

# Interregional migration of patients hospitalized in Poland in 2017

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## Abstract

**Aim:** An assessment the number of patients hospitalized out of a registered voivodeships in Poland in the year 2017 together with demographic and medical factors as well as hospitalization costs.

**Material and methods:** Data from National Health Fund (NFH) on hospitalisations of patients who were registered in one voivodeship but were hospitalized in another voivodeship in Poland in 2017 were statistically analysed.

**Results:** The majority of patients' hospitalizations (every fifth) flowed in to mazowieckie voivodeship from other voivodeships, twice less - to śląskie, wielkopolskie and małopolskie voivodeships in the year 2017. A positive correlation between inflow and outflow of patients' hospitalization between voivodships in Poland was found. A large number of migrating patients' hospitalizations were between neighbouring voivodships, but also to major hospital centers. Women predominated in patients' hospitalizations flowed between voivodeships. The age of patients hospitalized out the voivodeship registered differed

## Key words:

migration of patients,  
hospitalization,  
interregional migration

significantly between voivodeships. The largest migrating patients' hospitalization costs were due to orthopedics and traumatology or cardiology.

**Conclusion:** Identification the migration rate between voivodeships, together with the analysis of the reasons for migration of patients, patients' age and sex may improve optimizing the contracting of medical services.

## Introduction

Health care in Poland is financed primarily through public funds which are at the disposal of the National Health Fund (NHF), although other sources of funding may also be identified [1,2], including patients' additional insurance and own funds or external funding resources from the European Union. The scope of the NHF activity is governed by the Act of 27 August 2004 on health care services financed from public funds [3]. Among the competences falling within the remit of the NHF one may enumerate: control of medical entities regarding the realisation of specified procedures, evaluation of the provision of health care benefits (also in terms of compliance with existing rules), identification of causes of activity-and-finance plan overrun (in part or during the whole period for which the agreements between the NHF and the health care providers were concluded) [4]. The NHF is also tasked with cost allocation pertaining to patient migration. It is becoming increasingly common for the patients to use hospital services provided by medical entities across Poland and abroad. Since all beneficiaries (patients) are subject to compulsory health insurance, the NHF is obliged to cover the cost of the provided services regarding patient migration [5]. This leads to the necessity to analyse the migration rate, or the costs of the outflow of patients regionally assigned to particular NHF branches and the costs of the inflow of patients from a different branch, in order to effectively draw up accounts and report any related information [6].

The notion of *patient migration* does not appear frequently in Polish nor foreign literature [7,8]. It is used in professional practice of the National Health Fund and occurs in orders passed by the President of the NHF [9]. Assuming that the notion refers to the temporary movement of persons (patients) with the aim of improving their health and quality

of life, it ought to be associated with medical tourism [10,11,12,13,14,15,16], which comprises health tourism [17,18], spa and wellness [19,20], as well as health resort tourism [21,22]. Health tourism is connected with the movement of patients, e.g. as regards hospitalisation, with the objective of treatment. Such form of tourism has been defined as "the organized travel outside one's local environment for the maintenance, enhance mentor restoration of an individual's well being in mind and body" [23]. Health resort tourism, in turn, is aimed at the improvement of the patients' quality of life through the responsible care of their health and safety [19]. Both forms of tourism may develop due to the increasing linkage between health care systems all over the world and by virtue of trade and commercial exchange [24,25].

Reasons for migration have been broadly described in literature [26,12,21,27,28,19]. Among these, one might enumerate: the unavailability of health care provisions in the patients' place of residence, distrust to doctors of certain specialties, other patients' recommendations of services provided by a given medical entity [16], as well as higher quality of provisions and lower costs regarding medical services [29,30]. The selection of a particular health care unit by a migrating patient may be influenced by more advanced equipment and modern diagnostic and treatment methods in a given facility [31]. In the case of lack of public funding in relation to health care provisions involving hospitalisation [32], the patient is forced to seek such services abroad. The problem of limited financial resources, including funding of beneficiaries who require inpatient treatment, is a global issue which affects nearly all countries in the world [32,33]. Each of the aforementioned cases entails financial clearance of accounts between particular branches of the National Health Fund, also including settlements between national and foreign units.

The aim of this study was assessment the number of patients hospitalized out of a registered voivodeships in Poland in the year 2017 together with demographic and medical factors as well as hospitalization costs.

## Material and methods

In the study we analysed individual, not identified data from National Health Fund (NHF) on hospitalisations of patients who were registered in one voivodeship but were hospitalized in another voivodeship in Poland in 2017. For every such a hospitalization: regional branch of NHF where a patient was hospitalized, regional branch of NHF where a patient was registered, patient's age and gender, group of diseases according to ICD10, medical specialties that a patient was treated, cost of hospitalization.

Statistical analyses were performed using the STATISTICA software (StatSoft, Poland). Pearson's coefficient was used to analyse correlation between inflow and outflow of number and hospitalization costs of migrating patients' hospitalizations. Absolute numbers and percentages were estimated for categorical variables such as gender, age group, voivodeship, group of diseases, medical specialties; as well as means and standard deviations for continuous variable such as patients' age and hospitalization cost. Sums were calculated for total costs, total number of patients and according to voivodeships, group of diseases, medical specialties. Pearson chi-square test of independence was used in correlation analyses between gender and voivodeships. F test of analysis of variance was used to compare age between voivodeships. The value of  $p < 0.05$  was considered to be statistically significant.

