MORBIDITY BY STROKE AND ASSOCIATED RISK FACTORS IN THE PATIENTS HOSPITALIZED IN ROMANIA

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Abstract: *According to WHO, cardiovascular diseases produce more than half of the total deaths in the European region of WHO, 46 times more deaths and a burden of disease 11 times higher than that provoked by tuberculosis, malaria and HIV/AIDS combined. In Romania, cardiovascular diseases also represent also the main cause of death, being responsible for 62% of the total number of deaths. The study done on a number of 5 137 237 patients admitted to hospitals in Romania in 2008, in order to find out which was the pattern of using hospital services by the patients admitted with stroke, has shown that out of a number of 64 465 cases of stroke, 54% were without severe or catastrophic complications, 30% had severe complications, 11% had catastrophic complications and 5% died or were transferred before totalizing 5 days of hospitalization. The most frequent risk factors associated with stroke that were found as secondary diagnosis in the patients with stroke, were hypertension in 49% of the cases, dyslipidemia in 21% of the cases, atrial fibrillation in 13% of the cases and obesity in 5% of the cases.*

Cuvinte cheie: *morbiditatea spitalizată, factori de risc, DRG, accident vascular cerebral, mortalitate*

Rezumat: *Conform Organizaţiei Mondiale a Sănătăţii, bolile cardiovasculare produc mai mult de jumătate din totalitatea deceselor în Regiunea Europeană OMS, de 46 de ori mai multe decese şi o povară a îmbolnăvirilor de 11 ori mai mare decât cea provocată de tuberculoză, malarie şi HIV/SIDA combinate. În România, bolile cardiovasculare reprezintă, de asemenea, principala cauză de mortalitate, fiind responsabile de 62% din numărul total al deceselor. Studiul realizat pe un număr de 5 137 237 pacienţi internaţi în spitalele din România, în anul 2008, pentru a vedea care este modelul de utilizare al serviciilor spitaliceşti publice, de către bolnavii cu accident vascular cerebral (AVC), a arătat că dintr-un un număr de 64 465 de pacienţi cu AVC, 54% dintre cazuri au fost fără prognostic catastrofal sau sever, 30% dintre cazuri au avut complicaţii şi prognostic sever, 11% au avut complicaţii şi prognostic catastrofal şi 5% au decedat sau au fost transferaţi înainte de a totaliza 5 zile de spitalizare. Cei mai frecvenţi factori de risc asociaţi AVC la bolnavii internaţi, regăsiţi ca diagnostice secundare au fost HTA cu 49%, dislipidemiile cu 21%, fibrilaţia atrială cu 13%, diabetul cu 12% şi obezitatea cu 5%.*

INTRODUCTION

According to the World Health Organization (WHO), cardiovascular diseases cause more than half of all deaths in the WHO European Region, 46 times more deaths and a disease burden 11 times higher than that caused by tuberculosis, malaria and HIV/AIDS combined, in Europe, taking into account that 80% of deaths from cardiovascular disease are preventable.(1)

In 2008, cardiovascular diseases were responsible for 17 million deaths, namely 48% of all deaths from non-communicable diseases, the leading cause of death worldwide. The highest proportion of deaths from non-communicable diseases under the age of 70 years old was also represented by the cardiovascular diseases, namely 39%.(2)

In Europe, the highest standardized rates of mortality from cerebrovascular disease can be found in Russia, some countries of the former USSR, Moldova, Latvia and Romania, ranking the 6th place, with a rate almost double as against the European average.

Annually, cerebrovascular diseases (CVD) are responsible for over 50% of all deaths, with the exception of the region of sub-Saharan Africa, where the main cause of death are the infectious diseases, but it is anticipated that within a few years, cardiovascular disease to occupy the first place, here as well. Heart attack and stroke are responsible for a number of deaths of two or more than all cancers combined.

