

The Stroke Prevention and Educational Awareness Diffusion (SPREAD) Collaboration

The Italian Guidelines for stroke prevention

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Associazione Nazionale Medici Cardiologi Ospedalieri (ANMCO)

Associazione per la Lotta all'Ictus Cerebrale (ALICE)

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Introduction

The development of the Italian Guidelines on Stroke has been a coordinate process, involving a multidisciplinary working group in which twenty different professional organizations and two patients associations were represented. The group was organized in operative subcommittees. Each subcommittee dealt with a different area covered by the guidelines and was composed of 5-10 experts in the specific field. Furthermore, a "scientific task force" and an editorial board were in charge of coordinating and providing internal review of all the material progressively produced. From early 1998, when works officially started with a ple-

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nary meeting, to February 1999, when the final draft was printed, an intense collaboration has been made among the members of each subcommittee and among the groups for the developmental process and for consensus achievement on the guidelines. Most of the work and the communications occurred electronically through the limited-access section of an appositely created website. Plenary or single area meetings took place at crucial decisional points of the process. During the national forum "Stroke '99", the final draft was presented and discussed in a plenary session and in small workshops for comments and consensus by experts who were not involved in the guidelines formulation, nurses, therapists, patients, and regional representatives. Finally the ultimate version was submitted for approval to the medical associations involved.

The guidelines, a 306-page manuscript, consist of: (a) introduction; (b) methodology explanations; (c) epidemiological data; (d) diagnosis (clinical definition, laboratory and instrumental investigations and monitoring); (e) risk factors; (f) primary prevention; (g) secondary prevention: acute phase; (e) secondary prevention: long-term medical treatment; (f) secondary prevention: surgical therapy; (g) care-maintenance, rehabilitation and prevention of complications and (h) new perspectives for integrating prevention issues and multidisciplinary research.

The aim of these guidelines is to provide knowledge and recommendations about primary and secondary prevention of stroke in the clinical practice. They are not only informative but also normative, though in a non-binding way.

The recommendations are judged valid when they: (a) consider all the important steps of the clinical decision-making process and the related outcomes; (b) identify the best evidence concerning stroke prevention and critically evaluate its reliability; and (c) identify and take into account the different interests that may determine the selection among different outcomes (i.e. benefit, risk and costs).

The recommendations are relevant when they: (a) intervene in situations of wide clinical practice variability; (b) provide new evidence with a specific impact on a current therapeutic conduct; and (c) concern the treatment of such a number of people that even small changes in the practice could have a strong impact on outcomes and on allocation of resources.

The ethical frame of these guidelines is based on four fundamental principles: (a) to benefit; (b) not to harm; (c) to respect autonomy; and (d) to be rightful. It also takes into account the different positions deriving from the unavoidable contrasts existing between ethics, economy and law, which usually influence the relationship between doctor and patient.

At present, reliable evaluations of cost-effectiveness of the main treatments considered in these guidelines are not available in Italy. If such studies are performed it will be advisable to also consider the problems related to the estimation of costs: (a) exclusion of important cost factors; (b) inclusion of costs that are not surely related to the project; (c) improper calculation of costs; (d) improper updating of the cost values; (e) uncertainty of the estimates (sensitivity

analysis); (f) improper use of average-cost values; and (g) confusion and overlapping between costs and rates. In any case, costs are to be classified as direct, indirect or intangible (altogether they constitute the total cost), in relation to the most suitable measures of effectiveness and/or of benefit. The summary of the statements (**S**) and recommendations (**R**) presented in the final draft of 23 February 1999 are reported hereafter.

Methodology

S1.1 These guidelines have been formulated following a multidisciplinary approach in order to be: (a) suitable to the Italian setting; (b) based on the best available research evidence; (c) updated to the most recent scientific developments; and (d) propositive and flexible.

S1.2 The recommendations have been formulated considering the evidence found in the Cochrane Database of Systematic Reviews and electronic medical literature databases (e.g. MEDLINE), as well as data from both Italian and international research directly available to the experts involved in the guidelines formulation. Documented consensus on still-developing subjects has been also considered, specifying its peculiarity. The strength of evidence was graded according to a 3-grade rating (Table 1).

S1.3 The recommendations are always explained by the scientific work-up which they derive from, in order to provide formative teaching to the reader. These guidelines in fact aim to help, not to substitute, the clinical judgement necessary in every single case.

