outpatient treatment by a factor of more than ten, and mainly included charges for hospital beds and antibiotics [13]. In another study, the total annual cost of treatment for ischemic heart disease was 2254.17 euros per patient, of which 48% were direct costs (medications, medical consultations, diagnostic tests, invasive procedures, hospitalization, and treatment in admissions). As many as 81% of all direct medical costs were covered from public funds (including 30% of the cost of pharmacotherapy) [14]. The average annual cost of treatment for a patient with enteritis, calculated on the basis of a hospital's income from the National Health Fund for health services, was 10.298 zlotys (12.623 zlotys for Crohn's disease and 9092 zlotys for ulcerative colitis). Hospitalization generated 95.8% of the total cost [15].

The Eurostat data show that, compared to other member countries of the *Organization for Economic Co-operation and Development* (OECD), Poland is characterized by the shortest average time of hospitalization for neoplastic, respiratory, cardiovascular, and digestive diseases [16]. This is positive and should be encouraged, unless it results from the fact that, during a hospital stay, patients receive services that could be provided within outpatient specialist care [2].

The analysis of factors contributing to an increase in the hospitalization rate among emergency department patients, which generates direct medical costs, may provide information necessary for the economic streamlining of the healthcare system.

Objectives

This study aimed to identify factors contributing to the hospitalization of emergency department patients, and to determine the influence of these factors on the hospitalization rate.

Material and methods

The study sample included 150 emergency department patients in Kedzierzyn-Kozle (Opole Voivodeship, Poland). The inclusion criteria were: at least 18 years of age, responding coherently without symptoms of disturbed perception, and Polish as first language. The study was conducted from November 2014 to September 2015, with written consent from the director of the healthcare center. The research was approved by the Bioethical Commission of Wroclaw Medical University (approval no. KB- 673/2014).

The majority of the respondents were women (54.00%, 81). The median respondent ages was 44.50 years (range: 18.00–87.00). The majority of those surveyed had secondary education (46.90%, 69), were married (58.70%, 88), were living in a long-term relationship (74.70%, 109), defined their financial situation as average (53.74%, 79), were residents of cities with a population of 20.000–100.000 (46.98%, 70). Residents of rural areas accounted for 32.89% (49) of the group. The median number of people in the respondents' households was 1.43 (range: 1.00–8.00). The median of distances from the respondents' places of residence to an emergency department was 8 km (range: 1–37 km) and 2 km to a primary care center (range: 1–37 km).

The research instruments applied in this survey-based study were the authors' questionnaire, the *Health Behavior Inventory* (HBI) developed by Z. Juczyński, and a modified version of the *Camberwell Assessment of Need Short Appraisal Schedule* (CANSAS).

The authors' questionnaire concerned issues such as patient sociodemographic data; chronic diseases; the hospitalization rate in the last three years; the number of currently taken medications; visits to specialist outpatient clinics; BMI value; blood pressure; the results of laboratory tests performed during emergency department visits; knowledge of where to receive outpatient care at night, on Sundays, and an holidays; reasons for the current and the previous visit to an emergency department; and duration and severity of symptoms. The patients' self-reported severity of symptoms was determined by means of the ten-point Visual Analogue Scale (VAS), with '0' denoting a lack of symptoms and '10' indicating the most severe symptoms that the patient has ever had. The results of laboratory tests were taken from the hospital AMMS (*Asseco Medical Management Solutions*) computer system. If the patient did not undergo tests in an emergency department, the data came from the most recent hospitalization, and if the patient was hospitalized for the first time, a lack of data was noted.

The HBI consists of 24 statements measuring four categories of health-related behaviors – namely, proper eating habits (PEH), positive mental attitude (PMA), preventive behaviors (PB), and health practices (HP). The patient determined the frequency of health behaviors using a five-point scale, on which '1' denoted 'almost never' and '5' denoted 'almost always'. The values indicated by the patient were summed up, which gave a so-called general index of health behaviors, ranging from 24 to 120 points. The higher the index, the higher the frequency of health behaviors. Additionally, the frequency of health behaviors in four categories was analyzed: the index was the sum of the points obtained for each category divided by 6 [17].

