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Accessibility to personal insulin pumps among children with diabetes mellitus in Poland in 2014

ABSTRACT

One of the principal aspects of comprehensive medical care for patients with diabetes mellitus, especially paediatric patients, is the accessibility to personal insulin pumps. In Poland, the National Health Fund secures personal insulin pumps for children by means of a separately commissioned service. The structure of the provided services varies greatly from province to province in terms of accessibility to insulin pumps. (Clin Diabetol 2018; 7, 4: 175–181)

Key words: paediatric diabetes care, personal insulin pumps, diabetes

Introduction

One of the principal aspects of contemporary medical care for paediatric patients with diabetes mellitus

is the accessibility to modern technologies, including personal insulin pumps.

The most common type of diabetes mellitus occurring in the paediatric population is type 1 diabetes mellitus (98% of the cases), whose treatment, in all the patients, requires administration of insulin according to an intensive insulin therapy regimen [1]. According to what is currently known, the most effective treatment for type 1 diabetes mellitus patients is intensive insulin therapy with a personal insulin pump [2–4]. Numerous study results unequivocally demonstrate that, compared to multiple daily injections, treatment with the insulin pump is more beneficial and more effective in achieving good metabolic control and ensures a better quality of life to the patients as a result of a higher precision in insulin dosing, convenient self-administration of insulin in public places, a significantly lower number of insulin injections, a lower risk of hypoglycemia and glucose fluctuations, adjustment of an insulin dose to match the composition of a meal, an easier adjustment of an insulin dose to match the level of physical activity, a precise modelling of the basal dose according to the current needs [5–7].

Treatment with insulin pumps providing continuous subcutaneous insulin infusion has been available to children with diabetes mellitus in Poland for more than 15 years. The first personal insulin pumps were

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introduced and widely popularised for children by the Great Orchestra of Christmas Charity Foundation (WOŚP, Wielka Orkiestra Świątecznej Pomocy) in 2001. Another milestone was the introduction of the service “treatment with an insulin pump” by the National Health Fund in 2008 to the catalogue of public-funded services under separately commissioned healthcare services. Initially, the service was only available to children but in 2011 also young adults up to 26 years of age were included in the eligible population [8–10]. Given that paediatric diabetes care is centralised, it is usually the case that only one regional diabetes care facility per province provides treatment with insulin pumps.

The aim is to analyze the accessibility to personal insulin pumps reimbursed by the National Health Fund in the paediatric population in Poland in 2014.

Material and methods

The starting point for this study were the maps of health needs in diabetes mellitus published in 2016 by the Analyses and Strategies Department, Ministry of Health, as part of the project entitled: “Maps of Health Needs: A Systemic and Implementation Analyses Base” co-financed by the European Union from the European Social Fund as part of the Operational Programme Knowledge Education Development (project number POWR.05.02.00-00-0149/15-01). This study used the definitions of variables and indicators used in the Maps of Health Needs and is an extension of the data published therein. In addition, similarly to the Maps of Health Needs, the National Health Fund individual reporting data from 2014 were used in the present study.

The analysis covered services provided to children and adolescents up to 18 years of age. The study population was divided into 3 age groups: 0–6, 7–14 and 15–18 years. The patient’s age was defined according to the year of birth.

The analysis provides statistics on personal insulin pumps implanted in children with diabetes mellitus in Poland in 2014. The reported pump implantation was defined as product 5.10.00.0000053 (treatment of diabetes mellitus with an insulin pump in children up to 6 years of age or requiring up to 20 units of insulin daily) or as product 5.10.00.0000054 (treatment of diabetes mellitus with an insulin pump in children from 6 to 18 years of age) reported under separately commissioned services. The publication presents a set of descriptive statistics at the national and provincial levels. The analyses were carried out using R (a software for statistics) (Table 1).

The analysis also provides information about insulin pump implantation in new patients. New patients were defined in the present study as patients below 18

years of age who, during the period from 2009 to 365 days prior to the commencement of services aimed to implant an insulin pump, had not been provided by the public healthcare system with any service as part of outpatient specialist care or inpatient care for diabetes mellitus [ICD-10 (International Statistical Classification of Diseases and Related Health Problems, 10th edition) codes E10–E15] [13] (Table 2–4).

