Clinical Practice Guideline

Update: January 2007

Generalitat de Catalunya
Departament de Salut

Malaltia Vascular Cerebral
Pla Director

Agència d'Avaluació de Tecnologia i Recerca Mèdiques

L'Acadèmia
FUNDACIÓ ACADÈMIA DE CIÈNCIES MÈDIQUES I DE LA SALUT DE CATALUNYA I DE BALEARS

Clinical Practice Guideline

The mission of the Stroke Programme of the Department of Health of the Autonomous Government of Catalonia is to analyse health needs and services, propose strategies for the planning and assessment of services, reach a consensus with the professional sector and the scientific world as to priority lines of action, promote an intersectorial and transversal approach, collaborate in order to improve quality of services and propose training and research lines in the field of cerebral vascular disease.

The Catalan Agency for Health Technology Assessment and Research is a non-profit public company created in May 1994. Its mission is to foster the introduction, adoption, dissemination and use of medical technologies by means of criteria driven by proven efficacy, safety, effectiveness and efficiency, and also to promote research oriented towards the health needs of the population and knowledge of the health system. The Agency is a collaborating centre of the World Health Organisation in the assessment of medical technology, it is a founding member of the International Network of Agencies for Health Technology Assessment (INAHTA), and is a coordinating centre of the Network of Cooperative Research for Investigation in Health and Health Service Research (IRYSS Network).

Edition: Catalan Agency for Health Technology Assessment and Research
2st edition, January 2007, Barcelona

Publishing coordination: Elisa Rius Umpiérrez

Design and dummying: Joana López Corduente

Translation: LinguaCom

National Book Catalogue Number: B-46.917-2005

On the Clinical Practice Guidelines

The clinical practice guidelines (CPG), based on available scientific evidence, are instruments that can help professionals, managers and planners to make decisions on health questions, and if properly developed, distributed and implemented can improve clinical outcomes.

The CPG are elements of information for professionals and are not conceived as text books that answer all questions. They are not a set of rigid rules, and nor do they purport to replace professional judgement in every individual case.

CPGs do not usually link their recommendations to specific professional groups, since the different health-care levels of the network render it difficult to generalise applicability to one type of professional. Nevertheless, the CPG do address the real situation of every country.

This document is part of the Stroke Guides, which include:

- *Clinical Practice Guidelines for Stroke*
- *Overcoming Stroke* (Guide for patients and care-givers)
- Clinical Audit of the CPG recommendations

Presentation

One of the most important objectives of the Stroke Programme in Catalonia was to develop a *Clinical Practice Guideline* (CPG) on stroke. In October, 2004, the Plan formally commissioned the Catalan Agency for Health Technology Assessment and Research (CAHTA), which provided methodological support to the different professionals that have collaborated in drafting it, with the support of their scientific societies framed within l'Acadèmia de Ciències Mèdiques i de la Salut de Catalunya i de Balears (ACMCB).

This is an institutional CPG driven by the Department of Health. Its scientific content is an adaptation of the international guidelines and of available and updated scientific evidence. It aims to be the reference guide in Catalonia on integrated stroke care.

The *Guide* features a quality control system in the form of an audit of the clinical process and an assessment of results that will make it possible to periodically ascertain compliance with the recommendations and with the indicators the writing team saw as most important with regard to improving stroke care.

This CPG is presented along with a guide for patients and care-givers that was written by a team of patients and professionals to facilitate knowledge and understanding of the disease by those who suffer from it and by care-givers. Particular consideration was afforded to the participation of all the professionals involved in the care process for ictus patients, and time and interest was dedicated to collecting all their suggestions and opinions, based on scientific evidence and good clinical practices, to make sure that the stroke CPG is a real and useful instrument rather than a scientific document of scant practical utility.

Writing the stroke CPG heralded a major and selfless effort by a large group of persons, and was designed to be a useful instrument for professionals, planners, managers and patients. However, the set of recommendations it contains will not improve clinical practice simply because they have been committed to written form.

The Stroke Programme is the instrument created by the Department of Health to define and implement the recommendations of this CPG, make them operational in the territory and evaluate results, although this will only be maintained if the enthusiasm shown by the professionals that participated in the writing of this CPG is upheld and is extended. It also represents the basic tool to reach the ultimate goal of this CPG, namely to contribute to improving the health of the citizens of Catalonia.

Summary

The stroke CPG has been structured in four areas to make it easier to query any topics that may be of interest.

1. INTRODUCTION

   It defines what stroke is, the scope of the Guide and its objectives.

2. ABOUT THE GUIDE

   It shows how to use the Guide, how it was written and what its characteristics are.

3. STROKE IN CATALONIA

   It presents the knowledge on the situation of stroke in Catalonia and the territorial organisation criteria applied in the care provided for this disease.

4. ASSESSMENT AND MANAGEMENT OF THE STROKE PATIENT

   This is the clinical part of the Guide. It is structured in four Sections that are closely interdependent:

   - Management of acute stroke
   - Secondary prevention
   - Rehabilitation of stroke patients
   - Returning home

5. EDITORIAL STAFF AND COLLABORATORS

6. ANNEXES

Contents

Abbreviations

AANS:	American Association of Neurosurgical Societies
CAHTA:	Catalan Agency for Health Technology Assessment and Research
RCT:	Randomised Clinical Trial
MCA:	Middle Cerebral Artery
AHA:	American Heart Association
IA:	Incidental Aneurysm
NSAIDs:	Non-steroidal Antiinflammatories
TIA:	Transient ischemic attack
ARA-II:	Type II Angiotensin Receptor Antagonists
ASA:	American Stroke Association
ADL:	Activities of Daily Living
CMBDAH:	Hospital Discharge Minimum Data Base Set
CNS:	Central Nervous System
GBPA:	General Board of Planning and Assessment
DH:	Department of Health
TCD:	Transcranial Doppler
ECG:	Electrocardiogram
EMEA:	European Medicines Agency
ESCA:	Health Survey of Catalonia
EUSI:	European Stroke Initiative
FIM:	Functional Independence Measure
GCS:	Glasgow Coma Scale
GOS:	Glasgow Outcome Scale
CPG:	Clinical Practice Guideline
LMWH:	Low Molecular Weight Heparin
ICH:	Intracerebral Haemorrhage
SAH:	Subarachnoid Haemorrhage
HBP:	High Blood Pressure
ICD-2:	International Classification Diseases-2
ACEI:	Angiotensin-Converting Enzyme Inhibitors
CSF:	Cerebrospinal fluid
AVM:	Arteriovenous Malformations
COPD:	Chronic Obstructive Pulmonary Disease
CVD:	Cerebral Vascular Disease
NASCET:	North American Symptomatic Carotid Endarterectomy Trial
NIHSS:	National Institute of Health Stroke Scale
NZGG:	New Zealand Guidelines Group
WHO:	World Health Organisation
BP:	Blood Pressure
DBP:	Diastolic Blood Pressure
MBP:	Mean Blood Pressure
SBP:	Systolic Blood Pressure
ICP:	Intracranial Pressure
RCP:	Royal College of Physicians
MR:	Magnetic Resonance
rTPA:	recombinant Tissue Plasminogen Activator
SIGN:	Scottish Intercollegiate Guidelines Network
SITS:	Safe Implementation of Thrombolysis in Stroke
SITS-MOST:	SITS monitoring study
CT:	Computerised Tomography
TEA:	Thromboendoarteriectomy
PTE:	Pulmonary thromboembolism
OT:	Occupational Therapy
SAT:	Supraaortic trunks
CVT:	Cerebral venous thrombosis (CVT)
DVT:	Deep Vein Thrombosis
ICU:	Intensive Care Unit
WFNS:	World Federation of Neurosurgical Societies

1. Introduction

1.1. Definition of stroke

The World Health Organisation (WHO) defines stroke as a clinical syndrome, presumably of vascular origin, characterised by the rapid development of signs of focal (sometimes global) neurological affection lasting more than 24 hours, or which are fatal. The classic definition of transient ischemic attack (TIA) as a "clinical syndrome characterised by an acute loss of focal cerebral or ocular functions with symptoms lasting less than 24 hours" was recently debated by The American TIA Working Group, which proposes a time criterion of less than one hour (Alberts *et al*, 2002).

1.2. The scope of the CPG

This stroke CPG covers all the phases of cerebrovascular diseases in adults as of acute onset and excludes primary prevention, on which there is abundant bibliography (Goldstein *et al*, 2001; Pearson *et al*, 2003; Chalmers *et al*, 2003; Brotons *et al*, 2005).

1.3. What is the aim of this CPG

- To provide explicit recommendations to professionals as to what the best care is for stroke patients based on the scientific evidence available at the moment and on clinical experience-based good practice recommendations that address the whole process of the disease.
- To stimulate the appearance of local protocols that define and adapt the recommendations of the *CPG* to the characteristics of each institution and each territory.
- To provide planners with elements on the current state of knowledge of cerebral vascular disease to promote a rational and fair territorial distribution of resources.
- To furnish managers with elements on the most relevant clinical aspects of the disease and scientific evidence that supports the use of certain resources.
- To regularly evaluate the most important recommendations in the health care process, as well as outcomes, to improve the health of stroke patients.
- To be the scientific tool of reference to define what changes are needed in health care provided to stroke patients in Catalonia based on an integrated approach to disease care.

2. About the Stroke CPG

2.1. Methodology of the writing process

The Stroke Programme, which depends on the Health Department, commissioned the CAHTA to draft the *Guide* , as it is the Catalan institution with greatest experience in drafting clinical practice guidelines, and appointed the five members of the Drafting Committee (see Section 5) who coordinated the process of drafting the CPG.

The Drafting Committee reviewed the existing CPG and decided to adapt the recommendations of some CPG to our context, wherever possible. Consequently, the English Royal College of Physicians(RCP), the Scottish Intercollegiate Guidelines Network (SIGN) and the New Zealand Guidelines Group (NZGG) were contacted, and their permission was requested to adapt the recommendations of their CPGs to the reality of Catalonia, and which was kindly granted. Moreover, the recommendations of the American Heart Association (AHA), The American Stroke Association (ASA) and The European Stroke Initiative (EUSI) are also cited as a source of reference, although they are not presented here in a specific CPG format.

The Drafting Committee structured the work into four groups: territorial location and organisation, management of the acute phase, rehabilitation and long-term management, promoting the creation of the drafting team (see Section 5), comprised of 32 professionals from the different spheres of disease care. The Standing Commission of the Stroke Programme (see Section 5) helped in the recruitment of the professionals that formed this team, and provided their inputs throughout the drafting process. Contact was made with all the scientific societies (see Section 5) and groups involved, and informative sessions were conducted in each one.

In the phase prior to the drafting of the *Guide*, an electronic survey was sent to a group of primary care professionals to evaluate their perceptions of and attitudes to the disease. Qualitative work was also conducted using the focus group methodology with patients and care-givers in three hospitals of different levels in order to gauge their perceptions scientifically.

Work was done within the framework of the different groups, and the findings were presented at three meetings of the whole drafting team, where the different amendments were discussed and consensus-approved. Throughout the drafting period of the CPG, communication between groups by means of e-mail and telephone was decisive.

2.2. Conflict of interests

No member of the Drafting Committee of the CPG declared any conflict of interests.

2.3. Peer review

The last draft of the CPG was sent to a large number of professionals involved stroke care, for them to provide their suggestions.

These suggestions were taken into consideration by the drafting team and were included if there was consensus. The professionals who provided inputs have been included in Section 5.

2.4. Levels of scientific evidence and degrees of recommendation

The definition of the levels of scientific evidence (Table 1) and degrees of recommendations (Table 2) used in this CPG are those of SIGN. The levels of scientific evidence indicate the result of the methodological assessment of the studies revised, based on the characteristics of the epidemiological design that afford validity to the results described and to the conclusions drawn. The aim of this system of grading is to afford weight to the quality of the scientific evidence behind every recommendation. Moreover, the idea is to emphasise that when the set of evidence scientific is used to lend support to a recommendation, the assessment is made globally and not based only on a single study. It should be said that the degrees of recommendation are established according to the solidness of the scientific evidence they are based on, and that they do not reflect the clinical importance of the recommendation.

Table 1. Levels of scientific evidence

Levels of evidence	
1++	High-quality meta-analyses, systematic reviews of randomised clinical trials (RCT) or RCT with a very low bias probability
1+	Meta-analyses, systematic reviews of RCT or well-designed RCT with a low bias probability
1 -	Meta-analyses, systematic reviews of RCT or RCT with a very high bias probability
2++	High-quality systematic reviews of case studies and cohort controls Quality case studies and cohort controls with a very low probability of confusion, bias or chance, and a high probability that the association is causal
2+	Suitable case studies and cohort controls with a low probability of confusion, bias or chance, and a moderate probability that the association is causal
2 -	Case studies and cohort controls with a high risk of confusion, bias or chance, and a major probability that the association is not causal
3	Non-analytical studies (for example, case studies, case series)
4	Expert opinion

Table 2. Degrees of recommendation

Degrees of recommendation	
A	At least one meta-analysis, systematic review or RCT with a score of 1++, and directly applicable to the target population, or a systematic review of RCT or a set of scientific evidence comprising mainly studies with a score of 1+, directly applicable to the target population and which demonstrate global consistency of results
B	A set of scientific evidence that includes studies with a score of 2++, directly applicable to the target population and which demonstrate global consistency of results, or scientific evidence extrapolated from studies with a score of 1++ or 1+
C	A set of scientific evidence that includes studies with a score of 2+, directly applicable to the target population and which demonstrate global consistency of results, or scientific evidence extrapolated from studies with a score of 2++
D	Level of scientific evidence 3 or 4, or scientific evidence extrapolated from studies with a score of 2+

Points of good practice

✓ This indicates the best practice recommended on the basis of the clinical experience of the group that develops the Clinical Practice Guideline (CPG).

Sometimes, the groups that develop the CPG consider that there are important practical aspects that they would like to emphasise, but there is no scientific evidence supporting it and nor is there likely to be. Typically they are aspects of care or treatment regarded as a sensible clinical practice that probably nobody would question. Points of good practice are indicated in the CPG and are shown with the mark ✅ It must be emphasised that they are not an alternative to the recommendations based on scientific evidence and should only be used when there are no other ways of highlighting the aspects mentioned.

The recommendations adopted from other CPG or institutions are indicated with the following references:

AHA: American Heart Association
ASA: American Stroke Association
EUSI: European Stroke Initiative
NZGG: New Zealand Guidelines Group
RCP: Royal College of Physicians, UK
SIGN: Scottish Intercollegiate Guidelines Network

2.5. Costs

Although the implementation of this CPG may have cost implications, this document contains neither an analysis nor an economic assessment, although works on this topic were used in the review. In places where it is acknowledged that the recommendations of the *Guide* may have important implications in terms of resources, the suggestion to consider these needs locally is made.

2.6. Update of the CPG

This CPG is intended to be formally republished in 2009. The CAHTA and the *Guide* Drafting Committee will perform a twice-yearly evaluation of new scientific evidence and may generate a specific recommendation, an update of a specific aspect, or a complete review if changes in practice or in the approach of the *Guide* are identified as necessary. The amendments, when necessary, will be included in electronic format.

2.7. Dissemination of the CGP

The CPG is published in electronic format and on paper in Catalan, Spanish and English. It will be sent to all the institutions and providers that are involved with the disease, and to all the different health-care levels. There are no reproduction or copyright requirements as long as the source is cited. It may be posted on the different web sites of any institutions and centres that wish to do so.

In the first six months after the publication of the *Guide*, within the framework of the Stroke Programme, and together with the *Patient Guide*, a process of information on its contents will be initiated in all the territorial areas of Catalonia.

2.8. Assessment of the process and the results

The Stroke Programme asked the CPG drafting team to select the most important recommendations for auditing. This audit will be performed every two years in all the Hospitals of the public network of Catalonia. It is the best instrument for guaranteeing the implementation of its recommendations.

Moreover, and with the same frequency as the process, the most relevant clinical outcomes and process indicators will be reviewed. The assessment of outcomes will be conducted in a weighted sample of patients from a representative selection of the Hospitals of Catalonia.

3. Stroke in Catalonia

3.1. Epidemiology of stroke in Catalonia

Stroke is the third leading cause of death in the western world, the leading cause of physical disability in adults and the second leading cause of dementia. Although Catalonia has no specific stroke registry, the available epidemiological information gives us an idea of its magnitude and evolution (Framework document of the Stroke Programme, 2003).

According to the data of the Registry of the Hospital Discharge Minimum Data Base Set (CMBDAH) of the Catalan Health Service of 65 Catalan General Hospitals (91%), under the heading defined as acute cerebrovascular disease, there were 12,335 cases in Catalonia in 2002, and 2,292 within the transient ischemic attack (TIA) group, which does not include patients who were not hospitalised.

In Catalonia stroke accounts for 9.2% of overall mortality; 7.5% in men and 11.1% in women. The 1983 to 2002 period witnessed a 61.1% reduction in the mortality rate as standardised by age, in men and in women, falling from 157.4/100,000 inhabitants a year to 58.6/100,000 inhabitants a year. In 2002, stroke was the direct cause of 5,038 deaths, whereas in 1983 it caused 7,061 deaths, of all ages.

As for in-hospital morbidity, between 1995 and 2003 the number of discharges for acute CVD increased by 32%, with an increase in mean patient age (71.4 *versus* 72.7 years), a shorter average stay (14.2 *versus* 11.2 days), and a slight reduction in the proportion of deaths for this cause (17.8% *versus* 16.3%).

The prevalence of CVD, according to the Health Survey of Catalonia (ESCA) for 2002, is 1.8% in men and 1.4% in women, of all ages.

L'Hospital Universitari del Sagrat Cor de Barcelona registered 1,126 consecutive acute episodes of CVD in a five-year period (1998-2002) (Arboix *et al*, 2003; Arboix *et al*., 2000; Martí-Vilalta *et al*, 1999), although this sample may not be representative of what is happening in other hospitals in Catalonia. The event was ischemic in 70% of the cases (men 68.5% and women 71.5%), haemorrhagic in 9.6% (men 10.5% and women 8.8%), and TIA in 20.4% (men 21.1% and women 19.8%). It was the first episode of CVD in 69.5% of the men and in 79.9% of the women, and was a relapse in the rest.

In this registry, 90.6% of CVD presented in patients aged 65 years or above (men 88.7% and women 92.5%). In 3% of cases it presented in patients aged less than 55 years (men 3.1% and women 2.8%) and in 26.3% of cases in patients aged 85 years or above (men 18.4% and women 34%). The mean age of presentation was 77 years (men 75.7 years and women 79.4 years). The most prevalent risk factors were high blood pressure, 59.1% (men 53.7% and women 64.4%), auricular fibrillation, 29.3% (men 22.7% and women 35.7%), *diabetes mellitus*, 24.5% (men 28.5% and women 20.7%), dislipemia, 20.8% (men 20.9% and women 20.7%) and ischemic heart disease 17.4% (men 22.2% and women 12.8%).

3.2. Stroke care in Catalonia

In the last decade, stroke care in Catalonia has been through major changes. The initiatives and efforts of many professionals have contributed to this. Mention must be made of the roll-out of the stroke code in the city of Barcelona in 1999 (Estany J *et al.*), and subsequently in the province of Girona. Nevertheless, there is still room for improvement. In a few words, the most outstanding characteristics of stroke care Catalonia are:

- In most hospitals, acute stroke care is provided by neurologists, although in some regional hospitals it is still covered by the internal medicine services.
- A territory-based model of urgent care for acute strokes – the stroke code, is now being applied, and targets improving the impact of thrombolytic treatment and the management of acute stroke.
- There are few properly constituted stroke teams, i.e., that comply with the defining criteria of multidisciplinariness and clinical leadership.
- There are few acute stroke units and most of them fit the semi-intensive model and are located in the tertiary hospitals.
- Neither are there stroke units (nor a tradition) that encompass, in a single location, the acute phase care to the very advanced phases of long-term rehabilitation.
- Once the acute phase has taken place in the hospitals, the rehabilitation of many patients that need to remain hospitalised is carried out in convalescence centres, where many rehabilitation resources are concentrated. Few patients convalesce in rehab beds in acute care hospitals.
- There is a network of social and health care specifically targeting the elderly with chronic crippling diseases and terminal patients, complementary to primary and hospital care. In this network, there are hospital and ambulatory services that provide, to differing degrees, care in rehabilitation.
- Some patients follow home or ambulatory rehabilitation, although in few cases is this integrated with the other rehab activities.
- In general, rehabilitation is not part of an integrated model. Consequently, treatment is fragmented and patients may be treated in unsuitable settings, in non-integrated teams with unnecessary repetition of treatments.
- At the moment, there is clearly room for improvement in the question of information and training for patients and care-givers.

3.3. How care should be organised

There is evidence that the most important intervention to improve results for all patients with stroke is the provision of specialised and organised care that can cater to the needs of every patient. Without this organisation, compliance with the recommendations on specific actions made by the CPG has little impact on the improvement of outcomes.

- All patients with stroke or TIA must have access to specialised care in stroke, including rehabilitation, at the different times of the disease and in the terms defined by this guideline.
- All stroke patients must have the same degree of access to suitable care while their disease is evolving, regardless of where they live, their age, gender or ethnic origin.