S1.4 For each recommendation a formal consent was sought on: (a) validity; (b) reliability; (c) clinical relevance; (d) applicability; (e) comprehensibility; (f) flexibility; and (g) respect of persons. The degree of agreement is reported together with each recommendation as well as a possible documented disagreement, when it occurred.

S1.5 For the developmental process and consensus achievement on these guidelines, electronic communica-

Table 1 Strength of recommendations

Grade A	Level I	Data from randomized, controlled trials with low false-positive and false-negative errors
Grade B	Level II	Data from randomized, controlled trials with high false-positive or false-negative errors
Grade C	Level III	Data from nonrandomized, concurrent cohort studies
	Level IV	Data from nonrandomized cohort studies using historical controls
	Level V	Data from anecdotal case series

tions, general meetings or meetings involving the single area participants have been used, according to the specific decisional task.

S1.6 In order to make these guidelines a practical tool, each recommendation has been formulated taking into account: (a) flexibility; (b) clearness; and (c) minimal intrusion in the clinical practice.

S1.7 These guidelines are being disseminated through: (a) a pamphlet for quick consultation of the basic recommendations; (b) a summary of all recommendations for use in the daily clinical practice; (c) a complete textbook containing the scientific background, consistence and the elaboration produced by the experts involved in the guideline formulation; and (d) an electronic version accessible via Internet.

S1.8 These guidelines will be tested by specialists and general physicians on a general population sample to evaluate their applicability.

Epidemiology

S2.1 In Italy, stroke is the third cause of death after cardiovascular diseases and tumors. It causes 10%-12% of all deaths every year, and represents the main cause of disability.

S2.2 In the Italian elderly population, stroke prevalence is 6.5%.

S2.3 Stroke incidence increases progressively with age, reaching the highest values among people 85 years old and over. Therefore, 75% of all strokes affects subjects older than 65 years.

S2.4 In Italy every year, there are more than 130 000 new strokes. Owing to the progressive ageing of the population, in the year 2008 this number will be greater than 170 000 new strokes per year if the incidence remains stable.

S2.5 In Italy, prevalent stroke cases which were about 730 000 in 1990, will increase (assuming a constant incidence and mortality rate) to 950 000 subjects in the year 2008.

S2.6 While the incidence of stroke remains stable over time, mortality and disability show a decreasing trend. Mortality in the first month is 30%. Among survivors, 40% present with serious residual disability.

S2.7 After a transient ischemic attack (TIA) or minor stroke, the absolute risk of stroke varies from 7% to 12% in the first year, and from 4% to 7% per year in the first 5 years.

S2.8 After an ischemic stroke, the absolute risk of recurrence varies from 10% to 15% in the first year, and from 4% to 9% per year in the first 5 years.

Diagnostic work-up

S3.1 Correctly defining the pathophysiologic mechanism of TIA or stroke has important prognostic and therapeutic

implications. The diagnosis is usually made using a combination of clinical and laboratory data.

R3.1 (Grade C) According to the World Health Organization (WHO) definition, a TIA is characterized by the sudden development of signs and symptoms of focal cerebral or visual deficits of vascular origin lasting less than 24 hours. Loss of consciousness, dizziness or vertigo, transient global amnesia, drop attacks, generalized weakness, delirium or sphincteric incontinence do not allow alone a definite diagnosis of TIA.

R3.2 (Grade C) The diagnosis of TIA or stroke is only clinical and does not need neuroimaging support. However, computed tomography (CT) or magnetic resonance imaging (MRI) is recommended for the differential diagnosis with other pathologies that can mimic TIA or stroke.

R3.3 (Grade C) The clinical definition of the vascular territory in which the attack has occurred is recommended for its practical implications in planning the diagnostic work-up, interpreting correctly the information supplied by the neuroimages, understanding the pathophysiology, putting forward the prognostic factors and making therapeutic decisions, especially in the case of surgery.

S3.2 The pathophysiologic diagnosis of TIA or stroke is probabilistic and can be probable or possible. Two possible diagnoses may be hypothesized when the probability criteria of both are fulfilled.

R3.4 (Grade C) In the acute phase of TIA or stroke, routine laboratory tests are recommended in every patient.

R3.5 (Grade C) In the acute phase of stroke, cerebrospinal fluid examination is recommended only when subarachnoid hemorrhage is clinically suspected but CT is negative.

