National clinical guidelines for stroke

Second edition

Prepared by the Intercollegiate Stroke Working Party

June 2004

Clinical Effectiveness
& Evaluation Unit
ROYAL COLLEGE OF PHYSICIANS

Acknowledgements

The funding for these guidelines was donated to the stroke programme at the Royal College of Physicians by a consortium of sponsors including the Stroke Association, Boehringer Ingelheim, Merck Sharp & Dohme and Sanofi-Synthelabo & Bristol-Myers Squibb. Apart from the Stroke Association, none of the sponsors were members of the working party that developed the guidelines.

We would like to thank the many people who have reviewed the guidelines during their development (see Appendix 1).

Special thanks go to Penny Irwin who has co-ordinated the project with unfailing skill and enthusiasm.

Front cover

Design by Merriton Sharp, London

Photograph by Gina Glover: *Corridor at Central Middlesex Hospital.*
Website: www.ginaglover.com

Royal College of Physicians of London
11 St Andrews Place, London NW1 4LE

Registered Charity No 210508

ISBN 1 86016 208 8

Text design by the Publications Unit of the Royal College of Physicians

Typeset by Dan-Set Graphics, Telford, Shropshire

Printed in Great Britain by The Lavenham Press Ltd, Sudbury, Suffolk

The Intercollegiate Stroke Working Party

Chair
Dr Anthony Rudd, Consultant Physician, St Thomas' Hospital, London

Association of British Neurologists
Dr Peter Humphrey, Consultant Neurologist, Walton Centre for Neurology and Neurosurgery, Liverpool

British Association of Social Workers
Ms Bridget Penhale, Lecturer in Social Work, University of Hull

British Association of Stroke Physicians
Dr John Bamford, Consultant Physician, St James' University Hospital, Leeds

British Dietetic Association
Ms Helen Molyneux, Co-ordinator, Community Rehabilitation Team, Dewsbury Healthcare

British Dietetic Association
Ms Muriel Gall, Community Stroke Rehabilitation Team, Gravesend and North Kent Hospital, Gravesend

British Geriatric Society
Dr Helen Rodgers, Reader in Stroke Medicine, University of Newcastle

British Pharmacological Society
Professor Philip Bath, Stroke Association Professor of Stroke Medicine, University of Nottingham

British Psychological Society
Dr Peter Knapp, Research Psychologist, Stroke Outcomes Study, University of Leeds

British Psychological Society
Dr Audrey Bowen, Lecturer in Psychology, Faculty of Education, University of Manchester

Chartered Society of Physiotherapy
Ralph Hammond, Professional Affairs Officer, Chartered Society of Physiotherapy, London

Chartered Society of Physiotherapy
Dr Sheila Lennon, Lecturer in Physiotherapy, University of Ulster

College of Health
Dr Marcia Kelson, Research Fellow, College of Health

College of Occupational Therapists
Dr Marion Walker, Senior Lecturer in Stroke Rehabilitation, School of Community Health Sciences, Queen's Medical Centre, Nottingham

Different Strokes
Mr Donal O'Kelly, Chief Executive, Different Strokes

Faculty of Public Health
Professor Charles Wolfe, Department of Public Health Medicine, King's College London

Royal College of General Practitioners
Dr Colin Waine, Bishop Auckland, Co Durham

Royal College of Nursing
Ms Amanda Jones, Stroke Nurse Consultant, Sheffield University Hospitals

Royal College of Nursing
Dr Bernard Gibbon, Head of Primary and Community Nursing, University of Central Lancashire, Preston

Royal College of Nursing
Mr Steven Cross, Stroke Nurse Specialist, Stroke Unit, Hope Hospital, Salford, Greater Manchester

Royal College of Paediatricians
Dr Vijeya Ganesan, Lecturer in Paediatric Neurology, Institute of Child Health, London

Royal College of Physicians
Professor Martin Brown, National Hospital for Neurology and Neurosurgery, London

Royal College of Psychiatrists
Professor Alan House, Professor of Psychiatry, University of Leeds

Royal College of Radiologists
Professor Joanna Wardlaw, Consultant Neuroradiologist, University of Edinburgh

Royal College of Speech and Language Therapists

Mr Tom Penman, Connect, London

Royal Pharmaceutical Society

Mr Derek Taylor, Chair of the Elderly Practice Interest Group, Clinical Pharmacy Association

Society for Research in Rehabilitation

Professor Derick Wade, Consultant Neurologist, British Society of Rehabilitation Medicine, Rivermead Rehabilitation Centre, Oxford

Speakability

Ms Roz Rosenblatt, Information Services Manager, Speakability (previously Action for Dysphasic Adults), London

Stroke Association

Professor Peter Fentem, Member of Council, Stroke Association, London

Health economics opinion

Professor Alistair McGuire, LSE Health and Social Care, London School of Economics

Neurosurgical sub-group

Royal College of Radiologists

Dr AJ Molyneux, Department of Neuroradiology, Radcliffe Hospitals, Oxford

Society of British Neurological Surgeons

Mr Richard Kerr, Consultant Neurosurgeon, Radcliffe Hospitals, Oxford

Mr Peter Kirkpatrick, Consultant Neurosurgeon, Addenbrooke's Hospital, Cambridge

Mr Ken Lindsay, Department of Neurological Sciences, Southern General Hospital, Glasgow

Psychology sub-group

Dr Audrey Bowen, University of Manchester

Dr Peter Knapp, University of Leeds

Dr David Gillespie, University of Manchester

Dr Janet Cockburn, University of Reading

Dr Andrew Bateman, Oliver Zangwill Centre, Ely

Conflicts of interest

All working party members signed a form to declare any potential conflicts of interest with the guidelines or other parts of the stroke programme they oversee such as the National Sentinel Audit of Stroke.

Nearly all professionals worked for an organisation whose work is related in some way to the guidelines. Details of appointment and affiliations are therefore listed above. Financial interest information can be obtained on request from the Royal College of Physicians; a summary follows.

1 Sixteen members of the working party declared interests with potential to affect the guidelines. These included:
   a **commercial companies**: ten members had undertaken consultancy, lecturing and research work for companies including Aventis, AstraZeneca, Boehringer Ingelheim, GlaxoSmithKline, Ipsen, Merck Sharp & Dohme, Novartis, Sanofi-Synthelabo & Bristol-Myers Squibb, Servier, Takeda;
   b **charities**: six members held posts within patients' charities including the Stroke Association, Connect, Speakability, Different Strokes, the College of Health, the MS Society, Dialability, and the Neurological Alliance.

2 Four members had conducted research for and/or held posts connected to government agencies, including the NHS National Research and Development Programme, the health technology assessment programme, the Medical Research Council and the National Institute for Clinical Excellence.

3 One member of the neurosurgical sub-group declared a stockholding in the Micrus Corporation (a coil manufacturing company). Otherwise no members had any personal commercial interest (eg shares) with companies that could benefit from the guidelines.

On the rare occasions a potential conflict of interest arose for individuals they were excluded from the final decision on a recommendation, unless supported by others (eg a patients' organisation would often find support from several quarters). The published evidence base and majority opinion were the deciding factors for the wording and content of recommendations.

Contents

CLINICAL CARE

APPENDICES

REFERENCES 91

INDEX 131

TABLES OF EVIDENCE *see supplement*

Foreword

Having a stroke is one of the more alarming and devastating things that can happen to a person, and will happen to a quarter of us over the age of 45. Only 20 years ago there was a rather nihilistic attitude to management. The situation today could not be more different.

Not only is there much that can be done, but there is evidence that active care leads to less deaths, and less disability for those who do survive. Best care begins with proper assessment and continues, usually within a specific stroke unit, with active management. A key change over the last decade is that care has become a team effort. A stroke patient is likely to be treated during the course of their illness by many different people, ranging from the doctors and nurses in the emergency department, a wide array of professionals on the stroke unit, to therapists, doctors, nurses and social services staff in the community. One of the aims of these guidelines is to equip health and social care professionals – wherever they work – with the knowledge of what best care should be.

Keeping abreast of emerging evidence in a field such as stroke is a difficult task for busy practitioners. Since the first edition of these guidelines appeared four years ago, many hundreds of new references have been published, several requiring major changes in the way stroke care should be delivered. High quality treatment may save a patient's life or result in reduced disability. Guidelines can never provide the answers for every situation and do not replace sound clinical judgement and common sense. These guidelines do, however, provide a framework for such care and are intended to be just as practical and relevant for non-specialists as for specialists.

There have been a number of developments in stroke medicine over the past four years since the first edition was published. Stroke medicine is now a recognised specialty within medicine and all hospitals have been advised by the Department of Health that they should have a dedicated stroke unit. The roles of the nurse, physiotherapist, occupational therapist and speech therapist are also developing and companion publications drawing from this guideline provide each profession with specific guidance.

The results from the sentinel audit of stroke care demonstrate that while care has improved significantly over the last six years, there is no room for complacency. There is more that can be done. Professional groups involved in stroke care in hospitals and the community (separately and together) should use this guideline to reconsider their role within the care team and how they can work together to improve outcomes for patients and their families.

The final word should rest with the patient. A patient and carer information booklet has again been produced and should be made widely available. If patients and their carers are involved in decision-making about their care, they can more actively participate in the rehabilitation and prevention measures.

Everything in these guidelines can be – and has been – achieved. Better stroke care will improve the lives of many people in our country.

Professor Ian Philp

National Director for Older People's Services (with responsibility for implementing the National Service Framework for care of older people in England)

How to use these guidelines

These guidelines cover the management of stroke, transient ischaemic attack (TIA) and subarachnoid haemorrhage. (The management of stroke in childhood is covered in a separate publication produced jointly by the Royal College of Physicians and the Royal College of Paediatrics and Child Health). In order fully to understand this document all users should read sections 1 and 2. Section 1, the introduction, explains the context of the guidelines, and the methods of their development. Section 2, 'Service organisation', gives the recommendations for the overall organisation of a stroke service.

As in the first edition the guidelines are laid out in similar format for each topic. Each section contains a summary of the context, recommendations and key references, with a statement on the quality of the evidence where this may need further explanation. Suggestions for areas that would benefit from local guidelines are also given.

Further evidence in relation to each section is given in the tables of evidence in the supplement. Users wishing to find guidelines on a particular topic can look on the contents page or index, but are reminded that guidelines in other sections may also be relevant.

Changes in recommendations since the first edition

For those familiar with the first edition some changes will be evident. Recommendations for clinical care have been grouped differently into the areas of 'acute management' (section 3), 'rehabilitation' (section 4) and 'transfer to community' (section 5). Recommendations have been changed in accordance with the evolving evidence base in several key areas:

- **organisation of care**: definitions of specialist service, information for patients and palliative care
- **acute management**: diagnosis and management of TIA, thrombolysis, monitoring of physiological parameters and management of specific conditions including primary intracerebral haemorrhage, cerebral venous thrombosis, cervical artery dissection and diagnosis and referral of subarachnoid haemorrhage
- **secondary prevention** is now included in the acute section and new recommendations are included in particular for blood pressure lowering, antithrombotics, the use of statins, the management of women on HRT, carotid stenosis and concordance with secondary prevention
- the importance of assessment and interventions in the area of **swallowing and nutrition** have been enhanced

- recommendations concerning the **prevention of venous thrombo-embolism** have been changed to more accurately reflect the evidence in stroke
- **rehabilitation**: psychological impairments (cognitive impairments, where there are new recommendations for spatial awareness, memory, attention, praxis and executive functions, and mood); communication; improving motor control (where there has been some reorganisation, and additional areas covering constraint-induced movement therapy and robot-assisted therapy have been added); sensory impairment and pain; and functional rehabilitation interventions
- **transfer to community**: includes discharge planning and longer-term management (eg further rehabilitation, prevention of further stroke (referring to the secondary prevention section in section 3), social function)
- **audit criteria**: the 'top ten' key indicators from the National Sentinel Audit of Stroke are listed in Appendix 2.

The patient and carer perspective

Introduction

For the development of the first edition of these guidelines the opinions and experiences of stroke patients and their carers were obtained through focus groups conducted by the College of Health. The findings, which were an integral part of the guidelines' development process, were reported in Kelson *et al* 1998. The NICE Patient Involvement Unit recently advised that the findings were still relevant. We have therefore chosen to place the recommendations of the report at the beginning of this, the second edition, to emphasise to readers the subjective experiences of healthcare after stroke, and the need for these guidelines.

Recommendations from the report on patient and carer focus groups conducted by the College of Health in 1998 (adapted from Kelson *et al* 1998)

Guidelines and service development

The views of both patients and carers can and should be obtained to complement other forms of evidence in developing clinical guidelines. Priorities of patients and carers may differ from those of professionals. This has application for other chronic conditions beyond the field of stroke and for other initiatives, for example National Service Frameworks.

Access to quality services

Patients and their carers want timely access to quality services appropriate to their needs. The focus groups revealed various problems in accessing diagnostic, treatment, rehabilitation and support services. After access, participants also highlighted deficiencies in the quality of some services. Guideline developers should consider using patient quotes as one method for drawing attention to patient concerns about access to and quality of services [and in the first edition quotes from patients and carers and taken from the focus groups were used throughout, and for this edition have been supplemented by a study investigating quality of life among patients after stroke on behalf of the Economic & Social Research Council (McKevitt & Wolfe 2004)]

Knowledgeable staff

Patients and carers want to be looked after by knowledgeable staff who understand the full range of their needs after a stroke. These include communication, personal care, treatment, therapy, support and information needs. Staff knowledge of these could be developed

by training for all clinical and support staff involved in caring for stroke patients, regardless of where they are providing that care (eg on a dedicated stroke unit, a general medical ward or in the patient's home) [see section 2].

Shared decision-making

The diagnosis and management plan is not always explained in a manner that patients and carers can comprehend and recall. Patients want to be treated as responsible adults, and carers want to know precisely what is being done or planned for their relative.

This could be helped by:

- a written plan of care for the time in hospital and post-discharge
- a written information pack including advice on local statutory and voluntary services available in the community
- a clear indication as to what services are to be offered post-discharge, and advance warning of when services are to end
- arrangements for post-stroke monitoring of patients, possibly by therapists or a specialist nurse
- arrangements for assessing the practical and emotional needs of the carers and families of stroke patients, recognising that these may vary over time [see section 2].

Information when at home

There are many uncertainties for patients and carers after a stroke. These are often further exacerbated by inadequate direction to appropriate information sources or by poor quality of the information that is accessed. Patients and carers need to be offered relevant user-friendly information at each stage of their care and to have access to contacts for further questions and problems that arise later.

This could be helped by:

- a named contact (with telephone number) for further advice after discharge; the named person must have the authority to investigate and rectify problems brought to them
- information packs for carers, specifically addressing carer information and support needs
- patients not requiring admission to hospital should also have access to this information [see sections 2–5]

Patient and carer versions of guidelines

Patients and carers should know what care they may expect. This could be helped by providing a patient/carer-friendly version of the guidelines and making this available on all healthcare premises [patient and carer versions of this second edition of the guidelines are available from the Royal College of Physicians, London].

Links with patient/carer organisations

At local level, links with patient and carer organisations with a specific interest in stroke care, eg the Stroke Association, Different Strokes, Speakability, should be developed and strengthened. Hospital and primary care trusts may be best placed to develop and strengthen these links. Additional resources may be needed to ensure continued input from patient and carer organisations. Future studies need to investigate the specific needs of younger stroke patients.