Health care in Catalonia is provided through an integrated network that groups together different health-care levels distributed territory-wide. The concentration of resources is proportional to the territorial density, with a greater proximity of the tertiary resources to the city of Barcelona and its metropolitan area. The territorial dimension of Catalonia allows patients to travel according to the different conditions if the health transport media and territorial planning criteria are suitable.

While stroke generally requires hospitalisation, the organisation of the different types of stroke services must address all levels of care and the different moments of the disease and guarantee care to patients regardless of where they are. This requires the establishment of collaborations between the different levels of the network that operate in a given region so as to provide better care and optimise resources.

The Stroke Programme of the Department of Health must define the organisational criteria and the role and coordination of the different health-care levels to improve care to patients.

- The level of specialised care must be adapted to the territorial situation, but only proper coordination between the different health-care and territorial levels will result in an equitable care provision.
- All hospitals and their areas of reference must organise stroke care in teams and units adapted to their territorial characteristics.
- Territorial reference centres must be defined for patients that require more specific care in any of the phases of the disease, as must the collaboration and support formulas between the different health-care levels.
- Once the acute phase or the specific actions in the reference centres are over, care must be provided as close to the patient's normal setting as possible, clinical conditions permitting.

3.3.1. Acute stroke patients

Stroke is the acute expression of cerebrovascular diseases. In the acute phase, the patient must be cared for in a hospital where all the interventions recommended by the Guide can be performed throughout the course of the disease. Organised care is characterised by minimum requirements that include care by an interdisciplinary team of professionals (stroke team), the existence of clinical action protocols, access to cranial CT scan 24 hours a day, access to rehabilitation and the existence of rapid referral circuits to reference centres.

- Patients with symptoms suggesting acute stroke, or TIA, must be referred immediately to an acute care hospital if their physical or psychic conditions do not indicate otherwise (see page 45 "Hospital admission criteria").
- In certain clinical conditions, described in this Guide, the patients must be referred to reference centres with a sufficient number of cases treated and expertise in the administration of certain treatments and technologies, and be subsequently returned to the source hospital when the clinical situation so permits.
- It is necessary to define what reference hospitals in Catalonia should fulfil the requirements recommended by this Guide to treat certain clinical conditions.
- The patient transport system must be organised to provide care for stroke patients within the recommended time.
- Acute-stroke patients or TIA who are not attended in the emergency department or are not hospitalised must have access to the diagnostic media and treatment indicated by this Guide within the terms referred to in it.

3.3.2. Stroke teams

The stroke teams are the basic level of stroke care during the acute and subacute phase. They have a hospital base and are formed by a mobile interdisciplinary group that works jointly to guarantee the best stroke care at all times. The number of professionals in the team differs according to the degree of complexity of the hospital, and the composition of the team will vary throughout the course of the disease to be adapted to the needs of the patients in the acute phase and during the rehabilitation process. They are managed by an expert in strokes adapted to the different phases of the disease, and have a well-defined network of connexions with other health-care levels for the management of certain patients.

- The stroke teams comprise all the professionals that take care of the patient in the different phases of the disease in each hospital and its area of reference.
- The characteristics and the number of professionals that form the stroke team depend on the level of every centre and the moment of the disease.
- All hospitals with stroke teams must have referral circuits for the management/treatment of certain clinical situations.
- The stroke teams must have educational programmes in place for professionals, patients and care-givers, as well as consensus-based protocols for the management of the most frequent problems.

3.3.3. Stroke units

Most publications highlight the benefits of stroke units on survival, independence and the chances to return home after stroke (Stroke Unit Trialists' Collaboration, 2001; Rudd *et al.*, 2005). Stroke units must fulfil the following characteristics:

- Be hospital units located in well-defined geographical areas.
- Have a coordinated multidisciplinary team that meets to make decisions on specific cases. The professionals in the team must have expertise in the management of acute stroke and rehabilitation.
- Have training programmes for professionals, patients and care-givers.
- Have action and management protocols for common problems.
- Have access to neuroimaging and vascular imaging techniques.

It must be pointed out that the name *stroke units* from the literature includes different types of units which, while they do not fulfil the aforementioned requirements, have very different characteristics that are mentioned below.

- Acute stroke units that provide care in the acute phase (first 7-10 days), with a personal nurse/patient relationship just like on conventional wards.
- The units which are called semi-intensive, for certain patients in the hyperacute phase of the disease (first 2-3 days), with continuous monitoring and a more intensive personal nurse/patient relationship than in conventional hospitalisation units.
- The specific stroke rehabilitation units, with subsequent hospitalisation in the acute phase and a stay of several weeks.

There are few works that provide a detailed analysis of the benefits offered by each one of the different types of stroke units, although some recent publications prove that acute stroke units significantly reduce intrahospital mortality (Jarman *et al*., 2004). However, more accurate work is needed to define what type of results are impacted in the different models, each one of which has greater presence according to the characteristics and the health system of every country. In any case, the current evidence does clearly establish that hospital care organised in stroke units results in a significant reduction in mortality, disability and institutionalisation rates (Stroke Unit Trialists' Collaboration, 2001). There are also studies that demonstrate that care in stroke units is cost-effective (Launois *et al*., 2004).

The stroke team is the basic level of organisation of stroke care and must also be present in the stroke units. In this way, in Catalonia hospital care for stroke is developed in different models according to the complexity of the health-care level. The base health-care network allows patients to be attended to in the best place at all times during their disease.

- Stroke teams are the basic model of care in small hospitals, where the number of patients does not justify care in geographically defined units.
- Medium-sized hospitals, with a sufficient number of hospitalisations, must have geographically delimited stroke units where the nursing staff must provide expert care for this condition.
- The hospitals that act as reference centres must have acute stroke units which, besides the characteristics defined, must guarantee care to certain patients in intermediate care regimens.

3.3.4. Rehabilitation

The rehabilitation services are distributed in different health-care levels: Acute hospitals, monographic centres, social and health care centres, ambulatory and home rehabilitation.

The setting where rehabilitation care is provided depends on patient characteristics, the phase of evolution of the disease and social and family support. The decision as to the suitable scope of rehabilitation will be taken on a case-specific basis according to the following criteria:

- The effectiveness and the efficiency of the rehabilitation programme depends on the expertise of the professionals of the team, and that the latter is properly organised to take care of the specific needs of each patient.
- The overall care offer in rehabilitation throughout the disease must be complementary and integrated. The community rehabilitation services must be activated so that there is no discontinuity for patients and they must be sufficient to guarantee this continuity.
- The rehabilitation resources must adapt to patient needs and tolerance.

3.3.5. Working with patients and care-givers

Information and education for patients and care-givers is a basic care element in the disease, both ethically and to improve results.

- The information must take individual needs into account.
- It must be free, understandable, suitable and take the disability of the individual receiving it into account.
- Suitable health education programmes must be offered to patients and care-givers.

3.3.6. Primary care

The general psychician is the point of reference for the patient before and after hospitalisation. These professionals must be integrated to achieve continuity of care. The role of primary care in the following aspects must be underlined:

- Management of the primary prevention of vascular disease.
- Recognition of acute stroke/TIA symptoms.
- Knowledge of urgent referral criteria to the reference centres.
- Management of the secondary prevention of CVD.
- Collaboration with stroke teams and integration of the impact of the disease in the patient's global context.
- Access to specialised rehabilitation services.

3.3.7. Care for young people with stroke

Between 3.4% and 8.5% of all strokes occur in individuals aged under 45 years (Álvarez-Sabín, 1997). Although this CPG excludes treatment of stroke in children (the following CPG are suggested: http://www.stroke-site.org/guidelines/childneuro_stmt.html; http://www.ninds.nih.gov/news_and_events/proceedings/stroke_proceedings/childneurology_pr.htm), specialised care in young stroke patients must address their needs, particularly in the field of relationships, family, sexuality, work and leisure activities.

- Professionals must take into account the physical, social and psychological needs of young patients.
- The environment where care is given to young stroke patients must be suited to their needs.

3.3.8. Care for the elderly with stroke

While age is not an excluding factor of the rehabilitation programme, some elderly patients with stroke may present clinical conditions related to advanced age that render the rehabilitation process difficult (mental confusion, malnutrition, dementia, serious immobility and sensorial deterioration). These patients require care and rehabilitation more adapted to their tolerance. Other elderly patients have acute disabilities due to other chronic diseases. In such cases, stroke may impact the state of health less than other existing conditions (comorbidity, deterioration due to an accumulation of conditions and others).

- The elderly with stroke and comorbidity must be attended to in the environment that is most suited to their needs, where they can be offered the most suitable care for their state of health. The choice of a suitable resource will be a clinical decision.

4. Assessment and management of the stroke patient

4.1. Management of acute stroke

4.1.1. Where should care for acute stroke patients be provided?

- Patients with symptoms suggesting acute stroke or TIA, must be referred immediately to an acute care hospital if their physical or psychic conditions do not indicate otherwise (see Section 4.1.3).
- In certain cases (candidates for thrombolysis, young stroke patients, or those requiring endovascular or neurosurgical interventions), patients should be sent to reference hospitals with sufficient expertise in the application of certain treatments and/or technologies, and returned to their place of origin as soon as possible.
- All the hospitals of Catalonia that care for acute strokes must be ready to provide care to these patients and must have a predefined transfer circuit coordinated with the extrahospital emergency services.
- Acute hospitals must guarantee organised stroke care that must include, at least:
  - Interdisciplinary professional team
  - Local clinical protocols
  - Well-defined referral circuits to the reference centres
  - Access to brain CT scan
  - Access to rehabilitation

The characteristics of the reference centres are reflected in the following table.

The reference hospitals[1] must have:

- A circuit that operates with the extrahospital emergency services for the immediate transfer of patients.
- Clear identification of the professional that receives the patient.
- Neurologist involved in stroke care.
- Expert nursing in the management of acute-stroke patients.
- Acute stroke units that guarantee care to certain patients in the intermediate/semiintensive care regimen.
- Accredited experience of the professionals involved in hyperacute care.
- Available Intensive Care Unit (ICU).
- Participation in the national thrombolysis registries and those recommended by the European Medicines Agency (EMEA).
- Brain CT scan 24 hours-a-day and duly trained personnel to interpret it.
- Emergency Laboratory 24 hours a day.
- Early and continued care by a rehabilitation team.
- Hospital protocols for the diagnosis and treatment of stroke and its complications.
- Capacity to treat the whole health-care process in the framework of an integrated team.
- Stroke registry.
- Rapid and preferential access to high-technology hospitals to apply very specific diagnostic and/or therapeutic techniques.

The health system and the extrahospital emergency systems must be coordinated so that if necessary patients can be referred directly to the reference centres and/or tertiary centres.

Health-care protocols

C The hospitals where acute stroke patients are attended to must have written local protocols for the management of the most frequent problems and the complications associated with a poor stroke prognosis (NZGG).

1 Reference centres is taken to mean those designated by the Stroke Programme for the management of certain acute strokes (for example, candidates for thrombolysis, young people with strokes, patients that require continuous monitoring).

2 Only some reference hospitals are both high-technology or tertiary hospitals. They are concentrated in Barcelona and its metropolitan area and are designated by the Stroke Programme to carry out very specific diagnostic/therapeutic techniques (endovascular treatment of aneurysms, carotid angioplasty with stent and cerebral protection, intra-arterial thrombolysis, management of malignant middle cerebral artery infarction, and others).

The centres must have local protocols and clinical pathways to manage the following problems or situations:

- high/low blood pressure
- hyperglycemia/hypoglycemia
- hyperthermia
- Intracerebral haemorrhage (ICH)
- subarachnoid haemorrhage (SAH)
- prevention of thromboembolic venous disease
- enteral nutrition
- patients with dysphagia
- prevention of pressure sores
- incontinence
- postural cures in the hemiplegic patient
- administration of rTPA in acute stroke patients (in reference centres).

4.1.2. Assessment, diagnosis and initial interventions for stroke

The initial and immediate measures that need to be applied in a patient with a clinical stroke syndrome include a general and neurological assessment as promptly as possible. The first measures must target the maintenance of cardiorespiratory stability. The next step is to make a correct neurological diagnosis based on the clinical history, neurological examination and diagnostic work-up.

D The airway must be preserved. The indication of assisted ventilation must be assessed in acute stroke patients with depressed level of consciousness or airway compromise (ASA).

D Hypoxemia must be corrected (<92%) by means of O_2 administration (EUSI).

D O_2 administration is not routinely recommended in non-hypoxemic patients (ASA).

D Cardiac monitoring is recommended in the assessment of acute stroke patients to confirm/rule out the presence of atrial fibrillation, potentially dangerous arrhythmias and acute myocardial infarction (ASA).

Cardiac monitoring must be continuous throughout the first 24 hours in patients requiring it due to their history of heart disease, arrhythmias, unstable blood pressure, signs/symptoms of heart failure, abnormal baseline ECG and/or infarction affecting the insular cortex (EUSI).

B The management of acute stroke patients depends on an accurate diagnosis, which is basically a clinical diagnosis. The diagnosis of stroke should be performed by a stroke clinical expert (NZGG, RCP).

B A neuroimaging test is required to guide acute interventions (ASA, NZGG) *(see Neuroimaging Section).*

D The initial neurological assessment should include the location of the likely cerebral vascular territory affected (RCP).

C All patients with a definite or presumed diagnosis of acute stroke must have a basic general blood test (haemogram, platelet count, clotting, renal function, ionogram, glycaemia) and ECG (NZGG).

B Chest radiography should not be performed routinely unless the symptomatology of the patient so indicates (ASA, NZGG).

Other diagnostic tests may be necessary in selected acute stroke patients.

Neurological impairment should be evaluated with proper stroke scales (the Canadian Neurological Scale or the NIHSS, Table 1) (Coté *et al.*, 1986; Spilker *et al.*, 1997; Stavem *et al.*, 2003; Yamamoto *et al.*, 2003). The latter has gained prevalence in recent years because it provides relevant clinical and prognostic information (Kwiatkowski *et al.*, 1999; The NINDS t-PA Stroke Study Group 1997).

Once the diagnosis of stroke has been reached, a series of general parameters must be addressed, as the control thereof has prognostic consequences.

B On admission, a qualified professional must assess the patient's risk of aspiration using a validated test (Swallowing Test, see Section 4.1.11, Table 2 of the Annexes) (RCP).

D An assessment of the risk of developing pressure sores must be performed, as well as of the patient's needs with regard to moving and hand-ling (RCP).

C Glycaemia, arterial oxygen saturation, hydration and temperature must be maintained within the limits of normality. Infections must be managed aggressively unless the patient is receiving palliative care (RCP).

B Hypertension in the acute phase should be only treated when there are likely to be complications from hypertension (hypertensive encephalopathy, aortic aneurysm with renal involvement) (RCP).

Specific recommendations on the management of blood pressure in ischemic stroke and intracerebral haemorrhage are dealt with in Sections 4.1.5. and 4.1.6.

B Patients must be mobilised as soon as possible after the stroke (RCP; Langhorne *et al.*, 2002; Musicco *et al.*, 2003).

C Rehabilitation needs must be assessed within the first 48 hours (NZGG).

Neuroimaging

Brain imaging is of utmost importance as it allows excluding other aetiologies and distinguishing between ischemic and haemorrhagic stroke (Kinkel *et al.*, 1976; Wardlaw *et al.*, 2004). A recent study demonstrated that an immediate cranial CT scan is a cost-effective measure that improves patient quality of life (Wardlaw *et al.*, 2004)

A Brain imaging is required to guide acute interventions (ASA, NZGG).

B Brain imaging must be performed immediately if (RCP):

- There is depressed level of consciousness
- There is an unexplained progression or fluctuation of symptoms
- There is suspicion of SAH or ICH
- There is suspicion of hydrocephalus secondary to ICH or haemorrhagic transformation
- The patient is on anticoagulant treatment or has a haemorrhagic diathesis
- There is papillary edema, nuchal rigidity or fever
- The patient is a candidate for thrombolytic treatment

B In the remaining cases, brain imaging should be performed as soon as possible, and always within the first 24 hours after the onset of symptoms, unless there are good clinical reasons for not doing so (RCP).

B If the diagnosis is still questionable or the aetiology uncertain after the brain CT scan, a brain MRI should be undertaken (RCP).

D Radiological explorations in pregnant women must follow the general recommendations applicable in other cases. Radiological protection measures should be applied on the abdomen (Culebras *et al.*, 1997).

4.1.3. Hospital admission criteria

Generally speaking, patients with suspected or evident acute stroke are candidates for hospitalisation. Patients presenting a stroke in the course of certain medical situations such as coma, terminal neoplasm, terminal dementia and chronic diseases with serious disability may not be candidates for admission to acute care hospitals and be attended to in other settings, provided that the latter guarantee suitable health care.

In most cases the criteria that will guide the need for hospitalisation are the following (SCN,http://www.scn.es/form/guiasterap/avc/guiad3.htm):

- Perform the **nosological diagnosis** of stroke. 10% of patients with suspected stroke present a different process.
- Initiate the **specific treatment**: thrombolytic, neuroprotector, antithrombotic, surgical, endovascular, physiotherapeutic or speech therapy.
- Prevent and treat **complications**, neurological or not, which may present in 48% of patients in the acute phase.
- Perform the **aetiological study**: arterial, cardiological or haematological. Despite the exhaustive study of cerebral vascular patients, the aetiology is not ascertained in 20-40% of cerebral infarction cases and in 20% of cerebral haemorrhage cases.

4.1.4. Management of transient ischemic attack (TIA)

Patients with TIA must be assessed exhaustively and as soon as possible if their physical or psychic conditions do not indicate otherwise, since the risk of developing an established stroke after a TIA is high; it may reach 20% in the first month post TIA and is

particularly high in the first 72 hours (Lovett *et al.*, 2003; Coull *et al.*, 2004). It must be remembered that the causes of stroke and TIA are the same and that therefore they must be regarded as the same process.

B Patients with TIA must be studied suitably, either through hospitalisation or at the outpatient level by a neurovascular team, preferably within a maximum time of 48 hours after the episode (Rothwell *et al.*, 2005).

B Patients with more than one TIA in a week should be investigated in hospital immediately (RCP).

A Vascular risk factors, such as severe HBP, must be treated properly or referred to the specialist (RCP).

B Antiplatelet treatment must be initiated as soon as possible within the first 48 hours after the TIA (RCP; International Stroke Trial 1997; Chinese Acute Stroke Trial 1997).

✓ The study of TIA must include a brain imaging test, an extracranial/intracranial vascular exploration (Transcranial Doppler, supraaortic trunk ecodoppler, angio-MR, angio-CT, conventional angiography), and the relevant cardiological and coagulation studies.

Stroke services where the TIA is studied must have protocols specifying the access, organisation and the link to vascular surgery services.

4.1.5. Management of acute ischemic stroke

Stroke is a neurological emergency. Suitable management in the initial hours is basic in saving cerebral tissue.

Thrombolysis

A Treatment with rTPA must only be given in hospital centres with qualified staff and the necessary resources (reference centres, see Section 4.1.1.), and according to the following conditions (RCP):

- Administer it within the 3 first hours after the onset of symptoms.
- Exclude the existence of haemorrhage.
- Comply with the NINDS criteria.
- Be registered in the EMEA thrombolysis registry (SITS-MOST).

A Treatment with rTPA must be given as soon as possible, and any delay avoided (Adams *et al.*, 2005).

D Patients given rTPA outside the context of a clinical trial must be reported to the international audit of thrombolysis SITS-MOST (RCP).

A The use of intravenous streptokinase or ancrod as an alternative to rTPA is not recommended (ASA).

C Intraarterial thrombolysis is only given in centres with an interventional neuroradiology service in highly-screened patients with less than 6 hours of evolution (RCP, NZGG).

✓ In young patients with acute thrombosis of the basilar artery trunk, and in view of the poor prognosis, intraarterial thrombolysis may be considered within the first 12 hours of evolution.

A study has demonstrated that continuous monitoring with transcranial doppler (TCD) in patients treated with rTPA significantly improves the rates of repermeabilisation of the artery, although after three months there is only a tendency towards an improved functional situation in the patients treated (Alexandrov *et al.*, 2004). More studies are called for to be able to recommend its routine use.

The use of other thrombolytics that could increase the therapeutic window (Hacke *et al*, 2005) is being assessed in different randomised clinical trials (RCT), some with the support of advanced neuroradiological explorations (diffusion/perfusion/angio MR, perfusion/angio CT).

Antithrombotics

A Aspirin (300 mg) should be given as soon as possible after the onset of the stroke and once the presence of intracerebral haemorrhage has been ruled out. In patients with dysphagia it must be given rectally o by enteral tube. It should be maintained indefinitely or until another antithrombotic drug is started (RCP; International Stroke Trial, 1997, Chinese Acute Stroke Trial, 1997).

In some cases acetylsalicylic acid may be given parenterally.

A Aspirin cannot be given in the 24 hours following the administration of thrombolytics (RCP, ASA, NZGG).