R3.6 (Grade C) In every patient with TIA or stroke, an electrocardiogram (ECG) is recommended as one of the main examinations of the pathophysiologic work-up.

R3.7 (Grade C) After TIA or stroke, Holter ECG monitoring is recommended only when cardioembolism is suspected or no other definite pathophysiologic mechanism has been identified.

R3.8 (Grade C) After TIA or stroke, transthoracic echocardiography (TTE) is recommended only when cardiopathy is suspected on a clinical-anamnestic basis.

R3.9 (Grade C) In TIA or stroke, when suspecting a cardioembolic mechanism, transesophageal echocardiography (TEE) is recommended only in patients under 45 years of age with no other clear causes of cerebral ischemia, lack of instrumental evidence of cerebral vessel disease, and absence of major risk factors.

R3.10 (Grade A) In the acute phase of stroke, CT is recommended in every patient to reveal a possible cerebral hemorrhage and to support therapeutic choices.

R3.11 (Grade C) In the case of a normal early CT scan, repeat CT is recommended: (a) 5-7 days after the onset of symptoms when the diagnosis or the prognosis remains to be clarified; and (b) after 24-48 hours in clinically unstable strokes.

R3.12 (Grade C) In TIA, either in the acute or late phase, a CT exam, possibly contrast-enhanced, is recommended for differential and pathophysiologic purposes.

R3.13 (Grade C) Magnetic resonance imaging is recommended in the acute phase only in patients with clinically suspected cerebellar or brain stem strokes and an unclear CT scan, or when suspecting a cerebral venous thrombosis or a neck artery dissection.

R3.14 (Grade C) In the diagnostic work-up of a patient with TIA, MRI is complementary to CT when pathophysiologic clarifications are needed.

R3.15 (Grade C) Magnetic resonance angiography (MRA), replacing digital subtracting angiography, is recommended when a symptomatic stenosis of the internal carotid artery is detected on ultrasound, and the patient is a candidate for endarterectomy.

R3.16a (Grade A) Digital subtracting angiography is recommended for the evaluation of surgically approachable carotid stenosis when the echo-Doppler plus MRA study is not possible or is not conclusive.

R3.16b (Grade C) Digital subtracting angiography is recommended when vasculitides or cerebral vessel dissections or malformations are suspected.

R3.17 (Grade A) Electroencephalography (EEG) is recommended only in patients whose stroke-like clinical presentation is suspected to have an epileptic pathogenesis.

R3.18 (Grade A) In patients with TIA or recent stroke, echo-Doppler examination of supra-aortic vessels is recommended for the pathophysiologic work-up.

R3.19 (Grade C) Echo-Doppler examination of supra-aortic vessels is recommended for evaluating carotid artery stenosis in order to select the surgical approach, replacing angiography in this matter, only if integrated with MRA data and after having documented its reliability.

R3.20 (Grade C) Echo-Doppler examination of supra-aortic vessels is recommended in patients undergoing major cardiovascular surgery for the preliminary evaluation of the risk of cerebral ischemic complications due to the concomitant presence of a carotid artery stenosis.

R3.21 (Grade C) Echo-Doppler examination of supra-aortic vessels is recommended in patients who have undergone carotid endarterectomy (CEA) to monitor for recurrence, timing the follow-up examinations at 3 and 9 months after CEA and every year thereafter.

R3.22 (Grade C) Echo-Doppler examination of supra-aortic vessels is recommended in asymptomatic subjects: (a) after finding a non-cardiogenic carotid bruit; and (b) in groups of people with a high carotid stenosis prevalence (e.g. with peripheral arteriopathy or well-documented coronary artery disease, and in subjects over 65 years with multiple vascular risk factors).

S3.3 Lacking conclusive evidence, the prognostic value of the morphologic characteristics (e.g. consistency, homogeneity of tissue signal) of carotid plaques, as defined on ultrasound basis, is uncertain.

R3.23 (Grade C) Transcranial Doppler is complementary

in patients with a recent TIA or stroke, and provides additional information on patency of cerebral vessels, recanalization and collateral pathways.

R3.24 (Grade C) Transcranial Doppler is complementary in patients undergoing carotid endarterectomy, providing pre-operative evaluation and intraoperative monitoring.

