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Research Article

Statistical Analysis of Malignant Brain Neoplasms (ICD-10: C71) in the Lower Silesia Region of Poland in the Years 2006-2012

Robert Suslo [1*], Piotr Nowak [2], Jaroslaw Drobnik [1]

[1] Gerontology Unit, Public Health Department, Health Sciences Faculty, Wroclaw Medical University, Poland;

[2] Statistics and Operational Studies Department, Economic Sciences Institute, Law, Administration and Economy Faculty, University of Wroclaw, Wroclaw, Poland

*** Correspondence:** Robert Suslo, Gerontology Unit, Public Health Department, Health Sciences Faculty, Wroclaw Medical University, Poland; 5 Bartel St., 51-618 Wroclaw, Poland

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Abstract

It is crucial for the society, the government and the medical community to retrieve the full and reliable statistical information on malignant brain neoplasms (C71-C71.9 ICD-10) to adjust the medical financing, staff and equipment properly. In order to retrieve information useful for public health policies, data from the years 2006-2012 concerning relevant cases registered by the Polish public healthcare insurance provider Narodowy Fundusz Zdrowia in Lower Silesia region of Poland (NFZ) and by the Polish national neoplasms registry Krajowy Rejestr Nowotworow (KRN) were analyzed. The number of new malignant brain neoplasms cases registered by the KRN has risen slightly in the years 2006-2012. At the same time the number of cases reported by the NFZ rose dynamically, which means a significant increase in medical care intensity, and thus also workload on the medical facilities and staff associated with the care for grossly the same amount of brain malignant neoplasms patients and, supposedly, their longer survival times. It indicates that the level of public financing of the malignant neoplasms of brain treatment shall be adjusted adequately. The study revealed growing popularity among reporting Polish physicians of the least specific malignant neoplasms of brain ICD-10 categories, despite the rapid diagnostic techniques development and availability. It is alarming since the medical statistics data quality in the field of malignant brain neoplasms is deteriorating that way and proper evaluation of treatment costs and planning future financial allocations by both the public healthcare insurance provider NFZ and the Polish government become difficult.

Keywords:
malignant neoplasm; brain; medical statistics; public health; medical registry; oncology

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Introduction

Brain neoplasms are not among the most common cancers but nevertheless they remain a serious threat as their diagnosis is late and thus prognosis is poor in many cases [1]. Even in the case of prolonged survival the results of oncologic treatment leave many of the patients with serious incapacitation demanding medical and social support [2]. It is crucial for the society, the government and the medical community to retrieve the full and reliable statistical information on brain neoplasms to adjust the medical financing, staff and equipment properly [3]. In the Lower Silesia region of Poland the medical support system for the old, incapacitated and chronically ill is considered inadequate [4].

The data on incidence and prevalence of brain neoplasms in Poland are collected by several institutions and thus lack consistency. It is obligatory for any Polish physician to report any case of neoplastic disease to the governmental neoplasms registry but the reporting rate is still unsatisfactory for many years now; on the other hand many cases seem to be reported and recorded into databases many times concurrently by many different physicians and the backwards verification of the reports is often difficult. On the other hand, the Polish public healthcare insurance provider - that is involved in financing treatment of practically all oncology-related patients - has the proper data available but the information is focused on the amounts of medical services resulting from the neoplastic disease and not on the count of the patients who received them. In such a data environment providing relevant epidemiological information to the authorities is highly difficult and recognizing even gross trends may be problematic [5].

Materials and Methods

The aim of the study was to estimate yearly current trends in malignant brain neoplasms statistics in the Lower Silesia's population and their meaning for public health agencies. Data on registered cases of malignant neoplasms of brain (C71-C71.9 according to ICD-10) in the years 2006-2012, made available due to courtesy of the public healthcare insurance provider Narodowy Fundusz Zdrowia in Lower Silesia region of Poland (NFZ), were analyzed. Comparable data on reported new cases of malignant brain neoplasms (major group C71 according to ICD-10) in the years 2006-2012 in the Lower Silesia region of Poland were also retrieved from the official Polish national neoplasms registry Krajowy Rejestr Nowotworow (KRN). The data were analyzed with Microsoft Office Excel 2007 software. The structure of the available data did not allow performing any broader spectrum data analysis.

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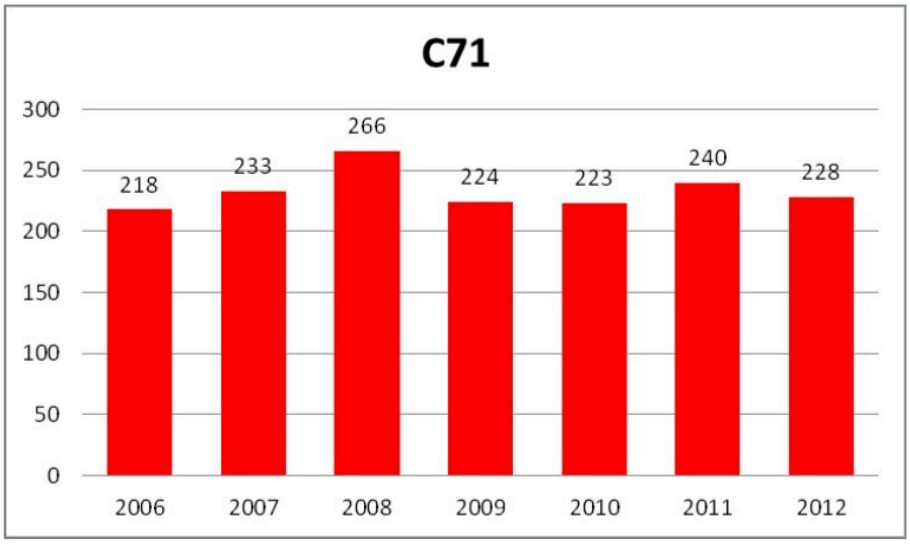