CANSAS is designed to discuss 22 different subject matters concerning problems experienced by patients suffering from chronic somatic diseases, and not suffering from severe mental disorders [18]. It allows us to assess the level of satisfaction of an individual's social, medical, psychological, and environmental needs [19]. The *Camberwell index* was calculated as follows: on the basis of 24 questions concerning 22 needs, the total number N of needs that were indicated as satisfied (1) or unsatisfied (0) was established. Where we could not establish the satisfaction level of a need because of a lack of answers, that need was omitted. In turn, from the N needs indicated by the participant, the number of satisfied needs M was calculated. The *Camberwell index* was then calculated as the ratio M/N [18].

Statistical analysis

The majority of the variables did not have normal distribution, which was verified using the Shapiro–Wilk test. The level of significance was set at $p < 0.05$. We hence calculated Spearman's rank correlation coefficient (rho) to determine the strength and direction of statistically significant correlations between the '3-year hospitalization' variable and the other variables. In logistic regression, to determine the odds ratio, we selected variables that significantly correlated with the number of hospital stays, and other quantitative variables, even though they did not correlate with hospitalization. This choice is justified by the fact that the lack of correlations between quantitative variables does not imply that there is no relationship between two categorical variables (in this case by comparison to the median). A 95% confidence level was accepted for the odds ratio.

R 3.0.2 (for Mac OS X) statistical software and Excel 2013 were used for the data analysis.

Results

The hospitalization rate positively correlated with the number of medications taken by the patient ($r = 0.71$, $p < 0.001$), the number of chronic diseases ($r = 0.60$, $p < 0.001$), treatment for endocrine diseases ($r = 0.51$, $p < 0.001$), treatment for chronic diseases ($r = 0.47$, $p < 0.001$), the patient's

age ($r = 0.44$, $p < 0.001$), the mean duration of chronic disease ($r = 0.42$, $p < 0.001$), and treatment for cardiovascular diseases ($r = 0.42$, $p < 0.001$). Patients who had received specialist outpatient treatment were statistically significantly more often hospitalized than those who had not visited a specialist outpatient clinic ($r = 0.41$, $p < 0.001$). Similarly, hospitalization of patients with a history of emergency department treatment correlated positively with the total hospitalization rate ($r = 0.41$ $p < 0.001$).

Patients treated for endocrine diseases were hospitalized more often than patients without such health problems ($r = 0.51$, $p < 0.001$) and more often than those with diseases of the cardiovascular ($r = 0.42$, $p < 0.001$), locomotor ($r = 0.32$, $p < 0.001$), digestive ($r = 0.31$, $p < 0.001$), urinary ($r = 0.30$, $p < 0.001$), nervous ($r = 0.29$, $p < 0.001$), and respiratory ($r = 0.29$, $p < 0.001$) systems.

The hospitalization rate correlated positively with such variables as a high BMI ($r = 0.33$, $p < 0.001$), higher self-reported severity of symptoms (5 or more; $r = 0.31$, $p < 0.001$), high potassium level in blood serum ($r = 0.22$, $p < 0.016$), and high level of patient knowledge on receiving outpatient care at night, on Sundays and holidays ($r = 0.22$, $p < 0.046$). Other factors that correlated positively were treatment for atrial fibrillation (AF) in an emergency department ($r = 0.21$, $p < 0.027$), a high level of health practices ($r = 0.20$, $p < 0.018$), and being brought to the emergency department in an ambulance ($r = 0.19$, $p < 0.018$).

The total hospitalization rate correlated negatively with such variables as hospitalization during the last visit to an emergency department due to joint dislocation or sprain, small wounds, and minor injuries ($r = -0.39$, $p < 0.000$), a high *Camberwell index* ($r = -0.37$, $p < 0.000$), a high level of education ($r = -0.32$, $p < 0.001$), and very good financial standing of the patient's family ($r = -0.26$, $p = 0.001$). An increase in the hospitalization rate was associated with experiencing no problems in getting referrals for blood and urine tests ($r = -0.20$, $p < 0.016$) and imaging (X-ray) examinations ($r = -0.19$, $p < 0.037$) from a primary care physician.