## Results

The National Health Fund paid for 526.5 thousand hospitalisations of patients who were registered in one voivodeship but were hospitalized in another voivodeship in Poland in the year 2017. The majority of these hospitalizations (104.7 thousand i.e. 20%) flowed in to mazowieckie voivodeship

from other voivodeships (Figure 1). Half the size of hospitalizations as to mazowieckie flowed in from other voivodeships to 3 voivodeships: śląskie, wielkopolskie, and małopolskie (each around 9-10%). Hospitals in the remaining voivodeships did 6.5% or fewer hospitalizations of patients registered in other voivodeships.

A significant positive correlation between the inflow of patients' hospitalizations to particular voivodeships and their outflow from these voivodeships in Poland was found ( $r=0.857$ ,  $p < 0.001$ ). This means that the greater the inflow of hospitalizations to a voivodeship, the greater outflow of hospitalization from the given voivodeship on average.

The most outflow of patients' hospitalizations to other voivodeship was from mazowieckie (55.5 thousand, i.e. 11%), followed by wielkopolskie, małopolskie and śląskie (circa 8% each). These voivodeships noted, at the same time, the greatest inflow of patients' hospitalization from other voivodeships, with their numbers exceeding the outflow of hospitalizations. Hence, these voivodeships had a positive balance of the number of patients' hospitalizations. Kujawsko-pomorskie, podlaskie and dolnośląskie voivodeships also noted a positive balance. However, the outflow greater than the inflow, i.e. a negative balance of patients' hospitalisations was identified in the remaining 9 voivodeships, with the biggest in lubuskie (-11.1 thousand), and in the rest voivodeships between -9.5 and -8.5 thousand of patients' hospitalizations.

Furthermore, a significant difference was found between voivodeships where patients were registered and voivodeships where they were hospitalized ( $\chi^2=1062913$ ,  $p < 0.001$ ). A large number of migration of hospitalized patients occurred between neighbouring voivodeships (Table 1). The high acclaim of the regional medical centres (like in wielkopolskie or małopolskie) which attract patients from adjacent voivodeships is also noticeable. For instance, 46% of patients' hospitalizations flowed in from lubuskie to wielkopolskie, which constitutes a significantly more than to the two remaining neighbouring voivodeships: zachodniopomorskie and dolnośląskie (about 20% each). The same applies to podkarpackie voivodeship, whose inhabitants were hospitalised considerably more frequently in małopolskie