Figure 1. Number of new cases of malignant neoplasms of brain (main category C71 according to ICD-10, not divided into subcategories) in the Lower Silesia region of Poland reported yearly to the Polish national neoplasms registry KRN in the years 2006-2012.

Results

The population of the Lower Silesia region of Poland characteristics, including age structure, remained stable in the years 2006-2012 although population ageing effect was visible [6]. In the year 2015 the region was inhabited by 2,9 million people of which 52 % were females [7].

According to the data provided by the Polish national neoplasms registry KRN, in the analyzed period of 7 years in the Lower Silesia Region of Poland there were 1632 new cases of malignant neoplasms of brain (the main category C71 with subcategories, according to ICD-10) and the yearly number in the year 2012 increased slightly - to 104,6% of the value from the year 2006, as it is visible in Figure 1.

At the same time the data made available by the public healthcare insurance provider NFZ pointed at 39.219 registered cases in the 7 years long period; there was a significant rising trend in the total number of yearly registered cases of malignant neoplasms of brain (the main category C71 with subcategories, according to ICD-10) which in the year 2012 reached 143,1% of the value from the year 2006, which

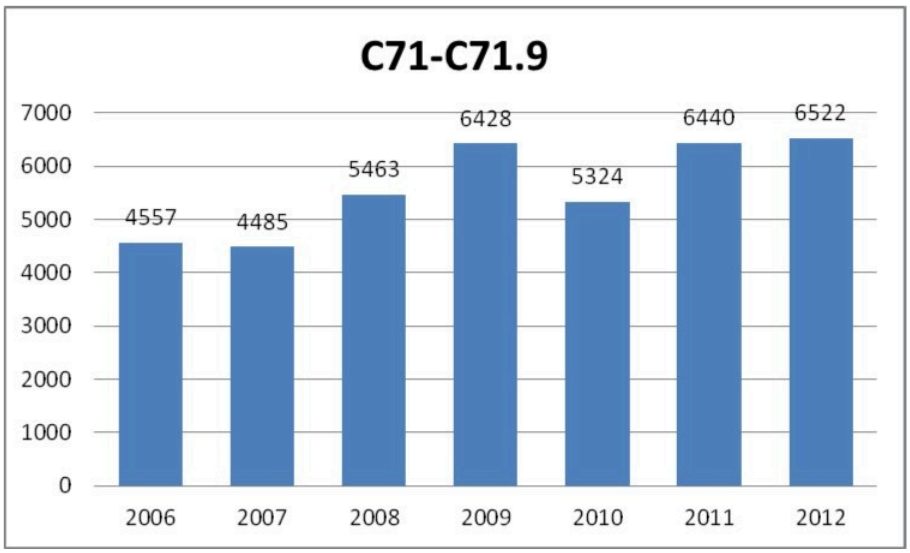


Figure 2. Total number of cases of malignant neoplasms of brain (main category C71 with sub-categories according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

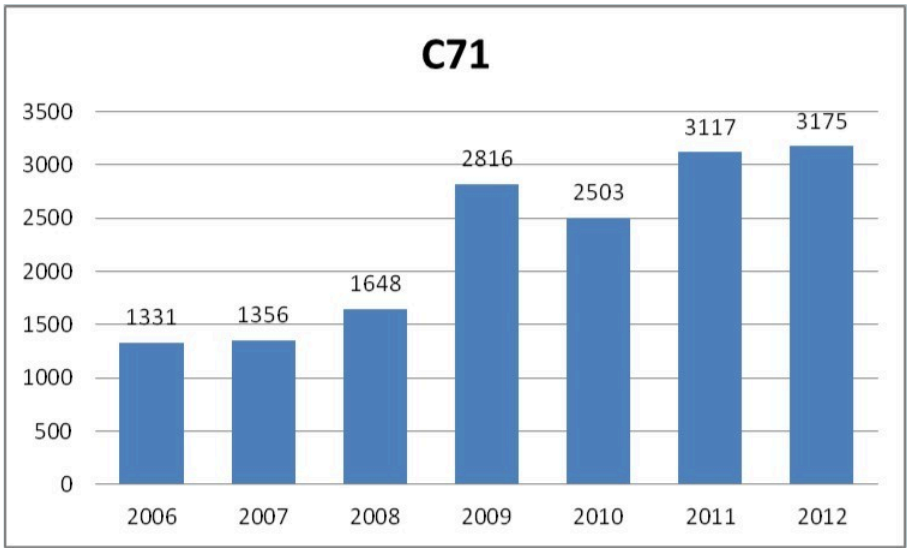


Figure 3. Number of cases of malignant neoplasm of brain, specified as the main category only (C71 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

is demonstrated in Figure 2. The amount of cases registered by NFZ in the year 2012 was 28,6 times bigger than the amount of new cases registered by the KRN - the ratio in the year 2006 was 20,9.