The hospitalization rate was not statistically significantly related to the patients' sex, the fact of having a life partner, the place of residence (village, town/city), or distances from the place of residence to an emergency department and to a primary care center ($p > 0.05$).

The highest likelihood of hospitalization was noted among patients who were taking more than four medications per 24 hours (12 times higher probability of hospitalization), were being treated for chronic diseases (5.5 times higher probability of hospitalization), were older than 44.5 years (3 times higher probability of hospitalization), were being treated in a specialist outpatient clinic (4 times higher probability of hospitalization), had BMI > 27.1 (3 times higher probability of hospitalization), had no better than average financial status (almost 2.5 times higher probability of hospitalization), estimated the severity of their symptoms above 5 (twice as high probability of hospitalization), or had a low index of satisfied needs (3 times higher probability of hospitalization for people with a *Camberwell index* ≤ 0.825) (Tab. 1).

Furthermore, the probability of hospitalization was higher for patients whose last visit to an emergency department ended with a hospital stay (6 times higher probability of hospitalization) and for those whose level of health practices was > 20 (2 times higher probability of hospitalization) (Tab. 1).

We also found that the probability of hospitalization was 9.5 times higher for patients being treated for urinary diseases, 8.5 times higher for endocrine diseases, 7 times higher for locomotor diseases, 5.5 times higher for digestive diseases, and 4 times higher for cardiovascular diseases than for patients without these health problems (Tab. 1).

Table 1. Odds ratio for 3-year hospitalization *vs.* variables analyzed (only statistically significant results are included)

Variables	Groups	3-year hospitalization					
		no		yes		OR	*p*
		n	%	*n*	%	95% CI	
Age (in years)	≤ 44.5	49	65.3	26	34.7	**3.14**	0.001
	> 44.5	28	37.3	47	62.7	1.54–6.51	
Finanacial standing of the family	at most average	38	43.7	49	56.3	**0.42**	0.012
	better than average	39	65.0	21	35.0	0.20–0.87	
Number of medications taken	≤ 4.5	19	54.3	16	45.7	**12.17**	< 0.001
	> 4.5	3	8.6	32	91.4	2.97–73.67	
Treatment for chronic diseases	no	55	70.5	23	29.5	**5.37**	< 0.001
	yes	22	30.6	50	69.4	2.56–11.62	
Treatment for cardiovascular diseases	no	61	63.5	35	36.5	**4.10**	< 0.001
	yes	16	29.6	38	70.4	1.91– 9.10	
Treatment for locomotor diseases	no	74	56.5	57	43.5	**6.84**	0.001
	yes	3	15.8	16	84.2	1.83–38.37	
Treatment for urinary diseases	no	75	56.4	58	43.6	**9.57**	0.001
	yes	2	11.8	15	88.2	2.10–89.67	
Treatment for endocrine diseases	no	72	61.0	46	39.0	**8.33**	< 0.001
	yes	5	15.6	27	84.4	2.89–29.73	
Treatment for digestive diseases	no	73	56.6	56	43.4	**5.48**	0.002
	yes	4	19.0	17	81.0	1.66–23.64	
Treatment in a specialist outpatient clinic	no	44	69.8	19	30.2	**3.87**	< 0.001
	yes	32	37.2	54	62.8	1.85–8.32	

Variables	Groups	3-year hospitalization					
		no		yes		OR	p
		n	%	n	%	95% CI	
The reason why the patient visited an emergency department (in the past): minor injuries	no	26	31.7	56	68.3	**0.24**	0.003
	yes	18	66.7	9	33.3	0.08–0.64	
Visits to an emergency department that ended with a hospital stay	no	40	53.3	35	46.7	**6.00**	< 0.001
	yes	6	15.8	32	84.2	2.14–19.66	
Self-reported severity of symptoms for which the patient reported to an emergency department	≤ 5	48	60.8	31	39.2	**2.23**	0.022
(0–10 scale)	> 5	29	40.8	42	59.2	1.11–4.55	
BMI [kg/m²]	≤ 27.1	48	64.0	27	36.0	**2.84**	0.003
	> 27.1	28	38.4	45	61.6	1.39–5.88	
Potassium [mEq/l]	≤ 4.21	33	57.9	24	42.1	**2.34**	0.039
	> 4.21	21	36.8	36	63.2	1.04–5.36	
HP – health practices	≤ 20	47	61.8	29	38.2	**2.21**	0.027
	> 20	27	42.2	37	57.8	1.07–4.63	
The *Camberwell index*	≤ 0.825	29	38.7	46	61.3	**0.36**	0.003
	> 0.825	48	64.0	27	36.0	0.17–10.72	