Acronyms and abbreviations used in the guidelines and tables of evidence

AAP	Adelaide Activities Profile
ADL	Activities of Daily Living
AF	Atrial fibrillation
AFO	Ankle-foot orthosis
AMAT	Arm Motor Ability Test
Anti Xa	Anti factor Xa
AoU	Amount of Use Test
ARA	Action Research Arm Test
ASA	Acetyl salicylic acid (aspirin)
ASU	Acute stroke unit
BD	Bi diem (twice daily)
BFB	Biofeedback
BI	Barthel Index
BMI	Body mass index
BP	Blood pressure
BPM	Balance performance monitor
BPS	British Psychological Society
BSE	Bedside examination
CAPRIE	Clopidogrel vs Aspirin in Patients at Risk of Ischaemic Events Trial
CAST	Chinese Acute Stroke Trial (collaborative group)
CCT	Controlled clinical trial
CEA	Carotid endarterectomy
CEEU	Clinical Effectiveness and Evaluation Unit
CHD	Coronary heart disease
CI	Confidence intervals
CIT	Constraint induced movement therapy
CLASS	Clomethiazole acute stroke study
COAD	Chronic obstructive airways disease
CSU	Catheter specimen of urine
CT scan	Computerised tomography scan
CV	Cardiovascular
CVA	Cerebrovascular accident
CVD	Cardiovascular disease
DIND	Delayed ischaemic neurological deficit
DSA	Digital subtraction angiography
DVT	Deep vein thrombosis
EADL	Extended Activities of Daily Living
ECST	European Carotid Surgery Trialists
EMG	Electromyography (recording of electrical potential from contracting muscle)
FAI	Frenchay Activities Index
FCP	Functional Communication Profile
FEES	Fibre-optic endoscopic examination of swallowing
FEESST	Flexible endoscopic evaluation of swallowing with sensory testing
FES	Functional electrical stimulation
FIM	Functional Independence Measure (an assessment of disability)
FIM-FRG	Functional Independence Measure – function related group
GAD	Generalized anxiety disorder
GAS	Goal attainment scaling
GHQ	General Health Questionnaire
GHQ-30	General Health Questionnaire (30-item)
GMW	General medical ward
GOS	Glasgow Outcome Scale
GP	General practitioner (family doctor)
HAD	Hospital Anxiety and Depression Scale
HDL	High density lipoprotein
HPS	Heart Protection Study
HRQL	Health-related quality of life
HRT	Hormone replacement therapy

Hz	Cycles per second
ICD	International Classification of Diseases
ICD-9-CM	International Classification of Disease (version 9, Clinically Modified)
IHD	Ischaemic heart disease
INR	International normalised ratio
IQR	Interquartile range
ISAT	International Subarachnoid Aneurysm Trial Collaborative Group
IST	International Stroke Trial Collaborative Group
IV	Intravenous
LACI	Lacunar infarct
LDL	Low density lipoprotein
LMWH	Low molecular weight heparin
LOS	Length of stay
M/A	Meta-analysis
MAL	Motor activity log
MBS	Modified barium swallow
MCA	Middle cerebral artery
MI	Myocardial infarction
MRA	Magnetic resonance angiography
MRI	Magnetic resonance imaging
MRS	Modified Rankin Scale
MRV	Magnetic resonance venography
NASCET	North American Symptomatic Carotid Endarterectomy Trial
NHP	Nottingham Health Profile
NICE	National Institute for Clinical Excellence
NIHSS	National Institutes of Health Stroke Scale
NINDS	National Institute of Neurological Disorders and Stroke
NNT	Number needed to treat
Non-S/R	Non-systematic review
Obs	Observational study
OARS-IADL	Older Americans Resource Sale (for instrumental activities of daily living)
OD	Once daily
OPCS	Office of Population Censuses and Surveys
OT	Occupational therapy
PACI	Partial anterior circulation infarct
PAFO	Placebo ankle-foot orthosis
PATS	Post-stroke Antihypertensive Treatment Study
PBWSTT	Partial body weight support treadmill training
PE	Pulmonary embolus
PNF	Proprioceptive neuromuscular facilitation
POCI	Posterior circulation infarct
PT	Physiotherapy
QoL	Quality of life
QoM	Quality of movement
RA	Research assistant
RCP	Royal College of Physicians
RCT	Randomised controlled trial
RMA	Rivermead Motor Assessment
RNL	Reintegration to normal living
RoM	Range of movement
RPAB	Rivermead Perceptual Assessment Battery
rt-PA	Tissue plasminogen activator
S/R	Systematic review
SAH	Subarachnoid haemorrhage
SALT	Speech and language therapy
SCQ	Sense of competence questionnaire
SD	Standard deviation
SF-12	Shortform 12
SF-36	Shortform 36
SICH	Subsequent intracranial haemorrhage
SIP	Sickness Impact Profile (also known as Functional Limitation Profile)
SITS-MOST	Safe Implementation of Thrombolysis in Stroke Monitoring Study
SLT	Speech and language therapy
SMD	Standard mean deviation
SPAF	Stroke prevention in atrial fibrillation
SSS	Scandinavian Stroke Scale

STICH	Surgical Trial in Intracerebral Haemorrhage
TACI	Total anterior circulation infarct
TACS	Total anterior circulation syndrome
TAIST	Tinzaparin in Acute Ischaemic Stroke Trial
TBI	Traumatic brain injury
TENS	Transcutaneous electrical nerve stimulation
Tg	Triglyceride levels
TIA	Transient ischaemic attack
UFH	Unfractionated heparin
VAS	Visual analogue scale
VFSS	Videofluoroscopic study of swallowing
WEST	Women's Estrogen for Stroke Trial
WMFT	Wolf Motor Function Test

Introduction

1 Introduction

1.1 Scope

As with the first edition, these guidelines cover the management of stroke in adults (over 16 years) from onset through to the longer term. For this second edition, however, the scope has been widened to include the management of transient ischaemic attack (TIA) and subarachnoid haemorrhage, and there is a separate set of guidelines for the management of stroke in childhood. Excluded from these guidelines are the detailed surgical management of disorders referred to surgeons, and primary prevention.

1.2 Stroke, transient ischaemic attack and subarachnoid haemorrhage

The word *stroke* is used to refer to a clinical syndrome, of presumed vascular origin, typified by rapidly developing signs of focal or global disturbance of cerebral functions lasting more than 24 hours or leading to death (World Health Organisation 1978).

It affects between 174 and 216 people per 100,000 population in the UK each year (Mant *et al* 2004), and accounts for 11% of all deaths in England and Wales. Cerebral infarction accounts for 69% of strokes, primary haemorrhage for 13%, subarachnoid haemorrhage for 6%, and 12% are of uncertain type (Wolfe *et al* 2002). The risk of recurrent stroke within five years of a first stroke is between 30% and 43% (Mant *et al* 2004).

Transient ischaemic attack (TIA) is a clinical syndrome characterised by an acute loss of focal cerebral or ocular function with symptoms lasting less than 24 hours. It is thought to be due to inadequate cerebral or ocular blood supply as a result of low blood flow, thrombosis, or embolism associated with diseases of the blood vessels, heart, or blood (Hankey & Warlow 1994).

It affects 35 people per 100,000 of the population each year and is associated with a very high risk of stroke in the first month of the event and up to one year (Coull *et al* 2004).

Subarachnoid haemorrhage (SAH) is a haemorrhage from a cerebral blood vessel, aneurysm or vascular malformation into the subarachnoid space, ie the space surrounding the brain where blood vessels lie between the arachnoid and pial layers. It is characterised by sudden onset of headache, and vomiting, with or without loss of consciousness.

SAH affects 6 to 12 people in each 100,000 of the population per year and constitutes about 6% of incident first strokes. Approximately 85% of patients bleed from an intracranial aneurysm, 10% from a non-aneurysmal peri-mesencephalic haemorrhage and 5% from other vascular abnormalities including arteriovenous malformation (VanGijn *et al* 2001).

1.3 Aims of the guidelines

The aims of the guidelines are:

1 To provide explicit recommendations for practising clinicians, managers, patients and carers about the management of stroke and TIA, covering the whole care pathway from the acute event to the longer-term management in the community.

2 To provide recommendations based on best available evidence.

3 To give consensus statements from the working party for important areas of clinical practice where evidence is lacking.

As in the first edition, the principles underlying the guidelines are that they should:

- address issues in stroke management that are important
- draw upon published evidence wherever possible
- indicate areas of uncertainty or controversy.

Wherever possible we have avoided making profession-specific recommendations, trying instead to address problems from the patient's perspective, suggesting what interventions are needed but not who should make them.

1.4 Context and use

The guidelines should be taken as statements to inform the clinician, not as rigid rules. Guidelines cannot cover every eventuality; new evidence is published every day. Feedback is most welcome because these guidelines will be updated on a regular basis to keep up with new evidence.

These guidelines relate particularly to the management of stroke; they do not specifically cover areas of routine good clinical practice such as courtesy, managing associated illness and making notes. It is assumed that they will be used within the context of the services available in the UK, and that clinicians and others will be operating within professionally recognised standards of practice.

The reader is reminded that practice needs to be set within the context of the current legal framework governing the provision of services; for example that applicable to community care or to social services case management. These guidelines are not intended to supplant such regulations, but should be read in conjunction with them.

1.5 Methodology of guidelines development

1.5.1 Intercollegiate Stroke Working Party

The guidelines were developed by the Intercollegiate Stroke Working Party, co-ordinated by the Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians in London. The members of the working party, listed in the front of this book, were

nominated by professional organisations and societies to give wide representation from all disciplines, including the views of patients and their families. Members were required to liaise with their own professional bodies and with other experts in the field as they felt appropriate throughout the process. Most members had great expertise and a longstanding personal interest in the field of stroke management.

1.5.2 Searching the scientific literature

An information scientist conducted formal searches of the literature for the areas covered by the first edition (Intercollegiate Working Party for Stroke 2000) for the period from 1999, the first edition having included the literature prior to that. For areas new to the second edition – ie subarachnoid haemorrhage, transient ischaemic attack, concordance with medication, therapy for cognitive disorders and paediatric stroke – the searches included the period from 1966 onwards. Available computerised databases including Medline, AMED, CINAHL, Psychinfo and Embase were systematically searched. The Cochrane Collaboration Database was used extensively, and other national guidelines were reviewed, including those of the Scottish Intercollegiate Guidelines Network (SIGN), and the National Institute for Clinical Excellence (NICE). Health technology appraisal reports were used; and members of the working party brought expertise and information from their own organisations and professional bodies.

The search strategies are available on the Royal College of Physicians website at **www.rcplondon.ac.uk**

1.5.3 Assessing the quality of research and writing the guidelines

The Scottish Intercollegiate Guidelines Network (SIGN) SIGN 50 guidelines appraisal checklists were used by the members of the working party to assess the quality of published articles. Ten per cent of the articles were randomly double-marked to check for consistency. Results of the assessments were presented to the working party for discussion and approval.

Articles were selected for inclusion on the following principles. Where evidence specifically relating to stroke was available, this alone was used. In areas with limited research available specific to stroke some studies include patients with other, usually neurological, diseases.

Where evidence from meta-analyses or randomised controlled trials (RCTs) was available, this was used. Where there was limited or no evidence from RCTs, then evidence from observational group studies or small-group studies was used. In general, evidence from single-case studies was not used, primarily because it is usually difficult to draw general conclusions from them. Studies considered but not included will be listed on the Royal College of Physicians website.

To indicate the quality of the evidence each guideline recommendation is accompanied by a letter (A, B, C or D) to indicate the strength of evidence supporting it. The level of evidence is demonstrated by a number (I to IV) indicating its provenance. Table 1.1 (overleaf) shows the meaning of each. These levels and grades have been used because they were the way preferred by the National Institute for Clinical Excellence (NICE) at the time these guidelines were written. The 'Evidence' paragraphs following guidelines give an indication of the nature

Table 1.1 Guideline strength: level of evidence and grade of recommendation

Level of evidence	Type of evidence	Grade of recommendation
Ia	Meta-analysis of randomised controlled trials (RCTs)	**A**
Ib	At lease one RCT	**A**
IIa	At least one well designed, controlled study but without randomisation	**B**
IIb	At least one well designed, quasi-experimental study	**B**
III	At least one well designed, non-experimental descriptive study (eg comparative studies, correlation studies, case studies)	**B**
IV	Expert committee reports, opinions and/or experience of respected authorities. This grading indicates that directly applicable clinical studies of good quality are absent.	**C**
Consensus of working party	Recommended good practice based on the clinical experience of the Guideline Development Group	**D**

and extent of the supporting evidence, together with key references. Lastly, for each topic, there is a table or group of tables giving further details of the main studies (see supplement).

If a recommendation is based on extrapolation from research in conditions other than stroke the grade of recommendation has been reduced by one level.

1.5.4 Evidence and lack of evidence

Many areas of important clinical practice did not have evidence available to construct guidelines. We have therefore made consensus statements (graded D) from this and other working parties, and given advice on local guideline development.

It is important to note that the evidence relating to specific individual interventions, usually drugs, is generally stronger. This is because, methodologically, it is easier to study them over longer periods of time than it is to investigate multifaceted interventions. This does not necessarily mean that interventions with so-called strong evidence are more important than those where the evidence is weak. To try to redress the imbalance that exists in the evidence base for stroke, guidelines that are considered by the working party to be an essential component of stroke care have been identified with a star regardless of the grading of the recommendation. A high-quality comprehensive stroke service will need to implement many guidelines that have only been graded level D.

1.5.5 Peer review

Following review of the literature and initial agreement of the guidelines by the working party there was a period of peer review during which experts in all disciplines, including patients' organisations, were asked to review the guidelines. Changes were made to the guidelines accordingly. Thanks are due to the reviewers (listed in Appendix 1) who took so much time and trouble to give the benefit of their knowledge and experience.

1.6 Format

For each topic we have included:

- a short introduction, setting the scene
- the guidelines, accompanied by grade of recommendation
- selected key references to the evidence supporting each guideline, with level of evidence (reference is made to any tables giving the full range of evidence – the tables of evidence contain details of the salient research studies and can be found in the supplement)
- areas where local guidelines may be considered.

Relevant quotations of patients and carers from the focus groups conducted to inform the guidelines (Kelson *et al* 1998; McKevitt & Wolfe 2004) are given throughout. Whilst these are not standard evidence they provide important insights to patient and carer concerns.

1.7 Terminology and theoretical framework

Stroke management is complex, so these guidelines necessarily cover many aspects of care. It is unlikely that any individual person or profession will need to know or use them all, but everyone must have some idea about their role in the team as a whole.

Table 1.2 (overleaf) gives the terminology and framework used throughout the remainder of the guidelines. Section 2, on service provision, covers aspects of the overall organisation of stroke care and the general approach to stroke management, reflecting its importance and the strength of evidence available. The section starts with a general statement on organisation in stroke services, and then considers some specific aspects of organisation, moving towards the specific and culminating in general advice concerning the involvement of families and carers. Thereafter sections 3 to 5, on clinical care, are based on the themes of:

- **level of illness**, where the International Classification of Functioning, Disability and Health (the revised version of the World Health Organisation's International Classification of Impairments, Disabilities and Handicaps) is the model used
- **time post-onset**, where three main times are identified: early (approximately the first week); middle (up to 6 months); late (thereafter)
- **management process**, where three main processes are identified: assessment (including medical diagnosis); care (maintaining life, safety and comfort, otherwise known as support); and treatment (any intervention presumed to effect a change).

One of the major factors impeding good stroke care is the lack of any widely accepted, easily understood framework and an attendant vocabulary and terminology. This lack may adversely affect communication between members of a team, teams, professions, organisations, and commissioners and providers of health care.

Recommendations

a All clinicians should consider and discuss explicitly with their colleagues the terminology and framework they use, and each team should use a consistent framework (**C**)

b It is strongly recommended that the World Health Organisation's (WHO) International Classification of Functioning, Disability and Health (ICF) terminology be used (**C**)

Evidence

There are two strong arguments supporting these guidelines. First, efficient and effective stroke management is best undertaken by a specialised team (Stroke Unit Trialists' Collaboration 2004). A team is a group of individuals who share common values and work towards common goals. This is only possible if members of the team use an agreed vocabulary. Second, it is common experience that differences in interpretation of commonly used words, and differences of opinion about the meaning of words, underlie many of the problems experienced in managing patients. Consequently, there is strong logic supporting the need for an agreed terminology. A proposed terminology and framework is given in Table 1.2.

a The WHO ICF introduces the concept of 'contextual factors', which impact upon the manifestation of all diseases. Contextual factors are: social, physical and personal. The model emphasises that there are complex, dynamic relationships between all levels of illnesses themselves, and between the person and the contextual factors (**IV**)

b WHO 2001 (**IV**)

Local guidelines

Local services will need to:

- specify the terminology used locally, or agree to use the suggested terminology and framework.

1.8 Participation in clinical research

There are many areas in stroke medicine where the evidence base is weak. Even where recommendations have been graded A there may well be justification for further research. When the research has received ethical approval and been subjected to peer review, it is acceptable to enter patients into clinical trials which may lead to contravention of the recommendations in this document. Stroke teams should be encouraged to participate in well-conducted multi-centre trials. Involvement in research not only advances scientific knowledge but also helps improve the quality of care, levels of staff satisfaction and retention. It is the responsibility of health services to support high quality research.