R3.25 (Grade C) Contrast-enhanced transcranial Doppler is recommended as an alternative to transesophageal echocardiography for detecting a right-to-left cardiac shunt.

Risk factors

S4.1 Several epidemiological studies have identified multiple risk factors for stroke. Some factors (i.e. age) cannot be modified; nevertheless they contribute to define the risk classes. Other factors can be modified through pharmacological or non-pharmacological approaches, and their identification is crucial to primary and secondary stroke prevention.

S4.2a The well-documented modifiable risk factors are: (a) arterial hypertension; (b) some cardiopathies (particularly atrial fibrillation); (c) diabetes mellitus; (d) hyperhomocystinemia; (e) left ventricular hypertrophy; (f) carotid stenosis; and (g) cigarette smoking.

S4.2b Transient ischemic attacks, although by themselves symptoms of vascular pathology, are usually considered to be a well-documented risk factor for stroke.

S4.3a Other factors probably contribute to stroke risk but up to now have not been completely documented as independent risk factors. They include: (a) dyslipidemia; (b) some cardiopathies (patent foramen ovale, septal aneurysm); (c) plaques of the aortic arch; (d) use of oral contraceptives; (e) alcohol abuse; (f) low physical activity; (g) migraine; (h) antiphospholipid antibodies; (i) hemostasis factors; (j) infections; and (k) drug use.

S4.3b Hypercholesterolemia is the main modifiable risk factor for coronary artery disease, while its association with stroke is still not completely defined.

S4.4 Age is the most important stroke risk factor. Stroke incidence increases with age and, after 55 years of age, it doubles every decade. The majority of all strokes occur in people over 65 years.

S4.5 A predisposition to stroke may be inherited. However, the role of genetic factors as stroke determinants is not yet determined.

S4.6 The different risk factors interact in a factorial fashion, and the risk of stroke increases with the number of factors.

Primary prevention

R5.1 (Grade C) In order to decrease stroke incidence and mortality, counseling and promotion of correct life-styles at

the whole population level are recommended with special focus on the subjects at higher risk.

R5.2 (Grade C) Cessation of cigarette smoking, proved to decrease stroke risk, is recommended for all smokers independent of age and amount of smoking.

R5.3 (Grade C) Alcohol intake is recommended to be limited to two glasses of wine (or an equivalent amount of alcohol) per day.

R5.4 (Grade C) Moderate physical activity (about 2500 kcal per week) is recommended, because it is associated with a reduction in stroke incidence, especially in men.

R5.5 (Grade C) The reduction of dietary salt (not adding salt when eating, avoiding salty foods) is recommended, especially in hypertensive elderly people, because it can reduce arterial hypertension, the major risk factor for stroke.

R5.6 (Grade A) The treatment of arterial hypertension, either systolic or diastolic, is recommended independently of age and severity of hypertension, because it decreases the risk of stroke. According to the WHO guidelines for 1999, the optimal systolic and diastolic arterial pressures are < 130 and < 85 mm Hg, respectively, for young and adult subjects and for diabetic subjects of any age, and < 140 and < 90 mm Hg, respectively, for the elderly.

R5.7 (Grade C) Oral anticoagulant therapy, maintaining the international normalized ratio (INR) at 2-3, is recommended for all patients with atrial fibrillation and valvulopathy, independently of the presence of others risk factors.

R5.8a (Grade C) In patients with non-valvular atrial fibrillation, the conversion to a sinus rhythm is recommended as the first therapeutic approach.

R5.8b (Grade A) In patients aged 65-75 years with non-valvular atrial fibrillation, oral anticoagulant therapy, maintaining the INR at 2-3, is recommended unless hemorrhage risks are increased.

R5.8c (Grade A) In patients with non-valvular atrial fibrillation, age over 75 years, and additional thromboembolic risk factors (e.g. diabetes, arterial hypertension, heart failure, left atrial dilatation, left ventricular dysfunction), oral anticoagulant therapy (INR 2-3) is recommended, evaluating carefully every single case and taking into account the increased hemorrhagic risk in the elderly.

R5.8d (Grade A) Although less effective, aspirin (ASA) therapy (325 mg/day) is recommended as an alternative to anticoagulant therapy for non-valvular atrial fibrillation in: (a) patients over 65 years with contraindications to oral anticoagulants; (b) patients over 75 years with a hemorrhagic risk higher than that for thromboembolism; and (c) patients with a poor compliance to anticoagulant therapy or difficult access to therapy-monitoring facilities.

