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The organisation of hospice and palliative care in Poland according to data from the National Health Fund: a cross-sectional study

Abstract

Background: The article presents an overview of the state of Polish specialist hospice and palliative care with a focus on the distribution of funding, types of provided care and organization of units.

Methods: The paper analysed data from the National Health Fund's database and the Registry of Entities Performing Medical Activity.

Results: As of May 2023, 522 medical entities offer hospice and palliative care services in Poland, with 84.4% being exclusive for adults, 4.9% exclusive for children and 10.1% available for both. The majority of the agreements are set on the model of home hospice, stressing the need for providing care in a familial environment. More in-patient settings (including free-standing stationary hospices and palliative medicine units in hospitals) and outpatient palliative medicine clinics also play a vital role in the provision of aforementioned services.

Conclusions: The study outlines the legal organization and structures of entities in Poland and provides insight into the allocation of obligations to different types of services. The findings show progress but also highlight the persisting challenges in funding and resource allocation. In summary, the article provides insight for policymakers and authorities for expanding and improving hospice and palliative care in Poland, with a focus on comprehensive and compassionate care for patients and their families.

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Keywords: Poland, hospice, palliative medicine, resource allocation, registries, financial management, adult

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Introduction

Specialist palliative care in Poland is one of the guaranteed health services financed from public funds under the terms specified in the Regulation of the Minister of Health of October 29, 2013, on guaranteed services in the field of palliative and hospice care, hereinafter referred to as "regulation" [1]. These services are provided for adults and children in various forms, which can be divided into home care, inpatient care and outpatient care. In the year 2019, the Ministry of Health in the "Maps of Health Needs", reported approximately 547,000 visits of specialised palliative home care teams at patients' homes, around 41,000 stays at inpatient settings and about 66,000 visits in outpatient clinics [2]. Different home care services are dedicated to adults and children. According to the data from the National Health Fund and Minister of Health in 2021 approximately 100,000 adults and more than 2,000 children receive specialised palliative care and 90% of patients over 18 are cancer patients [2, 3]. In 2019, in Poland, there were 1.5 units of palliative care per 100,000 inhabitants [the standard set by the European Association for Palliative Care (EAPC) is 2 units per 100,000 inhabitants], which puts Poland in 7th place in Europe when it comes to access to these services according to the EAPC [4]. Access to specialist palliative care services in Poland is limited because eligible individuals usually have to wait for admission to all types of units. Most of them (more than 60% in 2020) were reported on the waitlist for home care, but the longest time of waiting was observed in inpatient units, where the mean time of waiting was 43 days in urgent cases and 45 days in stable cases [2]. Most patients from the waitlist who are not admitted, die while waiting [5, 6]. The same requirements of referral are used for inpatient, outpatient and home specialist palliative care services. These referral criteria for adults require medical indications in the form of life-limiting incurable diseases, not responding to disease-modifying therapy found in the ICD-10 under the codes: B20–B24 (acquired immunodeficiency syndrome — AIDS), C00–D48 (neoplasms), G09 (sequelae of inflammatory diseases of the central nervous system), G10–G13 (systemic atrophies), G35 (multiple sclerosis), I42–I43 (cardiomyopathy), J96 (respiratory failure) and L89 (pressure ulcer) [1, 6]. For patients below 18 years of age, the list of diseases for which guaranteed benefits in the field of palliative and hospice medicine are provided is extended compared to the adult list and includes, inter alia, paediatric malignant tumours, genetic abnormalities, neuromuscular disorders, coma, as well as human immunodeficiency virus-related diseases [1].

Different home hospices are dedicated to children or adults, providing palliative care at the patient's home, including treatment, advice and support for patients and their families from a team of specialists (physicians, nurses, physiotherapists, psychologists). The services provided by the home hospices include patient examination, administration of drugs and needed diagnostic procedures at the patient's home as well as sharing medical equipment [1].

Inpatient specialist palliative care services are provided by inpatient hospices — separately operating units or palliative medicine wards located within hospitals. These facilities provide similar services performed by physicians and nurses, pharmacological treatment, pain management, treatment of other somatic symptoms, general rehabilitation and prevention of complications as well as psychological care and guidance for patients and their families.

Palliative care outpatient clinics offer specialist consultations provided by physicians and nurses, administration of prescribed medicines and psychological consultations in the facility as well as visits to patients' homes [1]. Some units also provide perinatal palliative care for parents and the child in the case of severe and irreversible disability or incurable life-threatening disease, arising in the prenatal period of the child's development or during childbirth [7].

