

ANALYSIS OF HOSPITALIZATION EPISODES DUE TO STROKE, ROMANIA

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BACKGROUND / INTRODUCTION

Stroke is a medical condition known since ancient times, under the historical name “apoplexy”.

Etymologically, apoplexy is a term that comes from antiquity, in Greek meaning a sudden blow or attack. In ancient times, it was believed that a person affected by apoplexy was struck by the gods [1].

Stroke is the term used by doctors to describe the fact that an area of the brain no longer functions due to a problem with the arteries that supply the brain with blood and nutrients.

Globally, stroke (stroke) is the second leading cause of death and the leading cause of disability in the world. [1]

There is a large discrepancy in stroke mortality across Europe. For example, in Denmark the stroke mortality rate is 4.6%, in the UK it is 9.6%, the European average is 9.8%, and the OECD average is 8.4%. In Europe, the areas of Eastern Europe remain on the map with the most deaths from stroke.

In developing countries – with low or middle incomes – the mortality rate is higher, as is the number of patients who remain with serious sequelae. This is due to the fact that health systems are not sufficiently developed and there is no medical education. In recent years, important steps have been made in everything that involves the treatment of stroke patients, but there is still much to be done.

A research conducted by the health economics team at the University of Oxford, at the request of specialists from the Health, Accessibility, Facility, Education (SAFE) program, before the pandemic, shows that the care of stroke patients will end up having enormous costs in Europe, reaching as

Stroke is a major global problem, the second leading cause of death and the leading cause of disability in the world, requiring specific policies that address its management in an integrated manner.

DRG analysis provides a solid basis for understanding the costs and complexity associated with stroke and can support policy decisions by providing scientific evidence. The data can be used to identify areas for improvement, such as reducing the length of hospital stay and preventing readmissions.

A multidisciplinary approach, including patient education, rehabilitation, remote monitoring and family doctor involvement, can reduce repeat hospital admissions and improve long-term prognosis.

Keywords: stroke, medical emergency, second leading cause of death and the leading cause of disability in the world

much as 86 billion euros in 2040 if prevention is not carried out and investment is not made in stroke treatment.

Specifically, this study illustrates that stroke care is underfunded and urgently needs investment. For the first time, all costs related to strokes that occurred in the European Union, the United Kingdom, Israel, Norway, Iceland and Switzerland in 2017 were included. The specialists included not only treatments, but also costs for care of impairments and productivity losses due to disability or death following a stroke. The study provides scientific projections related to stroke costs for the next 20 years.

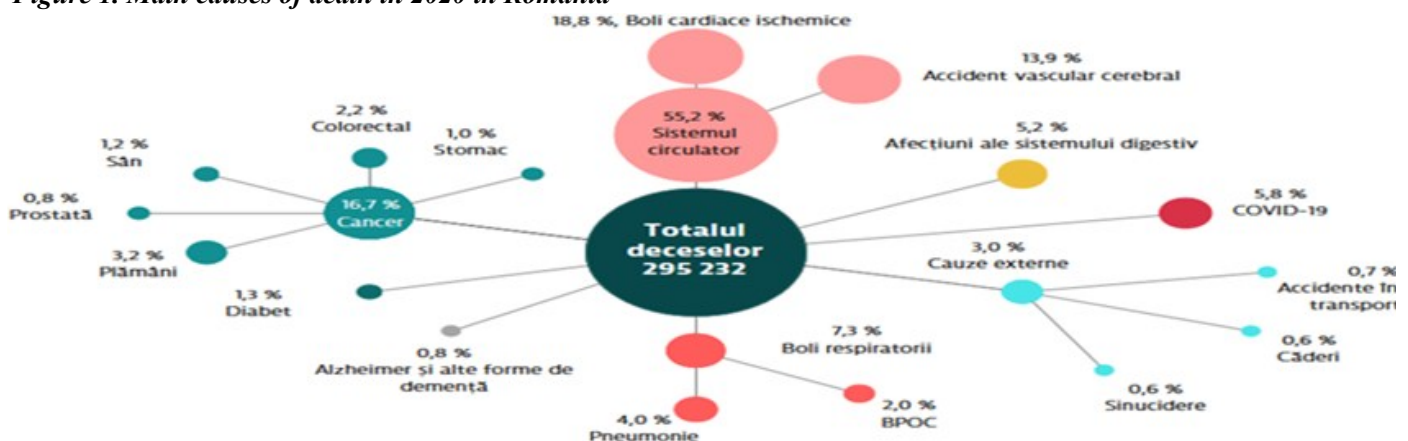
Romania ranks second in Europe in terms of stroke incidence and mortality but ranks one of the last in the European Union in terms of treatment of this pathology – figure 1.

According to WHO criteria, stroke is defined as a condition with rapid clinical evolution with signs of disturbance (usually focal) of brain function, lasting more than 24 hours or which can lead to death.