Results

In Poland, in 2014, a total of 1.7 thousand personal insulin pumps were implanted; 25 per 100,000 children (Figure 1). The number of pumps per 100,000 children (according to the patient’s place of residence) was the lowest in the Małopolskie Province (14.0) and the highest in the Świętokrzyskie and Mazowieckie Provinces (35.3 and 33.4, respectively). As shown in Table 5, 136 patients migrated outside their province of residence in order to receive an insulin pump. The largest number of patients from other provinces arrived in the Śląskie and Mazowieckie Provinces. Patients from other provinces accounted for 18% and 14%, respectively, of all the children in these two provinces who were implanted with an insulin pump. A total of 46% of all insulin pumps in Poland were implanted in first-time patients. In two provinces, the Świętokrzyskie and Podlaskie Provinces, this percentage exceeded 60%. The percentage of insulin pumps implanted in new patients was the highest in the age group 0–6 years (88%) and the lowest in the age group 15–18 years (24%).

Discussion

Modern technologies in diabetes care, treatment with personal insulin pumps, have dramatically changed the effectiveness and safety of insulin treatment, especially in children with diabetes mellitus [5–7]. Unfortunately, given that they require the provision of appropriate highly specialized care, advanced technologies are usually more accessible in larger and dynamic diabetes care facilities. This is associated with the numerous requirements related to insulin pump therapy (including, among other things, the reading and interpretation of data saved in the pump memory, systems for glucose monitoring, wide access to specialist diabetes education programmes). The worldwide trend in line with evidence-based medicine is to popularize insulin pump therapy in children [5–7].

In Poland, the number of children with diabetes mellitus receiving insulin pump therapy was estimated at 6.1 thousand, which accounts for about 63% of all the children with diabetes mellitus in 2014 (according to data from the National Health Fund database of inpatient services and appointments with specialists).

Table 1. Insulin pumps implanted in children, in total and by age group, according to the place of residence

Province	Number of insulin pumps implanted under separately commissioned healthcare services (according to the place of residence)			
	Total	Age group 0–6	Age group 7–14	Age group 15–18
Dolnośląskie	102	15	58	29
Kujawsko-pomorskie	70	14	37	19
Lubelskie	88	8	58	22
Lubuskie	42	10	21	11
Łódzkie	132	22	67	43
Małopolskie	90	24	48	18
Mazowieckie	330	67	182	81
Opolskie	32	5	22	5
Podkarpackie	58	13	33	12
Podlaskie	57	15	30	12
Pomorskie	104	33	54	17
Śląskie	170	49	90	31
Świętokrzyskie	76	11	44	21
Warmińsko-mazurskie	86	11	57	18
Wielkopolskie	192	28	100	64
Zachodniopomorskie	75	15	46	14
Poland	1704	340	947	417

Table 2. Insulin pumps implanted in children (age group 0–6), in total and according to province: according to the place of residence, for patients from outside the province and for patients newly diagnosed with diabetes mellitus

Province	Number of insulin pumps implanted under separately commissioned healthcare services (according to the place of service provision) for the age group 0–6	Percentage of insulin pumps implanted in patients from outside the province for the age group 0–6	Percentage of insulin pumps implanted in new patients (within one year of appearing in the system) for the age group 0–6
Dolnośląskie	12	0%	67%
Kujawsko-pomorskie	24	12%	92%
Lubelskie	53	8%	87%
Lubuskie	11	9%	91%
Łódzkie	26	4%	77%
Małopolskie	33	6%	88%
Mazowieckie	16	6%	94%
Opolskie	12	0%	58%
Podkarpackie	5	0%	100%
Podlaskie	8	12%	100%
Pomorskie	23	4%	78%
Śląskie	16	12%	100%
Świętokrzyskie	11	0%	100%
Warmińsko-mazurskie	11	0%	91%
Wielkopolskie	76	17%	92%
Zachodniopomorskie	3	0%	100%
Poland	340	8%	88%

Table 3. Insulin pumps implanted in children (age group 7–14), in total and according to province: according to the place of residence, for patients from outside the province and for patients newly diagnosed with diabetes mellitus

