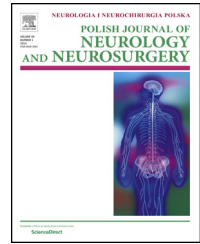


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Original research article

Diagnostics, treatment and secondary prevention of ischemic stroke in the Silesian Province, Poland between 2009 and 2015

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ABSTRACT

Background: The available data on diagnostics and treatment of ischemic stroke (IS) in Poland come mainly from non-representative cohorts or are outdated.

Objective: Therefore, the current study was done to access the most recent data on IS in the industrial region that covers 12% of the country's population.

Materials & methods: Analysis of the data from stroke questionnaires, obligatory for all patients hospitalized due to acute stroke and administered by the National Health Fund (the only public health insurer in Poland) between 2009 and 2015 ($n = 81,193$).

Results: The number of hospitalizations due to IS in the Silesian Province was 69,403 and constituted 85.5% of all stroke cases reported to the NHF between 2009 and 2015. Neuroimaging of the brain (CT/MRI) was performed in 68,696 (99%) subjects, while ultrasonography of extra- and/or intracranial arteries in 57,886 (83.4%). The rtPA therapy was applied in 3282 patients (4.7% of all IS subjects). The rate of patients treated with rtPA gradually increased (1.2% in 2009, 9.3% in 2015). Among all patients with IS, 57,636 (83.1%) subjects were administered antiplatelet drugs, 16,199 (23.3%) – oral anticoagulants, and 55,971 (80.7%) – antihypertensive drugs. Also, 2260 (3.3%) patients were referred for vascular intervention. In subjects with cardioembolic stroke etiology, 37.8% were treated with anticoagulants.

Conclusions: There has been observed a significant improvement in the quality of diagnosis and treatment of acute ischemic stroke during recent years. However, further actions are

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required both in terms of reperfusion treatment (thrombolysis and/or thrombectomy) and secondary prevention of stroke.

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1. Introduction

Stroke constitutes the third cause of death and the main cause of permanent disability in adults in Europe. Due to poor prognosis, high costs of treatment and chronic care, stroke is not only a medical problem, but also a social issue.

Based on the studies conducted in various countries it was documented that immediate hospitalization and treatment of patients according to an approved standard in specialized stroke units contributes to decreased mortality and lower treatment costs. In Poland, including the Silesian Province, there is a comprehensive network of stroke units and most patients diagnosed with stroke are treated in such specialized facilities [1,2].

Patients with ischemic stroke (IS) have had access to causal treatment for several years. It consists in administering a single dose of intravenous medication (alteplase – a recombinant tissue plasminogen activator – rtPA) which dissolves blood clots in an occluded cerebral artery [3–5]. The treatment is known as intravenous thrombolytic therapy. In 1996 the use of rtPA in AS was approved by the FDA, in 2002 this therapy was registered by the European Commission, in 2003 it was registered in Poland and since 2009 it has been fully reimbursed to all patients by the NHF, which is the only public health insurer in Poland.

There exist some reports concerning data on treatment of stroke in certain hospitals, cities, districts and provinces of Poland [6–8]. However, there is no comprehensive analysis concerning diagnostics and treatment of IS in the Silesian Province which is the second largest province in Poland with approximately 4,600,000 citizens (nearly 12% of Poland's population).

Therefore, the aim of this study was to analyze the use of diagnostic methods (neuroimaging, ultrasonography) and treatment of acute IS, as well as secondary stroke prevention in the Silesian Province between 2009 and 2015.

2. Patients and methods

The study was based on the data obtained from stroke questionnaires ($n = 88,425$) which were mandatorily reported to the NHF by all Silesian hospital departments for stroke patients (homogeneous patient groups: A48–A51). The analyzed period was between 2009 and 2015. The study was done with the approval of the Silesian division of the NHF and the Consultant in Neurology for the Silesian Province.

The questionnaire data were verified for incomplete or recurring data (e.g. recurring records of the same hospitalization were excluded). Finally, 81,193 stroke questionnaires were enrolled for the analysis. Diagnosis of stroke was made

according to the International Classification of Diseases version 10 (ICD-10).

The following data from the stroke questionnaires were used in the present study: age, sex, admission date, date of the first occurrence of stroke symptoms, date of death or discharge, number of hospitalization days, etiology of IS (according to the Trial Org 10172 in Acute Stroke Treatment – TOAST), clinical symptoms (consciousness disorders, hemiparesis/hemiplegia, speech disorders, sensory disorders, posterior circle syndrome), secondary stroke prevention (antiplatelets, anticoagulants, antihypertensives), information on referral for vascular intervention due to artery stenosis, application of rtPA, use of neuroimaging (CT/MRI) and ultrasonography of intra- and extracerebral arteries.

According to the Bioethics Committee, the study was not a medical experiment. Therefore, no approval of the Committee was required.

The statistical analysis was done using the statistical package SAS version 9.4 (SAS Institute Inc., Cary, NC). The level of statistical significance was set at $P < 0.05$.

The quantitative data were characterized using the mean and the standard deviation. For nominal data the percentage values were used. The correlation between the nominal variables was verified using the χ^2 test. The verification of the distribution of the variables and the agreement with the normal distribution were made using the Shapiro–Wilk test. The mean difference significance was verified using the Student's t-test for two groups and the ANOVA test for three or more groups. The consistency of the distribution was verified using the Mann–Whitney U test for groups and the Kruskal–Wallis test for skewed distributions. Multiple comparisons were made based on post hoc test results for variance analysis (ANOVA) and the Kruskal–Wallis test with the Bonferroni correction to assess significance of the percentage difference in the case of two or more groups. The test for trend was also calculated for consecutive years by means of Jonckheere–Terpstra and Cochran–Armitage tests for continuous and categorical variables, respectively.

3. Results

Based on the analysis of data obtained from the stroke questionnaires it was shown that the number of hospitalizations due to IS in the Silesian Province between 2009 and 2015 was 69,403 (35,880 women and 33,107 men; $P < 0.001$) which constituted 85.5% of all stroke cases reported to the NHF ($n = 81,193$). In 416 cases the data on sex were not available. The mean age of subjects hospitalized due to IS was 72.2 ± 11.8 years ($F - 75.4 \pm 11.5$ years, $M - 68.8 \pm 11.2$ years; $P < 0.05$). The mean period from first symptoms of ischemic stroke to hospitalization was 0.74 ± 3.4 days, and it was stable over years.

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