R5.8e (Grade A) In patients under 65 years with non-valvular, isolated atrial fibrillation, no prophylactic treatment is recommended because of its low embolic risk. In case of developing additional embolic risks, these must be evaluated in every single case in order to decide between ASA and oral anticoagulant therapy.

R5.9 (Grade C) The use of statins for the treatment of hypercholesterolemia as a measure of primary stroke prevention, is recommended only in patients with coronary artery disease.

R5.10a (Grade C) Although not directly proven, diagnosing and treating diabetes mellitus is recommended for its plausible contribution in reducing stroke risk.

R5.10b (Grade A) In diabetic patients 30 years of age and over with at least one additional risk factor, aspirin therapy is recommended for primary prevention of stroke.

R5.11 (Grade C) In patients with antiphospholipid antibodies, anti-thrombotic therapy is recommended only for those with a history of thrombotic events.

R5.12 (Grade C) Although plaques of the aortic arch may be a risk factor for stroke, at present their treatment with anti-thrombotic agents is not recommended given the lack of risk-to-benefit evidence.

Secondary prevention: acute phase

R6.1a (Grade A) For patients presenting with TIA, prompt hospital admission is recommended when symptoms are recurrent and last more than 1 hour, and when there is a possible embolic source (arterial or cardiac).

R6.1b (Grade A) In case of stroke, prompt hospitalization is recommended. Optimal care can be provided by a stroke unit or a hospital with a dedicated team, equipped with a CT scanner and connected to a rehabilitation service. This organization for acute stroke management has been proved to reduce mortality and residual disability and to increase the rate of patient discharge.

R6.1c (Grade C) For the management of patients with acute stroke, the following basic interventions are recommended: (a) early mobilization; (b) use of a urinary catheter only if strictly necessary; (c) prevention of cutaneous lesions and articular blocks; (d) proper feeding and hydration also in dysphagic patients; (e) treatment of fever; and (f) prevention and treatment of infectious complications.

R6.2 (Grade C) In patients with acute ischemic stroke and high blood pressure, antihypertensive treatment is recommended to be started not earlier than about 2 weeks, if it is still needed at that time.

R6.3a (Grade C) In patients with acute ischemic stroke and particularly high blood pressure (> 220/120 mm Hg), early antihypertensive treatment is recommended.

R6.3b (Grade C) Prosecution of the usual antihypertensive treatment is recommended in hypertensive patients with acute ischemic stroke.

R6.4 (Grade B) In patients with acute ischemic stroke, the use of elastic stockings or pneumatic compression in case of plegic patients is recommended for the prevention of deep venous thrombosis.

R6.5 (Grade C) For the prevention of deep venous thrombosis in patients with acute ischemic stroke, the use of

subcutaneous heparin (5000 IU b.i.d. or t.i.d.) is recommended only if the risk of deep venous thrombosis is high and persists after the first 14 days.

R6.6 (Grade A) In the acute phase of an ischemic stroke, antiplatelet treatment with aspirin (160-300 mg per day), is recommended, starting within the first 48 hours.

R6.7 (Grade A) Unfractionated heparin, heparinoids or nadroparin are not recommended for the treatment of acute ischemic stroke because of the lack of conclusive data on their efficacy and for their increased hemorrhagic risk.

S6.1 There is no conclusive evidence that intravenous heparin therapy is effective for the treatment of progressing stroke or crescendo TIAs.

R6.8a (Grade C) In patients with cardioembolic stroke due to non-valvular atrial fibrillation, early oral anticoagulant therapy is recommended only in cases of small/medium size CT lesions (< 30% of one lobe) that are non-hemorrhagic in the first 48 hours.

R6.8b (Grade C) In patients with cardioembolic stroke and a highly emboligenic cardiopathy, early intravenous heparin therapy, maintaining the partial thromboplastin time (PTT) at 1.5- to 2.5-times the baseline values and followed by oral anticoagulant therapy, is recommended only in cases of small/medium size CT lesions (< 30% of one lobe) that are non-hemorrhagic in the first 48 hours.

R6.8c (Grade B) In patients with cardioembolic stroke and a large CT lesion (> 30%) or poor arterial hypertension control, anticoagulant treatment is recommended to be started not before 5-14 days from stroke onset.