Table 1. Odds ratio for 3-year hospitalization *vs.* variables analyzed (only statistically significant results are included)

OR – odds ratio, CI1and CI2 – the 95% confidence interval for OR

p – level of significance of *Fisher's exact test of independence*

The probability of hospitalization in the group of patients who previously reported to an emergency department for reasons other than minor injuries was four times higher than in the group of those who visited an emergency department due to such injuries. Patients who had blood potassium levels > 4.21 were 2.5 times more likely to be hospitalized than with potassium levels ≤ 4.21 (Tab. 1).

Considering other variables, we had no grounds for claiming that the likelihood of hospitalization differed between the groups. These variables were education, being treated for respiratory diseases, average duration of chronic disease, reporting to an emergency department due to minor injuries on the day of our investigation, being transported to an emergency department by ambulance, having experienced problems receiving primary care services (getting requests for X-ray and blood and urine analysis), blood pressure, the results of some laboratory blood tests (levels of leucocytes, hemoglobin, thrombocytes, creatinine, sodium), the total index of health behaviors, proper eating habits, preventive behaviors, and positive mental attitude.

Discussion

Healthcare for patients with multiple morbidities involves considerable financial outlays, resulting from the numerous consultations and visits paid to primary and specialist care, as well as from unexpected hospitalizations due to exacerbation of chronic diseases [20]. Undoubtedly, inpatient care is more expensive than outpatient treatment because of the high fixed costs incurred in maintaining operational capability for 24 hours a day, seven days a week [21]. Thus, in the discussion on the possibility of reducing healthcare expenditure, we should focus on improving primary care as a means of decreasing disease burden [22]. In practice, this should be done in two ways: first, by providing comprehensive care for chronically ill patients (especially for those with multiple morbidities) with multidisciplinary teams of professionals with regard to patients' biopsychosocial needs (e.g.,

the *Chronic Care Model*) [23–26]; and secondly, by extending the competence and range of primary care services through surgical procedures (so-called 'small surgery') [27].

As our findings show, the strongest contributor to more frequent hospitalization is a multitude of medications being taken by a patient. Especially among the elderly, this phenomenon increases the risk of a worsening of functional capabilities and creates favorable conditions for adverse medicine interactions. These, on the other hand, may lead to falls and femoral neck fractures [28], potentially resulting in a lengthening period of disability, which generates direct medical costs. The patients who are at the greatest risk of polypragmasy are women and those with third level education [29]. The mean number of both prescription and over-the-counter medications taken by city dwellers is 5.5 ± 3.6 (p = 0.001), which is statistically significantly more than that noted among residents of rural areas (4.5 ± 3.4, p < 0.001) [30]. In recent years, an upward trend in the number of medicines taken worldwide has been observed. The *IMS Health Institute for Healthcare Informatics* predicts that global expenses on medications in 2018 will amount to about 1.3 bn dollars – about 30% more than in 2013 [31]. In 2020, these expenses will reach the level of approximately 1.4 bn dollars [32]. According to PharmaExpert, in 2014 Polish drugstores sold medications worth 28.496 mln zlotys (a 2.7% increase over 2013). The structure of medication sales between 2012 and 2014 remained unchanged, with prescription medications constituting 59%, and over-the-counter medications making up as much as 41% [33]. Combining various medications often brings about unfavorable and toxic effects, which may require hospitalization. Unfortunately, the Polish healthcare system still lacks documentation that would record the medications currently being taken by a patient. This problem could be solved by means of an electronic patient card or a system that would prevent healthcare workers from giving or selling patients medications containing the same substance under different trade names [34].

