Stroke Strategy of the Spanish National Health System

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Strategy approved by the National Health System Interterritorial Council on November 26, 2008

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Prologue

This Stroke Strategy falls within the framework of the National Health System Quality Plan, one of the objectives of which is that of improving the care provided to patients who have prevalent illnesses entailing a major social and economic burden.

Stroke has a major impact on our society. In Spain, stroke is currently the second-ranked cause of death in the general population and the leading cause of death in females. Stroke is also the leading cause of disability and generates a very high degree of spending for the health and social services in our country.

It is a proven fact that one of the keys for providing successful stroke care is how fast the initial symptoms are detected and the medical emergency systems are contacted in order to starting taking action as fast as possible and shorten the length of time between the onset of the stroke until appropriate measures are taken in each case. For this purpose, it is important to emphasize prevention and informing citizens as to the risk factors and the telltale stroke symptoms, as well as availing of good coordination among the emergency services and the health care centers by means of setting off what is known as "stroke code".

Another important issue when dealing with stroke is the need of having an integral plan for action from the start of the treatment which will assure the patient's maximum degree of recovery, given that it is a proven fact that systematic action on stroke from both the medical as well as the nursing standpoint are of vital importance for minimizing the sequelae caused by this illness to the extent possible.

The Stroke Strategy of the Spanish National Health System deals with these and other issues, putting forth a number of objectives aimed at improving each one thereof, at all times through the effort and commitment of the Autonomous Communities and the Ministry of Health and Consumer Affairs.

Societies of experts from all of the disciplines related to stroke as well as patients associations have taken part in this Strategy, coordinated by Dr. Jorge Matías-Guiu. Technical specialists from the Autonomous Community Health Departments and from the Ministry of Health and Consumer Affairs have also take part.

For the preparation of this Strategy, the most recent scientific evidence as well as the measures and plans carried out both in Spain as well as in the European Union and the WHO have been taken into account.

The Stroke Strategy of the Spanish National Health System is therefore a concerted effort among the Ministry of Health and Consumer Affairs, the Scientific Societies, the Patients' Associations and the Autonomous Communities for the purpose of achieving better stroke prevention, stroke care and stroke rehabilitation based on clinical excellence and on conditions of equality nationwide. Hence, this Strategy will contribute to the cohesion of our health system to the benefit of our citizens regardless of where they may reside.

With this initiative, the health services, professionals and patients now avail of a tremendously useful tools for improving the health of our citizens in general and of those persons who have had a stroke.

Therefore, I would like to express my appreciation to all those who have taken part in the preparation of this document, given that the result of their work will undoubtedly contribute to improving the quality of the care provided in the National Health System.

<div align="right">
Bernat Soria Escoms
Minister of Health and Consumer Affairs
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Introduction

Stroke is one of the leading causes of death in the Western world and is the leading cause of disability and economic cost. The repercussion of stroke within families, in the occupational and work-related field and on the social plane is tremendous, giving rise to very high economic expense for all health services and even more so if encompassing the social services.

Throughout the history of medicine, under the different names which this clinical-pathological process has been known, such as "apoplexy", a term of historical implications, it has been associated with a poor prognosis and the impossibility of recovery. However, within the last 20 years, a spectacular change has taken place in both the prevention measures but, above all, in the way in which stroke patients must be handled, which has led to a marked drop in the death rage and the sequelae. The most interesting aspect of this change is probably that it has not had to do with new, much more highly effective drugs having come on the market or new surgical techniques, as has been the case in other medical fields, but rather, although these innovations have occurred, this new situation is due to the improvement in the organizational and care-providing approaches. Therefore, stroke today is also, above all, a parameter of a health service's functioning, the low acute morbidity and mortality rates being an indicator of quality in the health care provided.

Over more than ten years ago, the WHO Regional Office for Europe set out some objectives, in conjunction with technical-scientific organizations, for improving the care provided for stroke in Europe which have been progressively renewed, having meant a framework of references for the centers providing care for this type of patients. In Spain, which has one of the finest health services in Europe, there are many centers in all of the Autonomous Communities which meet these objectives thanks to the effort of the administrations and professionals, but it must be a top-priority objective for all concerned that every stroke patient have the same prospects for improvement thanks to access to an efficient care model, regardless of where they live or in what situations the event occurs. Access to stroke care must be defined by an effort in health planning and not by chance, this being a commitment undoubtedly share by all those leaders and professionals involved in the improvement of our citizens' health.

Achieving more effective stroke care, raising standards and undertaking challenges for improvement not only entails better prospects in the prognosis of these patients with major repercussions on patients who have other disorders, but entails lowering the health spending cost, because the invest-

ments in this disease process mean an economic savings on health care stays, on dependence-related economic cost and, in short, on social costs.

The Stroke Strategy of the Spanish National Health System is probably the greatest attempt made in Europe to bring the improvements in stroke care to the entire population. This will mean quite a major effort on the part of the Central Government, all of the Autonomous Communities, the administrators and professionals thereof, in the firm belief that it will also be one of the actions possible to carry out in health and social policy which will be most profitable for the patients, family members and for the Government itself, in addition to being a fine example of how a health care cohesion program can be carried out for the countries in our environment. Committing care structures which are already efficient in other processes (in the field of emergency, hospitalization, prevention, medical treatment and rehabilitation, health care information, etc.) in improving and homogenizing the care provided for stroke is a challenge which has marked this Strategy and which is probably one of the most important actions in the health-related care provided for citizens in Spain.

Having had the privilege, thanks to the confidence of the Ministry of Health and Consumer Affairs, of taking part in the preparation of this Strategy, I can but stress the major effort invested and the excitement shown by those in charge and technical members of the Ministry proper, by the representatives from the Autonomous Communities serving on the Institutional Committee and by the representatives of the scientific associations and professional groups on the Technical Committee, their complete readiness to be involved and their commitment, as well as my being absolutely convinced that the results of this Strategy are going to be highly important to the care provided for stoke in particular and for all citizens in general in Spain, in addition to be a reference point to which many countries in Europe may look.

Jorge Matías-Guiu
Scientific Coordinator

Technical note

This document is comprised of three parts:

1. General aspects: detailing the justification, definition of stroke and the current situation of stroke in Spain.
2. The objectives of the Stroke Strategy of the Spanish National Health System approved by the National Health System Interterritorial Council on November 26, 2008, detailing the objectives and recommendations of this Strategy ranked by priority and agreed upon by the Strategy Technical Committee and the Institutional Committee of the Autonomous Communities.
3. Strategy evaluation and information system affording the possibility of effectively monitoring the actions for accomplishing the Strategy objectives.
4. Examples of good practices carried out in Spain which have proven themselves to be efficacious and effective.
5. Annexes in which different specific aspects of the Strategy are dealt with in greater depth.

1. General Aspects

1.1. Justification

Cerebrovascular diseases (CDs) are all those brain disorders secondary to a vascular disorder. Their acute manifestation is known by the term "stroke" in English from the Latin "ictus", because of its usually sudden and violent onset. There is a common consensus regarding avoiding more confusing or less explicit terms such as "cerebrovascular accident" or similar and to opt for the term "ictus" in Spanish which parallels the use of the term "stroke" in English. The term "ictus" in Spanish and "stroke" in English combines the cerebrovascular nature and the connotation of the acute nature of the episode[1].

Stroke is one of the leading public health problem. In the developed countries, stroke is one of the leading causes of death, in conjunction with cardiovascular disease and cancer. Stroke is also the leading cause of permanent disability in adults. Many of the patients to survive experience major sequelae which limit them in their everyday living activities. Stroke morbimortality not only causes suffering for the patients and their family members, but also weighs heavily on the economy of society[2].

Stroke is difficult to diagnose correctly due to the many, widely-varying ways in which it manifests itself clinically plus the need of diagnosing stroke as fast as possible. The first step in any protocolized measure for managing a stroke patient is based on a correct clinical diagnosis, this being the pillar on which all of the following actions thereafter are based[2].

Over the last thirty years, neurological knowledge has progressed exponentially, both in the basic aspect (molecular, cellular, histological and genetic physiopathology) as well as in the clinical aspect (diagnosis and treatment criteria, procedures and techniques). These advancements have also been made in the field of cerebrovascular diseases, which has led to the specific causal entities, the physiopathology and the pathogenesis of stroke being known and to achieving the specific early diagnosis thereof and to many different medicines or non-pharmacological treatment techniques effective for treating this disease for which no treatment option was known until just a few short years ago now being known[3].

1.2. Stroke: Concept and Classification

Stroke is the sudden deficit of blood flow to the brain which temporarily or permanently alters the function of a certain region of the brain. The Cerebrovascular Disease Study Group of the Spanish Neurology Society recommended that this term be used to refer generally to cerebral ischemia and to intracerebral or subarachnoid hemorrhage. The terms "brain attack" or "cerebrovascular accident (CVA)" have been being used interchangeably, these terms however now being used to a progressively lesser degree.

Table 1. **Classification of cerebrovascular disease by form of clinical presentation (NINDS, 1990)**

A) Asymptomatic
B) Focal cerebral dysfunction
   1. Transitory ischemic attacks (TIAs)
      — Carotid
      — Vertebrobasilar
      — Both
      — Indefinite location
      — Possible TIA
   2. Stroke
      a) Time-based profile
         — Improvement
         — Progress
         — Stable stroke
      b) Types of stroke
         — Cerebral hemorrhage
         — Subarachnoid hemorrhage
         — Intracranial hemorrhage associated with arteriovenous malformation
         — Cerebral infarction
            • Mechanisms: thrombotic, embolic, hemodynamic
            • Clinical categories: atherothrombotic, cardioembolic, lucunar, others
            • Location: internal carotid artery, medial cerebral artery, anterior cerebral artery, vertebrobasilar system (vertebral artery, basilar artery, posterior cerebral artery)
C) Vascular dementia
D) Hypertensive encephalopathy

Source: Modified from National Institute of Neurological Disorders and Stroke. Classification of Cerebrovascular Diseases III. Stroke 1990; 21: 637-76.

Stroke is classified into different subtypes in keeping with clinical, topographical, pathogenic, diagnostic and prognosis-related criteria. In 1990, after two prior editions, the U.S. National Institute of Neurological Disorders and Stroke (NINDS) attempted to define the various forms of stroke by their clinical presentation, their pathogenic mechanisms and their anatomopathological damage (Table 1)[4]. Other classifications have progressively been prepared based on these systematic ways of organizing cerebrovascular diseases.

Along general lines, CVDs can be divided into two major groups according to the mechanism by which they are caused: cerebral ischemia and intracranial hemorrhage. Ischemic strokes total 80%-85% of all strokes, whilst the remaining 15%-20% are due to hemorrhage[5]. A distinction can be made within cerebral ischemia, in turn, between focal cerebral ischemia, which affects one single area of the brain, and global cerebral ischemia, which affects the brain diffusely. On the other hand, a distinction is made within the hemorrhagic strokes, between cerebral hematomas and subarachnoid hemorrhage (Fig. 1)[5,6].

Figure 1. Cerebrovascular disease classified by type

TIA: Transitory Ischemic Attack; SAH: Subarachnoid Hemorrhage; TACI: Total Anterior Circulation Infarct; PACI: Partial Anterior Circulation Infarct; POCI: Posterior Circulation Infarct; LACI: Lacunar Infarct.

Source: Modified - Díez Tejedor E and Soler R. 1999 and de Arboix et al, 2006.
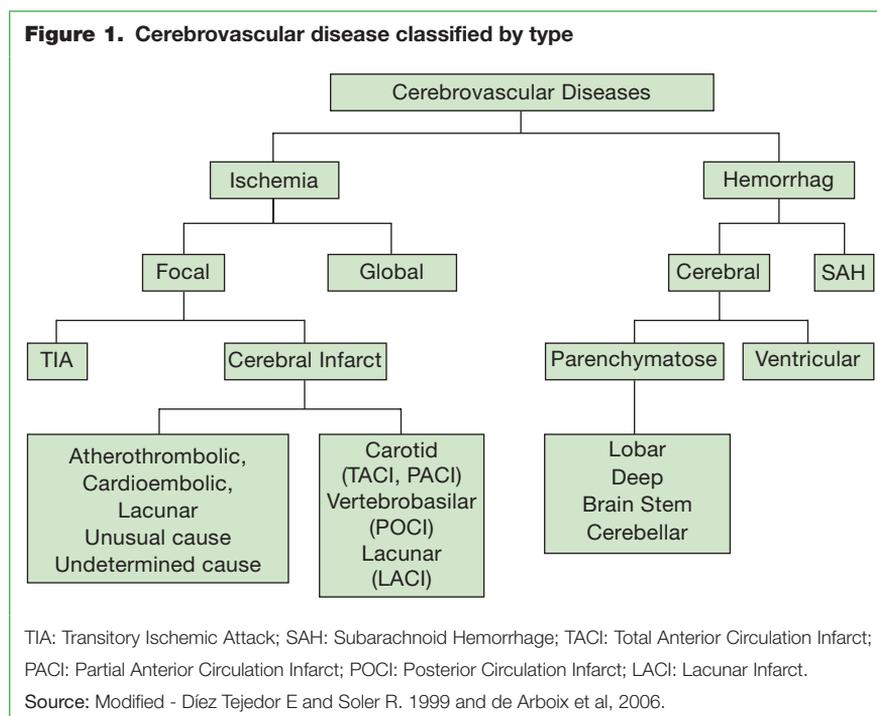
According to the duration of the ischemic process, two types of ischemia are conventionally considered: **Focal cerebral ischemia**: Transitory ischemic attack (TIA) and cerebral infarction. TIA is defined as an episode of focal or monocular cerebral ischemia lasting less than 24 hours, whilst cerebral infarct causes a neurological deficit lasting longer than 24 hours, indicating the presence of tissue necrosis. Several objections have been posed to defining TIA in these terms. The twenty-four hour duration is arbitrary, the majority of TIAS in fact lasting less than an hour (typically less than 10 minutes). Nowadays, the treatment measures for cerebral ischemia must be gotten under way within the first few hours, the 24-hour time frame for defining TIAs therefore perhaps being too long. Additionally, a major percentage of these transitory episodes are associated with brain damage detected in the neuroimaging studies. On the other hand, the TIA diagnosis may give a false impression of mildness, when the truth is that patients who have experience a TIA have a high risk of stroke and of other vascular events, thus making it necessary to adopt secondary prevention measures.

According to the underlying causes, a distinction is made among several clinical categories of cerebral infarction. The following etiological subtypes are usually considered: atherothrombolic, cardioembolic, lacunar, of unusual cause and of undetermined origin (Table 2)[7,8,9]. To define the etiology, a thorough anamnesis and physical examination must be conducted, in addition to neuroimaging studies (CT or MR), neurovascular studies (ultrasonography of supra-aortic and transcranial trunks, MR angiography, CT angiography or cerebral angiography, if necessary), cardiology studies and hemostasis studies.

Cerebral infarcts can also be classified by their topography. Depending on the vessel affected, the site of the infarct may be differ, the signs and symptoms likewise being different. One simply, widespread topographic classification is the Oxfordshire Community Stroke Project proposed in 1991 (Table 3)[10].

Global cerebral ischemia has its origins in a reduced blood flow throughout the entire brain, as occurs in cardiac arrest. Global cerebral ischemia affects the brain hemispheres diffusely, whether or not involving any associated lesion of the brain stem and/or cerebellum. Clinically, it may cause focal cerebral syndromes of the frontier territories, cognitive deficits (i.e. memory), a persisting vegetative state or brain death.

Cerebral hematomas or **hemorrhages** are extravasations of blood toward the cerebral parenchyma. The most frequent etiology is high blood pressure. Other causes include amyloid angiopathy (typical of the elderly), vascular malformations, drugs (i.e. anticoagulants), toxins (i.e. alcohol, cocaine), hemorrhagic diatheses and tumors. According to the topography, parenchymatose hemorrhage can be classified into: lobar, deep (basal ganglia,

I) Atherothrombotic infarct. Large-vein arteriosclerosis.

Evidence by way of ultrasonographic or occlusion angiography or stenosis studies ≥50% in a large-diameter extracranial or intracranial artery or rather of stenosis ≥50% when there are two or more vascular risk factors (age > 50 years of age, high blood pressure, diabetes mellitus, smoking habit or hypercholesterolemia) in absence of any other etiology.

II) Cardioembolic infarct.

Identification, in absence of another etiology, of any of the following emboligenic cardiopathies: presence of an intracardiac tumor or thrombus, rheumatic mitral stenosis, aortic or mitral prosthesis, endocarditis, atrial fibrillation, sinus node disease, left ventricular aneurysm or akinesia following acute myocardial infarction, acute myocardial infarction (less than 3 months) or presence of global cardiac hyperkinesia or dyskinesia.

III) Small artery occlusive disease. Lacunar infarct.

Small artery infarct (less than 1.5 cm diameter) in the territory of a perforating cerebral artery which normally causes a lacunar syndrome (pure hemiparesis, pure sensory stroke, mixed sensorimotor stroke, ataxic-hemiparesis or clumsy-hand dysarthria) in a patient with a personal history of high blood pressure or other vascular risk factors, in the absence of any other etiology.

IV) Unusual cerebral infarction.

Infarct in which the atherothrombolic, cardioembolic and lacunar origins have been ruled out and a less frequent cause has been identified. This infarction is usually caused by systemic diseases (connective tissue disease, infection, neoplasia, myeloproliferative syndrome, metabolic disorders, coagulation disorders…) or by other diseases, such as: arterial dissection, fibromuscular dysplasia, secular aneurysm, arteriovenous malformation, cerebral vein thrombosis, angeitis, migraine, etc.

V) Cerebral infarction of undetermined origin.

Infarction in which, following a thorough diagnostic study, the atherothrombotic, cardioembolic lacunar and unusual sub-types have been rules out or rather in which several possible etiologies have been identified.

Source: Adapted from the Laussane Stroke Registry (Bogousslavsky, 1988) and the ad hoc Committee of the Cardiovascular Disease Study Group of the Spanish Neurology Society- SEN (Arboix et al, 1998, 2002)

capsular or subthalamic), brain stem and cerebellar. The clinical presentation depends on the location and the volume of bleeding. The signs and symptoms of a cerebral hemorrhage can be impossible to distinguish from those of the ischemic strokes, although in cerebral hemorrhage, a lesser degree of consciousness and intense headache are more frequent. The diagno-

sis requires performing a cranial CT. Primary **subarachnoid hemorrhage** (SAH) is the extravasation of primary blood directly into the subarachnoid space. The most frequent cause is the rupture of an aneurysm and it typically causes sudden, intense headache meningeal signs and altered level of consciousness. SHA is normally detected in the cranial CT, it being necessary in very few cases to take recourse to lumbar puncture.

Table 3. Topographical classification of cerebral infarcts (Oxfordshire Community Stroke Project, 1991)

I) Total anterior circulation infarct (TACI).
   Clinical characteristics:
   — Altered cortical functions (aphasia, dyscalculia, visuospatial disturbances) +
   — Homonymous hemianopsia +
   — Motor and/or sensory deficit, in at least two of the following regions: face, upper limb or lower limb.

II) Partial anterior circulation infarct (PACI)
   Clinical characteristics:
   — Two of the three TACI characteristics, or
   — Isolated cortical function deficit, or
   — More restricted motor and/or sensory deficit (i.e. confined to one limb)

III) Lacunar infarct (LACI).
   Clinical characteristics:
   — Pure motor stroke/hemiparesis, or
   — Sensory stroke/hemiparesis, or
   — Mixed sensorimotor stroke, or
   — Ataxic hemiparesis (or clumsy-hand dysarthria)
   — Acute abnormal focusing movements

IV) Posterior circulation infarct (POCI).
   Clinical characteristics
   — Ipsilateral cranial pairs affected with contralateral motor and/or sensory deficit, or
   — Bilateral motor and/or sensory deficit, or
   — Oculomotor disturbances, or
   — Cerebellar dysfunction, or
   — Isolated visual field disturbance

Source: Adapted from: Bamford et al. Classification and natural history of clinically identifiable subtypes of cerebral infarction. Lancet 1991; 337:1521-6.

1.3. Risk factors

Epidemiological connections have been found to exist between strokes and many different risk factors. Some of these risk factors are well-documented, whilst others have as yet to be confirmed. The risk factors can be classified into modifiable, potentially modifiable and non-modifiable. In any case, the association of risk factors increases the risk of stroke. It is important to detect patients who has non-modifiable risk factors, given that although they can be treated, they identify high-risk subjects in which the coexistence of modifiable risk factors requires a stricter preventive control.

Table 4 provides a classification of ischemic stroke risk factors. The risk factors for hemorrhagic stroke are provided in Table 5.

Table 4. Ischemic stroke risk factors

I) Well-documented risk factors
    a) Modifiable
    High blood pressure
    Cardiopathy:
        Atrial fibrillation
        Infectious Endocarditis
        Mitral stenosis
        Recent myocardial infarction
    Smoking habit
    Sickle-cell anemia
    Prior TIA
    Asymptomatic carotid stenosis
    b) Potentially modifiable
    Diabetes mellitus
    Homocysteinemia
    Ventricular hypertrophy
    c) Non-modifiable
    Age
    Gender
    Hereditary factors
    Race/ethnic background
    Geographical location

II) Less-documented risk factors
    a) Potentially modifiable
    Dyslipidemias
    Other cardipathies
        Mycardiopathy
        Dyskinesia of ventricular wall
        Non-bacterial endocarditis

Table 4. Ischemic stroke risk factors *(continuation)*

           Mitral ring calcification
           Mitral prolapse
           Spontaneous echocardiographic contrast
           Aortic stenosis
           Permanent formamen ovale
           Atrial septum aneurysm
  Use of oral contraceptives
  Excessive alcohol intake
  Drug use
  Sedentary lifestyle
  Obesity
  Diet-related factors
  High Hematocrit
  Hyperinsullnemia/insulin resistance
  Acute unleashing factors: stress
  Migraine
  Conditions of hypercoagulability and inflammation
  Sub-clinical illness
  Medial intima thickening
  Aortic atheromatosis
  Socioeconomic factors
b) Non-modifiable
  Season of the year
  Climate

Source: Sacco RL et al. Risk factors. Stroke 1997; 28:1507-17.

Table 5. Hemorrhagic stroke risk factors

	Cerebral hematoma	Subarachnoid hemorrhage
Age	++	+
Female	−	+
Race/ethnic background	+	+
High blood pressure	++	+
Smoking	?	++
Excessive alcohol intake	++	?
Anticoagulation	++	?
Amyloid angiopathy	++	0
Hypocholesterolemia	?	0
Use of oral contraceptives	0	?

++, strong evidence; +, moderate positive evidence;?, doubtful evidence; −, moderate reverse evidence; 0, no relationship.

Source: Sacco RL et al. Risk factors. Stroke 1997; 28:1507-17.

High blood pressure is the most important risk factor. Given its high prevalence and major potential risk for both ischemic as well as hemorrhagic stroke, high blood pressure entails a high attributable risk in the population[11].

1.4. Current Stroke-Related Situation in Spain

1.4.1. Stroke Epidemiology

Very few stroke-related epidemiological studies exist in Spain. Stroke is a heterogeneous entity both in its forms of clinical presentation as well as its etiopathogenesis, thus making it difficult to obtain epidemiologically-reliable data. In the analysis of the World Health Organization (WHO) data, cerebrovascular diseases are ranked as the third leading cause of death in the Western world, the first-ranked cause of physical disability among adults and the second-ranked cause of dementia[12].

According to the data published by the WHO on the global mortality caused by cardiovascular diseases in 2002, a total of 32% (5.5 million deaths) were due to stroke.

The epidemiology of stroke has been marked by the methodological discrepancies involved. The question as to whether there are geographical or racial differences in different populations and the repercussion of population-based interventions on the risk factors in the incidence made it necessary to avail of comparable epidemiological data. In 1987, Malmgrem *et al*,[13] who were taking part in the Oxford Study, established what they referred to as ideal criteria for the analysis of stroke epidemiology, which made interventionist population-based studies necessary so as to guarantee a complete selection, given that they considered the information from the hospital records and the death registry to be insufficient and a hindrance to drawing comparisons among the studies. In Spain, we do not avail of any ideal stroke-related epidemiological studies. Most of the information available is based on hospital records, on door-to-door surveys conducted on the full population by sampling or by way of the death registry.[14]

There are several studies on stroke **incidence**. When a comparison is made of population groups, the incidence is found to rise progressively with age, being somewhat higher among males than among females. In Spain, four incidence studies have been published on different populations and different age groups. The first of these studies, which was published in 1993,

analyzed the incidence of stroke in young adults in the Autonomous Community of Cantabria, having found a raw annual incidence rate of 13.9 per 100,000 in the 11-50 age group and of 12 per 100,000 in the 16-45 age group (Table 6). In two later studies conducted on populations in Girona and Asturias, raw annual incidence rates of 174 per 100,000 and 132 per 100,000 were found respectively for all ages (Table 6). The last study published makes an estimate of the incidence of cardiovascular diseases on the population in 2002 in Catalonia by combining the Death Registry data and the Minimum Basic Data Set (MBDS) data of 65 of the 84 general hospitals in Catalonia in 2002 (90.7% of the acute hospital beds), of the patients over 24 years of age (Table 7). The cumulative cardiovascular disease incidence rates were 218 (95% CI, 214-221) in males and 127 (95% CI, 125-128) in females (Table 7)[15,16,17,18].