Table 1.2 Stroke management: ICF framework and terminology

Illness of person	**Synonym**	**Level of description**
Pathology	Disease/diagnosis	Organ/organ system
Impairment	Symptoms/signs	Body
Activity (was *disability*)	Function/observed behaviour	Interaction of person and environment
Participation (was *handicap*)	Social positions/roles	Person in their social context
Contextual factors	**Examples**	**Comment**
Personal experiences	Previous illness	May affect response to this stroke
Physical environment	House, local shops	May affect need for equipment etc
Social environment	Laws, friends	May affect motivation, support etc

Rehabilitation:

Aims	**Synonym**	**Comment**
Maximise patient's social rehabilitation	Minimise handicap/maximise participation	Takes matters well outside health; personalises position and roles; rehabilitation process
Maximise patient's sense of well-being (quality of life)	Minimise somatic and emotional pain, maximise satisfaction with life	Helping people come to terms with the effects of their stroke
Minimise stress on and distress of the family	Provide emotional and practical help	Takes matters well outside health; also takes much effort and time unrelated to 'objective' losses
Processes	**Explanation**	**Comment**
Assessment	Collection and interpretation of data	Only as much as is needed to take action, setting goals and intervening
Setting goals	Considering both long-term aims and short-term methods	Should be multiprofessional goals as well as uniprofessional goals
Intervention		
Giving/organising care	Intervention needed to maintain life and safety	Major resource use, proportional to dependence/disability
Giving/organising treatment	Intervention presumed to affect process of change	Usually referred to as 'therapy'; not necessarily face-to-face interaction
Re-evaluation	Checking effects of intervention	Re-iterative until no further goals remain

Other terminology:

Term/word	**Definition**	**Comment**
Outcomes	Result of intervention (or disease course over time)	Depends upon level being monitored, but for service should be at level of activity
Measurement	Comparison of data against a standard or 'metric'	Quantifies data (NB Data still need interpretation)
Audit	Comparison of observed performance against agreed standards followed by change	With the aim to improve service quality on a continuing basis. Interpretation should take into account case-mix and context
Goals (in rehabilitation)	Any defined change in state over time and/or future state	Generic term, no implications as to level, time frame etc
Long-term goals		Usually refers to (social) situation after discharge
Medium-term goals		Usually multiprofessional, in weeks/months, at level of disability/activity
Short-term, specific goals		Usually named person and set time/place

1.9 Cost of stroke care

Although implementation of these guidelines may have cost implications, this document does not undertake a full cost benefit analysis. Health technology appraisals or studies evaluating the clinical and cost effectiveness of topics in the guidelines have been included in the review. Where we recognise that guidelines have significant resource implications, we have suggested that this needs to be considered locally.

1.10 Licensing of drugs

Recommendations about the use of specific drugs do not take into account whether the drug is licensed by the Medicines Control Agency for that particular use. It is up to the individual physician and their local trust to decide whether to permit the unlicensed use of the drugs in their formulary. There are many situations where it is entirely appropriate to use medication which has not been licensed for specific situations, for example aspirin in acute ischaemic stroke. There are others where the rules of the license are so strong that if broken it may result in the use of the therapy being legally withdrawn – eg thrombolysis with TPA – or funding withdrawn if NICE guidance restricts its use.

1.11 Updating the guidelines

It is recognised that research evidence changes continuously. The Intercollegiate Working Party for Stroke, co-ordinated by the CEEU at the Royal College of Physicians, London,will be reviewing the evidence on an ongoing basis. Any major changes to the guidelines, required as a result of changing evidence, will be made to the version on the Royal College of Physicians website. It is anticipated that a third edition of the guidelines will be published in 2008.

1.12 Funding and conflicts of interest

The guidelines were developed as part of the stroke programme at the Clinical Effectiveness and Evaluation Unit. Funding for the programme was provided by a consortium from industry and the Stroke Association. Details of this are available on the Royal College of Physicians website at **www.rcplondon.ac.uk/college/ceeu/index.htm**. Competing interests of the working party members were fully declared and are listed after their names at the start of this book.

Service provision

2 Service organisation

The efficient and effective management of patients depends upon a well organised, expert service that can respond to the particular needs of each individual patient. Consequently, the organisation of stroke services must be considered at every level: at that of individual patients wherever they may be, in primary and secondary care, and at strategic health authority or national level.

This section addresses aspects of the organisation of stroke services both in hospital and in the community.

2.1 Specialist stroke services

2.1.1 Service provision

Recommendations

a Stroke services should be organised so that patients are admitted under the care of a specialist team for their acute care and rehabilitation (**A***)

b Stroke services should satisfy the following criteria by having:

- i a geographically identified unit as part of the inpatient service (**A***)
- ii a co-ordinated multidisciplinary team that meets at least once a week for the interchange of information about individual patients (**B***)
- iii staff with specialist expertise in stroke and rehabilitation (**B***)
- iv educational programmes for staff, patients and carers (**B***)
- v agreed protocols for common problems (**B***)
- vi access to brain and vascular imaging services (**B***)

c Each service should conduct a needs assessment exercise to determine the level of service so that all stroke patients in the area have access to the same standards of care (**C***)

d Any patient with persistent/continuing symptoms should be rapidly referred to hospital with the expectation of admission to a stroke unit. Exceptions may include those relatively few patients for whom the diagnosis will make no difference to management (**A***)

e A neurovascular clinic for the rapid assessment of TIA and minor stroke should be available (**B***)

f Services for TIA should have rapid access to imaging for patients who need it (**B**)

g Hospitals offering thrombolysis to patients after ischaemic stroke, outside of a trial, should only do so after specialist staff training and registration with the UK Safe Implementation of Thrombolysis in Stroke Monitoring Study (SITS-MOST) programme (**B**)

h Specialist stroke services should be available in the community as part of an integrated system of care to facilitate early supported discharge (**A**)

i Specialist day hospital rehabilitation or specialist domiciliary rehabilitation can be offered to outpatients with equal effect (**A**)

Evidence (*Tables 2.1.1–2.1.3*)

Most of the evidence comes from meta-analyses or multiple randomised controlled trials (RCTs), but some is secondarily derived from those studies. The main references for each guideline are:

a Stroke Unit Trialists' Collaboration 2004. The evidence in support of this guideline is overwhelming, and implementing this guideline should be the highest priority of all clinicians and managers (**Ia**)

b Tables 2.1.1–2.1.3 contain most of the supporting evidence: for (i)–(iii) see Stroke Unit Trialists' Collaboration 2004; Kalra 2000 (**Ia**); (iv) Naylor *et al* 1994 (**Ib**); (v) Michaels *et al* 2000 (health technology assessment) (**Ia**); (vi) Wardlaw *et al* 2004 (health technology assessment)

c Clinical Standards Advisory Group report 1998 (**IV**)

d Stroke Unit Trialists Collaboration 2004; Langhorne & Pollock 2002 (**II**)

e Table 2.1.1a: Blight *et al* 2000 (**III**)

f Lovett *et al* 2003; Coull *et al* 2004 (**III**); Wardlaw *et al* 2004 (health technology assessment) (**Ia**)

g NINDs 2000 selection criteria and protocols result in the outcomes on which the evidence for successful thrombolysis is based (**Ib**). The Conditions of UK License require strict adherence to SITS-MOST (**IV**)

h Table 2.1.1b: Early Supported Discharge Trialists 2004 (**Ia**) Patients were eligible for these trials once they could be safely supported at home. This varied according to the intensity of care available in the community

i Table 2.1.1c: Gladman *et al* 1993 (but see Dekker *et al* 1998); Forster *et al* 1999b; Indredavik 2000; Outpatient Service Trialists 2002 (**Ia**). The cost-benefit equation is not yet fully investigated

Local guidelines

All commissioners (primary care trusts, strategic health authorities) and all providers (hospital services and community services) in a health district will need to discuss and agree:

1 who will undertake a local needs assessment, and how;

2 which local providers are to be involved in a co-ordinated, specialised stroke management service;

3 who will be the lead clinician, responsible for all local stroke services in general, and the multidisciplinary team in particular;

4 the balance between hospital services, day hospitals, and domiciliary services; and how services work together effectively;

5 how services for longer-term support and reintegration into normal life are organised;

6 referral paths for rapid access to neurovascular clinics and specialist stroke services;

7 the numbers of specialist staff needed;

8 how training and education is to be provided;

9 evidence-based protocols for common problems.

Patient's view: *I thought, 'I feel a bit funny,' and this arm was all tingling – the left arm – tingling up and down and my voice started going funny and I said to my wife, 'What's happening?' She said, 'Oh, I think you're having a stroke.' (73 year old man)*

Patient's view: *Terrifying, really absolutely terrifying. When... suddenly you're... moving and all of a sudden you can't move anything, I couldn't move that at all, it was just hanging down my side and I was trying to lift it up and... in the end I couldn't lift it up, then you feel that it's completely dead… It still is. (73 year old man)*

Patient who had a stroke in Austria: *They were there right away and then twice a day after that. They constantly showed you what you would be able to do for yourself eventually. But when I came back to England it took ten days before they even assessed me. I know now that all the literature says that the first few days or weeks are the most important but here, you're almost ignored.*

2.1.2 Specialist stroke team

Effective stroke rehabilitation requires the co-ordinated skills of a wide range of professionals.

A **specialist** is defined as a healthcare professional with the necessary knowledge and skills in managing people with the problem concerned, usually evidenced by having a relevant further qualification and keeping up to date through continuing professional development.

A **specialist team or service** is defined as a group of specialists who work together regularly, managing people with a particular group of problems (for these guidelines, stroke) and who between them have the knowledge and skills to assess and resolve the majority of problems.

The precise composition and numbers for such a team will vary according to the size of the unit and its objectives. The range of staffing levels has been described in the British Association of Stroke Physicians' benchmarking survey (Rodgers *et al* 2003a). Each profession is responsible for defining the levels of expertise required.

Recommendations

a A specialist stroke team should include staff with specialist knowledge of stroke, specifically (**C**):

- i) a consultant physician specialising in stroke medicine
- ii) nurses
- iii) a physiotherapist
- iv) an occupational therapist
- v) a speech and language therapist
- vi) a neuroradiologist
- vii) a dietitian
- viii) a clinical psychologist
- ix) a pharmacist
- x) a social worker

b These should be adequately supported by staff in training (**D**)

c There should be an in-house education programme involving all staff providing the stroke service (**B**)

d Stroke services should take responsibility for training junior professionals in the specialty of stroke (**D**)

e There should be access to services supplying orthotics, specialist seating and assistive devices (**B**)

Evidence (*Tables 2.1.1–2.1.3*)

a Department of Health 2001, National Service Framework for Older People Stroke Standard (**IV**)

b Consensus of working party (**IV**)

c Extrapolation from Stroke Unit Trialists' Collaboration 2004; Langhorne & Pollock 2002 (**II**)

d Consensus of working party (**IV**)

e Mann *et al* 1999 (**III**); Audit Commission 2002 (**IV**)

Carer view on continuity of care received in the general ward situation: *You're getting... early clinical decisions... then some on-going clinical decisions... then... rehabilitation decisions... They should be in a stroke associated unit where you get focused attention... it saves time, it saves money, it saves beds [so] they can deal with more people who've got...God knows what else.*

2.1.3 Services for management of patients with acute stroke: hospital or home?

The evidence suggests that all patients with stroke benefit from being managed in specialised stroke units in hospital and that those managed at home do less well. No randomised trials have shown that the availability of home care services for patients with acute stroke can improve patient outcomes or reduce costs (Langhorne *et al* 2004).

Recommendations

a Patients should be admitted to hospital for initial care and treatment (**A***)

b Patients should only be managed at home if:

- i the guidelines in part 3.1 can be adhered to (**D**)
- ii care services are able to provide adequate and flexible support within 24 hours (**D**)
- iii the services delivered at home are part of a specialist stroke service (**A**)

c Patients with persisting impairments who have not been admitted to hospital should be seen by a specialist rehabilitation team that includes a specialist occupational therapist (**A**)

Evidence (Tables 2.1.1a–e and 2.1.3)

The evidence is largely derivative. Evidence shows that patients benefit from access to a specialist stroke service.

a Stroke Unit Trialists' Collaboration 2004; Langhorne *et al* 2004; Shepperd & Iliffe 2004; the evidence in support of this guideline is overwhelming (**Ia**)

b (i) Consensus of working party (**IV**); (ii) Consensus of working party (**IV**); (iii) Wade *et al* 1985a,b; Langhorne *et al* 2004; Outpatient Service Trialists 2003 (**Ia**)

c Logan *et al* 1997; Walker *et al* 1999; Gilbertson *et al* 2000 (**Ib**)

Local guidelines

For patients managed at home local guidelines should specify:

1 how specialist acute medical diagnostic services and specialist rehabilitation services are accessed quickly and easily for patients not admitted (eg organisation of the neurovascular clinic, direct access or rapid referral systems);

2 what emergency home care services are available;

3 their procedures (contact arrangements, etc);

4 what specialist rehabilitation community services are available.

For patients admitted to hospital local guidelines should specify:

- which wards have the necessary expertise and organisation.

2.2 Stroke services for younger people

Stroke is predominantly a disease of people aged over 65 years, but a significant number will be younger. This group of patients may not fit easily into standard services. Their medical needs may differ, with more emphasis on diagnosing the specific cause of the stroke. Rehabilitation may require specific and specialised attention to work prospects and bringing up young children. Prognosis and social needs may be different. A separate set of guidelines covering stroke in children has been produced (Royal College of Physicians and Royal College of Paediatrics and Child Health 2004).

Recommendations

a Specialist medical and rehabilitation services must:

i recognise the particular physical, psychological and social needs of younger patients with stroke (**C***)

ii be provided in an environment suited to their personal needs (**C***)

b People who had a stroke in childhood and require continuing health supervision when they become adult should have their care transferred in a planned and organised way from paediatric to adult services (**D**)

Evidence (Table 2.2.1)

a Kelson *et al* 1998; Kersten *et al* 2002; Roding *et al* 2003 (**III**). Younger patients in all these qualitative studies described how the services they received did not make provision for their specific needs during rehabilitation, and in the longer-term for areas such as returning to work or full-time education, and caring for a young family

b Consensus of Working Party; Intercollegiate Working Party for Paediatric Stroke (**IV**)

Local guidelines

Local guidelines should state:

- how the specific clinical, rehabilitation and social needs of younger people with stroke are to be assessed and managed.

Patient's view: *That's the most important in my life, to get back to work. I got a mortgage. I got to pay the insurance, so right now I'm the backbone. (61 year old man)*

2.3 Patients and carers

2.3.1 Patient and carer education

Information for patients and their families following stroke can be offered in a variety of formats. Patient information booklets are published with these guidelines, and are also available on the web. Patients' organisations have a variety of leaflets and web-based materials on stroke. However, research demonstrates how difficult it is to give information effectively and failure to provide sufficient information is one of the commonest causes of patients' complaints.

Recommendations

a Information provision should take into account the needs of each individual (**D**)

b Information should be freely available to patients and their families in a variety of languages and formats specific to patient impairments (**A***)

c Patients and carers should be offered education programmes to assist them in adapting to their new role (**B**)

Evidence (Table 2.3.1)

a Consensus of working party (**IV**)

b Forster *et al* 2004 (**Ia**) This review showed the variable quality of trials and wide range of outcomes used. However there was evidence that information provided in an education context, or group setting may be more beneficial than provision of paper information alone

c Extrapolation from findings in Forster *et al* 2004; (**Ia**)

2.3.2 Carers and families

Stroke is a family illness. Initially, as in any other acute illness, relatives need information and support through the crisis, but it is different from many other acute illnesses in that they will usually need long-term practical, emotional, social and financial support to cope with the many residual problems. The extent of the stress of caring for a disabled person and the factors influencing the nature and extent of stress has only recently been the subject of study. There is little research into ways of alleviating the distress. Consequently there is little evidence to help with guidelines.

Carer's view: *Its completely affected the family, it devastates you.*

Patient's view: *We had to keep my son off school [to help care for the respondent and her dependent disabled husband]. My son eventually was excluded from the school and my friend went up and she said, 'Look, I have told you and told you the woman has had a stroke.' They didn't want to know.*

Patient's view: *I never got anything at all. My [disabled] husband – nobody helped him.*

Carer's view: *I was in a full-time job which I'd had to give up when he was discharged from hospital. I don't know what my options were – he was totally dependent, you know, and you put him to bed and got him up and dressed, you washed him and everything like that.*

Recommendations

a The needs of the carers should be considered from the outset in the domains of:

- i information provision (**A***)
- ii planning and decision making (**A***)
- iii professional support (eg psychosocial, health) (**A***)

b Stroke services must be alert to the likely stress on carers, specifically recognising the stress associated with 'hidden' impairments such as cognitive loss, urinary incontinence, and irritability (**B***)

c Information should be given to carers on the nature of stroke and its manifestations, and on relevant local and national services (**A**)

d Family support workers should be involved to help reduce carer distress (**A**)

Evidence (Table 2.3.1–2.3.2)

a i) Forster *et al* 2004; ii)-iii) van den Heuvel 2000, 2001, 2002; Johnson & Pearson 2000 (**IIa**)

b Anderson *et al* 1995; Dennis *et al* 1998; Scholte op Rheimer *et al* 1998a,b (**III**)

c Forster *et al* 2004 (**Ia**) showed that there is some evidence that information combined with education sessions is more effective than information giving alone

d Dennis *et al* 1997; Mant *et al* 2000; Lincoln *et al* 2003 (**Ib**)

Local guidelines

Local guidelines will need to:

1 define how to involve families from the outset;

2 ensure that information that is relevant, easily understood and local is readily available in suitable formats and languages;

3 describe how families are to be supported: who will do it, and how services are accessed.