WHO predicts that the developing countries represent a warning: it is estimated that premature mortality by cerebrovascular disease (CVD) will not only continue, but will also increase. For 2020, it is expected that worldwide, CVD to be responsible for 25 million deaths.(3)

In Romania, cardiovascular diseases are also the leading cause of mortality, accounting for 62% of all deaths. Specific mortality by these diseases show a downward trend, but the standardized death rate is well above the European average.

Comparing the gross rate of hospital discharges to 100000 inhabitants for all cardiovascular disease, ischemic heart disease, myocardial infarction and stroke in Europe (latest available year, all ages) of DGSanco Report 2008 (4) – we note that Romania is in a middle position in respect of all

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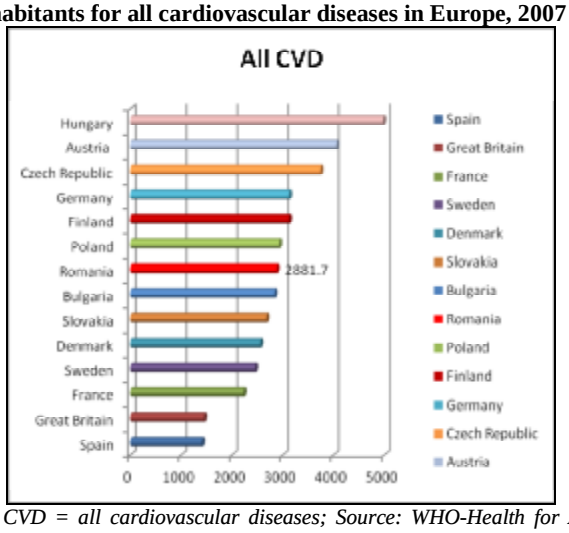
cardiovascular diseases at a rate of 2881.7 to 100 000 inhabitants.

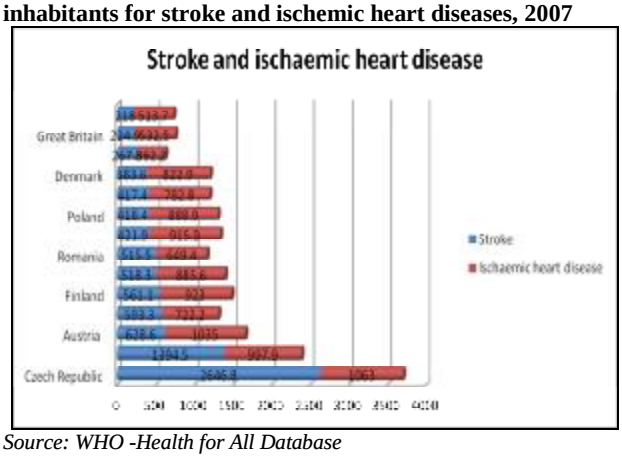
Figure no. 1. Gross rate of hospital discharge to 100 000 inhabitants for all cardiovascular diseases in Europe, 2007



All CVD = all cardiovascular diseases; Source: WHO-Health for All Database

Regarding stroke and ischemic heart disease, gross rates of hospital discharge are close, stroke registering a higher rate of 649,4 to 100 000 as against 515.5 to 100 000 for the ischemic heart disease, similar to the model of other European countries except Hungary and the Czech Republic, where stroke rates are much higher than the ischemic heart disease. France, Britain, Spain, Denmark and Sweden have much lower rates of stroke.

Figure no. 2. Gross rate of hospital discharge to 100 000 inhabitants for stroke and ischemic heart diseases, 2007



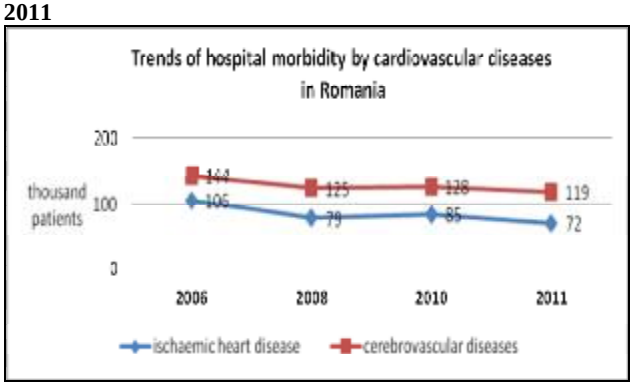
Source: WHO -Health for All Database

Regarding the evolution of hospital morbidity from cardiovascular disease in Romania, this had a downward trend from 2006 to 2011; the cerebrovascular diseases decreased from 144 000 patients to 119 000 patients hospitalized in a year.