Table 6. **Estimated stroke incidence rate, by age groups**

Author	Year	Location	Reference population	Total %$_{ooo}$
Leno	1993	Cantabria	Ages 11- 50	13.9
Leno	1993	Cantabria	Ages 16 -45	12.0
Lopez-Pousa	1995	Girona	Entire population	174.0
Caicoya	1996	Asturias	Entire population	132.0

Source: Compiled by Pérez Sempere Morbidity Due to Cardiovascular Disease in Spain. Incidence and Prevalence (Hospital Vega Baja, Orihuela, Alicante). Duran et al. INFORME ISEDIC,2004 (2nd Edition)

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Table 7. Spread of patients over 24 years of age admitted to hospital with diagnosis of stroke, by age groups, gender and entities diagnosed in Catalonia in 2002

	25-34	35-44	45-54	55-64	65-74	75-84	>84	All
Hemorrhagic 430,431,432								
Males	30	80	127	237	366	389	106	1,335
Females	39	39	84	83	230	340	162	977
Males + Females	69	119	211	320	596	729	268	2,312
Ischemic 433#, 434#								
Males	20	65	281	594	1,171	1,209	368	3,708
Females	14	42	101	206	672	1,419	846	3,300
Males + Females	34	107	382	800	1,843	2,628	1,214	7,008
Poorly defined 436, 437, 437,1, 437,2, 437,4, 437,5, 437,6, 437,8, 437,9								
Males	5	13	28	81	187	262	118	694
Females	1	5	16	31	123	319	237	732
Males + Females	6	18	44	112	310	581	355	1,426
Total								
Males	55	158	436	912	1,724	1,860	592	5,737
Females	54	86	201	320	1,025	2,078	1,245	5,009
Males + Females	109	244	637	1,232	2,749	3,938	1,837	10,746

The pound symbol (#) following a three-digit code indicates that any fourth or fifth digit thereof was included.

Source: Marrugat.J, Arboix.A, García-Eroles.L, Salas.T, Vila.J, Castell.C, Tresserras.R, Elosua.R. Estimación de la incidencia poblacional y la mortalidad de la enfermedad cerebrovascular establecida isquémica y hemorrágica en 2002. [Estimate of populational incidence and the mortality of established ischemic and hemorrhagic cerebrovascular disease in 2002] Rev. Esp. Cardiol. 2007;60(6):573-80.

TIA incidence is more difficult to ascertain because a major percentage of patients who experience TIAs do not consult their physician. In Alcoi (Alicante), by means of a door-to-door study[19], an annual incidence of 280 per 100,000 was calculated in the population over 20 years of age. In the Girona study[20], a TIA incidence of 64 per 100,000 was found. Lastly, in the study conducted in Segovia[21], an annual incidence rate of 35 per 100,000 was found (Table 8).

Table 8. TIA Incidence (Transitory or ischemic accident) and minor stroke

Author	Year	Location	Reference Population	Method	No. Cases	Incidence Rate %$_{ooo}$
A. TIA						
Matías Guiu	1994	Alcoi	Over age 20	Door to door	7	280
Lopez-Pousa	1995	Girona	Entire pop.	Door to door	39	64
Sempere	1996	Segovia	Entire pop.	Community	103	35
B. Stroke (minor ischemic)						
Sempere	1996	Segovia	Entire pop.	Community	132	45
C. Global TIA plus minor ischemic stroke						
Sempere	1996	Segovia	Entire pop.	Community	235	80

Source: Compiled by Pérez Sempere Morbidity Due to Cardiovascular Disease in Spain. Incidence and Prevalence (Hospital Vega Baja, Orihuela, Alicante). Duran et al. INFORME ISEDIC,2004 (2nd Edition)

Regarding **prevalence**, the data in our country show the prevalence to be around 2% in those individuals over 20 years of ago in Alcoi[19] to show higher figures which the population studied is confined to the older-aged subgroups: 4% in Girona[16], 8% in Madrid[21,22] and 7% in Ávila[21,22] for individuals over 65 years of age (Table 9). The prevalence of TIA among those individuals over 65 years of age totals around 2% (Table 10).

Table 9. Stroke Prevalence

Author	Year	Location	Reference Population	%
Matías-Guiu	1994	Alcoi	Over 20 years of age	2.1
López Pousa	1995	Girona	Over 65 years of age	4.0
Bermejo	1997	Madrid	Over 65 years of age	8.5
Bermejo	1997	Ávila	Over 65 years of age	7.0

Source: Compiled by Pérez Sempere Morbidity Due to Cardiovascular Disease in Spain. Incidence and Prevalence (Hospital Vega Baja, Orihuela, Alicante). Duran et al. INFORME ISEDIC,2004 (2nd Edition)

Table 10. TIA Prevalence

Author	Year	Location	Reference Population	%
López-Pousa	1995	Girona	Over 69 years of age	0.7
Bermejo	1997	Madrid	Over 65 years of age	2.1
Matías Guiu	1994	Alcoi	Over 65 years of age	3.1

Source: Compiled by Pérez Sempere Duran et al. INFORME ISEDIC,2004 (2nd Edition)

A meta-analysis was published in 2006 which included seven stroke prevalence studies in persons over 70 years of age which had been conducted within the 1991-2002 period in seven different populations in central and northeastern Spain[23]. In all of the aforementioned studies as a whole, a total of 10,647 persons were evaluated, a total of 715 cases having been detected (Table 11). The prevalence rates adjusted by age were 7.3% for the males, 5.6% for the females and 6.4% for the males plus females. The prevalence rate was significantly lower among the females, with an Odds Ratio (OR) of 0.79 (95% CI: 0.68-0.93). Prevalence increased with age, particularly among the females. In the oldest ages, the percentage of individuals affected was higher among the females. On the other hand, there were some major geographical differences. The prevalence was greater in urban areas (8.7%) and lesser (3.8%) in the rural population. On comparing this data with that of other European studies, the prevalence rates for stroke in Spain were found to be ranked in a mid-range position and that they followed the same trends with regard to spread by gender and age.

Table 11. Stroke prevalence data adjusted by age according to the samples studied in the different studies

Examination Abbreviation (country)	Location were population studied resides	Sample type	Number of individuals studied	No. Cases	Age Years	Prevalence adjusted by age%
PRATICON (Spain) 2002	El Prat de Llobregat (Barcelona)	RMC*	1,754	208	≥ 70	11.9
ZARADEMP (Spain) 1996	Zaragoza	RMC	2,850	205	≥ 55	6.2
BIDASOA (Spain) 1996	Irún, Hondarribia (Guipúzcoa)	RMC	1,349	75	≥ 65	5.4
PAMPLONA (Spain) 1991	Pamplona (Navarre)	RMC	1,127	80	≥ 70	7.1
NEDICES (Spain) 1994	Lista (Madrid) Las Margaritas (Getafe, Madrid) Arévalo (Avila)	RMC	1,010 1,164 1,393	47 47 53	≥ 65	4.5 3.9 3.8
KUNGSHOLMEN (Sweden) 1987	Kungsholmen (Stockholm)	Census	984	31	≥ 75	
ROTTERDAM (Holland) 1993	Rotterdam	General population	2,347	158	≥ 55	
ILSA (Italy) 1992	Genoa, Segrate (Milan) Selvazzo-Rubano-Padua Catania, Impruneta (Florence) Fermo (Ascoli Piceno) Naples, Casamassima (Bari)	RMC	3,343	280	≥ 65	

Table 11. Stroke prevalence data adjusted by age according to the samples studied in the different studies (*continuation*)

Examination Abbreviation (country)	Location were population studied resides	Sample type	Number of individuals studied	No. Cases	Age Years	Prevalence adjusted by age%
SNES (Italy) 1987	Riposto, Santa Teresa di Riva Terrasini (Sicily)	General population	2,094	115	≥ 65	
Vecchiano (Italy) 2001	Vecchiano, Northeast Tuscany	All inhabitants ≥ age 65	1,136	96	≥ 65	5.5

*RMC: Randomized from Municipal Census

Source: Modified from: Boix R, del Barrio JL, Saz P, Reñé R, Manubens JM, Lobo A et al. Stroke prevalence among the Spanish elderly: an analysis based on screening surveys. BMC Neurology. 2006; 6:36.

Three-fourths of all strokes affect patients over 65 years of age, and due to the population forecasts, in which Spain would be one of the oldest populations in the world by 2050, a rise in the incidence and prevalence of this type of disease is foreseen within the years to come[24]. Females experience their first stroke at an older age than males (74.6 ± 11.4 years vs. 68.8 ± 11.9)[25]. (Table 11)

According to the **Hospital Morbidity** Survey, there has been a constant rise in the number of patients admitted to hospital with a main diagnosis of cerebrovascular disease at release (Fig. 2)[26].

Figure 2. Hospital Morbidity due to cerebrovascular disease, by gender. Spain 1977-2002

Source: Carlos III Health Institute (ISCIII).
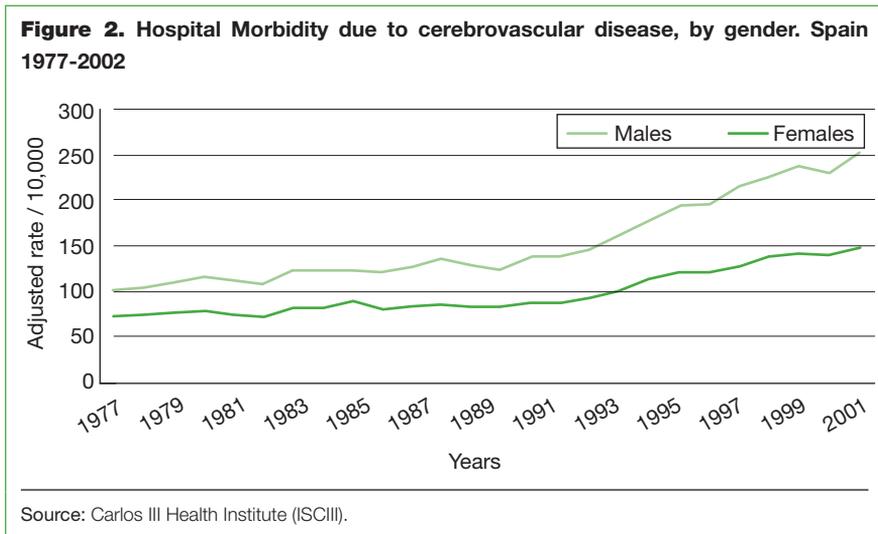
This trend continues to hold its own. Hence, in 2003, there were a total of 114,498 with a rate of 268 for every 100,000 inhabitants. In 2006, according to this same survey, stroke was the cause of 114,807 hospital releases and 1 288 010 hospital stays, this latter item of data being higher than ischemic cardiopathy[26].

Regarding **mortality,** stroke is currently the second-ranked leading cause of death in Spain after ischemic cardiopathy. According to the Spanish National Institute of Statistics (INE) data, acute cerebrovascular diseases or stroke were the second-ranked leading cause of death in Spain in 2006 (32,887 cases in the two genders) and the top-ranked leading cause of death in females (19,038 cases)[27] (Table 12).

Table 12. Number of deaths by most frequent cause of death (1) and gender. 2006.

Diseases	Males	Females	Total
Ischemic heart diseases	21,194	15,882	37,076
Cerebrovascular diseases	13,849	19,038	32,887
Bronchial and lung cancer	16,879	2,634	19,513
Heart failure	6,562	12,326	18,888
Chronic lower respiratory tract diseases	10,770	3,563	14,333
Dementia	3,639	7,576	11,215
Colon cancer	5,642	4,284	9,926
Diabetes mellitus	3,818	5,854	9,672
Alzheimer's disease	2,806	6,368	9,174
Pneumonia	4,083	3,729	7,812
Hypertensive disease	2,120	4,555	6,675
Kidney failure	3,003	3,032	6,035
Breast cancer	65	5,956	6,021
Stomach cancer	3,542	2,174	5,716
Prostate cancer	5,413	—	5,413
Total diseases	194,154	177,324	371,478

(1) Causes of over 1.4% relative importance.

Source: Spanish Institute of Statistics (INE) 2006.

In parallel to the rise in the morbidity of cerebrovascular diseases, there is a downward trend in the mortality figures for the last 20 years, this decline being related to the detection and control of the major risk factors, particularly high blood pressure, with the presentation of very slight clinical forms and the improvement in the care provided (i.e. prevention, diagnosis, treatment and rehabilitation) for these patients (Fig. 3).

The spread of stroke as a cause of death varies among the different Autonomous Communities (Table 13)[28].

Figure 3. Mortality due to cerebrovascular disease, by gender. Spain 1951-2002
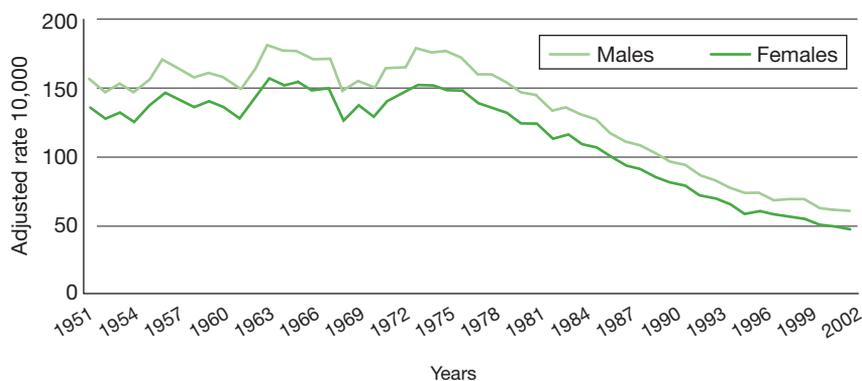
Source: Carlos III Health Institute (ISCIII)

Table 13. Spread of mortality due to cerebrovascular disease by Autonomous Communities. 2003

Autonomous Community	Rate / 100,000 inhab.	% related to nationwide average
Andalusia	104.36	117.76
Aragon	112.47	126.91
Asturias (Principality)	107.44	121.24
Balearic Islands	74.53	84.10
Canary Islands	47.67	53.79
Cantabria	96.80	109.23
Castile and Leon	102.18	115.30
Castile-La Mancha	108.15	122.04
Catalonia	78.58	88.67
Community of Valencia	94.50	106.64
Extremadura	112.90	127.40
Galicia	118.02	133.17
Madrid (Community)	52.59	59.34
Murcia (Region)	86.12	97.18
Navarre (Community)	82.45	93.04
Basque Country	78.99	89.13
Rioja	90.45	102.06
Ceuta and Melilla	62.22	74.72
Nationwide total	88.62	100

Source: Spanish National Institute of Statistics 2003.

1.4.2. Evolution following stroke: deficit and disability

Stroke is the major cause of long-term disability in adults and is the second-ranked leading cause of dementia.[29]

At 6 months immediately following the stroke, 26.1% of the patients have died, 41.5% are independent and 32.4% are dependent, it being estimated over all that a total of 44% of all stroke survivors are left functionally dependent[29].

Table 14. Spread by age groups and gender of the number of disabilities due to cerebrovascular disease in Spain 1999						
Age groups (years)	6-24	25-44	45-64	65-79	+ 79	Total
Males	1,840	4,381	17,915	42,030	16,090	82,256
Females	988	1,745	14,515	38,437	37,342	93,027
TOTAL	2,828	6,126	32,429	80,467	53,432	175,282

Source: Spanish National Institute of Statistics (INE) 2007

According to the data from the Survey on Disabilities, Deficiencies and Health Condition (Spanish National Institute of Statistics 1999, Table 14)[30], 811,746 persons over age 65 are dependent due to cerebrovascular disease de out of a total of 1 113 626 dependent individuals, meaning 73%. A third thereof have a moderate degree of dependence, 50% severe dependence and 16% highly severe dependence. Dependent elderly persons total 17% of all individuals of all older people.

The main deficits, disability and complications noticeable following a stroke are: paralysis, lack of balance, speech/language disorder, visual disorders, cognitive deficits, emotional disturbances, physical and psychological fatigue, epileptic crises and pain[29].

Recurrent stroke is the main type of stroke responsible for disability and death after a stroke. Hence, the mortality rises from 20.1% to 34.7% (73% increase) and functional dependence from 36.7% to 51% (39% increase), depending upon whether a matter of a first stroke or a recurrent stroke. Therefore, the prevention of recurring stroke is fundamental for preventing disability[29].

Thirty-seven percent (37%) of disabled females are cared for by their daughters, a total of 19.7% being cared for by other relatives, 15% by their

husbands and 6.3% by their son. According to the same report, 44.6% of disabled males are cared for by their wives, 21.3% by their daughter and 12% by other family members[29].

1.4.3.   Costs and global burden of disease

The global burden of disease takes into consideration the fatal and non-fatal (disability) consequences caused by diseases or injuries. In this regard, stroke is ranked second with regard to the burden of disease in Europe (responsible for 6.8% of the Disability-Adjusted Life Years – DALYs), whilst Alzheimer's disease and other dementias are ranked fifth (3.0%) and traffic accidents seventh (2.5%)[31]. The results of the World Health Organization study "Global Burden of Disease 2002" indicate that in the European region of very low mortality (Euro-A), to which Spain pertains, of every 100 DALYs lost due to stroke, a total of 62.1% are lost due to mortality (Years of Life Lost-YLL) and 37.9% due to poor health (Disability-Adjusted Life Years - DALYs). Similarly, for all causes of death or injury, stroke totals 6.9% of YYL (of the total) and 2.4% of the years lived with disability[32].

Apart from the above, in Spain for 2000, cardiovascular diseases entailed a major burden of disease, for a total loss of 211,803 DALYS. By disease sub-categories, the relative importance of the YYL lost due to stroke (4.4% of total) are outstanding, ranked fourth right below unipolar depression (8.5% DALYS), dementias (6.5% DALYS) and ischemic cardiopathy (4.9% DALYS). Of every 100 DALYS lost due to stroke, 69.7% were due to mortality (YLL) and 30.3% due to poor health (years lived with a disability). In the females, the relative importance of stoke as the cause of loss of DALYS is greater (4.8% of total), being ranked third after unipolar depression (12.1%) and dementias (9.4%). In males, the relative importance of DALYS is somewhat less (4.0%), ranked lower than diseases such as ischemic cardiopathy (6.1), alcohol abuse (6.1%), unipolar depression (5.5%), malignant tracheal, bronchial and lung tumors (5.2) and others[33].

In terms of burden from a socioeconomic standpoint, the term "burden" being understood as the cost of the disease, it is estimated that stroke uses up 3%-4% of the health care spending in the high-income countries, 76% of the direct health care costs being spread throughout the first year following the event, concentrated mostly in hospital costs[34,35]. In the review by Ekman et al[36], which analyzes the European studies published within the 1994-2003 time frame, the cost of stroke for the first year following the event is estimated at 20,000-30,000 euros, with the exception of the Spanish study conducted by Carod-Artal et al[37] with an estimate of 5,338 euros.

In studies of stroke costs, the inclusion of the direct costs, the term "direct costs" being understood as those associated with the loss of production of goods and services caused by a disease, this is a relatively recent phenomenon, in comparison with other neurodegenerative diseases, such as, for example, Alzheimer's disease. The importance of the direct non-health care costa (social and/or family assistance) and of the indirect costs (i.e. due to the disability or loss of work) leads to the number of studies conducted from the corporate standpoint having increased, especially over the past few years. Several studies have been made estimating the cost of stroke in Spain (Table 15)[38, 39, 40, 41]. This Table shows how, within a range, the data tally with the costs of stroke within the first year. Likewise, the item related to the hospital costs is that of greatest importance in relation to the direct health care costs. In the years following the event, the direct health care costs are less, due to the fewer hospital costs, all other items taking on greater importance, especially those having to do with rehabilitation, medication and outpatient consultations.

The study conducted by Oliva et al[42] on the unofficial care given to persons who are dependent based on the information included on the Survey on Disabilities, Deficiencies and Health Condition (EDDES) conducted by the Spanish National Institute of Statistics identifies that nearly 130,000 who have experienced a stroke have someone caring for them. Focusing exclusively on those persons for whom care is being provided by another individual who does not receive any monetary benefit whatsoever for their services, nearly 115,000 main "unofficial" caregivers are identified.

As far as how the hours of care provided are spread out, it is interesting to find the major care-providing load withstood by the caregivers. In the case of stroke, 46% of the caregivers provide more than 60 hours a week of care, to which another 10% can be added who provide 41-60 hours of care per week (Fig. 4).

Despite employing conservative estimates regarding the monetary value of the caregivers' time, the transformation of the time spent in providing care into monetary figures leads to the estimated cost of unofficial caregiving total 801.7 million to 1,243.9 billion euros (basic case). By modifying the basic scenario, in terms of the number of hours which can be charged to comorbidities, the authors estimate a higher level, ranging from 1 125,300,000 to 1 746,000,000 euros[42].

The burden caused by cerebrovascular diseases is growing rapidly due to the ageing of Europe's population.[43]

Table 15. Cost of stroke in Spain[42]

Study	Perspective and type of cost	Approach and simple size	Average cost per patient (euros)	Health care costs (% of total cost)	Indirect costs (% of total cost)	Unofficial caregivers (% of total cost)	Year estimated
Carod-Artal et al (1999)	National Health System Direct health care costs	Bottom up 90	5,338	Hospital admission: 47.1% Transportation: 12.2% Medications after release: 7.3% rehabilitation/speech therapy: 7.5% 2nd admission: 7.3% Others: 18.6%	n.d	n.d	1996
Beguiristain et al. (2005)	Society	Bottom up 535	4,762 (96.5%) for social costs	Transition stage: the health care costs add up to 96% of the total 66% of the health care costs were for the initial hospitalization and 18% for rehabilitation	n.d	n.d	2000
Leal et al. (2006)	Society Direct costs+ Indirect costs	Top Down	1.238 billion (total cost)	Health care cost: 622 million (50.2% of total). Cost breakdown: Primary Care: 4.8% Specialized Care: 14.1% Emergencies: 5.8% Hospitalizations: 66.1% Drugs: 9.0%	Indirect costs: 320 million (25.8% of total)	297 million (24% of total cost)	2003
Hervás-Angulo et al (2006)	Society	Bottom up 91	Direct cost + Indirect cost: Year 1: 5,759.5 + 571.9 Year 2: 3,596.6 + 631.8 Year 3: 4.671,3 + 221	Year 1: 84.5% Year 2: 71.3% Year 3: 91.1% Hospital care cost as a percentage of health care cost Year 1: 55.9% Year 2 6.9% Year 3: 25.0%	Year 1: 9.0% Year 2: 14.9% Year 3: 4.5%	n.d	2004

Table 15. Cost of stroke in Spain[42] *(continuation)*

Study	Perspective and type of cost	Approach and simple size	Average cost per patient (euros)	Health care costs (% of total cost)	Indirect costs (% of total cost)	Unofficial caregivers (% of total cost)	Year estimated
Hervás et al. (2007)	Costs of unofficial caregiving	Bottom up 95	Average cost of unofficial caregiving c21,551	n.d	n.d	Statistically significant differences in the cost estimated depending on the degree of dependence	2004
Navarrete-Navarro et al. (2007) [a]	Society	Bottom up 425	Including direct health care costs,, costs of unofficial caregiving and indirect costs	Year 1: 6,722 (36.5% of the total cost) Year 2: 2,890 (22.5%) Year 3: 2,707 (24.4%) Total: 12,319 (29.1%)	Year 1: 288 (15.6% of the total cost) Year 2: 972 (7.6%) Year 3: 624 (5.6%) Total: 4,476 (10.6%)	Year 1: 8,839 (47.9% of the total cost) Year 2: 8,979 (69.9%) Year 3: 7,768 (70.0%) Total: 25,586 (60.4%)	2004
Oliva et al (2008)	Caregiving costs	Top-down (EDDES)	Basic case: 801.7- 1,243.9 million. Higher range: 1,125.3- 1,746.0 million.	n.d	n.d		2002

Bottom up: Based on surveys and clinical record data on a groups of patients recruited for each study.

Top-down: An estimate is made of the global cost of a disease on a population or country

EDDES: Encuesta de Deficiencias, Discapacidades y Estado de Salud [Survey of Deficiencies, Disabilities and Health Condition]

[a] Major relative importance of the hospitalization as related to the health care cost for Year 1 (3,406 euros). In years 2 and 3, the main items are the medicines, rehabilitation and the diagnostic testing.

Figure 4. Spread of the hours of care per week provided to persons diagnosed with stroke who have one or more types of disabilities
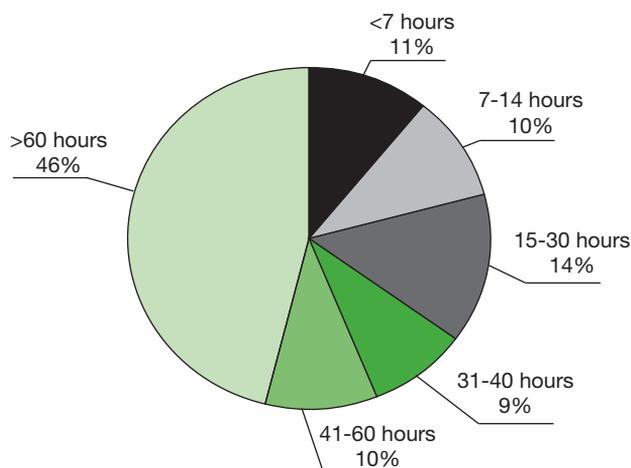
Reducing the burden stroke means for the individual, the family and society is a challenge for health care professionals, the health systems and the scientific community in general. Although primary prevention be crucial and will continue to be the cornerstone of the efforts for reducing global disability caused by stroke, cumulative proof exists as to the systematic improvement of the way in which stroke is being managed, including rehabilitation, which can also lower the mortality and disability due to this cause.