S6.2 There is no evidence in favor of the effectiveness of glycerol or other osmotic diuretics on the long-term outcome of ischemic stroke.

R6.9 (Grade A) In acute ischemic stroke, the use of hemodilution or steroids is not recommended because their ineffectiveness has been demonstrated.

R6.10 (Grade C) In acute ischemic stroke the following interventions are recommended: (a) use of antipyretics to control fever; (b) treatment of infectious complications; and (c) control of hyperglycemia.

R6.11 (Grade C) Prophylactic anti-epileptic therapy is not recommended in case of stroke without seizures.

R6.12 (Grade C) In patients with stroke, anti-epileptic therapy is recommended after a first seizure or recurrent seizures, avoiding the use of phenobarbital for its possible negative effect on recovery.

Secondary prevention: long-term medical treatment

R7.1 (Grade A) In patients with TIA or non-cardioembolic ischemic stroke, antiplatelet therapy with aspirin (100-325 mg/day) is recommended.

R7.2 (Grade A) In patients with TIA or non-cardioembolic ischemic stroke, the association of aspirin (50

mg/day) and dipyridamole (400 mg/day) is recommended.

R7.3 (Grade A) In patients with TIA or ischemic stroke, when aspirin is not well tolerated or is ineffective, antiplatelet therapy with ticlopidine (500 mg/day) is recommended, monitoring for hematological complications in the first three months.

R7.4 (Grade C) In patients with emboligenic cardiopathies or valvulopathies and a cardioembolic stroke or TIA, oral anticoagulant therapy is recommended, maintaining the INR between 2 and 3.

R7.5 (Grade C) In patients with hypercholesterolemia and TIA or ischemic stroke due to supra-aortic vessel atherosclerosis, hypocholesterolemic therapy with statins is recommended because it has been shown to prevent stroke and acute myocardial infarct.

S7.1 In case of TIA or ischemic stroke, there is no evidence in favor of the effectiveness of oral anticoagulant therapy maintaining the INR between 2 and 3.

R7.6 (Grade A) In patients with ischemic stroke or non-cardioembolic TIA, oral anticoagulant therapy, maintaining the INR between 3 and 4.5, is not recommended for its higher cerebral hemorrhagic risk.

R7.7 (Grade A) In patients with non-valvular atrial fibrillation and an embolic stroke or TIA, oral anticoagulant therapy is recommended, maintaining the INR between 2 and 3.5.

R7.8 (Grade A) In case of embolic stroke or TIA in patients with non-valvular atrial fibrillation and contraindications to oral anticoagulant therapy, antiplatelet therapy with aspirin (325 mg/day) is recommended.

R7.9 (Grade B) In case of embolic stroke or TIA in patients with non-valvular atrial fibrillation and contraindications to oral anticoagulant therapy and aspirin, treatment with indobufen (100-200 mg b.i.d.) is recommended.

R7.10 (Grade A) In case of embolic stroke or TIA in patients affected by dilatative cardiomyopathy isolated or associated with non-valvular atrial fibrillation or with an intraventricular thrombus, oral anticoagulant therapy is recommended, maintaining the INR between 2 and 3.

R7.11a (Grade C) In patients with ischemic stroke or TIA proved to be due to a patent foramen ovale, antiplatelet therapy with aspirin (325 mg/day) is recommended.

R7.11b (Grade C) In patients with ischemic stroke or TIA proved to be due to a patent foramen ovale and the presence of septal aneurysm or deep venous thrombosis, oral anticoagulant therapy is recommended maintaining the INR between 2 and 3.

R7.11c (Grade C) In case of stroke recurrence while on oral anticoagulant therapy, in patients with ischemic stroke or TIA proved to be due to a patent foramen ovale, surgical cardiac correction is recommended.

R7.12 (Grade C) In case of stroke recurrence, in patients with cardiac valvular prostheses who are on proper oral anticoagulant therapy, the association of oral anticoagulant and dipyridamole (400 mg/day) or aspirin (100 mg/day) is recommended.

Surgical treatment

R8.1 (Grade A) Carotid endarterectomy is recommended for cases of symptomatic (within 6 months) carotid stenosis > 70% (according to the North American Symptomatic Carotid Endarterectomy Trial [NASCET]).