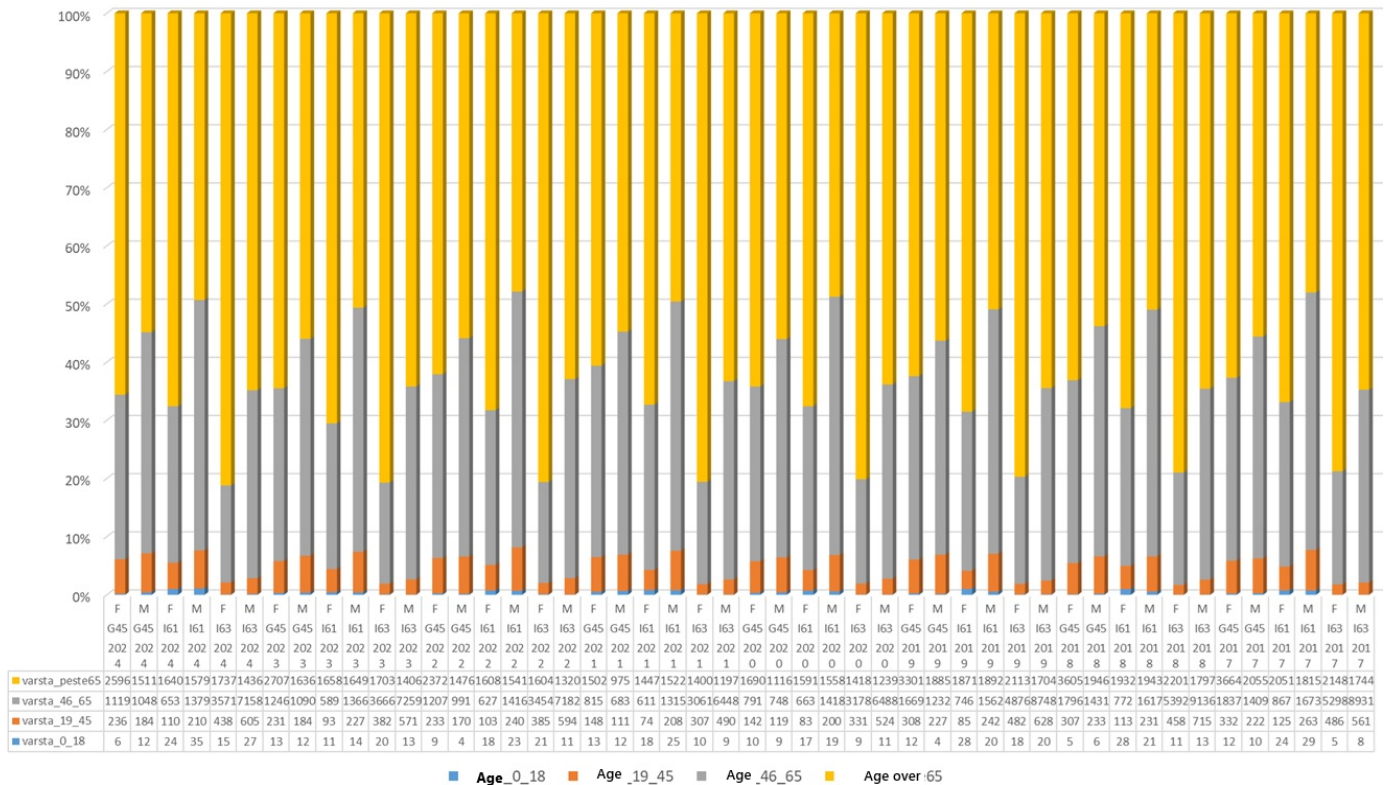
The progress made in recent years in the treatment of ischemic stroke allows, when intervened in a timely manner, to reduce brain damage and, implicitly, the occurrence of complications. In other words, death or the development of serious sequelae can be prevented.

In Romania, approximately 60,000-70,000 strokes occur annually.

Figure 1. Main causes of death in 2020 in Romania



Graph no. 1. Stroke evolution between 2017-2024



Of these, approximately 55,000 are ischemic strokes, and the rest are hemorrhagic strokes. [2]

The standardized mortality rate from cardiovascular diseases in Romania is 2.5 times higher than the EU5 average. Also, the standardized incidence rate for cardiovascular diseases in Romania, of 776.4 new cases per 100,000 people, is above the EU average of 610.7 new cases per 100,000 people. [3]

Modifiable risk factors for stroke are closely related to lifestyle and the environment and include: tobacco use and related products, stress, sleep disorders, sedentary lifestyle, harmful alcohol consumption and unhealthy diet. High blood pressure, diabetes, obesity and hypercholesterolemia are also important risk factors for stroke. [1]

OBJECTIVE

Identification at county level of the geographical distribution of hospitalization episodes in patients classified in the four age groups 0-18, 19-45, 46-65 and over 65 years for the three diagnoses, in 2024.

METHODOLOGY

The present study is a descriptive, retrospective study, conducted on data reported by hospitals in Romania and included in the National DRG Database.