A Early administration of anticoagulants (intravenous, subcutaneous heparin, low molecular weight heparin or heparinoids) is not recommended routinely for the treatment of acute ischemic stroke (ASA, RCP, NZGG, Gubitz *et al.*, 2004; Berge *et al.*, 2001).

The use of intravenous heparin may be addressed in selected patients (acute thrombosis of the basilar artery, stroke or TIA associated with dissection of the carotid artery), although there is no scientific evidence of its effectiveness (Beletsky et al., 2003).

Other drugs

In general, the results of clinical trials with neuroprotective drugs and drugs for the control of cerebral edema were negative or provided low-quality scientific evidence for recommending their routine use.

A At the moment, the routine use of any neuroprotective agent cannot be recommended in acute ischemic stroke (ASA, RCP).

B Central nervous system-depressing drugs must be avoided (RCP).

Citycholine, a neuroprotective drug, has demonstrated a discreet beneficial effect on neurological recovery after three months when given in the first 24 hours and for 6 weeks after onset in patients with moderate to severe stroke. (Dávalos *et al.*, 2002). Recently, some authors have considered that these findings were obtained from a highly selected group of patients and cannot therefore be generalised (Adams *et al.*, 2005). New studies are under way to analyse whether these same results can be obtained in other groups of patients.

Carotid thromboendarterectomy (CTE) and angioplasty in acute stroke

There is little information on the efficacy of emergency surgical treatment (CTE) in acute stroke related to carotid stenosis, although isolated cases have reported benefits of CTE.

- **D** Emergency CTE is not recommended for the treatment of patients with acute stroke secondary to carotid stenosis (ASA).
- **D** The use of endovascular techniques for the treatment of acute stroke secondary to carotid stenosis (ASA) is not recommended.

Decompressive surgery and hypothermia in malignant middle cerebral artery infarction (MCA)

- ✓ Patients with malignant MCA infarction (or at risk of developing it) must be tackled interdisciplinary.
- **D** Surgical decompression in screened patients aged under 65 years and with malignant MCA infarction may reduce the mortality associated with this condition (Schwab *et al.*, 1998; Steiner *et al*, 2001; Cho *et al.*, 2003; Foerch *et al.*, 2004; Kastrau *et al.*, 2005).

Hypothermia as a treatment of malignant MCA infarction has been studied in small series. While it is a potential treatment, current scientific evidence does not render it possible to establish any solid recommendations.

Management of medical complications

Blood pressure

Despite the prevalence of high blood pressure (HBP) in the acute phase of ischemic stroke, at the moment there are no comparative clinical trials that indicate what the optimal management is.

- **C** In general, a cautious approach is recommended in the management of HBP in the acute ischemic stroke (ASA, NZGG).
- **C** Antihipertensive agents must be avoided unless SBP > 220 mm Hg or DBP > 120 mm Hg (ASA, NZGG).
- **C** If antihypertensives are recommended, they should be short-acting and have little effect on cerebral circulation (ASA, NZGG).
- **C** In view of the risk of neurological deterioration, sublingual nifedipine or other antihypertensives that may lead to a rapid and unforeseeable reduction in blood pressure must not be used. The use of intravenous labetalol is recommended (ASA, NZGG).
- **C** Hypertensive patients that are candidates for thrombolysis require a slow reduction in blood pressure to SBP ≤ 185 mm Hg and DBP ≤ 110 mm Hg before beginning treatment. (ASA, NZGG).
- **D** Low blood pressure in the setting of an acute stroke may lead to an increase in the infarction area. The underlying cause must be located and treated (NZGG, EUSI).

Although the ideal moment for starting post-stroke antihypertensive treatment is not known, in general it should not be started within the first week after stroke (Gorelick *et al.*, 2002; NZGG).

In the year 2000 the Societat Catalana d'Hipertensió Arterial and la Societat Catalana de Neurologia published a consensus document containing detailed information on the management of blood pressure in the acute phase of stroke (Tovar J. L. *et al*, 2000).

Glycaemia

Hypoglycaemia may course with identical symptoms to those of ischemic stroke. Moreover, maintained hypoglycaemia may give rise to brain damage. Therefore, the assessment of glycaemia and its correction in case of hypoglycaemia is of capital importance. Moreover, hyperglycaemia is very frequently seen in the acute phase of stroke, either because the patient is diabetic or as a physiological response to stress, and is associated with a worse functional prognosis and higher mortality (Williams *et al.*, 2002).

C Levels of glycaemia >140 mg/dl must be corrected (Weir *et al.*, 1997).

D Hypoglycaemia must be corrected immediately (ASA, EUSI).

Temperature

Fever in the context of acute cerebral infarction is associated with greater morbidity and mortality due to an increase in metabolic requirements, the release of neurotransmitters and free radical products (Hajat *et al.*, 2000). At the moment, there is no scientific evidence that hypothermia achieved by means of intravascular catheters improves the prognosis of these patients (De Georgia *et al.*, 2004).

B Hyperthermia (>37.5°C) must be treated with antipyretics such as paracetamol and the underlying causes investigated (ASA, NZGG).

Deep vein thrombosis (DVT)

DVT frequently appears during the first weeks after stroke, particularly in patients who are immobilised or confined to bed. There is evidence that up to 50% of hemiplegic patients may develop DVT and that it is clinically apparent in only 5%. Similarly, and while autopsy series have frequently shown the presence of pulmonary thromboembolisms (PTE), the latter are clinically apparent only in 1-2% of acute strokes.

A The preventive use of anticoagulants (heparin, low molecular weight heparin or heparinoids) is recommended in immobilised patients (ASA, SIGN), but routine use is not recommended (RCP).

A The routine use of stockings or other physical compression measures is not associated with a significant reduction in DVT in patients with paretic or plegic legs (Mazzone *et al.*, 2004).

B The patient has to be mobilised as soon as possible (ASA, NZGG, RCP).

Additional information can be found in the PRETEMED 2003 guide (Alonso Ortiz del Rio *et al.*, 2003), that offers recommendations on the prophylaxis of thromboembolic venous disease in patients with acute or chronic medical conditions.

In the case of patients with paralysis of a lower extremity as a sequela of a stroke, the following recommendations must be taken into account:

D Prophylaxis with low molecular weight heparin is recommended in patients with paralysis of a lower extremity presenting major risk factors (pregnancy, thrombophylia, congestive heart failure, decompensated chronic obstructive pulmonary disease, acute myocardial infarction, etc.) (PRETEMED, 2003).

C There is no evidence on the effectiveness of primary prevention of the DVT beyond the first three months in patients confined to bed permanently (Gatt *et al.*, 2004).

At the moment there is a computerised registry of patients with venous thromboembolic disease in Spain (<www.riete.org>) that aims to broaden knowledge on this condition.

Management of neurological complications

✓ To identify the appearance of neurological complications early, patients should be monitored clinically with the use of neurological scales (Canadian Neurological Scale and NIHSS).

Cerebral edema and intracranial hypertension

These neurological complications tend to be brought on by the occlusion of major intracerebral arteries that cause multilobular infarctions. Cerebral edema tends to be maximal between the third and fifth day after the stroke, although it may occur in the first 24 hours in major cerebellar infarctions.

The objectives of the treatment of cerebral edema are:

- To reduce intracranial pressure.
- To maintain cerebral perfusion pressure to avoid the aggravation of the cerebral ischemia.
- To prevent cerebral damage secondary to the herniation.

D Management of intracranial hypertension in stroke patients includes raising the bed head to 30°, avoiding pain, maintaining suitable oxygenation and normalising body temperature (EUSI).

A Steroids are not recommended for the treatment of cerebral edema and intracranial hypertension secondary to ischemic stroke (ASA, NZGG).

B Osmotherapy and hyperventilation are recommended in patients with neurological aggravation due to intracranial hypertension (ASA, NZGG).

C In cases of intracranial hypertension secondary to hydrocephalus, drainage of the cerebrospinal fluid may be indicated (ASA, NZGG).

C Surgical decompression and the evacuation of major cerebellar infarctions that cause compression of the brain stem is recommended (ASA, NZGG).

Epileptic fits/seizures

C Primary prophylaxis with antiepilepitic drugs is not recommended. Secondary prevention, once epileptic attacks have appeared, is recommended (ASA, NZGG, EUSI).

Haemorrhagic transformation

The appearance of blood in a cerebral infarction occurs very frequently, although in general it is asymptomatic. Nevertheless, up to 5% of patients develop symptomatic haemorrhagic transformations (Hornig *et al.*, 1986). The use of any antithrombotic drug, and particularly anticoagulants and thrombolytics, increases the risk of a serious haemorrhagic transformation. Aspirin has also been related to an increase, albeit lower, in the risk of haemorrhagic transformation.

Progressive stroke

Progressive stroke is a relatively frequent situation. It is defined as the reduction of one point on the Canadian scale or an increase of >3 points on the NIHSS, and may be the consequence of different neurological and non-neurological causes.

✓ If the aggravation is caused by the thrombosis, treatment with intravenous sodium heparin may be considered.

4.1.6. Management of intracerebral haemorrhage (ICH)

Patients with an ICH require general and basic support measures similar to those of ischemic strokes, but with certain particularities (See Section 4.1.2). Patients with severe ICH frequently appear to have a depressed level of consciousness and therefore the initial assessment at the Emergency Department is very important. The need for intubation and surgical treatment must be addressed.

General measures and blood pressure control

ICH is a major medical emergency with a high frequency of early neurological deterioration and death that can benefit from exhaustive monitoring in the acute phase. The patients who so must be hospitalised in a stroke unit or an ICU.

D Patients on anticoagulants, those who have recently undergone thrombolytic treatment and, those with coagulation alterations require the urgent correction of their presenting haemostasis disorder/defect. If the patient was on antiaggregant treatment it should be suspended (SIGN).

For the management of cerebral edema secondary to ICH and intracranial hypertension, please see Section 4.1.5. Management of neurological complications (cerebral edema and intracranial hypertension).

Management of blood pressure

In general, the control of blood pressure must be stricter in patients with ICH (185/110 mm Hg), although an aggressive attitude is not recommended.

C In patients with ICH and a prior history of HBP, the mean BP (MBP) must be kept under 130 mm Hg (AHA; NZGG; Diringer *et al.*, 1993).
MBP = DBP + 1/3 (SBP – DBP)

D In patients with elevated ICP and ICP monitor, the cerebral perfusion pressure (MBP - ICP) must be maintained above 70 mm Hg (AHA).

Complementary examinations

Coagulation studies:

C A haemogram with platelet count and coagulation study must be performed (NZGG).

Angiography

C Angiography should be considered in ICH patients without a clear aetiology and in patients that are candidates for surgery (particularly young people, normotensive and the clinically stable) (NZGG, AHA).

C Angiography might not be necessary in hypertensive patients and with an ICH of characteristic location (thalamus, basal nodes, cerebellum and brain stem), elderly and in cases where there is no suspected underlying cause (AHA, NZGG).

C Angio-MR and Angio-CT may avoid the need to perform a conventional angiography in some patients (NZGG, AHA).

Angio-CT or angio-MR are particularly indicated in candidates for urgent surgical evacuation of the haematoma, in patients with suspected cerebral venous thrombosis, and in all patients with indication for conventional angiography, who have a formal contraindication for conventional angiography or where the test is not available.

Medical management

Recently, the results of a RCT with the administration of recombinant factor VIIa in the first 4 hours after the onset of the ICH versus placebo were published. This haemostatic agent limits the growth of the ICH, reduces mortality and improves the functional situation in patients with ICH, although it also increases the risk of a thromboembolic complications, particularly at high doses. The frequency of fatal or crippling thromboembolic episodes (coronary and/or cerebrovascular) was not significantly different between the two groups. Further studies are called for to identify patients with a high risk of thromboembolic complications (Mayer *et al.*, 2005*a*; Mayer *et al.*, 2005*b*).

Surgical management

Current scientific evidence does not support the routine surgical evacuation of ICH.

A Surgical evacuation of primary supratentorial ICH is not more beneficial than conservative treatment (Mendelow *et al.*, 2005).

C Surgery should be considered in the following situations (AHA, NZGG):

- Cerebellar ICH > 3 cm diameter with neurological deterioration secondary to compression of the stem or hydrocephalus.
- ICH secondary to aneurysms, arteriovenous malformations or cavernomas with moderate/good clinical prognosis and accessibility.
- Young patients with neurological deterioration secondary to large lobar ICH.

C Patients with small ICH (< 10 cc) or with minimum neurological deficits, or those with Glasgow Coma Scale ≤ 4, are not candidates for surgery unless they have a cerebellar ICH with compression of the stem (SIGN, NZGG).

4.1.7. Management of subarachnoid haemorrhage (SAH)

SAH is a medical emergency where early diagnosis and urgent treatment are fundamental.

B Subarachnoidal haemorrhage must be ruled out in any patient with severe abrupt-onset headache with or without alteration of the level of consciousness (RCP).

The diagnosis of this entity is made mainly by cranial CT scan and lumbar puncture.

D The cranial CT scan is the diagnostic test of choice and must be performed immediately if there is a depressed level of consciousness, and urgently in other patients (RCP).

If the cranial CT scan is negative or doubtful, a lumbar puncture should be performed.

✓ If both tests are negative, the probability of SAH is low, except cases that started more than 10 days before. In this eventuality, MR may be used with *flair* sequences to diagnose the SAH.

✓ Angio-CT and angio-MR could be indicated for the investigation of a possible aetiology of SAH.

Following confirmation of the diagnosis, the initial treatment of SAH targets mainly the prevention of rebleeding and complications such as cerebral ischemia and hydrocephalus.

D Support measures must be initiated to guarantee adequate hydration, oxygenation and analgesia (RCP).

A Oral nimodipine (60 mg) every 4 hours is recommended unless there is a specific contraindication (RCP).

In patients with reduced level of consciousness it should be given intravenously, although current scientific evidence only demonstrates a significant improvement in the long term with oral nimodipine.

A Antifibrinolytic agents are not indicated in the treatment of SAH (RCP; Roos *et al.*, 2003).

D Steroids are not indicated in the treatment of SAH (RCP).

SAH is an extremely serious condition that tends to affect young people. The most important complications, which present at different moments in the evolution of the disease, are rebleeding, hydrocephalus and vasospasm. For these reasons, this condition must be treated in centres with suitable human and technical resources. The interdisciplinary team must include neurologists, preferably with vascular dedication, neurosurgeons, neuroradiologists, intensivists and anaesthesiologists.

B All patients with SAH must be transferred to a specialised centre in the course of the same day (RCP).

✓ The use of the following scales is recommended to simplify clinical assessment in patients with SAH: The Glasgow Coma scale (GCS) to assess the

level of consciousness, the Hunt and Hess scale and The World Federation of Neurosurgical Society scale (WFNS) to establish a clinical grading; The Fisher scale, to establish a radiological grading by CT and the Glasgow Outcome Scale (GOS) to assess recovery.

✓ Due to the high risk of complications, in the acute phase these patients must be admitted to a monitored unit regardless of their level of consciousness.

✓ All patients must be evaluated by an interdisciplinary team.

B The angiographic tests must be performed in a specialised centre (RCP).

A Ruptured aneurysms can be treated by the conventional endovascular or surgical route, as determined by the neurovascular team (RCP).

B Patients who remain with neurological deficits after the acute phase must be sent to a rehabilitation service (RCP).

A All patients must be counselled on secondary prevention; particularly the treatment of HBP and giving up smoking, as applicable (RCP).

C Patients with a family history of SAH and/or Polycystic Kidney disease must be warned of the risk of SAH and if they wish may be referred to a specialised centre for suitable information (RCP).

Management of unruptured aneurysms (incidental or symptomatic)

The prevalence of incidental aneurysms (IA) in angiographic studies in adults stands at around 0.5%-1.3% (Schievink WI 1997, Winn *et al.*, 2002). The most recent study on IA (International Study of Unruptured Intracranial Aneurysms, ISUIA) revealed a smaller risk of rupture of small aneurysms than had hitherto been believed, and more morbidity/mortality in operated patients (ISUIA, 1998). Scientific evidence in this field is somewhat scarce and the available works only support levels of evidence 2+ to 4. The following recommendations come from the panel of experts of the AHA (Bederson *et al.*, 2000) and do not feature specific recommendations on the endovascular treatment of the incidental intracranial aneurysms, since there is no RCT that compares conventional surgical treatment to the endovascular form. The evolution of endovascular techniques may be expected to modify the treatment of these patients.

D The treatment of intracavernous carotid IA is not generally indicated. In the case of large intracavernous carotid IA, the decision to treat surgically must be individualised according to the age of the patient, the existence of symptoms by compression or alternatives to surgical treatment. Surgery should be avoided in elderly individuals with symptom-free IA (AHA).

D Symptomatic unruptured aneurysms of any size must be considered for treatment initially. Large or very large symptomatic aneurysms entail a major surgical risk and must be reviewed individually (risk dependent on the IA, skill of the surgeon) (AHA).

D IA of any size in patients with prior SAH have a greater risk of bleeding than IA of a similar size in subjects without a record of SAH. Large localised IA at the tip of the basilar artery require an assessment of the need for surgery. The decision on the ideal type of treatment is based on age, the medical/

neurological situation and the relative risk of the operation. If the decision is to keep the patient under observation, follow-up angio-CT or angio-MR must be performed to detect the growth of the aneurysm (AHA).

D Considering the low risk of bleeding of small IA (< 10 mm), a cautious approach is recommended although young patients in this situation must be considered independently. In general, small IA but ≃10 mm, with special haemodynamic characteristics and in cases where there is a positive family history, surgery should be considered. When the attitude is conservative, regular checks must be guaranteed using suitable techniques (AHA).

D IA ≥ 10 mm must be assessed for surgery depending on other characteristics such as age, coexisting medical or neurological conditions and the relative surgical risk (AHA).

4.1.8. Management of sinus and cerebral venous thrombosis (CVT)

CVT is a rather infrequent neurological condition caused by thrombosis of the cerebral venous circulation (surface and deep cerebral veins, dural sinuses and initial part of the jugular vein). The aetiology is very diverse and clinical symptoms very variable, generally characterised by headache, neurological impairment, seizures, depressed level of consciousness and papillary edema.

D The most sensitive test for the diagnosis of CVT is MR with venography (Stam *et al.*, 2005).

Some authors have defended the stance that cranial CT scan with venography would be equivalent to the angio-MR in making the diagnosis of CVT (Ozsvath et al, 1997; Wetzel et al, 1999). In any case there is no quality scientific evidence that clearly establishes which diagnostic exploration is better. In general, this decision depends on the availability and of technical capacity of the equipment and the experience of the neuroradiological team.

B If the diagnosis of CVT is confirmed treatment must be started with intravenous heparin and subsequently oral anticoagulants for 3 months (RCP).

4.1.9. Management of cervical arterial dissection

The dissection of cervical arteries takes place when the intima of the carotid or vertebral artery is torn. This may cause stroke by local arterial occlusion or by embolisation due to the acute local thrombosis. It is the second cause of stroke in patients of less than 45 years.

✓ When arterial dissection is suspected a MR with angio-MR must be performed.

C Although anticoagulant treatment is common in arterial dissections, current scientific evidence does not make it possible to establish indications on whether anticoagulation or antiaggregation is better (Lyrer *et al.*, 2003).

4.1.10. Initial assessment of rehabilitation needs

The initial objectives of rehabilitation in the acute stroke are to guarantee correct postural healing, maintain analytical articular balance with passive mobilisations, active work on the unaffected extremities and of the mobility preserved on the affected extremities, respiratory physiotherapy (ventilation, draining of secretions) and initiate sitting early, according to the level of consciousness and the clinical situation of each patient.

A In all patients, the need for rehabilitation should be assessed as soon as possible after admission (RCP).

A In patients with indication for rehabilitation, treatment should commence as soon as possible (EUSI).

B Patients must be mobilised as soon as possible after the stroke (SIGN).

A Rehabilitation treatment must be conducted by a multidisciplinary team in a stroke unit (EUSI).

4.1.11. Assessment of dysphagia and nutritional status

It is considered that 45% of patients hospitalised for acute stroke present dysphagia and swallowing disorders. Between 22% and 42% are silent aspirators detected only with videofluoroscopy. Aspiration of liquids and food into the airways is associated with an increased risk of presenting post-stroke pneumonia.

A If there is suspicion of dysphagia and/or risk of pulmonary aspiration, the patient must be evaluated by a trained specialist who will determine the conditions for safe swallowing, as well as the consistency of the solid and liquid diet (RCP).

B The assessment of dysphagia must be made as soon as possible, preferably in the course of admission, with a simple and validated clinical swallowing test (RCP, NZGG) *(Annexes, Table 2)*.

The nausea reflex test is not a valid swallowing test. Current scientific evidence lends greater support to voluntary cough and the sensitive pharynx test.

D The use of videofluoroscopy must be assessed when alterations are detected in the clinical swallowing test. If the alteration of the pharyngeal phase of swallowing persists, instrumental and dynamic test must be considered to view the pharynx during the passage of different volumes and consistencies of food (RCP).

Malnutrition is present in 15% of these patients and is related to poorer rehabilitation outcomes.

C Nutritional status must be assessed by suitable professionals within the first 48 hours of admission (RCP).