Another variable contributing to hospitalization is the number of chronic diseases. Our observation that patients treated for endocrine and cardiovascular diseases are hospitalized significantly more often than those who do not suffer from such diseases – and more often than those treated for other chronic conditions – indirectly confirms that these health problems are common in the population. However, the probability of hospitalization for endocrine diseases is much higher than in the case of cardiovascular disease. Consistent with the results reported by KPMG, by 2030 the number of patients with diabetes in Poland will increase from 2.17 mln to nearly 3 mln people, the number of patients with hypertension will rise by 3.3 mln to exceed 13.8 mln, and the number of those affected by coronary disease will increase from 3 mln to 4.2 mln. Furthermore, in 2030, there may be as many as 120 thousand cases of hospitalization due to myocardial infarction, and 190 thousand for cerebrovascular diseases; in 2011, there were about 85 thousand and 135 thousand hospitalization cases for these respective conditions [35].

Our findings indicate that the likelihood of hospitalization in the group of patients over 44.5 years old is greater than in younger individuals. Based on the analysis conducted by KPMG, it can be concluded that the aging of society does not determine the incidence of diseases. Since prevention is the most cost-effective way of coping with chronic conditions [36], it is necessary to invest in the promotion of healthy diets, physical activity, and anti-smoking campaigns in order to change the lifestyle and habits of Polish people [35]. The results presented here also show that hospitalization is more likely among individuals with BMIs over 27.1, which additionally shows the need for actions aimed at the prevention of obesity.

Our study demonstrated that the frequency of hospitalization was statistically significantly related to the presence of chronic diseases and self-reported severity of symptoms. As indicated by Sadillioglu (2013), chronically ill patients more often perceive their health status as more serious than those without chronic diseases (symptoms assessed as not very serious 73.1% vs. 87.2%, respectively). However, objective evaluation by physicians revealed that patients in both groups – 95.28% (323/339) of patients with at least one chronic disease and 98.4% (510/518) of patients without chronic diseases–had similarly not very serious health status [37]. The fact that chronically ill patients perceive their symptoms to be more severe than they really are may result from their fears for their health. In the study of Nowicka-Sauer (2015), an elevated level of anxiety (more than 7 points on the Hospital Anxiety and Depression Scale, HADS) was observed in 42.7% of chronically ill patients, and a pathological level of anxiety (11 points or more) was seen in 23.7%. This was statistically significantly higher in women ($p = 0.015$) [38]. The fact that hospitalization is twice as likely for people who estimate the severity of their symptoms to be above 5 suggests that patients' self-reported symptoms should not be ignored in the process of treatment and diagnosis. This is particularly important in an emergency department, where decisions about interventions must be made quickly.

What is more, Sadillioglu (2013) asserts that women (19.1%) expect admission to hospital after treatment in an emergency department significantly more often than do men (16.0%) [37]. Nevertheless, our study does not provide evidence for a substantial influence of sex on hospitalization rate.

Patients whose previous visit to a hospital emergency department ended with them being sent to a hospital ward are more likely to be hospitalized again than those whose visit to an emergency department was followed up by treatment in an outpatient clinic. This is probably the case because patients remember the diagnosis made during previous hospitalizations and associate current symptoms with those observed in the past. This theory is supported by Foran (2010), who showed that patients usually retain their initial diagnoses from the emergency department, and that this factor may increase the probability of admission to hospital in the future [39].

Interesting results were obtained in our study with regard to a visible connection between the level of health practices and the frequency of hospitalization. The health practices category includes such behaviors as obtaining sufficient rest, avoiding overwork, body weight control, sleeping adequately, cutting down on smoking, and avoiding extreme physical effort [17]. This above relationship can be explained in terms of such patients' excessive care for their health. Presumably, such patients are hospitalized for the purpose of diagnosis in the very early stages of the disease. This relationship requires further investigation. It is also worth stating that, out of four groups of health behaviors, only health practices had a significant influence on the hospitalization rate.