Assessing the crucial role of the risk factors in the development of stroke is an important step in understanding this disease.

Extensive epidemiological investigations have established that hypertension, diabetes mellitus, hyperlipidemias and smoking are independent risk factors for stroke. Since the treatment of stroke is almost impossible, the only solution is prevention.

Figure no. 3. The trend of hospital morbidity by cardiovascular diseases (thousand patients), between 2007 – 2011



Source: NIS, 2012

PURPOSE

The aim of this study was to investigate hospitalized morbidity and the risk factors associated with stroke in Romania

METHODS

To this end, we conducted a study in 2008 to see the pattern of using the public hospital services by the patients with cerebral vascular accident (CVA) in Romania.

The research was conducted by querying the DRG database from the National School of Public Health and Health Management, regarding the patients admitted to hospitals in Romania in 2008 (5 137 237 patients).

The main investigated DRG codes were: B70C - stroke without catastrophic or severe prognosis; B70B - stroke with complications and severe prognosis, B70A - stroke with catastrophic complications and prognosis; B70D - stroke with the patient dead or transferred before 5 days of hospitalization.

The information about the considered risk factors (hypertension, diabetes, dyslipidemia, atrial fibrillation and flutter) was obtained from the secondary diagnoses reported for each patient in the minimum data set.

The diagnosis codes taken into consideration for the risk factors regarding the ICD 10-AM classification version 3 were: I10 codes for primary hypertension, diabetes, E10, E11, E13, E14 codes, for atrial fibrillation and flutter I48 codes, for dyslipidemia E78, for obesity E66 codes.

RESULTS

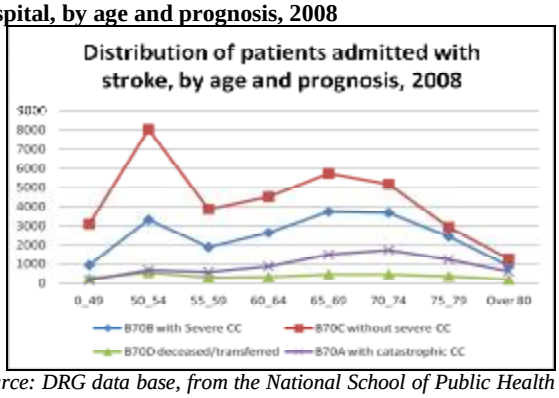
In 2008, in the hospitals of Romania, a total of 64 465 patients were hospitalized with the diagnosis of stroke (DRG code B70 - stroke)

The most affected age groups were the ages group of 50-54 years old and 65-74 years old. Gender distribution of hospitalized cases was 52% female and 48% male.

The distribution by age groups of these patients suggests that the patients with poor prognosis (B70C) belong to the age group of 50-54 years old; most of the patients having a catastrophic prognosis were over 65 years old.

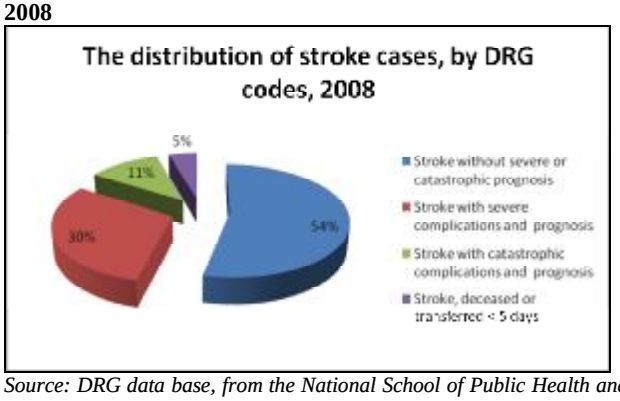
A noteworthy aspect is that the severe prognosis and deaths under 5 days are more numerous in the age groups of 50-54 years old and 65-74 years old.