R8.2 (Grade A) Carotid endarterectomy is not recommended for symptomatic carotid stenosis < 50% (according to NASCET).

R8.3 (Grade B) In patients with symptomatic carotid stenosis between 50% and 70% (according to NASCET), carotid endarterectomy is recommended only in case of recent ischemia, non-ocular symptoms, ulcerated plaque, not very old age, male sex and absence of diabetes.

S8.1 Considering the treatment of asymptomatic carotid stenosis, evidence in favor of endarterectomy effectiveness is still incompletely defined, developing studies will furnish further recommendations.

R8.4 (Grade A) In cases of asymptomatic carotid stenosis of 60% or more, endarterectomy is recommended only if the major perioperative complication risk is less than 3%.

R8.5a (Grade C) Before performing a carotid endarterectomy in patients with clinical or non-invasive instrumental evidence of severe coronary artery disease, coronarography is recommended.

R8.5b (Grade C) When planning carotid endarterectomy in patients with severe coronary artery disease, the possibility of coronary revascularization is recommended to be considered as well. The timing of the two interventions could be simultaneous or sequential, choosing to treat first the most symptomatic vascular district.

R8.6 (Grade A) Deciding the timing of carotid endarterectomy in symptomatic patients, either the specific clinical pattern or the neuroimaging features may be considered:

- a) In cases of TIA or minor stroke and a negative CT scan, the surgical approach is recommended as soon as possible;
- b) In cases of stable neurologic deficits and small lesions on CT scan, the early surgical approach is recommended;
- c) In cases of large CT lesions, the early surgical approach is not recommended, independently of the neurological impairment.

R8.7 (Grade A) Carotid echo-Doppler is recommended as a screening examination for either the etiopathogenetic or the therapeutic work-up.

R8.8 (Grade A) Conventional angiography is still considered the gold standard for assessing the surgical indication in cases of carotid stenosis.

R8.9 (Grade C) Carotid echo-Doppler, if validated with conventional angiography and completed with magnetic resonance angiography, can substitute angiography in evaluating carotid stenoses especially when $\geq 80\%$. Conventional angiography is recommended in case of

doubts, especially for carotid stenosis between 50% and 79%, or when suspecting multiple lesions or vascular malformations.

R8.10a (Grade C) During general anesthesia, intraoperative cerebral monitoring is recommended by means of valid intraoperative techniques (EEG, somatosensory evoked potentials, transcranial Doppler).

R8.10b (Grade C) For cerebral protection, the selective temporary shunt could be recommended in either general or loco-regional anesthesia.

R8.10c (Grade C) Loco-regional anesthesia is recommended for endarterectomy, as it allows better intraoperative cerebral monitoring and is associated with lower perioperative risks of death, stroke, myocardial infarction and pulmonary complication.

S8.2 Despite favorable results, obtained in non-randomized studies, for the utility of carotid patching in decreasing perioperative risks of stroke, death, thrombosis and restenosis, at present there is not enough conclusive evidence to recommend its use.

S8.3 At present percutaneous transluminal angioplasty (PTA) is not considered safe.

R8.11a (Grade C) In the absence of conclusive randomized, controlled studies comparing PTA and thromboendarterectomy, at now the routine use of PTA is not recommended.

R8.11b (Grade C) PTA with stenting is recommended only in selected cases, such as restenosis, moderate stenosis appearing echomorphologically regular and compact, or carotid stenosis localizations other than the bifurcation.

R8.12 (Grade A) Both endarterectomy techniques, open thromboendarterectomy and eversion endarterectomy, are recommended for the surgical treatment of carotid stenosis, provided a major perioperative complication rate less than 3%.

R8.13 (Grade A) The estimate of major perioperative complication (death, stroke) incidence, conducted by every surgical center, is recommended for its weight on surgery indication, especially in cases of asymptomatic carotid stenosis.

R8.14 (Grade C) The post-procedural control to detect and, if necessary, repair possible defects while performing thromboendarterectomy is recommended as a quality measurement and has been shown to reduce post-operative complications, such as restenosis and late stroke.

R8.15 (Grade B) Antiplatelet therapy is recommended before surgical intervention except in the presence of contraindications.

R8.16 (Grade C) The surgical correction of stenosis recurrence is recommended if severe and clinically symptomatic.