**Table 1.** Distribution of migrating patients's hospitalizations between voivodeships

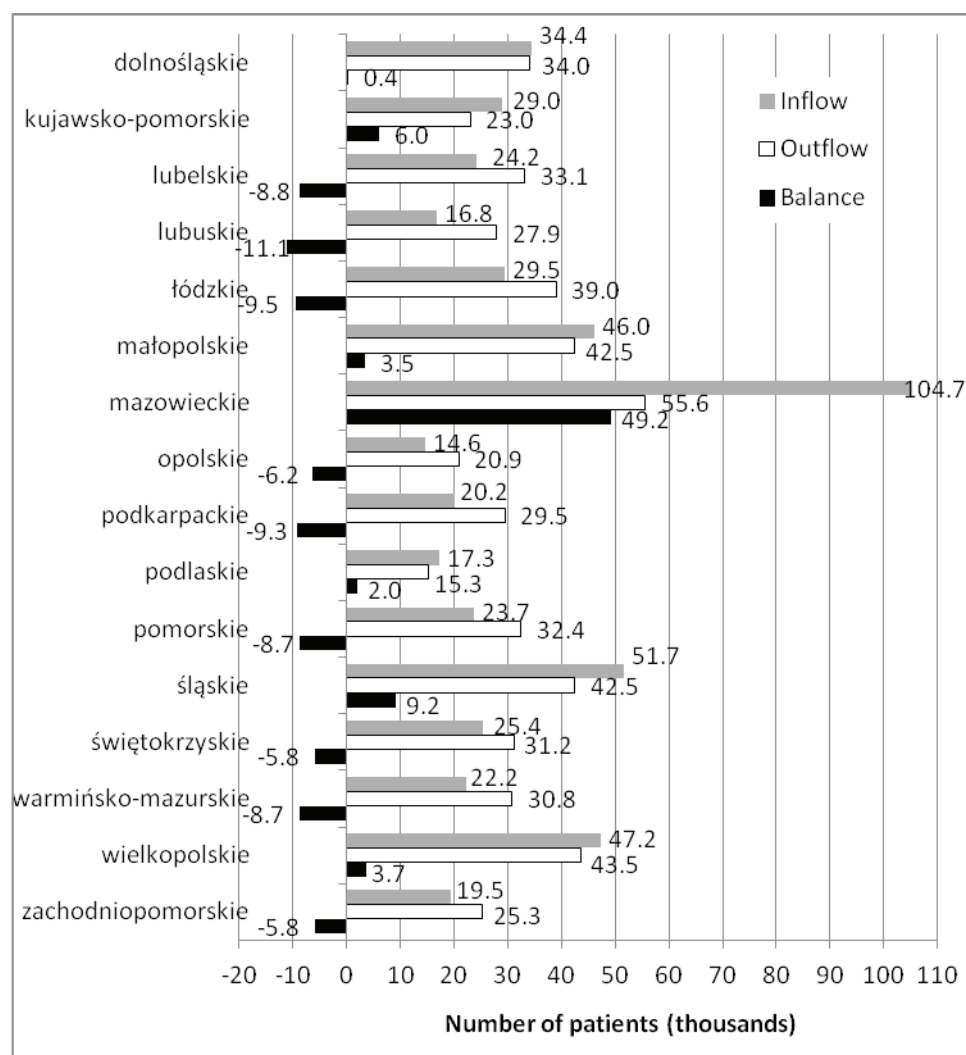
Voivodeship of hospital	Voivodeship of patients registered (N=Number of patients in ths.)															
	dolnośląskie (N=34.0)	kujawsko-pomorskie (N=23.0)	lubelskie (N=33.1)	lubuskie (N=27.9)	łódzkie (N=39.0)	małopolskie (N=42.5)	mazowieckie (N=55.6)	opolskie (N=20.9)	podkarpackie (N=29.5)	podlaskie (N=15.3)	pomorskie (N=32.4)	śląskie (42.5)	świętokrzyskie (N=31.2)	warmińsko-mazurskie (N=30.8)	wielkopolskie (N=43.5)	zachodnio-pomorskie (N=25.3)
Total (N=526.5)	6.5	5.5	4.6	3.2	5.6	8.7	19.9	2.8	3.8	3.3	4.5	9.8	4.8	4.2	9.0	3.7
dolnośląskie	0.0	1.7	1.2	18.4	3.3	4.2	10.6	15.5	1.1	0.4	1.5	7.7	0.9	0.7	30.0	3.0
kujawsko-pomorskie	2.0	0.0	0.8	0.7	10.9	2.2	27.6	0.4	0.4	0.6	19.2	2.9	0.4	6.6	21.8	3.5
lubelskie	1.7	0.9	0.0	0.3	0.0	0.3	63.6	0.3	14.5	3.2	1.3	2.8	3.2	0.7	1.4	0.8
lubuskie	18.6	0.9	0.5	0.0	1.0	1.2	5.5	0.6	0.3	0.2	0.9	1.8	0.2	0.3	45.9	21.4
łódzkie	6.0	2.7	1.1	0.4	0.0	3.4	42.2	3.5	0.5	0.5	1.6	13.0	10.5	0.8	12.4	1.3
małopolskie	2.3	0.7	1.8	0.3	1.8	0.0	10.8	0.9	14.4	0.2	1.0	57.8	5.5	0.5	1.1	0.9
mazowieckie	2.5	5.3	19.3	0.5	16.7	4.8	0.0	0.5	1.6	11.4	3.7	3.5	17.1	8.9	2.6	1.7
opolskie	41.2	0.6	0.7	0.4	4.0	4.4	5.8	0.0	0.7	0.2	0.6	35.9	0.5	0.3	4.0	0.8
podkarpackie	2.3	0.6	19.6	0.3	1.8	37.5	16.8	0.4	0.0	0.4	0.8	6.6	0.0	0.3	1.2	0.6
podlaskie	1.2	1.6	4.6	0.3	1.6	2.1	61.3	0.2	0.4	0.0	3.0	1.7	0.4	19.3	1.5	0.9
pomorskie	1.6	28.6	1.1	0.4	3.0	1.9	11.9	0.2	0.4	0.9	0.0	2.0	0.4	32.2	4.6	10.6
śląskie	6.5	1.3	2.3	0.7	7.8	35.3	13.6	12.3	2.7	0.7	1.9	0.0	9.5	1.1	2.6	1.7
świętokrzyskie	1.6	0.4	8.8	0.2	5.7	28.4	24.8	0.5	18.6	0.3	0.6	8.6	0.0	0.3	0.8	0.4
warmińsko-mazurskie	0.9	9.4	1.0	0.3	1.5	1.2	32.3	0.2	0.3	26.8	21.9	1.4	0.3	0.0	1.7	0.9
wielkopolskie	21.1	19.5	0.8	9.0	14.7	2.2	12.2	2.8	0.4	0.3	2.6	3.0	0.4	0.7	0.0	10.4
zachodnio-pomorskie	3.2	6.4	1.0	19.6	1.8	1.8	11.7	0.3	0.5	0.5	20.8	2.5	0.5	1.1	28.3	0.0

(37.5%) than in lubelskie (19.6%) or świętokrzyskie voivodeship (16.8%). A substantial attractiveness of the mazowieckie voivodeship, Warsaw in particular was also noticed. It had a high inflow of patients' hospitalization from the neighbouring voivodeships, but also from other voivodeships, including małopolskie, podkarpackie or śląskie. Contrarily, łódzkie may be held as an example of a voivodeship without a similar property of attracting patients' hospitalizations. This voivodeship had only a minor inflow of patients' hospitalizations from opolskie, śląskie or świętokrzyskie voivodeships which are adjacent to łódzkie.

Women predominated among migrating patients' hospitalizations, accounting for 56.4% of hospitalisations between voivodeships in Poland in 2017 (Figure 2). A significant difference between gender of migrating hospitalised patients and a voivodeships