1.4.4. Regulatory framework

The General Health Law (Law 14/1986) which afford the possibility of changing over from the former Social Security health care model to the current National Health System model stipulates that the right to health protection set forth under Article 43 of Spain's Constitution must be further organized in finer detail by setting out the fundamental principles such as the universality, public funding, equity, integrality and continuity of the services. The axis of the model adopted under this law are the Autonomous Communities, toward which health care policy has progressively been decentralized, the National Health System therefore being the overall coordinator of the Central Government Health Services and the Autonomous Community Health Services integrating all of the health care functions and benefits.

Royal Decree 63/1995, previously revoked ya derogado, generally set forth the contents of the National Health System health benefits. This general definition, as well as the time having elapsed, with the resulting scientific-technical changes which have taken place, then made it necessary to redefine the National Health System benefits and services for the purpose of better guaranteeing the equity in accessing the same.

National Health System Cohesion and Quality Law 16/2003 of May 28th sets forth under Article 7.1 thereof that the catalogue of National Health System benefits is for the purpose of guaranteeing the basic common conditions providing integral, continuing care at the appropriate level. This law considers the National Health System health care benefits to be the preventive, diagnostic, therapeutic, rehabilitation health promotion and maintenance services or set of services as a hole which are provided for citizens, specifically setting forth, lastly, the benefits which are to comprise the catalogue.

Article 8 of the aforesaid Law stipulates that the health care benefits of the catalogue are to be provided in fact by means of the portfolio of common services which, as provided under Article 20, is to be agreed upon within the National Health System Interterritorial Council and is to be approved by means of Royal Decree.

Similarly, Article 4.c) stipulates that the citizens shall be entitled to receive, on the part of the health service of the Autonomous Community to which they have temporarily traveled, whatever care stated in the National Health System benefits catalogue that they might require, under the same conditions and identical guarantees as the citizens who reside in that same Autonomous Community.

Royal Decree 1030/2006 of September 15th sets forth the portfolio of common services of the National Health System and the procedure for the updating thereof. This Royal Decree takes charge of updating the benefits set out under the prior Decree of 1995 and details the same, including both in the portfolio of Primary Care (PC) services as well as in that of Specialized Care (SC) a specific section describing the benefits to be offered to the population.

The aforesaid Royal Decree defines the characteristics of the service portfolio:

The services included in this portfolio are considered as being basic and common, being understood as such those necessary for carrying out an appropriate, integral and continuing provision of health care for all those using the National Health System.
The National Health System portfolio of common services must guarantee integral care and the continuing of the care provided to

*those using this system, independently of the level of care at which
care is provided for them at each given point in time.
It also sets out that The Autonomous Communities, may approve,
within their authorities, their respective portfolios of services,
which shall include at least the National Health System common
services portfolio, which must be guaranteed for all users thereof.*

A description is provided in following of the services offered for stroke in the Portfolio of Services:

Annex II defines the common services portfolio for Primary Care.

- Section 5 has to do with basic rehabilitation, including aspects such as physical therapy treatment in neurological disorders.
- Section 6.4.1 includes *the providing of protocolized care in patients who have prevalent, chronic health problems* in the Primary Care services portfolio, where hypertension, hypercholesterolemia and other stroke risk factors are included.

The Specialized Care portfolio of services is also defined in Annex III:

- In Section 5, *Indication or prescription and provision, wherever applicable, of diagnostic and therapeutic procedures* includes the circulatory system diseases which take in cerebrovascular disease.
- Section 8, which deals with *rehabilitation in patients with recoverable functional deficits* includes *the rehabilitation of the disorders of the muscular-skeletal system, the nervous system, the cardiovascular system and the respiratory system by means of physical therapy, occupational therapy, speech therapy which is directly related to a disease process which is being treated in the National Health System and technical methods (orthoprostheses).*

The common portfolio of services for providing emergency care is also included, in which it is stated that *emergency care is to be dispensed both at health care centers as well as outside thereof, including in the patient's home and in situ care on a round the clock basis… The organizational model and procedure for providing emergency care shall be established by the competent health care administrations such that access to the provision thereof will be is due time and place for facilitating care adapted to the needs of each patient.*

Regarding the portfolio of common drug benefit services, it is specifically stated as *including the medicines and medical products and all of the measures aimed at the patients being provided with the same in keeping with their clinical needs and in the proper doses according to their individual re-*

quirements, for the appropriate length of time and at the lowest possible cost to them and to the community.

Annex VI deal with the portfolio of common ortho-prosthetic services defining the ortho-prosthetic benefit as *the use of medical products, be they implantable or otherwise, the end purpose of which is to fully or partially replace a body structure or rather to modify, correct or facilitate the function thereof. This shall include all of the elements necessary for improving the quality of life and autonomy of the patient in question.*

This benefit shall be provided by the health services and shall give rise to economic aid in those cases in which, according to the rules which are set forth under regulations on the part of the competent health administrations.

On the other hand, with regard to the preparation of this strategy and the others already approved, it must be said that General Health Law 14/1986 of April 25th sets forth under Article 70 thereof that *The State and the Autonomous Communities shall approve health plans within the scope of their respective authorities and that the General Health Care Coordination shall include:*

- *Setting out, on a general basis, minimum common basic criteria for evaluating the effectiveness and performance of the health programs, centers or services.*
- *Determining minimum common purposes or objectives regarding health promotion, prevention, protection and provision of health care.*
- *The framework of measures and priorities for achieving a coherent, harmonious and solidary health system.*

National Health Care Cohesion and Quality Law 16/2003 adds, under Article 64 thereof:

> *Without detriment to the Autonomous Community authorities of health planning and organization of the services, the Ministry of Health and Consumer Affairs (Ministry of Health and Consumer Affairs) and the competent bodies of the Autonomous Communities, through the National Health System Interterritorial Council, in collaboration with the scientific societies, **shall prepare integral health plans on the disorders which are most prevalent, relevant or which entail a special burden for society and families**, guaranteeing integral health care which includes the prevention, diagnosis, treatment and rehabilitation thereof.*

At the II Conference of Presidents held in September 2005, the Spanish Ministry of Health and Consumer Affairs was placed in charge of preparing

a Quality Plan for the Spanish National Health System, the main end purpose of which is the improvement of the quality thereof, assuring access to the services provided thereby under conditions of equality throughout the entire country.

Thus, within this entire context, the Spanish Ministry of Health and Consumer Affairs presented the National Health System Quality Plan in March 2006, encompassing 12 strategies, 41 objectives and 189 projects for taking action. In Strategy 9, *Improving the care provided for patients who have certain disorders, Objective 9.1 states: Improve the care provided to patients who have prevalent disorders entailing a major social and economic burden.*

Hence, in 2006 and 2007, a total of five (5) strategies (Cancer, Ischemic Heart Disease, Diabetes, Mental Health and Palliative Care) were written and approved, the strategy presented herein will be carried out in conjunction with the Chronic Obstructive Pulmonary Disease Strategy in the course of 2008.

1.5. Methodology

As the strategies previously approved in 2006 and 2007 by the National Health System Interterritorial Council (Cancer, Ischemic Heart Disease, Diabetes, Mental Health and Palliative Care) two aspects have served as a basis for the preparation of this Strategy:

1. A **thorough analysis** of the current situation of stroke in Spain and in the international realm for the purpose of identifying the background, the current status of the care-providing organization, the critical points and the evidence available concerning best practices. For this purpose, the stroke plans currently in force in the Autonomous Communities have been taken into account.

2. The election of the **scientific coordinator** and the setting up of the **Strategy Drafting Committees**:

Two committees were formed:

a) A **Technical Committee** comprised y the neurology, neurosurgery, neurological disease and neuroradiology societies and by geriatrics societies from Primary Care, including both physicians and nurses, pediatrics, emergency care, rehabilitation, as well as social workers, physical therapists, occupational therapists, speech therapists and other societies related to the Spanish Public Health Society and Health Administration, the Spanish

League for Combating Hypertension of the Spanish Hypertension Society, the Spanish Arteriosclerosis Society, the Spanish Internal Medicine Society, the Spanish Intensive, Critical and Coronary Unit Society, in addition to the Spanish Patients' Forum.

b) An **Institutional Committee** which brings together the representatives appointed by the Autonomous Community Health Departments, one of the main functions of which has been to evaluated the fittingness and feasibility of the objectives proposed, given that those responsible for organizing and carrying out the objectives in question are the Autonomous Communities and their health services proper.

On the part of the Ministry of Health and Consumer Affairs, the Directorate General of the Quality Agency has been in charge, through the Health Planning and Quality Office, in conjunction with the Technical Coordinator, for supervising the work with the support of the Health Information Institute.

These two Committees have worked together interactively by way of *in situ* meetings as well as via e-mail and other computer tools.

In a first stage, the critical points of the Spanish National Health System in the care provided for the persons who have experienced a stroke were identified. For this purpose, the Autonomous Communities set the priorities with which to be dealt and, based thereon and on their own experience, the technical committee pointed out the points in the care-providing process which showed greatest deficiencies or inequalities inequalities.

Based on these deficiencies, for the purpose of achieving greater quality and equity in the system, the **objectives and recommendations** which were presented to the Interterritorial Council on November 26, 2008 were prepared.

For all of the lines of strategy as a whole which had been proposed, indicators were identified with the support of the Health Information Institute which would afford the possibility of a continuing, systematic evaluation. This will make it possible to monitor and evaluate this Strategy throughout the course of its being carried out by means of an information system feasible for the entire National Health System as a whole and all of the stroke plans and programs in existence in the Autonomous Communities.

1.5.1. Document structure

This document is structured into five parts:

Part I – General aspects, including the justification, the definition of stroke, the current status of stroke in Spain and the working methodology.

Part II – Further details of the lines of strategy, detailing the objectives and the recommendations.

The following lines of strategy were defined as a result of the consensus of those taking part in this Strategy:

- Strategy Line 1: Health promotion and protections / Primary and secondary prevention
- Strategy Line 2: Acute-stage care of stroke patients
- Strategy Line 3: Rehabilitation and reinsertion
- Strategy Line 4: Training
- Strategy Line 5: Research

The lines of strategy are unrolled into general and specific objectives, with their respective technical recommendations. The order in which the lines of strategy are presented is a result of the theoretically suitability of the approach to health care planning and the internal coherence of the Strategy.

Part III – Strategy evaluation and information system, including descriptive information, indicators and a qualitative report.

Part IV – Examples of good practices carried out within the context of Spain which have proven themselves to be efficient and effective.

Part V – Annexes in which different specific aspects of the Strategy are dealt with in greater depth.

In conclusion, this document is aimed, based on the information and evidence currently available, at setting out a set of objectives and recommendations to be achieved which realistically and depending on the resources available and the scope of the authorities of the Autonomous Communities, will contribute to improving the quality of the stroke-related interventions and outcomes.

2. Strategy Line Execution

2.1. Health Promotion and Prevention: Primary and Secondary Prevention

2.1.1. Situation analysis

Justification

It is better to prevent stroke than to have to take measures to treat stroke once it has occurred. Getting effective measures of prevention under way is considered as being able to prevent more stroke deaths than all the thrombolytic, antithrombotic and neuroprotective treatments combined[44].

Many different vascular risk factors are involved in the etiology of stroke. Some are not modifiable, but others can indeed be controlled[45,46]. Detecting and modifying these risk factors is fundamental for preventing an initial stroke or TIA (primary prevention) and also for preventing recurring strokes following an initial episode (secondary prevention). These risk factors often arise in association with one another and further heighten one another.

In several systematic reviews, different treatments have been shown not only to prevent stroke but also to reduce the incidence of other vascular events, such as myocardial infarction and peripheral arterial disease. Therefore, the decision of starting a measure or preventive treatment must be guided by estimating the risk of experiencing any of these vascular episodes[47].

Although coronary disease and ictus share different risk factors, the degree of importance thereof in each one of these conditions differs. Unlike the case of ischemic cardiopathy, in stroke, the most important risk factor is arterial hypertension (relative risk or RR > 4)[48]. This factor is association both with ischemic strokes as well as with hemorrhagic strokes. All of the other risk factors are associated to more moderate degrees.

The most correct approach to cardiovascular prevention requires a combined evaluation of the vascular risk factors, this being a task in which primary care plays a fundamental role[49]. In each patient, the risk of stroke must be evaluated individually by means of employing risk profile scales, which establish the degree to which the risk exceeds that of the average for the population in question.

The tables for calculating vascular risk which are used on the most widespread basis in our environment are: the Framingham Table, the REGI-COR (Registre Gironí del COR) Table and the SCORE (Systematic Coronary Risk Evaluation) Table[50,51,52] which differentiate the calculation by gender and by age, as non-modifiable risk factors and additionally consider the blood pressure figures, the cholesterol figures and smoking-related status and, occasionally, the presence of diabetes. All of these tables are specifically for use in individuals who have no known vascular disease. The individuals in whom evidence exists of prior vascular disease, are at high risk, regardless of the calculation found using the table in question and must be provided with preventive strategies and more intensive treatments[47].

In conjunction with the vascular risk factors, secondary prevention also includes another type of measures, such as the antiaggregant or anticoagulant treatments and certain invasive treatments.

Over the last few years, several guides have progressively been published by international organizations entailing evidence and recommendations for the primary and secondary care of stroke[53,54,55]. In our country, the Ministry of Health and Consumer Affairs has recently published the "Practical Clinical Guide to Primary and Secondary Stroke Prevention"[56]. This guide, prepared by a multidisciplinary team comprised of professionals involved in providing care for this type of patients, sets out what the measures are that must be taken in primary and secondary stroke prevention according to the best evidence available. A summary of the main aspects thereof is provided in following:

Primary Prevention

A) Arterial hypertension

Arterial hypertension is the most important risk factor, after age, for experiencing both ischemic and hemorrhagic strokes. Modifying lifestyles can reduce the arterial pressure readings, but many patients additionally require treatment with drugs. Pharmacological treatment of arterial hypertension reduces morbimortality due to vascular causes and that of stroke in particular. The arterial pressure readings must be kept at figures below 140/90 mm Hg. In patients with diabetes, these readings must be lower, below 140/80 mm Hg. The combination of two or more antihypertensive drugs is often required.

B)   Tobacco

Smoking is associated with a higher risk of vascular disease, including stroke, and quitting smoking reduces this risk. Passive smokers are also at higher risk of vascular disease, including stroke. It must be recommended to cease drinking or smoking and to avoid exposure to second-hand tobacco smoke.

C)   Alcohol

Drinking excessive amounts of alcohol increases the risk of vascular disease in general and of stroke in particular. Drinking a small or minor amount (less than one or two units of alcohol per day) does not seem to increase the risk of stroke and could even be a protective factor. It is recommended not to promote drinking alcohol among those patients who are not drinkers and to reduce the alcohol intake of drinkers to less than two units (200 cc of wine) a day.

D)   Other Drugs

The use of different drugs has been related to the risk of experiencing a stroke and other vascular diseases. Using cocaine and crack are associated with both ischemic strokes and hemorrhagic strokes. Marijuana has also been related to ischemic stroke, whilst amphetamines and the structural de-rivative thereof, MAMA (ecstasy, glass) are related to ischemic stroke, HAS and cerebral hemorrhage. Measures must be taken to prevent and abandon this type of addictions in the population, most particularly among the young-est individuals.

E)   Diet

As far as diet is concerned, it has been proven that eating fish regularly (more than once a week) and eating three or more pieces of fruit a day re-duces the risk of stroke. Apart from this, it is recommended to reduce salt in the diet, especially in individuals who have high arterial pressure readings and to reduce total fats, especially saturated fats.

F) Obesity

Obesity is related to the presence of the main vascular risk factors, specifically arterial hypertension, diabetes and dyslipidemia. Both overall obesity (measured by the body mass index) and abdominal obesity (measured by the waist-hip index) have been associated with a higher risk of stroke. In obese individuals, it is recommended to reduce the body weight by way of modifications in diet and physical activity. In certain specific cases, pharmacological or surgical treatments of obesity will be considered.

G) Diabetes mellitus

Diabetes increases vascular risk and the risk of stroke. In patients with pre-diabetes, the structured diet and physical activity programs reduce the risk of developing diabetes.

The onset and severity of chronic microvascular complications (retinopathy, nephropathy and neuropathy) are determined to a greater degree by the degree of glycemia control, whilst developing macrovascular complications (ischemic cardiopathy and cerebrovascular diseases) depends more on the associated presence of other cardiovascular risk factors (hypertension, dyslipidemia, smoking and obesity) than on the degree of hyperglycemia[57].

H) Dyslipidemia

Despite the relationship between the high levels of cholesterol in plasma and vascular risk being well-established, controversy exists as to the association with the risk of experiencing an episode of stroke. However, the hypolipemiant drugs of the statin group not only reduce coronary events but also ischemic strokes. In primary care, it is recommended to treat all adults who have very high blood cholesterol levels (>320 mg/dl total cholesterol or >240 mg/dl LDL cholesterol) and all those who have a high vascular risk (including diabetic patients) with statins.

I) Oral contraceptives and hormone treatments

Oral contraceptives increase the risk of stroke, mainly of ischemic strokes, although the absolute risk is low. The risk is greatest for first-generation contraceptives with higher doses of estrogens than for the second or third-

generation contraceptives. In certain groups of women, the use of contraceptives entails a higher risk, such as among women who smoke, women who suffer from migraines or those who have a past history of thromboembolic episodes. Other contraceptive measures can be recommended for these women. Those women who have some type of congenital thrombophilia and who take oral contraceptives are at a particularly high risk of cerebral venous thrombosis.

Although the incidence rate of stroke increases considerably after menopause, replacement hormone therapy with estrogens (alone or combined with progestogens) has been found to increase the risk of stroke and of other vascular episodes in post-menopausal women. Therefore, hormone treatment is not recommended in post-menopausal women for vascular prevention.

J) Embologenic cardiopathies

Non-valvular atrial fibrillation is the most frequent cause of cardioembolic stroke. In patients with atrial fibrillation, anticoagulants are more highly effective than antiaggregants for preventing stroke, although they also have more hemorrhagic complications. Indefinite treatment with oral anticoagulants (INR: 2-3) is recommended for the primary prevention of stroke in patients with high-risk atrial fibrillation (patients > 75 years of age, with diabetes, hypertension or vascular disease, patients with cardiac insufficiency or ventricular dysfunction and patients with prior thrombotic phenomena). In the patients at moderate risk, one can opt for anticoagulation or antiaggregation. Lastly, in the low-risk patients (< 65 years of age, with no past history of embolism who have no other risk factor) antiaggregant treatment is recommended. When formal contraindications to anticoagulants exist, then one is to resort to the antiaggregants.

Myocardial infarction is now complicated progressively less frequently by a stroke due to the application of aggressive treatments which include twofold antiaggregation treatments (aspirin and clopidogrel). Treatment with oral anticoagulants must be considered in the patients who have had a myocardial infarction with an elevated ST segment associated with a dyskinesia or with a ventricular aneurysm.

The cardiopathies with left ventricular ejection fraction below 30% are associated with an increased risk of stroke, which can be reduced with anti-aggregants or anticoagulants.

The mechanical type valve prostheses entail a very high risk of thrombosis and embolisms, thus making indefinite anticoagulation necessary with an INR interval that depends on the type of valve and on the individual

characteristics of the patient in question. When the risk of embolism is high, it is recommended to add antiaggregants to the anticoagulant treatment. The biological type of valve prostheses entail a lesser risk. Following implantation, it is recommended to set out a three-month treatment with anticoagulants followed by antiaggregants.

K) Asymptomatic carotid stenosis

A stenosis of the internal carotid artery is sometimes discovered in patients who have not experienced any ischemic stroke or TIA. These patients are at risk of a stroke of 2%-3% annually, which may be as high as 5% for the more severe stenoses. Clinical trials have shown carotid endarterectomy to be more highly effective than medical treatment in asymptomatic patients with significant carotid stenosis (>70%). Nevertheless, the absolute benefit is low. The effectiveness is greater in males and in the patients who have a longer life expectancy. This surgical procedure must be considered solely if the surgical team certifies a perioperative morbimortality of less than 3%. The decision must be made jointly with the patient, taking into account their individual factors and the possible risks and benefits. It is recommended to maintain treatment with antiaggregants following the endarterectomy, as well as in those patients on whom surgery is not to be performed.

L) Nonruptured cerebral aneurysms

The main cause of SAH is the rupture of an intracranial aneurysm. The prevalence of aneurysm in the cerebral vessels is estimated at 1%-6% of the population, with a 0.7% average annual risk of rupture. To reduce the risk of rupture, in those patients who have a nonruptured intracerebral aneurysm, it is recommended to keep the arterial pressure readings within normal ranges and to avoid smoking, drinking alcohol or using sympathetic-mimetic substances. Additionally, in the aneurysms of 7 mm in diameter or larger, the intervention of the aneurysm sac (by surgery or endovascular procedure) must be considered, particularly if the site is posterior. In the event of adopting a conservative approach, the strict monitoring of the changes in the size of the aneurysm is recommended.

M)   Physical exercise

Engaging in physical exercise is associated with a lower risk of vascular epi-
sodes, including stroke. It is recommended that all individuals engage in
regular physical exercise, within their possibilities, for at least 30 minutes a
day.

In addition to the aforementioned factors, which are modifiable, there
are other individuals who have non-modifiable risk factors who have a
greater possibility of having a stroke, these individuals being those who may
benefit the most from a stringent control of the factors. Age is the main non-
modifiable factor of stroke. The presence of a past history of stroke in the
family is also associated with a high risk of stroke.

Secondary prevention

A)   Keeping risk factors in check

In patients who have had an initial episode of stroke or TIA, a strict check
must be kept on the risk factors.

On the release report, the measures which the patient in question has
to take to modify their lifestyles must be stated.

The arterial pressure readings must be monitored in all of the patients
who have had an ischemic or hemorrhagic stroke. Antihypertensive treat-
ment reduces the risk of recurrent strokes in patients with high arterial pres-
sure readings and even in patients whose readings fall within what is consid-
ered to be normal range. To date, the greatest benefits have been achieved
with a combination of an angiotensin-converting enzyme inhibitor (ACEI)
and a diuretic (perindopril 4 mg/d and indapamide 2.5 mg/d). Following the
acute phase of the stroke, once the patient has stabilized, the arterial pres-
sure must then be lowered progressively for the purpose of keeping the arte-
rial pressure below 130/80 mmHg and ideally below 120/80 mmHg.

In the patients with a past history of ischemic stroke or TIA of an ath-
erothrombotic etiology, treatment with atorvastatin (80 mg/d) is recom-
mended, regardless of the baseline LDL cholesterol levels. Treatment with
statins has shown itself to reduce the risk of recurring ischemic events, al-
though it has been associated with a discreet increase in hemorrhagic stroke.

B) Antithrombotic treatment for the prevention of non-cardioembolic TIA or stroke

In the patients who have experienced an ischemic stroke or a TIA of non-cardioembolic etiology (specifically atherothrombotic stroke, lacunar stroke and strokes of undetermined causes), antiaggregation with aspirin (100-300 mg/d), aspirin and extended-release dipyridamole (50 and 400 mg/d), triflusal (600 mg/d) or clopidogrel (75 mg/d) is recommended. The antiaggregants reduce the risk of further vascular episodes such as stroke or myocardial infarction and the risk of vascular death. Combining aspirin and dipyridamole provides for added effectiveness to aspirin in monotherapy. On the other hand, combining aspirin with clopidogrel has not shown itself to be more effective than the monotherapy treatment for the prevention of recurring stroke and has been associated with an increase in severe hemorrhagic complications. The antiaggregant treatment with triffusal has shown itself to be of an effectiveness similar to that of aspirin, with fewer hemorrhagic complications.

Introducing aspirin treatment has been found to be beneficial as of the acute stage of the ischemic stroke. Administering aspirin within the first 48 hours has been found to reduce the recurrence of stroke without significantly increasing the risk of hemorrhagic transformation of the infarction. Therefore, it is recommended to start the treatment with aspirin within the first 48 hours following the clinical suspicion of ischemic stroke once the presence of bleeding has been ruled out.

Anticoagulant treatment has not shown itself to be more effective than the antiaggregants for reducing the recurrence of non-cardioembolic strokes and is associated with a greater risk of hemorrhagic episodes.

In the case in which a patient has recurring strokes despite correct antiaggregant treatment, the underlying causes must be reviewed thoroughly and priorities set for keeping the risk factors in check.

C) Antithrombotic treatment for the secondary prevention of cardioembolic TIA or stroke

Anticoagulants are more highly effective than antiaggregants for preventing further embolic episodes, although they do have more adverse effects. In those cases in which the anticoagulant treatment is contraindicated, the treatment with antiaggregants (aspirin 300 mg/d) is a correct alternative. In patients with atrial fibrillation who have a recurrent stroke or TIA despite being anticoagulated, one may opt for intensifying the anticoagulant treatment or adding an antiaggregant.

Indefinite treatment with oral anticoagulants (INR: 2-3) is recommended in the patients with atrial fibrillation who have had a stroke without any formal contraindications to this treatment.

In the patients implanted with a mechanical type heart valve prosthesis who experience an ischemic stroke despite being on anticoagulant treatment with INR within recommended range, it is recommended that an anti-aggregant be added.