Detailed requirements for the provision of guaranteed hospice and palliative services are presented in Table 1, which is based on the Regulation of the Minister of Health of October 29, 2013, on guaranteed services in the field of hospice and palliative care [1].

This article aims to provide a summary of the hospice and palliative care organisations across Poland (as of May 2023), including unit distribution, services provided, as well as financing from the National Health Fund.

Methods

The study was conducted using open-access databases: the National Health Fund database called *Guidebook on Concluded Contracts*. Using the search engine for services available at https://www.nfz.gov.pl/o-nfz/informator-o-zawartych-umowach/, for each available Voivodeship Department of the National Health Fund the authors selected 'Palliative and hospice care' in the item 'type of benefit'. The details of each contract were analysed, and the data figures are summarized using Statistica v13™. Data from the 'Register of Entities Performing Medical Activity' (https://rpwdl.ezdrowie.gov.pl/) were also used to confirm the legal and administrative status of the units.

Table 1. Requirements for the provision of guaranteed hospice and palliative services

	Inpatient care	Home hospice for adults	Home hospice for children	Outpatient care	Perinatal care
Medical staff	A specialist in the field of palliative medicine, or a physician in the course of specialization in palliative medicine, or a physician holding a document certifying completion of a course in accordance with the palliative medicine specialization curriculum **1 full-time position for every 10 places**	A specialist in the field of palliative medicine, or a physician in the course of specialization in palliative medicine, or a physician holding a document certifying completion of a course in accordance with the palliative medicine specialization curriculum **1 full-time position for every 30 beneficiaries**	A medical specialist in the field of paediatrics, neonatology, paediatric neurology, paediatric oncology and haematology, anaesthesiology, anaesthesiology and resuscitation, anaesthesiology and intensive care, paediatric surgery, or palliative medicine, family medicine, or a physician in the course of specialization of one of these fields, or a physician holding a document certifying completion of a course in accordance with the palliative medicine specialization curriculum **1 full-time position for every 20 beneficiaries**	A specialist in the field of palliative medicine, or a physician in the course of specialization in palliative medicine, or a physician holding a document certifying completion of a course in accordance with the palliative medicine specialization curriculum	A medical specialist in the field of paediatrics, or neonatology, or perinatology, or paediatric neurology, or paediatric oncology and haematology, or paediatric surgery, or anaesthesiology, or anaesthesiology and resuscitation, or anaesthesiology and intensive care, or family medicine, or palliative medicine, who possesses documented experience of at least two years in palliative care and at least one year of work experience in a centre specializing in perinatal palliative care
	A nurse who has completed a specialization in the field of palliative care nursing, or is in the process of such specialization, or has completed a qualification course in the field of palliative care nursing, or is in the process of such a course, or has completed a specialist course in the fundamentals of palliative care, or is in the process of such a course **25% of the total working time of nurses providing services to a given healthcare provider**	A nurse who has completed a specialization in the field of palliative care nursing, or is in the process of such specialization, or has completed a qualification course in the field of palliative care nursing, or is in the process of such a course, or has completed a specialist course in the fundamentals of palliative care, or is in the process of such a course **25% of the total working time of nurses providing services to a given healthcare provider (1 full-time position for every 15 beneficiaries)**	A nurse who has completed a specialization in the field of palliative care nursing, or is in the process of such specialization, has completed a specialization in the field of paediatrics care nursing and a specialist course in the fundamentals of paediatrics hospice palliative care, or is in the process of such a course, or has completed a qualification course in the field of palliative care nursing, or is in the process of such a course, or has completed a qualification course in the field of paediatrics care nursing and a specialist course in the fundamentals of paediatrics hospice palliative care, or is in the process of such a course, or has completed a specialist course in the fundamentals of palliative care, or is in the process of such a course **25% of the total working time of nurses providing services to a given healthcare provider (1 full-time position for every 12 beneficiaries)**	A nurse who has completed a specialization in the field of palliative care nursing, or is in the process of such specialization, or has completed a qualification course in the field of palliative care nursing, or is in the process of such a course, or has completed a specialist course in the fundamentals of palliative care, or is in the process of such a course	

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Table 1. cont. Requirements for the provision of guaranteed hospice and palliative services