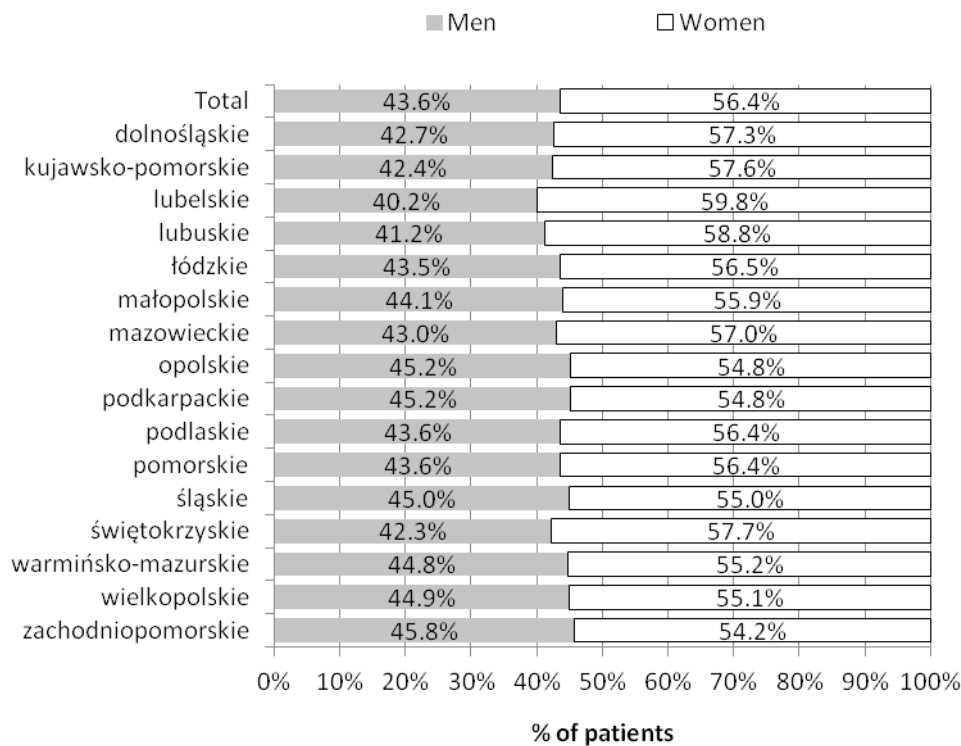
where they were registered was found ( $\chi^2=472.509$ ,  $p<0.001$ ). Women constituted the smallest group of migrating patients' hospitalizations in zachodniopomorskie (54.2%), and the biggest in lubelskie voivodeship (59.8%).

The age of patients hospitalized in other regions than they were registered was between 0 and 107 years,  $45.6\pm 23.8$  years on average. The biggest number of migrating hospitalized patients were the 60-year-olds (18.1%), followed by slightly smaller number of 20-year-olds, 30-year-olds and 50-year-olds (12% of each group), and even fewer children up to 10 years old, 40-year-olds and 70-year-olds (each group approximately 10%), 7% of teenagers, around 5% of 80-year-olds, 0.5% of 90-year-olds and only 26 centenarians (Figure 3). Furthermore, a significant difference between the age of the migrating hospitalized patients and the voivodeship where they were