2.4 Organisation of and approaches to rehabilitation

There is debate about the best overall clinical approach to rehabilitation of an individual patient, and there is significant variability in the specific interventions used. Given that each profession may consider the patient from a different perspective, an atmosphere of co-operation and consultation should be created. Some of the evidence used here is taken from studies in other chronic illnesses.

This section covers the following aspects of the organisation of rehabilitation:

- the use of assessments/measures (2.4.1)
- goal-setting (2.4.2)
- the underlying approach to rehabilitation (2.4.3)
- contact with therapists (2.4.4).

2.4.1 Use of assessments/measures

Objective measurement of function is central to rehabilitation. Many valid tools exist and these guidelines do not attempt to specify which should be used. It is important that staff are trained in the use of the chosen scales to ensure that they are used consistently within the team and that their function and limitations are understood.

Recommendations

a Clinicians should use assessments or measures appropriate to their needs (ie to help make a clinical decision) (**D**)

b Where possible and available, clinicians should use assessments or measures that have been studied in terms of validity (appropriateness for the purpose) and reliability (extent of variability) (**D**)

c Routine assessments should be minimised, and each considered critically (**D**)

d Patients should be reassessed at appropriate intervals (**D**)

Evidence (*Table 2.4.1*)

a–d Although there is evidence that a structured assessment helps to identify problems (Wade 1998a; Wikander *et al* 1998), no specific evidence supports any particular recommendation (**IV**)

Local guidelines

Local clinicians should:

1 agree which assessments are going to be used locally, in order to improve communication;

2 agree how frequently formal reassessment is going to occur;

3 not spend too much time or effort discussing and researching individual assessments. It is important to allow some choice if there are strong views or equally good measures available.

2.4.2 *Goal-setting*

One of the characteristics of rehabilitation is the setting of goals. However, the term is used loosely and practice varies greatly. Goal-setting here refers to the identification of, and agreement on, a target which the patient, therapist or team will work towards over a specified period of time.

Recommendations

a Goals should be meaningful and challenging but achievable (**B**), and there should be both short- and long-term goals (**D**)

b Goal-setting should involve the patient (**B**), and the family if appropriate (**D**)

c Goals should be set at the team level as well as at the level of an individual clinician (**D**)

d Judging progress against goals set ('goal attainment scaling') may be helpful (**B**)

Evidence (Table 2.4.2)

There is reasonable evidence for goal setting in rehabilitation (Wade 1998b), but most of it is not specific to stroke. Although goal setting is identified as good practice by specialists in stroke care (McGrath & Davies 1992; Rockwood *et al* 1993; McGrath *et al* 1995), the majority of studies are descriptive and based on small samples for other patient populations.

a Bar-Eli *et al* 1994, 1997; VanVliet *et al* 1995 (**III**); Consensus of working party (**IV**)

b Blair 1995; Blair *et al* 1996; Glasgow *et al* 1996 (**III**); Consensus of working party (**IV**)

c Consensus of working party (**IV**)

d Stolee *et al* 1992; Rockwood *et al* 1997 (**IIb**)

Local guidelines

Local groups will need to agree on:

1 the terminology used by the team (see Table 1.2);

2 documentation (eg as given in Wade 1999);

3 the possible other uses of goals (such as goal-attainment scaling as a means of monitoring progress).

Patient's view: *Letting me do things on my own, which is wonderful really. Even buttering bread – they see I was having difficulty but they were just standing there, 'Go on Bill!' (73 year old man)*

2.4.3 Underlying approach to rehabilitation

See also section 4.

All rehabilitation approaches focus on the modification of impairment and improvement in function within everyday activities. Differences in approaches centre around the type of stimuli used and/or the emphasis on task-specific practice and/or the principles of learning followed. It is important for all team members to implement a consistent approach to rehabilitation and to maximize the carry-over outside of formal therapy, giving patients opportunity for informal practice. Emerging evidence suggests that giving the patients the opportunity to practice functional activities (task-specific training) may be a major element in improved outcomes.

Recommendations

a All members of the healthcare team should work together with the patient, carer and family, using a shared philosophy and common goals (**B***)

b One of the current therapeutic approaches to movement re-education should be used to improve function (**A**)

c Patients should be given the opportunity to repeatedly practice functional skills and activities (**A***)

d All staff should be trained in the recognition and basic management of emotional, communication and cognitive problems (**D**)

e Healthcare workers should consider their knowledge, training, competence, health and physical capabilities before every manual handling procedure, taking into account the setting and the available equipment (**B**)

f All team members handling patients should be taught safe and appropriate ways of moving and handling (**C**)

Evidence (Tables 2.4.3, 2.4.4, 3.8.1 and 4.4.1)

Research is accumulating to suggest that patients derive benefit from therapy focused on the management of disability.

a Basmajian *et al* 1987; Jongbloed *et al* 1989; Gelber *et al* 1995; Edmans *et al* 2000; van der Lee *et al* 2001 (**Ib**)

b Pollock *et al* 2004 (**Ia**)

c Table 2.4.4: Smith *et al* 1981a; Langhorne *et al* 1996; Kwakkel *et al* 1999; Trombly & Wu 1999; Dean *et al* 1997, 2000a; Wu *et al*, 2000 (**Ia**)

d Consensus of working party (**IV**)

e Table 3.8.1: Carr & Kenney 1992; Lincoln *et al* 1996 (**IIb**); Health and Safety Executive 1992

f Health and Safety Executive 1992; Royal College of Nursing 2002 (**IV**)

Local guidelines

Local teams should:

1 agree core training strategies;

2 provide training opportunities for all staff in moving and handling stroke patients.

Patient's view: *Whoever says there's no frustration is lying. There is frustration within yourself because you can't do what you want to do – you cannot and that's it. (71 year old woman)*

2.4.4 Contact with therapists

There is much debate about the amount of therapy that is needed. One important but unanswered question is whether there is a minimum threshold, below which there is no benefit at all. Studies on well-organised services show that it is rare for patients to receive more than two hours therapy each day.

Recommendations

a Patients should undergo as much therapy appropriate to their needs as they are willing and able to tolerate (A)

b The team should promote the practice of skills gained in therapy into the patient's daily routine in a consistent manner (A*)

Evidence (Table 2.4.4)

There are few trials, and interpretation of most is confounded because services giving more therapy were usually also well organised and expert, in comparison with the control group.

a Langhorne *et al* 1996; Kwakkel *et al* 1997; Partridge 2000; Slade 2002; Table 4.3.1: Bhogal *et al* 2003 (**Ia**)

b Smith *et al* 1981a; Langhorne *et al* 1996; Kwakkel *et al* 1999 and 2002 (**Ia**); Table 4.4.1a: Lincoln 1999 (**Ib**)

Local guidelines

Local teams should:

- agree standards of practice including frequency and duration of therapy.

2.5 Palliative care

Stroke may cause a range of distressing symptoms that need to be managed, once it is felt that death is inevitable. These may include pain, depression, confusion and agitation, and problems with nutrition and hydration.

Recommendations

a All staff providing palliative care for patients after stroke should be trained in the principles and practice of palliative care (**D**)

b All stroke patients should have access to specialist palliative care expertise when needed (**D**)

c End of life decisions to withhold or withdraw life-prolonging treatments (including artificial nutrition and hydration) should be in the best interests of the patient (**D**)

Evidence (No table)

1 Extrapolation from National Institute for Clinical Excellence guidelines (2004), Supportive and palliative care for people with cancer: Part A and Part B. Consensus of working party (**IV**)

2 Extrapolation from NICE Guidelines (2004) Supportive and palliative care for people with cancer: Part A and Part B; Consensus of the working party (**IV**)

3 British Medical Association (2002) Witholding and Withdrawing Life-prolonging Medical Treatment: Guidance for decision-making **www.bmjpg.com/withwith/ww.htm**; Consensus of working party (**IV**)

Local guidelines

The local service will need to identify:

1 where expertise in palliative care can be accessed;

2 training for the stroke team in palliative care skills.

2.6 Service evaluation

Service evaluation needs to cover not only individual professions and departments but also the quality of the service as a whole, including care in the community. This section discusses various ways in which the stroke service might be evaluated for the purposes of clinical governance and quality improvement. Matters to be considered include sources of data (especially routine hospital data, documentation, outcome assessment, adjusting for casemix, measuring structure and process and how the data can be used to improve clinical services). Care should be taken using routine hospital statistics as the basis for needs assessment as in many districts these are inaccurate.

2.6.1 Organisational and clinical audit

The Intercollegiate Working Party for Stroke organises the National Sentinel Audit, the key indicators of which are included in Appendix 2.

Recommendations

a Clinicians should take responsibility for all aspects of data collection including:

i keeping a stroke register (**B**)

ii providing leadership in clinical audit (**C**)

b Assessment of the quality and effectiveness of services should concentrate upon process measures, rather than outcome, until improvements are made in methods of risk adjustment for casemix (**B**)

c Clinicians should benchmark the clinical and organisational quality of their services against national data, by participating in national audit (**B**)

d Service providers should consider using a specific, structured set of documentation to follow the patient throughout his/her illness (not necessarily extending to integrated care pathways) (**B**)

e All clinicians should be involved in audit of stroke care and use the results to plan service improvements (**B**)

f GPs should maintain a stroke register to enable them to routinely audit primary and secondary prevention of stroke (**C**)

Evidence (Table 2.6.1 a-c)

a i) Mant *et al* 1997 (**IIa**); ii) Royal College of Physicians 2001 *Consultant Physicians: Working for Patients* (**IV**)

b Jessee & Schranz 1990; Mant & Hicks 1995; Gompertz *et al* 1995 (**IIa**)

c Rudd *et al* 2001 (**III**)

d Extrapolation from Kwan & Sandercock 2002 (**Ia**)

e Rudd *et al* 2001 (**III**)

f Department of Health 2001 – National Service Framework for Older People, Standard 5 requirement by April 2004; Department of Health – General Medical Services (GMS) Contract 2003 (**IV**)

Local guidelines

Local services will need to:

1 discuss areas likely to benefit from standard documentation;

2 consider using a standardised audit package, eg the Royal College of Physicians' *A multidisciplinary stroke audit package: second edition*;

3 discuss how outcome data collected routinely are to be used to improve quality without over-interpretation of data and differences;

4 agree systems for integrating primary and secondary care data for clinical and audit purposes.

2.6.2 Patient and carer opinions

The perceptions of service users are an important way of evaluating service delivery, as demonstrated in the report by the College of Health on the views of patients and their carers for the development of these guidelines. Carers' views should not necessarily be taken to reflect those of patients who are unable to communicate or participate easily in opinion gathering exercises (Sneeuw *et al* 2002).

Recommendations

a Districts should include the views of patients and carers in service evaluations (**B**)

b Plans for service developments should include the opinions of patients and carers (**C**)

Evidence *(Table 2.6.2)*

a Consensus of working party; and extrapolation from Scholte op Reimer *et al* 1996; Pound *et al* 1999 (**III**); Commission for Health Audit and Inspection 2003 (**IV**)**.** Useful websites include **www.chi.nhs.uk/eng/surveys** and the Picker Institute who are conducting the NHS patients' surveys under the auspices of the Health Care Commission (**http://www.pickereurope.org/surveys/overview.htm**)

b The NHS Plan, Ch10 (Department of Health 2000) (**IV**)

Local guidelines

Local guidelines should specify:

- how patient and carer opinions will be obtained and incorporated into service planning and delivery.

Clinical care

3 Acute management

3.1 Diagnosis and investigations

Effective early management of acute stroke and transient ischaemic attack can reduce mortality and morbidity as well as reducing waste of scarce health and social services resources. The evidence from the Stroke Units Trialists' Collaboration shows that non-specialist disorganised care costs lives, increases dependency and is not cost effective.

3.1.1 Investigation and management of patients with transient ischaemic attack

The risk of developing a stroke after a hemispheric TIA can be as high as 20% within the first month, with the greatest risk within the first 72 hours.

Recommendations

a Patients first seen in the community with TIA, or with a stroke but having made a good recovery when seen, should be assessed and investigated in a specialist service (eg neurovascular clinic) as soon as possible within seven days of the incident (**B***)

b Patients likely to have a diagnosis of TIA should be prescribed an alternative antiplatelet regime immediately (**B**)

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

d Risk factors for cerebrovascular disease such as severe hypertension should be treated appropriately or the patient referred for specialist management (**A**)

Evidence (Table 3.1.1)

a Lovett *et al* 2003; Coull *et al* 2004 show a high risk of early stroke after TIA

b Extrapolation from International Stroke Trial Collaborative Group 1997 and Chinese Acute Stroke Trial 1997 (**II**)

c Wardlaw *et al* 2004b (health technology assessment)

d Consensus of working party (**IV**); Tables 3.3.2 to 3.3.4 Post-stroke Antihypertensive Treatment Study 1995; PROGRESS 2001; Heart Protection Study Collaborative Group 2002a,b (**Ib**); Table 3.5.2: Rothwell *et al* 2003c

Local guidelines

Local services need to:

- agree on all aspects of the specialist neurovascular service (access, organisation, links with vascular surgery and measurement of quality).

3.1.2 Investigation of acute stroke

If patients present with a clinical syndrome that might be due to stroke, the first stage of management is to make the correct diagnosis through careful history-taking, examination and investigation.

Recommendations

a The diagnosis should always be reviewed by an experienced clinician with expertise in stroke. The assessment and investigation should include identification of possible underlying cardiovascular causes (**B***)

b The initial neurological assessment should document the localisation of the likely cerebral area affected (**C**)

c Brain imaging should be undertaken as soon as possible in all patients, within 24 hours at most of onset unless there are good clinical reasons for not doing so (**B***)

d Brain imaging should be undertaken as a matter of urgency if the patient has: (**B**)

- **i** been taking anticoagulant treatment
- **ii** a known bleeding tendency
- **iii** a depressed level of consciousness
- **iv** unexplained progressive or fluctuating symptoms
- **v** papilloedema, neck stiffness or fever
- **vi** severe headache at onset
- **vii** indications for thrombolysis or early anticoagulation

e If the patient deteriorates unexpectedly further brain imaging should be considered to identify intracranial complications, eg hydrocephalus or haemorrhagic transformation (**B**)

f If the underlying pathology is uncertain, or the diagnosis of stroke is in doubt after CT scan, MRI should be considered (**B**)

g Cross-sectional MRI should be performed when imaging has been delayed for more than 10 days after stroke (**B**)

Evidence (Table: 3.1.2)

Little direct research has been undertaken on the process of diagnosis, and most data come incidentally from other studies. The latest health technology assessment (Wardlaw *et al* 2004) provides major evidence to support modern imaging techniques to aid diagnosis.

a Ricci *et al* 1991; Kothari *et al* 1995b; Martin *et al* 1997 (**III**)

b Consensus of working party; Royal College of Physicians of Edinburgh 1998; and 2000 (**IV**)

c Extrapolation from Chinese Acute Stroke Trial 1997 and International Stroke Trial Collaborative Group 1997 (**Ib**); Royal College of Physicians of Edinburgh 1998/2000 and Royal College of Radiologists 2003, National Service Framework for Older People, Department of Health 2001 (**IV**)

d Sandercock *et al* 1985 (**III**); Health Technology Assessment, Wardlaw *et a*l 2004 (**Ia**)

e Keir *et al* 2002 (**III**); Consensus of working party (**IV**)

f Wardlaw *et al* 2004 (**Ia**)

g Wardlaw *et al* 2004 (Health Technology Assessment) (**Ia**)

Carer: *Well, I thought, there's no alternative but to dial 999. So I dialled 999, I said 'It's not an accident or an emergency for a hospital or anything' I said, 'but my husband's fallen down in the house,' and I said, 'He's suffered a stroke some time back ...and I can't get him up'. They were very, very kind. Twice they sent them… Now we've got these link lines, you know…*

3.2 Immediate (medical/surgical/nursing/therapy) interventions for stroke

Stroke is a medical emergency. With active management in the initial hours after stroke onset ischaemic brain may be saved from infarction.