	Inpatient care	Home hospice for adults	Home hospice for children	Outpatient care	Perinatal care
Medical staff	A psychologist, or a psychologist who has specialized in the field of clinical psychology, or a psycho-oncologist with psychological or medical education and a Master's degree, or after completing postgraduate studies in psycho-oncology **1 half-time position for every 20 places**	A psychologist, or a psychologist who has specialized in the field of clinical psychology, or a psycho-oncologist with psychological or medical education and a Master's degree, or after completing postgraduate studies in psycho-oncology **1 half-time position for every 30 beneficiaries**	A psychologist, or a psychologist who has specialized in the field of clinical psychology, or a psycho-oncologist with psychological or medical education and a Master's degree, or after completing postgraduate studies in psycho-oncology **1 half-time position for every 12 beneficiaries**	A psychologist, or a psychologist who has specialized in the field of clinical psychology, or a psycho-oncologist with psychological or medical education and a Master's degree, or after completing postgraduate studies in psycho-oncology	A psychologist, or a psychologist holding a specialist title in the field of clinical psychology, or a psychotherapist, who holds a diploma of a medical doctor or a master's degree, has completed postgraduate training, or holds a psychotherapist certification
	An individual with a Master's or Bachelor's degree in physiotherapy, a Master's degree in movement rehabilitation or rehabilitation, a Master's degree in physical education, along with a two-year specialization in therapeutic gymnastics or rehabilitation, or after completing a 3-month specialization course in rehabilitation, a degree as a physiotherapy technician, a Master's degree from the Academy of Physical Education, and specialization in the field of movement rehabilitation **1 quarter-time position for every 10 places**	An individual with a Master's or Bachelor's degree in physiotherapy, a Master's degree in movement rehabilitation or rehabilitation, a Master's degree in physical education, along with a two-year specialization in therapeutic gymnastics or rehabilitation, or after completing a 3-month specialization course in rehabilitation, a degree as a physiotherapy technician, a Master's degree from the Academy of Physical Education, and specialization in the field of movement rehabilitation **1 quarter-time for every 15 beneficiaries**	An individual with a Master's or Bachelor's degree in physiotherapy, a Master's degree in movement rehabilitation or rehabilitation, a Master's degree in physical education, along with a two-year specialization in therapeutic gymnastics or rehabilitation, or after completing a 3-month specialization course in rehabilitation, a degree as a physiotherapy technician, a Master's degree from the Academy of Physical Education, and specialization in the field of movement rehabilitation **1 quarter-time position for every 15 beneficiaries**		
	An individual who has completed either a public or non-public school with the rights of a public school, and has obtained a diploma confirming professional qualifications in the profession of a medical caregiver, or an individual who has completed a qualifying vocational course and has obtained a diploma confirming professional qualifications in the profession of a medical caregiver				

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Table 1. cont. Requirements for the provision of guaranteed hospice and palliative services