Figure no. 4. Distribution of patients with stroke admitted to hospital, by age and prognosis, 2008



Source: DRG data base, from the National School of Public Health and Management, 2008

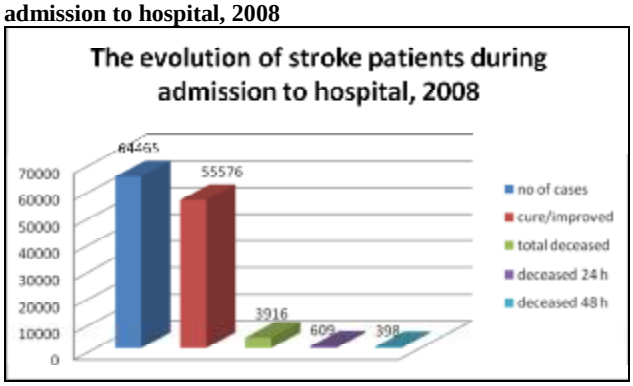
Figure no. 5. The distribution of stroke cases, by DRG codes, 2008



Source: DRG data base, from the National School of Public Health and Management, 2008

As it is shown in figure no. 5, 54% of stroke cases were without catastrophic or severe prognosis. 30% of cases had complications and severe prognosis, 11% had complications and catastrophic prognosis and 5% died or were transferred before 5 days of hospitalization. Of this last group - B70D, one third was transferred and two thirds died. The total number of cases for the DRG group B70C (stroke without catastrophic or severe prognosis) admitted to hospital was of 35 000 in 2008. B70C and B70B (stroke with complications and severe prognosis) were the most common cases in all age groups. The evolution of the hospitalized patients with stroke is pretty good given that 86% are discharged with their health condition improved and only 6% die during hospitalization, and among those deceased, in 16% death occurs within 24 hours and in 10% within 48 hours, which means that for almost one quarter of stroke cases admitted, no treatment method has worked (figure no. 6).

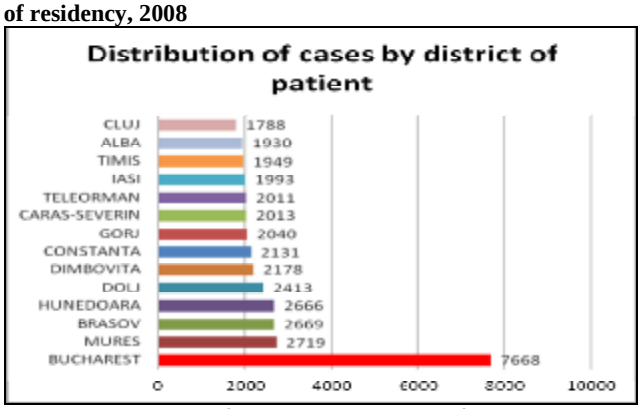
Figure no. 6. The evolution of stroke patients during admission to hospital, 2008



(Source: DRG data base, from the National School of Public Health and Management, 2008)

Regarding the distribution of cases, most hospitalized cases were from Bucureşti and Mureş, Braşov, Hunedoara and Dolj counties.