3.2.1 Initial screening and monitoring

Recommendations

a The patient should be assessed on admission for:

- **i** their risk of aspiration, using a validated 50 ml water swallow screening tool, administered by an appropriately-trained professional (**B**)
- **ii** their needs in relation to moving and handling (**C**)
- **iii** their risk of developing pressure sores (**C**)

b Monitoring in the acute phase should include: conscious level, blood pressure, pulse, heart rhythm, temperature, blood glucose, oxygen saturation and hydration (**D**)

Evidence *(Table: 3.2.1)*

a i Martino *et al* 2000; Perry & Love 2001; There is much evidence supporting the validity of simple clinical screening of swallow, voluntary cough and pharyngeal sensation. Testing the gag reflex is invalid as a test of swallow (Horner *et al* 1993)

ii Health and Safety Executive 1992; Royal College of Nursing 2002

iii National Institute for Clinical Excellence 2001, guidelines on *Pressure ulcers: risk assessment and prevention (guideline B)* (**IV**)

b Consensus of working party (**IV**)

3.2.2 General interventions

Recommendations

a Blood glucose, arterial oxygen concentration, hydration and temperature should be maintained within normal limits. Infection should be actively managed unless the patient is receiving palliative care (**B**)

b Blood pressure should only be lowered in the acute phase where there are likely to be complications from hypertension, eg hypertensive encephalopathy, aortic aneurysm with renal involvement (**B**)

c Patients should be mobilized as soon as possible (**B**)

Evidence *(Table 3.2.2)*

a Extrapolation from Stroke Unit Trialists' Collaboration 2004; Indredavik *et al* 1999b (**Ib**); Langhorne & Pollock 2002; Bhalla *et al* 2003 (**III**)

b Blood Pressure in Acute Stroke Collaboration 2004 (**Ia**); Ahmed & Wahlgren *et al* 2003 (**Ib**)

c Langhorne & Pollock 2002 and extrapolation from Stroke Unit Trialists' Collaboration 2004 (**II**)

3.3 Management of acute ischaemic stroke

3.3.1 Thrombolysis

Thrombolysis has the potential to improve outcome of patients with cerebral ischaemia, however it is a high-risk treatment and should only be administered by personnel trained in its use, in a centre equipped to investigate and monitor patients appropriately. Evidence from Phase IV studies on intravenous thrombolysis in North America has shown that unless the protocols for treatment are strictly adhered to outcomes are worse. The evidence for the benefits of intra-arterial thrombolysis remains limited.

Recommendations

a Thrombolytic treatment with alteplase should only be given provided that: (**A**)

- **i** it is administered within three hours of onset of stroke symptoms (unless as part of a clinical trial)
- **ii** haemorrhage has been definitively excluded
- **iii** the NINDS criteria have been met
- **iv** the patient is in a centre registered with Safe Implementation of Thrombolysis in Stroke Monitoring Study (SITS-MOST)

b Patients given alteplase outside the context of a research trial should be notified to the international audit of thrombolysis SITS-MOST (**C**)

c Intra-arterial thrombolysis should only be used in centres with an interventional neuro-radiology service (**C**)

Evidence (Table 3.3.1)

a Liu & Wardlaw 2004; NINDS 2000; Wardlaw *et al* 2004a (**Ia**)

b The European License for Tissue Plasminogen Activator (tPA) requires centres to register with the agency that quality assures the conditions under which it is administered in the UK (address included in Appendix 3) (**IV**)

c Extrapolation from Furlan *et al* 1999. Intra-arterial thrombolysis was suitable in a small number of cases meeting specific criteria (**Ia**)

3.3.2 Anti-thrombotic treatment

Recommendations

a Aspirin (300 mg) should be given as soon as possible after the onset of stroke symptoms once a diagnosis of primary haemorrhage has been excluded. In dysphagic patients aspirin should be given rectally or by enteral tube (**A***). Thereafter aspirin (50–300 mg) should be continued indefinitely until an alternative antiplatelet therapy is started (see section 3.5)

b Aspirin should be delayed for 24 hours following thrombolysis (**A**)

c Anticoagulation should not be initiated routinely for the treatment of acute ischaemic stroke, including progression (**A**)

Evidence (Table 3.3.2)

a International Stroke Trial Collaborative Group 1997; Chinese Acute Stroke Trial 1997; de Schryver *et al* 2004 (**Ia**). Early aspirin use is strongly supported by large trials, though the effect is relatively limited

b NINDS 2000; Wardlaw *et al* 2004a (**Ia**)

c Gubitz *et al* 2004; Sandercock *et al* 2004 (**1a**). Few patients with atrial fibrillation have been included in trials of early anticoagulation after stroke. The benefits of early anticoagulation may be offset by the risks of haemorrhage, though these may be less for small strokes (**Ia**). Saxena *et al* 2001 showed there was no overall advantage to the use of low and medium dose subcutaneous unfractionated heparin in patients with AF in the acute phase of ischaemic stroke (**Ia**)

3.3.3 Other drug treatment

None of the trials of drugs aiming to salvage ischaemic brain (eg neuroprotectors and drugs to reduce cerebral oedema) have thus far identified any that can be recommended for routine use.

Recommendations

a Drugs (other than those covered elsewhere in these guidelines) aimed at treatment of the ischaemic or haemorrhagic lesion should only be used as part of a randomised controlled trial (**A**)

b Drugs depressing the function of the central nervous system (eg anxiolytics and tranquillisers) and new prescriptions for sedatives should be avoided (**B**)

Evidence (Tables 3.3.3a and b)

Meta-analyses have been undertaken for many drug interventions. For most drugs the evidence is simply too weak to recommend use at this point. The tables show the Cochrane collaboration reviews and other studies. There are well over 100 individual trials, and not all are referred to here.

a There is insufficient evidence to warrant the use of most drugs, and some are detrimental (**Ia**)

b Goldstein 1995. This study supports animal work (**IIa**)

3.4 Management of specific diagnoses

3.4.1 Management of primary intracerebral haemorrhage

Surgical interventions are not well researched, but there is no evidence to support *routine* surgical evacuation of intracerebral haemorrhage. The STICH trial is expected to report after the publication of these guidelines.

Recommendation

a Surgical intervention should be considered in cases of supratentorial haemorrhage with mass effect or posterior fossa/cerebellar haematoma (**B**)

Evidence (Table 3.4.1)

a Mathew *et al* 1995; Prasad & Shrivastava 1998; (**III**) Zuccarello *et al* 1999 (**1b**)

3.4.2 Management of hydrocephalus and cerebral oedema

Recommendations

a Neurosurgical opinion should be sought for cases of secondary hydrocephalus (**D**)

b Cases of malignant cerebral artery infarction with, or likely to develop, significant mass effect should be discussed with a neurosurgeon (**D**)

Evidence (Table 3.4.2)

a Morley *et al* 2004 (**Ia**). Cochrane review that found no trials, so evidence is inconclusive. Consensus of working party (**IV**)

b Consensus of the working party (**IV**)

3.4.3 Management of cerebral venous thrombosis

Occlusion of the cerebral veins or dural venous sinuses may present as a stroke syndrome, subarachnoid haemorrhage or as isolated raised intracranial pressure. The condition should be considered in patients who may have a prothrombotic tendency (particularly during pregnancy or the puerperium), in those with intracranial, nasal sinus or ear infections, and in those who have been dehydrated or have disseminated malignancy. Headache is usually a prominent feature which may precede the stroke syndrome by several weeks. Seizures are common. Intracranial haemorrhage may occur and areas of infarction frequently show haemorrhagic change.

Recommendations

a Cross-sectional MRI should be performed with MRV where venous thrombosis needs to be excluded and has not been demonstrated on CT (**D**)

b Cases with suspected or confirmed cerebral venous thrombosis should be commenced on heparin (**B**)

Evidence *(Table 3.4.3)*

a Consensus of working party (**IV**)

b Stam *et al* 2004 (**Ia**). There was a non-significant trend in favour of treatment

3.4.4 Management of cervical arterial dissection

Cervical arterial dissection is a condition in which a tear occurs in the inner lining (intima) of either the carotid or vertebral artery allowing blood to track within the wall of the artery. Ischaemic stroke or TIA can occur because of embolisation of thrombus which forms at the site of the intimal tear or because the lumen of the artery becomes totally occluded. Rarely, dissection of the intracranial vertebral artery may cause subarachnoid haemorrhage. The symptoms of dissection may present days or even weeks after the initial injury to the arterial wall. Although traditionally associated with trauma or abnormal movement of the neck (particularly rotation) it is now recognised that dissection can occur spontaneously. The disorder appears to be more common in children and younger adults below the age of 50 years. Dissection should be especially considered in patients with a history of recent neck pain or trauma and in those with Horner's syndrome or evidence of a collagen disorder.

Recommendation

a Cross-sectional MRI should be considered with MRA where arterial dissection needs to be excluded (**D**)

Evidence *(Table 3.4.4)*

a Consensus of working party (**IV**)

3.4.5 Management of subarachnoid haemorrhage

Initial clinical management of subarachnoid haemorrhage (SAH) aims largely to prevent re-bleeding and to reduce the rate of secondary complications such as cerebral ischaemia or hydrocephalus. Later management of patients with a residual deficit is similar to that for ischaemic stroke, so separate guidelines only address acute diagnosis and treatment.

Recommendations

a Subarachnoid haemorrhage should be considered in any patient presenting with sudden-onset, severe and unusual headache with or without any associated alteration in consciousness (**B**)

b If subarachnoid haemorrhage is suspected:

i CT brain scan should be undertaken immediately if the patient has an impaired level of consciousness and within 12 hours in all patients (**D**)

ii if the CT scan is negative or equivocal lumbar puncture should be undertaken 12 or more hours after onset. Spectrophotometry should be used to permit detection of small amounts of xanthochromia (**B**)

c An MRI brain scan should not be used to diagnose SAH (**D**)

d Once the diagnosis is confirmed:

i oral nimodipine 60 mg four-hourly should be given, unless there are specific contra-indications (**A**)

ii anti-fibrinolytic agents (**A**) and steroids (**D**) should not be given

iii general supportive measures to ensure adequate hydration and oxygenation should be instituted and should include adequate analgesia, eg codeine phosphate (**D**)

e All patients, irrespective of age or clinical grade, should be discussed with a neurosurgeon immediately (**D**)

f Transfer of patients to the neurosciences centre for further specialist management should be on the same day, and in accordance with local protocol (**B**)

g Imaging of cerebral vessels should be undertaken at the neurosciences centre (B). A ruptured aneurysm should be treated by endovascular or surgical obliteration as determined by the neurovascular team (**A**)

h All patients should be monitored for the development of treatable complications, especially hydrocephalus, cerebral ischaemia, electrolyte imbalance and hypotension (D)

i Any patient with residual impairment after investigation and treatment should be referred to an appropriate specialist rehabilitation service (**B**)

j All surviving patients should be advised on secondary prevention, especially on treatment for hypertension and the need to stop smoking (**A**)

k Patients with a strong family history (one other affected first degree relative besides themselves and/or with a history of polycystic kidney disease) should be advised that their family may be at greater risk of subarachnoid haemorrhage and a referral made to a neurovascular specialist for up-to-date information and advice (**B**)

Evidence *(Tables 3.4.5a and b)*

The evidence regarding the use of drugs and hypervolaemic agents is mainly negative apart from that for calcium antagonists. Referral for early surgery has some supporting evidence.

a Linn 1994 showed subarachnoid haemorrhage was the cause in 25% of cases reviewed retrospectively who presented with severe headache to their GP (**II**)

b i) Consensus of working party (**IV**)

ii) UK National External Quality Assessment Scheme for Immunochemistry 2003; Royal College of Radiologists 2003

c Consensus of working party. A CT scan is more sensitive than MRI for detecting blood in the acute stage (**IV**)

d i) Rinkel *et al* 2004; Barker and Ogilvy 1996; calcium antagonists reduce cerebral ischaemia following SAH, but long-term benefit is proven for nimodipine only. (**Ia**) ii) Lindsay 1987; Roos *et al* 2004; There is no present evidence to recommend routine use of antifibrinolytics – rebleeding may be reduced, but the benefit offset by an increase in cerebral ischaemia (**Ia**). iii) Consensus of working party (**IV**)

e Consensus of working party (**IV**)

f Extrapolation from Whitfield & Kirkpatrick 2004; de Gans *et al* 2002; Roos *et al* 1997 (**Ia**). Suggestion that early surgery improves outcome

g International Subarachnoid Aneurysm Trial Collaborative 2002; no firm evidence regarding timing of coil embolisation (**Ia**)

h Consensus of working party (**IV**)

i Extrapolation from Stroke Unit Trialists' Collaboration 2004 (**Ia**)

j Tables 3.5.1–3.5.7 demonstrate the effectiveness of secondary prevention strategies after stroke

k Table 3.4.5b, Crawley *et al* 1999; The Magnetic Resonance Angiography in Relatives of Patients with Subarachnoid Haemorrhage Study Group (MARS) 1999; Kissela *et al* 2002 (**III**)

3.5 Secondary prevention

Patients who have suffered a stroke remain at an increased risk of a further stroke of between 30% and 43% within five years (Mant *et al* 2004). The risk of completing a stroke after a TIA may be as high as 20% within the first month. Patients with TIA and stroke also have an increased risk of myocardial infarction and other vascular events. The risk of further stroke is highest early after stroke or TIA. Therefore there should be a high priority given to rapid delivery of evidence-based secondary prevention.

These guidelines apply to all patients with TIA and stroke, even those not admitted to hospital.

Recommendations

a An individualised strategy for stroke prevention should be implemented within a maximum of seven days of acute stroke or TIA (**B***)

Evidence (Table 3.5.1)

a Lovett *et al* 2003; Coull *et al* 2004 (**II**)

3.5.1 Lifestyle

Recommendations

a All patients should be given appropriate advice on:

- **i** stopping smoking (**B***)
- **ii** regular exercise (**D***)
- **iii** diet and achieving a satisfactory weight (**B***)
- **iv** reducing the intake of salt (**B***)
- **v** avoiding excess alcohol (**D***)

Evidence (Table 3.5.1)

a i Silagy *et al* 2004; Lancaster 2004; Rice & Stead 2004 (**Ia**)

ii Consensus of working party (**IV**)

iii Mulrow *et al* 2004 showed a reduction in blood pressure for those who reduced body weight (**Ia**); Hooper *et al* 2004 (**Ia**) showed a potentially important reduction in cardiovascular risk for a reduction in fat intake

iv Jurgens *et al* 2004 showed reduced salt in the diet can marginally lower blood pressure in hypertensive people, but the effect may not be long term (**Ia**)

v Consensus of working party (**IV**)

Patient's view: *I don't see why, I still can't understand why I got [stroke] because I didn't really abuse my life too much. I eat reasonable. I drink reasonable. Why should I get it? … I did smoke. I gave up the day before I had the stroke. How's that for timing? (68 year old woman)*

3.5.2 Blood pressure

Recommendations

a All patients should have their blood pressure checked, and high blood pressure persisting for over two weeks should be treated. The British Hypertension Society guidelines are: In non-diabetic people with hypertension the optimal blood pressure treatment goals are systolic blood pressure <140 mmHg and diastolic blood pressure <85 mmHg; for patients with diabetes mellitus and high blood pressure the optimal goals of control are 130/80 (**A***)

b Further reduction of blood pressure should be undertaken using a thiazide diuretic (eg indapamide or bendrofluazide) or an ACE inhibitor (eg perindopril or ramipril) or preferably a combination of both, unless there are contraindications (**A**)

Evidence (Table 3.5.2)

a Williams *et al* (British Hypertension Society guidelines) 2004 (**IV, but based on up-to-date evidence of RCTs**)

b Post Stroke Antihypertensive Treatment Study collaborative group 1995; Heart Outcomes Prevention Evaluation (HOPE) 2000a,b; PROGRESS 2001 (**Ib**)

3.5.3 Anti-thrombotic treatment

Recommendations

a All patients with ischaemic stroke or TIA who are not on anticoagulation should be taking an antiplatelet agent, ie aspirin (50–300 mg), daily, (**A***) or clopidogrel, or a combination of low-dose aspirin and dipyridamole modified release (MR). Where patients are aspirin intolerant an alternative antiplatelet agent (eg clopidogrel 75 mg daily or dipyridamole MR 200 mg twice daily) should be used (**A***)

b Anticoagulation should be started in every patient with persistent or paroxysmal atrial fibrillation (valvular or non-valvular) unless contraindicated (**A***)

c Anticoagulants should not be used for patients in sinus rhythm (**A***) unless there is a major source of cardiac embolism (**D**)

d Anticoagulants should not be started until brain imaging has excluded haemorrhage, and usually not until 14 days have passed from the onset of an ischaemic stroke (**A**)