In the patients with mitral stenosis who have had an ischemic stroke or TIA, anticoagulant treatment (INR: 2-3) is recommended.

In the patients with a mitral valve prolapse who have had an ischemic stroke or TIA, antiaggregant treatment is recommended. Anticoagulant treatments must only be considered in those cases which are at a high risk of further embolic phenomena.

In those patients who have a permeable foramen ovale who have experienced an ischemic stroke or TIA, antiaggregant treatment is also recommended. Only if they have a greater risk of cardioembolic episodes (i.e. associated septal aneurysm) must treatment with anticoagulants be indicated. Surgical intervention for percutaneous closure of the defect must only be considered within the context of a clinical trial and in the cases of repeated stroke.

D) Symptomatic carotid stenosis treatment

Carotid endarterectomy is recommended in patients with ischemic stroke or TIA with less than a six-month evolution and major stenosis of the carotid artery (70%-99%), according to the measurement criteria of the NASCET study), provided that the surgical team certifies perioperative morbimortality below 6%. In these cases, the clinical trials have demonstrated a net benefit of the intervention. It is recommended to perform the endarterectomy early on, within the first two weeks immediately following the episode in question, if possible.

In the moderate stenoses (50%-69%, NASCET values), the benefit of the intervention is discreet. In these cases, carotid endarterectomy must be considered, depending on the age, gender and other individual factors of the patient in question (i.e. males can benefit to a greater degree than females).

Endarterectomy is not recommended in slight stenoses of the carotid artery (less than 50%, NASCET values). In these cases, intervention entails more risks than benefits.

Treatment with antiaggregants and keeping the vascular risk factors in check must continue following endarerectomy, as well as in the patients on whom surgery is not being performed.

For the time being, the endovascular techniques (angioplasty with stent implantation) have not shown themselves to be as effective as endarterectomy. The indications of the endovascular techniques must be individualized in certain patients (i.e. patients with high surgical risk or who entail technical difficulties for performing the endarterectomy) or within the context of a clinical trial.

E) Invasive procedures for treating cerebral aneurysms

If the cause of a SAH is identified as having been the rupture of an aneurysm, the aneurysm must then be excluded by means of endovascular (introduction of coils) or surgical techniques. The risk of rebleeding is very low with both of these techniques, but the rate for complications is lower with the endovascular treatment.

2.1.2.   Objectives and Recommendations

General objective 1

Reduce stroke incidence

Specific Primary Care Objectives

1.1.   Detect at-risk patients (hypertensive, diabetic and dyslipidemic) early and include them in programs for monitoring and keeping their risk factors in check.
1.2.   Reverse the current trend of prevalence of obesity in the population.
1.3.   Reduce the prevalence of smoking in the adult population (> 15 years of age) in Spain (or any Autonomous Community) to 28% (males 35% and females 25%).
1.4.   Increase the percentage of the population who engage in physical activity.
1.5.   Those patients who have high-risk emboligenic cardiopathies are to undergo anticoagulant or antiaggregant treatment.

Recommendations:

- Provide early detection and prevention of the risk factors through PC, both opportunistic (taking advantage of any consultation with the physician or nurse) as well as by way of actively bringing in at-risk population.
- Create information systems which will make it possible to monitor the main risk factors of stroke.
- Keep a closer check on the risk groups through monitoring programs and other measures.
- Promote healthy habits among the entire population to heighten awareness and make both this disease and its risk factors known so that they can be prevented through health education as a continuing activity within PC, school interventions, pharmacies, advertising media such as newspapers, radio and television, etc.
- Heighten the awareness of the population regarding the risks of the abuse of alcohol, cocaine and drugs in general by using the same channels are mentioned above.
- Increase the information the population has concerning the effects which smoking has on health among both smokers as well as those individuals exposed to second-hand smoke, promoting informative campaigns adapted to specific population groups according to the age, gender and role.
- Offer healthy menus in keeping with the NAOS strategy within the framework of collective dining: at public and private schools and collective institutional dining halls.
- Set out criteria of homogeneity in the messages given to the population on the part of the Autonomous Communities and the Ministry.
- Include in the care-providing objectives of the centers and provide incentives for the PC professionals in carrying out health prevention, promotion and education activities.
- Study the effectiveness of intracranial aneurysm screening in patients who have a past family history of subarachnoid hemorrhage or aneurysms.

Specific Objectives of Secondary Prevention

1.6. The patients who have experienced a stroke or TIA must keep the risk factors in check and undergo preventive medical treatment.

1.7. The Autonomous Communities shall get measures under way for the purpose of ascertaining and increasing the percentage of pa-

tients who are still adhering to the treatment five (5) years into treatment.

Recommendations:

- The patients will be followed-up in PC as of one year immediately following the episode of stroke, except those who have a large artery blockage disorder, who shall continue with hospital monitoring.
- Those patients who have large artery blockage disorders and have surgery or endovascular treatment indicated, shall undergo this treatment at hospitals which has a low rate of surgical morbimortality for this type of interventions.
- Following any further stroke, a diagnostic re-evaluation of the patient must be made.

2.2.   Acute Stage Stroke Patient Care

2.2.1.   Situation analysis

Justification

Over the last few years, some major advancements have been being made in the knowledge of cerebrovascular diseases which have led to rethinking the care provided for stroke patients.

Most of the Autonomous Communities consider stroke to be one of the population's top-priority health problems, as a result of which stroke patient care programs have been being carried out or are planned to be carried out.

Ten of the seventeen Autonomous Communities consider stroke to be a priority area of intervention in health in their communities, seven thereof having a plan for action in place. They have an agency responsible for the planning and/or evaluation of stroke in eight Autonomous Communities, with a stroke advisory council in five of these Communities and with Autonomous Community regulations in place in solely two of the Communities (Catalonia and Basque Country).

In eleven of the Autonomous Communities, protocols, clinical practice guides and/or clinical channels for providing stroke care have been developed.

In fifteen of the Autonomous Communities, stroke is a high-priority emergency indication in the Community emergency services and is a criteria for immediate medicalized transport.

Fibrinolysis protocols are in place at the hospitals in fourteen Autonomous Communities. Ten of these Communities have stroke units in the hospitals, eleven have multidisciplinary teams.

The hospitals have stroke monitoring with neurosonology equipment in fifteen Autonomous Communities, diffusion/perfusion magnetic resonance (MR) at ten hospitals and interventionist vascular neuroradiology in thirteen Autonomous Communities.

Managing acute stage stroke. Diagnosis and treatment

The treatment of stroke starts with recognizing the presence of a neurological emergency, even when the symptoms are slight or transitory. The prognosis will depend, to a great extent, on a number of measures aimed at reducing brain damage to the utmost.

Time is critical, given that the treatment window may be very narrow. Thus, an adequate action within the first few hours is fundamental for saving brain tissue. It is indispensable that the hospitals which provide care to stroke patients avail of efficient clinical channels for rapidly identifying and clinically evaluating the patients with a potential stroke. The objective is to evaluate and decide as to the treatment within the first 60 minutes immediately following the point in time at which the patient arrives in the hospital Emergency Service.

In view of a patient who has signs and symptoms of stroke, an overall and neurological evaluation must be made as soon as possible. The first measures must be aimed at maintaining cardiorespiratory stability. The next step is to make a correct neurological diagnosis by anamnesis, physical examination and making diagnostic tests.

A proper anamnesis must be made of all of the patients suspected of having a stroke, in which the time of onset of the symptoms, the clinical manifestations and the circumstances under which the neurological symptoms presented are determined, in addition to their personal past history of disease. It is fundamental to rule out clinical signs and symptoms which appear to be stroke and focus on its possible etiology.

In the physical examination, in addition to the general physical exam, a neurological examination is indispensable. This examination must be made as fast as possible but must also be complete. To this end, it is highly useful to employ neurological evaluation scales. The scale most used is the NIH Stroke Scale (NIHSS). Using this scale not only helps to quantify the degree

of neurological deficit, but also facilitates communication among the professionals, identifies the possible site of the blocked vessel, affords the possibility of establishing an early prognosis and aids toward indicating the treatment.

The supplementary radiological examinations (brain MR or CAT) and analyses must be made in order to correctly evaluate the patients who have signs and symptoms compatible with stroke.

A total of 26%-34% of all stroke patients show a diminished neurological condition, whether in the form of a reduced level of consciousness or progressive focal deficits, within the first week immediately subsequent to the stroke, the progression reaching an end in most within the first 48 hours[58].

The progression may be due to different causes (i.e. extension of the infarction, hemorrhagic transformation, edema, metabolic disorders, seizures) and is associated with a worse evolution. Approximately half of the deaths which occur during the acute stage of stroke are the result of medical complications (pneumonia, sepsis), the other half being attributed to neurological complications (recurring stroke, cerebral edema)[58].

Monitoring the vital signs (heart rate, arterial pressure, respiration, temperature), the overall medical condition (including glycemia) and the neurological condition within the first 48 hours is fundamental. In the most severe strokes (total infarctions of the medial cerebral artery or of the brain stem and hemorrhagic strokes), this must be lengthened up to 72-96 hours. Neurological scales are used for neurological monitoring, mainly the NIH stroke scale, the Canadian scale and the Glasgow coma scale. This monitoring is more effective when done on Stroke Units[58].

The prime objectives of the acute stage of stroke are to keep the neurons which are not as yet irreversibly damaged (shadow area) intact and prevent or remedy any possible complications. The treatment includes a number of general measures and also specific therapies.

Specific Treatment: Fibrinolysis

A vast majority of ischemic strokes are due to the blockage of an extracranial or intracranial artery. The long the artery remains blocked, the more extensive the brain tissue damage will be[59], there also being a major risk of reperfusion hemorrhaging[60].

In view of the results of the NINDS study, in 1996, the FDA approved the use of the thrombolytic recombinant tissue plasminogen activator agent (rt-PA) to be administered intravenously in treating the acute stage of ischemic stroke within the first three hours immediately following the onset of the symptoms. This is currently the sole treatment option for these patients.

In September 2002, the European Medicines Agency also approved its use on our continent, but with the requirement that all the patients had to be included in the international observational safety monitoring study called the SITS-MOST study.

The data of this registry has been published very recently[61] and confirms the effectiveness of this treatment in everyday clinical practice. It is important to stress that it was necessary to meet the following requirements in order to take part in this registry: avail of a Stroke Unit organizational structure, continual patient monitoring throughout the first 24 hours, early start of rehabilitating treatment and the process managed by either a neurologist or another expert specialist.

Being a highly effective treatment, solely 40%-60% of the patients treated with intravenous (i.v.) rt-PA within the first three hours achieve effective early reperfusion. There are several factors associated with the effectiveness of the post-rt-PA rechanneling, some of which include the composition and characteristics of the thrombus, the diameter of the artery blocked, the etiology of the stroke[62], the glycemia prior to rechanneling[63], the fibrinolysis endogen inhibitors[64], and the time lapse to start of treatment. The earlier within the first three hours that the rt-PA is administered, the better the results achieved[65]. Therefore, it is important for the patients to get to the hospital as soon as possible. To achieve this, it is indispensable for what is known as the "Stroke Code" to be implemented.

The main complication of rt-PA treatment is symptomatic hemorrhagic conversion. The experience of the center when the fibrinolysis is performed is associated with the risk of mortality associated with this treatment[66].

Fibrinolysis treatment is a therapeutically useful intervention on not increasing the cost and being effective. The main factors is reducing disability, which results in a better quality of life for the patient and a reduction in costs[67,68]. New approaches to treatment are being considered as a supplement to the thrombolytic treatments[69,70].

General anticoagulation is not indicated in the acute stage of stroke and is contraindicated in patients with moderate to severe strokes, given that the use thereof is associated with a heightened risk of severe intracranial hemorrhagic complications.

Antiaggregation with acetylsalicylic acid is recommended (starting dose of 325 mg) within the first 24-48 hours immediately following the stroke, but must not be considered as being a substitute for other specific stroke treatments. The use thereof within the 24 hours immediately following the tPA i.v. treatment is contraindicated.

At this point in time, it is not possible to recommend the routine use of any neuroprotective agent in acute ischemic stroke.

Decompressive surgery (craniectomy) in selected patients younger than 65 years of age with malignant infarction of the medial cerebral artery may reduce the mortality associated with these symptoms.

Stroke care organization and coordination

Stroke chain of care[71]

The major advancements made over the last ten years in providing care for stroke patients has led to the negative, conformist concept regarding this so widespread and disabling disease so generally held until now having now been abandoned. This change in way of thinking has been taking place progressively over the past few years on showing how an integral, multidisciplinary, specialized approach focused on the patient goes hand in hand with a reducing mortality and curtailing the intensity of the sequelae.

Stroke care is provided by means of an integrated network grouping together different levels of care spread throughout the territory. So that the territorial planning criteria will be effective by assuring the equity of the health care service provided, it must afford the possibility of patients moving to the proper center and the time frame indicated according to the different nosological processes.

Although strokes require admission to hospital during the acute stage, the organization of the different care-providing levels (hospital emergency service, extrahospital emergencies, PC, etc.) must take into account the different points in time of this illness, by guaranteeing care for these patients regardless of where they are located. This requires setting up collaborations among the different levels which are operating within a certain given region, thus providing for better care and a greater optimization of the resources. It therefore becomes indispensable to define the organizational criteria and the role and the coordination of the different levels at which care is provided so as to improve the care with which these patients are provided, to achieve equity and the best conditions for accessing the benefit of the care provided.

The magnitude of the socio-sanitary problem, a better knowledge of the physiopathology of cerebral ischemia, the technological advancements in the field of diagnosis and effective treatment measures having surfaced have made it necessary to organize multidisciplinary teams trained in cerebrovascular units or Stroke Units.

These teams must be understood as being not solely a physical space within the hospital to which stroke patients are admitted. These units are also a structure which participates in and coordinates all types of actions which may be of interest to stroke patients: implementation of the currently-

recommended clinical practice guides, physical and psychological rehabilitation programs, health education for family members and patients and research.

Therefore, managing a stroke must be seen as a chain of measures taken one after another, all of which are important, which will enable us to assure that the patient will be provided with appropriate, fast and efficient care.

The integrated care of stroke patients is referred to as the stroke care chain, the main aspects of which are provided in the following Table.

Table 16. Stroke Care Chain

1. **Pacient**	I. Recognizing telltale symptoms
	II. Perceiving an emergency
2. **Extrahospital emergency service (112) and/or reference hospitals**	III. Activate Stroke Code (call neurologist or another specialist who is a stroke expert)
3. **Emergency service**	IV. Attended by **Stroke Team**
	V. Request cranial CT "stat"
	VI. Start general measures for treating stroke
4. **Stroke unit**	VII. General measures for treating stroke
	VIII. Specific acute stage treatment (fibrinolysis)
	IX. Clinical tests (acute stage and secondary prevention)
	X. Etiological diagnosis protocol
	XI. Perform transcranial doppler
	XII. Early rehabilitation
	XIII. Start secondary prevention
	XIV. Care personnel interacting with other hospital services (Cardiology, C.V., etc.)
	XV. Health education (in relation to cerebrovascular diseases and risk factors)
	XVI. Contact the social /welfare worker at the hospital to arrange for convalescence facilities
5. **External/outpatient consultation**	XVII. Stroke follow-up protocol
	XVIII. Compliance with secondary stroke prevention
	XIX. Secondary prevention of vascular diseases
	XX. Early detection of post-stroke dementia and depression

Source: Prepared by authors.

The planning of the provision of stroke care must include developing emergency transport systems which will guarantee: immediate transfer of the patients to accredited hospitals, emergency care by neurologists or other specialists who are experts in treating stroke, the development and consolidation of stroke units which implement generally-accepted diagnosis and treatment protocols and the presence in these units of a sufficient number of beds for the semi-intensive monitoring of the patients who are undergoing thrombolytic treatment or who require special care due to the characteristics of their cerebrovascular disease.

Stroke Code

In the stroke care chain, it is fundamental to set up systems which will favor seamless connections among the extrahospital and intrahospital emergency services. The Stroke Code is one system which enables fast identification, notification and transfer of the stroke patients to the emergency services. Thus, the intrahospital diagnosis and care process can be set into motion while the stroke patient is being transferred to the Emergency Service.

— *Extrahospital Stroke Code*:
The Stroke Code is in place in most of the advanced health systems and connects the emergency systems with the hospital. These systems, based on the coordination of administrative and care-providing structures are for the purpose of prioritizing the order of the demands for emergency care and meeting these demands appropriately in keeping with their degree of priority. All over the world, these systems are based on a telephone for taking the information which pertains to a centralized answering system. This setup is comprised of trained administrative staff members and physicians on call. They usually have computerized protocols which, by way of certain prompt phrases, provide a specific response and assigns high or lower priority according to pre-programmed criteria. The code being set implies a number of actions to be carried out by the emergency services and prior communication with the Hospital stroke unit or team.

— *Intrahospital Stroke Code*:
The implementation of the "Stroke Code", setting a specific team of professionals into action, determining the priority of the stroke patient and meaning previously-established actions and procedures being gotten under way at the hospital as a result of the implementation of the extrahospital code or the arrival of a stroke patient at the hospital emergency room door. One of the standards procedures which are usually included in the clinical pathway

at the hospital is the direct evaluation by the stroke team professionals and stat neuroimaging being performed, as well as the application of thrombolysis whenever indicated.

In Spain, it has been suggested that activating the Stroke Code is useful in the acute stage of stroke, shortening the time lapse both outside as well as inside the hospitals by as much as half, thus making reperfusion treatment with fibrinolysis[72] (rt-PA) possible for a larger number of patients earlier on, which means a better clinical course for these patients[73].

Similarly, a prospective study conducted throughout a five-year period in 5,843 stroke patients evaluated the clinical effectiveness of a specialized emergency stroke care system (Stroke Code, Stroke Units, Stroke Team and stroke physician on call), a progressive reduction in the number of admissions to hospital, the shortening of hospital stays, the lowering of the mortality and of the need for institutionalization having been found[74].

Care continuity

Regarding the care provided at release, a total of 61% have some nursing release report program which sets out the care at home. Home hospitalization following the stroke is considered for thirty-one percent (31%).

Catalonia and Basque Country has a follow-up program for those patients who have had a stroke, and Andalusia has a follow-up protocol. In eight of the Autonomous Communities, there are definite activities in place for providing support for the patients and their families.

The providing of continuing care following release from hospital on the part of the nursing staff specially-trained in stroke, mainly the educational and support techniques, leads to tangible benefits for the patients and their caregivers[75].

In a systematic review of 14 randomized, controlled clinical trials (1,617 participants) focused on evaluating the effects of the rehabilitation services based on therapies for stoke patients who are living in their homes, it was found that the patients seemed to have improved their independence in their personal daily living activities. However, the proof stems from a review of heterogeneous interventions[76].

Stroke Care Plan[77]

Organizing an efficient system for providing care for stroke patients and getting this system under way is what is known as a stroke care plan. This plan

requires suitable cooperation between the professionals and the Health Administration[77]. They must work together jointly at the municipal, Autonomous Community and central government level by promoting coordinated measures which will improve the care provided for these patients, which will afford the possibility of curtailing the devastating effects of stroke.

Specialized care in cerebrovascular diseases improves the course of stroke patients and cuts the costs of the process. Different studies conducted in our country show emergency specialized stroke care being provided to be associated with a lesser risk of a poor clinical course[3], to reduce the mortality and the intrahospital complications, increasing the percentage of patients who manage to be independent after having had a stroke[78]. These good results are maintained six months later, this being the length of time throughout which it is noted that those patients for whom care has been provided by a specialized professional have a better functional situation and less of a probability of experiencing a recurrence of stroke or another vascular episode. These results are similar to those found in other international studies[66,79,80,81]

Stroke Units and Teams

In 1996, the WHO and the European Stroke Council drafted the Helsinborg Declaration" in which it was stated that the Stroke Unit, understood as being a specific, non-intensive acute care unit for treating stroke patients provides the most effective acute stroke care, noting as the objective for 2005 that all acute stroke patients were to have ready access to specialized evaluation and treatment in Stroke Units[82].

The Stroke Units are hospital units located in well-defined geographic area integrated by a coordinated multidisciplinary team specialized and trained in providing care for stroke patients and which had protocols in place for taking action and managing patients based on the best scientific evidence available. Until accreditation standards and criteria are set out, it is considered that Stroke Units must be coordinated by a neurologist. The objectives of the admission are:

- Optimize the emergency diagnosis strategies in order to reduce the time lapse from the onset of the stroke to action being taken for medical treatment.
- Provide specific treatment adapted to each sub-type of stroke, etiology, location and size.
- Begin secondary prevention.

Stroke Teams are a multidisciplinary group of specialists coordinated by a neurologist or by another specialist who is an expert on stroke, which, without having a structure with set geographical boundaries, collaborate in the diagnosis and treatment of stroke patients and which have systematized care protocols in place.

They are an alternative to which some consideration must be given at those hospitals which cannot be outfitted with a Stroke Unit *per se*.

The Stroke Units have shown themselves to be more highly beneficial than the teams, given that they shorted the average length of time in the hospital, reduce the mortality and dependence, as well as the systemic and neurological complications. They additionally cut the costs per patient and the overall costs[83,84,85].

Stroke Units lower the mortality of stroke patients when they are analyzed in comparison to the conventional care units[86,87]. The Stroke Units without multidisciplinary measures or the mobile stroke units do not contribute to reducing the mortality[87].

Thus, a systematic review, in which a total of 31 randomized, controlled clinical trials (6,936 participants) found that the stroke patients who were provided with organized care in a Stroke Unit (compared to those for whom other forms of care were provided) have greater possibilities of staying alive and living independently in their own homes at one year following the event. The benefits were more obvious in those Stroke Units located in certain areas, no lengthening of the hospital stay having been founded. Compared to other services, the Stroke Unit care showed a drop in the number of deaths recorded at the end of the follow-up period (Odds ratio [OR] 0.86; 95% Confidence Interval [95% CI] 0.76-0.98) in deaths or institutionalization (OR 0.82; 95%CI 0.73-0.92) and in deaths or condition of dependence (OR 0.82; 95%CI 0.73-0.92)[86].

These results differ from those found by way of another systematic review in which 32 randomized, controlled clinical trials were included (6,636 participants), with a number of patients that it was necessary to treat (NNT) in order to prevent the early death of 17 (95% CI, 13-24). The Stroke Units which included early rehabilitation during the first week, showed better results with NNT of 16 (95%CI, 12-23). For the mortality analysis, an OR of 0.66 was found (95%CI, 0.57-0.76). The analysis in terms of the type of Stroke Unit provided the following results: acute Stroke Unit OR, 0.75 (95%CI, 0.59-0.95); rehabilitation Stroke Unit OR, 0.59 (95%CI, 0.37-0.93); combined Stroke Unit OR, 0.59 (95%CI, 0.45-0.76); combined rehabilitation unit OR, 0.65 (95%CI, 0.43-0.98); mobile stroke unit OR, 0.65 (95%CI, 0.27-1.50); OR of the general medicine unit within an acute care unit without multidisciplinary management, 0.63 (95%CI, 0.25-1.54)[87].

Being admitted to a Stroke Unit also gives rise to beneficial effects on the psychosocial well-being of stroke patients and they are provided with clinical care, nursing, care, information, clinical care advice which are important for patients[88].

The obstacles to these actions being gotten under way are related to the fragmentation of stroke care due to an inadequate integration of the services, the professionals and the resources which must closely collaborate in stroke care[89]. According to the Institute of Medicine of the National Academy of Sciences, the fragmentation of the distribution of the health services leads to less than optimum treatment regarding both safety as well as the inefficient use of the health system resources. To assure that the scientific knowledge is converted into clinical practice, the IOM has recommended that coordinated health systems be set up which integrate the prevention and treatment services and promote patient access to evidence-based care.

It is indispensable to design the stroke care-providing process so as to coordinate and promote patient access to a full range of activities and services. The main aspects thereof are: community education, primary prevention, notification and response of the emergency medical services, hospital diagnosis and treatment, rehabilitation and secondary prevention[89].

On the survey conducted by the Ministry of Health and Consumer Affairs on the Autonomous Communities within the framework of the preparation of this strategy, a total of eleven Autonomous Communities have Stroke Units in place at the hospitals within their Communities, twelve having multidisciplinary teams. In the different Autonomous Communities, stroke care comes under different units:

— *Hospitals with Stroke Teams:* The Stroke Teams are the basic care model when the number of patients does not justify care in geographically delimited units. The Stroke Teams have experts in managing stroke which come in at the request of other professionals at the hospital to attend these patients. Not being large enough, these hospitals possibly do not have a neurologist on duty round the clock, and many specific acute stage treatments such as thrombolysis cannot be performed at these hospitals. Therefore, these centers will not avail of very specific or complex treatment techniques, and when it is considered necessary for the patient to be transferred to a primary center or to a reference center in order, once the acute stage treatment has been completed, to complete the process at the hospital from which they had originally be referred. These hospitals have to set out plans for collaborating with the primary and reference stroke centers nearest to them, including commitments for transfers.

— *Hospital with a Stroke Unit:* These hospitals will have geographically delimited Stroke Units staffed with nursing personnel who are experts

in providing care for stroke patients. They are to have the necessary means of diagnosis and neurologists on call in order to be able to administer any acute stage treatment.

— *Reference hospitals for stroke diagnosis and treatment:* In addition to availing of an acute Stroke Unit, these hospitals will have to guarantee that care will be provided for certain patients in the form of interim care and the performing of complex techniques.