	Inpatient care	Home hospice for adults	Home hospice for children	Outpatient care	Perinatal care
Medical equipment	Hospital beds with adjustable height, anti-decubitus mattresses, pillows, supports, rollers, body hygiene equipment, bed elevators, bedside screens, transfer boards, oxygen supply (at least 1 per 3 beds), electric suction pump (at least 1 per 5 beds), inhalers, glucometers, blood pressure monitors, first aid kit, infusion pump (at least 1 for every 15 beds), orthopaedic crutches, orthopaedic canes, orthopaedic walkers, wheelchairs, ECG machine	Oxygen supply (at least 1 per 10 beds), electric suction pump (at least 1 per 10 beds), inhalers, glucometers, blood pressure monitors, infusion pump (at least 1 for every 20 beds), orthopaedic crutches, orthopaedic canes, orthopaedic walkers, wheelchairs, a nursing briefcase containing injection kit, fluid transfer set, dressing kit, infection protection equipment, catheter irrigation tray, enteral feeding tube, first aid kit, blood pressure measuring device, glucose tests, hand washing and sanitizing equipment	Oxygen supply (at least 1 per 10 beds), electric suction pump (at least 1 per 10 beds), inhalers, glucometers, blood pressure monitors, infusion pump (at least 1 for every 20 beds), orthopaedic crutches, orthopaedic canes, orthopaedic walkers, wheelchairs, a nursing briefcase containing injection kit, fluid transfer set, dressing kit, infection protection equipment, catheter irrigation tray, enteral feeding tube, first aid kit, blood pressure measuring device, glucose tests, hand washing and sanitizing equipment		
Medical services	Round-the-clock access to healthcare services provided by a doctor	Round-the-clock access to healthcare services provided by a doctor **Medical advice (at least twice a month)**	Round-the-clock access to healthcare services provided by a doctor **Medical advice (at least twice a month)**	A medical clinic is open at least 3 times a week, 2.5 hours a day, including at least 1 hour before 6 p.m.	Separate room for providing medical advice
	Round-the-clock access to healthcare services provided by a nurse	Round-the-clock access to healthcare services provided by a nurse **Nursing visits (at least twice a week)**	Round-the-clock access to healthcare services provided by a nurse **Nursing visits (at least twice a week)**	Patients can receive services in the outpatient care unit if their condition is stable and they can reach the facility on their own	Access to OB/GYN and Neonatology specialists
		Medical advice or a visit by other medical staff	Medical advice or a visit by other medical staff	At most 2 visits a week can take place in the patient's home	Cooperation with midwives and specialists in OB/GYN
		Medical advice using IT services or other communication systems	Medical advice using IT services or other communication systems		Specialists in perinatal palliative care must have at least 3-years' experience in the Paediatrics field
		Adult patients can receive services under child palliative care if they were diagnosed with a genetic disease, or the disease was diagnosed before the age of 18, or the patient cannot reach an adult palliative care centre due to remote place of residence or rare nature of the disease	Adult patients can receive services under child palliative care if they were diagnosed with a genetic disease, or the disease was diagnosed before the age of 18, or the patient cannot reach an adult palliative care centre due to a remote place of residence or rare nature of the disease		Services in perinatal care are provided to new-borns until the 28th day after the birth

ECG — electrocardiogram; OB/GYN — obstetrics and gynaecology

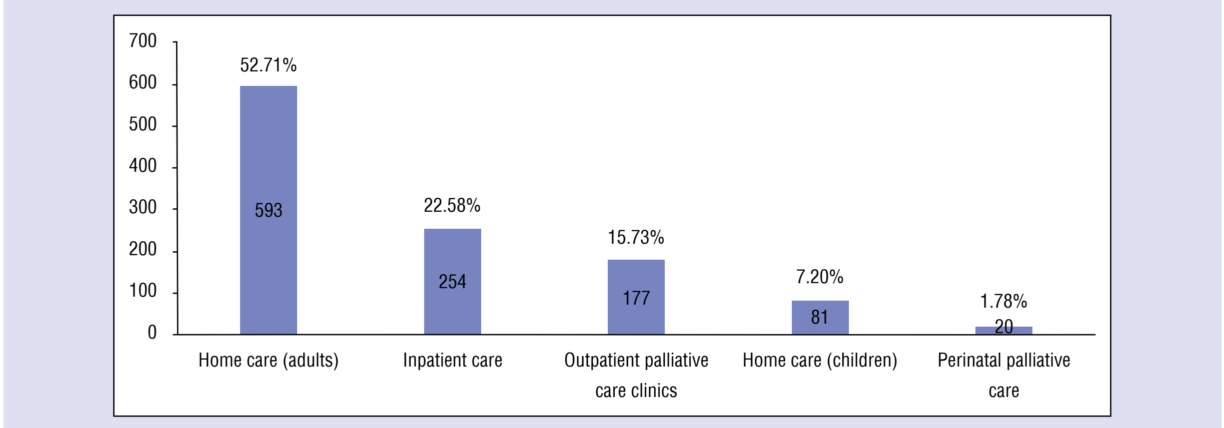

Figure 1. Agreements for the provision of guaranteed services in the field of palliative and hospice care by type of unit