Province	Number of insulin pumps implanted under separately commissioned healthcare services (according to the place of service provision) for the age group 7–14	Percentage of insulin pumps implanted in patients from outside the province for the age group 7–14	Percentage of insulin pumps implanted in new patients (within one year of appearing in the system) for the age group 7–14
Dolnośląskie	35	14%	51%
Kujawsko-pomorskie	67	9%	33%
Lubelskie	117	23%	45%
Lubuskie	45	4%	33%
Łódzkie	96	5%	29%
Małopolskie	51	0%	49%
Mazowieckie	58	5%	36%
Opolskie	37	3%	41%
Podkarpackie	44	2%	27%
Podlaskie	19	0%	74%
Pomorskie	24	4%	17%
Śląskie	47	6%	51%
Świętokrzyskie	32	3%	72%
Warmińsko-mazurskie	55	2%	42%
Wielkopolskie	202	12%	44%
Zachodniopomorskie	18	6%	39%
Poland	947	9%	41%

Table 4. Insulin pumps implanted in children (age group 15–18), in total and according to province: according to the place of residence, for patients from outside the province and for patients newly diagnosed with diabetes mellitus

Province	Number of insulin pumps implanted under separately commissioned healthcare services (according to the place of service provision) for the age group 15–18	Percentage of insulin pumps implanted in patients from outside the province for the age group 15–18	Percentage of insulin pumps implanted in new patients (within one year of appearing in the system) for the age group 15–18
Dolnośląskie	12	0%	42%
Kujawsko-pomorskie	41	0%	17%
Lubelskie	38	18%	26%
Lubuskie	21	0%	43%
Łódzkie	62	5%	21%
Małopolskie	16	6%	38%
Mazowieckie	32	12%	16%
Opolskie	17	6%	12%
Podkarpackie	14	7%	21%
Podlaskie	11	9%	27%
Pomorskie	11	0%	18%
Śląskie	14	7%	29%
Świętokrzyskie	12	0%	17%
Warmińsko-mazurskie	17	0%	29%
Wielkopolskie	95	15%	25%
Zachodniopomorskie	4	0%	25%
Poland	417	9%	24%