Analysis of the NFZ's data concerning separate ICD-10 categories revealed that the number of reported cases of malignant neoplasms of brain specified as the main category only (C71 according to ICD-10) was the biggest among all ICD-10 categories pertaining to malignant neoplasms of brain - in the analyzed period there were 15.946 such reports and their yearly number rose dynamically so in the year 2012 it reached 238,5% of the value from the year 2006, as it is visualized in Figure 3.

The data acquired from the NFZ revealed in the whole analyzed period 2.255 cases of malignant neoplasms of cerebrum, except lobes and ventricles (C71.0 according to ICD-10); their yearly number demonstrated rapid decrease in the year 2007 with subsequent minor changes - in the year 2012 it reached 47,8% of the value from the year 2006, as it is demonstrated in Figure 4.

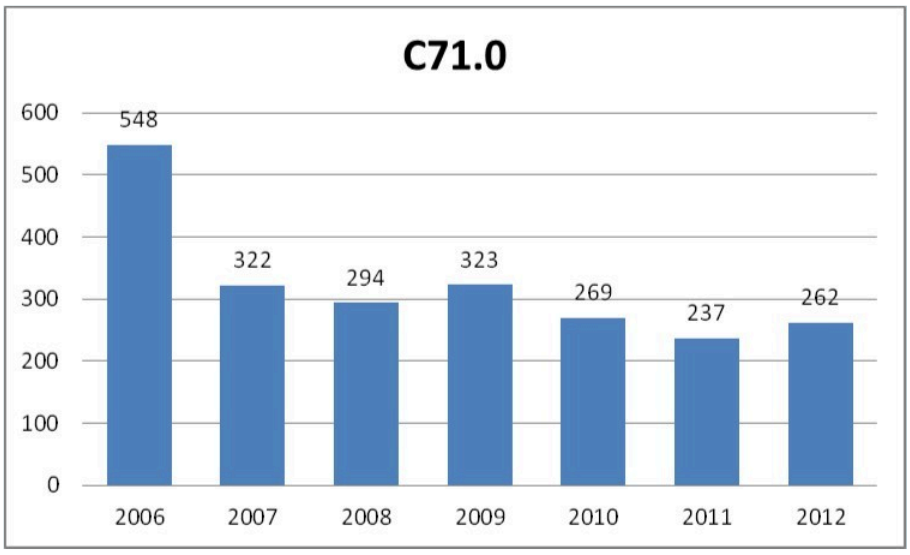


Figure 4. Number of cases of malignant neoplasm of brain: cerebrum, except lobes and ventricles (C71.0 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

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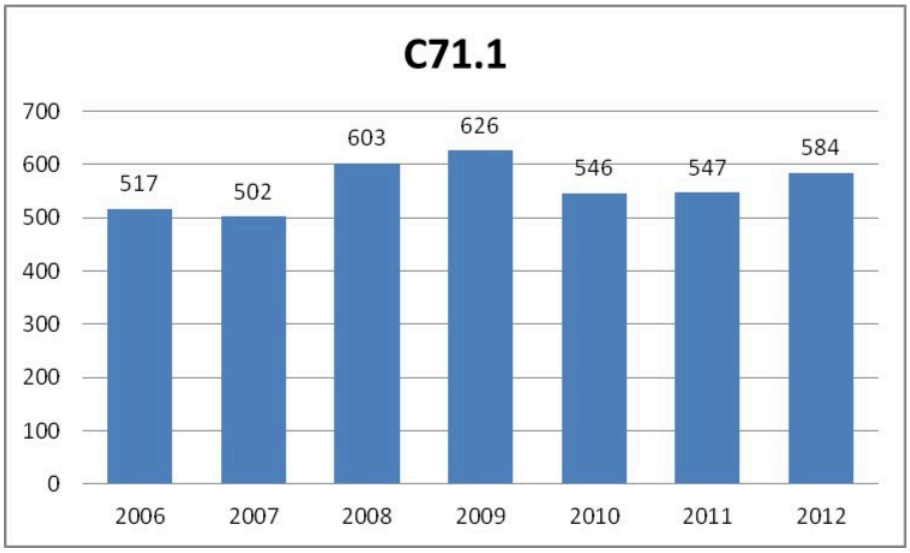


Figure 5. Number of cases of malignant neoplasm of brain: frontal lobe (C71.1 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

The total number of frontal lobe malignant brain neoplasms (C71.1 according to ICD-10) registered by the NFZ was 3.925 in the years 2006-2012; the yearly number of those cases increased in the analyzed period to reach in its end 113,0% of the initial value, as it is visible from Figure 5.