All continuous hospitalizations from the period 2017-2024 that were reported by hospitals in Romania in a contractual relationship with the National Health Insurance House were included.

In accordance with the provisions of the Ministry of Health Order no. 1782/576/2006 on the registration and statistical

reporting of patients receiving medical services in continuous hospitalization and day hospitalization, with subsequent additions and amendments, INMSS collects and processes the minimum set of data at patient level for cases treated in continuous and day hospitalization.

The data were selected using the ICD-10-AM classification, as well as the grouping of hospitalizations using the Romanian grouper RODRGv1.1. The records from the observation sheets were extracted and analyzed, which were grouped into one of the three related DRG codes, respectively:

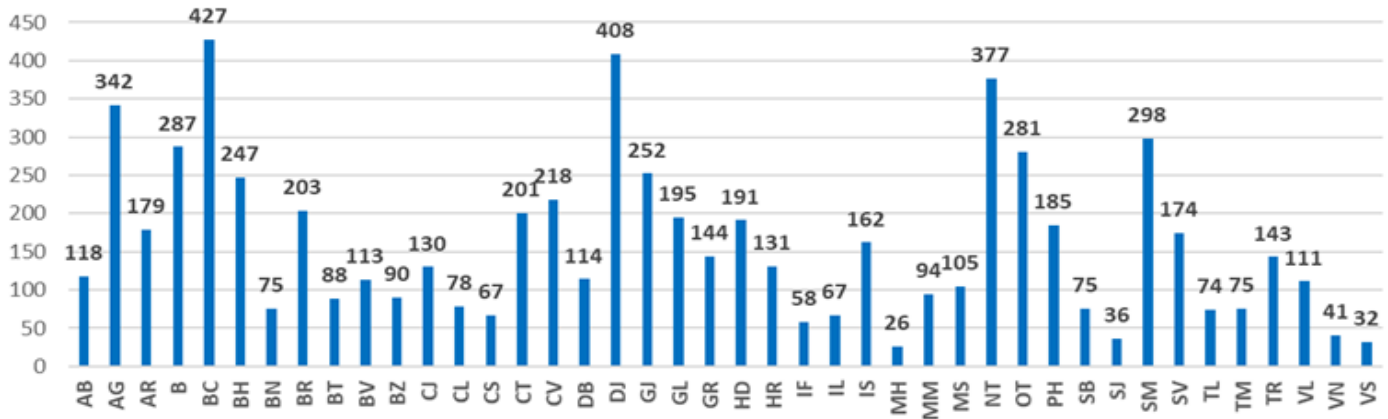
- transient ischemic attack and related syndromes - G45;
- intracranial hemorrhage - I61;
- cerebral infarction - I63 .

In accordance with the provisions of Law 190/2018 and Art. 13 of EU Regulation no. 679/2016, personal data are deleted at the time of transmission to INMSS, and the identification of persons for the purpose of analysis is based on encrypted CNP.

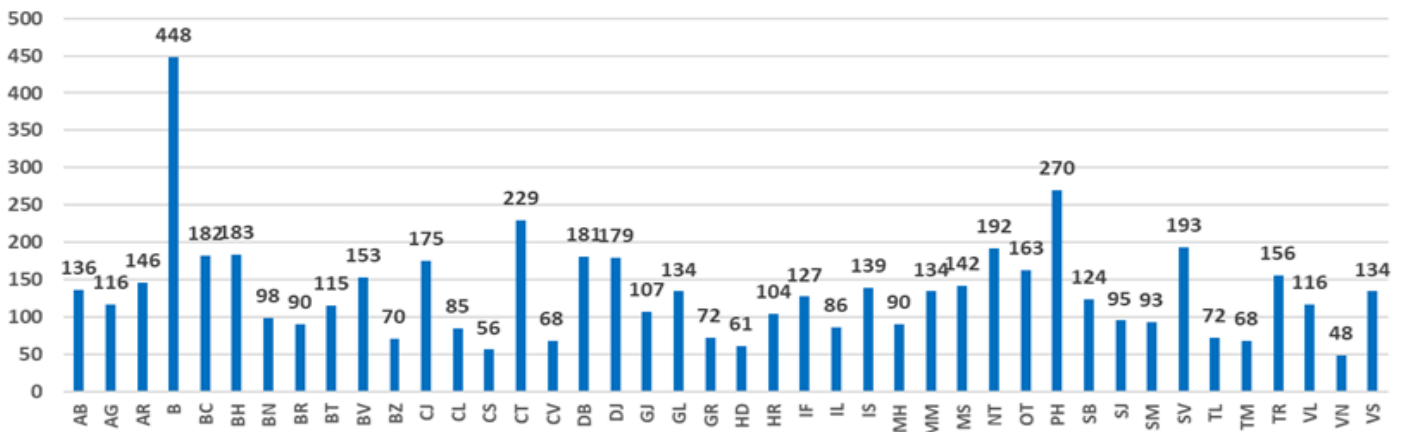
Vârsta pacienților a fost calculată în ani împliniți, ca diferență între data internării și data nașterii.