Evidence (Table 3.5.3)

a Antithrombotic Trialists' Collaboration 2002 (**Ia**); Bhatt *et al* (CAPRIE) 2000; Diener *et al* (ESPS 2) 1996 (**Ib**)

b Segal *et al* 2000; Hart *et al* 1999 (**Ia**)

c Stroke Prevention in Reversible Ischaemia Trial (SPIRIT) 1997; Sandercock *et al* 2004 (**Ia**)

d Gubitz *et al* 2004; Sandercock *et al* 2004; Koudstaal 2004a,b; Berge *et al* 2000 (**Ia**)

3.5.4 Antilipid agents

Recommendation

a Treatment with a statin (eg 40 mg simvastatin) should be given to patients with ischaemic stroke or TIA, and total cholesterol of >3.5 mmol/L unless contraindicated (**A**)

Evidence (Tables 3.5.4)

a Hebert *et al* 1997; (**Ia**) Heart Protection Study Collaborative Group 2002a (**Ib**)

3.5.5 Hormone replacement therapy

Recommendation

a The decision whether to start or continue hormone replacement therapy (HRT) should be discussed with the individual patient and based on an overall assessment of risk and benefit (**A**)

Evidence (Table 3.5.5)

a Viscoli *et al* 2001; Simon *et al* 2001 (**1b**). The evidence suggests an increased risk of stroke for those on HRT

3.5.6 Carotid stenosis

Recommendations

a Any patient with a carotid artery territory stroke but without severe disability should be considered for carotid endarterectomy (**A**)

b Carotid endarterectomy should be considered where carotid stenosis is measured at greater than 70% as measured using the ECST methods, and 50% as measured using the NASCET methods (**A**)

c Carotid duplex ultrasound should be performed on all patients being considered for carotid endarterectomy and confirmed with magnetic resonance angiography (MRA) or with a second ultrasound (**B**)

d Carotid endarterectomy should be performed as soon as the patient is fit for surgery, preferably within 2 weeks of TIA (**D**)

e Carotid endarterectomy should only be undertaken by a specialist surgeon in centres where outcomes of carotid surgery are routinely audited (**B**)

f Carotid angioplasty or stenting is an alternative to surgery but should only be carried out in specialist centres where outcomes of these techniques are routinely audited (**B**)

Evidence (Table 3.5.6)

a Cina *et al* 2004; Rothwell *et al* 2003a,b (**Ia**)

b Young *et al* 1996; Wardlaw *et al* 2001; Westwood *et al* 2002 (**Ia**)

c Rothwell *et al* 2003 (**1a**); North American Symptomatic Carotid Endarterectomy Trial Collaborators (NASCET) 1998; European Carotid Surgery Trialists (ECST) 1998 (**Ib**)

d Rothwell *et al* 2004 showed the greatest benefit was from early surgery, and declined to little or no benefit if surgery was delayed beyond 12 weeks (**Ia**)

e Moore *et al* 1996; Cina *et al* 2004 (**Ia**)

f CAVATAS Investigators 2001 (**Ib**). Both the endovascular and the surgical group had an equally bad complication rate of 10% compared to the endarterectomy trials with 6% to 8% complication rates. Either the patient group entered into the trial were at greater risk than in the previous studies or the complication rates for endovascular treatment are excessively high. More research is required and any patients should be entered into further trials.

Local guidelines for secondary prevention

Local guidelines for secondary prevention will need to specify local policies for:

1 antiplatelet treatments, taking into consideration the cost implications of implementing routine use of agents other than aspirin;

2 referral to specialist vascular surgeons for carotid surgery;

3 controlling anticoagulation;

4 dietary advice and follow-up;

5 smoking cessation therapy, including nicotine replacement therapy.

3.5.7 Concordance with secondary prevention strategies

After stroke most patients will be prescribed one or often more drugs to reduce their risk of future stroke. These will only be effective if taken. Specific problems after stroke may include difficulties in opening containers due to loss of hand function, and difficulties secondary to focal (eg aphasia, neglect) or general cognitive losses.

Recommendations

a All patients should receive verbal and written information about their medicines in a format appropriate to their needs. This should include information about the reason for the medication, how and when to take it and any possible common side effects (**B**)

b Every attempt should be made to ensure concordance with secondary prevention strategies, eg with appropriate compliance aids such as large-print labels, non-child-proof tops (**C**)

c Patients who need or request it should be supplied with an appropriate compliance aid according to their level of manual dexterity, cognitive impairment and personal preference and compatible with safety in the home environment (**B**)

Evidence (Table 3.5.7)

a Extrapolation from Haynes *et al* 2004 (**Ia**)

b International Pharmaceutical Federation Statement on Professional Standards 2003; consensus of working party (**IV**)

c Extrapolation from Haynes *et al* 2004 (**Ia**)

Local guidelines

Local policies will need to be specified for:

1 organisation of pharmacy services on the wards and for patients after discharge from hospital;

2 effective communication of prescribing information between primary and secondary care;

3 services to assist frail people to obtain and take prescribed medication;

4 referral to smoking cessation services.

3.6 Multidisciplinary assessment: rehabilitation referral

There is no evidence to support particular selection criteria for more active rehabilitation or admission to a stroke unit (Wade 2003). If anything, those with more severe stroke have been shown to have the most to gain from it (Stroke Unit Trialists' Collaboration 2004).

Recommendations

a All patients should be referred to a specialist rehabilitation team as soon as possible after admission (**A***)

b A multidisciplinary assessment using a formal procedure or protocol should be undertaken and documented in the notes within five working days of admission (**D**)

c The protocol should include assessment of the following in addition to those assessments completed within the first 24 hours of admission (Section 3.2.1, 'Initial screening and monitoring'):

- **i** screening for cognitive impairment, using a validated clinical method (**D**)
- **ii** nutritional status, using a validated method, to be undertaken by appropriately trained personnel (**B**)
- **iii** assessment for problems with communication (**D**)
- **iv** self-care (**C**)

Evidence *(Table 3.6)*

Much of the evidence does not relate specifically to stroke.

a Stroke Unit Trialists' Collaboration 2004; this evidence is very strong (see Section 2.1.1) in general, though not on the timing (**Ia**)

b Consensus of working party (**IV**)

c i) Consensus of working party (**IV**); ii) Gariballa *et al* 1998; FOOD Trial Collaboration 2003 both show importance of nutritional status for outcome (**III**); iii) Consensus of working party (**IV**); iv) National Association of Neurological Occupational Therapists 2002

Local guidelines

There should be local agreement on:

1 who will do assessments, and how they are to be contacted;

2 the protocol or procedures, and care pathways, to be used;

3 who should be referred to whom, how, and when.

3.7 Swallowing, feeding and nutrition: assessment and management of dysphagia and nutrition

Oropharyngeal dysphagia, an abnormality in swallowing fluids or food, is common in patients with stroke. Incidence of dysphagic symptoms varies according to the manner and timing of evaluation, ranging from 64 to 90%, with aspiration rates (including silent aspiration) ranging from 22 to 42% on videofluoroscopy evidence. The presence of aspiration may be associated with an increased risk of developing pneumonia after stroke.

Malnutrition is also common, being present in about 15% of all patients admitted to hospital, and increasing to about 30% over the first week. Malnutrition is associated with a worse outcome and a slower rate of recovery.

Recommendations

a Patients presenting with features indicating dysphagia and/or risk of pulmonary aspiration should receive a full clinical assessment of swallowing by an appropriately trained specialist who should also advise on safe swallow and consistency of diet and fluids (**A**)

b Any patient who appears to have persistent abnormalities of the pharyngeal phase of swallowing should be considered for an instrumental investigation to allow visualisation of the pharynx, ie videofluoroscopy or flexible endoscopic evaluation of swallowing (FEES) (**C**)

c Every patient should have his/her nutritional status screened by appropriately trained personnel, using a valid nutritional screening method, within 48 hours of admission (**B**)

d Nutritional and hydration support should be considered in any patient with malnutrition or difficulties feeding (**B**)

e Enteral feeding tubes should be considered where patients are unable to maintain adequate nutrition orally (**A**)

f Every patient with nutritional problems, including dysphagia, who requires food of modified consistency should be referred to a dietitian (**C**)

g Patients' needs should be assessed for the most suitable posture and equipment to help them with feeding (**D**)

h Patients with feeding and swallowing difficulties should have medication supplied in an appropriate formulation (**D**)

i All patients should have their mouth kept clean and free of infection to minimise complications and promote patient comfort (**D**)

j The need for enteral feeding should be kept under review and the tube removed when no longer required (**D**)

Evidence *(Tables 3.7a–c)*

The evidence includes randomised trials, but some of the guidelines are extrapolating from the evidence.

a Logemann *et al* 1999; Langmore *et al* 1998; Royal College of Speech and Language Therapists guidelines 2004

b There is evidence that standardised clinical bedside assessment protocols increase the sensitivity and specificity in identifying the nature of oropharyngeal swallowing problems. However, silent aspiration is most reliably identified by videofluoroscopy or Flexible Endoscopic Evaluation of Swallowing (FEES). Splaingard *et al* 1988; Langmore *et al* 1991; Lim *et al* 2001; Leder & Espinosa 2002

c Extrapolation from evidence that poor nutritional status after stroke relates to clinical outcome. Davalos *et al* 1996; Gariballa *et al* 1998; FOOD Trial Collaboration 2003 (**IIa**)

d Potter *et al* 1998. A meta-analysis showing probable benefit of improving nutrition in malnourished patients, but not specifically for patients with stroke (**Ia**)

e Bath and Smithard 2004 (**Ia**). Too few studies have been performed, and these have involved too few patients. PEG feeding may improve outcome and nutrition as compared with NGT feeding

f Penman & Thomson 1998; Royal College of Speech and Language Therapists & British Dietetic Association 2003 (**IV**)

g Consensus of working party (IV)

h Consensus of working party (IV)

i Consensus of working party (IV)

j Consensus of working party (IV)

Local guidelines

Local services should agree:

1 the standardised initial screening assessment of swallowing, and the training of nursing, therapeutic and medical staff in its use;

2 the use of videofluoroscopy FEES and enteral feeding: areas with resource and ethical implications;

3 how and when malnutrition and dehydration should be diagnosed and managed;

4 the training of staff in the management of patients with swallowing problems;

5 descriptors of texture modification of solids and fluids (Royal College of Speech and Language Therapy & British Dietetic Association 2002).

Carer's view: *My husband was having tube feeding – for weeks it was going on – and the only reason they gave that he was still on tube feeding was that they couldn't get a speech therapist to look at him.*

Carer's view: *When she came out of hospital D– was four and a half stone. Pathetic. Couldn't hold a spoon, couldn't do nothing.... Me and the boy [their son] got on with it as best we could.*

3.8 Prevention of complications

3.8.1 Positioning and support interventions

Positioning of stroke patients and provision of appropriate seating may prevent the development of contractures, pain, skin breakdown and respiratory complications.

Recommendations

a Staff should position patients, whether lying or sitting, to minimise the risk of complications such as aspiration, respiratory complications, shoulder pain, contractures, (see section 3.2.1) and pressure sores (**B**)

b Intermittent compression should not be used routinely for a swollen hand (**A**)

Evidence (Tables 3.8.1)

There are few studies relating to positioning. Positioning improves with formal teaching. It has been observed that patients in stroke units are more likely to be in recommended positions.

a Carr & Kenney 1992; Lincoln *et al* 1996; Jones *et al* 1998; Cullum *et al* 2004 (**Ia**); NICE 2001, *Guidelines on pressure sore risk assessment and prevention* (**IV**)

b Roper *et al* 1999 (**Ib**) The only trial of intermittent pneumatic compression in treatment of oedema of the hand. Small but well conducted, it showed no difference in hand volume between treatment and controls

Local guidelines

Local guidelines need to specify:

- locally agreed procedures for positioning and use of specialist equipment.

3.8.2 Venous thromboembolism

Venous thromboembolism often occurs within the first week of a stroke, and most often in immobile patients with paralysis of the leg, but its impact after stroke is still unclear. Studies using radio-labelled fibrinogen leg-scanning suggest that deep venous thrombosis (DVT) occurs in up to 50% of patients with hemiplegia but clinically apparent DVT probably occurs in fewer than 5%. Similarly, although autopsy series have identified pulmonary embolism (PE) in a large proportion of patients who die, clinically-evident PE occurs in only 1–2% of patients.

Recommendations

a Aspirin (50–300 mg daily) should be given according to the guidance in the recommendations in 3.5.3 on antithrombotic treatment (**A**)

b Compression stockings should be applied in stroke patients with weak or paralysed legs (once the patient's peripheral circulation, sensation and the state of the skin have been assessed) (**B**)

c Mobilisation and optimal hydration should be maintained as far as possible from the outset (**D**)

d Prophylactic anticoagulation should not be used routinely (cf 3.5.3) (**A**)

Evidence (Tables 3.8.2)

a Antiplatelet Trialists' Collaboration 1994; Chinese Acute Stroke Trial Collaborative Group 1997; International Stroke Trial Collaborative Group 1997; post hoc analyses show a reduced incidence of DVT in patients given aspirin (**Ib**)

b Amaragiri & Lees 2004 (**Ia**). Compression stockings reduce the incidence of DVT peri-operatively by 68%, and may be helpful after stroke, though no large RCTs have evaluated their use in stroke (**Ib**)

c Consensus of working party (**IV**)

d Gubitz *et al* 2004; Sandercock *et al* 2004; anticoagulants reduce the incidence of venous thromboembolism but increase the risk of cerebral haemorrhage (**Ia**)

Local guidelines

Local guidelines need to consider:

1 protocols for assessment of peripheral circulation and criteria for use of compression stockings;

2 protocols for early mobilisation;

3 protocols for hydration from stroke onset.

3.9 Bladder and bowel management

Most patients with moderate to severe stroke are incontinent of faeces and urine at presentation, and many are discharged incontinent. Bladder training may establish continence in hospital, but cannot always be sustained by carers at home. Incontinence is a major burden on carers once the patient is discharged home. Management of both bladder and bowel problems should be seen as an essential part of the patient's rehabilitation, as they can seriously hamper progress in other areas.

Recommendations

a All wards and stroke units should have established assessment and management protocols for both urinary and faecal incontinence and constipation (**B**)

b Continence services should cover both hospital and community, to provide continuity of care (**C**)

c All nurses and doctors should be able to assess incontinent patients, and know who to contact for support and advice (**D**)

d There should be active bowel and bladder management from admission (**B**)

e Indwelling urinary catheters should be used only after alternative methods of management have been considered, in accordance with NICE guidelines (**C**)

f Further tests (urodynamics, anorectal physiology tests) should be considered when incontinence persists (**B**)

g Incontinent patients should not be discharged from hospital until adequate arrangements for continence aids and services have been arranged at home and the carer has been adequately prepared (C)

h In selecting equipment, factors to consider include ease of putting on, appearance, and comfort (B)

i Sexual function should be considered, particularly the potential problems associated with an indwelling catheter (D)

Evidence (Table 3.9)

The evidence to date relates more to general continence management, with little specific to stroke.

a Royal College of Physicians 1995, 1998; Wikander *et al* 1998 (**III**); Langhorne & Pollock 2002; Barrett 2002

b Department of Health 2000 (**IV**)

c Consensus of working party (**IV**)

d Extrapolation from Cochrane reviews which show: inconclusive evidence for prompted voiding (Eustice *et al* 2004); bladder training may be helpful (Wallace *et al* 2004); it is not possible to recommend any particular intervention for bowel care in neurological disease (Coggrave *et al* 2004) (**Ia**)

e National Institute for Clinical Excellence *Guideline for preventing healthcare-associated infections in primary and community care* 2003 (p7–9) (**IV**)

f Glazener *et al* 2004 (**Ia**)

g Department of Health 2000 (**IV**)

h Extrapolation from Brazzelli *et al* 2004 (**1a**)

i Consensus of working party (**IV**)

Local guidelines

Local guidelines need to specify:

1 the specialist continence advisory service, who the continence advisor is and who should be referred;

2 assessment and management protocols for patients with urinary and faecal incontinence;

3 levels of specialist training in continence management for nurses involved in the care of stroke patients;

4 what incontinence equipment will be provided, by whom, and who will pay for it once the patient goes home;

5 how to maintain continence at home.

Patient's view: *You go into a toilet and say to the nurse, 'Will you come in with me and wipe my backside?' You know, it's, it's horrible – absolutely terrible feeling. (73 year old man)*

4 Rehabilitation

Rehabilitation starts from the onset of stroke and may need to continue for a very long time. It needs to be considered in all settings, not just that of the hospital.