R8.17 (Grade C) A frequent post-operative follow-up is not recommended after carotid endarterectomy. The follow-up is recommended within 3 months from the intervention, after 9 months and then every year.

Care-maintenance, rehabilitation and prevention of complications

S9.1 The term “rehabilitation” encompasses all those coordinate actions set up with the aim to exploit at best the potential recovery of every patient in order to gain as much independence as possible in the activities of daily living.

S9.2 The rehabilitation process must follow a precise individual plan, designed by a competent medical specialist as a part of a more general management project, which carefully defines the setting and a series of multidisciplinary interventions, actively involving the family physician as well.

S9.3 The targets of long-term health care after stroke are the following: (a) control of comorbidities; (b) prevention of recurrence; (c) definition of prognosis; and (d) enhancement of functional recovery.

R9.1 (Grade C) A multidisciplinary team, pursuing optimal strategies for diagnosis, prevention and recovery, is recommended for rehabilitation after stroke.

R9.2 (Grade C) In the subacute phase of stroke, a carefully planned scheme for the prevention of recurrence is recommended.

R9.3 (Grade C) After hospital admission of a patient with stroke, early prevention of deep venous thrombosis is recommended, continuing it as long as the risk due to immobility is present.

R9.4 (Grade C) Evaluation of the risk of falling is recommended on admission and periodically during the hospital stay. The complexity of the intervention to prevent falling is proportional to the degree of disability.

R9.5a (Grade C) Proper limb placement is recommended to prevent shoulder traumas.

R9.5b (Grade C) To avoid shoulder traumas, intense forced limb mobilization is not recommended.

R9.6 (Grade C) Early evaluation of swallowing is recommended in patients with stroke before starting solid and liquid oral intake. In case of dysphagia, swallow-facilitating techniques must be used.

R9.7 (Grade C) Preservation of cutaneous integrity is recommended in the acute phase and throughout the rehabilitation process.

R9.8a (Grade C) Urinary catheter should be removed as soon as possible.

R9.8b (Grade C) The long-term use of urinary catheter is recommended only in patients with untreatable urinary incontinence or retention.

R9.9 (Grade B) Treatment of bowel functions is recommended in patients with constipation or fecal incontinence.

R9.10 (Grade C) A careful clinical assessment of depression is recommended after a stroke.

R9.11a (Grade B) Thorough counseling is recommended for patients and their relatives to explain stroke causes and rehabilitative expectations, and to enhance collaboration.

R9.11b (Grade B) Comprehensive caregiver training is recommended to guarantee proper rehabilitative support.

S9.4 The rehabilitation setting, varying from in-patient services (hospital, long-term care institution) and out-patient services (ambulatory, habitation) should be chosen considering a series of parameters such as clinical stability, residual independence, cognitive features, fatigability and family support.

S9.5 The clinical estimate, necessary to plan the individual rehabilitation project, must be based on the evaluation of patients according to clinical status, social aspects, motor and cognitive impairments, mood and behavioral features, communication ability, family assistance and independence.

S9.6 The main steps necessary to properly cope with residual disability are: (a) development of abilities useful for daily life management; (b) training based on key instructions and increasingly difficult tasks; (c) progressive increase in self-confidence; and (d) autonomous performance of rehabilitative activities at home.

R9.12a (Grade C) Early mobilization of patients with acute stroke is recommended, unless clinically contraindicated.

R9.12b (Grade C) Encouraging patients to resume previous activities of daily living is recommended as soon as they are clinically stable, helping them with compensatory strategies if necessary.

S9.7 Motor recovery may be reached by: (a) facilitation techniques, in case of sufficient residual limb functionality; (b) compensatory techniques, in case of poor residual strength and need to replace usual methods to do things; and (c) motor task learning, when the patient needs to learn a specific motor performance.

R9.13 (Grade B) Encouraging the use of affected limbs is recommended if some residual functions are still present. Exercise and functional training should be directed to enhance strength and motor control for restoring sensorimotor and functional abilities.

S9.8 In planning a rehabilitation project, the patient's needs must be taken in account in relation to: (a) complete information on disease characteristics; (b) future perspectives; (c) domiciliary services; (d) possibility to properly modify the habitation; (e) psychiatric management, and (f) involvement in work and social activities.

S9.9 Government actions, promoting interventions for long-term prevention and assistance, are crucial.

Acknowledgement Supported by Bayer Italy, with an educational grant.