Figure no. 7. Distribution of hospitalized patients by county of residency, 2008

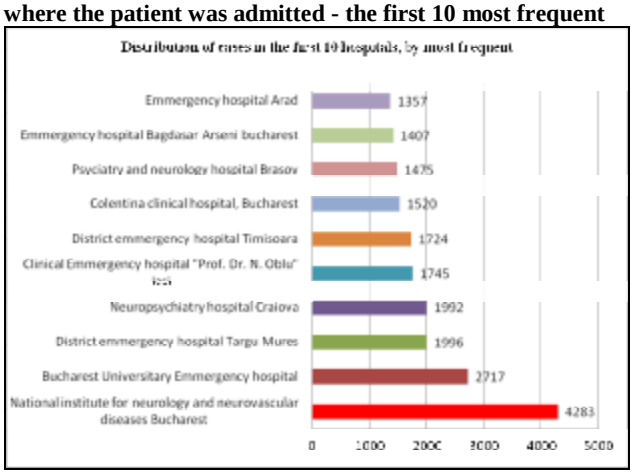


Source: DRG data base, from the National School of Public Health and Management, 2008

Of all hospitalized cases, the first 10 hospitals in terms of frequency, with most of the cases, were those presented in the chart below:

- National Institute of Neurology and Neurovascular Diseases Bucureşti – 4283 cases;
- University Emergency Hospital Bucureşti – 2717 cases;
- Clinical Emergency Hospital Tîrgu-Mureş – 1996 cases;
- Neuropsychiatric Hospital Craiova – 1992 cases;
- Prof Dr. N. Oblu Clinical Emergency Hospital Iaşi – 1745 cases;
- County Clinical Emergency Hospital Timişoara – 1724 cases;
- Colentina Clinical Hospital – 1520 cases;
- Psychiatric and Neurology Hospital Braşov – 1475 cases;
- "Bagdasar Arseni" Clinical Emergency Hospital– 1407 cases;
- County Clinical Emergency Hospital Arad – 1357 cases.

Figure no. 8. Distribution of stroke cases by the hospital where the patient was admitted - the first 10 most frequent



Source: DRG data base, from the National School of Public Health and Management, 2008

Among the main procedures for the prognosis and treatment of stroke cases, CT scans were applied to about half of the hospitalized cases, in exchange MRI was applied only to 3.37% of patients and angiography in 1% of patients. The annual evaluation of the quality of care provided by the hospitals in the U.S., the large number of such procedures climbs the hospitals on the top of the best quality services. This may be considered further evidence for the need to organize stroke units.

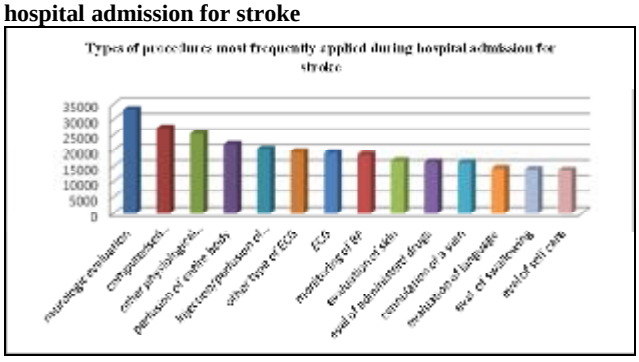
Table no. 1. Procedures with major impact on treatment and prognosis in the patients with stroke, applied during hospitalization

Name of the procedure	Number of cases	Percentage of the total number of cases (%)
CT scan	28978	46.23
Other type of electrocardiography (ECG)	19637	31.32
Ultrasonography	11433	18.24
Electroencephalography	6387	10.19
MRI	2115	3.37
Sphygmoraphy	870	1.39
Support ventilator	524	0.84
Angiography, angiotomography and arteriography	500	0.80
Blood transfusion	494	0.79
CPR	451	0.72
Nerve conduction studies	409	0.65
Cranial trepanation and puncture	12	0.02
Radioisotope studies of cerebral perfusion	12	0.02

Source: DRG data base, from the National School of Public Health and Management, 2008

The most commonly applied procedures were the neurological assessment, CT scans and other physiological assessments, infusion, injection, ECG, blood pressure monitoring, assessing skin integrity, catheterisation/cannulation, language and swallowing assessment, evaluation of self-care ability. The multiple necessary procedures emphasize the complexity of care required in such a situation.