A If proper feeding cannot be guaranteed orally, enteral nutrition by nasogastric catheter or by endoscopic percutaneous gastrostomy must be considered (RCP).

There must be local protocols in place on the placement and maintenance of nasogastric catheters and gastrostomies. Patients on enteral feeding must be checked periodically.

D All patients with nutrition problems, including dysphagia, that require the modification of food consistency, must be referred to a dietician (RCP).

D The best possible assessment of the most suitable position of the patient must be made, as well as the equipment needed to guarantee efficacious feeding (RCP).

4.1.12. Assessment of incontinence and constipation

The treatment of sphincter incontinence is an essential part of the rehabilitation programme of stroke patients, both for its incidence and the burden for care-givers.

B Stroke units must have established assessment and management protocols for both urinary and faecal incontinence and constipation (RCP).

✓ In the absence of other causes, if incontinence persists, urodynamic and/or anorectal physiology-type studies must be considered (NZ).

C The incontinence cures must continue after hospitalisation to guarantee continuity of treatment after discharge RCP).

B Urinary catheters are only placed after a suitable assessment within the framework of a protocol-based action (NZGG).

The use of urinary catheters should never be routine. Their use in urinary incontinence must be limited and withdrawal should be considered when the precipitating causes have been treated and the re-education of micturation rhythm commenced.

C The incontinence equipment must be easy to place and be comfortable, and the patient must be discharged with guidance on handling and training for the caregiver (RCP).

✓ In the absence of other causes, if incontinence persists, urodynamic and/or anorectal physiology studies will have to be consi-dered.

✓ Constipation may be a major problem for the patient and needs to be managed with strategies such as leveraging gastrocolic reflex after meals, sitting on the toilet after meals and the use of laxative drugs or enemas.

4.1.13. Recommendations for patient discharge

Clinical report

The hospital discharge clinical report must contain all the information, well-ordered, that makes it possible for the different specialists involved in stroke care to assess the evolution of the patient. This aspect is basic if we take into account the concept of a stroke care network and therefore the mobility of the patient in the health network. It must be a tool that is useful for professionals and the health administration, facilitating information on the diagnostic and therapeutic processes used, as well as the complexity involved in the clinical situation of the patient (Table 3, Annexes).

Health information/education for the patient, relatives and/or care-givers

✓ Before the patient is discharged from hospital the patient and/or their care-givers must receive the information they need to:

- Know the disease
- Know how to use the affected extremities
- Go about the activities of their daily life: personal hygiene, meals, get dressed, take care of their hair, etc.
- Sit down and walk, using support devices if necessary
- Achieve drug control: type of medicinal products, times, doses, adverse reactions, analytical controls, etc.
- Instruct the patient on how to administer insulin and do the capillary glycaemia control, when necessary.
- Recognise signs and the symptoms that may warn of a new cerebral episode
- Follow diet recommendations
- Practice the rehabilitation recommendations
- Follow the recommendations on toxic substances (alcohol, tobacco)
- Control risk factors: BP, weight, diet, tobacco, sedentary lifestyle, etc.
- Identify emotional lability.

4.2. Secondary prevention

Between 30%-43% of patients that have had a stroke will have another stroke within the next five years (Mant *et al.*, 2004), and this risk is maximal in the month after the first episode. Similarly, the risk of having a cerebral infarction after a TIA is approximately 20% in the first month. Moreover, patients with stroke/TIA have a greater possibility of having an acute myocardial infarction or other vascular events. For all these reasons, the establishment of secondary prevention measures must be a priority in all these patients.

These recommendations are applied to all the patients with stroke/TIA, including those who have not been hospitalised.

B An individualised secondary prevention strategy must be implemented in the days following the beginning of the stroke/TIA (RCP).

4.2.1. Life style

All people with stroke/TIA must be given the following advice: give up smoking, do regular exercise, follow a diet suited to their risk factors and achieve a satisfactory weight, reducing salt in the diet and avoiding excessive alcohol consumption.

Smoking

C The patient should give up smoking (giving up smoking reduces the risk of stroke by at least 1.5 times) (NZGG).

Alcohol

A Excessive alcohol consumption should be avoided (EUSI).

Primary prevention studies have demonstrated that a low-to-moderate consumption of alcohol (<12 g/day and 12-24 g/day) is associated with a reduction in the relative risk of stroke and particularly of ischemic stroke (Reynolds et al, 2003) (Table 4).

Physical activity

A Moderate physical exercise is required (30-60 minutes of aerobic physical activity at least three times a week). In high-risk cases, programmes with medical supervision are recommendable. Physical inactivity is associated with an increase in the risk of stroke (NZGG).

Weight

B Changes in life style must be recommended to achieve gradual weight loss if body mass index is greater than 25 (and particularly above the age of 30) (NZGG).

C Abdominal obesity is an independent risk factor of stroke in all races and ethnic groups and weight loss must therefore be emphasised in the stroke prevention programme (Suk *et al*, 2003).

4.2.2. Blood pressure (BP)

All patients with stroke must have their blood pressure controlled. The optimal moment for initiating antihypertensive treatment is unknown, although in general 7 days should be allowed to elapse before beginning antihypertensive treatment, thus avoiding hypotensive treatment in the haemodynamic instability phase (days 1-3 after stroke).

A Antihypertensive treatment is recommended in most patients that have had a stroke/TIA unless they have symptomatic hypotension (NZGG).

A After a stroke/TIA, BP should be reduced, regardless of the baseline figures, with a thiazide diuretic and/or an ACEI, provided that the patient tolerates it (EUSI).

Ramipril or the combination of perindopril plus indapamide reduce the incidence of vascular recurrences regardless of baseline BP figures (Yusuf et al, 2000; PROGRESS 2001).

In patients with bilateral carotid stenosis, BP should not be reduced aggressively (Rothwell et al, 2003).

The MOSES study demonstrates that treatment with an angiotensin receptor antagonist, ARA-II (eprosartan), compared to nitrendipine, reduces mortality and relapses of cardiovascular and cerebrovascular episodes in hypertensive patients and with a high risk of thrombosis (Schrader et al, 2005).

✓ Orthostatic hypotension must be avoided in elderly patients that receive hypotensive treatment.

Elderly patients generally present a very variable BP. Thus, it is important to have multiple BP measurements to confirm the diagnosis. Due to the

high prevalence of orthostatic hypotension, BP in the sitting and standing position must be measured in these patients. If systolic BP is reduced by more than 20 mm Hg, the dose of the antihypertensive treatment should not be increased. (Williams *et al*, 2004).

There are studies not designed specifically for the secondary prevention of stroke that suggest a reduction in the risk of stroke with ARA-II alone or in combination with other antihypertensives (ALLHAT 2002, Dahlof *et al.*, 2002; Papademetriou *et al.*, 2004).

4.2.3. Diabetes mellitus

D Any stroke and diabetes patient must receive the most suitable treatment to control it (NZGG, AHA).

4.2.4. Hyperlipemia

A A The use of statins (simvastatin and atorvastatin) is recommended in patients with stroke/TIA of presumably atherothrombotic cause. (Heart Protection Study Collaborative Group, 2004; Amarenco et al., 2006)

Simvastatin (40 mg/day) provides a significant reduction in major vascular episodes in patients that have had a stroke and have LDL cholesterol levels > 135 mg/dl. Atorvastatin (80 mg/day) provides a beneficial effect in secondary prevention in patients with stroke/TIA of presumably atherothrombotic cause and LDL cholesterol levels between 100-190 mg/dl.

4.2.5. Hyperhomocystinemia

There is no scientific evidence at the moment that supports secondary prevention of stroke with vitamin supplements (Moller, J., 2000; Toole, J. F., 2004), although epidemiological studies suggest that plasma elevation of homocysteine is a risk factor for atherothrombotic stroke (Schwammenthal Y, 2004).

4.2.6. Hormone replacement therapy

B Hormone replacement therapy is not recommended in postmenopausal women. In all cases, the decision to initiate and/or continue treatment must be individualised (RCP, The Women's Health Initiative Steering Committee, 2004).

4.2.7. Antiplatelet agents

They are the indicated treatment in the secondary prevention of stroke in the following cases:

- Atherothrombotic cerebral infarction/TIA
- Lacunar infarction
- Cerebral cardioembolic infarction if contraindicated for anticoagulation
- Cerebral infarction by unknown cause.

Aspirin

A Aspirin is the first-line treatment in the secondary prevention of stroke unless anticoagulation is indicated or acetylsalicylic acid is contraindicated

(NZGG, EUSI, RCP). The doses that have proven their effectiveness range from 50 mg/day to 325 mg/day.

Clopidogrel

A The efficacy of clopidogrel is slightly superior to that of acetylsalicylic acid in the secondary prevention of ischemic stroke, and the benefit is more evident in high risk individuals (NZGG, RCP, EUSI).

Clopidogrel has a lower incidence of haemorrhagic complications and must be regarded as the drug of choice in patients who are allergic to aspirin, with a background of gastric intolerance to acetylsalicylic acid, gastroduodenal ulcer, and in patients in whom aspirin has failed.

Aspirin + clopidogrel

A *The combination of aspirin and clopidogrel has not proven to be superior to aspirin in the secondary prevention of ischemic stroke in high risk patients* (Diener *et al*, 2004).

Triflusal

A Triflusal has shown similar efficacy to aspirin in the secondary prevention of ischemic episodes and a lower risk of haemorrhagic complications (Matias-Guiu *et al.*, 2003; Culebras *et al.*, 2004).

Dipyridamole

A Dipyridamole combined with aspirin reduces the risk of stroke relapse. The combination of dipyridamole and aspirin has shown greater efficacy than aspirin or dipyridamole alone (Leonardi-Bee *et al.*, 2005)-: ESPRIT Study Group, 2006).

4.2.8. Anticoagulants

A Anticoagulation is the recommended treatment in any patient with a cerebral infarct/TIA associated with paroxysmal or permanent atrial fibrillation (RCP, NZGG, EUSI).

B Anticoagulation is the recommended prevention treatment in patients with cerebral infarctions/TIA associated with prosthetic valves (EUSI).

C Anticoagulation is recommended in patients with cardioembolic infarctions/TIA (RCP, NZ, EUSI).

A Anticoagulant treatment cannot be started before the presence of ICH or haemorrhagic transformation is ruled out by neuroimaging (NZGG).

✓ Although anticoagulation has not been proven to be more efficacious than antiplatelets, oral anticoagulation may be used in the following situations: TIA or infarctions in patients that were taking antiplatelets agents, relapsing TIA, dissection of cervical arteries, severe carotid stenosis awaiting surgery, antiphospholipid syndrome and aneurysm of the interauricular septum.

B Anticoagulation is effective and safe in the treatment of cerebral venous thrombosis even in the presence of haemorrhage (NZGG).

4.2.9. Thromboendarterectomy (TEA)

The therapeutic indication for carotid stenosis must be taken by a multidisciplinary team including neurologists with preferably vascular dedication, vascular surgeons and neuroradiologists.

In symptomatic patients

A Carotid endarterectomy (CTE) is recommended in patients with stroke and stenosis of the ipsilateral carotid artery between 70% and 99% (following the criteria of the North American Symptomatic Carotid Endarterectory Trial, NASCET), unless they have a major disability and/or comorbid conditions (NZGG, EUSI).

A CTE in symptomatic patients with stenosis of 50-70% (NASCET) must be indicated in individualised fashion (NZGG).

In this group, the factors that determine the greatest benefit of surgery are: male sex, age (the older the patient, the greater the benefit provided that < 80 years), the hemispherical more than the retinal clinical manifestation, the presence of unstable plaques and the coexistence of intracranial arteriosclerosis lesion (NZGG).

A The indication of surgery is only valid for centres with a rate of perioperative complications (stroke or death in the first 30 days) of less than 6% (NZGG, EUSI).

A CTE is not recommended in symptomatic patients and stenosis below 50% (NASCET) (NZGG, EUSI).

B Candidates for CTE must have two non-invasive concordant tests (normally an ultrasound and confirmation by angio-MR or angio-CT) that permit the diagnosis and quantification of the atheromatous lesion. A conventional angiography is not strictly necessary (NZGG, EUSI).

Conventional angiography before the CTE is recommended in all situations where non-invasive tests are low quality or discordant (Rothwell et al, 2003; Nederkoorn et al, 2003).

A CTE must be conducted preferentially in the fortnight after the ischemic episode, except in cases of extensive cerebral infarct, where surgery has to be delayed 6 to 8 weeks (Rothwell *et al.*, 2004; Bond *et al.*, 2003).

In asymptomatic patients

There is certain evidence that CTE in asymptomatic patients is beneficial, but the effect of this intervention is small in terms of the reduction in the absolute risk (Chambers *et al.*, 1999).

A Asymptomatic patients with carotid stenosis > 70%, age < 75 years and without concomitant conditions might benefit from CTE if it is performed by an expert in vascular surgery with a rate of perioperative complications < 3%) (Halliday *et al.*, 2004).

4.2.10. Angioplasty and stenting

There is evidence that carotid angioplasty with *stenting* has rates of perioperative complications superimposed over those of the CTE. It is yet to be defined which patients are candidates for this technique, although it could be beneficial in patients > 80 years, with a concomitant condition limiting or contraindicating the CTE, when there are technical difficulties for performing the CTE (difficult neck, distal location of the lesion, non-arteriosclerotic stenosis–fibromuscular dysplasia, arterial dissection) and in carotid restenosis (EUSI, NZGG).

B Carotid angioplasty with *stenting* is an alternative to conventional surgery in cases of carotid stenosis and comorbid medical conditions that increase the risk of CTE (RCP; Coward *et al.*, 2004; Yadav *et al.*, 2004).

Two recent RCS have shown no benefit of angioplasty with carotid stent versus TEA. The SPACE study (SPACE Collaborative Group, 2006) showed no difference in the combined percentage of death or ipsilateral stroke 3 days after the procedure (6.84% in TEA versus 6.34% in stent). In the EVA-3S study (Mas et al., 2006), the incidence of any stroke or death after 6 months was significantly lower in the group treated with TEA than in the treated group with angioplasty and stent (6.1% versus 11.7%; p= 0.02). However, this study has been heavily criticised, as the results suggest that the participating investigators did not have sufficient experience.

B Carotid angioplasty must be performed in centres with experts in this therapeutic procedure who have a proven low rate of perioperative complications (Yadav *et al.*, 2004).

Recently, a panel of experts (The American Academy of Neurology, The American Association of Neurological Surgeons, The American Society of Interventional and Therapeutic Neuroradiology, The American Society of Neuroradiology, The Congress of Neurological Surgeons, The AANS/ CNS Cerebrovascular Section and The Society of Interventional Radio-logy) published the requirement for the certification of expertise in the performance of diagnostic and therapeutic endovascular techniques. A minimum of 100 cervicocerebral diagnostic angiographies is reco-mmended before beginning the postgraduate learning of interventionist angiographic techniques (Connors et al., 2005). The American Society for Vascular Surgery has also published the accreditation criteria for perfor-ming angioplasty and the placement of carotid stent, and has placed the number of procedures necessary for the performance of this technique with low perioperative morbidity figures at between 10 and 30 (Hobson et al, 2004).

4.3. Rehabilitation of stroke patients

Rehabilitation is a process that is limited in time and driven by objectives that target enabling the disabled to achieve an optimal mental, physical and social functional level and to furnish them with the tools they need to change their own life. The fundamental objective of the rehabilitation of the stroke patient is to treat the disability in order to achieve maximum functional capacity in every case and facilitate independence and reintegration into the family, social and occupational setting.

- ✓ The rehabilitation of the stroke patient is a continuous process where the planning of objectives must be coordinated throughout the different phases and areas of care so as to avoid the fragmentation of the rehabilitation programme and the treatment of the patient in unsuitable areas or the reestablishment of unnecessary treatments.
- ✓ The rehabilitation team needed to deal with patients with stroke sequelae is comprised of a multidisciplinary group of professionals (physiotherapists, nurses, occupational therapists, neuropsychologists, social workers and speech therapists) that work under the coordination of an expert in rehabilitation to accomplish the pre-established objectives.
- ✓ The health-care network structure must facilitate access of patients to rehabilitation in the most suitable setting if such facilities are not available in the health-care level where the patient is being treated.
- D The patient and their family/care-givers must have been involved in the rehabilitation process (NZGG, RCP).
- B Compliance with stroke rehabilitation guidelines/protocols improves functional outcomes and patient satisfaction with the treatment received (Duncan *et al.*, 2002; Reker *et al.*, 2002).

4.3.1. Areas of rehabilitation care

While rehabilitation must start as of the beginning of the disease, a decision must be taken as to the area where the patient will attend rehabilitation treatment before the patient is discharged from the acute hospital care unit.

- D Access must be guaranteed to an adequate type of rehabilitation service for each patient (Best Practice Guidelines for Stroke Rehabilitation Management, Heart and Stroke Foundation of Ontario, 2003, <http://209.5.25.171/>).
- ✓ The expert in rehabilitation must evaluate rehabilitation needs in the acute phase, as well as the most suitable type of care in all patients that have presented a stroke.
- B All the health regions must have different community rehabilitation services (ambulatory, home, day hospital) to complement the hospital ones (**NZGG**).
- C The hospital and community rehabilitation services must be highly coordinated in every territory to guarantee continuity of the rehabilitation programme, regardless of patient location (**NZGG**).
- ✓ The social and health and community rehabilitation services must have an expert team in stroke rehabilitation to treat patients with residual disability that are discharged from hospital.
- ✓ The capacity to treat the patient in any area of care with the necessary resources according to the criteria of this Guide must be guaranteed.

The local protocols must determine the selection criteria to decide the most suitable area in every case, according to the necessary intensity of the rehabilitation programme – number of hours a day and type of rehabilitation therapies -, the need for nursing care during the rest of the day and the patient's family and social support.

Although the decision must be individualised, the patient and his/their care-giver/s must be involved and the following points must be considered with flexibility for the situation of every patient: there are clinical and sociofamiliar profiles more suited for each area, where rehabilitation gets the best results. It must be remembered that the patient location may change in the course of their rehabilitation process, so there should be no loss of coordination or continuity.

Rehabilitation admission in acute care hospital: indicated in individuals in immediate post-help phase with moderate/serious disability in two or more functional areas, who have the capacity to participate in 3 hours of therapy a day and do not present serious cognitive deficits.

Convalescence unit/average stay: for medically stable individuals with moderate/serious disabilities in two or more functional areas that require 24 h a day nursing care and whose medical and/or cognitive conditions do not allow them to participate in highly intensive therapies.

Long-term stay centre: for individuals with conditions similar to those of convalescence/average stay, with insufficient sociofamiliar support to envisage a medium term return home.

Rehabilitation day hospital: for medically stable individuals with sufficient sociofamiliar support to avoid full-time institutionalisation, but insufficient to be attended during the day at home.

Ambulatory rehabilitation: for medically stable individuals without major cognitive deficits, with mild/moderate disabilities in one or two functional areas with suitable sociofamiliar support and the possibility of travelling to the rehabilitation service.

Home rehabilitation care: indicated in individuals with moderate/serious disabilities and insufficient sociofamiliar support and no possibility of travelling to the primary care rehabilitation service.

4.3.2. General principles of rehabilitation

Early start

Rehabilitation must begin as soon as the diagnosis has been made and control of vital conditions guaranteed. The patients that initiate rehabilitation in the first week after the stroke have less disability and better quality of life in the long term than those who start it later (Musicco *et al.*, 2003). Feys et al. describe that a highly-intensive early treatment programme on the upper extremity for 6 weeks improves the motor function of the arm 5 years after the stroke (Feys *et al.*, 2004).

- C The rehabilitation needs of every patient must be assessed in the first 24-48 hours of the stroke (NZGG).
- B Early initial rehabilitation treatment (the first week) provides better outcomes (Musicco *et al.*, 2003).

Continuity

- ✓ Rehabilitation is a continuous process where the planning of objectives must be coordinated throughout the different stages and areas of care to avoid fragmentation of the rehabilitation programme, treating patients in unsuitable areas or avoiding unnecessary repeat treatments.

Intensity and frequency

There is evidence that intensive rehabilitation treatment improves functional results (Kwakkel *et al.*, 2004). If therapy time is increased in the 6 first months post-stroke, independence in activities of daily living (ADL) improves. One research work compared a rehabilitation programme with a frequency of 5 days a week to another more intensive programme with a frequency of 7 days a week, showing that the more intense rehabilitation treatment was more effective and efficient since it managed to improve disability on discharge with a reduction in the hospital stay (Sonoda *et al.*, 2004).

D As for the intensity of the rehabilitation treatment, it is necessary to guarantee that patients do the maximum therapeutic activity they can tolerate (NZGG).

✓ In the local setting, protocols must be established to optimise rehabilitation treatment time in every area of care and offer at least three hours of therapy in the hospital rehabilitation services and one hour in the social and health convalescence services or mean stay.

Duration

Although the greatest degree of neurological recovery takes place in the first three months, and functional recovery in the first six months, the process of adaptation to the disability and reintegration into the community may be longer.

D The rehabilitation treatment must end when new functional objectives cannot be identified or when the patient does not wish to continue (NZGG).