Datele au fost procesate cu ajutorul programului software SQL Server Management Studio Express 2005, prelucrarea și analiza ulterioară s-a realizat folosind programele SPSS și Excel. Analiza s-a realizat în funcție de o serie de variabile demografice și socioeconomice, cum ar fi vârsta, durata spitalizării, starea la externare etc, informații incluse în setul minim de date raportat în sistemul DRG de către spitale. Interpretarea și prezentarea s-a realizat sub formă de tabele și grafice.

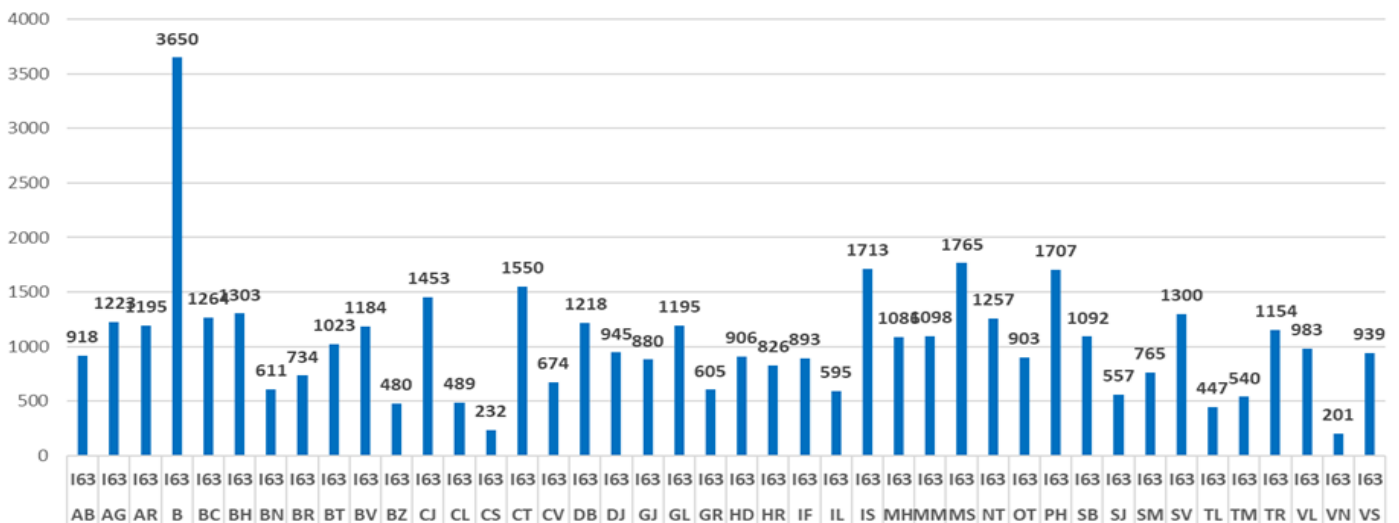
Graph no. 2. Distribution of cases diagnosed with transient ischemic attack and related syndromes at county level (G45) in 2024



Graph no. 3. Distribution of cases diagnosed with intracranial hemorrhage (I61) at county level in 2024



Graph no. 4. Distribution of cases diagnosed with cerebral infarction (I63) at county level in 2024



RESULTS

HOSPITALIZED MORBIDITY BY STROKE

Imaginea In Romania, between 2017-2024 the three conditions, transient ischemic attack and related syndromes - G45, intracranial hemorrhage - I61 and cere-

bral infarction - I63 are diagnosed in both sexes, frequently at ages 46-65 and more at ages over 65 - graph no. 1. According to graph no. 2 for the G45 diagnosis, the most hospitalization episodes in 2024 were in Bacău County and the fewest in Mehedinți County. Graph no. 3 highlights for 2024 the most hospitalization episodes of I61



in Bucharest and the fewest in Vrancea County. For the diagnosis I63 in graph 4 we observe the most hospitalization episodes in 2024 in Bucharest and the fewest in Vrancea County.

A decrease in the age group 0-18 in females is highlighted in 2024 for cases of transient ischemic attack and related syndromes (G45) - graph no. 5.

For intracerebral hemorrhage (I61) in 2023-2024 for both females and males, there are no variations in the age groups 46-65 and over 65 years. A doubling of cases in the age group 0-18, for both males and females, is highlighted in 2024 - graph no. 6

For cerebral infarction in 2023-2024, for both females and males, there are no variations in the age groups 46-65 and over 65 years. We note, however, that in 2024, the number of patients in the male gender in the 0-18 age group doubled from 13 to 27, while in the female gender it decreased from 20 to 15 - graph no. 7.

RISK FACTORS

According to the National Institute of Public Health (INSP), in Romania, the risk factors for stroke are at high values, as follows: low consumption of fruits and vegetables = 98%, inadequate physical activity = 92%, overweight and obesity = 59%, high cholesterol = 55%, episodic alcohol abuse = 35%, smoking = 19%, high blood pressure = 16%, high blood sugar levels = 15%. - figure no. 2 and figure no. 3.