Communications between the hospitals and the medical emergency services (MES) is indispensable, using transport protocols which will assure the transfer of the patients to hospitals with the appropriate resources for each case. Different forms of telemedicine and transport services, including air transport whenever indicated, may facilitate the interconnection among the care providers (healthcare personnel) of the system, allowing services located far away geographically to collaborate in the care provided for stroke patients.

In a study conducted by IASIST[90], an analysis is made of the hospitalization due to stroke in Spain for 2005 and the hospital variability, females having been found to show a higher mortality (gross and adjusted) than males. The hospital stay management indicators rise along with the level of the hospital in question and are higher than what was expected for the younger-aged groups in the three types of events studied (TIA, ischemic stroke and hemorrhagic stroke).

The trend found decreases with age in hemorrhagic stroke and increases in the case of TIA, whilst it remains constant for ischemic stroke.

Protocols and guides

Within the framework of carrying out the National Health System Quality Plan, through the National Health System Quality Agency, the clinical evidence-based clinical practice guide Preparation Program is being carried out for the entire National Health System as a whole ("GuiaSalud" Health-Guide). For carrying out this program, a working agreement has been signed with the Carlos III Health Institute and Health Technologies Evaluating Units and Agencies of several Autonomous Community Health Departments and the Latin American Cochrane Center. Within this program, the Basque Autonomous Community Government Health Department's Health Technologies Evaluation Service (OSTEBA) prepared a clinical practice guide for stroke, with the collaboration of the scientific societies and experts.

Within the framework of the preparation of this strategy, a survey was conducted of the Autonomous Communities and scientific societies, based

on the responses of which, the conclusion is drawn that, at the Autonomous Community level, at least 13 Autonomous Communities have protocols, clinical practice guides, clinical pathways or other similar documents in place for providing stroke care.

In relation to the 17 Scientific Societies which have taken part in the preparation of this strategy, nine have now drafted protocols, guides for taking action or other documentation of related to the organizational aspects of providing care for stroke.

2.2.2.   Objectives and Recommendations

General objective 2

Lower the mortality rate at one month immediately following the stroke having occurred and increase survivor autonomy

Further explanations: The Helsingborg Declaration sets the objective of achieving more than 80% survivors per month and that 70% thereof be independent at three months.

Specific objectives

2.1.   Increase the percentage of patients who are provided with specific treatment within the first three hours immediately following the onset of symptoms, assuming the Helsingbord criteria.
2.2.   Carry out informative campaigns and instructional activities for identified risk groups in order to improve the population's knowledge of the warning signs and guidelines for taking action.
2.3.   The Autonomous Communities are to avail of a care-providing network of Stroke Units or Teams in keeping with the criteria set forth in the ANNEX to this strategy.
2.4.   The Stroke Code is to be implemented throughout the entire Autonomous Community, such that any personal or telephone contact from a patient or family member with any medical center, emergency care center, emergency room or hospital which is not a reference hospital will immediately trigger referral to the reference units and teams.
2.5.   The basic areas are to avail of a reference Stroke Unit or Team within an isochrone making access possible within 60 minutes by the means stipulated under their plan or program.

2.6. All reference hospitals must have the Stroke Code implemented (as per criteria set forth under the ANNEX to this strategy) for top-priority care of all stroke patients, regardless of the way in which they arrive at the hospital.

2.7. All hospitals providing care for stroke and TIA are to have a clinical pathway, care-providing protocol or process in place for providing care for stroke.

Further explanations: At least the following shall be included.

- *The diagnostic, medical and surgical processes necessary, as well as decision-making algorithms and maximum time frames for preforming neuroimaging, fibrinolysis, thromboembolism prevention and others*
- *The standardized nursing care*
- *Early rehabilitation process with evaluation of deficit and disability and start of treatment.*
- *Interventionist neurosurgical and neuroradiological care.*
- *A person (case manager or other position) to coordinate the care-providing process and to stay abreast of whatever the patients' needs may be during the process.*

2.8. The Autonomous Communities are to promote guidelines as to what is to be done for providing pediatric stroke care.

Recommendations

- Prepare and get under way a strategic plan for communications with the populations of interest aimed at achieving a more efficient use of the emergency systems.
- Set up mechanisms for coordinating the providing of care between the medical emergency systems and the receiving hospitals.
- Set out criteria and protocols as to what measures are to be taken in interhospital transfer based on the activation of the Stroke Code, the expeditiousness of arriving at the reference hospital and stabilizing and checking the patient, if necessary.
- Set up written notification systems for the hospital at the emergency care centers and emergency rooms stating the time of onset, the clinical situation of the patient and the conditions of transfer.
- Use telemedicine as support for fast, correct diagnosis in those cases in which the hospital is located some distance away.

- For the correct diagnosis of pediatric cases, it is recommended to anesthetize these patients so as to make it possible to carry out the tests are accurately as possible.
- The Autonomous Communities are to see to the Stroke Units and Teams fully complying with all of the criteria set forth under this Strategy.
- The Autonomous Communities are to set out measures which will provide for the continuity of care between primary and specialized care for stroke and for transitory ischemic accidents.

2.3.   Rehabilitation and Reinsertion

2.3.1.   Situation analysis

Stroke is the main cause of severe disability in adults. Strokes cause a wide variety of deficits and disabilities.

The American Heart Association-Stroke Outcome Classification[91] systematizes the neurological deficits caused by stroke into six areas: motor, sensory, visual, language or communication, cognition or intellectual and affect.

The length of time over which the recovery takes place and the degree of recovery are clearly related to the initial severity of the stroke: the more severe the initial stroke, the lesser and the slower the recovery. Beyond the month five-seven immediately following the stroke, even in patients with severe or highly severe strokes, it is difficult to objectify any further degree of recovery by means of the standard scales which evaluate the main daily living activities (DLAs).

The closest approximation to date to these patterns of recovery according to the degree of severity with which the stroke presents are those researched by the Copenhagen Stroke Study (CSS)[92,93,94]. The CSS is a prospective, community line of research describing the evolution and the course over time of the post-stroke recovery in 1,197 patients without prior screening by layering them by the initial clinical degree of severity. The initial mortality (21%) reduced the population to 947 survivors on whom a follow-up was carried out throughout the six-month period immediately subsequent to the stroke. A total of 15% of the total population at release from rehabilitation are institutionalized, 64% being sent to their own homes.

Table 17 shows the percentages of recovery of the deficits, of DLA function and of the ability to walk, grouped by the degree of severity of the initial presentation.

Table 17. Recovery from disability in relation to the initial degree of severity of the stroke according to the Copenhagen Stroke Study.

	Initial Degree Affected by the Stroke*				
	Mild (41%)	Moderate (26%)	Severe (14%)	Very Severe (19%)	Total (n=1.197)
Mortality	3%	12%	33%	62%	21%
Recovery of the deficits	96%	81%	39%	20%	78%
Recovery of function**	68%	36%	26%	4%	46%
Recovery of walking function***	89%	61%	55%	24%	66%

* The initial degree to which affect was evaluated by means of the *Scandinavian Neurological Stroke Scale,* by classifying the strokes by the scale scoring into very severe (0-14), severe (15-29), moderates (30-44) and mild (45-58)

** Defined by a Barthel Index = 100

*** Defined by the Barthel Walking Function Item ³ 10 /15

Regarding the pattern of recovery over the course of time, the CSS shows functional recovery to be complete in 95% of the patients at 13 weeks and varying with the initial degree of severity of the stroke. The highly function in DLA is reached at an average of 2 months (8.5 weeks) in patients with initially mild strokes, within 3 months (13 weeks) in patients with moderate strokes, at 4 months (17 weeks) in patients with severe strokes and at 5 months (20 weeks) in patients with very severe strokes. Even in patients with severe and very severe strokes, it is difficult to detect changes in the neurological deficit or the functional recovery anywhere beyond 5-6 months.

In Spain, post-rehabilitation outcomes have been published in patients with a moderate to very severe initial deficit and disability[95,96]. These outcomes are in line with that which has been published by the CSS for similar groups of patients. A total of 60-75% of these patients affected from a moderate to a very severe degree recover the ability to walk by themselves, and a percentage of nearly 50% recovering levels of functional independence in DLAs, functional gains of over 50 points on the Barthel scale, being achieved with multidisciplinary rehabilitation treatment in the acute and sub-acute stage.

Rehabilitation in stroke is a treatment process aimed at the person affected regaining their maximum physical, psychological and social potential. In different studies, stroke rehabilitation has been shown to be effectives, particularly if carried out within specific programs. Rehabilitation reduces mortality, improves the functional prognosis and favors the rapid reincorporation of patients into their own homes, also cutting the overall costs for

reasons of this disease. In Spain, the average hospital stay for stroke is similar to that reported in the rest of Europe, rehabilitation however being used to a smaller degree, as is also the case regarding the use of technical aids or adaptations in the home[97].

Rehabilitation is a complex process. In addition to the patient proper and their family, a multidisciplinary team which may be comprised of physicians who are rehabilitation specialists, physical therapists, occupational therapists, speech therapists, neuropsychologists, nursing staff and social workers also takes part in the rehabilitation process.

The rehabilitation programs are more effective when they are carried out in the early stage. Late rehabilitation is that which is carried out when a major part of the deficits have stabilized and is for the purpose of maintaining the functionality recovered, continuing the adaptation process and improving the process of performing DLAs. The perception of health among the persons with sequelae from stroke at two years following the stroke is lower than the general population. The factors which determine a lower quality of life are depression, dependence on another in the areas of motor function and the need for welfare assistance[98].

Therefore, once the recovery stage has been overcome, social welfare must then play the leading role.

2.3.2.   Objectives and Recommendations

General objective 3

Increase the percentage of stroke patients who are fully integrated into their personal and social life.

Specific Objectives

3.1.   All stroke patients are to avail of an individual early rehabilitation plan from the very start of the process which will make it possible to diagnose the disability/deficit, set the proper rehabilitation intervention into motion and make provision for the future resources.

3.2.   All stroke patients are to be furnished with a functional evaluation at release following full completion of their rehabilitation plan as support for their integration into the social and/or employment realm.

3.3. The patient and the family are to be provided with the appropriate instruction and information at the hospital for carrying out the necessary care at home.

3.4. The Autonomous Communities are to set out the mechanisms necessary in order for the release report to be immediately accessible by the PC teams.

> *Further explanations: The release report shall include the actions which have been taken and must be continues on the medical plane for providing care for the patient and instructing the family members thereof and rehabilitating measures.*

3.5. The Autonomous Communities are to avail of a map of resources concerning the different scopes of rehabilitation.

Recommendations

- Improve the coordination between PC and SC and among other centers and living facilities so as to thus facilitate the recovery of these patients.
- Promote compatible computerized clinical records between Primary and Specialized Care.
- Define rehabilitation care levels (acute, sub-acute and chronic) and care-providing scopes (hospital, medium-stay units, outpatient, home care…) in order for all these levels to be well-coordinated.
- The centers must have a multidisciplinary team which will assure the utmost degree of recovery possible. It is recommended that occupational and speech therapy be included.
- An early intervention is to be made regarding the rehabilitation as far as the cognitive and affective processes are concerned.
- Those patients who need to be fitted with ortho-prostheses are to be furnished with proper information on the part of the Autonomous Communities.

General objective 4

Provide care and support for the patient who has a disability and for their family.

Specific Objectives

4.1. The PC teams are to make an integral evaluation of the patients released from care and of their caregivers.

4.2. Carry out PC interventions aimed at providing support for the families who are taking care of and attending persons who have had a stroke.

4.3. Set up a system with the Autonomous Communities for coordinating among the different institutions assigned the social and health care authorities and resources for organizing the processes of providing support for those persons who have a residual disability following a stroke and for their caregivers.

Further explanations:

- *These caregiver support programs must provide information on services, resources and materials for this care and for facilitating and expediting red-tape-related processes.*
- *They are to include a system of aid or loans as technical aids offsetting deficit and disability, as well as adaptations in the home.*

Recommendations

- Give information to the caregivers through the patient and caregiver association for the purpose of improving their own care and also that of the patient.
- Set out and disseminate a map of patient association resources as a resource for the healthcare professionals, the patients and their family members.
- The patients without any family support and/or for providing respites for caregivers are to avail of adequate centers for providing the necessary care which will be accessible to the reference population and for furnishing the information on the resources and the requirements for accessing the same.
- A set of supporting measures are to be established in each area for the caregivers, such as:

  — Ways for facilitating the administrative processing steps for caregivers for obtaining their own prescriptions of that of the patient and other steps which must be taken.

— Implementation of telephone consultations for clearing up care-related doubts quickly.
— Pamphlets of concise, basic information for caregivers for managing
— Programs for loaning recoverable ortho-prothesthetic material, such as wheelchairs, walkers and other materials for providing home care for these patients.

- The professional Social Workers are to set out the actions which are necessary to be taken for the adoption of social and family services which are required.
- The setting up of systems for providing a response to emergency situations in need of attention by a social worker (claudication or no caregiver, etc.) are to be promoted.
- Set up a network of reference socio-sanitary centers in the Autonomous Communities.
- Programs are to be created aimed at promoting caregiver well-being: support groups, social therapists, health education.

2.4. Training

2.4.1. Situation analysis

The healthcare professionals in primary care, at the emergency care centers and the Stroke Units and Teams are all involved in providing care for stroke patients, it being fundamental that all of these professionals possess basic training and go through continuing training which will guarantee fast, proper stroke patient identification, transfer and care.

A continuing training plan specifically for stroke is in place for healthcare professionals in six Autonomous Communities (Andalusia, Asturias, Catalonia, Castile-La Mancha, Madrid and the Basque Country).

The scientific societies play a fundamental role in the continuing training of these professionals. Eight of these societies (GENI, SERMEF, SEMERGEN, SEDENE, SEN, SEMFYC, SEMG, SONES) have specific training programs with different methodologies, sessions, courses and workshops.

2.4.2. Objectives and Recommendations

General objective 5

Bolster the training of the health system professionals for properly meeting the needs of stroke patients.

Specific Objectives

Avail of a Continuing Training Plan Continuing Training Plan in the Autonomous Communities for all of the professionals in primary care, emergency centers and in the Stroke Units and teams which will guarantee the fast, correct identification, transfer and providing of care for stroke patients.

Recommendations

- Facilitate access to continuing training courses for the professional at different levels of care who provide care for stroke.
- Organize training and instructional courses in care for the nursing personnel who provide care for stroke patients.
- Bolster interconsultation regarding stroke patients among the different levels of care.
- Train emergency are centers, including the call center personnel, in programs for taking Stroke Code-related action.
- Training pediatricians in the prevention and providing of care for children who have experienced a stroke.

2.5.   Research

2.5.1.   Situation analysis

One of the priorities of this Strategy includes that of fostering and organizing the research related to the fields of knowledge useful for evaluating the efficacy, effectiveness and efficiency of the stroke-related activities by generating new evidence for developing a modern system updated on an ongoing basis in promotion, prevention, treatment, rehabilitation activities and in providing the finest of care for stroke patients.

The stroke-related research promoted
by the Carlos III Health Institute

By way of the latest calls for applications for aid under the Biomedical and Health Sciences Research Promotion Program within the framework of the 2004-2007 National R+D+I plan, a total of 30 stroke research projects have been funded within the 2006-2007 period through the Carlos III Health Institute in an amount totaling 2 947 124 euros. Hence, for carrying out research projects, a total of 2 269 282 euros has been earmarked (totaling 77% of all the funds earmarked for this disease over the last two years, n=20), 509,894 euros (17.3%, n=5) for conducting research projects of a non-commercial clinical nature with medicines for human use and 167,948 euros (5.7%, n=5) in research studies on evaluating health care technologies and research in health services.

In 2002, the first call for applications for Theme-Based Cooperative Health Research Networks (RETICS) was put out, a total of 69 networks having been selected, 13 of which fell within the Networks of wide-ranging centers and 56 being Networks of groups on subjects of a more specific scope. In the 2006 call for applications, a total of 16 networks were selected and granted, one of which was within the area of cerebrovascular diseases.

The Cooperative Neurovascular Research Network (RENEVAS) is initially comprised of 15 consolidated research groups, including hospital centers and universities in different Autonomous Communities and has been financed by an amount totaling 2 272 647 euros over the past few years, 1 099 800 euros in 2007 and 1 172 847 euros in 2008. The justification of the need of structuring neurovascular diseases into a cooperative research network is conditioned, first of all, by the socio-sanitary motivation of neurovascular disease in Spain and by the existence of basic and clinical groups which have their own individual experiences in researching neurovascular diseases on their own who decided to become associated in or to combine their experience, capacities and resources for achieving a more highly competitive translational research which will facilitate seeking knowledge which will make it possible to identify diagnosis and treatment targets that will help to reduce stroke morbidity and mortality in our environment.

This Network is organized and structured to function as a stable coordination tool among the different centers of which it is comprised. From this standpoint, the Network objective is for the researching activity carried out by the different groups to be coordinated, breaking with the isolation in which they had been carrying out their activities to date. Specifically, this Network having been created has made it possible to structure a common research project in acute cerebral ischemia, broken down into 28 sub-proj-

ects which the Network is aiming to carrying out over the next 4 years. This project is structured into five sections:

1. Risk factors and prevention
2. Molecular markers and neuroimaging: acute cerebral ischemia diagnosis and prognosis
3. Clinical studies and experimental models of post-ischemia cerebral reperfusion
4. Molecular and cellular mechanisms of acute cerebral ischemia: treatment targets.
5. Repairing neurovascular unity

2.5.2.   Objectives and Recommendations

General objective 6

Bolster stroke research.

Specific Objectives

6.1.   The Ministry of Health and Consumer Affairs and the Autonomous Communities are to promote top-priority interdisciplinary stroke research by means of including the calls for applications for research projects.
6.2.   The Autonomous Communities and the Ministry of Health and Consumer Affairs are to get measures under way which will bolster the creation of accredited networks of research centers and groups of excellence in stroke.

Top-priority lines

1. Set up descriptive and analytical epidemiological studies on stroke.
2. Study of the genetic determinants of stroke.
3. Increase the research on earlier, more effective, more efficient biomarkers for ischemic and hemorrhagic stroke.
4. Research on drugs for the acute stage of stroke.

5. Research on the degree of adherence to secondary prevention and control of risk factors following a stroke.
6. Research on the efficiency of the Stroke Units and health services which provide stroke care.
7. Research of the efficiency of neurosurgical and neuroradiological treatment interventions.
8. Research on the efficiency of rehabilitating treatment interventions.
9. Research on advancements in stroke-related telemedicine.
10. Research in new measures facilitating reinsertion into gainful employment.
11. Research on stroke in pediatric patients.
12. Research in ultrasonography and neuroimaging techniques.
13. Research in Regenerative Medicine applied to stroke.

3. Strategy Evaluation and Information Systems

Introduction

The integral stroke care set out in this Strategy, which includes coordinated actions and objectives ranging from promotion to rehabilitation undoubtedly poses a challenges for the health system from the standpoint of its evaluation.

Traditionally, the existing information sources and records revolve first and foremost around the health care provided once the disease or pathological event in question has occurred. More specifically, the morbidity for which care has been provided and the procedures carried out at the hospital level are today the prime source of data from this system. In addition to this data, there is information available from surveys conducted on citizens and the death registers listed by cause of death.

Despite the wealth of information provided for the aforementioned sources, other aspects thereof have their shortcomings, such as the knowledge of the problem in stages prior to hospitalization, in conjunction with the actions carried out by the PC level and by the specialized outpatient level. Not availing of this information for the entire National Health System as a whole detracts to a good extent from the overall comprehension of the approach for dealing with stroke.

Apart from the above, evaluation at the National Health System level not being conventional in the past —beyond local or Autonomous Community experiences— of other aspects such as those related to suitable coordination, the effectiveness of the organizational models, etc. accentuates to what degree this information is incomplete.

Therefore, it will necessarily take some time to be able to bridge those gaps considered of special importance for contributing to a better knowledge of the problem so as to be able to pinpoint the best actions to be taken for the purpose of the improvement thereof. This difficult must however only hasten the headway of the work being done among all of those comprising the National Health System.

On one hand, developing the computerized clinical record systems is undoubtedly a key aspect for making it possible to obtain data from records of the care provided on an outpatient basis (primary care and specialized consultations). On the other hand, the debates and agreements which are generated within the Strategy Committees will afford the possibility of deal-

ing with the most qualitative aspects and gathering the ad-hoc information necessary for the evaluation thereof.

The Strategy evaluation is designed to be the result of combining two main aspects:

— Indicators extractable from the National Health System information system (currently available or being worked on)
— Specific information gathering by means of designing a questionnaire for collecting information following an agreement as to the items and criteria for completing the questionnaire. The consensus is to be established within the Strategy Monitoring Committee with all of the Autonomous Communities.

One and another are detailed the following paragraphs in relation to the different objectives.

A)   Quantitative Indicators

General objective 1

1.   Stroke hospitalization release rate

- Formula: [a) / b)] * 100,000
  a) Number of stroke patient hospital releases within one year's time.
  b) Population for the year in question.

- Definitions:
  The numerator includes all those releases in which the main diagnosis is stated as code numbers 430, 431, 432, 433.x1, 434.x1, 435, 436 and 437.1 of International Classification of Diseases ICD-9MC.

- Information sources:
  —   Hospital release registry (MBDS). Ministry of Health and Consumer Affairs.
  — Current population estimates. Spanish National Institute of Statistics.

- Breakdown:
  — By Autonomous Communities and by gender.

- Periodicity:
  — Annual.

Specific Primary Care Objective 1.1

2. Arterial hypertension coverage in Primary Care

    - Formula: [a) / b)] * 100
      a) Number of individuals over 14 years of age detected in Primary Care as being diagnosed with AHT.
      b) Number of health care cards of individuals older than 14 years of age.

    - Definitions:
      The criteria for AHT diagnosis are to be according to the scientific consensuses in effect.

    - Information source:
      — Primary Care Information System clinical database. Ministry of Health and Consumer Affairs.

    - Breakdown:
      — By Autonomous Communities and by gender.

    - Periodicity:
      — Annual.

    - Remarks:
      The prior agreement as to basic standardized criteria for collecting and sharing this information at the National Health System level during the working stage is required for calculating this indicator.

3. Prevalence of arterial hypertension

    - Formula: [a) / b)] * 100
      a) Number of individuals surveyed who report having AHT.
      b) Total number of individuals included in the survey.

    - Definitions/Detailed Explanations:
      The answers to the question as to whether "he/she has been told by a physician that he/she has arterial hypertension" are to be included.

    - Information source:
      — Spanish National Health Survey. Ministry of Health and Consumer Affairs.

    - Breakdown:
      — By Autonomous Communities, gender and age groups.

    - Periodicity:
      — Every three years.

4. Coverage of diabetes in Primary Care

- Formula: [a) / b)] * 100
  a) Number of persons over 14 years of age detected as having been diagnosed with diabetes mellitus.
  b) Number of health care cards of individuals over 14 years of age.

- Definitions:
  The criteria for diagnosing diabetes mellitus are to be in keeping with the scientific consensuses in effect.

- Information source:
  — Primary Care Information System clinical database. Ministry of Health and Consumer Affairs.
  — Primary Care Information System Health Care Card data. Ministry of Health and Consumer Affairs.

- Breakdown:
  — By Autonomous Communities and by gender.

- Periodicity:
  — Annual.

- Remarks:
  The prior agreement as to basic standardized criteria for collecting and sharing this information at the National Health System level during the working stage is required for calculating this indicator.
  The use of the Primary Care Information System as a source of Health Care Card data is considered to be temporary. The National Health System protected population database must be considered to be the ideal source for this data whenever an agreement is reached as to the use thereof for this purpose.

5. Prevalence of diabetes

- Formula: [a) / b)] * 100
  a) Number of individuals surveyed who report having diabetes mellitus.
  b) Total number of individuals included in the survey.

- Definitions:
  The answers to the question as to whether "he/she has been told by a physician that he/she has diabetes mellitus" are to be included.

- Information source:
    — Spanish National Health Survey. Ministry of Health and Consumer Affairs.

- Breakdown:
    — By Autonomous Communities, gender and age groups.

- Periodicity:*
    — Every three years.*

6. Coverage of obesity in Primary Care

- Formula: [a) / b)] * 100
    a) Number of individuals over 14 years of age detected in Primary Care as having been diagnosed with obesity.
    b) Number of health care cards of individuals older than 14 years of age.

- Definitions:
    The criteria for diagnosing obesity are to be in keeping with the scientific consensuses in effect.

- Information source:
    — Primary Care Information System clinical database. Ministry of Health and Consumer Affairs.

- Breakdown:*
    — By Autonomous Communities and by gender.*

- Periodicity:*
    — Annual.*

- Remarks:
    The prior agreement as to basic standardized criteria for collecting and sharing this information at the National Health System level during the working stage is required for calculating this indicator.

Specific Primary Care Objective 1.2

7. Prevalence of obesity

- Formula: [a) / b)] * 100
    a) Number of persons surveyed who had a BMI above the values stated in the Definitions.
    b) Total number of individuals included in the survey.

- Definitions:
  The BMI is calculated based on the height and weight data stated by the individual, as follows:
  — For the individuals under 18 years of age, the cutoff points set out by age and gender sub-groups by Cole TJ, Bellizzi MC, Flegal KM, Dietz WH (Establishing a standard definition for child over-weight and obesity worldwide: international survey. BMJ 2000; 320: 1-6) are to be used.
  — For the case of adults (older than 17 years of age), by the stan-dard equation: weight in kilograms/height meters squared.
  Obesity is considered to exist if the BMI is of 30 kg/m^2 or higher.