A In patients with limited activity after the first 6 months, the indication of an objectives-based rehabilitation treatment period should be assessed (RCP).

One year after the stroke, the appearance of functional deterioration through depression, falls, fractures or spasticity may require specific and short-lasting rehabilitation treatment to return to the previous functional level.

D In the chronic phase, when the sequelae have stabilised, the patients must have access to the rehabilitation services to review long-term needs (SIGN).

Periodical assessment

To evaluate outcomes, a distinction must be made as to whether it is regarded as deficit, limitation of activity or restriction in participation following the disease model proposed by the WHO. The outcomes of the rehabilitation programme should always take into account, apart from limitation of activity or disability, the destination on discharge and quality of life.

✓ Objective and validated methods and scales must be used to identify objectives, plan treatment and evaluate results.

The most valid, reliable and consensus-based scales of limitation of activity in stroke rehabilitation are the Barthel Index and the Functional Independence Measure (FIM) (Table 5). Besides global outcome scales, outcome measures that include instrumented ADL and advanced mobility are recommended (gait, equilibrium, etc.) (Duncan et al., 2000).

D To measure the post-stroke limitation of activity the use of the Barthel Index and the motor component of the FIM are recommended (Kwon *et al.*, Stroke, 2004).

B The final outcome of the rehabilitation treatment should be assessed 6 months after the stroke (Duncan *et al.*, 2000).

Involvement of patients and care-givers

B Patients and their care-givers must participate actively in the process of rehabilitation from the outset (SIGN).

4.3.3. Specific interventions

Stroke may affect different functional areas that limit the activity and the participation of stroke patients. The specific rehabilitation therapies targeting the treatment of deficits, limitations and post-stroke complications are addressed below. All rehabilitation interventions must be addressed in the context of a global, coordinated and defined rehabilitation plan for every patient with stroke sequelae.

Communication disorders

Aphasia

Aphasia is an acquired alteration of oral (understanding and/or expression) or written (reading and/or writing) language stemming from a focal cerebral lesion that maintains cognitive functions relatively intact (Davis GA, 1993).

C All patients with a lesion in the dominant hemisphere that present language alterations should be assessed by a speech and language therapist using valid and reliable methods (RCP).

A If the patient presents aphasia, the speech and language therapist must inform the staff and the family of such deficiencies and disabilities and facilitate communication techniques that are suitable for the deficit (RCP).

B The recovery of aphasia patients is more significant in patients treated by a speech therapist (Robey *et al*, 1998).

B The speech and language therapist must assess the convenience of an intensive speech and language therapy. The studies suggest that between two and eight hours a week of speech and language therapy should be provided (RCP).

B Intensive speech therapy in a short period of time improves the results of therapy in patients with aphasia after a stroke (Bhogal *et al*, 2003).

D As long as there are identifiable objectives and demonstrable progress, the patient with communication disabilities should continue to receive suitable treatment, and periodical assessments of this programme must be made (RCP).

Dysarthria

Dysarthria is a speech motor disorder of variable severity that affects the clarity of speech, the quality and the volume of the voice and particularly intelligibility (Yorkston *et al.*, 1996).

✓ Patients with dysarthria must be referred to a speech and language therapist for assessment and guidance. The specialist will make the differential diagnosis and will carry out the treatment, and will determine the time and type of intervention, as well as the needs for amplification and alternative communication systems.

Neuropsychological disorders

Cognitive and behavioural impairments are a major cause of disability after stroke. They may have a negative impact on the engagement of the patient in rehabilitation, on activities of daily living (ADL), on the participation of the individual in society and on patient and family quality of life.

✓ Any patient who requires it must have access to neuropsychological assessment by an expert in neuropsychology.

Neuropsychological assessment and rehabilitation must target different cognitive areas: level of consciousness, attention, language, perceptions, praxia, gnosia, memory, reasoning and frontal function, together with emotional and behavioural disorders (Lezak, M. D., 1995; Mapou, R. L., 1995).

Cognitive disorders

Attention

Attention is an essential requirement for carrying out many cognitive and motor tasks. Different types of attention may be affected: sustained, selective or divided attention (capacity to handle and respond to two simultaneous activities).

B Patients with attention disorders must receive treatment targeting the improvement of the level of alertness and the capacity to sustain attention (RCP).

Memory

Stroke may affect different aspects of memory. Patients may find it difficult to learn new information or skills, remember and recover information and remember what they have to do in the future (prospective memory).

B Specific interventions targeting facilitating the learning of compensatory strategies (sound alarms, notebooks, diaries, electronic organizers, etc.) are recommended in patients with memory deficits (RCP).

Neglect/spatial inattention

Stroke, particularly that of the right hemisphere, may alter patient capacity to direct their attention to the space around them and to their own body, and limit the capacity to respond and guide oneself by stimuli that come from the opposite side to the lesion. Rehabilitation of visual-spatial deficits improves independence in ADL and in the capacity to drive vehicles.

B Patients with persistent and disabling neglect/spatial inattention must be treated with specific techniques such as cueing, scanning, limb activation, aids and adaptations of the environment (RCP).

Praxis

Apraxia is an alteration of acquired motor skills, or praxis, in a patient with a good understanding of language and without a primary motor deficit that prevents him from making the movement. Apraxia may stem from a lesion of the right or left hemisphere.

A Patients with apraxia must be instructed in the use of internal and external aids (e.g. verbalisation and following written/pictorial action sequences) (RCP).

Executive functions

Deficits in executive functions present particularly when the frontal lobes are affected. The executive functions are those that permit organisation, planning, starting or inhibiting behaviour, solving problems and self-control. They also affect self-consciousness and social behaviour.

B Patients with alteration of executive functions must be taught compensatory techniques such as the use of electronic organizers or written lists of needs to improve the execution of ADL (RCP).

D Patients must learn problem-solving strategies and how to apply them in everyday situations and in functional activities in the post acute phase of the rehabilitation (Sohlberg *et al.*, 1987).

Behavioural and emotional disorders

Depression and anxiety

Depression is common after a stroke and affects 20% to 63% of patients. Premorbid personality, the degree of functional affection, the lack of family and community support and loss of self-esteem are contributing factors. The presence of depression has a negative effect on the progress of rehabilitation.

33% of patients with stroke present anxiety related to the uncertainty of recovery, the events that present, the family and the fear of having another stroke.

C The presence of depression and anxiety must be screened for in the first month after the stroke. Suitable standardised questionnaires may be used, but the diagnosis must be confirmed by means of anamnesis (NZGG).

A The persistence of depression > 6 weeks after stroke must be treated with antidepressants (NZGG).

B Patients with depressed moods must be offered expert psychological treatment (RCP).

C The routine use of cognitive behavioural psychotherapy cannot be recommended in patients with persistent depressive moods (NZGG).

Other non-pharmacological treatments, such as social/behavioural group therapies, should be considered.

A The prophylactic use of antidepressive drugs to prevent the appearance of depression or improve other outcomes is not recommended (RCP).

D If there is a good response to antidepressive treatment, it should be maintained for at least 6 months and be reviewed periodically (RCP).

Emotionalism

Emotionalism refers to the loss of control over the emotions and contributes to the social isolation of the patient. Although emotional incontinence causes weeping or sadness it does not always correspond to depression.

A Patients with severe and persistent post-stroke emotionalism must be treated with antidepressants, with efficacy monitored by the frequency of weeping (RCP).

Motor impairment

Patients with motor impairment must be treated by expert stroke physiotherapists. The treatment must be individual and personalised according to the different elements altered. There are different physiotherapeutic treatment techniques, but there is no quality study that has demonstrated the superiority of any one of the techniques in the improvement of functional capacity, although the specific preparation of concrete tasks improves the execution thereof.

Re-education programmes can be classified in three major groups: 1) compensation techniques, 2) facilitation techniques (they include the traditional therapies: Bobath, Brunnstrom, Propioceptive Neuromuscular Facilitation) and 3) more modern techniques, particularly task-oriented motor relearning. Since there is scientific evidence that better results are obtained with more intense treatment, automated systems must be taken into account (e.g. robotics –*robotic-assisted therapy, treadmill*, etc.), although the long-term effects on function, activity and participation are unknown (Teasell *et al.*, 2005).

D All patients with motor impairment secondary to stroke must have access to an expert stroke physiotherapist. Physiotherapeutic treatment must be based on an individualised assessment of the deficits (SIGN).

There is not enough scientific evidence to recommend one physiotherapy technique over others.

B Stroke patients must be mobilised as soon as possible (RCP).

B Specific training in concrete tasks improves the execution thereof (for example, coaching in gait improves speed) (RCP).

A In patients with mild motor impairment of an upper extremity, intensive rehabilitation treatment should be considered (RCP).

A A In patients with motor deficit of the upper limb, restriction therapy of the healthy side is recommended. (Wolf et al, 2006)

This therapy, applied in fortnightly periods in patients that had a stroke between 3 and 9 months previously, has demonstrated that it improves the motor function of the paretic/plegic upper limb and that this improvement lasts for a year after the stroke.

A Combination programmes of muscle boosting exercises and physical training (aerobic activity) must be considered in patients with stroke sequelae. (RCP)

Gait re-education

C Patients with gait alteration must be re-educated, considering the use of walking aids (sticks and walkers) to increase balance (RCP).

A Teaching gait or walking with a treadmill and partial weight support is not routinely recommended (RCP).

B For patients who can walk independently, the use of the treadmill and partial weight support (< 40%) from day 30 to 3 months may be regarded as an adjunt to conventional therapy (RCP).

Orthosis of the lower extremity

It is used to maintain correct foot alignment, correct pes equinus, reduce spasticity and walk more safely using less energy. Orthoses improve gait parameters without any effect on paretic muscular activity (Leung *et al.*, 2003).

A The use of orthoses of the lower extremity should be considered in patients with foot drop to improve their gait capacity (RCP).

B The use of orthoses of the lower extremity should be assessed individually (RCP).

Functional electrical stimulation

Electrical stimulation may be considered in certain patients as an orthosis to improve movement and gait, although its effects are not sustained.

A The routine use of functional electrical stimulation is not recommended, although in certain patients it may be used to improve arm movement, ankle dorsiflexion and gait performance (RCP).

Biofeedback

Biofeedback provides auditory or visual information to the patient with regard to body movement or posture. It can record muscular activity (electromyographic biofeedback) or posture (computerised posturography). Although an improvement of symmetry in standing position has been demonstrated and in posture control, the use of postural biofeedback platforms do not improve clinical outcomes of equilibrium and disability (*Yavuzer et al, 2006*).

A The routine use of biofeedback is not recommended (RCP).

Management of spasticity

It is a motor alteration characterised by an increase in speed dependant on muscular tone. The treatment of spasticity cannot be considered separately from the rest of the rehabilitation programme. In general, treatment should begin with physical therapies and subsequently consider the indication of antispastic oral medicinal products or local infiltration with botulinum toxin. There is little evidence on the risks and benefits of antispastic medicinal products and physical treatment. The injection of botulinic toxin has demonstrated efficacy in the treatment of focal spasticity without significant negative effects.

B Spasticity must be treated when it provokes significant symptoms (pain, articular limitation, difficulties in healing) or when it interferes with rehabilitation (RCP).

B Spasticity of the upper or lower extremity post-stroke should not be treated routinely with oral or locally injected drugs (NZGG).

A In patients with severe focal spasticity, injection of botulinum toxin must be considered in combination with physiotherapy to reduce muscular tone and/or increase the range of joint motion. The efficacy of botulinum toxin increases when it is combined with electrostimulation (RCP).

Limitation in activities of daily living

The action of occupational therapy in the stroke patient targets promoting the preservation or the acquisition of a maximum degree of autonomy or independence in their environment. The occupational therapist promotes the restoration of function and participation in self-healing, household, work and social activities. To accomplish this objective he works on the person, activity, and/or on the environment to improve motor, sensorial and perceptual, cognitive, psychosocial components and at the same time to modify activity and the environment.

Activities of daily living (ADL)

They include basic ADL (feeding, dressing, hygiene, baths, etc.) and instrumental ADL (household tasks, use of the telephone, computer, bells, etc.).

A All patients with difficulties in ADL must be treated by a multidisciplinary team that includes an expert in occupational therapy (RCP).

B Patients with persistent difficulties in ADL must be assessed for perception impairments (RCP).

Technical aids and personal adaptations

Technical aids and minor modifications of the environment can significantly increase the patient's functional independence. The interventions of the occupational therapist address assessing and providing counselling on:

- The most suitable sitting system to achieve a correct postural hygiene that facilitates functionality (wheelchair, armrest, support tray, cushions, accessories, etc.).
- Technical aids to compensate impairments, either provisionally or permanently.
- The orthoses needed to prevent deformities and/or improve the functionality of the upper extremity.
- Modifications of the environment by increasing stimulation from the affected side to prevent falls and facilitate ADL.
- Health education to care-givers provides the patient with only the minimum help, with ergonomics for themselves, to guarantee continuity of the level of independence when he or she goes home.

B The need for special equipment must be assessed individually (RCP).

A At the time of discharge from hospital, all patients must be assessed to ascertain what equipment or adaptations may increase their safety and functional independence (RCP).

A The tools and aids needed by the patient must be provided (RCP).

Technical aids and environmental adaptations

A An assessment of the changes, equipment and adaptations of the environment needed to guarantee patient independence and safety must be made (RCP).

D The patient and/or their care-giver must receive suitable training to make good use of the equipment (RCP).

C Regular assessments should be made to review the suitability and the use of the equipment since patient needs can change (RCP).

Complications

Sensorial impairment: post-stroke central pain

Pain in patients with stroke may have different causes. In general it is mechanical and is related to the restriction of movement, and in some cases was already present before the stroke. In a minority of patients pain is related specifically to cerebral damage caused by stroke (post-stroke central pain).

D The presence of pain in patients with stroke must be identified and treated as soon as possible (SIGN).

A Post-stroke central pain responds to treatment with tricyclic antidepressants (amitriptyline) or anticonvulsants (gabapentin) (RCP).

D When post-stroke central pain is intractable, the patient must be referred to a specialist pain service as soon as possible (RCP).

Shoulder pain

Pain in the shoulder of the plegic/paretic arm is a frequent and crippling complication that may affect up to 30% of all stroke patients. It may hamper or even prevent rehabilitation and is associated with longer hospital stays and poorer outcomes (Turner-Stokes *et al.*, 2002).

C The correct positioning and education of the medical team and care givers in the correct handling of the hemiplegic arm are the most useful preventive measures of shoulder pain (RCP).

C The initial approach to shoulder pain includes drug treatment with NSAIDs (RCP).

A Functional electrical stimulation (FES) has shown benefits in the preventive treatment of the appearance of subluxation of the back and pain in the back when applied in the early post-stroke stages (Ada *et al.*, 2002).

B Local infiltration with steroids is not recommended (NZGG).

Falls

Falls are a frequent complication, often with devastating consequences, in patients with stroke.

A The multifactorial assessment of the risk of falls, the management of this risk, as well as physical conditioning programmes are efficacious in the reduction of the risk of falls (Chang *et al.* 2004) .

A There is no evidence of the efficacy of hip protectors in the prevention of hip fracture in the elderly after falls (Parker *et al*, 2004).

The data come from clinical trials with patients who did not necessarily have stroke sequelae.

4.4. Returning home

4.4.1. Planning the hospital discharge

Planning of hospital discharge refers to the process whereby a team normally transfers the responsibility for caring for the patient to someone else for the patient to maintain the benefit of the programme followed hitherto. This planning requires the participa-

tion of patient, family and the health-care personnel and must be planned from the beginning of the care programme.

A The hospital services must have protocols and local guides to ensure that (RCP):

Patients and family are prepared and totally involved in discharge planning (RCP*).* D

*The primary social and health-care teams are informed of the discharge to the extent that it affects the follow-up or direct intervention in the case (*RCP*).* D

There are no impediments in the physical environment where the patient will live and/or that all the equipment needed to adapt to the environment and the necessary support services is available (RCP*).* D

A Early hospital discharge, when the patient can perform the bed-chair transfers, can only be addressed if there is coordinated community care provided by a multidisciplinary rehabilitation team (RCP, NZGG).

A Any continuity treatment required by the patient must be offered without delay by a specialised service in the community (home, ambulatory, day hospital) (RCP, Langhorne *et al.*, 2005).

4.4.2. Education and information of patients, family and/or care-givers

The negative impact of stroke on how the family operates has been widely described. The members of the family and the care-givers may present affective symptomatology: stress, anxiety, depression, together with changes in social functioning. Interpersonal relationships are affected and relatives often feel isolated. The psychological orientation guidelines to the relatives of affected patients are: information, training and emotional support.

A People who have had a stroke and their relatives and care-givers must receive information and counselling and have the chance to talk about the impact of the disease on their life (NZGG;; Clark *et al.*, 2003).

A Stroke services must offer training/education programmes to those affected and their families (NZGG).

Training/education facilitates the learning of skills and to know what social support resources are available.

B Educational programmes must be flexible to adapt to the information needs of the different patients and/or care-givers and which may change over time (NZGG).

A The information/educational programmes offered by stroke teams and targeting patients and relatives/care-givers reduces patient anxiety in the long-term (Smith *et al.*, 2004).

D The social and health services must make sure that patients and relatives receive information on the local support organisations (patient associations, volunteers) if such organisations exist in their setting (RCP).

✓ The process of providing information to patient and family must be continual (from the beginning of hospitalisation) and these people must receive support (with training during the hospital stay).

✓ Information and the education for patients and relatives must include issues related to patient care, whenever they are necessary (skin cure, changes of position, airway hygiene, urinary incontinence, constipation and others).

4.4.3. Prevention of stress in care givers

Research on the stress of having to care for a disabled person and the factors that modulate the nature and the intensity of this stress has only begun. There is little scientific evidence on how to ease this burden. Besides the needs of the patient and the family, consideration must be given to the needs of the people who directly take on the role of care givers.

B The needs of care givers must be considered from the outset as follows (RCP):

Provide the necessary information (RCP)

Stimulate participation in decision-making (RCP)

Guarantee accessibility to the health-care team (RCP)

D The stroke teams must assess the stress of the care givers, particularly when the patient has cognitive/behavioural impairment or incontinence (RCP).

A The social services must be involved in reducing stress in care givers (RCP).

B The relatives/care-givers must receive counselling on how to maintain the level of social/recreational activities (NZGG).

4.4.4. Post-stroke social support interventions

When the time comes for the patient to go home, both patient and family have to face the challenge of the daily reality with the physical, emotional and social sequelae of the stroke. The need for help in activities of daily living is compounded by the impact on job life and leisure and social activities. This situation requires assessment above all with regard to the social resources available in the setting to palliate as far as possible the practical repercussions on the life of the patient, as well as actions geared towards reintegration and participation in community life.

A The needs for social support, both for patients and care givers, must be reviewed regularly (RCP).

✓ The patient and their family should have a reference social worker who will monitor their needs throughout the rehabilitation process, and who will assess and coordinate suitable community resources to respond to these needs.

4.4.5. Driving vehicles after stroke

Stroke may affect the ability to drive safely due to the deficits it may cause (hemineglegence, hemianopia, cognitive disorders, etc.) and often the affected skills are underestimated by patient and care-givers. Visuospatial and attention deficits, motor deficits

and retarded response speed are the worse prognosis factors for continuing to drive after a stroke. Often the patients do not receive information on the possibility of driving again and their skills are not reviewed. he health-care team must inform patients who so wish on the possibilities of driving again and the patient is under the obligation to act according to this advice.

Patients with TIA

✓ Patients that have had a TIA must submit a favourable report from a specialist corroborating the absence of neurological sequelae.

Patients with stroke

C The capacity to drive safely must be evaluated in all patients that have had a stroke and want to drive again (NZGG).

✓ Driving licences should neither be issued or renewed to people who have certain deficits that may entail a functional disability, endangering road safety, unless the person in question can provide a favourable medical report.

4.4.6. Post-stroke sexuality

Sexual dysfunctions may be the result of motor deficits and of sensitivity disorders, urinary alterations, perceptive alterations, anxiety, depression, changes in self-perception and self-esteem, as well as fear of a further stroke following sexual intercourse. Moreover, there may be other conditions such as diabetes and peripheral vascular problems that may lead to erectile dysfunction in men.

B Patients and their partners must be given the chance to discuss sexuality immediately after the stroke. The initiative should be taken by the health-care team (NZGG).

C Informative leaflets on sexuality-related aspects should be available to stroke patients. These leaflets should include advice on physical aspects (positions, sensorial deficits, erectile dysfunction, etc.) and psychological aspects (fear, communication, roles, feeling of attractiveness) (NZGG).

C Patients and their partners must be informed that sexual intercourse has a low risk of causing another stroke (NZGG).

4.4.7. Post-stroke leisure activities and exercise

Despite the physical and emotional changes involved in stroke, this should not prevent leisure activity whenever possible. In patients with a high degree of physical and communication dependence, a very personalised approach should be addressed. The participation of the family or the patient's environment is very important, both when the plan is drawn up and when the activities are put into practice.

B After stroke, counselling and/or treatment geared towards reaching the required level of social and leisure activity should be offered (NZGG).

✓ The health professionals should facilitate and adapt the activity proposed by the patient and the family/environment to maintain and/or create a leisure habit in the stroke patient.