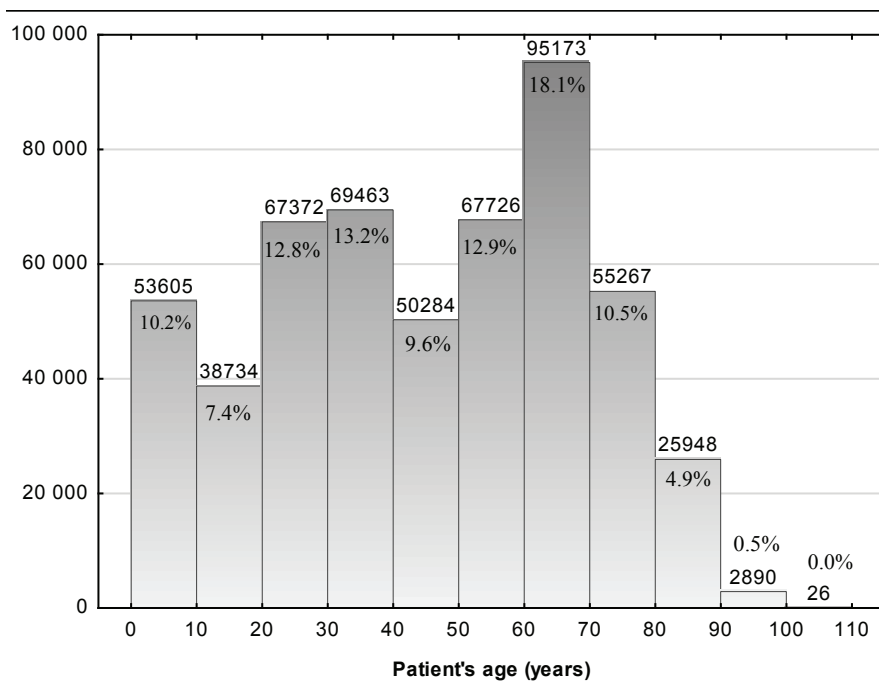


**Fig. 1.** Migration of patients' hospitalizations acc. to voivodeships





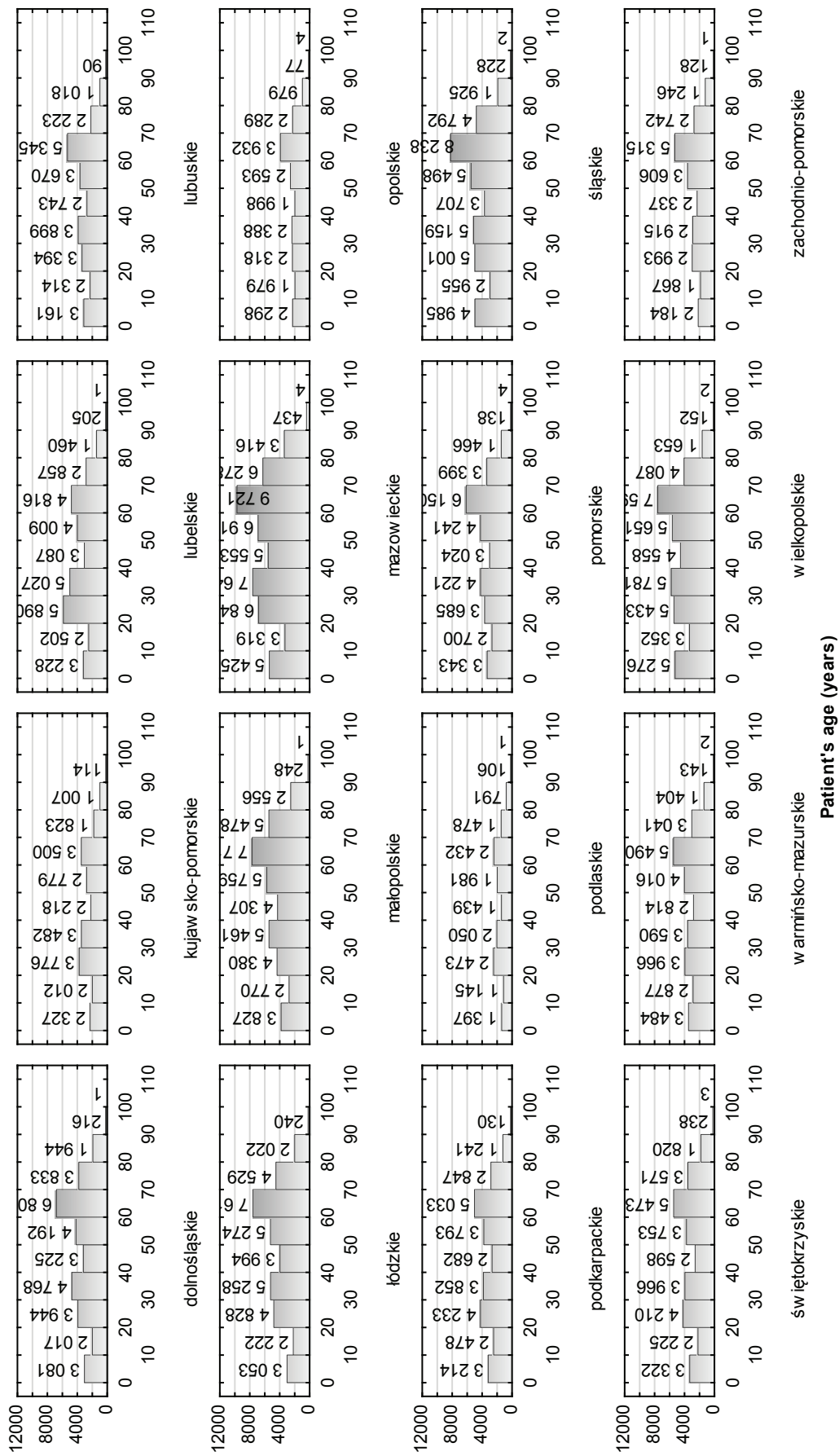
**Fig. 2.** Gender of migrating patients' hospitalizations acc. to voivodeships



**Fig. 3.** Age of migrating patients' hospitalizations – total group

registered was found ( $F=191.452, p<0.001$ ). From the following three voivodeships: kujawsko-pomorskie, lubelskie and podlaskie, 20-year-olds constituted the biggest group of migrating hospitalized patients, while 60-year-old patients predominated from the remaining 13 voivodeships (Figure 4).

While analysing the number of migrating hospitalized patients according to the International Classification of Diseases, Tenth Revision (ICD10) (Table 2), it was found that the greatest number of migrating patients' hospitalizations were due to neoplasms (12.5% of all migrating hospitalizations) and diseases