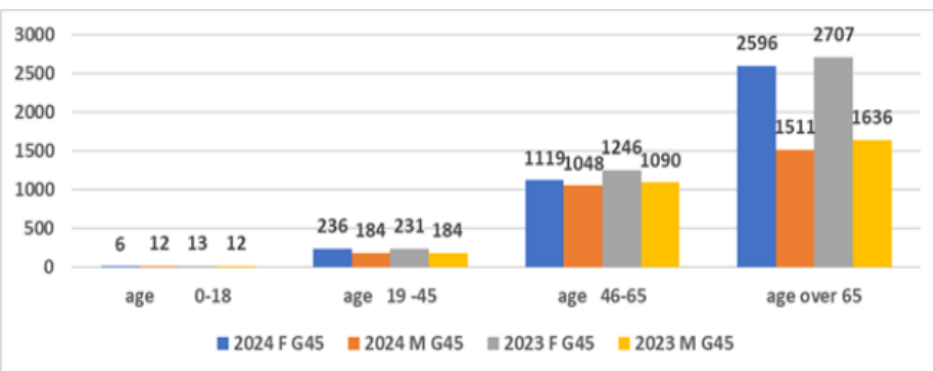
It is found that the main risk factors for stroke are overweight and obesity (59%) as well as high cholesterol (55%) - figure no. 3.

Body mass index, according to the OECD report (2022), in most EU countries, more than half of adults are overweight or obese. Compared to 2014, in 2019, overweight rates increased in almost all countries, except France and Luxembourg, where they remained stable. In Romania in 2019 the share was 59%, up from 2014, higher than the European average of 53% [4].

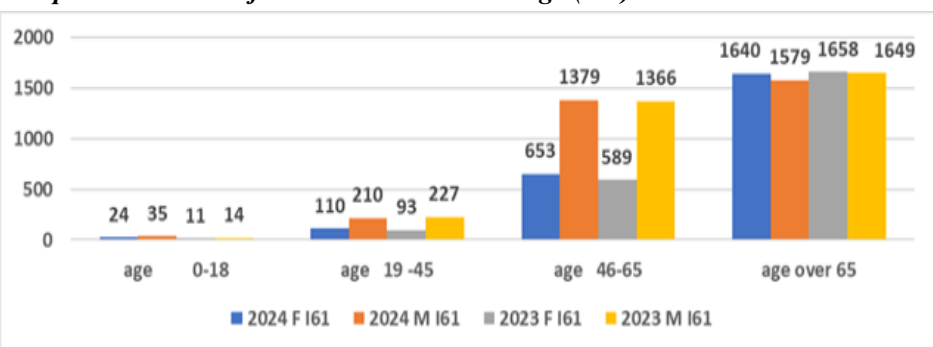
Data show that in all EU countries, men are more likely than women to be overweight or obese. The largest gender differences were recorded in Luxembourg and the Czech Republic. [4]

High blood pressure is the leading risk factor for death and disability in the European region, accounting for almost a quarter of deaths and 13% of disability, with the region having the highest prevalence of high blood pressure in the world. [5]

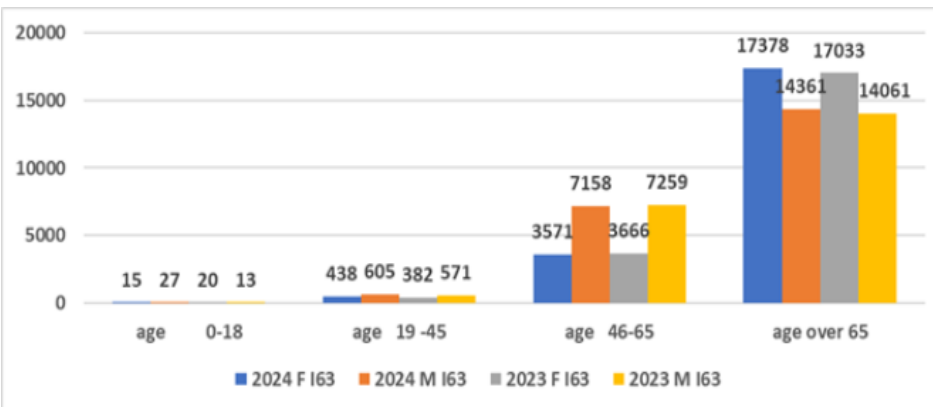
Graph no. 5. Cases of transient ischemic attack and related syndromes (G45) 2023-2024



Graph no. 6. Cases of intracerebral hemorrhage (I61)



Graph no. 7. Cases of cerebral infarction (I 63) in 2023-2024



Excessive salt intake is the main factor in high blood pressure and, subsequently, in deaths from stroke, so regulating the amount of salt in processed foods has the potential to have a positive impact on health. [5]

It is becoming increasingly important for the general population to be aware of the fact that, in Romania, the risk of stroke at population level is high. Romanians have a high risk of stroke, a high risk of premature death from stroke and a high prevalence of risk factors for stroke. Every individual can actively engage in controlling and reducing risk factors for stroke.