C After a stroke, patients must have access to a system of adapted transport to facilitate their participation in social and recreational activities (NZGG).

The main objectives of an intervention in free time are:

- to maintain/recover self-esteem
- to continue to have an *active* social and family life
- to maintain/recover/stimulate social relationships.

Intervention in leisure time after stroke must be:

- agreed to with the patient
- realistic and possible (adapted to the degree of autonomy)
- introduced gradually.

Physical exercise is good for health in general and should be adapted to the possibilities of patients with chronic stroke sequelae. There is scant scientific evidence on what types of exercise are most favourable and their benefits on these patients. Exercises for teaching agility, equilibrium and the muscle strength against resistance improve equilibrium, the general mobility of the patient and can reduce the risk of falls (Marigold *et al.*, 2005).

D In patients with stroke the optimal dose of physical exercise must be assessed individually according to the needs and the limitations of each patient (Gordon *et al.*, 2004).

D An exercise frequency of 3 to 7 days a week is recommended, with a duration of 20-60 minutes/day of continuous or accumulated exercise (e.g. in workouts ≥ 10 minutes) according to physical fitness (Gordon *et al.*, 2004).

A Current scientific evidence is insufficient to establish that adapted physical cardiovascular exercise in patients with stroke has positive effects on disability, ADL, quality of life and the rate of lethality (Meek *et al.*, 2003).

5. CPG Editorial staff and collaborators

5.1. GPG Editorial Committee

Jaume Roquer González

Esther Duarte Oller

Sònia Abilleira Castells

Emília Sánchez Ruiz

Miquel Gallofré López

5.2. CPG Drafting team

Sònia Abilleira Castells	Neurologist. CAHTA Stroke Programme
Juan Jacobo Aguilar Naranjo	Head of the Physical Medicine and Rehabilitation Department Hospital Universitari Joan XXIII, Tarragona
Jordi Altés Capellà	Head of the Medicine Department Hospital Comarcal de l'Alt Penedés, Vilafranca del Penedès
Beatriz Alvarez García	Surgeon. Angiology, Vascular and Endovascular Surgery Dept., Hospital de la Vall d'Hebron, BarcelonaHospital de la Vall d'Hebron, Barcelona
Mª Teresa Alzamora Sas	Family Doctor ABSRiu Nord-Riu Sud. Santa Coloma de Gramenet
Luisa Amador Gutiérrez	Convalescence Unit H. de l'Esperança, Centre Geriàtric Municipal, H. del Mar
Adrià Arboix	Clinical Head of the CVD Unit, Neurology Service Hospital Universitari del Sagrat Cor
Montse Bassols i Pascual	Metge. Unitat del Mapa Sanitari, DGPA Department of Health
Xavier Cabré Ollé	Metge Internist. Medical Coordinator of Emergencies Hospital Universitari Arnau de Vilanova, Lleida
Mª Àngels Carreras Pellicer	Physiotherapist. Neurological Sequelae Department Hospitals Vall d'Hebron
Ángel Chamorro Sánchez	Neurologist. Stroke Unit, Neurology Department Hospital Clínic de Barcelona
Mariano de la Figuera	Family Doctor. PCC La Mina Sant Adrià del Besós
Mª José Delgado Mestre	Rehabilitator PCD of Sant Andreu, Barcelona
Esther Duarte Oller	Head of Department of the Physical Medicine and Rehabilitation Department IMAS. Hospital de l'Esperança, Barcelona
Mª Teresa Fusté Peris	Nurse, Head of Nursing Management Institut Clínic de Neurociències. Hospital Clínic de Barcelona

Mª Jesús Galiana Llasat	Convalescence Unit Hospital de la Santa Creu
Miquel Gallofré	Stroke Programme. Chief Department of Health
Rosa Mª Gracia	Intensivist Hospitals Vall d'Hebron
Carme Guinovart	Convalescence Unit Hospital de la Santa Creu de Vic
Juan M. Macho Fernández	Neuroradiologist. Imaging Diagnosis Centre Hospital Clínic de Barcelona
Carme Majós Bellmunt	Phoniatrican and Speech Therapist Hospital Universitari de Bellvitge
Ramon Miralles	Head of Department of the Geriatric Department of the IMAS H. de l'Esperança, Centre Geriàtric Municipal, Hospital del Mar
Joan Molet Teixidó	Neurosurgeon Hospital de Sant Pau
Ernest Palomeras Soler	Neurologist Hospital de Mataró
Bernabé Robles	Head of Neurology Department Hospital de Sant Boi
Teresa Roig Rovira	Head of Neuropsychology Institut Guttmann, Barcelona
Jaume Roquer González	Head of Neurology Department Hospital del Mar, Barcelona
Alex Rovira Cañellas	Neuroradiologist. Head of the MR Unit (IDI) Hospitals Vall d'Hebron
Nohora Rueda Moreno	Occupational Therapist Hospital de l'Esperança, Barcelona
Glòria Saltó	Head of Physical Medicine and Rehabilitation Department. Corporació de Salut del Maresme i la Selva
Emília Sánchez Ruiz	Assistant Director of Research and External Relations Catalan Agency for Health Technology Assessment and Research
Rosa Sansegundo	Rehabilitator Hospital La Tecla, Tarragona

5.3. Standing Commission

José Álvarez Sabín	Head of Neurology Department Hospitals Vall d'Hebron
Mª Teresa Alzamora Sas	Family Doctor ABS Riu Nord-Riu Sud. Santa Coloma
Imma Bori	Head of Department, Physical Medicine and Rehabilitation Department Hospitals Vall d'Hebron
Josep Callejas	Head of Angiology and Vascular Surgery Department Hospital Germans Trias i Pujol
Cristina Cervantes	Physiotherapist Hospital de l'Esperança
Conxita Closa	Rehabilitator Physiomanagement
Gerard Conesa	Neurosurgeon Hospital Clínic de Barcelona
Antoni Dávalos Errando	Head of the Neurology Department Hospital Germans Trias i Pujol
Àngels De Miquel	Neuroradiologist Hospital de Bellvitge
Plácida López	Social Worker PCC of Castellar del Vallès
Àngels Martos	Head of the Internal Medicine Department Hospital de Calella
Consol Rivera	Occupational Therapist Universitat de Vic
Rosa Suñer	Nurse, Neurology Department Hospital Josep Trueta
Alba Tarruella	Speech Therapist Hospital de Calella
Santiago Tomàs	Head of Emergencies Hospital Mútua de Terrassa

5.4. Peer-reviewers

Julia Abad Romero	Nurse Hospital Universitari Germans Trias i Pujol
Paquita Abulí Picart	Nurse Hospital de Figueres
Josefina Adrover Sobrino	Nurse Hospital Joan XXIII
Miquel Aguilar Barberà	Neurologist Hospital Mútua de Terrassa
Lluïsa Algans Coll	Nurse Hospital Josep Trueta

Fuat Arikan Abelló	Neurosurgeon Hospitals Vall d'Hebron
Juanjo Armendáriz	Internist Hospital de la Seu d'Urgell
M. A. Arribas	Neurologist Hospital Comarcal de l'Alt Penedès
Conxa Aviñó Farret	Rehabilitator Hospital de Palamós
Josep Bagunyà	Neurologist Hospital de la Seu d'Urgell
Montserrat Bernabeu	Rehabilitator Institut Guttmann
Cristina Bonet	Occupational Therapist Institut Guttman
Josefina Carbonell	Nurse Clínica l'Aliança, Vic
Olga Carmona	Neurologist Hospital de Figueres
Montserrat Carrasco Sánchez	Nurse Hospital Mútua de Terrassa
Ester Catena	Neurologist Hospital Comarcal de l'Alt Penedès
Marta Castillo	Occupational Therapist Institut Guttman
Mercè Cerdà	Head of Physical Medicine and Rehabilitation Department Pius Hospital de Valls
Marta Comerma	Terapeuta Ocupacional Institut Guttman
Mª José Creus Macia	Nurse Hospital Universitari Germans Trias i Pujol
Mireia Datsira	Occupational Therapist Universitat de Vic
Alberto de Dios Romero	Internist Hospital La Seu d'Urgell
Ana de Pobes	Terapeuta Ocupacional Institut Guttman
Mercè Díaz Gegúndez	Nurse Hospital Sant Jaume de Calella
Benito E. Domínguez Donaire	Nurse Hospital de Bellvitge
Mª Josep Durà Mata	Rehabilitator Hospital Germans Trias i Pujol
Antonia Enseñat	Neuropsychologist Institut Guttmann
Concepción Escola Lafontana	Nurse Hospital de Sant Pau

Josefina Fernández	Internist Pius Hospital de Valls
Mª Angels Fernández Labrada	Nurse Hospital de l'Esperit Sant
Alberto García	Neuropsychologist Institut Guttmann
Anna Garcia Xifra	Nurse Hospital del Mar. IMAS
Tamara Gastelaars	Occupational Therapist Universitat de Vic
Olga Grañé	Occupational Therapist Institut Guttman
Jordi Grau Amorós	Head of Medicine Hospital de Badalona
Gervasi Hostench	Medical Coordinator of Emergencies Hospital de Campdevànol
Montserrat Juncadella	Neuropsychologist Hospital de Bellvitge
Gemma Lecha Amat	Nurse Hospitals Vall d'Hebron
Laura López	Nurse Hospital de Sant Pau
Teresa López López	Nurse Hospital de Figueres
Montserrat Maldonado Aguilar	Nurse Hospital Mútua de Terrassa
Antonio Martínez Yélamos	Neurologist Hospital de Viladecans
Rita Massa	Stroke Unit Coordinator Hospital de Blanes
Aurora Molina González	Nurse Hospital Universitari Germans Trias i Pujol
Amalia Molina Jiménez	Nurse Centre Hospitalari de Manresa
Alfons Moral	Neurologist Hospital Sant Camil
Susanna Morón	Occupational Therapist Institut Guttman
Coral Navarro	Occupational Therapist Universitat de Vic
Maria Oriol Navarro	Nurse Hospital Arnau de Vilanova
Núria Pau Llobera	Nurse Hospital Clínic
Xavier Pérez Berruezo	Director Medical Unit Hospital de Palmaos

Carmen Pérez Gómez	Nurse Hospital Mútua de Terrassa
Edith Pérez Hernández	Occupational Therapist Hospital de Figueres
Gabriela Picco	Internist Hospital de la Seu d'Urgell
Natalia Picó	Neuropsychologist Institut Guttmann
Laura Prats Morera	Nurse Hospital de Sant Pau
Jordi Pujiula Maso	Nurse Hospital Josep Trueta
Agata Pujol Mas	Nurse Hospitals Vall d'Hebron
Pilar Ricart	Nurse Hospital Arnau de Vilanova
Empar Riu	Rehabilitator Centre Sòciosanitari del Carme
Francina Riu	Head of Emergencies Hospital de Puigcerdà
Jordi Salas	Physiotherapist Fisiogestió
Jordi Sanahuja	Neurologist Hospital Universitari Arnau de Vilanova
Rocio Sánchez-Carrion	Neuropsychologist Institut Guttmann
Josep Sánchez Ojanguren	Neurologist Hospital de l'Esperit Sant
Carme Sanclemente	Internist Hospital General de Vic
Joaquín Serena	Head of Neurology Department Hospital Trueta
Cristina Silvestre	Occupational Therapist Institut Guttman
Lluís Soler Singla	Neurologist Hospital General de Catalunya
Ignasi Soriano	Occupational Therapist Institut Guttman
Sònia Tasies	Occupational Therapist Institut Guttman
José Luís Tovar	Nephrologist, Hypertension Unit Hospitals Vall d'Hebrón
Toni Turon Estrada	Neurologist Hospital de Santa Caterina

Carmen Velez Miranda	Nurse Hospitals Vall d'Hebron
Joan Vila Prunes	Nurse Hospitals Vall d'Hebron
Antonio Yuste	Medical Director Fundació Hospital Comarcal Sant Antoni Abad

5.5. Scientific societies and other groups

The ordinary or extraordinary sessions of the following scientific societies were informed about the drafting and the contents of the Guide:

- Societat Catalana de Neurologia
- Societat Catalana de Rehabilitació
- Societat Catalana de Medicina d'Urgències
- Societat Catalana de Neurocirurgia
- Societat Catalana de Medicina Familiar i Comunitària
- Societat Catalana d'Angiologia i Medicina Vascular
- Grup de Neuroradiologia
- Grup de Terapeutes Ocupacionals
- Grup de Medicina Neurointensiva

6.Annexes

Table 1. Canadian Neurological Scale and NIHSS

CANADIAN NEUROLOGICAL SCALE (Coté *et al.*, 1986)

Mentation			Score
	Level Consciousness	Alert	3.0
		Drowsy	1.5
	Orientation	Oriented	1.0
		Disoriented/NA	0.0
	Speech	Normal	1.0
		Expressive Deficit	0.5
		Receptive Deficit	0.0
		TOTAL: _____	

Section A1	Motor Functions	Weakness	Score
NO COMPREHENSION DEFICIT	**Face**	None	0.5
		Present	0.0
	Arm: Proximal	None	1.5
		Mild	1.0
		Significant	0.5
		Total	0
	Arm: Distal	None	1.5
		Mild	1.0
		Significant	0.5
		Total	0
	Leg: Proximal	None	1.5
		Mild	1.0
		Significant	0.5
		Total	0
	Leg: Distal	None	1.5
		Mild	1.0
		Significant	0.5
		Total	0
		TOTAL: _____	

Section A2	Motor Functions	Weakness	Score
COMPREHENSION DEFICIT	**Face**	Symmetrical	0.5
		Asymmetrical	0.0
	Arms	Equal	1.5
		Unequal	0.0
	Legs	Equal	1.5
		Unequal	0.0
		TOTAL: _____	

NIHSS SCALE (Goldstein *et al*., 1989)

Instructions	Scale Definition	Score
1a. Level of Consciousness: The investigator must choose a response if a full evaluation is prevented by such obstacles as an endotracheal tube, language barrier, orotracheal trauma/bandages. A 3 is scored only if the patient makes no movement (other than reflexive posturing) in response to noxious stimulation.	0 = **Alert;** keenly responsive. 1 = **Not alert**; but arousable by minor stimulation to obey, answer, or respond. 2 = **Not alert**; requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements (not stereotyped). 3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and flexic.	_____
1b. LOC Questions: The patient is asked the month and his/her age. The answer must be correct - there is no partial credit for being close. Aphasic and stuporous patients who do not comprehend the questions will score 2. Patients unable to speak because of endotracheal intubation, orotracheal trauma, severe dysarthria from any cause, language barrier, or any other problem not secondary to aphasia are given a 1. It is important that only the initial answer be graded and that the examiner not "help" the patient with verbal or non-verbal cues.	0 = **Answers** both questions correctly. 1 = **Answers** one question correctly. 2 = **Answers** neither question correctly.	_____
1c. LOC Commands: The patient is asked to open and close the eyes and then to grip and release the non-paretic hand. Substitute another one step command if the hands cannot be used. Credit is given if an unequivocal attempt is made but not completed due to weakness. If the patient does not respond to command, the task should be demonstrated to him or her (pantomime), and the result scored (i.e., follows none, one or two commands). Patients with trauma, amputation, or other physical impediments should be given suitable one-step commands. Only the first attempt is scored.	0 = **Performs** both tasks correctly. 1 = **Performs** one task correctly. 2 = **Performs** neither task correctly.	_____
2. Best Gaze: Only horizontal eye movements will be tested. Voluntary or reflexive (oculocephalic) eye movements will be scored, but caloric testing is not done. If the patient has a conjugate deviation of the eyes that can be overcome by voluntary or reflexive activity, the score will be 1. If a patient has an isolated peripheral nerve paresis (CN III, IV or VI), score a 1. Gaze is testable in all aphasic patients. Patients with ocular trauma, bandages, pre-existing blindness, or other disorder of visual acuity or fields should be tested with reflexive movements, and a choice made by the investigator. Establishing eye contact and then moving about the patient from side to side will occasionally clarify the presence of a partial gaze palsy.	0 = **Normal.** 1 = **Partial gaze palsy;** gaze is abnormal in one or both eyes, but forced deviation or total gaze paresis is not present. 2 = **Forced deviation,** or total gaze paresis not overcome by the oculocephalic maneuver.	_____
3. Visual: Visual fields (upper and lower quadrants) are tested by confrontation, using finger counting or visual threat, as appropriate. Patients may be encouraged, but if they look at the side of the moving fingers appropriately, this can be scored as normal. If there is unilateral blindness or enucleation, visual fields in the remaining eye are scored. Score 1 only if a clear-cut asymmetry, including quadrantanopia, is found. If patient is blind from any cause, score 3. Double simultaneous stimulation is performed at this point. If there is extinction, patient receives a 1, and the results are used to respond to item 11.	0 = **No visual loss.** 1 = **Partial hemianopia.** 2 = **Complete hemianopia.** 3 = **Bilateral hemianopia** (blind including cortical blindness).	_____
4. Facial Palsy: Ask – or use pantomime to encourage – the patient to show teeth or raise eyebrows and close eyes. Score symmetry of grimace in response to noxious stimuli in the poorly responsive or non-comprehending patient. If facial trauma/bandages, orotracheal tube, tape or other physical barriers obscure the face, these should be removed to the extent possible.	0 = **Normal** symmetrical movements. 1 = **Minor paralysis** (flattened nasolabial fold, asymmetry on smiling). 2 = **Partial paralysis** (total or near-total paralysis of lower face). 3 = **Complete paralysis** of one or both sides (absence of facial movement in the upper and lower face).	_____
5. Motor Arm: The limb is placed in the appropriate position: extend the arms (palms down) 90 degrees (if sitting) or 45 degrees (if supine). Drift is scored if the arm falls before 10 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic arm. Only in the case of amputation or joint fusion at the shoulder, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	0 = **No drift;** limb holds 90 (or 45) degrees for full 10 seconds. 1 = **Drift;** limb holds 90 (or 45) degrees, but drifts down before full 10 seconds; does not hit bed or other support. 2 = **Some effort against gravity;** limb cannot get to or maintain (if cued) 90 (or 45) degrees, drifts down to bed, but has some effort against gravity. 3 = **No effort against gravity;** limb falls. 4 = **No movement.** UN = **Amputation** or joint fusion, explain: _____ **5a. Left Arm** **5b. Right Arm**	_____ _____
6. Motor Leg: The limb is placed in the appropriate position: hold the leg at 30 degrees (always tested supine). Drift is scored if the leg falls before 5 seconds. The aphasic patient is encouraged using urgency in the voice and pantomime, but not noxious stimulation. Each limb is tested in turn, beginning with the non-paretic leg. Only in the case of amputation or joint fusion at the hip, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice.	0 = **No drift;** leg holds 30-degree position for full 5 seconds. 1 = **Drift;** leg falls by the end of the 5-second period but does not hit bed. 2 = **Some effort against gravity;** leg falls to bed by 5 seconds, but has some effort against gravity. 3 = **No effort against gravity;** leg falls to bed immediately. 4 = **No movement.** UN = **Amputation** or joint fusion, explain: _____ **6a. Left Leg** **6b. Right Leg**	_____

NIHSS SCALE (Goldstein *et al.*, 1989)

7. Limb Ataxia: This item is aimed at finding evidence of a unilateral cerebellar lesion. Test with eyes open. In case of visual defect, ensure testing is done in intact visual field. The finger-nose-finger and heel-shin tests are performed on both sides, and ataxia is scored only if present out of proportion to weakness. Ataxia is absent in the patient who cannot understand or is paralyzed. Only in the case of amputation or joint fusion, the examiner should record the score as untestable (UN), and clearly write the explanation for this choice. In case of blindness, test by having the patient touch nose from extended arm position.	0 = **Absent.** 1 = **Present in one limb.** 2 = **Present in two limbs.** UN = **Amputation** or joint fusion, explain: _____	_____
8. Sensory: Sensation or grimace to pinprick when tested, or withdrawal from noxious stimulus in the obtunded or aphasic patient. Only sensory loss attributed to stroke is scored as abnormal and the examiner should test as many body areas (arms [not hands], legs, trunk, face) as needed to accurately check for hemisensory loss. A score of 2, "severe or total sensory loss," should only be given when a severe or total loss of sensation can be clearly demonstrated. Stuporous and aphasic patients will, therefore, probably score 1 or 0. The patient with brainstem stroke who has bilateral loss of sensation is scored 2. If the patient does not respond and is quadriplegic, score 2. Patients in a coma (item 1a=3) are automatically given a 2 on this item.	0 = **Normal;** no sensory loss. 1 = **Mild-to-moderate sensory loss;** patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched. 2 = **Severe to total sensory loss;** patient is not aware of being touched in the face, arm, and leg.	_____
9. Best Language: A great deal of information about comprehension will be obtained during the preceding sections of the examination. For this scale item, the patient is asked to describe what is happening in the attached picture, to name the items on the attached naming sheet and to read from the attached list of sentences. Comprehension is judged from responses here, as well as to all of the commands in the preceding general neurological exam. If visual loss interferes with the tests, ask the patient to identify objects placed in the hand, repeat, and produce speech. The intubated patient should be asked to write. The patient in a coma (item 1a=3) will automatically score 3 on this item. The examiner must choose a score for the patient with stupor or limited cooperation, but a score of 3 should be used only if the patient is mute and follows no one-step commands.	0 = **No aphasia;** normal. 1 = **Mild-to-moderate aphasia;** some obvious loss of fluency or facility of comprehension, without significant limitation on ideas expressed or form of expression. Reduction of speech and/or comprehension, however, makes conversation about provided materials difficult or impossible. For example, in conversation about provided materials, examiner can identify picture or naming card content from patient's response. 2 = **Severe aphasia;** all communication is through fragmentary expression; great need for inference, questioning, and guessing by the listener. Range of information that can be exchanged is limited; listener carries burden of communication. Examiner cannot identify materials provided from patient response. 3 = **Mute, global aphasia;** no usable speech or auditory comprehension.	_____
10. Dysarthria: If patient is thought to be normal, an adequate sample of speech must be obtained by asking patient to read or repeat words from the attached list. If the patient has severe aphasia, the clarity of articulation of spontaneous speech can be rated. Only if the patient is intubated or has other physical barriers to producing speech, the examiner should record the score as untestable (UN), and clearly write an explanation for this choice. Do not tell the patient why he or she is being tested.	0 = **Normal.** 1 = **Mild-to-moderate dysarthria;** patient slurs at least some words and, at worst, can be understood with some difficulty. 2 = **Severe dysarthria;** patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to any dysphasia, or is mute/anarthric. UN = **Intubated** or other physical barrier, explain:_____	_____
11. Extinction and Inattention (formerly Neglect): Sufficient information to identify neglect may be obtained during the prior testing. If the patient has a severe visual loss preventing visual double simultaneous stimulation, and the cutaneous stimuli are normal, the score is normal. If the patient has aphasia but does appear to attend to both sides, the score is normal. The presence of visual spatial neglect or anosagnosia may also be taken as evidence of abnormality. Since the abnormality is scored only if present, the item is never untestable.	0 = **No abnormality.** 1 = **Visual, tactile, auditory, spatial, or personal inattention** or extinction to bilateral simultaneous stimulation in one of the sensory modalities. 2 = **Profound hemi-inattention or extinction to more than one modality;** does not recognize own hand or orients to only one side of space.	_____

Table 2. Assessment of dysphagia. Swallowing test

The clinical manifestations significantly associated with the risk of aspiration are: dysphonia and dysarthria, abolition of nausea reflex, alteration of voluntary cough, accumulation of saliva or food in the mouth, cough after swallowing and changes of voice after swallowing (Daniels et al., 1998).