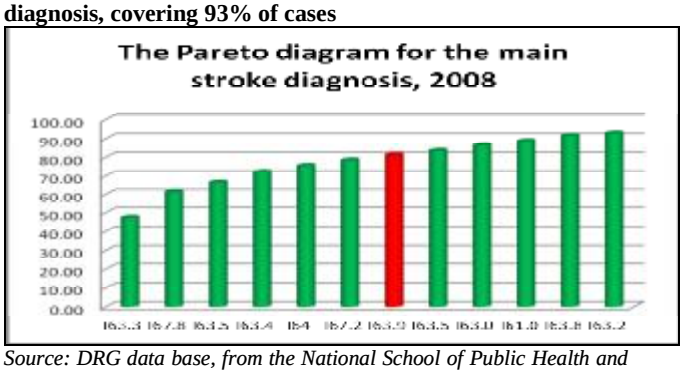
Figure no. 9. The most frequent procedures applied during hospital admission for stroke



Source: DRG data base, from the National School of Public Health and Management, 2008

Also, Pareto distribution (figure no. 10) of the main diagnoses shows that 7 diagnoses were associated in 80% of cases, basically being variations of cerebral infarction and unspecified stroke. Unfortunately, there are a significant number of cases in which the site of infarction or hemorrhage cannot be achieved. The full name of diagnoses is presented in table no. 2.

Figure no. 10. The Pareto diagram for the main stroke diagnosis, covering 93% of cases



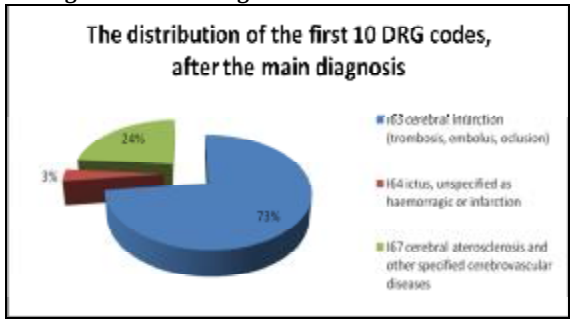
Source: DRG data base, from the National School of Public Health and Management, 2008

Table no. 2. Full name of diagnoses

Code of the diagnosis	Name of the main diagnosis	No. of cases
I63.3	Cerebral infarction due to thrombosis of cerebral arteries	26422
I67.8	Other specified cerebrovascular diseases	9018
I63.5	Cerebral infarction due to unspecified occlusion or stenosis of cerebral arteries	3235
I63.4	Cerebral infarction due to embolism of cerebral arteries	3717
I64	Stroke, not specified as haemorrhagic or as infarction	2178
I67.2	Cerebral atherosclerosis	1879
I63.9	Unspecified stoke	1817

A number of three primary diagnoses covers 80% of the stoke cases, classified among the first 10 DRGs of B70 type. These are cerebral infarction by thrombosis, embolism or occlusion (73%), cerebral atherosclerosis and other specified cerebrovascular disease (24%) and ictus, not specified as haemorrhage or infarction (3%).

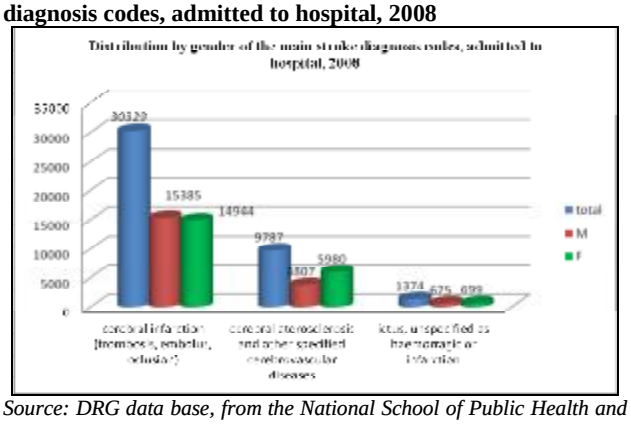
Figure no. 11. The distribution of the first 10 DRG codes, according to the main diagnosis



Source: DRG data base, from the National School of Public Health and Management, 2008

The gender distribution of the main three diagnostic categories shows us that stroke does not differ in terms of distribution between men and women, cerebral atherosclerosis is diagnosed more frequently in women and unspecified ictus is diagnosed equally in both genders.