There were 2.547 cases of malignant neoplasms of temporal lobe of the brain (C71.2 according to ICD-10) registered by the NFZ in the whole analyzed period; the yearly number rose significantly and in the year 2012 it reached 138,0% of the value from the year 2006, as it is visualized in Figure 6.

In the analyzed period there were irregular changes in the yearly numbers of the NFZ registered cases of brain parietal lobe malignant neoplasms (C71.3 according to ICD-10) and the total number of such cases in the analyzed period was 2.128, as it is demonstrated in Figure 7.

A rising trend was present in the case of malignant neoplasms of occipital lobe of brain (C71.4 according to ICD-10) and their number registered yearly by the NFZ increased in the year 2012 to 203,8% of the

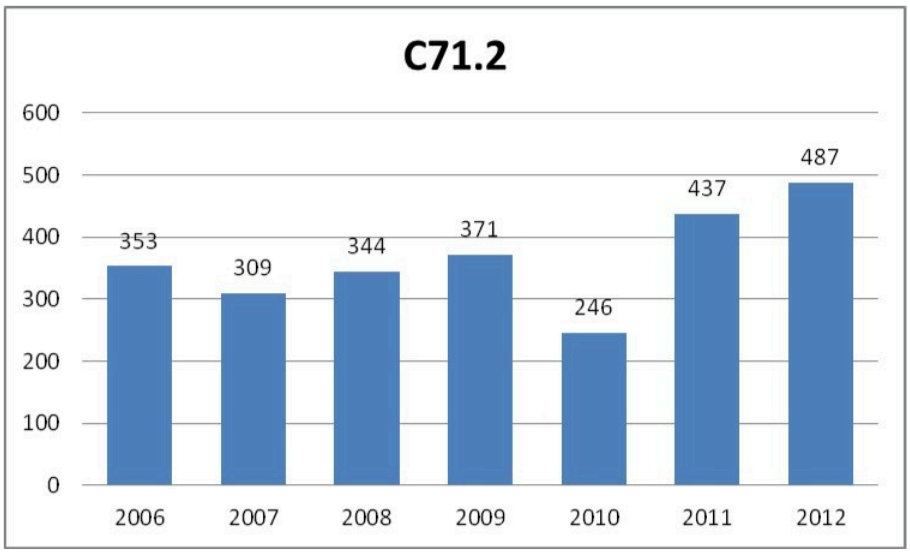


Figure 6. Number of cases of malignant neoplasm of brain: temporal lobe (C71.2 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

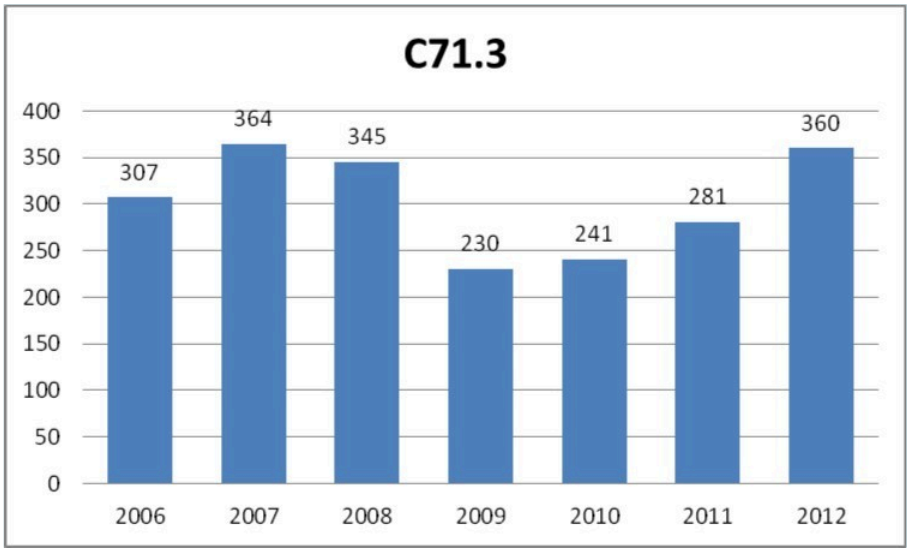


Figure 7. Number of cases of malignant neoplasm of brain: parietal lobe (C71.3 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

value from the year 2006, with the total amount of cases in the years 2006-2012 reaching 497, according to the data in Figure 8.

A similar dynamic increase was observed in the number of cases of malignant neoplasms of cerebral ventricle of brain (C71.5 according to ICD-10), which was recorded between the years 2007 and 2009 - in the year 2012 the number of cases registered yearly by the NFZ was 217,1% of the value from the year 2006, consistently with the data in Figure 9; the total number of cases in the analyzed period was 506.