Complementary explorations

1. Clinical swallowing test: oral administration of progressive quantities of liquids, semisolids and solids, assessing:

	WATER		SEMISOLID (yoghurt)		SOLID
	5 cc	10 cc	1 teaspoonful	1 tablespoonful	bread
Oral retention					
Immobility larynx					
Changes voice after swallowing					
Cough on swallowing					

2. When the presence of a swallowing disorder is confirmed the clinical exploration and the swallowing test must be repeated weekly.
3. In the presence of abolished voluntary cough, the radiological/videofluoroscopic study test must be performed during the swallowing test (beyond the second week post-stroke).
4. Radiokinematic exploration with videofluoroscopy, with intake of liquid/mush containing barium to record, in slow motion, the different phases of the swallowing process and ascertain the problem specifically.

Table 3. Recommendations for the hospital discharge report

The hospital discharge report should be written using the following structure:

1. Reason for hospitalisation
2. Background
   - Patient's prior clinical and functional situation
   - Prior drug treatment
   - Vascular risk factors and control
   - Allergies
3. Summary of the anamnesis detailing symptoms, moment of onset of symptoms, circumstances and initial evolution.
4. Most relevant data from the physical exploration, vital constants, neurological and neurovascular exploration. The result and the quantification scale of the neurological deficits used should be included (NIH, Canadian, etc.).
5. Diagnostic tests and their results, including whether they were within normality. The date and the time of the neuroimaging tests in acute phase should be included.

6. Diagnosis

- Syndrome diagnosis (stroke, TIA)
- Etiopathogenic diagnosis (ischemia –atherothrombotic, cardioembolic, lacunar, undetermined-, haemorrhagic –spontaneous or secondary to, and indicate the cause)
- Vascular diagnosis (e.g., carotid stenosis, aneurysms of the posterior communicating artery, arteriovenous malformation, etc.)
- Topographic diagnosis (infarction middle cerebral artery, frontal lobar haemorrhage, etc.)
- Diagnosis of stroke-associated diseases (auricular fibrillation, permeable foramen ovale, diabetes *mellitus*, high blood pressure, hyperlipemia, etc.)
- Diagnosis of diseases not directly associated with the stroke

7. Evolution

- Describe incidents during hospitalisation, detailing possible complications
- Describe the neurological and functional situation at time of discharge
- Detail the special cares required by the patient (rehabilitation, speech therapy, nasogastric tube, urinary tube, diapers, articulated bed, wheelchair, etc.)
- Detail the results of the scales: NIH, Canadian, Barthel, modified Rankin.

8. Treatment

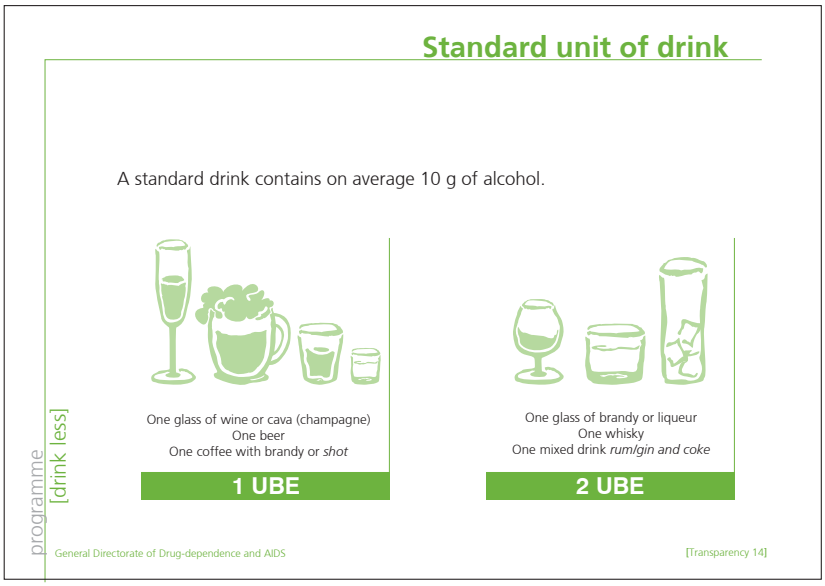
- Modification of habits or life style and strict control of vascular risk factors, taking the recommendations of the CPG into account.
- Drugs, doses and duration of treatment.

9. Dates of reviews and treatment programme (e.g. rehabilitation).

Table 4. Alcohol content of the most frequent alcoholic drinks

DRINK	DOSE	ALCOHOL CONTENT (grams)
Beer	small glass large glass	10 15
Table wine	small glass (100 ml) large glass (200 ml)	10 20
Coffee with brandy	small glass	8
Sweet wines	small glass	14
Cava (champagne)	glass	10
Martini	small glass	10
Liqueurs/mixed drinks	glass	22
Fruit liquors	small glass (shot)	6

http://www.ub.es/sacu/alcohol/textcast.html#contingut



Department of Health. Drink Less Programme
http://www.gencat.net/salut/depsan/units/sanitat/html/ca/alcohol/bvms01.htm

Table 5. Barthel Scale or Index, modified Rankin scale and Functional Independence Measure (FIM)

Modified Rankin Scale (Wolfe et al, 1992)

Score	Description
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Dead

TOTAL (0–6): _____

Barthel Index (Modified Granger)
(Mahoney et al, 1965; Granger et al, 1979)

Activity	Score
FEEDING 0 = unable 5 = needs help cutting, spreading butter, etc., or requires modified diet 10 = independent	_____
BATHING 0 = dependent 5 = independent (or in shower)	_____
GROOMING 0 = needs to help with personal care 5 = independent face/hair/teeth/shaving (implements provided)	_____
DRESSING 0 = dependent 5 = needs help but can do about half unaided 10 = independent (including buttons, zips, laces, etc.)	_____
BOWELS 0 = incontinent (or needs to be given enemas) 5 = occasional accident 10 = continent	_____
BLADDER 0 = incontinent, or catheterized and unable to manage alone 5 = occasional accident 10 = continent	_____
TOILET USE 0 = dependent 5 = needs some help, but can do something alone 10 = independent (on and off, dressing, wiping)	_____
TRANSFERS (BED TO CHAIR AND BACK) 0 = unable, no sitting balance 5 = major help (one or two people, physical), can sit 10 = minor help (verbal or physical) 15 = independent	_____
MOBILITY (ON LEVEL SURFACES) 0 = immobile or < 50 yards 5 = wheelchair independent, including corners, > 50 yards 10 = walks with help of one person (verbal or physical) > 50 yards 15 = independent (but may use any aid; for example, stick) > 50 yards	_____
STAIRS 0 = unable 5 = needs help (verbal, physical, carrying aid) 10 = independent	_____
TOTAL (0–100):	_____

Functional Independence Measure (FIM) (Hamilton *et al.*, 1987)

PERSONAL CURES (6-42 points)
A. Feeding
B. Appearance
C. Bath
D. Dressing top half body
E. Dressing bottom half body
F. WC
SPHINCTER CONTROL (2-14 points)
G. Urine control
H. Bowel control
TRANSFERS (3-21 points)
L. Walk, wheelchair
J. WC
K. Bath or shower
LOCOMOTION (2-14 points)
L. Walk, wheelchair
M. Walk up and down stairs
PARTIAL TOTAL MENTAL (5-35 points)
COMMUNICATION (2-14 points)
N. Understanding
O. Expression
SOCIABILITY (3-21 points)
P. Social Interaction
Q. Problem-solving
R. Memory
PARTIAL TOTAL MENTAL (5-35 points)
TOTAL (18-126 points)

INDEPENDENCE	7 = Complete 6 = Incomplete
MODIFIED DEPENDENCE	5 = Supervision, preparation 4 = Assistance> 25% 3 = Assistance > 50%
COMPLETE DEPENDENCE	2 = Assistance > 75% 1 = Total assistance

7. References

References

Ada L, Foongchomcheay A. Efficacy of electrical stimulation in preventing or reducing subluxation of the shoulder after stroke: a meta-analysis. Aust J Physiother. 2002;48:257-67.

Adams H, Adams R, Del Zoppo G, Goldstein LB. Guidelines for the early management of patients with ischemic stroke. 2005 Update. A scientific statement from the Stroke Council of the American Heart Association/American Stroke Association. Stroke. 2005;36:916-21.

Adams HP Jr, Adams RJ, Brott T, del Zoppo GJ, Furlan A, Goldstein LB, *et al*; Stroke Council of the American Stroke Association. Guidelines for the early management of patients with ischemic stroke: A scientific statement from the Stroke Council of the American Stroke Association (ASA). Stroke. 2003;34:1056-83.

Albers GW, Caplan LR, Easton JD, Fayad PB, Mohr JP, Saver JL, *et al*; TIA Working Group. Transient ischemic attack--proposal for a new definition. N Engl J Med. 2002;347:1713-6.

Alexandrov AV, Molina CA, Grotta JC, Garami Z, Ford SR, Alvarez-Sabin J, *et al*; CLOTBUST Investigators. Ultrasound-enhanced systemic thrombolysis for acute ischemic stroke. N Engl J Med. 2004;351:2170-8.

ALLHAT Officers and Coordinators for the ALLHAT Collaborative Research Group. The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial. Major outcomes in high-risk hypertensive patients randomized to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic: The Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT). JAMA. 2002;288:2981-97.

Alonso Ortiz del Río C, Medrano Ortega FJ, Romero Alonso A, Villar Conde E, Calderón Sandubete E, Marín León I, *et al*. Guía PRETEMED 2003. Guía de profilaxis de enfermedad tromboembólica en patología médica. Córdoba: SADEMI; 2003.

Alvarez-Sabin J. Stroke in teenagers. Rev Neurol. 1997;25:919-23.

Amarenco P, Bogousslavsky J, Callahan A 3rd, Goldstein LB, Hennerici M, Rudolph AE, Sillesen H, Simunovic L, Szarek M, Welch KM, Zivin JA; Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL) Investigators. High-dose atorvastatin after stroke or transient ischemic attack. N Engl J Med 2006;355:549-59.

Arboix A, Massons J, García-Eroles L, Oliveres M, Balcells M, Targa C. Migrainous cerebral infarction in the Sagrat Cor Hospital of Barcelona stroke registry. Cephalalgia. 2003;23:389-94.

Arboix A, Morcillo C, García-Eroles L, Oliveres M, Massons J, Targa C, Different vascular risk factor profiles in ischemic stroke subtypes: a study from the "Sagrat Cor Hospital of Barcelona Stroke Registry". Acta Neurol Scand. 2000;102:264-70.

Bederson JB, Awad IA, Wiebers DO, Piepgras D, Haley Jr EC, Brott T, *et al*, Members. Recommendations for the management of patients with unruptured intracranial aneurysms. A statement for healthcare professionals from the Stroke Council of the American Heart Association (AHA). Circulation. 2000;102:2300-8.

Beletsky V, Nadareishvili Z, Lynch J, Shuaib A, Woolfenden A, Norris JW; Canadian Stroke Consortium. Cervical arterial dissection: time for a therapeutic trial? Stroke. 2003;34:2856-60.

Berge E, Sandercock P. Anticoagulants versus antiplatelet agents for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2001, Issue 2. Art. No.: CD003242. DOI: 10.1002/14651858.

Bhogal S, Teasell R, Speechley M. Intensity of aphasia therapy, impact on recovery. Stroke. 2003;34:987-92.

Bond R, Rerkasem K, Rothwell PM. Systematic review of the risks of carotid endarterectomy in relation to the clinical indication for and timing of surgery. Stroke. 2003;34:2290-301.

Broderick JP, Adams HP Jr, Barsan W, Feinberg W, Feldmann E, Grotta J, *et al*. Guidelines for the management of spontaneous intracerebral hemorrhage: A statement for healthcare professionals from a special writing group of the Stroke Council, American Heart Association (AHA). Stroke. 1999;30:905-15.

Brotons C, Royo-Bordonada MA, Álvarez-Sala L, Armario P, Artigao R, Conthe P, *et al*. Adaptación española de la Guía Europea de Prevención Cardiovascular. Clin Invest Arterioscl. 2005;17:19-33.

CAST: randomised placebo-controlled trial of early aspirin use in 20,000 patients with acute ischaemic stroke. CAST (Chinese Acute Stroke Trial) Collaborative Group. Lancet. 1997;349:1641-9.

Chalmers J, Todd A, Chapman N, Beilin L, Davis S, Donnan G, *et al*; International Society of Hypertension Writing Group. International Society of Hypertension (ISH): statement on blood pressure lowering and stroke prevention. J Hypertens. 2003;21:651-63.

Chambers BR, You RX, Donnan GA. Carotid endarterectomy for asymptomatic carotid stenosis. The Cochrane Database of Systematic Reviews. 1999, Issue 4. Art. No.: CD001923. DOI: 10.1002/14651858.

Chang JT, Morton SC, Rubenstein LZ, Mojica WA, Maglione M, Suttorp MJ,*et al*. Interventions for the prevention of falls in older adults: systematic review and meta-analysis of randomized clinical trials. BMJ. 2004;328:680-3.

Cho DY, Chen TC, Lee HC. Ultra-early decompressive craniectomy for malignant middle cerebral artery infarction. Surg Neurol. 2003;60:227-32.

Clark MS, Rubenach S, Winsor A. A randomized controlled trial of an education and counselling intervention for families after stroke. Clin Rehab. 2003;17:703-12.

Connors III JJ, Sacks D, Furlan AJ, Selman WR, Russell EJ, Stieg PE, *et al*, for the NeuroVascular Coalition Writing Group. Training, competency, and credentialing standards for diagnostic cervicocerebral angiography, carotid stenting, and cerebrovascular intervention: A Joint Statement from the American Academy of Neurology, the American Association of Neurological Surgeons, the American Society of Interventional and Therapeutic Neuroradiology, the American Society of Neuroradiology, the Congress of Neurological Surgeons, the AANS/CNS Cerebrovascular Section, and the Society of Interventional Radiology. Neurology. 2005;64:190-8.

Coté R, Hachinski VC, Shurvell BL, Norris JW, Wolfson C. The Canadian Neurological Scale: a preliminary study in acute stroke. Stroke. 1986;17:731-7.

Coull AJ, Rothwell PM. Underestimation of the early risk of recurrent stroke: evidence of the need for a standard definition. Stroke. 2004;35:1925-9.

Coward LJ, Featherstone RL, Brown MM. Percutaneous transluminal angioplasty and stenting for carotid artery stenosis. The Cochrane Database of Systematic Reviews 2004, Issue 1. Art. No.: CD000515.pub2. DOI: 10.1002/14651858.

Culebras A, Kase CS, Masdeu JC, Fox AJ, Bryan RN, Grossman CB, *et al*. Practice guidelines for the use of imaging in transient ischemic attacks and acute stroke. A report of the Stroke Council, American Heart Association. Stroke. 1997;28:1480-97.

Culebras A, Rotta-Escalante R, Vila J, Domínguez R, Abiusi G, Famulari A, *et al*; TAPIRSS investigators. Triflusal vs aspirin for prevention of cerebral infarction: a randomized stroke study. Neurology. 2004;62:1073-80.

Dahlof B, Devereux RB, Kjeldsen SE, Julius S, Beevers G, de Faire U, *et al*; LIFE Study Group. Cardiovascular morbidity and mortality in the Losartan Intervention for endpoint reduction in hypertension study (LIFE): a randomised trial against atenolol. Lancet. 2002;359:995-1003.

Daniels SK, Brailey K, Priestly DH, Herrington LR, Weisberg LA, Foundas AL. Aspiration in patients with acute stroke. Arch Phys Med Rehabil. 1998;79:14-9.

Dávalos A, Castillo J, Álvarez-Sabín J, Secades JJ, Mercadal J, López S, *et al*. Oral citicoline in acute ischemic stroke. An

individual patient data pooling Analysis of Clinical Trials. Stroke. 2002;33:2850-7.

Davis GA. A survey of adult aphasia and related language disorders. 2nd ed. Englewoods Cliffs (United Kingdom): Prentice-Hall; 1993

De Georgia MA, Krieger DW, Abou-Chebl A, Devlin TG, Jauss M, Davis SM, *et al*. Cooling for acute ischemic brain damage (COOL AID). A feasibility trial of endovascular cooling. Neurology. 2004;63:312-7.

Diener HC, Bogousslavsky J, Brass LM, Cimminiello C, Csiba L, Kaste M, *et al*; MATCH investigators. Aspirin and clopidogrel compared with clopidogrel alone after recent ischaemic stroke or transient ischaemic attack in high-risk patients (MATCH): randomised, double-blind, placebo-controlled trial. Lancet. 2004. 24;364:331-7.

Diringer MN. Intracerebral hemorrhage: pathophysiology and management. Crit Care Med. 1993;21:1591–603.

Document Marc del Pla d'Atenció a la Malaltia Vascular Cerebral. Barcelona: Departament de Sanitat i Seguretat Social; octubre de 2003.

Duncan PW, Horner RD, Reker DM, Samsa GP, Hoenig H, Hamilton B, *et al*. Adherence to postacute rehabilitation guidelines is associated with functional recovery in stroke. Stroke. 2002;33:167-77.

Duncan PW, Jorgensen HS, Wade DT. Outcome measures in acute stroke trials: a systematic review and some recommendations to improve practice. Stroke. 2000;31:1429-38.

ESPRIT Study Group; Halkes PH, van Gijn J, Kappelle LJ, Koudstaal PJ, Algra A. Aspirin plus dipyridamole versus aspirin alone after cerebral ischaemia of arterial origin (ESPRIT): randomised controlled trial. Lancet 2006; 367: 1665-73.

Estany J, Ferrándiz S, Garcia Alfranca F, coordinadors. Protocols, codis d'activació i circuits d'atenció urgent a Barcelona: Malalt politraumàtic. Infart agust miocardi. Malalt amb ictus. [Document tècnic provisional]: . Barcelona: Consorci Sanitari de Barcelona.

Feys H, De Weerdt W, Verbeke G, Steck GC, Capiau C, Kiekens C, *et al*. Early and repetitive stimulation of the arm can substantially improve the long term outcome after stroke: a 5-year follow-up study of a randomized trial. Stroke 2004;35:924-9.

Foerch C, Lang JM, Krause J, Raabe A, Sitzer M, Seifert V, *et al*. Functional impairment, disability, and quality of life outcome after decompressive hemicraniectomy in malignant middle cerebral artery infarction. J Neurosurg. 2004;101:248-54.

Goldstein LB, Adams R, Becker K, Furberg CD, Gorelick PB, Hademenos G, *et al*. Primary prevention of ischemic stroke: A statement for healthcare professionals from the Stroke Council of the American Heart Association. Stroke. 2001;32:280-99.