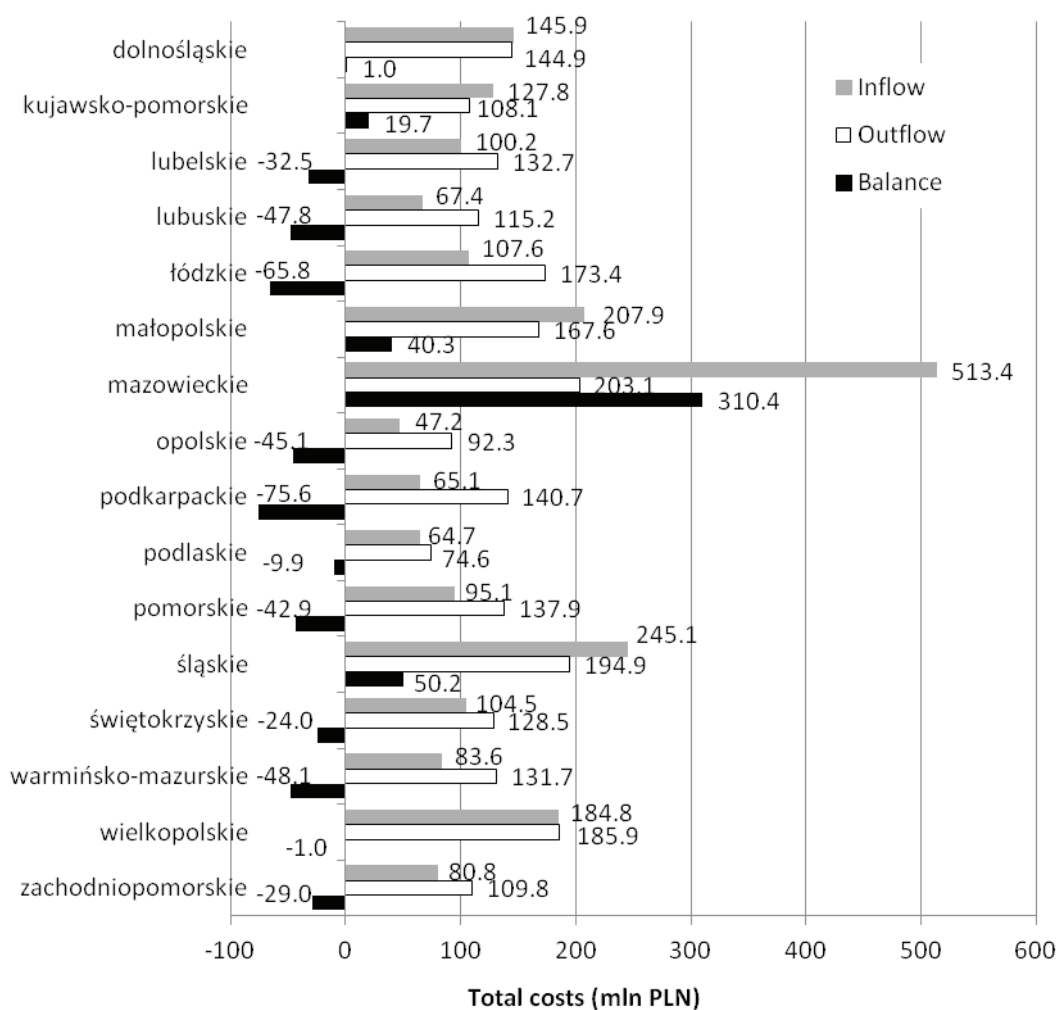
**Fig. 4.** Age of migrating patients' hospitalizations acc. to voivodeships

of the circulatory system (12.1%). Next, around 9% of the overall migrating hospitalizations were caused by: pregnancy, childbirth and the puerperium or diseases of the genitourinary system or diseases of the musculoskeletal system. Fewer patients migrated to hospitals because of diseases of the eye and adnexa, diseases of the digestive system, diseases of the respiratory system or injury, poisoning and certain other consequences of external causes (accounting for 6 – 8% of all migrating hospitalizations each).

The total cost of migrating patients' hospitalisations between voivodeships in Poland in the year 2017 amounted to 2.2 milliard PLN, i.e. approximately 138 million PLN for each voivodeship on average. However, the distribution of costs of migrating hospitalizations between the voivodeships was not uniform (Figure 5). Nearly a quarter of costs (23%) flowed in to the mazowieckie voivodeship. Śląskie ranked second, with 11% of the total cost flowed in,

followed by małopolskie with inflow of 9% of the cost of migrating patients' hospitalisation.

Moreover, a significant positive correlation between the costs of hospitalizations flowed in to voivodeships and the outflow of costs from these voivodeships in Poland was found ( $r=0.742$ ,  $p=0.001$ ). This means that the higher the total costs flowed in to a given voivodeship, the higher the total costs flowed out on from this voivodeship on average. What is more, there are positive correlations, close to a functional relationship, between the inflow of migrating hospitalized patients and the inflow of the cost of their hospitalisation ( $r=0.996$ ,  $p<0.001$ ), between the outflow of migrating hospitalized patients and the outflow of the cost of their hospitalizations to other voivoships ( $r=0.967$ ,  $p<0.001$ ), and between the balances between inflow and outflow of patients hospitalized and the balance of these cost between voivodeships ( $r=0.986$ ,  $p<0.001$ ).



**Fig. 5.** Total costs of migrating patients' hospitalizations acc. to voivodeships



Table 3 presents the number of patients' hospitalizations and their costs according to medical specialty units. The highest costs were that of the hospitalization in orthopaedics (280.1% million PLN, which accounted for 12.5% of the total hospitalisation cost of migrating patients). The second highest costs of patients' hospitalisations from different voivodeships in Poland were on cardiology units (9.8%), followed by surgery (8.4%, at the same time representing the second biggest number of migrating patients' hospitalizations 53.4 thousand), obstetrics and gynaecology (8% of the total cost and simultaneously the largest group of migrating patients' hospitalization 78.3 thousand), neurosurgery and otolaryngology (6.3% and 5.6% of the total cost respectively). The remaining specialties generated a lower cost of migrating

patients' hospitalizations (less than 5%), although migrating hospitalization costs on ophthalmology and transplantology units also ranked relatively high.

## Discussion

The notion of patient migration, comprising medical tourism, appears in numerous scientific articles in the context of analyses concerning: the term itself, factors affecting the dissemination of the phenomenon [34], patients – their sex and age, positive and negative effects regarding the development of this kind of tourism, as well as inter-cultural competence on medical tourism market [35], and the cost of the provided services. The concept of medical tourism is