BURDEN caused by stroke

The overall picture regarding the level and trend of stroke was configured by calculating and

analyzing the level of some indicators in a territorial profile, respectively in temporal evolution (2017-2024).

The burden of disease measured by disability-adjusted life years, DALY (Disability Adjusted Life Years), which represents the sum of years of life lost through premature deaths and years lived with disability caused by the presence of disease or accidents, adjusted for the severity of the disease, places cardiovascular diseases in the top three places of the DALYs hierarchy per 100,000 - figure no. 4.

Romania is among the EU member states with the highest avoidable mortality, recording high values of deaths, both from causes preventable through public health interventions, and from causes treatable through adequate quality care. The main causes of avoidable mortality in Romania remain cardiovascular diseases with values 1.5 – 3 times higher than the EU average [4].

In the period 2017-2024, according to graph no. 8, the number of deaths recorded with dg. G45 increased in 2017 and 2018, in 2019 it returned to the value of 2017, then it increased constantly until 2022 when it doubled and even exceeded 2019 (the year of the pandemic). In 2023 it returned to the value of 2021, then an increase in the number of deaths is noted in 2024.

For the diagnosis I61 in graph no. 9, an increase in the number of deaths is observed in 2018 compared to 2017, then a constant decrease until 2021. In 2022, the number of deaths increases, exceeding the number of deaths recorded in 2021. From 2023 and then 2024, a slow decrease in the number of deaths is observed.

Diagnosis I63 according to graph no. 10 between 2017-2019, the number of deaths increased constantly, then registered a slight decrease in 2020. The period 2020-2023 is characterized by a similar value of the number of deaths recorded by this dg around 5000 deaths. In 2024, the number of deaths decreased compared to 2023, but not significantly, from 5096 to 4761 deaths.

PREVENTION AND SCREENING PROGRAMS

Promotional campaigns aim to: quit smoking, reduce salt intake, consume fruits and vegetables daily, engage in regular physical activity, and avoid excessive alcohol consumption, thereby reducing the risk of stroke.

Health policies, as well as the identification of people at high risk of stroke, are essential. Thus, premature deaths from stroke could be prevented. Also, the identification of people at high risk of stroke allows for early, appropriate treatment. Knowledge of risk factors and relevant parameters for stroke contributes to preventing the initiation

Figure 2. Risk factors for stroke

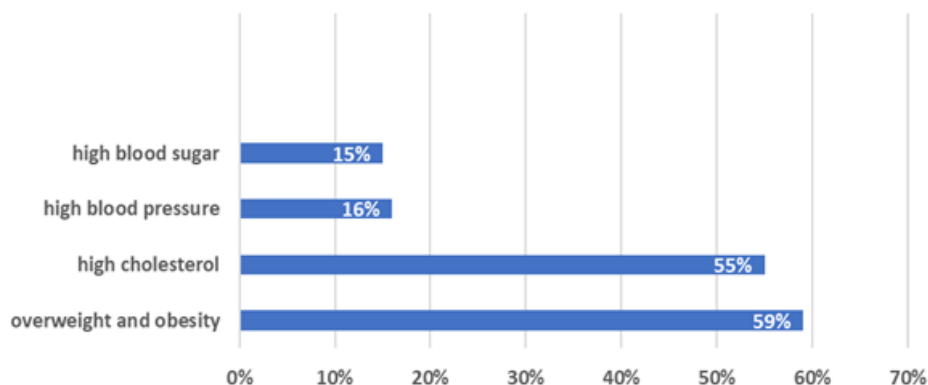
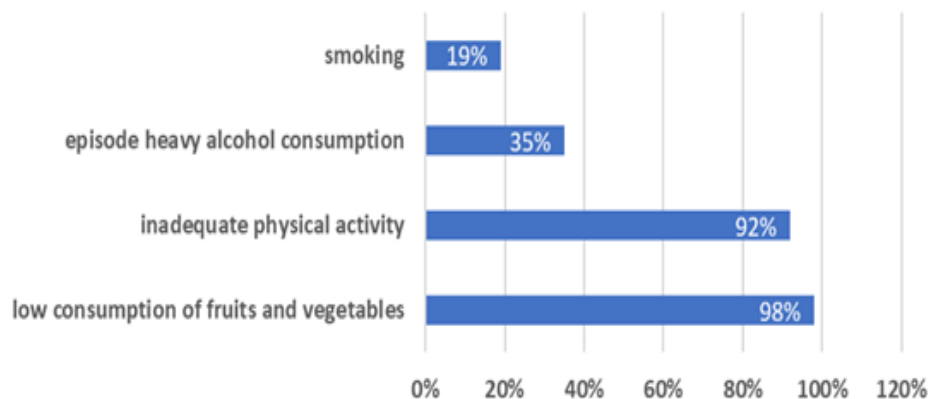


Figure 3. Dietary habits that are harmful to stroke



of the pathological process and the severity of the disease.