In contrast to the previous categories, there was a significant drop in yearly number of NFZ registered cases of malignant neoplasms of cerebellum (C71.6 according to ICD-10), which was observed between

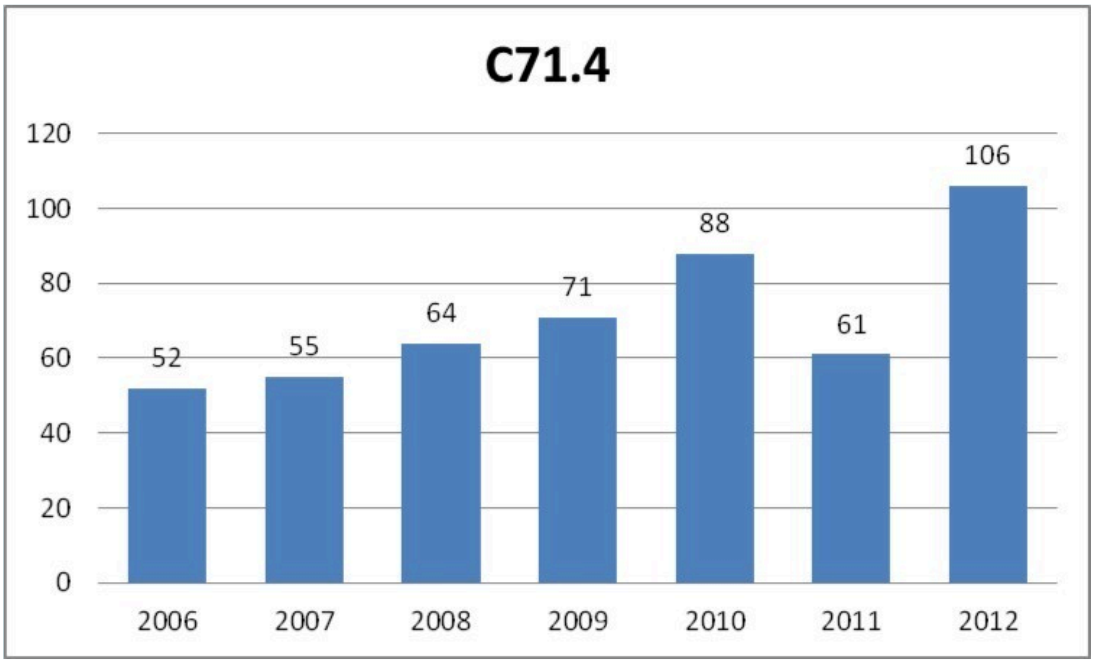


Figure 8. Number of cases of malignant neoplasm of brain: occipital lobe (C71.4 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

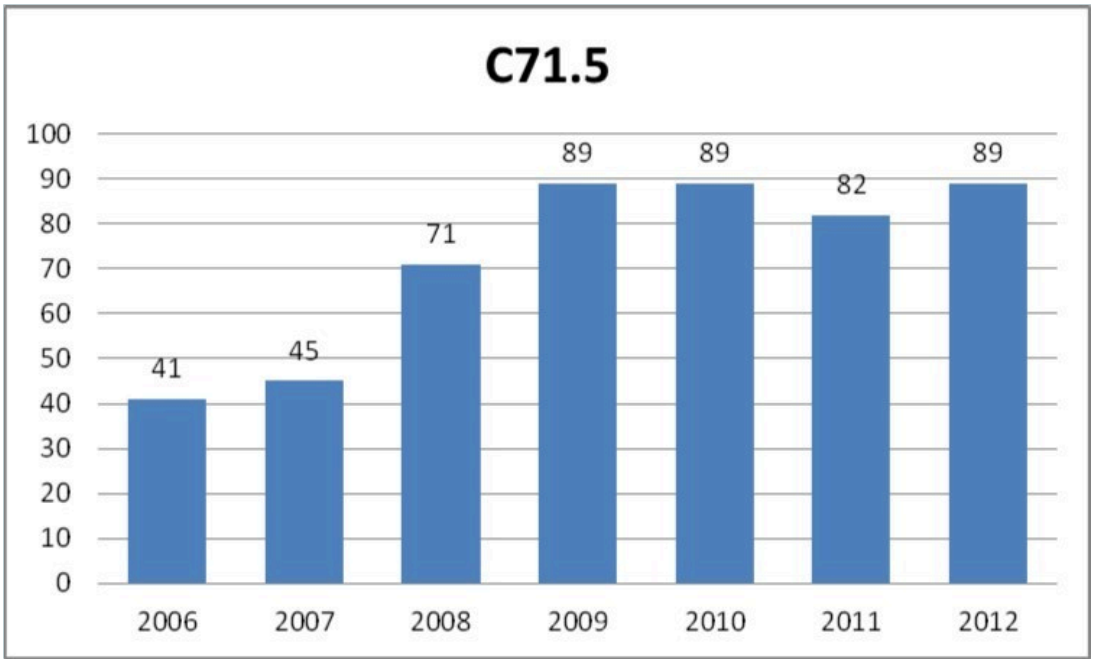


Figure 9. Number of cases of malignant neoplasm of brain: cerebral ventricle (C71.5 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

the years 2009 and 2010 - in the year 2012 it was 40,7% of the value from the year 2006, as it is visible in Figure 10; there were 2.321 cases of this kind registered in the years 2006-2012.