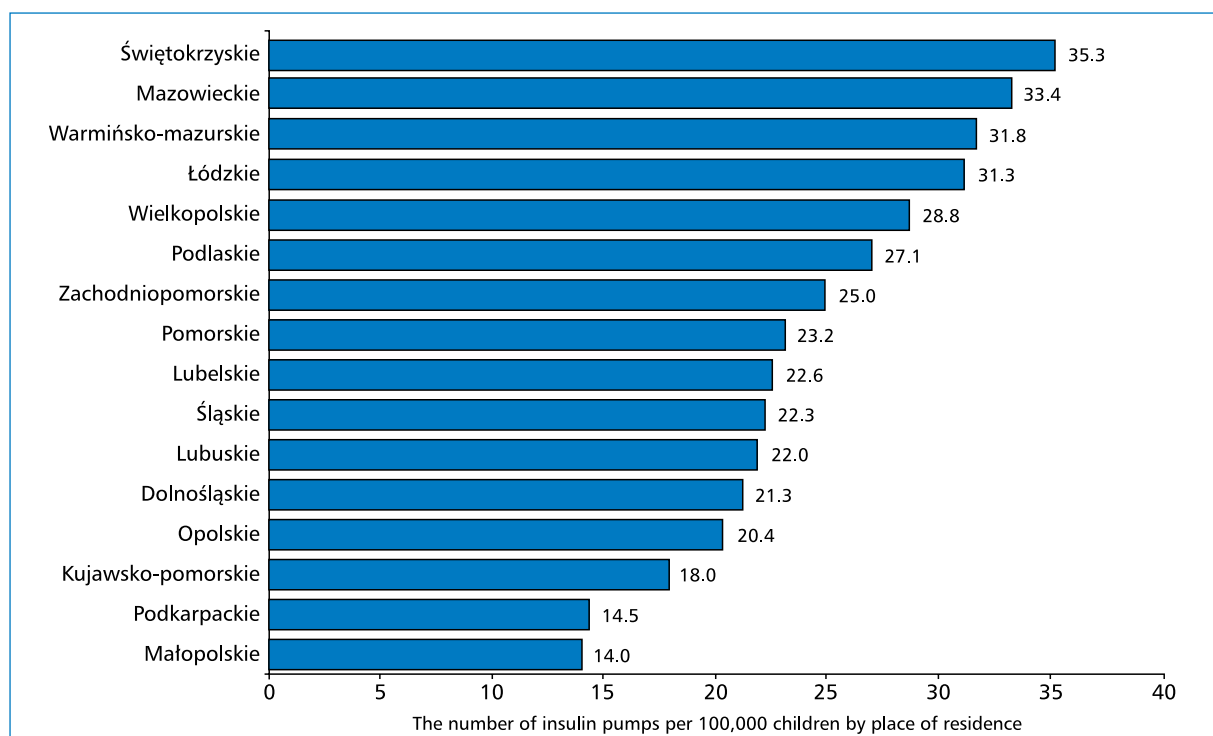


Figure 1. Number of insulin pumps per 100.000 children that were implanted under separately commissioned healthcare services, according to province

Table 5. Insulin pumps implanted in children, in total and according to province: according to the place of service provision, for patients from outside the province and for patients newly diagnosed with diabetes mellitus

Province	Number of insulin pumps implanted under separately commissioned healthcare services (according to the place of service provision)	Percentage of insulin pumps implanted in patients from outside the province	Percentage of insulin pumps implanted in new patients (within one year of appearing in the system)
Dolnośląskie	106	8%	53%
Kujawsko-pomorskie	66	3%	39%
Lubelskie	63	3%	52%
Lubuskie	38	5%	44%
Łódzkie	132	7%	33%
Małopolskie	58	3%	60%
Mazowieckie	373	14%	39%
Opolskie	25	4%	36%
Podkarpackie	55	2%	32%
Podlaskie	59	2%	66%
Pomorskie	100	3%	41%
Śląskie	208	18%	57%
Świętokrzyskie	77	4%	65%
Warmińsko-mazurskie	83	1%	46%
Wielkopolskie	184	5%	49%
Zachodniopomorskie	77	8%	44%
Poland	1704	8%	46%

The popularization of this treatment model is closely associated with reimbursement of both the insulin pump and the accessories. This reimbursement, both in Poland and other countries, progressed gradually and included various indications [5–7, 11–13].

Interestingly, there are considerable differences in the number of insulin pumps in children between individual regions of Poland. The number of insulin pumps per 100,000 children considerably varies from province to province, and in 2014, there was a 2.5-fold difference between the provinces. The unequal accessibility is also evidenced by the number of patients migrating to the Śląskie and Mazowieckie Provinces. The percentage of insulin pumps implanted within one year of appearing in the system since 2009 with the diagnosis of diabetes mellitus (it should be assumed that these are children with newly diagnosed diabetes mellitus) was 46%. Disturbingly low percentages were observed in several provinces, mainly in the Podkarpackie and Łódzkie Provinces. The regional differences between individual diabetes care facilities are most likely multifactorial. Firstly, the regional branches of the National Health Fund differently commissioned services for children with diabetes mellitus at facilities that provide such services. There is a lack of standards that would determine the number of insulin pumps for children with diabetes mellitus for a given province, hence the service commissioning is often “blind”. Further difficulties are posed by the fact that insulin pumps in public facilities are purchased by means of tenders, the possession of experienced and committed specialist diabetes team, and the possession of appropriate equipment at the diabetes care facility. Unfortunately, although not only in Poland, the differences between individual diabetes care facilities are often still quite considerable [9, 10]. Elimination of the differences between individual diabetes care facilities requires an appropriate strategy (e.g. central determination of glycated haemoglobin) and the formation of large paediatric diabetes care facilities that could meet the economic requirements, mainly with respect to staff and equipment. Improving the accessibility to insulin pump therapy is without any doubt an important challenge. One of the fastest solutions would be to estimate the percentage of pumps requiring commissioning in individual provinces per specific number of children with diabetes mellitus. This requires determining the number of children with diabetes mellitus in each province, which would be made possible by a registry.

The widespread use of social media nowadays suggests an additional important aspect. Patients and

their caregivers look for the best diabetes care and the most recent versions of the devices offered: the insulin pumps. This is another aspect that is partially responsible for the “pump migration” and should lead to appropriate identification and rewarding of the leading diabetes care facilities.

Conclusions

Accessibility to personal insulin pumps among children with diabetes mellitus in Poland varies.

Equal access to treatment with personal insulin pumps should be a priority when developing programs supporting the treatment of diabetes mellitus and should be an important element of health policy in Poland.

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