4.1 Psychological impairment

4.1.1 Mood disturbance: depression, emotionalism, anxiety

Disturbance of mood is common after stroke. Diagnosis of an abnormal mood state is difficult, particularly in the presence of speech disturbance. Diagnostic separation is also difficult, especially as different abnormalities may coexist. Treatments may include antidepressant medication or psychological therapy, such as cognitive behavioural therapy.

Symptoms suggestive of depression are common after stroke. Symptoms include crying, feeling miserable or hopeless, lack of motivation, loss of appetite, and reduced social activities.

Crying is not uncommon after stroke. If it appears to arise with minimal provocation the patient may be experiencing emotionalism and impairment in the control of crying (and, more rarely, laughing).

Feelings of fear and worry are also common after stroke. Anxiety is an unpleasant, uncontrollable affect of fear or apprehension often accompanied by physical symptoms, such as breathlessness, palpitations and trembling. After stroke it may be provoked by situations, such as a fear of falling when transferring on to a toilet, or fear of meeting people, or it can be a generalised anxiety disorder not linked to any specific provocation. Anxiety may be associated with post-traumatic stress disorder, when factors may be intrusive memories or flashbacks to the time of the stroke. It varies in its severity and thereby its impact on function. Some people may cope with anxiety disorder by avoiding the provocation. Treatments may include pharmacological or psychological therapies.

Recommendations

a Patients should be given information, advice and the opportunity to talk about the impact of illness upon their lives (**B**)

b Patients' psychological and social needs should be assessed (**C**)

c Patients should be screened for depression and anxiety within the first month of stroke, and their mood kept under review. In those patients who can respond to it, a standardised

questionnaire may be used for screening, but any clinical diagnosis should be confirmed by clinical interview, during which the interviewer should attempt to find whether there is suicidal thinking (**D**)

d Emotionalism after stroke should be confirmed at clinical interview (**B**)

e Any patient diagnosed with one form of mood disorder should be assessed for the others (**B**)

f Patients with severe, persistent or troublesome tearfulness (emotionalism) should be given antidepressant drug treatment, monitoring the frequency of crying to check effectiveness (**A**)

g Patients with minor depression should be managed by 'watchful waiting', treatment only being started if the depression is persistent. More severe or already persistent depression should be considered for a trial of antidepressant medication (**A**) or psychological therapy, given by an appropriately trained and supervised practitioner (**B**)

h Antidepressants should be continued for at least six months if a good response has been achieved, with the treatment kept under review (**D**)

i Antidepressant medication should not be used routinely to prevent the onset of depression or improve other outcomes (**A**)

j Patients with marked anxiety should be offered psychological therapy, given by an appropriately trained and supervised practitioner (**B**)

k Patients with marked anxiety should be considered for a trial of antidepressant medication or benzodiazepines (**B**). Prescribers should use the committee on safety of medicines (CSM) guidelines on the use of benzodiazepines, reproduced in the BNF (**C**)

l Mood disorder that is causing persistent distress or worsening disability should be managed by or with advice from an experienced clinical psychologist or psychiatrist (**D**)

Evidence *(Table 4.1.1a and b)*

a Evans *et al* 1988 (**III**)

b College of Health report (Kelson *et al* 1998) identified the widespread need for support. Consensus of working party (**IV**)

c Consensus of working party (**IV**)

d Allman *et al* 1992 (**III**)

e Schultz *et al* 1997 (**III**)

f Brown *et a*l 1998; Andersen *et al* 1993 (**Ib**) House *et al* 2004 (**Ia**)

g Lipsey *et al* 1984; Andersen *et al* 1994; Churchill *et al* 2001; Kimura *et al* 2000 (**Ib**). National Institute for Clinical Excellence 2004

h Consensus of working party (**IV**)

i Anderson *et al* 2004 (**Ia**)

j Gould *et al* 1997; van Balkom *et al* 1997 (**Ia**)

k Extrapolation from Gould *et al* 1997; van Balkom *et al* 1997 (**Ia**); British National Formulary

l Consensus of working party (**IV**)

Local guidelines

Local services will need to agree:

1 who will give expert opinion and how services will be accessed;

2 which drugs should be kept on the formulary for use in post-stroke mood disturbance.

Patient's view: *You get so emotional when you think about it. When they took me down the physio and they, both of them held me up and said, 'Come on, Bill, you can walk' – and I get emotional to know that you can move your leg. I just had a little bit of movement in my fingers then, that's all I could do just then and now I've got all that. (73 year old man)*

Carer's view: *We don't know what's going on in his brain. And now he's so emotional. He cries for little, little things. He just starts crying all the time.*

4.2 Cognitive impairment

Stroke can disrupt a wide range of cognitive processes. This may result in impairments such as neglect/inattention or apraxia/dyspraxia, and in difficulties with attention, memory and executive functioning (described below). Cognitive impairments may adversely affect a person's ability to participate in therapy, perform activities of daily living and live independently. They may be confusing and distressing for patients and carers. Staff should be aware that several types of cognitive impairment may occur together in one individual.

Five impairment-specific guidelines are provided (4.2.2–4.2.6), and follow the initial sections on general and local guidelines. Pharmacological interventions for cognitive impairment are not reviewed. There are no impairment-specific guidelines on perception. The impact of perceptual disorders on activities of daily living (ADL) is varied. It can range from difficulty crossing the road (due to an impairment of distance perception) to an inability to recognise a person's face (such as a spouse). A Cochrane systematic review of perceptual disorders was in progress at the time of going to press.

4.2.1 General guidelines for all cognitive impairments

Recommendations

a All patients should be screened for the presence of cognitive impairments as soon as is practicable. The nature of the impairment should be determined, and its impact on activity and participation should be explained to patients, carers and staff (**D**)

b Those with difficulty on screening, and anyone not progressing as expected in rehabilitation, should have a detailed cognitive assessment (**D**)

c All members of the multidisciplinary team should take into consideration the patient's cognitive status when planning and delivering treatment (**D**)

d Plans should be modified as patients improve, and session demands gradually increased to maintain motivation (**D**)

e Planning for discharge from hospital should include an assessment of any safety risks from persisting cognitive impairments (**D**)

Evidence (No table)

a–e Consensus of working party (**IV**)

Local guidelines

Local services must identify:

1 experienced personnel (therapists or psychologists) for specialist assessment and rehabilitation;

2 staff training needs.

Carer: *There's no emotional back up, but it's all very clinical, you know... It's all to do with physiotherapy and speech but they forget the other side of it.*

4.2.2 Spatial awareness (neglect/inattention)

Stroke, especially within the right hemisphere, may affect a person's awareness of the space around them (usually on the left), and the space occupied by their body. For example, they may not be fully aware of (or 'neglect') their left arm, or fail to attend to things that are positioned in space on their left (eg a dining fork). Patients often fatigue easily.

Recommendations

a For every patient with impaired spatial awareness, nursing and therapy sessions (eg for shoulder pain, postural control, feeding) will need to be modified to cue attention to the impaired side (**D**)

b Patients with a persisting, disabling impairment should receive therapy for their neglect/inattention using techniques such as cueing, scanning, limb activation, aids and environmental adaptations (**B**)

Evidence (Table 4.2.2)

a Consensus of working party (**IV**)

b Bowen *et al* 2004 (**Ib**), evidence downgraded as meta-analysis showed benefits on impairment but not disability/participation level measures; Edmans *et al* 2000 (**II**); Robertson *et al* 2002 (**Ib**)

4.2.3 Memory

Stroke may affect memory in several ways. Patients may have difficulty learning new information (eg names) or skills, or remembering or retrieving this information. Remembering to do something in the future (prospective memory) may also be impaired. Memory for visual and verbal information may be differentially affected and be responsive to different therapy techniques.

Recommendations

People with memory difficulties should:

a have their profile of impaired and preserved memory abilities determined, and nursing and therapy sessions should use techniques which capitalise on preserved abilities, eg visualisation *vs* verbalisation (**D**)

b be taught compensatory techniques to reduce their disabilities, such as using notebooks, diaries, audiotapes and electronic organisers. Auditory alarms may be particularly helpful in prompting action, such as taking medication (**B**)

c be taught approaches aimed at directly improving their memory, but the evidence to date is inadequate to support the use of 'strategy training' over 'repetition' (**B**)

d be facilitated to engage actively in rehabilitation, as this may improve episodic memory (**A**)

Evidence *(Table 4.2.3)*

a Consensus of working party (**IV**)

b Wilson *et al* 2001 (**Ib**), evidence extrapolated from a mixed aetiological sample

c Majid *et al* 2004 (**Ib**), evidence and recommendation downgraded as only one small trial in meta-analysis

d Rose et al 1999 (**Ib**)

4.2.4 Attention

Attentional impairments are probably the most pervasive cognitive deficits following stroke, especially in the first few weeks and in those with right hemisphere stroke. Attentional processing is an essential prerequisite for many cognitive and motor functions, and impairments may affect other, unimpaired processes.

Guidelines

People who appear easily distracted or unable to concentrate:

a should have their ability to focus, sustain and divide attention formally assessed (**D**)

b require careful planning of nursing and therapy sessions to minimise the attentional demands placed on them, eg they need to work for short periods, take rest breaks, and avoid background visual/auditory distractions or times when tiredness is most likely (**D**)

c should receive therapy (eg computerised practice) to improve alertness and the ability to sustain attention (**B**)

Evidence *(Table 4.2.4)*

a Consensus of working party (**IV**)

b Consensus of working party (**IV**)

c Lincoln *et al* 2004 (**Ib**), evidence and recommendation downgraded as only two small trials in meta-analysis and only benefits on impairment but not disability/ participation level measures

4.2.5 Praxis

Apraxia/dyspraxia is a disorder of skilled voluntary movement that is not due to a sensory or motor impairment. People with apraxia may be unable to perform a skilled activity (eg dressing) due to an impaired conceptual ability to organise the actions required. Apraxia occurs after both left and right hemisphere stroke but is more common after left. Patients can perform some actions automatically but not under voluntary control. Assessment is difficult especially when left hemisphere stroke produces both apraxia and impaired communication. (This section excludes articulatory dyspraxia, which is covered in 4.3).

Recommendations

a Patients demonstrating difficulties using everyday objects or carrying out activities should be assessed for the presence of apraxia jointly with a speech and language therapist if any communication difficulty is present (**D**)

b Assessors must distinguish between impairments in voluntary versus automatic actions. Assessments should elicit novel, sequential, voluntary movements and consider the impact of different input routes (verbal, visual, tactile) (**D**)

b Patients with apraxia should be trained in the use of internal or external strategies eg verbalisation and following a written/pictorial action sequence (**A**)

Evidence (*Table 4.2.5*)

a Consensus of working party (**IV**)

b Consensus of working party (**IV**)

c Donkervoort *et al* 2001 (**Ib**)

4.2.6 Executive function

Executive functioning impairments may occur following a stroke, especially when the frontal lobes are affected. Executive functions have an organising role on the initiation and inhibition of behaviour. A person's ability to plan, to problem-solve and to self-monitor may be impaired. These cognitive impairments can also have a striking effect on a person's social behaviour. An inability to behave appropriately in public can lead to social isolation and loneliness among people with executive impairments.

Recommendations

a People with impaired executive functions should be taught compensatory techniques, such as using electronic organisers/pagers or written checklists, to increase their ability to perform daily activities (**B**)

b When a patient's behaviour is influenced by executive dysfunction the situation should be discussed with the patient, family, staff and others involved (**D**)

Evidence (*Table 4.2.6*)

a Wilson *et al* 2001 (**Ib**), evidence extrapolated from a mixed aetiological sample

b Consensus of working party (**IV**)

4.3 Communication: aphasia, dysarthria and articulatory dyspraxia

Stroke can affect communication in different ways. The patient may have impaired motor speech production (dysarthria) or impaired planning and execution of motor speech (articulatory dyspraxia) resulting in changes to their intelligibility. They may have impaired language skills (aphasia or dysphasia) resulting in difficulties in generating or understanding words, reading and/or writing. The patient may have subtle communication problems due to language impairment associated with non-dominant hemisphere stroke. Accurate diagnosis is essential to guide and inform the team and the family.

Recommendations

a Every patient with a dominant hemisphere stroke should be assessed for speech and language difficulties by a speech and language therapist using a reliable and valid method (**B**)

b If the patient has aphasia, the staff and relatives should be informed and trained by the speech and language therapist about communication techniques appropriate to the communication disability (**A**)

c Where achievable goals can be identified, and continuing progress demonstrated, patients with communication disabilities should be offered appropriate treatment, with monitoring of progress (**C**)

d Patients with aphasia should have their suitability for intensive speech and language therapy assessed by a speech and language therapist. The trials suggest that the speech and language therapy should be for between two and eight hours a week (**B**)

e For patients with long-term aphasia, a period of speech and language therapy intervention, including group communication treatment, should be considered (**A**)

f Any patient with severe communication disability but reasonable cognition and language should be assessed for and provided with appropriate alternative or augmentative communication aids (**D**)

Evidence (Table 4.3)

The table shows evidence for interventions currently evaluated for speech and language disorders: assessment; treatment by therapists or volunteers; and computers. There are also many well-designed single-case studies not included in the table – a list may be obtained from Speakability, a national charity for people with aphasia. Impairment-based therapies and compensatory management strategies for dysarthria cannot presently be supported or refuted by good quality, clinically controlled trials (Sellars *et al* 2004). Other sources of evidence will therefore need to be considered.

a Royal College of Speech and Language Therapists 2002 (**IV**); David *et al* 1982 (**IIb**) – one of several studies suggesting a specific benefit from assessment

b Kagan *et al* 2001 (**Ib**); Whurr *et al* 1992 (**III**); Robey 1998 (**II**) – reviews that suggest effects of treatment, but not all studies were RCTs; Greener *et al* 2004 (**Ia**) – this meta-analysis of RCTs suggests that treatment is neither shown to be effective or ineffective

c Royal College of Speech and Language Therapists 2002 (**IV**)

d Robey 1998 (**Ib**); Bhogal *et al* 2003 (**Ia**)

e Katz & Wertz 1997 (Ib); Elman & Bernstein 1999 (**Ib**)

f Consensus of working party (**IV**)

Local guidelines

Local guidelines need to specify:

1 the methods to be used by appropriately-trained practitioners to screen patients for, and with, disordered communication;

2 assessments and measures to be used by local speech and language therapists;

3 the local options for routine and specialist or intensive treatments, including setting, the availability and flexibility of treatment packages, and how these services are accessed;

4 eligibility for, access to, and funding of communication aids and the provision of training to enhance communication with patients with communication difficulties available for healthcare and related practitioners.

Dysphasic patient's view: *It's not only speech that [helps] people like us, it's building up people's confidence, it's getting them to re-join life again...*

Dysphasic patient's view: *They're too gentle with us really and they should be tougher with us if they're going to improve your conversation, improve everything about you.*

4.4 Motor impairment

4.4.1 Improving motor control: conventional treatment

See also section 2.4.

The aim of conventional therapeutic approaches is to increase physical independence through the facilitation of motor control and skill acquisition. Guidelines relating to conventional therapy approaches are presented in section 2.4. There is strong evidence to support the effect of rehabilitation in terms of improved functional independence and reduced mortality. It is important to note that some of these options such as treadmill training and robotic-assisted therapy are costly options in terms of resources with little evaluation of effects on longer-term function, activity and participation.

Recommendations

a Patients should be assessed by a physiotherapist within 72 hours of admission (**C**)

b A physiotherapist with expertise in neurodisability should coordinate therapy to improve movement performance of patients with stroke (**C**)

c Intensive therapy for the upper limb should be considered to improve arm function in patients with mild impairment (**A**)

d Bilateral arm training may improve motor performance of the upper limb (**B**)

e Gait re-education techniques to improve walking ability based on recognised therapy approaches should be offered (**B**)

f Walking sticks should be considered to increase standing stability in patients with severe disability (**B**)

g For the specific objectives of improving reaching for objects and increasing walking speed, a task-specific approach should be used rather than an impairment-focused approach (**B**)

Evidence (*Table 4.4.1 a–d*)

a,b Association of Chartered Physiotherapists Interested in Neurology (ACPIN) 1995 (**IV**)

c Van der Lee *et al* 2001 (**Ia**); Parry *et al* 1999 (**Ib**); Platz *et al* 2001a,b (**Ib**)

d Cunningham *et al* 2002a (**IIb**); Whitall *et a*l 2000 (**IIb**); Mudie & Matyas 1996 (**III**)

e Wall & Turnbull 1987; Richards *et al* 1993; Green *et al* 2002 (**Ib**)

f Tyson & Ashburn 1994; Lu *et al* 1997; Tyson & Thornton 1998, 2001; Laufer *et al* 2001. There are only a small number of studies in this area, using small sample sizes. What there are show that using a walking aid does not encourage the patient to favour the lower unaffected limb (**III**)

g i) Nelson *et al* 1996; Trombly & Wu 1999; Wu *et al* 2000; Dean *et al* 2000; Langhammer & Stanghelle 2000; Kwakkel & Wagenaar 2002 (**Ib**)

Local guidelines

Local guidelines need to specify:

1 the local options for routine, specialist or intensive treatments, including setting, the availability and flexibility of treatment packages, and how these services are accessed;

2 provision of training available for healthcare and related practitioners to enhance patients' rehabilitation.