The NFZ registered total number of malignant neoplasms of brain stem (C71.7 according to ICD-10) cases was 387 in the analyzed period and the yearly number rose rapidly in the beginning of the analyzed period to demonstrate a consistent dropping trend later so in the year 2012 it reached 78,4% of the value from the year 2006, as it is demonstrated in Figure 11.

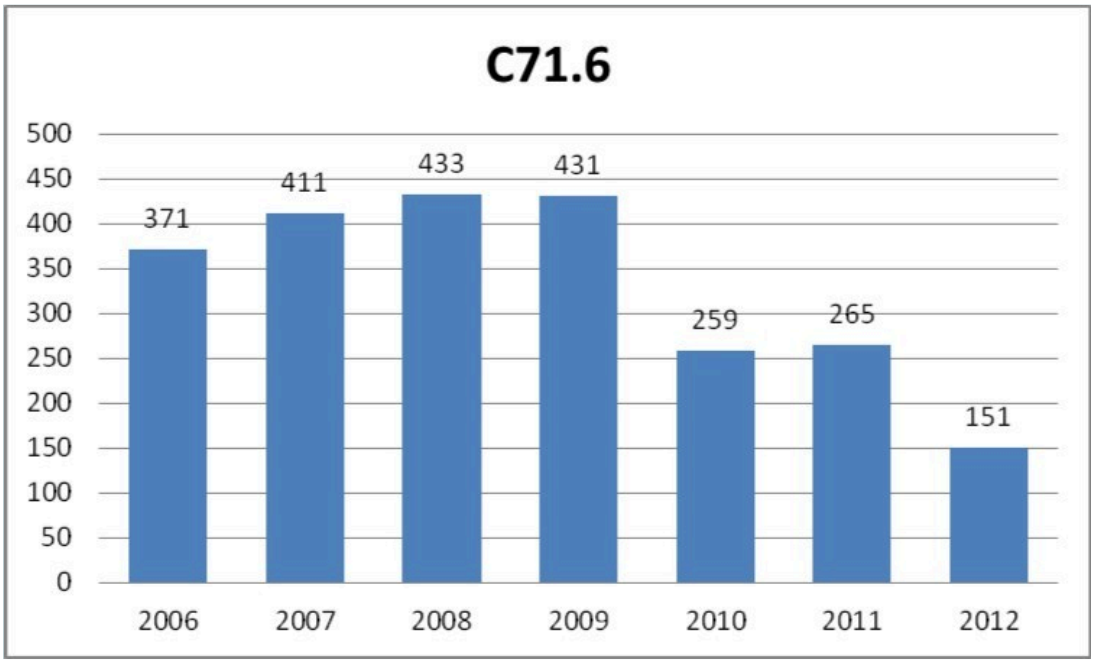


Figure 10. Number of cases of malignant neoplasm of brain: cerebellum (C71.6 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

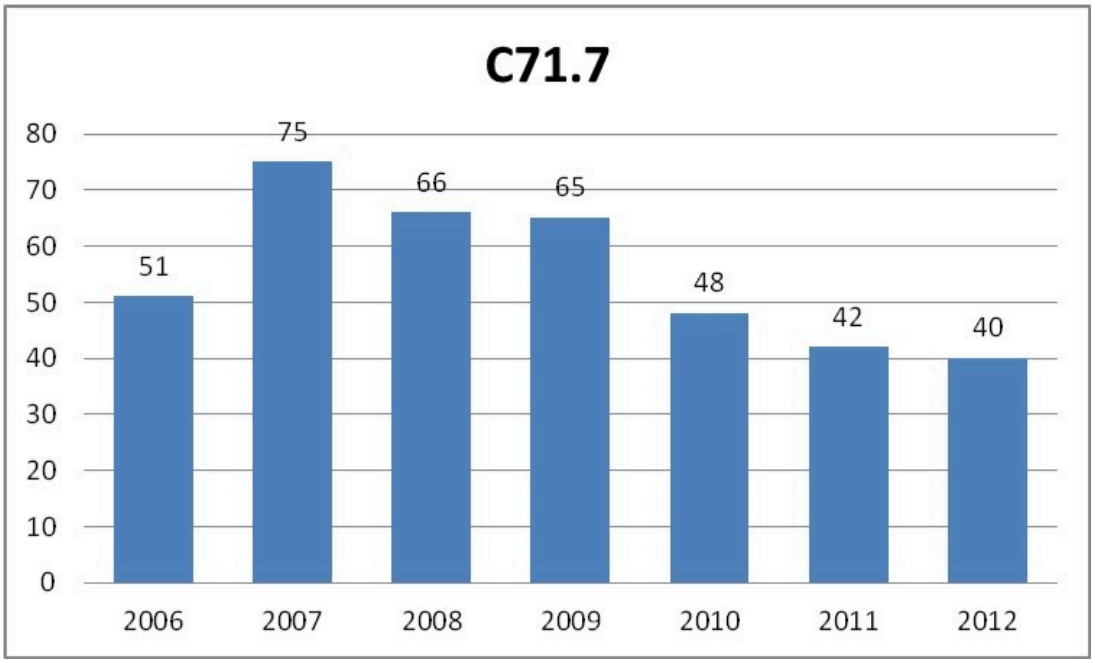


Figure 11. Number of cases of malignant neoplasm of brain: brain stem (C71.7 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

The number of cases of malignant neoplasms in the form of overlapping lesions of brain (C71.8 according to ICD-10) registered by the NFZ was 661 in the analyzed years and the yearly number initially rose to reach its zenith in the year 2009 and then dropped rapidly, so the value in the beginning and in the end of analyzed period do not show any significant difference, as it is visualized in Figure 12.