The factors that deserve distinct analysis are those that correlate negatively with the hospitalization rate. One of these is having received treatment for joint dislocation or sprains, small wounds, or minor injuries during the last stay in an emergency department; this is associated with a four times lower probability of hospitalization than for patients who reported to an emergency department for other reasons. On account of the inadequate representation of subjects who visited an emergency department due to minor injuries on the day of our investigation, we have no grounds for claiming that the likelihood of hospitalization in this group is different than in the group of patients who ended up in the emergency department for other reasons. It is of note, however, that the proportion of hospitalizations among patients who were in an emergency department due to minor injuries on the day of our investigation was considerably lower than in the other group – 21.4% versus 51.9%, respectively ($p = 0.04674$). These findings support the results of our previous analysis (Szwamel, Kurpas, 2015), which was conducted on a sample of 17,406 individuals and which demonstrated that the probability of discharging a patient with a health problem in the S or T ICD-10 groups (injuries and poisonings) was almost four times higher than in the case of a patient with another diagnosis (OR 3.94, 95% CI 3.67–4.24) [27]. Similar results were obtained by Rzońca and Bednarz (2013), who claimed that nearly three-fourths of emergency department patients with body injuries – resulting mostly from strokes and falls – did not need further treatment in other hospital wards [40]. According to the Central Statistical Office (2013), in 2012 over 4.2 mln people received outpatient treatment (mostly for trauma and orthopedic surgery) in admissions and emergency departments throughout the country [41]. Thus, the inclusion of the treatment of minor injuries in primary healthcare services (which is efficient from the economic point of view) does seem reasonable.

Consistent with the results of our study, a low index of patients' satisfied needs makes hospitalization more probable. It is important to know whether patients' needs are satisfied or not, because these are related to the worsening of health status, low quality of life, and healthcare expenses [42]. Low indices of satisfied needs in the group of people with chronic respiratory diseases is mainly observed among patients of advanced age, men living alone, residents of rural areas, patients with multiple morbidities, patients showing high levels of illness acceptance and health practices, those with a low level of satisfaction with their health, those with a high quality of life in the physical domain, and those with a low quality of life in the environmental, psychological, and social relations domains [43]. It is worth emphasizing that, in accordance with Eurostat data for 2014, many patients did

not actually undergo tests recommended to them by medical professional: 3.1% of Poles because they were too expensive; 0.3% because the test location was too distant; 2% because of a lack of time; 0.1% because they did not know a good physician or specialist; 4.4% because they were on a waiting list; 0.7% because of a fear of physicians, hospitalization, medical examination, or treatment; and 1.8% because of expectations that the problem would clear itself up [16].

Our findings demonstrate that problems in obtaining laboratory and imaging requests from a primary care physician visibly reduced the hospitalization rate, but the results of logistic regression give no grounds to claim that the probability of hospitalization was different in those patients who had difficulties obtaining these requests than in patients who did not have such problems. This issue, however, requires more in-depth analysis conducted at least twice on the same study sample and over a longer period.

Limitations of the study

As a consequence of the inadequate representation of patients with greater than secondary education, we came to seemingly contradictory conclusions – namely that the proportion of hospitalizations in the group with no more than secondary education was significantly higher than in the group with higher than secondary education, at 52.5%

and 29.6%, respectively ($p = 0.035$); however, based on the results of logistic regression, we have no grounds to claim that the likelihood of hospitalization in these two groups was different. A similar situation was found with regard to the inadequate representation of patients who reported to the emergency department on account of minor injuries on the day of our investigation.

Conclusions

The hospitalization risk group mainly includes individuals with multiple morbidities, polypragmasy, low economic status, a low index of satisfied needs, a high level of health practices, a history of hospitalization, and those reporting to an emergency department for reasons other than minor injuries. Hospitalization prevention programs carried out at the primary care level should include elements such as measurement of health behaviors, propagation of the knowledge of chronic diseases and their prevention, and education of patients on the purpose, tasks, and functioning of a hospital emergency department. All action taken should aim to enhance the responsiveness of healthcare to patients' needs. A subsidy for primary care is recommended to increase the competence and range of medical services provided within 'small surgery'.

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