**Table 2.**

ICD10 groups of diseases of migrating patients' hospitalisation in Poland

Group of diseases	Number of patients	% of patients
Neoplasms	65,954	12.5
Diseases of the Circulatory System	63,888	12.1
Pregnancy, Childbirth and the Puerperium	49,003	9.3
Diseases of the Genitourinary System	46,871	8.9
Diseases of the Musculoskeletal System	46,585	8.8
Diseases of the Eye and Adnexa	40,887	7.8
Diseases of the Digestive System	40,808	7.8
Diseases of the Respiratory System	34,768	6.6
Injury, poisoning and certain other consequences of external causes	33,550	6.4
Diseases of the Nervous System	20,783	3.9
Endocrine, Nutritional and Metabolic Diseases	20,699	3.9
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	12,819	2.4
Infections and Parasitic Diseases	10,981	2.1
Congenital malformations, deformations and chromosomal abnormalities	10,674	2.0
Diseases of the Skin and Subcutaneous Tissue	9,267	1.8
Diseases of the Ear and Mastoid Process	8,792	1.7
Diseases of the blood and blood-forming	5,719	1.1
Factors influencing health status and contact with health services	3,782	0.7
Mental, Behavioural and Neurodevelopment disorders	642	0.1
Certain Conditions Originating in the Perinatal Period	8	0.0
External Causes of Morbidity	8	0.0

**Table 3.**

Number of migrating patients' hospitalizations and their costs according to medical speciality units

Medical specialties	Number of patients (ths.)	Total cost (mln PLN)	% of total costs
Orthopedics and Traumatology	42.2	280.1	12.5
Cardiology	31.4	219.0	9.8
General Surgery	53.4	188.8	8.4
Obstetrics and Gynaecology	78.3	180.0	8.0
Neurosurgery	11.9	140.7	6.3
Otolaryngology	23.4	125.9	5.6
Ophthalmology	39.5	107.0	4.8
Transplantology	1.1	93.0	4.1
Internal Medicine	32.3	83.9	3.7
Urology	24.7	66.5	3.0
Vascular Surgery	7.5	64.6	2.9
Neurology	16.0	58.9	2.6
Oncological Surgery	9.9	54.5	2.4
Thoracic Surgery	6.0	48.6	2.2
Pediatrics	20.2	46.1	2.1
Cardiosurgery	2.2	44.0	2.0
Endocrinology	8.3	38.5	1.7
Pulmonology	10.8	32.5	1.5
Hematology	4.9	31.3	1.4
Pediatric Surgery	11.4	29.8	1.3
Pediatric Orthopedics and Traumatology	3.8	26.5	1.2
Gastroenterology	8.4	21.9	1.0
Infection Diseases	7.1	21.9	1.0
Rheumatology	7.3	21.0	0.9
Plastic Surgery	2.6	18.8	0.8
Pediatric Oncology and Hematology	3.2	18.2	0.8
Pediatric Cardiology	3.1	17.8	0.8
Maxillofacial Surgery	2.6	17.5	0.8
Pediatric Neurosurgery	1.3	12.6	0.6
Pediatric Otolaryngology	3.7	10.9	0.5
Oncology	4.5	10.5	0.5
Dermatology and Venereology	5.5	10.3	0.5
Pediatric pulmonology	3.3	10.0	0.4
Nephrology	3.4	9.8	0.4
Pediatric Gastroenterology	3.8	8.9	0.4
Pediatric Neurology	3.4	8.8	0.4
Pediatric Allergology	2.9	6.0	0.3
Pediatric Ophthalmology	2.8	5.8	0.3
Pediatric Nephrology	2.2	5.6	0.3
Angiology	0.8	5.4	0.2
Pediatric Endocrinology	2.0	4.5	0.2
Toxicology	1.0	4.0	0.2
Allergology	3.9	3.9	0.2
Geriatrics	1.1	3.5	0.2
Pediatric Urology	1.3	3.0	0.1
Pediatric Rheumatology	1.0	2.6	0.1
Pediatric Maxillofacial Surgery	0.3	2.5	0.1
Diabetology	0.8	2.3	0.1
Pediatric Transplantology	0.0	2.1	0.1
Audiology and Phoniatics	1.1	2.0	0.1
Pediatric Infection Diseases	0.7	1.9	0.1
Pediatric Cardiosurgery	0.3	1.9	0.1
Pediatric Diabetology	0.6	1.7	0.1
Pediatric Immunology	1.0	1.5	0.1
Immunology	0.3	0.8	0.0
Pediatric Dermatology and Venereology	0.3	0.6	0.0
Pediatric Audiology and Phoniatics	0.2	0.2	0.0

also examined as an effect of social processes [16]. There are several reasons for migration of patients described in the literature in the field [36]. Medical tourism may take place in the circumstances when the necessary treatment is unavailable or illegal in patient's place of origin [34,37]. Another cause of patient migration is the fact that although medical services are accessible to patients, they may be provided more quickly and efficiently in a different region. Migrations are also affected by legal and political restrictions, such as for instance the migration of patients with infertility problems to different countries.

Analysis of the types of provided medical services and their cost in case of patient migration enables the creation of data sets pertaining to the places where the services performed are finest for the patient in terms of cost-efficiency, effectiveness and timeliness, as well as regarding the procedures performed and the analyses of migrating patients as regards their sex and age [30]. Snyder and other scientists claim that migrations of patients also entail the emigration of medical staff to places where the rate of hospitalisation was increased. This, as a result, has influence on the shape of health professionals training system, their change of workplace, the use of outsourcing and also on local economies [38]. Moreover, changes in the health care system on account of patient migration coincide with the need to promote the medical tourism sector and to support the health needs of the population [39].

The performed analysis of migration of patients between regions in Poland may contribute to and facilitate greater cooperation between medical entities, medical schools, local government institutions and any other entities functioning as a medical cluster, with the aim of supporting medical tourism and promoting medical facilities and regions.