The total reported to the NFZ number of cases of malignant neoplasms of brain that were not specified (C71.9 according to ICD-10) was 8.046 in the years 2006-2012 and the yearly number showed a rising

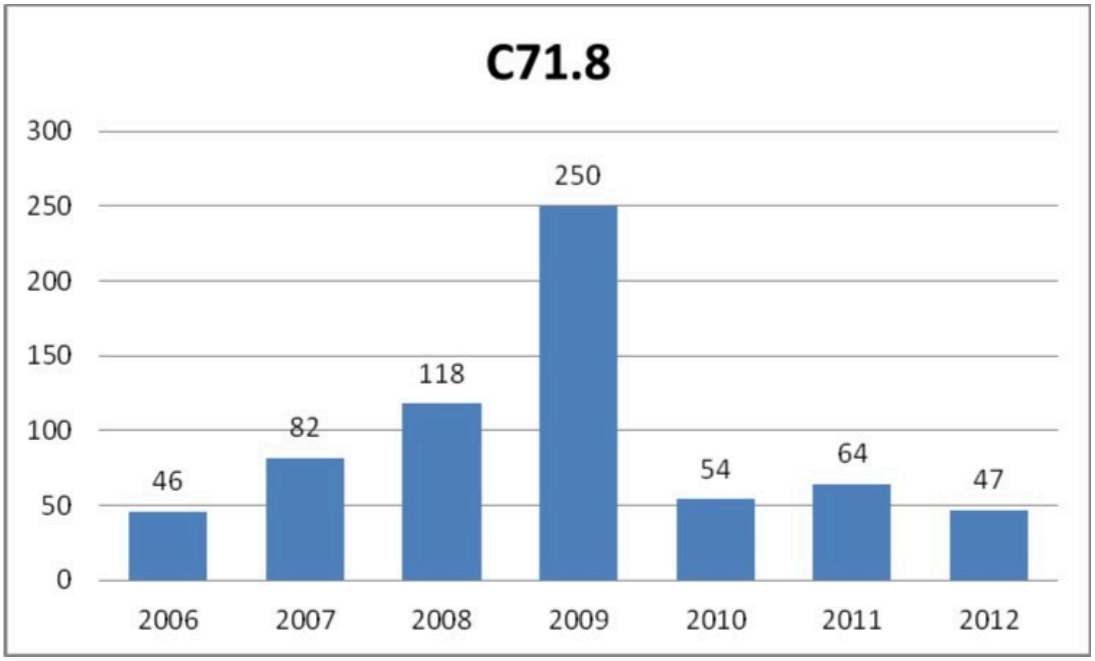


Figure 12. Number of cases of malignant neoplasm of brain: overlapping lesion of brain (C71.8 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

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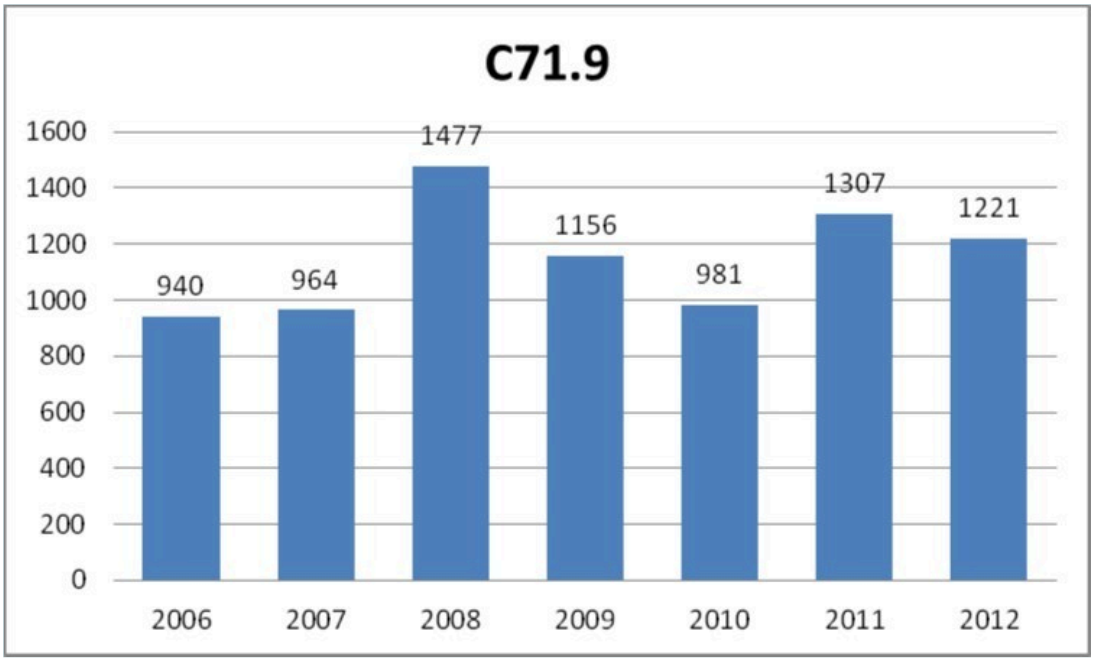


Figure 13. Number of cases of malignant neoplasm of brain: not specified (C71.9 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006-2012.

trend in the analyzed period: in the year 2012 it was 130,0% of the value from the year 2006, as it is visible in Figure 13.