Goldstein LB, Bertels C, Davis JN. Interrater reliability of the NIH stroke scale. Arch Neurol. 1989;46:660–2.

Gordon NF, Gulanick M, Costa F, Fletcher G, Franklin BA, Roth EJ, *et al*. Physical activity and exercise recommendations for stroke survivors: An American Heart Association Scientific Statement from the Council on Clinical Cardiology, Subcommittee on Exercise, Cardiac Rehabilitation, and Prevention; the Council on Cardiovascular Nursing; the Council on Nutrition, Physical Activity, and Metabolism; and the Stroke Council. Circulation. 2004:2031-41.

Gorelick PB. New horizons for stroke prevention: PROGRESS and HOPE. Lancet Neurol. 2002;1:149-56.

Granger CV, Albrecht GL, Hamilton BB. Outcome of comprehensive medical rehabilitation: measurement by PULSES profile and the Barthel Index. Arch Phys Med Rehab. 1979;60:145-54.

Green J, Young J, Forster A, Collen F, Wade D. Combined analysis of two randomized trials of community physiotherapy for patients more than one year post stroke. Clin Rehabil. 2004;18:249-52.

Gubitz G, Sandercock P, Counsell C. Anticoagulants for acute ischaemic stroke. The Cochrane Database of Systematic Reviews 2004, Issue 2. Art. No.: CD000024.pub2. DOI: 10.1002/14651858.

Hacke W, Albers G, Al-Rawi Y, Bogousslavsky J, Davalos A, Eliasziw M, *et al*; DIAS Study Group. The Desmoteplase in Acute Ischemic Stroke Trial (DIAS): a phase II MRI-based 9-hour window acute stroke thrombolysis trial with intravenous desmoteplase. Stroke. 2005;36:66-73.

Hajat C, Hajat S, Sharma P. Effects of poststroke pyrexia on stroke outcome. A Meta-analysis of studies in patients. Stroke. 2000;31:410-4.

Halliday A, Mansfield A, Marro J, Peto C, Peto R, Potter J, *et al*, MRC Asymptomatic Carotid Surgery Trial (ACST) Collaborative Group. Prevention of disabling and fatal strokes by successful carotid endarterectomy in patients without recent neurological symptoms: randomised controlled trial. Lancet. 2004;363:1491-502.

Hamilton BB, Granger CV, Sherwin FS, Zielezny M, Tashman JS. A uniform national data system for medical rehabilitation. In: Fuhrer MJ, editor. Rehabilitation outcomes: analysis and measurement. Baltimore, MD: Brookes Publishing Co; 1987.

Heart Protection Study Collaborative Group. Effects of cholesterol-lowering with simvastatin on stroke and other major vascular events in 20536 people with cerebrovascular disease or other high-risk conditions. Lancet. 2004;363:757-67.

Hobson RW 2nd, Howard VJ, Roubin GS, Ferguson RD, Brott TG, Howard G, *et al*; CREST. Credentialing of surgeons as interventionalists for carotid artery stenting: experience from the lead-in phase of CREST. J Vasc Surg. 2004;40:952-7.

Hornig CR, Dorndorf W, Agnoli AL. Hemorrhagic cerebral infarction--a prospective study. Stroke. 1986;17:179-85.

Jarman B, Aylin P, Bottle A. Acute stroke units and early CT scans are linked to lower in-hospital mortality rates. BMJ. 2004;328:369.

Kastrau F, Wolter M, Huber W, Block F. Recovery from aphasia after hemicraniectomy for infarction of the speech-dominant hemisphere. Stroke. 2005;36:825-9.

Kinkel WR, Jacobs L. Computerized axial transverse tomography in cerebrovascular disease. Neurology. 1976;26:924-30.

Kwakkel G, van Peppen R, Wagenaar RC, Wood Dauphine S, Richards C, Ashburn A, *et al*. Effects of augmented exercise therapy time after stroke: a meta-analysis. Stroke. 2004;35:2529-39.

Kwiatkowski TG, Libman RB, Frankel M, Tilley BC, Morgenstern LB, Lu M, *et al*. Effects of tissue plasminogen activator for acute ischemic stroke at one year. National Institute of Neurological Disorders and Stroke Recombinant Tissue Plasminogen Activator Stroke Study Group. N Engl J Med. 1999;340:1781-7.

Langhorne P, Taylor G, Murray G, Dennis M, Anderson C, Bautz-Holter E, *et al*. Early supported discharge services for stroke patients: a meta-analysis of individual patients' data. Lancet. 2005;365:501-6.

Langhorne P, Pollock A, in conjunction with the Stroke Unit Trialists' Collaboration. What are the components of effective stroke unit care? Age Ageing. 2002;31:365–71.

Launois R, Giroud M, Mégnigbêto AC, Le Lay K, Présenté G, Mahagne MH, *et al*. Estimating the cost-effectiveness of stroke units in France compared with conventional care. Stroke. 2004;35:770-5.

Leonardi-Bee J, Bath PM, Bousser MG, Davalos A, Diener HC, Guiraud-Chaumeil B, *et al*; Dipyridamole in Stroke Collaboration (DISC). Dipyridamole for preventing recurrent ischemic stroke and other vascular events: a meta-analysis of individual patient data from randomized controlled trials. Stroke. 2005;36:162-8.

Leung J, Moseley A. Impact of ankle foot orthoses on gait and leg muscle activity in adults with hemiplegia: systematic literature review. Phys Ther. 2003;89:39-55.

Lezak MD. Neuropsychological assessment. New York: Oxford University Press; 1995.

Lovett JK, Dennis MS, Sandercock PA, Bamford J, Warlow CP, Rothwell PM. Very early risk of stroke after a first transient ischemic attack. Stroke. 2003;34:138-40.

Lyrer P, Engelter S. Antithrombotic drugs for carotid artery dissection. Cochrane Database Syst Rev. 2003;(3):CD000255.

Mahoney FI, Barthel D. Functional evaluation: the Barthel Index. Md State Med J 1965;14:56-61.

Mant J, Wade D, Winner S. Health care needs assessment: stroke. In: Stevens A, Raftery J, Mant J, Simpson S, editors. Health care needs assessment: the epidemiologically based needs assessment reviews. 2nd edition. Oxford (United Kingdom): Radcliffe Medical Press; 2004.

Mapou RL. Clinical neuropsychological assessment. A cognitive approach. New York: Plenum Press; 1995.

Marigold DS, Eng JJ, Dawson AS, Inglis JT, Harris JE, Gylfadottir S. Exercise leads to faster postural reflexes, improved balance and mobility, and fewer falls in older persons with chronic stroke. J Am Geriatr Soc. 2005;53:416-23.

Martí-Vilalta JL, Arboix A. The Barcelona Stroke Registry. Eur Neurol. 1999;41:135-42.

Mas JL, Chatellier G, Beyssen B, Branchereau A, Moulin T, Becquemin JP, Larrue V, Lievre M, Leys D, Bonneville JF, Watelet J, Pruvo JP, Albucher JF, Viguier A, Piquet P, Garnier P, Viader F, Touze E, Giroud M, Hosseini H, Pillet JC, Favrole P, Neau JP, Ducrocq X; EVA-3S Investigators. Endarterectomy versus stenting in patients with symptomatic severe carotid stenosis. N Engl J Med 2006 Oct 19;355(16):1660-71.

Matías-Guiu J, Ferro JM, Alvarez-Sabin J, Torres F, Jimenez MD, Lago A, *et al*, TACIP Investigators. Comparison of triflusal and aspirin for prevention of vascular events in patients after cerebral infarction: the TACIP Study: a randomized, double-blind, multicenter trial. Stroke. 2003;34:840-8.

Mayer SA, Brun NC, Begtrup K, Broderick J, Davis S, Diringer MN, *et al*. Recombinant activated factor VII intracerebral hemorrhage trial investigators. Recombinant activated factor VII for acute intracerebral hemorrhage. N Engl J Med. 2005;352:777-85.(a)

Mayer SA, Brun NC, Broderick J, Davis S, Diringer MN, Skolnick BE, *et al*; Europe/AustralAsia NovoSeven ICH Trial Investigators. Safety and feasibility of recombinant factor VIIa for acute intracerebral hemorrhage. Stroke. 2005;36:74-9.(b)

Mazzone C, Chiodo Grandi F, Sandercock P, Miccio M, Salvi R. Physical methods for preventing deep vein thrombosis in stroke. The Cochrane Database of Systematic Reviews 2004, Issue 4. Art. No.: CD001922. pub2. DOI: 10.1002/14651858.

Meek C, Pollock A, Potter J, Langhorne P. A systematic review of exercise trials post stroke. Clin Rehabil. 2003;17:6-13.

Mendelow AD, Gregson BA, Fernandes HM, Murray GD, Teasdale GM, Hope DT, *et al*; STICH investigators. Early surgery versus initial conservative treatment in patients with spontaneous supratentorial intracerebral haematomas in the International Surgical Trial in Intracerebral Haemorrhage (STICH): a randomised trial. Lancet. 2005;365:387-97.

Moller J, Nielsen GM, Tvedegaard KC, Andersen NT, Jorgensen PE. A meta-analysis of cerebrovascular disease and hyperhomoscistyeinaemia. Scand J Clin Lab Invest. 2000;60:491-9.

Musicco M, Emberti L, Nappi G, Caltagirone C; Italian Multicenter Study on Outcomes of Rehabilitation of Neurological Patients. Early and long-term outcome of rehabilitation in stroke patients: the role of patient characteristics, time of initiation, and duration of interventions. Arch Phys Med Rehabil. 2003;84:551-8.

Nederkoorn PJ, van der Graaf Y, Hunink MGM. Duplex ultrasound and magnetic resonance angiography in carotid artery stenosis. A systematic review. Stroke. 2003;34:1324-32.

New Zealand Guidelines Group (NZGG). Life after stroke. New Zealand guideline for management of stroke. Wellington (New Zealand): New Zealand Guidelines Group (NZGG); 2003.

Ozsvath RR, Casey SO, Lustrin ES, Alberico RA, Hassankhani A, Patel M. Cerebral venography: comparison of CT and MR projection venography. AJR Am J Roentgenol. 1997;169:1699-707.

Papademetriou V, Farsang C, Elmfeldt D, Hofman A, Lithell H, Olofsson B, *et al*; Study on Cognition and Prognosis in the Elderly study group. Stroke prevention with the angiotensin II type 1-receptor

blocker candesartan in elderly patients with isolated systolic hypertension: the Study on Cognition and Prognosis in the Elderly (SCOPE). J Am Coll Cardiol. 2004;44:1175-80.

Parker MJ, Gillespie LD, Gillespie WJ. Hip protectors for preventing hip fractures. The Cochrane Database of Systematic Reviews 2004, Issue 3. Art. No.: CD001255.pub2. DOI: 10.1002/14651858.

Pearson TA, Blair SN, Daniels SR, Eckel RH, Fair JM, Fortmann SP, *et al*. AHA Guidelines for primary prevention of cardiovascular disease and stroke: 2002 update: consensus panel guide to comprehensive risk reduction for adult patients without coronary or other atherosclerotic vascular diseases. American Heart Association Science Advisory and Coordinating Committee. Circulation. 2002;106:388-91.

PROGRESS Collaborative Group: Randomised trial of a perindopril-based blood pressure lowering regimen among 6,105 individuals with previous stroke or transient ischaemic attack. Lancet. 2001;358:1033-41.

Reker DM, Duncan PW, Horner RD, Hoenig H, Samsa GP, Hamilton BB, *et al*. Postacute stroke guideline compliance is associated with greater patient satisfaction. Arch Phys Med Rehabil. 2002;83:750-6.

Reynolds K, Lewis B, Nolen JD, Kinney GL, Sathya B, He J. Alcohol consumption and risk of stroke: a meta-analysis. JAMA. 2003;289:579-88.

Robey RR. A meta-analysis of clinical outcomes in the treatment of aphasia. J Speech Lang Hear Res. 1998;41:172-87.

Roos YBWEM, Rinkel GJE, Vermeulen M, Algra A, van Gijn J. Antifibrinolytic therapy for aneurysmal subarachnoid haemorrhage. The Cochrane Database of Systematic Reviews 2003, Issue 2. Art. No.: CD001245. DOI: 10.1002/14651858.

Rothwell PM, Eliasziw M, Gutnikov SA, Fox AJ, Taylor DW, Mayberg MR, *et al* for the Carotid Endarterectomy Trialists' Collaboration. Analysis of pooled data from the randomized controlled trials of endarterectomy for symptomatic carotid stenosis. Lancet. 2003;361:107-16.

Rothwell PM, Eliasziw M, Gutnikov SA, Warlow CP, Barnett HJ. Sex difference in the effect of time from symptoms to surgery on benefit from carotid endarterectomy for transient ischemic attack and nondisabling stroke. Stroke. 2004;35:2855-61.

Rothwell PM, Warlow CP. Timing of TIAs preceding stroke. Neurology. 2005;64:817-829.

Royal College of Physicians (RCP): The Intercollegiate Working Party. National Clinical Guidelines for Stroke. London (United Kingdom): RCP; June 2004.

Rudd A.G, Hoffman A, Irwin P, Lowe D, Pearson M.G. Stroke Unit Care and Outcome: Results from the 2001 National Sentinel Audit of Stroke (England, Wales, and Northern Ireland). Stroke. 2005;36:103-6.

Schievink WI. Intracranial aneurysms. N Engl J Med. 1997;336:28-40.

Schrader J, Luders S, Kulschewski A, Hammersen F, Plate K, Berger J, *et al*. Morbidity and mortality after stroke, eprosartan compared with nitrendipine for secondary prevention. Principal results of a prospective randomized controlled study (MOSES). Stroke. 2005;36:1218-24.

Schwab S, Steiner T, Aschoff A, Schwarz S, Steiner HH, Jansen O, *et al*.Early hemicraniectomy in patients with complete middle cerebral artery infarction. Stroke. 1998;29:1888-93.

Schwammenthal Y, Tanne D. Homocysteine, B-vitamin supplementation, and stroke prevention: from observational to interventional trials. Lancet Neurol. 2004;3:493-5.

Scottish Intercollegiate Guidelines Network (SIGN). Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning. Edinburgh (United Kingdom): SIGN; 2002.

Smith J, Forster A, Young J. A randomized trial to evaluate an education programme for patients and carers after stroke. Clin Rehabil. 2004;18:726-36.

Sohlberg MM, Mateer CA. Effectiveness of an attention-training program. J Clin Exp Neuropsychol. 1987;9:117-30.

Sonoda S, Saitoh E, Nagai S, Kawakita M, Kanada Y. Full-time integrated treatment program, a new system for stroke rehabilitation in Japan: comparison with conventional rehabilitation. Am J Phys Med Rehabil. 2004;83:88-93.

SPACE Collaborative Group; Ringleb PA, Allenberg J, Bruckmann H, Eckstein HH, Fraedrich G, Hartmann M, Hennerici M, Jansen O, Klein G, Kunze A, Marx P, Niederkorn K, Schmiedt W, Solymosi L, Stingele R, Zeumer H, Hacke W. 30 day results from the SPACE trial of stent-protected angioplasty versus carotid endarterectomy in symptomatic patients: a randomised non-inferiority trial. Lancet 2006;368:1239-47.

Spilker J, Kongable G, Barch C, Braimah J, Brattina P, Daley S, *et al*. Using the NIH Stroke Scale to assess stroke patients. The NINDS rt-PA Stroke Study Group. J Neurosci Nurs. 1997;29:384-92.

Stam J. Thrombosis of the cerebral veins and sinuses. N Engl J Med. 2005;352:1791-8.

Stavem K, Lossius M, Ronning OM. Reliability and validity of the Canadian Neurological Scale in retrospective assessment of initial stroke severity. Cerebrovasc Dis. 2003;16:286-91.

Steiner T, Ringleb P, Hacke W. Treatment options for large hemispheric stroke. Neurology. 2001;57(5 Suppl 2):61-8.

Stroke Unit Trialists' Collaboration. Organised inpatient (stroke unit) care for stroke. The Cochrane Database of Systematic Reviews 2001, Issue 3. Art. No.: CD000197. DOI: 10.1002/14651858.

Suk SH, Sacco RL, Boden-Albala B, Cheun JF, Pittman JG, Elkind MS, *et al*; Northern Manhattan Stroke Study. Abdominal obesity and risk of ischemic stroke: the Northern Manhattan Stroke Study. Stroke. 2003;34:1586-92.

Teasell RW, Kalra L. What's new in streok rehabilitation. Back to basics. Stroke 2005;36:215-7.

The European Stroke Initiative Executive Committee and the EUSI Wirting Committee. European Stroke Initiative Recommendations for Stroke Management –Update 2003. Cerebrovasc Dis. 2003;16:311-37.

The International Stroke Trial (IST): a randomised trial of aspirin, subcutaneous heparin, both, or neither among 19435 patients with acute ischaemic stroke. International Stroke Trial Collaborative Group. Lancet. 1997;349:1569-81.

The NINDS t-PA Stroke Study Group. Intracerebral hemorrhage after intravenous t-PA therapy for ischemic stroke. *Stroke.* 1997;28:2109-18.

The Women's Health Initiative Steering Committee. Effects of conjugated equine estrogen in postmenopausal women with hysterectomy: the Women's Health Initiative Randomized Controlled Trial. JAMA. 2004;291:1701-12.

Toole JF, Malinow MR, Chambless LE, Spence JD, Pettigrew LC, Howard VJ, *et al*. Lowering homocysteine in patients with ischemic stroke to prevent recurrent stroke, myocardial infarction and death: the Vitamine Intervention for Stroke Prevention (VISP) randomised controlled trial. JAMA. 2004;291:567-75.

Tovar JL, Álvarez-Sabín J, Armario P. Document de consens: Maneig de l'elevació de la pressió arterial en la fase aguda de l'ictus. Recomanacions de les Societats Catalanes de Neurologia i d'Hipertensió Arterial. Annals de Medicina. 2000;83:21-7.

Turner-Stokes L, Jackson D. Shoulder pain after stroke: a review of the evidence base to inform the development of an integrated care pathway. Clin Rehabil. 2002;16:276-98.

Unruptured intracranial aneurysms -risk of rupture and risks of surgical intervention. International Study of Unruptured Intracranial Aneurysms Investigators. N Engl J Med. 1998;339:1725-33.

Wardlaw JM, Seymour J, Cairns J, Keir S, Lewis S, Sandercock P. Immediate computed tomography scanning of acute stroke is cost-effective and improves quality of life. Stroke. 2004;35:2477-83.

Wetzel SG, Kirsch E, Stock KW, Kolbe M, Kaim A, Radue EW. Cerebral veins: comparative study of CT venography with intraarterial digital subtraction angiography. AJNR Am J Neuroradiol. 1999;20:249-55.

Williams B, Poulter NR, Brown MJ, Davis M, McInnes GT, Potter JF,*et al*. British

Hypertension Society Guidelines. Guidelines for management of hypertension: report of the fourth working party of the British Hypertension Society, 2004—BHS IV. J Hum Hypertens 2004;18:139-85.

Williams LS, Rotich J, Qi R, Fineberg N, Espay A, Bruno A, *et al*. Effects of admission hyperglycaemia on mortality and costs in acute ischaemic stroke. Neurology. 2002;59:67-71.

Winn HR, Jane JA Sr, Taylor J, Kaiser D, Britz GW. Prevalence of asymptomatic incidental aneurysms: review of 4568 arteriograms. J Neurosurg. 2002;96:43-9.

Wolf SL, Winstein CJ, Miller JP, Taub E, Uswatte G, Morris D, Giuliani C, Light KE, Nichols-Larsen D; EXCITE investigators. Effect of constraint-nduced movement therapy on upper extremity function 3 to 9 months after stroke: the EXCITE randomized clinical trial. JAMA. 2006;296:2095-104.

Wolfe CD, Taub NA, Woodrow EJ, Burney PG. Assessment of scales of disability and handicap for stroke patients. Stroke. 1991;22:1242-4.

World Health Organization. ICDH-2: International Classification of Functioning and Disability, Beta-2 Draft, Short Version. Geneva (Switzerland): World Health Organization; 1999.

Yadav JS, Wholey MH, Kuntz RE, Fayad P, Katzen BT, Mishkel GJ, *et al*. Stenting and Angioplasty with Protection in Patients at High Risk for Endarterectomy Investigators. Protected carotid-artery stenting versus endarterectomy in high-risk patients. N Engl J Med. 2004;351:1493-501.

Yamamoto L, Magalong E. Outcome measures in stroke. Crit Care Nurs Q. 2003;26:283-93.

Yavuzer G, Eser F, Karakus D, Karaoglan B, Stam HJ. The effects of balance training on gait late after stroke: a randomized controlled trial. Clin Rehabil 2006 Nov;20(11):960-9.

Yorkston KM. Treatment efficacy: dysarthria. J Seech Hear Res. 1996;39:46-57.

Yusuf S, Sleight P, Pogue J, Bosch J, Davies R, Dagenais G. Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. The Heart Outcome Prevention Evaluation Study Investigators. N Engl J Med. 2000;342:145-53.

With the collaboration of