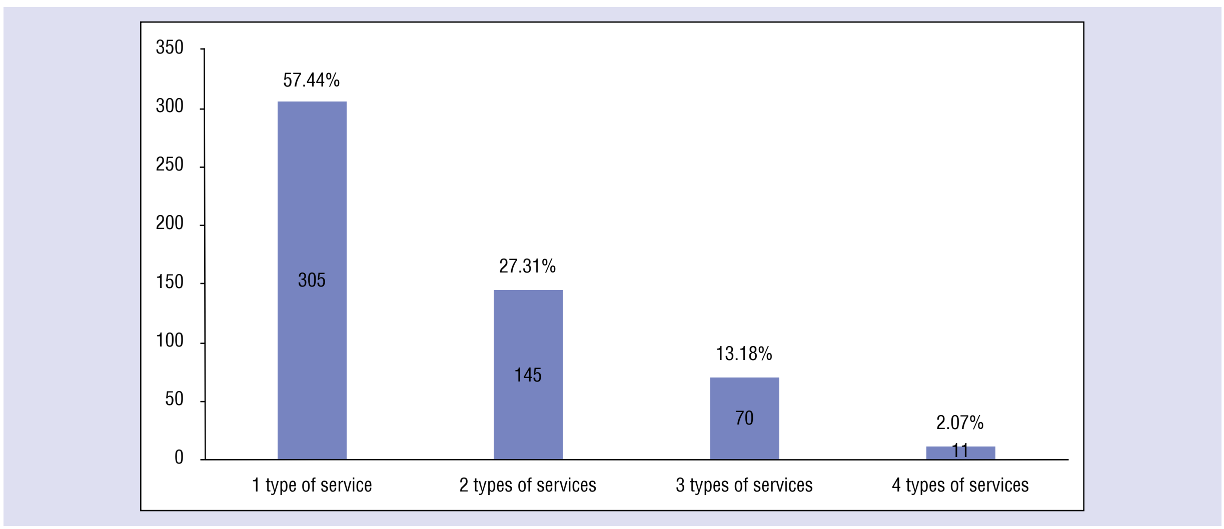

Figure 2. Number of types of palliative and hospice care services provided by medical entities

Results

According to data from the National Health Fund database for May 2023, 522 medical entities in Poland provide services in the field of palliative and hospice care, of which 450 (84.4%) — are exclusively for adults, 26 (4.9%) — exclusively for children and 54 (10.1%) — for both adults and children.

Overall, Polish public facilities operate based on 1125 agreements with the National Health Fund for the provision of different guaranteed services in the field of palliative and hospice care, with most agreements being signed for home hospices. Figure 1 contains the summary of agreements by type of care provided.

Depending on the institution's profile and its possibilities, units provide one or more kinds of palliative care. The overview of the number of units which can provide one, two, three and four types of palliative care is shown in Figure 2. Table 2 presents the summary of the number of units conducting different profiles of care, including home care, and inpatient and outpatient care offered within one unit.

Figure 2 outlines the number of types of palliative and hospice care services offered by medical entities. The data indicates that 305 units provide a single type of service, 145 units offer two types, 70 units provide three types, and 11 units offer the most comprehensive profile with four types of services. This diversity in the number of services offered reflects the varying capabilities and resources of different facilities.

Depending on, inter alia, the kind of owner of the facility or being a part of an institution, units which offer palliative care can be divided into different types of organizational and legal forms, including companies, foundations or associations, independent public health facility, self-employed person and church legal entity. The number of facilities acting as these forms is

Table 2. Number of palliative care units conducting different profiles of care

Conditions	Number of units	Percentage
Home care (home hospices)	189	35.5%
Inpatient care (inpatient hospices and palliative medicine wards in hospitals)	89	16.7%
Home and outpatient care	87	16.3%
Home and inpatient care	65	12.2%
Home, inpatient, and outpatient care	56	10.5%
Inpatient and outpatient care	23	4.3%
Home care for children	23	4.3%
Home, inpatient, outpatient, and home care for children	8	1.5%