Figure 14 summarizes the data concerning the reported to the NFZ structure of malignant tumors of brain cases in the beginning and in the end of the analyzed period: the most commonly reported ICD-10 categories were the most unspecific ones: C71 and C71.9.

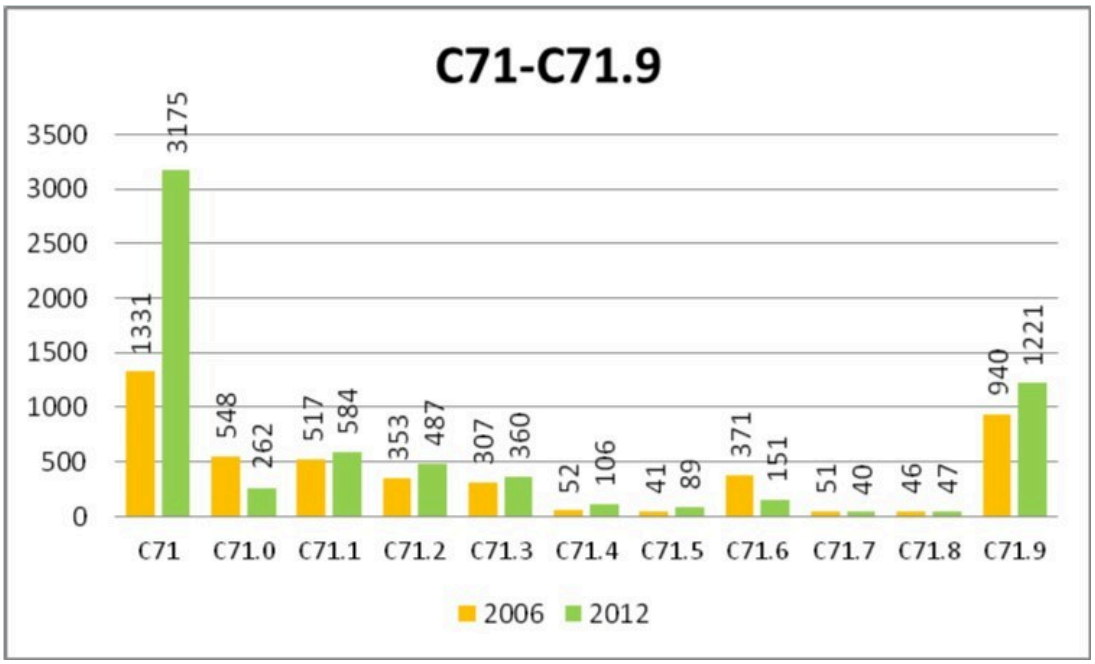


Figure 14. Number of cases of malignant neoplasm of brain (C71-C71.9 according to ICD-10) registered yearly by the public healthcare insurance provider NFZ in the years 2006 and 2012.

Discussion

The data from the Polish national registry of neoplasms KRN seems not to be too alarming as the number of new cases of malignant neoplasms of brain (C71 according to ICD-10) has risen only slightly in the years 2006-2012. However, the number of cases reported by the public healthcare insurance provider NFZ rose dynamically as rose also the NFZ/KRN cases yearly ratio. Assuming that the reporting to the KRN efficacy did not change significantly in the analyzed years it means a significant increase in care intensity, and thus also workload on the medical facilities and staff associated with the care for grossly the same amount of brain malignant neoplasms patients and, supposedly, also their longer survival times. It indicates that the level of public financing of the malignant neoplasms of brain treatment shall be adjusted adequately.

Among the specific ICD-10 subcategories there was a significant rise in the number of reported malignant neoplasms of brain located in temporal lobe, parietal lobe, occipital lobe and cerebral ventricle (C71.2, C71,3, C71.4 and C71.5 according to ICD-10, respectively) whereas a significant drop was to be observed in the case of malignant neoplasm of cerebrum, cerebellum and brain stem (C71.0, C71.6 and C71.7 according to ICD-10, respectively); the authors intend to seek for some medical explanation of those changes in the future.

The growing popularity among reporting Polish physicians of the least specific malignant neoplasms of brain ICD-10 categories shall be interpreted as alarming since the medical statistics data quality is deteriorating that way, thus proper evaluation of treatment costs and planning future financial allocations by the public healthcare insurance provider NFZ and the Polish government become increasingly difficult.

Competing Interests

The authors declare no conflicts of interests.

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