Figure no. 12. Distribution by gender of the main stroke diagnosis codes, admitted to hospital, 2008

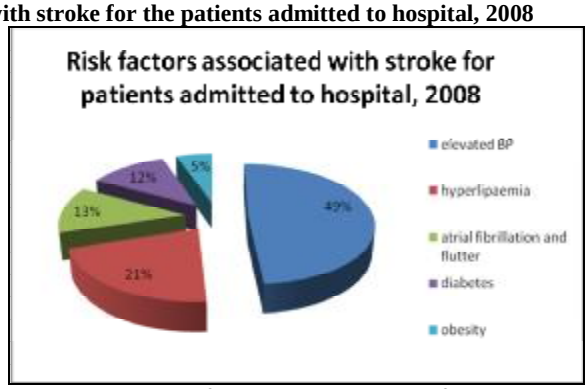


Source: DRG data base, from the National School of Public Health and Management, 2008

Risk factors in the patients hospitalized with stroke

The most frequent risk factors, found as secondary diagnoses were hypertension, dyslipidemia and diabetes mellitus type 2. Thus, HTA represents 49% of the associated risk factors in the patients hospitalized with stroke, a total of 41196 cases; dyslipidemias represent 21% of the total associated risk factors, namely 18090 cases. Diabetes mellitus represents 12% of all associated risk factors, i.e. 9986 cases. Obesity is responsible for a much smaller percentage, 5% and atrial fibrillation and flutter, 13% of the associated risk factors.

Figure no. 13. The percentage of the risk factors associated with stroke for the patients admitted to hospital, 2008



Source: DRG data base, from the National School of Public Health and Management, 2008

CONCLUSIONS AND PROPOSALS

In conclusion, we can say that in 2008, stroke accounted for a large group of diagnoses, with an average length of stay of 10 -12 days and a hospital mortality of 6%, especially in the first 24 hours. Most cases were treated in the most important clinical hospitals, Bucharest treating by far the most cases. There is no uniformity of procedures and interventions applied, they are very different. The main risk factors were hypertension 49%, dyslipidemias 21%, atrial fibrillation 13% and diabetes by 12% and obesity by 5%.

In accordance with the European Heart Health Charter to which Romania is a signatory in 2007 and in accordance with the EU Directives, promoting cardiovascular health (including the cerebrovasular diseases) needs to focus on interventions both at population and individual level, according to the declaration *"Every child born in the new millennium has the right to live until the age of at least 65 without suffering from avoidable cardiovascular disease."*

Therefore, great emphasis should be placed on prevention of stroke through various interventions that lead to the decrease of specific morbidity from stroke and early mortality.

Cerebrovascular disease burden can be reduced by: prevention and health education, early diagnosis, proper management of the case, rehabilitation and secondary and tertiary prevention, counselling on lifestyle and non-medical interventions related to agricultural, educational, social policies regarding the access to healthy food, sports, playgrounds for children, personal safety etc.

In this respect, it is necessary that the risk factors associated to cardiovascular disease to be approached even since childhood. The main modifiable risk factors can be addressed through: control of the biological determinants (BP, blood glucose, blood cholesterol, overweight or obesity) and health education with a view to adopt a healthy lifestyle (smoking cessation, unhealthy diet, alcohol abuse and physical inactivity).

Stroke is a disease that can be prevented. Activities for prevention and health promotion are more effective and less costly than the treatment of the disease, once installed.

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