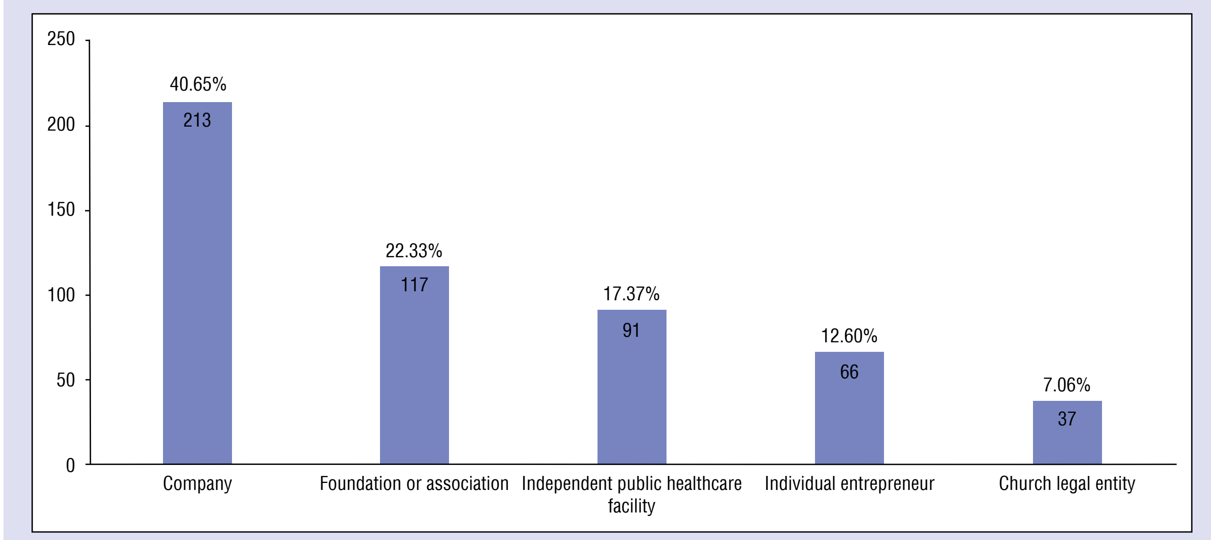

Figure 3. Organizational and legal forms of entities that provide palliative care services in Poland

summarized in Figure 3. Various types of companies account for the highest number (213) of healthcare settings, followed by foundations or associations (117), independent public healthcare facilities (91), self-employed individuals (66) and legal entities of churches or religious associations (37). Among these settings, 111 constitute units of hospitals and 9 operate within universities.

The total amount of obligations (product value) for all types of services (as of May 2023) is 754,510,597.51 Polish Złoty (PLN), which are distributed into different fields of palliative care. The sum of contracts for inpatient services amounts to 399,746,089.79 PLN, while contracts for home services amount to 277,512,012.96 PLN. Moreover, home services for children are allocated 50,866,925.64 PLN, underscoring the significance of allocating resources to paediatric palliative care. Palliative care outpatient services account for the least sum — 3,939,001.24 PLN. The allocations of these obligations are presented in Figure 4.

Discussion

The present study provides a comprehensive overview of the organization of hospice and palliative care in Poland, with a focus on the distribution of units, types of care provided, and financing from the National Health Fund. The findings offer valuable insights into the current state of hospice and palliative care services in Poland, shedding light on various aspects that can be addressed to enhance the quality, analyse the needs and improve accessibility of these crucial services.

According to the analysis of agreements for the provision of public services, home hospices represent the most prevalent type, accounting for 593 agreements. This significant emphasis on home hospices may partly come from the low financial barrier of entry for initiating the provision of this kind of service. A high number of home hospices in comparison to other types of palliative care services,