In 2023, the Minister of Health signed the Declaration on the Action Plan for Stroke in Europe (SAP-E), a strategic plan developed by the European Stroke Organization and the Stroke Alliance for Europe, which must be implemented by 2030.

This plan aims to significantly reduce the number of stroke cases and their long-term consequences.

Stroke is one of the leading causes of death and disability globally.

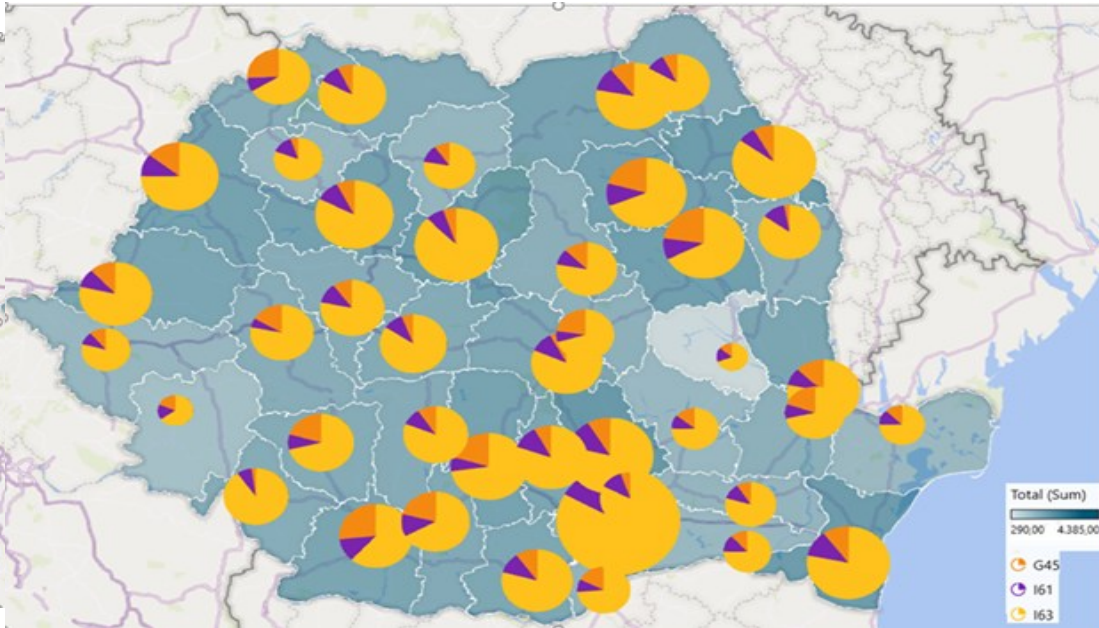
Studies show that in the absence of effective measures, the burden of stroke could increase by 25% in the next decade.

To counter this trend, Romania has decided to join efforts to implement effective, integrated and sustainable public policies for the prevention and treatment of stroke in Europe.

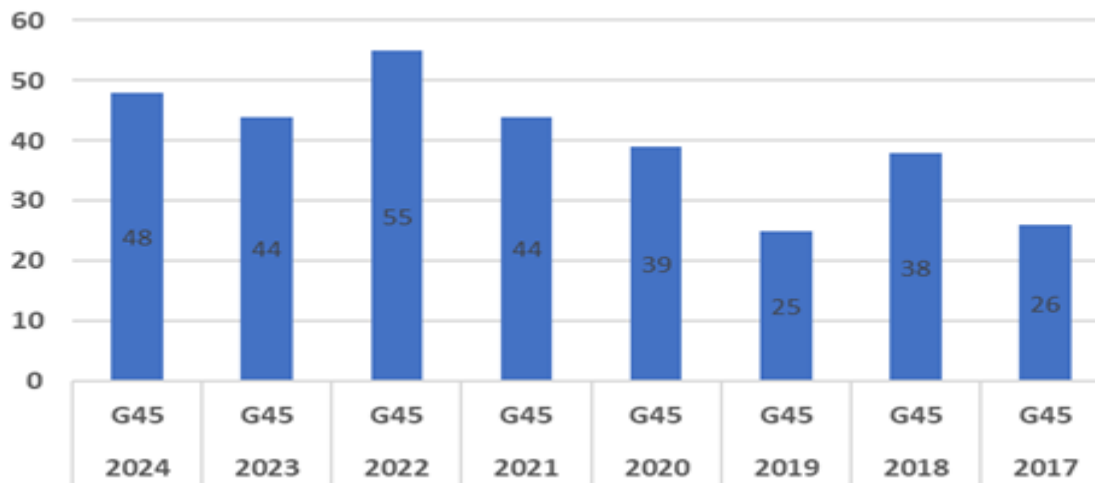
There are four major objectives to be achieved by 2030:

- reducing the number of strokes by 10%;
- treating at least 90% of stroke patients in a specialized unit ("stroke unit") as the first level of care;
- developing national stroke plans, covering the entire chain of care;
- developing and implementing strategies for multisectoral public health interventions with a favorable impact on stroke.