- Information sources:
  — Spanish National Health Survey. Ministry of Health and Con-sumer Affairs.

- Breakdown:
  — By Autonomous Communities, gender and age groups.

- Periodicity:
  — Every three years.

Specific Primary Care Objective 1.3

8. Percentage of smokers among individuals above 15 years of age
  - Formula: [a) / b)] * 100
    a) Number of individuals surveyed who are older than 15 years of age and who report smoking tobacco daily at the point in time questioned,
    b) Total number of individuals older than 15 years of age who were surveyed.

  - Definitions:
    All those individuals who smoke daily, regardless of the amount smoked, are considered smokers.

  - Information source:
    — Spanish National Health Survey. Ministry of Health and Con-sumer Affairs.

  - Breakdown:
    — By Autonomous Communities, gender and age groups.

- Periodicity:
  — Every three years.

Specific Primary Prevention Objective 1.4

9. Percentage of individuals who engage in physical activity

- Formula: [a) / b)] * 100
  a) Number of persons age 16 or older included in the survey who engage in physical activity in their free time.
  b) Total number of individuals surveyed who were age 16 or older.

- Definitions:
  All those individuals who report engaging in some physical exercise such as walking, playing some sport, calisthenics, etc. are included.

- Information source:
  — Spanish National Health Survey. Ministry of Health and Consumer Affairs.

- Breakdown:
  — By Autonomous Communities, gender and age groups.

- Periodicity:
  — Every three years.

General objective 2

10. General stroke mortality rate

- Formula: [a) / b)] * 100 000
  a) Number of deaths caused by stroke within one year's time.
  b) Population for the year in question.

- Definitions:
  All those deaths for which the cause is stated as coded 160-164 of the International Classification of Diseases (ICD), 10 are included in the numerator.
  The age-adjusted rates are to be employed by using the standard European population.

- Information sources:
  - — Deaths by cause of death. Spanish National Institute of Statistics and processed by the Ministry of Health and Consumer Affairs.
  - — Current population estimates. Spanish National Institute of Statistics.

- Breakdown:*
  - — By Autonomous Communities and by gender.*

- Periodicity:*
  - — Annual.*

11. Premature stroke mortality rate

- Formula: [a) / b)] * 100,000
  - a) Number of deaths due to stroke in individuals younger than 75 years of age within one year's time.
  - b) Population under 75 years of age for the year in question.

- Definitions:
  All those deaths for which the cause is stated as coded 160-164 of the International Classification of Diseases (ICD), 10 are included in the numerator.
  The age-adjusted rates are to be employed by using the standard European population.

- Information sources:
  - — Deaths by cause of death. Spanish National Institute of Statistics and processed by the Ministry of Health and Consumer Affairs.
  - — Current population estimates. Spanish National Institute of Statistics.

- Breakdown:*
  - — By Autonomous Communities and by gender.*

- Periodicity:*
  - — Annual.*

- Remarks:
  It will be necessary to evaluate the results found using this indicator compared to the "mortality due to cerebrovascular disease", given that the coding of the cause of death does sometimes not allow for the same degree of accuracy as the hospital release coding.

B) Qualitative Indicators

PREVENTION

Specific Primary Care Objectives

Specific objectives	Included in health plan	Included management objective	Measurement system	Evaluated	Result (include equation and data source)
1.5. The high-risk emboligenic cardiopathy patients will be provided with anticoagulant or anti-aggregant treatment					
Specific Secondary Prevention Objectives					
1.6. The patients with stroke and TIA must keep the risk factors under control and undergo preventive medical treatment.					
1.7. The Autonomous Communities are to get measures under way for ascertaining and increasing the percentage of patients who continue following the treatment five years after the event.					

ACUTE STAGE CARE

Specific objectives	Included in health plan	Included management objective	Measurement system	Evaluated	Result (include equation and data source)
2.1. Increase the percentage of patients who are provided with specific treatment within the first 3 hours immediately following the onset of symptoms, assuming the Helsingborg criteria.					

Specific objectives	Included in health plan	No. Accomplished	No. Now under way	No. Evaluated	Brief descp.
2.2. Carry out information campaigns and instructional activities for identified risk groups for improving the population's knowledge of the warning signs and guidelines for taking action.					
	Yes/No/%		Remarks		
2.3. The Autonomous Communities are to have a care-providing network of Stroke Units and Teams in keeping with the criteria set out in the ANNEX to this Strategy.					
2.4. The Stroke Code is to be implemented throughout the Autonomous Community such that any personal or telephone contact from a patient or family member with any non-reference health center, emergency center or hospital will immediately trigger referral to reference units and teams.					
2.5. The basic districts are to have a reference Stroke Team or Unit within an isochrone allowing access within 60 minutes by the means stipulated in their plan or program.					
2.6. All reference hospitals must have a Stroke Code in place (as per criteria stipulated in the ANNEX to this Strategy) for providing top-priority care for all stroke patients, regardless of the means by which they arrive.					

Specific objectives	Included in health plan	Accom-plished	Description of measures
2.7. All hospitals who provide care for stroke and TIA are to have a clinical pathway, care-providing protocol or process in place.			
2.8. The Autonomous Communities are to promote guidelines for taking action for pediatric stroke care.			

REHABILITATION AND REINSERTION

Specific objectives	Included in health plan	Included manage-ment objectie	Mea-sure-ment system	Evalu-ated	Result (include equation and data source)
3.1. All stroke patients are to avail, from the start, of an individu-al early rehabilitation plan making it possible to diagnose the disabil-ity/deficit, start the rehabilitation intervention and make provision for future resources.					
3.2. All stroke patients are to be provided with a functional evalua-tion as support for their integration into the social and/or gainful em-ployment realm at release upon completion of their rehabilitation plan.					
3.3. The patient and family are to be provided with the proper in-struction and information at the hospital in order to carry out the care necessary at home.					

Specific objectives	Included in health plan	Accomplished	Description of measures
3.4. The Autonomous Communities are the set up the mechanisms necessary in order for the release report to be immediately accessible by the Primary Care teams.			

Specific objectives	Included in health plan	Included management objective	Measurement system	Evaluated	Result (include equation and data source)
4.1. The Primary Care teams are to make an integral evaluation of the patients released and of their caregivers.					
4.2. Carry out interventions in Primary Care aimed at providing support for the families who are taking care and tending to stroke patients.					

Specific objectives	Included in health plan	Accomplished	Description of measure
4.3. Set up a system in the Autonomous Communities for coordinating among the different institutions assigned social and health care authorities and resources for organizing the support services for those individuals who have a residual disability following stroke and their caregivers.			

TRAINING FOR PROFESSIONALS			
Specific objectives	**Included in health plan**	**Accom-plished**	**Description of measures**
5.1. Avail of a Continuing Training Plan in the Autonomous Communities for all professionals in PC, emergency centers and hospital emergency rooms and the Stroke Teams and Units to guarantee fast, proper identification, transfer and the providing of care for stroke patients.			See ANNEX I

INVESTIGATION			
Specific objectives	**Included in health plan**	**Accom-plished**	**Description of measures**
6.1. El Ministry of Health and Consumer Affairs and the Autono-mous Communities are to pro-mote top-priority lines of interdis-ciplinary stroke research by means of including the same in their calls for applications for proj-ects.			See ANNEX II
6.2. The Autonomous Communi-ties and the Ministry of Health and Consumer Affairs are to get mea-sures under way to bolster the creation of accredited research networks and groups of excel-lence in stroke.			

Annex I concerning evaluation:
Continuing training activities

Time period evaluated

State the total number of activities (courses, workshops, open conferences, etc.) accredited by the National Accreditation Agency or by the respective Autonomous Community body, the total credits granted by the Agency and the total number of those having attended.

Offered for	Number	Credits	No. Attended
Neurologists			
Primary Care Physicians			
Nurses			
Social Workers			
Occupational Therapists			
Other Professionals			
Multidisciplinary Teams			

Annex II concerning evaluation:
Research activity notification sheet

For the studies related to any of the Strategy objectives, please provide:

1. Specific Strategy Objective to which the study is related.
2. Project Title.
3. Principal Researcher.
4. Total Budget.
5. Source of funding (if managed by the Carlos III Health Institute, state the record code number).
6. Currently under way/completed/published.

4. Good Practices

4.1. Health Promotion and Prevention Activities Program (HPPAP)

Objective: Integrate the Stroke prevention and promotion activities into the care-providing practice of the primary care consultations by generating periodic Recommendations regarding priorities and preventive methods based on scientific evidence.

Target population: The entire population seen by primary care physicians regardless of the reason for the consultation.

Scope: Primary care centers registered for the program.

Description: The Health Promotion and Prevention Activities Program is aimed at promoting preventive activities at the health centers. The Recommendations are structured into three sections: adult care, childhood and adolescent care and those related to mental health prevention.
Specifically, regarding primary stroke care, the Health Promotion and Prevention Activities Program sets out the methodology and periodicity of a number of checks and advice for the prevention and early detection of stroke risk factors.

Evaluation: An evaluation is made very two years. The last evaluation was made in 2001. A total of 627 centers (currently 688) were registered for this Program. A total of 153 took part in the evaluation, the data of 118 centers being valid. An evaluation was made of a total of 2,628 clinical records in the childhood sub-program and of 6,692 clinical records in the adult program. Regarding the percentages to which the preventive activities had been carried out for adults, a total of 60% of the clinical records had pages of preventive activities. Around 80% included some item of data regarding arterial hypertension and 75% had some cholesterol test. A total of 80% of the clinical records included data concerning the smoking habit, 70% including data on alcohol intake. A total of 45% of the clinical records included some recommendation of physical exercise.

Institution and centers responsible for the intervention or program: Spanish Family and Community Medicine Society (semFYC)

Reference sources:
- Spanish Family and Community Medicine Society (SemFYC). Health Prevention and Promotion Activities Program (PAPPS) [Internet]. Barcelona: Spanish Family and Community Medicine Society (SemFYC); 2004. Available online at: www.papps.org

4.2. "Don't Waste Any Time" Campaign for stroke prevention and fast action

Objectives:

- Inform the population as to stroke risk factors and warning signs.
- Make Recommendations as to good living habits.

Target population: General population.

Scope: Autonomous Community.

Description: In 2005, the Autonomous Community of Catalonia Health Department carried out a campaign for informing the population as to stroke warning signs and what to do in case of stroke. This campaign was carried out by means of informative pamphlets which were given out at health centers, posters and a video broadcast on local television stations describing the warning signs of stroke.

Institution and centers responsible for the intervention or program: Autonomous Community of Catalonia Health Department.

Reference sources:

- Autonomous Community of Catalonia [Internet]. Barcelona: Autonomous Community of Catalonia. 2005. "Don't Waste Any Time", stroke prevention campaign http://www10.gencat.cat/gencat/AppJava/es/actualitat2/2005/51121ictus.jsp.

4.3. Stroke Day

Objectives:
- Inform the population as to stroke risk factors and warning signs.
- Point out the social repercussions of stroke.

Target population: General population

Scope: National

Description: For the last 12 years, the Spanish Neurology Society has been holding Stroke Day, a day on which informative campaigns on stroke are conducted not only at the national level but also in all of the Autonomous Communities with press conferences and informative pamphlets. Stroke Day is held on the same day as the Stroke awards ceremony, and this Spanish Neurology Society initiative has subsequently been adopted at the European and worldwide level.

Evaluation: In 2006, a total of 65 newspapers with local and national circulations published news items having to do with Stroke Day on the day it was held.

Institution and centers responsible for the intervention or program: Study Group on Cerebrovascular Diseases. Spanish Neurology Society.

Reference sources:
- http://www.sen.es/noticias/ictus_2008.htm
- http://www.sen.es/noticias/ictus_2006.htm
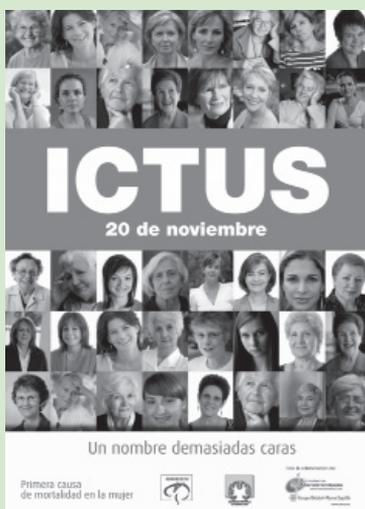
4.4. Stroke Code Implemented in the Autonomous Community of Madrid

Objective: Analyze compliance with the stroke code at the hospitals throughout the Autonomous Community of Madrid.

Target population: All stroke patients who come into the emergency rooms of the hospitals within the scope of the study within the time period stipulated for the study.

Scope: Hospitals with Stroke Units in the Autonomous Community of Madrid (Hospital Clínico San Carlos, Hospital La Paz, Hospital Gregorio Marañón, Hospital Ramón y Cajal, Hospital La Princesa)

Description: The Stroke Code is a system enabling fast identification, notification and transfer of stroke patients to the emergency services and stroke units on a top-priority basis. The Stroke Code (SC) being implemented in a health district improves the organization of stroke care. Evaluate the results of this action in the Autonomous Community of Madrid where the SC was implemented as of the start of 2007.

Evaluation: An evaluation is made by means of an observational, prospective, multi-center study conducted at the hospitals located within the scope of the study by means of a prospective multi-center record in the emergency services of the five hospitals which have a stroke unit within the Autonomous Community of Madrid. All of the patients for whom the neurologist on call was consulted due to a suspected stroke were recorded throughout two consecutive weeks. Demographic and clinical data, care-providing times, means of transport, SC activation, number of thrombolysis, managing and referral from emergency services were all recorded. The data was collected within a definite time period (March 24, 2008 – April 6, 2008) by the neurologists on call:

There are few patients from other health districts. The referral system is not working.

One out of every two patients is not calling the 112 emergency number.

Only one out of every three patients is transferred by SUMMA or SAMUR emergency services.

Long delay in the transfer of the patients for whom the Stroke Code is not activated.

Extremely low percentage of extrahospital Stroke Code activation (8%).

Acceptable percentage of intrahospital Stroke Code activation (29.5%).

Thrombolysis time cut significantly when the extrahospital Stroke Code in activated.

Intrahospital times acceptable, both when Stroke Code is or is not activated.

Good percentage of thrombolysis (6%).

Institution and centers responsible for the intervention or program: Madrid Neurology Association // Madrid Health Service (SERMAS), Autonomous Community of Madrid Health Department.

Reference sources:
• Vivancos Mora J, Alonso de Leciñana M, Díez Tejedor E, Egido Herrero JA, Gil Nuñez A, Fuentes Jimeno B, García Pastor A, Masjuán Vallejo J, Meca Lallana V, Serna Candel C. Impacto asistencial de la implantacion de un protocolo de codigo ictus extra-intrahospitalario en la comunidad de Madrid [Impact of the Implementation of an Extra/Intra-hospital Stroke Code in the Autonomous Community of Madrid], Neurologia (abstract) in newspaper.

4.5. Dissemination of the "Stroke Code" emergency hospital referral system among the PC physicians

Two experiences carried out in the Majorca Island (Balearic Islands) and Albacete (Castile-La Mancha) health districts are explained here.

Objective:
• Bolster the training of the health system professionals for appropriately meeting the needs of stroke patients.
• Unify the action of the PC professionals in view of a patient experiencing a stroke.

Target population:. Primary Care-level health professionals.

Scope: Majorca Island (Balearic Islands) and Albacete (Castile-La Mancha) health districts

Description:

Balearic Islands:
• Firstly, an algorithm was prepared for taking action at the PC level which would remind the professionals of the warning signs, the first actions to be taken, the criteria for referral and the activation of the Stroke Code. PC physicians from Majorca and neurologist from the "Son Dureta" University Hospital took part in this study.
• These measures for taking action were disseminated throughout all of the PC centers and to the SC emergency services on the Island of Majorca on the part of a group of duly-trained professionals. A total of 43 clinical sessions were held with more than 500 professionals taking part at 20 centers, and a poster showing the algorithm for taking action was distributed among all of the centers.

Castile-La Mancha: During the last half of 2006 and the first half of 2007, a scientific dissemination campaign was organized into two distinct stages:
1. Meeting with all of the medical coordinators of the PC centers.

2. Instructional talk/lecture given by the Albacete University Hospital neurologists who came weekly to each one of the health centers throughout the province.

Evaluation:
Balearic Islands: Throughout the 6 months immediately prior to the intervention, 46 Stroke Codes were activated, a total of 17 fibrinolysis procedures having been performed. In the 6 months immediately following the intervention, a total of 96 Stroke Codes were activated and 23 fibrinolysis procedures performed.
Castile-La Mancha: Number of patients referred as Stroke Code patients to the Albacete University Hospital emergency services increased from 110 (annual average) prior to the dissemination campaign up to the 130 immediately subsequent to the campaign. This increase meant an 18% rise.

Conclusions: A PC instruction plan can be useful for increasing Stroke Code activation so that stroke patients will be provided with proper medical care.

Institution and centers responsible for the intervention or program:
Balearic Islands: IB-Salut, Balearic Island Health Service. Autonomous Community of the Balearic Islands.
Castile-La Mancha: SESCAM, Castile-La Mancha Health Service.

References:
- **Balearic Islands:** Spanish Neurology Society. Messages posters from the Spanish Neurology Society 2007. Neurología. 2007; 22(9); 666-824.
- **Castile-La Mancha:** García-García J, Gracia-Gil J, Sopelana-Garay D, Ayo-Martín O, Vadillo-Bermejo A, et al. Intravenous thrombolytic treatment in acute ischemic stroke: initial results in the Albacete University Hospital Complex. Rev Neurol 2008; 46(1):7-12.

4.6. Telestroke Catalonia

Objective:
- Improve the quality of the medical care provided and assure the equity of the providing of services to all stroke patients by means of telemedicine.
- Reduce the mortality and improve functional progress and quality of life of stroke patients
- Cut the costs of the process in order to prevent unnecessary transfers.

Target population: Stroke patients.

Scope: North Barcelona, Osona and Eastern Valleys districts.

Description: In January 2007, the Telestroke-Catalonia was set into motion, this being a system enabling the reference Hospital neurologist (Hospital Call d'Hebron in Barcelona) to be accessible for providing support and facilitating decision-making on a 24-7 basis for the Vic General Hospital emergency physicians based on a videoconferencing and cerebral CT imaging display. In 2008, this project will be expanded to the Granollers, Mollet and Sant Celoni Hospitals.

Evaluation: In 2007, a total of 95 patients have been evaluated by way of this system, 47% having been stroke patients seen at the Vic Hospital. Averaging 75 years of age, average time from onset of symptoms of 151 minutes and average NIH score of 7. Telemedicine avoided unnecessary transfer in 45 cases, it having been possible for tPA i.v. repercussion treatment to have been performed in 19 patients; this treatment having been performed in 12 of these patients at the Vic Hospital. Telemedicine has clearly improved the indicators for the quality of care provided for stroke at the Vic Hospital on reducing emergency ambulance transfer ($p<0.05$), increasing the percentage of patients who are evaluated stat by a neurology specialist ($p<0.01$), reducing the number of unnecessary transfer)$p<0.05$) and increasing the number of thrombolytic treatments ($p<0.05$). Telemedicine can therefore be said to make the following possible:

- Round-the-clock emergency evaluation by a specialist of the acute stroke patients who come into a center where there is no neurologist on call.
- The controlled implementation of the thrombolysis treatment at regional centers, starting treatment earlier and reducing the number of unnecessary transfers.
- Select patients who benefit from transfer to a reference center.
- Prevent unnecessary patient transfers.

Institution and centers responsible for the intervention or program: Vall d'Hebron University Hospital, Vic General Hospital, Autonomous Community of Catalonia Health Department, Catalonian Health Institute.

Reference sources:
- Ribó M, Molina CA, Pedragosa A, Sanclemente C, Santamarina E, Rubiera M, Delgado-Mederos R, Maisterra O, Quintana M, Alvarez-Sabín J. Geographic differences in acute stroke in Catalunya: Impact of a regional interhospital network. Cerebrovascular Dis 2008; 26: 284-288.
- M. Ribó, J. Alvarez-Sabín. ¿Puede la telemedicina restablecer la equidad geográfica en el tratamiento del ictus agudo? Rev Neurol. 2008 May 1-15; 46: 557-60.
- M. Ribó, C. Molina, C. Sanclemente, A. Pedragosa, M. Rubiera, E. Santamarina, O. Maisterra, J. Alvarez-Sabín. Telemedicina en el manejo del ictus agudo: 6 meses de experiencia. LIX Reunión de la Sociedad Española de Neurología. Barcelona, 20-24 de Noviembre de 2007. Neurología 2007;22: 604-605.
- M. Ribó, C. Molina, E. Santamarina, P. Delgado, M. Rubiera, O. Maisterra, R. Delgado-Mederos, J. Alvarez-Sabín. Equidad geográfica en la atención al ictus agudo. Impacto de la implantación de una red interhospitalaria. LIX Reunión de la Sociedad Española de Neurología. Barcelona, 20-24 de Noviembre de 2007. Neurología 2007; 22:605.

- M. Ribó, CA. Molina, M. Rubiera, M. Quintana, E. Santamarina, O. Maisterra, R. Delgado-Mederos, J. Alvarez-Sabin. Geographic differences in acute stroke care in Catalunya: impact of a regional inter-hospital network. 17th European Stroke Conference. Nice, May 13-16, 2008. Cerebrovasc Dis 2008; 25(suppl 2): 77.

4.7.   Balearic Island Telestroke

Objective:
- Use telemedicine to set up an interhospital consultation network which will make early specialized care possible for any stroke patient in order to:
  — Facilitate the care-providing work of the smaller-sized hospitals which have fewer resources.
  — Make remote fibrinolysis treatment possible.
  — Guarantee care equity.
- Reduce the monthly mortality rate and survivor autonomy.

Target population: Stroke patients.

Scope: Autonomous Community.

Description: "Telestroke" is a pioneer service in Spain enabling those experiencing a cerebrovascular accident in any Autonomous Community to be provided, by videoconferencing, with the same care as in the reference hospital (Son Dureta University Hospital, Palma de Majorca) under equal conditions. Stroke Teams have been set up at consulting hospitals (i.e. Hospital Can Misses de Ibiza, Hospital Mateu Orfila de Menorca and Fundación Hospital de Manacor). The Stroke Unit protocol of the reference hospital has been adapted at these hospitals, requiring outfitting with videoconferencing equipment and a private ATM network under the ownership of the Balearic Island Health Service Ib-Salut.

Evaluation: Following the design, tune-up, dissemination, local training and videoconferencing stage, operation was started. Within the July 2006-January 2008 period, a total of 31 calls and 24 teleconferences were made and 16 fibrinolysis procedures were performed (11 at Hospital Can Misses in Ibiza and 5 at the Hospital Fundación de Manacor). A total of 60% of the patients for whom care was provided were females, averaging 67 years of age and scoring an average of 13 on the NIH stroke scale. A total of 60% were TIAC (total infarctions of anterior circulation). The response times were: onset-to-hospital, 80 minutes; door-to-CAT, 27 minutes; door-to-needle, 72 minutes. A total of 31% of the patients who underwent fibrinolysis treatment scores over 4 on the NIH stroke scale at admission, 12.5% having experienced symptomatic hemorrhage and 6% exitus. The initial results indicate telemedicine enabling access to fibrinolysis treatment on the part of the population who do not have access to hospitals which have a neurologist on call, helps to organize the care provided for stroke as it enables early.

4.8. Evaluation of the Clinical Pathway for Acute Stroke Patients

Objectives: Evaluate the degree to which the Clinical Pathway for Acute Stroke adheres to the standards of quality and verify the impact thereof on the medical care provided.

Target population: Patients for whom care was provided before and after the implementation of the Acute Stroke Clinical Pathway.

Scope: "La Paz" University Hospital.

Description:. Clinical pathways are highly useful tools for providing standardized care in clinical practice. However, there are very few studies which evaluate the implementation of a clinical pathway in acute stroke. At the "La Paz" Hospital, an observational study has been conducted on patients for whom care has been provided according to the acute stroke (post-Acute Stroke Clinical Pathway) clinical pathway, an evaluation being made of the degree to which full compliance is rendered with the standards of quality compared to other patients for whom care had been provided prior to the implementation of the clinical pathway in question (pre-Acute Stroke Clinical Pathway). A record was made of demographic variables, vascular risk factors, degree of severity and sub-type of stroke, care-providing activity data, hospital complications and perceived quality of the care provided according to a satisfaction survey.

Evaluation: A study was conducted of a total of 72 patients, 36 pre-ASCP averaging 73.10 years of age (DS 9.5), 47.2% of whom were males.
In the post-ASCP, the antiaggregant, and the fibrinolysis treatment plus the timely dysphagia evaluation fully met the standards in 100% of the cases. The overall evaluation of the service on the part of the patients and their family members was very high.
The appropriate timing of the coagulation results, urgent cranial CT and removal of vein path was better in the post-ASCP patients than in the pre-ASCP patients. A total of 51.6% compared to 40%, 42.9% compared to 32.3% and 60% compared to 39.3%, respectively.

The average time lapse between the request for neurosonological tests and second CT was better in the post-ASCP patients than among the pre-ASCP patients, 0.87 compared to 1.33 days and 1.37 compared to 2.06 days, respectively.