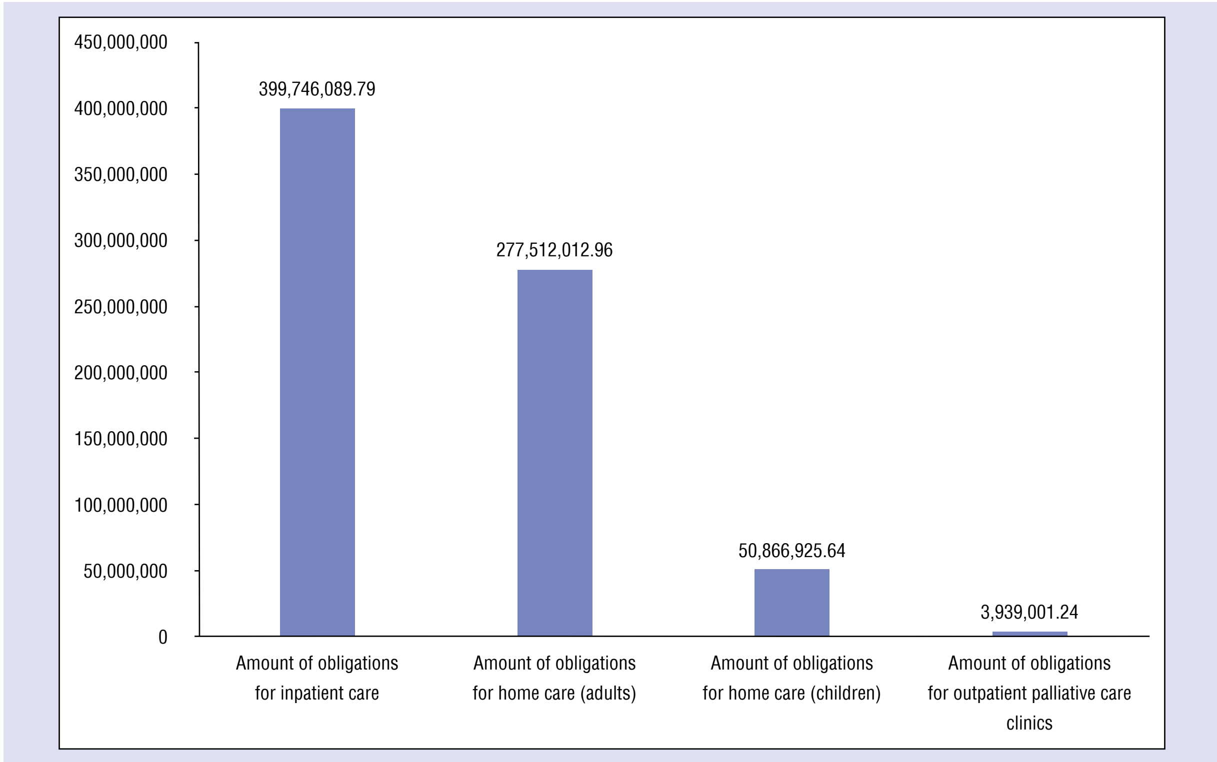

Figure 4. The total amount of obligations in Polish Złoty (PLN) by type of palliative care service

comply with recommendations that consider home care to be preferred [8, 9]. In Western European countries, home hospices usually constitute a smaller percentage of facilities than in Poland, although there are also differences in the organization of palliative care in countries with similar economic status. In France, home hospices constitute only 14% of facilities, in Germany and Austria it is about 30%, and in Italy, the percentage reaches as much as 58% [4]. Studies confirm that in most circumstances, both patients and their families appreciate home palliative care and prefer it over spending their last chapter of life in a medical facility [10]. Thus, it is important to recognize the need for even further expansion of providing palliative care in a familiar environment, allowing patients to spend their final days surrounded by their loved ones [11]. The difference between the number of home and inpatient hospices is particularly visible when comparing the paediatric populations of Poland with other countries. In this population, the number of home hospices significantly exceeds the number of inpatient facilities [4].

Meanwhile, stationary hospices and palliative medicine wards in hospitals account for 254 agreements, indicating the availability of inpatient care. Palliative medicine outpatient clinics, with 177 agreements, also play an important role in providing consultations and support for patients with stable general conditions who can visit the clinics on their own. Additionally, home hospices for children (81 agreements) and perinatal palliative care (20 agreements) demonstrate the attention given to paediatric palliative care, encompassing specialized services for children and families facing life-threatening illnesses. Despite the need to establish palliative care teams in Polish hospitals, this type of service is not included in guaranteed services financed from public funds, which is the main barrier to its development [12].

In Recommendations on Organizational Standards for Specialist Palliative Care for Adult Patients, published in 2022, the Expert Group of National Consultants in Palliative Medicine and Palliative Care Nursing presented consensus on the new organization of hospice and palliative care in Poland obtained in the Delphi study [9]. This document was based on the International Association of Hospice and Palliative Care consensus-based definition of palliative care and European Association for Palliative Care standards and norms for palliative care as well as was supported by the Polish Association of Palliative Care and Polish Palliative Care Nurses Association [13–17]. After the publication of these recommendations in 2022, the Minister of Health appointed a working group to prepare a draft of the long-term strategy for the development of palliative and hospice care [18]. Moreover, the Polish Society of Palliative Medicine published their

perspectives on new standards in specialist outpatient palliative care and home palliative care [19, 20]. The above initiatives may lead to changes in the organization, financing and access to palliative care in Poland.

The analysis of organizational and legal forms of medical entities in palliative care highlights the varied landscape of institutions providing these services. This diverse range of organizational forms demonstrates the involvement of both public and private sectors in providing palliative and hospice care services in Poland. Such diversity may offer flexibility in service delivery and resource allocation, but it also raises the need for comprehensive coordination and collaboration among these entities to ensure the effective and equitable distribution of palliative care services across the country. Regardless of their legal form, all types of settings indicated in this study are financed on the same terms and conditions from public sources (National Health Fund). In addition, charitable support for palliative care services as well as volunteers' deployment provide access to additional funding sources [21, 22]. However, it varies depending on the activity of individual units in this area.