Accurate data concerning medical tourism in terms of the cost of provided provisions and the obtained information about patients are rather infrequent and inaccessible. Hopkins and co-authors acknowledged that scientific literature lacks sufficient figures regarding the scope of medical tourism, shareholder claims, verified migration rate of patients, as well as the revenues generated by both direct and indirect medical tourism [40]. Likewise, Smith together with

co-authors share this view following their study of medical tourism in the context of bilateral trade relations between the United Kingdom and India [41].

Results of the English-language literature review indicate that patients' choice of a particular medical service provider is often affected by the lower cost of provisions, but at the same time by the higher quality of service. To better reflect this, one might give the example of the Indian hospital chain Apollo which specialises in cardiac surgery and observes comparable results as its counterparts in the USA in terms of the quality of service, treatment and clinical indicators [42]. When analysing the costs of service one might consider, for instance, the knee replacement surgery, which costs between 40 000 and 50 000 USD in the USA, while in Costa Rica the cost amounts to about 10 000 USD [43]. Heart bypass surgery costs 144 000 USD in the USA, but in Thailand the cost is 24 000 USD, while in India 8 500 USD. Despite such examples, one may notice a scarcity of research detailing a full cost analysis for a given type of medical service. Furthermore, there is even fewer research undertaken to study the total cost of services, including the analysis of medical errors occurrence or unfortunate accidents recorded as a result of additional monitoring of patients who were treated due to medical tourism [44]. Several studies even point to subsequent costs incurred by public health care systems in the countries of origin of the migrating patients [45].

The authors of this study presented costs according to the ICD10 classification list on the basis of information collected from the National Health Fund. The figures refer to the cost of migrating patients' hospitalisation according to voivodeships. The data serve as a source of information contributing to the discussion on the necessity (or its lack) to transfer funds to regions with a higher average number of treated patients and a greater inflow than outflow of beneficiaries. As results from the studies performed by other scientists, the cost of medical services provided for patients may increase as a consequence of further complications [46]. Moreover, a prolonged period of treatment of a given medical complication could substantially affect the patient's financial standing and quality of life, consequently increasing the overall cost. Therefore, it seems that such examples ought to

prompt discussion on potential solutions to similar problematic issues in the future.

The outlined research results regarding migration of patients refer to the provisions and benefits financed by the National Health Fund. Nevertheless, they also serve as an incentive to raise the question of financing by patients themselves. For patients, the lower cost of service bears a considerable influence on the choice of a particular venue where the treatment is to take place [47]. Cross and others highlight the importance of a careful selection of patients to ensure subsequent positive clinical indicators in a given medical facility, which in turn refers to the comparability of the treatment methods. Another aspect worthy of noting is, as Cross and Carruth also stress, the ensuring of continuity of health care [48]. The provision of services is only one among the elements of patient care, alongside: preliminary consultation, educational programmes, inpatient treatment and home rehabilitation. All of the elements ought to be coordinated and constantly improved.

In countries where the government is in control of the access to health care services, like in the case of Poland, there is a noticeable problem with waiting time for treatment. Numerous patients choose outsourcing of medical care in order to reduce the time of waiting. This wish for a more rapid access to medical services (hip or knee replacement, spinal surgery or eye treatment) led to an increased rate of medical tourism among Canadians [48]. Therefore, it may be assumed that patients migrating across Poland may also do so for similar reasons.

In Poland a debate remains open on addressing patient needs as regards health care services and in terms of the waiting time for medical treatment. Measures undertaken by the Ministry of Health are aimed at reducing the scale of this problem through, among others, analysing the maps of health needs according to voivodeships and regions or through educating an increased number of medical students.

Research results presented in this work may contribute to the discussion on reliable and comparable data concerning patient migration. Conclusions pertaining to medical tourism may have an impact on the development of local health care systems [49] and make a contribution to increasing the level of competition on

the health care services market [50,51,28]. The study also points to a trend of medical service centralisation. Regional medical centres located in wielkopolskie, małopolskie and mazowieckie voivodeships observe a positive net migration rate of patients not only from the adjacent regions, but also from other more distant voivodeships. Furthermore, the study occasions a more in-depth consideration regarding the issue of how to raise the competitiveness of hospitals located in certain regions, such as in the case of łódzkie which does not seem to have a comparable attractiveness with respect to patient migration.

Medical tourism causes the traditional model of health care to change and gives rise to the need of analysing a wide range of subjects, including: the issue of patient selection before treatment so as to limit possible future complications, the issue of the continuity of health care and the control over medical licences. Furthermore, it is essential to add that any further research into the migration of patients ought to be conducted against the background of the global reforms of the health sector implemented in Poland.

## Conclusions

1. The majority of patients' hospitalizations (every fifth) flowed in to mazowieckie voivodeship from other voivodeships, twice less – to śląskie, wielkopolskie and małopolskie voivodeships in the year 2017.
2. A positive correlation between inflow and outflow of patients' hospitalization between voivodeships in Poland was found. The higher inflows were to voivodeships, the higher outflows from them were on average.
3. A large number of migrating patients' hospitalizations were between neighbouring voivodeships, but also to major hospital centers.
4. Women predominated in patients' hospitalization flowed between voivodeships.
5. The age of patients hospitalized out the voivodeship registered differed significantly between voivodeships. 20-years old patients predominated in kujawsko-pomorskie, lubelskie and

podlaskie voivodeships, but 60-year-olds in the remaining voivodeships.

- The largest migrating patients' hospitalization costs were due to orthopedics and traumatology or cardiology.

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