The conclusion is therefore reached that the ASCP means a trend toward cutting shorter the diagnosis and treatment times, in addition to which the overall evaluation of the care is highly positive.

Institution and centers responsible for the intervention or program:. "La Paz" University Hospital, Neurology, Preventive Medicine, Rehabilitation and Emergency Services. Autonomous University of Madrid. Madrid Health Service. Autonomous Community of Madrid.

Reference sources:
• Spanish Neurology Society. Messages and poster from the Spanish Neurology Society 2007. Neurología. 2007; 22(9); 666-824.

4.9. Health Promotion and Self-Help Program for Cerebrovascular Disease Patients and Their Families

Objective: Develop a health education program for stroke patients. Provide care and support for patients who have a disability and for their family members.

Target population: Patients for whom care is provided for cerebrovascular disease and their family members.

Scope: Health district, area, region.

Description: This program is structured into a number of instructional measures at the individual and group level (i.e. knowledge of this disease and its risk factors), primary and secondary prevention, planning at release (i.e. knowledge acquired, evaluation of continuity of home care), among others, concerning family members and patients (n=2,550) who are admitted to the Stroke Unit. The nursing personnel holds a 30-minute session weekly in the Neurology Services.

Evaluation: For the purpose of attempting to get these patients and their family members actively involved, a health education program has been being carried out starting as of 1996. These measures managed for both patients and their family members to be informed about this disease, contributing to foster adaptive responses, changes in lifestyle and compliance with treatment on the part of the patients, this contributing, in all probability, to the promotion and protection of the health of these patients.

4.10. Clinical Pathway of the Donostia Hospital for Acute-Stage Cerebrovascular Disease Rehabilitation Treatment

Objective: The Clinical Pathway of rehabilitating treatment in the hospital stage of acute cerebrovascular disease is aimed at:
- Reducing the degree of variability in requesting and carrying out rehabilitating treatment.
- Designing circuits which will improve the coordination among the services involved.
- Dimension the resources necessary for properly meeting the demand.
- Facilitating systematic, multidisciplinary care in keeping with the clinical practice Recommendations based on the evidence concerning rehabilitating treatment.

Target population: Stroke patients.

Scope: Health area, district, region.

Description: The Clinical Pathway is confined to the acute hospital stage of stroke and was designed by a multidisciplinary team comprised of 2 rehabilitation physicians, 2 neurologists, 2 physical therapists, 2 nurses and 1 Quality Unit physician who served as the coordinator.

- A total of 4 documents were prepared: Time matrix, Information Guide for patients and family members, Measurement Indicators and Check Sheets for purposes of verification.
- Classroom/practice training courses were prepared for the healthcare personnel assigned to the Neurology floor.
- The suitability of necessary resources for the implementation thereof was studied.
- Time Schedules for coordinating between the Neurology and Rehabilitation Interconsultations and between Hospital Rehabilitation and the continuing thereof at the outpatient centers were designed.
- Progressive implementation of the process (matrix, interconsultations…) into the hospital computer network.

Evaluation: The intervention having begun in 2005, it has been considered to have been fully implemented as of January 2007 with the incorporation thereof into the Hospital computer network.

The first aspects in which improvements were noted were those in which the coordination factor was of major importance: interconsultations received and made fast; early, individualized start of treatment; and the continuation of treatment on an outpatient basis following release from hospital.

- In 2007, a total of 254 interconsultations (IC) were requested for stroke cases from Neurology to Rehabilitation during the floor admission stage at an average of 4 days following the onset of the stroke.
- The average IC response took less than 2 days as of the point in time requested.
- More than 95% of the patients had a session appointment made and a therapist assigned on the same date on which the physician replied to the IC and began specific rehabilitation treatment on the following day at the hospital proper.
- Coordination channels have been set up with the different outpatient centers for continuing the treatment within the time frame of 3 working days immediately following release from hospital.

The improvement in the coordination among different disciplines in the rehabilitation of stroke patients can motive professionals, achieve early, individualized care and facilitate informing and getting both the patients and their caregivers actively involved. The coordination among disciplines is feasible and is an important aspect in setting up Stroke Units.

Institution and centers responsible for the intervention or program: Spanish Rehabilitation and Physical Medicine Society (SERMEF).

4.11.   Stroke Project

Objective: Foster cooperative, multi-center research on any fact of cerebrovascular diseases regarding their epidemiology, physiopathology, pathogenesis, clinical aspects, prevention or treatment, ruling out all those studies for a main objective which were to be related to commercial interests of the pharmaceutical industry.

Scope: Nationwide.

Description: The Stroke Project came into being in April 1998 as an initiative of the Cerebrovascular Diseases Study Group of the Spanish Neurology Society for the purpose of promoting collaborative research in the field of cerebrovascular disease.

These studies are coordinated by neurologists connected to different centers within the National Health System in many different Autonomous Communities, in which experts in other fields and basic sciences (biochemists, geneticists,…) also take part.

Two meetings are held annually at different locations in Spain, where new projects are presented and the projects approved present their current status. To date, a total of 21 meetings have been held.

The Stroke Project strategy is based on the following aspects:

1. Fostering the collaboration among Spanish researchers interested in STROKE and stimulating sharing with research groups.
2. Encouraging learning and training of new researchers.
3. Approaching the studies from a multi-disciplinary focus.
4. Defining priority lines of research and cooperative research groups.
5. Creating databases for improving the potential of the groups working alone by themselves.
6. Providing Spanish hospital with the abilities to carry out these activities.

Evaluation: Multi-center, multi-disciplinary studies have been carried out within the Stroke Project, coordinated by different researchers, having given rise to publications and presentations at congresses.

A total of 23 projects have now been fully completed, there currently being a total of 5 projects under way and another 4 in the preparation stage. Ten publications have been made in indexed journals and 45 presentations at congresses.

Institution and centers responsible for the intervention or program: Cerebrovascular Disease Study Group. Spanish Neurology Society (SEN).

Reference sources:
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Annexes

I. Stroke Prevention

Primary prevention

The early detection and prevention of stroke risk factors must be carried out at the Primary Care level. And for this purpose, changes in lifestyle which have shown themselves to be beneficial for preventing stroke: hygienic eating measures[99,100,101] (diet low in saturated fats, rich in fruit, green leafy vegetables and fish[102,103,104], regularly engaging in physical activity), quitting smoking[105,106] and avoiding a high alcohol intake must be recommended generally to the population at the primary care level.

In conjunction with these measures of a universal nature[107], healthy patients without any vascular disease who are at a higher risk of developing a stroke due to the presence of risk factors must be sought out actively in order to more strongly emphasize these general measures and evaluate their risk of developing a vascular disease[108]. A wide-ranging consensus in Europe[109] and Spain[110] recommends the use of the SCORE[103] project cardiovascular risk evaluation tables and recommend considering high-risk cardiovascular patients as being those who score a 5% or above risk to their age, diabetics and those who have an arterial pressure AP > 180/100 mm Hg, total cholesterol > 320 mg/dl-8.3 mmol/l or rather LDL cholesterol > 240 mg/dl-6.2 mmol/l, for whom it is not necessary to make the RCV calculation[111]. Those patients who already have a vascular disease (ischemic cardiopathy, prior myocardial infarction or stroke and/or peripheral arthropathy) must be considered very high risk.

In these high-risk patients, a strict control of their risk factors is fundamental.

A closer check and follow-up must also be made of other risk groups (elderly, pregnancy, homocysteinemia, lower-risk cardiopathies, long-term use of anticoagulants and antiaggregants, drug users, …).

Secondary prevention

Recurring stroke is the leading cause of disability and death following a stroke[112]. The risk of a stroke following a TIA or a cerebral infarction is 18% at 3 months (10% within the first week). This risk is especially pat-

ent in patients who have experienced a stroke of an atherothrombotic etiology[113,114]. Today, we avail of effective treatments which differ according to the cause of the stroke, a specialized neurological diagnosis and treatment as early on as possible therefore being fundamental.

This higher risk of having yet a further stroke continues to exist on a lifelong basis, 2% per year. But anyone who has had a stroke also has a very high risk (3% per year) of having a coronary heart disease (myocardial infarction). At ten years, with standard 1990's preventive treatment, 54% of the ischemic stroke patients have had at least one major vascular episode[115].

The minimal objectives which must be set out for controlling risk factors would be[112]:

Table 18. Risk Factor Control

Primary Prevention	Secondary Prevention
Diet low in saturated fats, rich in fruits, green leafy vegetables and fish	
Prevent obesity (BMI < 30, Abdominal circumference <102 cm in males and 88cm in females)	
Engage regularly in physical activity	
Quit smoking	
Avoid high alcohol intake (> 60 g/day)	
Glycohemoglobin < 7%	
AP < 140/90 mm Hg	AP < 130/80 mm Hg (ideal 120/80[116])
LDL-Chol < 130 mg/dl	LDL-Chol < 100 mg/dl
Anticoagulation if AF	Antiaggregation or anticoagulation

Source: Guide lne for prevention of stroke in patients with ischemic stroke or transient ischemic attack. SAH. Stroke 2006; 37: 577-617.

Without overlooking in secondary prevention the medical treatment of cardioembolic disease (AF, ischemic cardiopathy, dilated myocardiopathy, valve disease, prostheses) and interventionist treatment (carotid endarterectomy or carotid angioplasty) in patients with ischemic stroke (TIA or IC) and stenosis of the extracranial internal carotid artery > 70%.

II. Citizen information

Justification

One of the fundamental aspects for reducing stroke mortality and disability consists of requesting care fast and channeling the patient to the right place for being provided with care[117,118,119,120].

One of the causes of the delay in requesting this care is the little degree of knowledge regarding the warning signs of stroke, its severity and its sequelae, and even more importantly, concerning the need for immediate treatment[121,122,123,124,125,126,127,128,129,130].

It is therefore basic to change the public's attitude toward stroke, specifically concerning any delay in accessing medical service.

Changing citizen behavior by way of information campaigns is possible and has met with success in other campaigns[131].

However, the educational programs targeting the public for the purpose of modifying patterns of behavior do have their limitations, the results sometimes being scant and coming to be only on a long-range basis[132,133, 134].

Citizen information objectives

Reduce the length of the delay in accessing medical care by means of increasing the population's knowledge of the stroke warning signs and what to do.

Recommendations based on the degree to which the population has a knowledge of stroke and on the guidelines which will expedite access to the health system[135,136].

Contents of the information

1. What is "stroke"?

Stroke is a process which occurs suddenly and causes brain damage due to lack of blood flow to the brain.

2. Stroke Warning Signs

Stroke may manifest itself in many different ways, **but any of the following signs**, it may be a sign of stroke:

- Sudden loss of strength or numbness of limbs, especially if both on same side of body.
- Sudden confusion or slurred speech.
- Sudden vision problems, blindness or seeing double.
- Sudden loss of balance or difficulty walking.
- Sudden unusual or very intense headache.

3. Take Action Immediately

Some forms of stroke can be treated, but the longer the time lapse between the onset of the symptoms and treatment, the less effective these treatments are. Treatment early on reduces brain damage, death and disability.
Call the Emergency Medical Services immediately.

4. How Important This Problem Is

- Stroke is the leading cause of death in females and the third-ranked cause in males.
- The onset of stroke is closely linked to age.
- Stroke is the leading cause of loss of functions and dependence.
- One of every three deaths in our country is related to cardiovascular diseases.
- Forty percent of those who survive a stroke will be left with a moderate or severe degree of disability and will be limited in or unable to return to their regular social and working life.

5. Risk of Stroke

- Stroke is closely linked to age, being more frequent among those over 65 years of age.
- The main factors are especially **high cholesterol**, **smoking and/or drinking alcohol, high blood pressure, diabetes, age, gender** and **a past family history of stroke.**

- **Improper diet, stress, lack of exercise** are also damaging.
- **Having had a prior stroke** is also a risk factor for experiencing a further stroke. Following the pharmacological treatment and living habits greatly reduces the probability of a further episode of stroke.

These factors have a multiplying effect: More than one of these factors to a slight degree gives rise to a much higher risk of having heart disease than if you have just one severe factor by itself.

Target population

Based on prior experience, it is better to use a "motivated" population, such as, for example:

- Patients with a cardiovscular risk or their family members.
- Patients with a prior episode or their family members.
- The selection can be made through the primary care structures and also through brain-damaged patients' organizations.

Educational strategies

Use language suited to the general population, avoiding scientific and technical terms.

The strategy preferred by other similar projects[132] has been by using pamphlets, a good alternative is for them to be handed out to the population by professionals.

Campaigns in the broadcasting media are useful, but require the support of professionals.

Combined campaigns (those using more than one way of reaching the population, the broadcasting media, television, radio, newspapers and informative pamphlets) are those which have shown themselves to be most useful.

Facilitate in the doctor's office, nurse's office or others, information on patients' organizations in the form of informative handouts or pamphlets.

Evaluation procedures

Most of the campaigns[132] are evaluated by means of recall surveys focused mainly on the modification of knowledge among the population or by means of controlling the access times in a target population[137], following an educational procedure. This is what occurred in the case of the province of Ontario where the stroke registries were used for identifying the changes in the delay times and the total number of patients who come in[133].

Minimum common aspects of the information among the different autonmous communities

- Stroke warning signs.
- Contact the medical services.
- Strategies for evaluating the campaign results.

III.   Stroke unit and team criteria

The main aspects of the stroke care process are: community education, primary prevention, notification and response of the emergency medical services, diagnosis and treatment in hospital, rehabilitation and secondary prevention[138].

Although strokes require hospital admission during their acute stage, the organization of the different types of services must consider all levels of care and the different points in time of this illness, guaranteeing stroke patient care regardless of where these patients are located. This requires setting up collaborations among the different levels of the network operating within a certain given region, thus providing for better care and a better optimization of the resources.

Once the acute stage is over and the specific measures at the reference centers have been taken, stroke care will be provided, if the clinical conditions so allow, as near as possible to the patient's regular environment[139].

Acute stage stroke care levels

There are three types of hospitals as far as providing care for stroke patients is concerned [139]:

a) Hospitals which have a stroke team

These hospitals must guarantee an organized care of the stroke, which must include at least the following[139]:

- Stroke team, coordinated by a neurologist who is a stroke expert.
- Clinical protocols for taking action.
- Previously-agreed interhospital referral protocols.
- Brain CT round the clock.
- Physical therapy.

The stroke team is the basic stroke care-providing level. The stroke team must be prepared to diagnose and treat strokes knowing when to refer to another level of care. Their main and fundamental characteristic is the fast availability of the personnel comprising the team. These teams are comprised of an interdisciplinary mobile group which works together to assure the finest care for stroke patients at all times. The number of professionals comprising the team will different depending upon the degree of complexity of the hospital in question and may vary throughout the course of this illness in order to adapt to the patient's needs in the acute stage and during the rehabilitation process. There must be a neurologist who is an expert in stroke in charge, coordinating and providing professional support throughout the different stages of this illness.

b) Hospitals which have stroke units

This type of hospital is outfitted with the personnel, infrastructure and programs necessary for stabilizing and treating most stroke patients during their acute stage. The minimum aspects, modified from those described by Alberts et al[140] of this type of hospitals are[139]:

- Stroke Unit. The basic requirements for the proper functioning of a stroke unit are[141]:

    — There must be beds specifically set aside for stroke patients.
    — Have a neurologist who is an expert in cerebrovascular diseases serving as the team coordinator.
    — Working program coordinated with other specialists involved (vascular surgery, neuroradiology, cardiology, rehabilitation and geriatrics).
    — Neurologist on call, preferably *in situ*.

— Diagnosis and treatment protocols.
— Non-invasive multiple parameter monitoring (ECG and arrhythmia detection, oximetry, arterial pressure).
— Nursing team expert in cerebrovascular diseases.
— Nursing protocols
— Neurosonology Laboratory for neurovascular study for the unit.

- Circuits established with the Extrahospital Emergency Service for immediate patient transfer. Stroke Code[142].
- Emergency Service.
- Access to Neurosurgery.
- ICU available.
- Brain CT available round the clock.
- Emergency Laboratory Service round the clock.
- Multidisciplinary rehabilitation.
- Stroke registry.
- Fast, top-priority access to the high-tech hospitals for implementing very specific diagnostic and/or treatment techniques.

It is crucial that the emergency medical services be integrated into the stroke center. This must be an integral component of this type of centers.

Although these centers provide high-quality care for patients, some patients who have complex forms of stroke, with a major neurological deficit or multi-organ disease may require or benefit from specialized care as well as the technical resources not available at this type of hospitals.

c) Reference hospitals for stroke diagnosis and treatment

These are located at high-tech or tertiary hospitals and are defined as that which is outfitted not only with a Stroke Unit but with the personnel, infrastructure and programs necessary for diagnosing and treating those stroke patients who require highly-specialized medical and surgical care.

The key aspects of reference centers, adapted from those described by Alberts *et al*[143] can be divided among 5 main areas[139]:

1. Personnel:

    a. Care-providing process coordinator: Neurologist who is an expert in cerebrovascular diseases.
    b. Neurologists who are experts in cerebrovascular diseases.
    c. Neurosurgeons who are experts in surgically treating cerebrovascular diseases.

    d. Nursing personnel specialized in cerebrovascular diseases.
    e. Vascular surgeons.
    f. Diagnostic neuroradiologists.
    g. Physicians who are experts in endovascular neurointerventions.
    h. Intensive care specialists.
    i. Rehabilitation physicians.
    j. Social workers/assistants.

2. Advanced diagnostic techniques in:

    a. Neurosonology.
    b. Cerebral neuroimaging.
    c. Vascular neuroimaging.
    d. Functional neuroimaging.
    e. Echocardiography.

3. Advanced surgical and neurointerventionist treatments:

    a. Carotid athermatosis.
    b. Aneurysms and intracranial AV malformations.
    c. Intracranial vasospasm.
    d. Intraarterial rerouting and reperfusion.
    e. Intracerebral hemorrhages.
    f. Intracranial hypertension.
    g. Cardiovascular surgery.

4. Infrastructure:

    a. Stroke Unit.
    b. ICU (desirably with experts in neurological care).
    c. 24/7 Neurology on call with physicians trained in cerebrovascular diseases.
    d. Neurosurgery on call 24/7.
    e. Neurointerventionist coverage 24/7.
    f. Stroke registry.

5. Education/research program

    a. Community education.
    b. Community prevention.
    c. Professional education.
    d. Patient education.
    e. In-house cerebrovascular research programs.
    f. Specialized training program.
    g. Publications and presentations at congresses.

Coordination

It is indispensable for there to be communication among the hospitals and the extrahospital emergency services or medical emergency services (SEM), using transport protocols which will assure patients will be transferred to hospitals which are equipped with the resources suitable for each case. The medical emergency services (SEM) must include fast, efficient patient evaluation and selection[139]; pre-hospital communication with the personnel involved at the hospital; and medical stabilization on route[140]. The specific transport protocols are based on providing the highest-quality clinical care and shortening the times for transporting to the appropriate hospital.

Different types of telemedicine and transport services, including air transport whenever indicated, can facilitate the interconnection among the system care providers (health care personnel), making it possible for services located far away geographically to collaborate in providing the care for stroke patients.

IV. Concerning stroke care in small chidren and frail elderly patients

Criteria governing care of the frail elderly

More than half of the patients who experience a stroke in the Western countries are older than 75 years of age[144], and solely one fifth of these patients are younger than 65 years of age[145]. Therefore, 80% of all strokes occur, in our environment, in elderly patients, specifically more than 50% in frail patients (> 75 years of age). This fact in itself alone justifies the presence of a geriatrics specialist on the stroke teams, at least as simply one more member of the multidisciplinary team[146,147,148]. Within this context, special mention must be made of the following aspects:

- Ageism must be avoided: discrimination in the integral approach employed based on the advanced age of the person in question[149]. Assumption of the functional capacity as the actual means of predicting morbimortality[150].
- The decision-making process must be individualized with regard primary prevention in individuals over 75 years of age, where there is still as yet a clear lack of evidence for a large part of the risk fac-

tors[151]. On the other hand, one must take into account peripheral arterial disease, which is often underdiagnosed in the elderly, as a major risk factor for cardiovascular-morbi-mortality[152].

- Although it is important to increase the number of patients on whom thrombolysis is used, one must have it clearly in mind that most elderly people are not going to be apt for employing this intervention. The utmost effort must therefore be made, generally speaking, to improve managing in the acute stage[153].

- Strokes in the very elderly (>85 years of age) are more frequent among females. Within this age range, AF and prior physical disability[154], are involved more often, and age is factor of short-range prognosis.

- In the strokes in the very elderly, a poor short-term prognosis (hospitalization or intrahospital mortality) is related to age, to the degree of severity of the stroke and the degree of disability prior to the acute episode[154]. The long-range prognosis (at least 5 years= is related to the degree of severity of the stroke at onset and the present of AF[154,155].

- The elderly can benefit from rehabilitation therapy as much or even more than young adults, but the heterogeneity is patent. At very elderly ages, although the possibility of recovering independence following a moderate-to-severe stroke may occur in less than 30%, the response to intrahospital multidisciplinary treatment may make it possible for even persons over 85 years of age to recover an average of 50% of the functional deficit experiences[156,157,158]. This makes it necessary to diversify the alternatives of rehabilitation and therefore to handle different car-providing levels with different profiles and intensities of rehabilitating work[158] (Fig. 5).

Fig. 5. Indication of multidisciplinary treatment for functional recovery in elderly stroke patients (adapted fom Dobkin[158])

Algorithm decisions based on the finer details regarding the prior functional situation, current cognitive condition and specific objectives of the rehabilitation. MTDRh – Multidisciplinary rehabilitation.
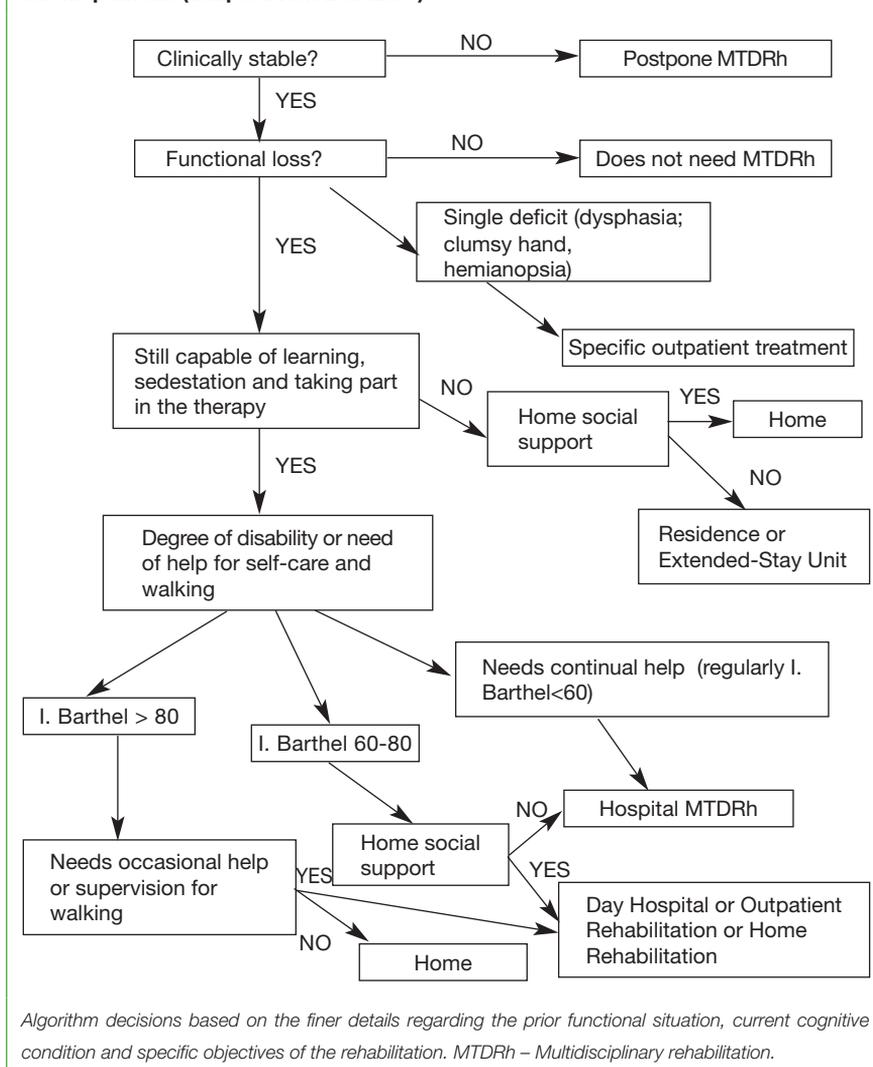
Criteria for childhood stroke care

Although less frequent than adult stroke, childhood stroke is having a progressively greater impact on health due to the fact that the incidence rates recorded are rising (mainly due to the better ability to diagnose stroke pro-

vided by todays imaging techniques and the higher survival rate of the children affected by potentially stroke-inducing illnesses). The annual incidence rate of childhood stroke is estimated within the 2.3-13 cases per 100,000 children per year. In the newborn period, the incidence rate is much higher ((1/4,000-5,000 live newborns)[159,160,161,162,163,164]. In Spain, for a population of 7,381,830 children within the 0-16 age range (figure from the Spanish National Institute of Statistics on January 1, 2007), there are 148-960 children affected by stroke every year. Childhood stroke is additionally important due to its consequences. Childhood stroke is one of the top ten leading causes of infant death, a total of 60%-70% of those children who survive being left with motor and/or intellectual sequelae, which are generally permanent[141,162]. On the other hand, 20% of the children who experience an initial stroke outside of the newborn period are going to experience recurring strokes[165]. The average cost of the first year following a childhood stroke is 43,000 dollars[159].