The financial aspect of palliative and hospice care is a critical consideration for sustaining and expanding these services. The sum of contracts for hospice and palliative services in May 2023, presented in Figure 4 (754,510,597.51 PLN), is not comparable with the total funds planned for hospice and palliative care services in 2023, as the situation changes throughout the year with new contracts being concluded and others coming to an end. Obtaining data close to the actual expenditure on palliative care would require determining the funds spent under each contract in a specific year, which is not possible in the National Health Fund's database. In comparison, the National Health Fund reported the costs of hospice and palliative care services amounted to 733,000,000.00 PLN in 2018 and 813,000,000.00 PLN in 2019 and the value of expenditure on palliative care in Poland in the financial plan of the National Health Fund for the year 2022 was approximately 977.826,000.00 PLN [2, 23].

Despite the systematic increase in financial outlays for palliative care in Poland, the percentage of funds allocated to it from the National Health Fund is still below 1% of the total costs of healthcare services financed by the public healthcare system [2]. The current valuation of hospice and palliative care services comes from 2016 and is based on data from 2013 and 2014, which may be insufficient in light of high inflation resulting from dynamic changes in the world, as well as rapidly ageing Polish society [24, 25]. Expenditures determined based on the analysis of contracts at the level of a total of 754.5 million in 2023 may also indicate a slowdown in the dynamics of expenditure growth when compared to relatively more substantial increases in previous years. For example, the annual expenditure of the National Health Fund on palliative and hospice services amounted to about 414.4 million in 2015 to 667.6 million in 2017 [26]. Nevertheless, financing of palliative care services in Poland is still insufficient because eligible patients in urgent cases are waiting for admission to inpatient settings for up to 43 days [2]. According to the Public Information Bulletin of the Commissioner for Human Rights, palliative medicine services will be thoroughly analysed and revaluated by Agency for Health Technology Assessment and Tariffs in the second half of 2023 [27].

The Ministry of Health and the National Health Fund also administer other databases that are not publicly available. Data from some of them can be obtained by submitting an application for access to information under the Act of September 6, 2001, on Access to Public Information. Nevertheless, data that would describe detailed information on access to palliative care (e.g. data from the Patient's Online Account regarding the number of referrals and the number of people who did not get palliative care services, as well as the time from i the referral to its implementation) are not publicly available. These restrictions were introduced by the Act of 28 April 2011 on the Health Care Information System [Article 5(3a)]. Therefore, the government has access to actual data on access to palliative care.

Study limitations

While this study offers valuable insights into the organization and provision of palliative and hospice care in Poland, it is essential to acknowledge certain limitations of this search method, causing the possibility of vague inaccuracies. First, medical entities that have concluded contracts in more than one voivodeship are listed in the system separately for each voivodeship. Moreover, in the National Health Fund database, the authors discovered situations of more than one contract for the same service being reported for the same entity. Although these limitations were considered and efforts were made to correct them in this analysis, there is a possibility that these results concerning the number of services provided by units are slightly inflated compared with the actual state.

Conclusions

In conclusion, this article contributes valuable information about the usage of Big Data analysis in hospice and palliative care in Poland. The data obta-

ined from official open access datasets on the distribution of units, types of care provided, and financial commitments highlight both strengths and areas for improvement in the palliative care system but are limited. The findings may serve as a foundation for policymakers, healthcare authorities, and stakeholders to further develop and enhance hospice and palliative care services, ensuring appropriate distribution of various types of palliative care facilities and funding for reimbursement, but should be analysed with caution. Moreover, the work indicates the need to expand the scope of publicly available information to determine actual access to hospice and palliative care services and to identify existing barriers. Efforts to strengthen interdisciplinary teams, expand access to different types of care, and foster collaboration between various organizational forms are essential steps toward achieving the highest quality of hospice and palliative care in Poland.

Article information and declarations

Data availability statement

Source of the data discussed is included in the article, the numbers spoken of are found in the manuscript itself, no further data needs to be presented for the understanding of the paper.

Ethics statement

The study presents work with existing, free to access database, no ethical concerns apply.

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None.

Author contributions

JD, JG, BK, KK, FL, MP, SR and KP contributed to the design and implementation of the research, to the analysis of the results and the writing of the manuscript. LP conceived and supervised the project.

Conflict of interest

The authors declare that they have no conflict of interest.

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Supplementary material

None.

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