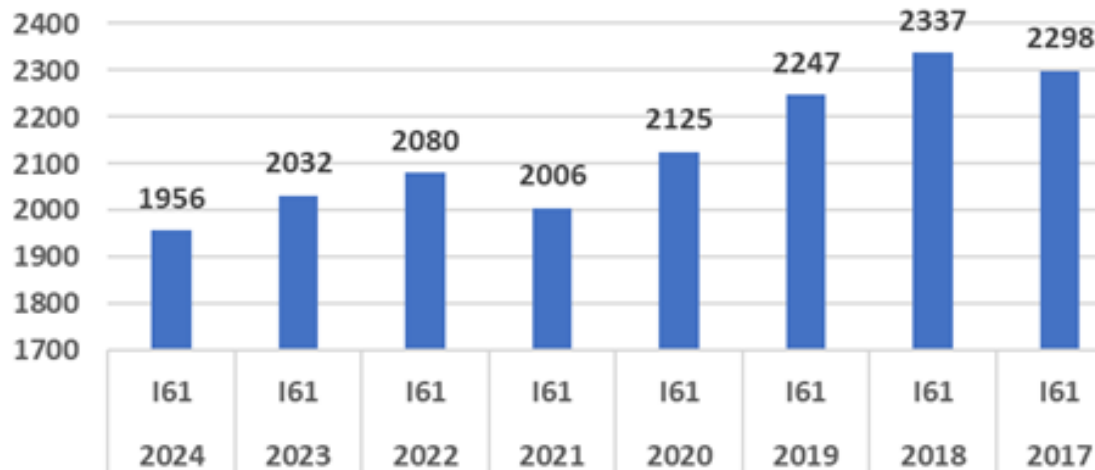
Figure 4. Disease burden estimated by Disability Adjusted Life Years (DALY)



Graph no. 8. Number of deaths diagnosed with transient ischemic attack and related syndromes



Graph no. 9. Number of deaths with intracranial hemorrhage



Romania will support the development and implementation of measures at national level, with the aim of improving the entire chain of care for stroke patients, promoting research and innovation, developing primary and secondary prevention strategies, improving emergency medicine services, optimizing the management of acute stroke cases, ensuring access to treatments, rehabilitation and improving the quality of long-term care.

In this context, it is also important to mention that the signing of the SAP-E Declaration falls within the objectives of the National Health Strategy 2023-2030 and the National Strategy for Cardiovascular and Cerebrovascular Diseases in Romania. [6]

CONCLUSION

Globally, stroke is the second leading cause of death and the leading cause of disability in the world.

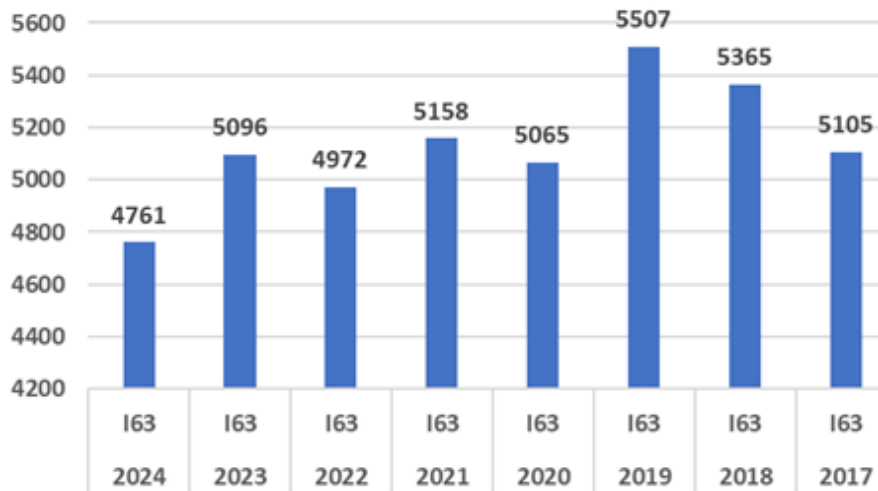
At the European level, there is a large discrepancy in terms of mortality due to stroke.

Romania ranks second in Europe in terms of incidence and mortality due to stroke, but ranks one of the last in the European Union in terms of treatment of this pathology.

Stroke is a medical emergency and immediate treatment is extremely important.

The progress made in recent years regarding the treatment of

Graph no. 10. Number of deaths from cerebral infarction



ischemic stroke allows, when timely intervention is provided, to reduce brain damage and, implicitly, the occurrence of complications. In other words, death or the development of serious sequelae can be prevented.

In 2023, the Minister of Health signed the Declaration on the Stroke Action Plan in Europe (SAP-E), a strategic plan developed by the European Stroke Organization and the Stroke Alliance for Europe, to be implemented by 2030. This plan aims to significantly reduce the number of stroke cases and their long-term consequences.

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