Stroke is more difficult to diagnose in small children, given that the signs with which stroke presents are often non-specific and are confused with other more frequent disorders. Additionally, the analysis of its etiology is many times difficult due to its etiologies being numerous and complex to diagnose (these small children must often be sedated in order to run the neuroimaging studies). Therefore, the diagnosis very often takes a long time[166].

This delay in the diagnosis, in conjunction with a lack of epidemiological studies in our country, of clinical trials and of research on the impact of stroke on the developing brain leads to pediatric stroke treatment being less effective than in adults[160]. Therefore, one of the suggested stroke objectives stresses the need of setting up a specific program for providing care for childhood stroke, favoring diagnostic tests being run outside of the regular hours (on call), training neuropediatricians in this disease and facilitating research in pediatric stroke.

We additionally suggest that, just as has been done elsewhere[167], that a national Telephone Network be created for managing pediatric strokes, agreed upon among the Autonomous Communities and backed by the Spanish Pediatric Neurology Society, which will serve to: 1) Aid toward managing pediatric stoke patients in the national pediatric hospitals 2) Gather data on the childhood population experiencing strokes 3) Conduct nationwide and international multi-center studies for contributing to improving the treatment of childhood stroke.

V.   Stroke care plans

The standardized care plans set out, in sequence and in sufficient detail, all the steps which must be followed in meeting the patient's integral care-related needs[168].

The stroke care plan, derived from nurse judgment, includes the integral evaluation, the identification of the health problems which can be detected by nursing personnel (nurse diagnostics), the objectives to be accomplished and the interventions necessary to do so. The integral evaluation of each individual is to be systematic and aimed at obtaining clinically-relevant information regarding the patient in question, including physical, psychological, social, spiritual and environment-related aspects and is to be made in an orderly manner which will facilitate the analysis of the situation and will guarantee personalized care[169].

The care plans must include the experience and knowledge of patients, family members and caregivers who have experiences this devastating illness [170,171].

Criteria for preparing care plans in acute stage stroke

Surveillance and intervention regarding potential complications:

- Progressive of neurological loss.
- Convulsive crises.
- Intracranial hypertension.
- Deep-vein thrombosis.
- Bronchial aspiration.
- Arterial hypertension.
- Tachyarrhythmia, cardiac insufficiency, coronary pain.
- Dehydration, hydroelectric disorders.
- Malnutrition.
- Hyperglycemia.
- Hyperthermia.
- Pain.
- Hemorrhage-related complication.

Prevention and treatment:

- Aspiration prevention.
- Evaluation of dysphagia.

- Deglutition therapy.
- Protocol for administering enteral feeding.
- Pressure ulcer prevention.
- Early mobilization and postural treatment.
- Management in view of one side of body nonfunctional.
- Managing distorted peripheral sensitivity.
- Preventing falls.
- Surveillance and restraint.
- Prevention in unilateral neglect.
- Daily living activities: Bathing and hygiene, toilet use, dressing/ grooming, feeding.
- Prevention of respiratory tract infections.
- Aspiration of bronchial contents.
- Clapping and posture treatment.
- Prevention or urinary and intestinal tract disorders.
- Managing incontinence and urinary retention.
- Managing constipation and fecal impaction.
- Prevention of venoclysis infections.
- Prevention of progression of stroke.
- Monitoring vital signs.
- Neurological monitoring.
- Administering medication.
- Speech and communication disorders.
- Pain management.
- Prevention of sleep / rest disorders.
- Emotional patient / family support.
- Planning for release.

Criteria for care plan continuity in primary care follow-up processs

The nursing report at release with remarks and examination is the end of the release planning process and is the document which makes the coordination in the continuity of care possible and the document which assures nursing care[172].

The needs of the patient and of the main caregiver (and family) will have to be watched over in view of the needs which arise, as well as in view of the family possibly faltering.

The nursing report at the release of a stroke patient must:

- Identify the specific needs of the patient in question so as to keep these needs covered in the home following release.
- Provide patients and family members with a sense of security.
- Inform the professionals who will be providing care for the patient in question at hospitals for chronic patients, socio-sanitary centers, PC or home care and set up immediate coordination with rehabilitation.
- Include scales of functional and instrumental evaluation (Rankin, Barthel Index…).
- Provide health information/education to the patient and/or family caregiver concerning:

  — Knowledge of this illness.
  — Knowing how to use the affected limbs.
  — Carrying out daily living activities.
  — Pharmacological control: Type of medication, schedule, dosage.
  — Written nursing recommendations protocolized on an patient information sheet for patients who are starting anticoagulant treatment.
  — Recognizing the signs and symptoms which may be warnings of another cerebral episode.
  — Vascular risk factor recommendations (diet, alcohol, smoking, hypertension, activity, exercise,…).

- Inform concerning educational activities offered for patients, family members and caregivers.
- Inform concerning local stroke patients' associations.
- Inform concerning sexual dysfunction.

VI.   Managing the acute stage of stroke

Stroke treatment begins with recognizing it as being a neurological emergency, even when the symptoms are mild or transitory.

Stroke prognosis will depend, to a great extent, on a number of measures aimed at reducing brain damage to the utmost. Time is of the essence, given that the treatment window may be narrow, taking appropriate actions within the first few hours therefore being fundamental for saving brain tissue.

It is indispensable that the hospitals which provide care to stroke patients have efficient clinical pathways in place for quickly identifying and clinically evaluating the patients with a potential stroke. The objective is to evaluate and decide upon the treatment within the first 60 minutes immediately following the patient arriving in the hospital emergency room.

Anamnesis

A proper clinical record must be made for all patients suspected to be having a stroke in which the time lapse since the onset of symptoms, clinical manifestations and circumstances in which the neurological symptoms presented and also the personal past history of disease are stated.

Examinations to be performed on all patients

In the physical examination, in addition to a general examination, a neurological examination is indispensable and must be made as fast as possible whilst it must also be complete.

The paraclinical examinations which have to be available on a 24/7 basis in order to correctly evaluate those patients whose signs and symptoms are compatible with stroke are:

- Cerebral Computed Tomography or Magnetic Resonance.
- Lab tests for:

  — Glycemia.
  — Electrolytes and renal function.
  — Cardiac ischemia markers.
  — Complete hemogram, including platelet count.
  — Prothrombin time (PT) /INR.
  — Activated Partial Thromboplastin Time (APPT).
  — Oxygen saturation.

- ECG.
- Ultrasonography and/or Angiography, CT/MR. Conventional angiography is indicated solely in select cases.

Examinations to perform on selected patients

- Liver function tests.
- Toxicological screening.
- Alcohol content in blood.
- Pregnancy test.
- Arterial gasometry (if hypoxia suspected).
- Chest X-ray (if pulmonary disease suspected).

- Lumbar puncture (is SAH suspected and CT normal).
- Electroencephalogram (if epileptic crisis suspected).

General treatment

A total of 26%-34% of the patients show a deterioration of the neurological condition, whether in the form of a reduced level of consciousness or of progressive focal deficits during the first week immediately following the stroke. In most, the progression ends within the first 48 hours. This may be due to different causes (expansion of the infarction, hemorrhagic transformation, edema, metabolic disorders, seizures and is associated with a worse evolution. Approximately half of the deaths that occur during the acute stage of stroke are the result of medical complications (pneumonia, sepsis), the other half being attributed to neurological complications (recurring stroke, cerebral edema)[173]. Treatment in a Stroke Unit is the most effective measure for reducing the number of complications and the progression of stroke. All stroke patients must have access to a Stroke Unit or Stroke Team during the acute stage.

Monitoring is fundamental of both the vital signs (HR, AP, breathing) as well as of the neurological and general medical condition throughout the first 48 hours. In the most severe strokes (MCA or brain stem infarctions and hemorrhagic stroke) this monitoring must be lengthened to up to 72-96 hours. Neurological scales are used for neurological monitoring, mainly the NIH and Canadian stroke scales and the Glasgow coma scale.

General stroke treatment encompasses a number of measures aimed mainly at preventing the early complications. Additionally, in conjunction with the medical treatment, this aids toward keeping the cells on the periphery of the infarction core (penumbra) intact. The main general measures during the acute stage of stroke are:

1. Assure air passage permeability, maintain proper oxygenation and prevent bronchial aspirations (dysphagia tests).
2. Control infections and hyperthermia.
3. Cardiac monitoring throughout the first 24 hours of the stroke.
4. Correctly manage arterial pressure.
5. Keep glycemia levels below 140 mg/dL.
6. Achieve proper nutritional and hydroelectric balance.
7. Prevention and treatment of deep-vein thrombosis and pulmonary embolism.
8. Treatment of cerebral edema and intracranial hypertension (ICHT).
9. Treatment of seizures.

Specific stroke treatment

Fibrinolysis

Thrombolytic or fibrinolysis treatment with the recombinant tissue plasminogen activator (rt-PA) is included in the treatment of cerebral infarction within the first 3 hours of evolution. According to the requirements employed in the European SITS-MOST[174] registry, in order to be able to perform fibrinolysis treatment, the following requirements must be met: avail of a Stroke Unit organizational setup, start rehabilitating treatment early, and the process should be managed by an expert neurologist. In a situation of very difficult geographic accessibility, experiences with telemedicine are being started.

The time lapse up to the start of treatment is very important, given that the earlier the tPA treatment is started – within the first 3 hours – the better the outcomes achieved[175]. Therefore, it is highly important that the patients arrive at the hospital as soon as possible. One way of achieving this is the implementation of an interconnection system among the extrahospital physicians and the vascular neurologist at the hospital, which is known as the Stroke Code. This system has shown itself to shorten the time lapse, meaning a higher percentage of early re-routing and a better clinical evolution of these patients[176].

It is very important to keep glycemia at levels below 140 mg/dL before administering the tPA[177], and the AP below 185/110 mm Hg.

The main complication of rt-PA treatment is symptomatic hemorrhagic transformation.

The degree of experience at the Center where the fibrinolysis is performed is associated with the risk of mortality associated with this treatment[178].

Fibrinolysis with windows of 3-6 hours is as safe and effective as that of less than 3 hours. However, for performing fibrinolysis, it is indispensable to demonstrate arterial occlusion salvageable brain tissue by means of diffusion and perfusion techniques using MR[179,180].

The beneficial effect of intravenous fibrinolysis can be bolstered by physical means, such as ultrasound[181] and ultrasound plus microbubbles[182].

In specific situations and at reference hospitals, interarterial fibrinolysis treatment and neurovascular rescue technique can by performed in specific situations and at reference hospital by using mechanic re-routing devices[183].

Antithrombotic treatment
(platelet antiaggregants and anticoagulants)

In ischemic stroke patients, the antithrombolytic treatment with platelet antiaggregants and anticoagulants must be started as soon as possible. In cases of fibrinolysis treatment, treatment is to be started as of 24 hours.

Neuroprotection

This is a supplementary treatment measure which is not a replacement for repermeabilization. Despite a good number of substances having demonstrated their neuroprotective activity in experimental studies, none has been proven, for the time being, to have a clear benefit on human clinical symptoms, according to the design of the protocols in which they were used. The only exception is that of cytocholine, which, in an analysis of the cumulative data of individual patients (data pooling) from 4 prospective, randomized, double-blind, placebo-controlled clinical trials of oral cytocholine in patients with acute stage ischemic stroke, showed how treatment with oral cytocholine (2gr/d) started within the first 24 hours of a moderate or severe stroke significantly increases the probability of complete recovery at 3 months[184]. Central nervous depressant drugs must be avoided.

Interventionist treatment

Surgical decompression (craniectomy) in selected patients under 65 years of age with malignant infarction of the MCA may reduce the mortality associated with this disorder.

The cases of major infarction or hemorrhages (> 3cm) of cerebellum and in those in which there is an effect on the fourth ventricle and basal cisterns, surgical decompression (craniectomy) and or emergency external ventricular drainage is required.

The surgical evacuation of the primary supratentorial hemorrhages is not indicated except in selected cases.

Early endovascular or surgical treatment of intracerebral aneurysms prevents the risk of re-bleeding. Deferred surgical treatment is indicated in patients who have a poor initial clinical degree and non-embolizable aneurysms.

Vascular malformations (VMA, cavernomas) must be treated surgically. In the cases of VMAs, endovascular treatment is supplementary to surgery in most cases.

Objectives

- Survival at one month: > 85%
- Functional Independence at 3 months: > 70% of stroke survivors
- All stroke patients who are subject to specific medical treatment must be transferred to a hospital which has a Stroke Unit.
- Increase the percentage of patients with cerebral infarction who are treated with fibrinolysis.

VII.   Stroke rehabilitation programs

Rehabilitation is an objective-oriented process limited in time which is aimed at preventing complications, minimizing deficit and achieving the utmost functional capacity possible in each case so as to facilitate personal autonomy and reinsertion into family, social and working life.

Rehabilitation must be early so as to optimize the care provided and must also be coordinated and continuing throughout the different stages and areas of the care-providing process[185].

Patients who have a disability caused by stroke must have access to a multidisciplinary rehabilitation team which will deal with all of the areas affected as a whole. This team may be comprised of physicians who are specialists in rehabilitation, physical therapists, occupational therapists, speech therapists, neuropsychologists, nursing personnel and social workers.

The evaluation must be made using valid, reliable standardized scales[186]. The evaluation must include motor, sensory perception and visual areas, speech, cognitive and emotional aspects. The physical disability evaluation is to encompass both the basic and instrumental daily living activities.

It is essential to estimate the functional objective for each patient and to schedule the appropriate treatment interventions which are of importance and effective in keeping with these objectives[185,187,188]. The recovery process must be re-evaluated periodically and re-adjusted to new situations, if necessary.

Rehabilitation is an educational process which involves patients, family members and/or caregivers in the decision-making process, social acceptance and maintenance of the gains achieved with the treatment. The rehabilitation team must know and make use of the community and socio-sanitary resources within the district where they work for expeditiously reinserting patients.

Stages and scopes of care in stroke patient rehabilitation

1. Acute stage hospitalization stage:

This stage is started early and is ideally integrated into an organized care-providing effort, such as a **Stroke Unit.** In the acute stage, the most appropriate referral for each patient must be planned with a view to release from hospital[185,189] (Fig. 6)

2. Scopes of sub-acute stage rehabilitation[189,190]:

    -   **Hospital Rehabilitation.** For individuals who have a moderate or severe disability in two or more functional areas, who require nursing care and who have medical and cognitive conditions enabling them to take part in high-intensity therapies for the purpose of overcoming the disability and returning to their regular environment.
    -   **Outpatient Rehabilitation.** Patients who do not have major cognitive deficits, who have slight / moderate disabilities in one or two functional areas, with adequate social-family support and possibility of coming in to the rehabilitation service.
    -   **Home Care.** Indicated for individuals who have a moderate-to-severe disability and sufficient social-family support to be able to be at home, with difficulties for coming in to the rehabilitation service.
    -   **Long-Term Stay Hospital or Living Facilities.** Individuals in a situation of disability in basic activities, incapable of tolerating intense treatments and who do not have sufficient social-family support to foreseeably be able to return home on a medium-range basis.
        The patient's location may progressively change over the course of their rehabilitation process without losing in coordination or continuity[6].

3. Chronic stage in view of stabilized sequelae:

Approached by means of health care and/or socio-sanitary setups of a community scope which facilitate care and the appropriate maintenance of the persons who have a residual disability following stroke and of their family members and caregivers.

Fig. 6. Referral at release from hospital

```
        ┌──────────────────────────┐   NO   ┌──────────────────────────┐
        │ Patient medically stable?│───────▶│ Postpone decision until  │
        └──────────────────────────┘        │ medically stable         │
                    │                        └──────────────────────────┘
                   YES
                    ▼
        ┌──────────────────────────┐   NO   ┌──────────────────────────┐
        │ Does patient has a       │───────▶│ Does not require         │
        │ functional disability?   │        │ rehabilitaton            │
        └──────────────────────────┘        └──────────────────────────┘
                    │
                   YES
                    ▼
        ┌──────────────────────────┐   NO   ┌──────────────────────────┐
        │ Is patient able to learn?│───────▶│ Palliative disability    │
        └──────────────────────────┘        │ care                     │
                    │                        └──────────────────────────┘
                   YES
                    ▼
        ┌──────────────────────────┐   NO   ┌──────────────────────────┐
        │ Is patient in sufficient │───────▶│ Low-intensity            │
        │ physicial shape to:      │        │ rehabilitation:          │
        │ Remain seated for at least│       │ Institutionalized or home│
        │ 1 hour and capable of    │        └──────────────────────────┘
        │ minimal physical effort? │
        └──────────────────────────┘
                    │
                   YES
                    ▼
        ┌──────────────────────────┐
        │ Multidisciplinary        │
        │ objective-oriented       │
        │ rehabilitation based     │
        │ on functional            │
        │ prognosos                │
        └──────────────────────────┘
                    │
        ┌──────────────────────────┐
        │ According to degree      │
        │ of severity to which     │
        │ affected, tolerance to   │
        │ treatment and social     │
        │ and family availability  │
        └──────────────────────────┘
                    │
    ┌───────────┬───────────┬───────────┬───────────┐
    ▼           ▼           ▼           ▼
┌─────────┐ ┌─────────┐ ┌─────────┐ ┌─────────────┐
│ Specific│ │Outpatient│ │Home care│ │Medium and   │
│ hospital│ │rehabil.  │ │         │ │long-range   │
│ rehabil.│ │services  │ │         │ │stay Hospitals│
│ services│ │          │ │         │ │or Living    │
│         │ │          │ │         │ │Facilities   │
└─────────┘ └─────────┘ └─────────┘ └─────────────┘
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* Palliative disability care refers to maintenance care or rehabilitation.

VIII. Family information

Information for families

Informing and educating patients and their families is indispensable throughout all stages of the process and must begin as of the point in time of the diagnosis in order to carry out the necessary care to be taken at home.

Information

The information furnished to the family must be provided in each case by the care-proving team taking into account in the process what the family understanding concerning stroke, its risk factors, warning signs and sequelae.

The role of the patients' association must be bolstered with regard to informing the families, for which purpose it would be necessary to stimulate the training of local associations of stroke patients and their family members, given that they play an indispensable role in providing support, information and advices to the patients and their caregivers.

Caregiver support programs

- **Informative pamphlets** providing concise, basic information for **caregivers** to enable them to manage the most common foreseeable problems and situations during their recovery and for them to be able to deal with possible future events from their home.
- **Informative pamphlets** on the **patient and family associations**, promoting the collaboration among the different players involved in providing health care.
- **Information on services, resources, materials for providing care and facilitating and expediting red tape.**
- **Implementation of telephone consultations for quickly answering questions concerning providing care for stroke patients.**

Education

Educating the family concerning stroke is for the purpose of improving the quality of life of the patients and their families and of lightening the burden of the main caregiver by means of appropriately training the caregivers.

These programs should incorporate as actively involved in the training families who have gone through a similar experience so as to identify and convey good practices in managing and providing care for this illness.

The stroke training programs for family members can be carried out at three levels:

- Developing a **practical guide for patients and their caregivers**. The end purpose is not for this guide to take the place of the individual explanation with which they will be provided by the professional but rather to supplement this explanation and aid toward a better understanding thereof.
- **Implementing Workshops for Family Members** of a psychoeducational nature were the proper training will be provided for the caregivers.
- Promoting the creation of **Support Groups** for the family members as spaces where one is helped to cope with everyday situations, to develop skills for providing care without ceasing to care for oneself and to elaborate the deterioration, relationship and treatment with the patient.

Glossary

ABCD	Duration Age, Blood pressure, Clinical characteristics, Duration.
ACs	Autonomous Communities.
AEC	Community Nursing Association.
AELFA	Spanish Speech Therapy, Phoniatry and Audiology Association.
AETSS	Spanish Social and Health Workers Association.
AF	Atrial Fibrillation.
AHA-SOC	American Heart Association-Stroke Outcome Classification.
AHT	Arterial Hypertension.
AP	Arterial Pressure.
APETO	Spanish Association of Professional Occupational Therapists.
APPT	Activated Partial Thromboplastin Time.
ASCP	Acute Stroke Clinical Pathway.
ATM	Asynchronous Transfer Mode.
BDCAP	PC Information System Clinical Database.
BMI	Body Mass Index.
CAT	Computerized Axial Tomography.
CI	Confidence Index.
CISNS	National Health System Interterritorial Council.
CSS	Copenhagen Stroke Study.
CT	Computed Tomography.
CVA	Cerebrovascular Accident.
CVD	Cerebrovascular Disease.
CVR	Cardiovascular Risk.
DALY	Disability-Adjusted Life Year.
DECE	Diet and Risk of Cardiovascular Disease in Spain.
DLAs	Daily Living Activities.
ECG	Electrocardiogram.
EDDES	Survey on Disabilities, Deficits and Health Condition.
FAECAP	Federation of Community Nursing and Primary Care Associations.
FDA	Food and Drug Administration.
FEP	Spanish Patients' Forum.
GENI	Spanish Interventionist Neuroradiology Group.
HDL	High-Density Lipoproteins.
HMG	Human Menopausal Gonadotropin.

HR	Heart Rate.
ICD	International Classification of Diseases.
ICHT	Intracranial Hypertension.
ICU	Intensive Care Unit.
INE	Spanish National Institute of Statistics.
INR	International Normalized Ratio.
IOM	Institute of Medicine.
ISCIII	Carlos III Health Institute.
ISEDIC	Social Impact of Dependent Stroke Patients.
i.v.	Intravenous.
LDL	Low-Density Lipoproteins.
MBDS	Minimum Basic Data Set Registry.
MCA	Middle Cerebral Artery.
MNR	Magnetic Nuclear Resonance.
MSC	Ministry of Health and Consumer Affairs.
MTHFR	Methylenetetrahydrofolate Reductase.
NAOS	Nutrition, Physical Activity and Prevention of Obesity.
NIH	National Institute of Health**.**
NIHSS	National Institute of Health Stroke Scale.
NINCDS	National Institute of Neurological and Communicative Disorders and Stroke.
NINDS	National Institute of Neurological Disorders and Stroke.
NNT	Number Needed to Treat.
NRL	Neurologist.
OR	Odds Ratio.
OSTEBA	Basque Government Health Department Technologies Evaluation Service.
PAPPS	Health Promotion and Preventive Activities Program.
PC	Primary Care.
REGICOR	Girona Heart Registry.
RENEVAS	Cooperative Neurovascular Research Network.
RETICS	Thematic Networks on Cooperative Health Research.
RF	Risk Factors.
RPM	Randomized from the Municipal Citizen Census Registration Record.
R+R+I	Research& Development & Innovation.
RR	Relative Risk.
rt-PA	Thrombolytic treatment with the recombinant tissue plasminogen activator].
SAH	Subarachnoid Hemorrhage.
SAMUR	Municipal Emergency Medical and Rescue Service.
SCORE	Systematic Coronary Risk Evaluation.

SC	Specialized Care.
SEA	Spanish Arteriosclerosis Society.
SEDENE	Spanish Neurology of Nursing Society.
SEEGG	Spanish Geriatric and Gerontology Nursing Society.
SEEUE	Spanish Society of Emergency Nursing.
SEGG	Spanish Society of Geriatrics and Gerontology.
SEH-LELHA	Spanish Society of Hypertension.
SEMICYUC	Spanish Society of Intensive Medicine, Critical Care and Coronary Units.
SEMI	Spanish Society of Internal Medicine.
SEM	Emergency Medical Services.
SEMERGEN	Spanish Society of Primary Care Physicians.
SEMES	Spanish Society of Emergency Medicine.
SEMFYC	Spanish Family and Community Medicine Society.
SEMG	Spanish Society of General Medicine.
SEN	Spanish Neurology Society.
SENEC	Spanish Neurosurgery Society.
SENP	Spanish Pediatric Neurology Society.
SENR	Spanish Neuro-Rehabiliation Society.
SENR	Spanish Neuroradiology Society.
SERMEF	Spanish Rehabilitation and Physical Medicine Society.
SESPAS	Spanish Society of Public Health and Health Administration.
SIAP	PC Information System.
SITS-MOST	Safe Implementation of Stroke Monitoring in Thrombolysis Study.
SNS	Spanish National Health System.
SONES	Spanish Neurosonology Society.
SUMMA	Madrid Medical Emergency Service.
TACI	Total Infarct Anterior Circulation.
TIA	Transitory Ischemic Accident.
TSI	Personal Health Card.
VMA	Vascular Malformations.
WHO	World Health Organization.
YLL	Years of Life Lost.

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In Spain the stroke represents the second cause of death in the general population and the first among the female population, furthermore it is the leading cause of disability generating a very high social expenditures.

To improve the approach of this pathology an effort of health planning is required that has resulted in our country in the adoption by the Interterritorial Council of the National Health System, which was held on 26 November 2008, of the Strategy on Stroke of the National Health System.

This document proposes a set of general and specific objectives with their corresponding technical recommendations, structured in five strategic areas, namely, promotion and protection of health, care in acute stages, rehabilitation and reintegration, training and research. Its progressive implementation by health services will be a qualitative improvement in stroke care and a reduction of the burden of the disease that this pathology represents.