Carer's view: *She was paralysed down the right side. But because she had part use of her left hand, the nursing staff said: 'Oh, you're alright, just drag yourself up with your left hand'. Well now, any therapist would tell you that is the worst thing that you can do.*

Patient's view: *I worry about this hand. I'm reasonably OK, as far as dressing and finger movement. I can't sign my name. I cannot sign a credit card or a chequebook, and this impairs me. (72 year old man)*

4.4.2 Improving motor control: biofeedback

During therapy, patients are usually given feedback on their performance as part of the retraining therapy. One method of enhancing feedback is to utilise technology to detect activity and to give feedback. This is biofeedback, and it is usually but not always based on electromyography (EMG).

Recommendations

a Biofeedback systems should not be used on a routine basis (**A**)

Evidence (Table 4.4.2)

Biofeedback has usually been investigated as an adjunct to conventional therapy. It has been subject to several meta-analyses, with conflicting results.

a Glanz *et al* 1995; Moreland *et al* 1998 (**Ia**)

4.4.3 Improving motor control: functional electrical stimulation

Functional electrical stimulation (FES) is the use of direct electrical stimulation of muscle or peripheral nerves to cause movement. It has been proposed both as a means of improving muscle function (ie as treatment), and also as a way of replacing or augmenting weakened muscle function.

Recommendations

a Functional electrical stimulation should not be used on a routine basis (**A**)

b Individual patients should be considered for FES as an orthosis in certain circumstances, such as improving arm movement, ankle dorsiflexion and gait performance (**A**)

Evidence (Table 4.4.3)

a Glanz *et al* 1996; Ada & Foongchomcheay 2002 (**Ia**); De Kroon *et al* 2002 (**Ia**)

b Burridge *et al* 1997; Popovic *et al* 2002 (**Ib**)

Local guidelines

When considering the use of FES as an orthosis, local teams may wish to specify:

1 which patients are considered suitable;

2 how its benefit is to be judged for any patient trying it.

4.4.4 Improving motor control: treadmill training

Walking on a treadmill, with some body weight supported via a harness connected to an overhead support system, can be used to train walking. The evidence on its benefit compared to other modes of therapy in this area, however, is still inconclusive.

Recommendations

a Treadmill training (with partial body weight support) should not be used on a routine basis (**A**)

b For patients who can walk independently, treadmill training with partial body weight support (<40%) between 30 days to three months post stroke should be considered as an adjunct to conventional therapy (**B**)

Evidence (Table 4.4.4)

a Moseley *et al* 2004

b Extrapolation from Moseley *et al* 2004; Cochrane review found treadmill training among people who could walk independently, with body weight support, appeared to be more effective than other interventions at improving walking speed, but this conclusion was not robust (**Ia**). Visintin *et al* 1998 (a reasonably large well designed study); Sullivan *et al* 2002; Werner *et al* 2002a, 2002b (**Ib**)

Local guidelines

Standard treadmills are of limited value since they are unable to provide partial bodyweight support. Treadmill training has a major implication in capital cost. Local guidelines will need to consider:

1 use of treadmill with support, once available;

2 other therapeutic approaches to be used.

4.4.5 Improving motor control: strength and aerobic training

It has been customary for therapists to avoid resisted exercise, believing that excess effort would reinforce abnormal tone and stereotypical movement patterns. There is growing

evidence to suggest that resisted exercise actually improves muscle strength though the functional benefit is uncertain.

Recommendations

a Resisted exercise should be considered to improve muscle strength in targeted muscles (**A**)

b Patients should participate in cardiovascular training (aerobic activity) (**A**)

Evidence (Table 4.4.5)

a Butefisch *et al* 1995; Engardt *et al* 1995; Miller & Light 1997; Sharp & Brouwer 1997; Brown & Kautz 1998; Smith *et al* 1999; Teixeira-Salmela *et al* 1999

b Meek *et a*l 2003; Saunders *et al* 2003 (**Ia**) show the evidence to date is inadequate to support the use of one method over any other (**Ia**)

4.4.6 Improving motor control: robot-assisted therapy

Robot-assisted therapy is provided by a robot manipulator, which applies forces to the affected arm (which is supported by a moveable arm support) during movement. The robot enables patients of any level of impairment to repetitively practice movement, as the robot can operate from passive to active-rested modes. The robot can be programmed to give visual and auditory feedback during therapy.

Recommendations

a Robot-assisted movement therapy should be considered as an adjunct to conventional therapy in patients with deficits in arm function, who are at least 6 months post stroke (**A**)

Evidence (Table 4.4.6)

a Volpe *et al* 2000; Lum *et al* 2002 (**1b**). The evidence is not strong and there may be major resource implications for this intervention

Local guidelines

Local guidelines should cover:

1 the selection of patients for treatment;

2 resource issues.

4.4.7 *Improving motor control: orthotics (including splinting and casting)*

Orthotics are comprised of ankle-foot orthoses, knee-ankle-foot orthoses, resting splints, lycra garments and serial splints or casts. Evidence is conflicting with regard to the use of orthotics following stroke as they appear to have both biomechanical and tone-reducing effects. Most studies are on the use of ankle-foot orthoses. Although the hemiplegic upper limb may develop contractures due to the presence of abnormal tone and paresis, splinting in hemiplegia is not well addressed in the literature. A Cochrane review on orthotics in stroke management is in progress at the time of this publication.

Recommendations

a Ankle-foot orthoses should be:

- **i** considered for people with foot drop to improve their walking ability (**A**)
- **ii** individually fitted (**B**)

b Serial casting should be considered to prevent or reverse contractures (**B**)

c Serial casting (splinting) should be considered to reduce spasticity (**B**)

d Inflatable air splints should not be used on a routine basis to maintain range (**B**)

Evidence (Table 4.4.7)

a Leung & Moseley 2003 (**Ia**) This systematic review suggests that AFOs may lead to immediate improvements in gait parameters, but their effect on paretic muscle activity is inconclusive

b Mortenson & Eng 2003 (**Ia**) This systematic review of 13 studies of adults with brain injury (mainly with traumatic brain injury) includes 2 RCTs and 3 cohort studies; the other trials are case series

c Association of Chartered Physiotherapists Interested in Neurology (1998) Clinical practice guidelines on splinting adults with neurological dysfunction (**IV**). Extrapolation from Lannin *et al* 2003 (**Ib**); Rose & Shah 1987 (**Ib**). Evidence for hand splinting is conflicting, with Lannin *et al* 2003 finding no significant effect in a study with 28 patients; Rose & Shah 1987 report a positive increase in range in study of 30 patients

d Poole & Whitney 1990 (**III**)

Local guidelines

Procedures will need to be in place for:

1 timing of the intervention;

2 consent;

3 provision of written information;

4 safety precautions.

4.4.8 Management of spasticity

Spasticity is a motor disorder characterised by a velocity-dependent increase in tonic stretch reflexes. Spasticity may lead to secondary complications such as muscle and joint contractures. Antispastic drugs, developed for use in spinal cord disease, are widely promoted, and botulinum toxin (BTX) is now becoming available. Several studies have shown no measurable increase in muscle tone with resisted exercise.

Guidelines

a After stroke, spasticity should be treated if it is causing problems, using physical treatments and possibly drugs (although the functional benefit is uncertain) (**B**)

b Spasticity should not limit the use of strength training (**B**)

c In patients with disabling or symptomatically distressing spasticity, injection of botulinum toxin should be considered in conjunction with physiotherapy for reducing tone and/or increasing the range of joint motion (**A**)

d Additional electrostimulation should be considered for increasing the effectiveness of botulinum toxin (**A**)

Evidence (Tables 4.4.8a and b)

Despite being available for many years, there is remarkably little evidence on the benefits or risks of anti-spastic drugs. There is minimal evidence concerning physical treatments. In contrast to the situation with drugs or therapy there is much more evidence relating to botulinum toxin (not all specific to stroke). The evidence shows that it is expensive, but effective, and it can be targeted without significant side effects.

a Ketel & Kolb 1984; Katrak *et al* 1992. There is reasonable evidence that drugs reduce spasticity, but there is no evidence to support routine use in the absence of specific problems directly attributable to spasticity (**IIa**)

b Brown & Kautz 1998. A small trial supports a growing body of observational and physiological literature supporting this statement; Butefisch *et al* 1995; Ada *et al* 1998 (**III**)

c Burbaud *et al* 1996; Simpson *et al* 1996 (**Ib**); Hesse *et al* 1996a (**Ib**); Royal College of Physicians 2002 (**IV**). There are several trials in stroke and other diseases supporting the functional benefits as well as the reduction in spasticity. There is insufficient evidence to guide selection of patients or to suggest that precise (EMG-guided) localisation is needed (Childers *et al* 1996) (**Ib**)

d Hesse *et al* 1998b (a small trial, but supported by animal experiments) (**Ib**)

Local guidelines

Local guidelines on the use of botulinum toxin (BTX) should be informed by the guidelines for the use of BTX in the management of spasticity in adults (Royal College of Physicians 2002) and should cover:

1 agreed criteria for the selection of patients for treatment;

2 agreement on which clinicians may use botulinum toxin.

4.4.9 Constraint-induced movement therapy

Constraint-induced movement therapy (CIT) involves restricting the use of the non-stroke upper limb while at the same time encouraging active use of the stroke-affected upper limb. The high intensity CIT delivered in research trials may be difficult to deliver in routine practice and has only been proven for the upper limb in certain well-defined situations.

Recommendations

a Constraint-induced therapy to increase the use of the affected arm should be considered in patients with at least 10 degrees of active wrist and finger extension, who are more than a year post stroke and who can walk independently without an aid (**B**)

Evidence (Table 4.4.9)

a Taub *et al* 1993;Van der Lee *et al* 1999; Kunkel *et al* 1999; Miltner *et al* 1999; Dromerick *et al* 2000; Sterr *et al* 2002 (**IIb**)

4.5 Sensory impairment and pain

4.5.1 Sensory disturbance: controlling pain after stroke

Patients who have suffered a stroke may experience pain of several types. Most of the pain is mechanical, arising from reduced mobility; some will come from pre-morbid diseases such as osteoarthritis; and a minority will be specific to stroke damage (central post-stroke pain). Pain is often not recognised and poorly treated, however the evidence on which to base treatment is minimal and rarely specific to stroke.

Recommendations

a All patients with stroke should be asked whether pain is a significant problem or a contributing factor to their current clinical state on a regular visit (**D**)

b All pain suffered by a person with stroke should be subject to a full clinical diagnosis, including a referral to an appropriate specialist service if needed (**D**)

c People with stroke who have musculoskeletal pain should be:

i assessed by specialist therapists for potential alleviation through exercise, passive movement, better seating or other procedures (**D**)

ii prescribed appropriate analgesics where non-pharmacological treatments are ineffective (**D**)

d Central post-stroke pain

i Neuropathic pain may respond to tricyclic antidepressants (eg amitriptyline) or anticonvulsants (eg gabapentin) (**A**)

ii Patients with intractable pain should be referred to a specialist pain service as soon as possible (**D**)

Evidence (Table 4.5.1a and b)

There are some meta-analyses relating to pain management in general (see Cochrane reviews), and some specifically relating to central neurogenic pain. None is specific and exclusive to stroke.

a Consensus of working party (**IV**)

b Consensus of working party (**IV**)

c Consensus of working party (**IV**)

d i) Leijon & Boivie 1989; McQuay *et al* 1996; Fishbain 2000; Mellegers *et al* 2001; Wiffen *et al* 2004; Carroll *et al* 2003 (**Ia**); ii) Consensus of working party (**IV**)

Local guidelines

Local guidelines need to:

1 emphasise the importance of identifying and treating pain;

2 give details about local specialists in pain relief.

4.5.2 Shoulder pain

Pain in the shoulder of the affected arm is not uncommon, arising in at least 30% of all patients after stroke. It is associated with severity of disability, and is thus more common in patients in rehabilitation settings. It is not related to subluxation of the shoulder. Its relationship to handling and positioning remains uncertain. Studies have shown no benefit for shoulder strapping or intra-articular injections of triamcinolone.

Recommendations

a The following interventions to prevent shoulder pain should be considered:

- **i** avoiding the use of overhead arm slings, which encourage uncontrolled abduction **(A)**
- **ii** use of foam supports **(A)**
- **iii** education of staff and carers about correct handling of the hemiplegic arm **(B)**
- **iv** correct positioning **(B)**

b For established shoulder pain, treatment should:

- **i** start with simple interventions, eg non-steroidal anti-inflammatory analgesia **(C)**
- **ii** If this does not work, treatment should include high-intensity transcutaneous electrical nerve stimulation **(A)**

Evidence *(Table 4.5.2)*

Most studies focus on subluxation of the shoulder, but this has been shown not to be a factor in shoulder pain. Shoulder pain after stroke is strongly associated with prolonged hospital stay and poor recovery of arm function. Incorrect handling is a contributing factor in development and/or exacerbation of shoulder pain. This relationship requires further study.

a i) Kumar *et al* 1990 (a small study, and only studying one movement) (**Ib**); ii) Kotzki *et al* 1991 (a small study only) (**Ib**); iii) Braus *et al* 1994; Wanklyn *et al* 1996 (**III**); iv) Dean *et al* 2000b (**1b**)

a i) Leandri *et al* 1990 (a large study with reasonable effects shown) (**Ib**); ii) Price & Pandyan 1999 (**Ia**). Meta-analysis showed benefits for passive humeral lateral rotation

Local guidelines

Local clinicians may wish to:

1 develop guidelines for ward staff on care of the shoulder;

2 agree how to manage pain once present.

4.5.3 Sensory stimulation: acupuncture and transcutaneous electrical nerve stimulation

Transcutaneous electrical nerve stimulation (TENS) and acupuncture are both possible ways of giving sensory input, and are placed together for that reason. Their use is still being investigated; the mechanisms 'underlying benefits' (if any) are unknown.

Recommendations

a Acupuncture should only be used in the context of ongoing trials (**D**)

b Routine TENS for improving muscle control should only be used in the context of ongoing trials (**A**)

Evidence *(Table 4.5.3)*

The evidence is relatively limited, and may be subject to publication bias.

a Sze *et al* 2002. (**Ia**) Quality of trials included in systematic review of insufficient quality to make definitive statement

b Tekeoolu *et al* 1998. The evidence is mixed, with some trials showing benefit and others no difference, so it is difficult to generalise from these. However, it may have a role in specific circumstances (**Ib**)

4.6 Drugs reducing impairment

There are many drugs that may help without directly affecting the underlying pathology. Some have already been considered (analgesia, antispastic agents etc), but there are some that do not easily fit into groups mentioned.

Recommendations

a The following drugs, intended to reduce impairments directly, should not be prescribed except within the context of randomised trials (**A**):

- **i** amphetamine
- **ii** piracetam
- **iii** fluoxetine (may be used to treat depression)
- **iv** meprobamate
- **v** bromocriptine

Evidence *(Table 4.6)*

a Table 4.6 shows the main randomised studies of note. Only fluoxetine and amphetamine seem consistently to be associated with benefit, but studies are too small to allow firm conclusions (**Ib**)

4.7 Functional rehabilitation interventions

See also section 5.1

This section encompasses guidelines and evidence from therapies which are designed to help patients adapt to their impairments, so that they may participate as fully as possible in their chosen daily activities of life. Adaptive therapies include the teaching of new skills, the provision of information, the use of problem-solving aids or appliances and environmental modification. The topics covered range from a relatively restricted area such as self-care to environmental changes.

4.7.1 Activities of daily living

Much of stroke rehabilitation aims, directly or indirectly, to increase independence and ability in all activities of daily living (ADL), not only personal (eg dressing) but also domestic (eg cooking) and communal (eg shopping). Many of the techniques described earlier in this section might help in this task. Furthermore it has been convincingly shown that organised rehabilitation directly improves ADL. However, there is little research on direct treatment techniques.

Recommendations

a All patients with difficulties in ADL should be assessed by an occupational therapist with specialist knowledge in neurological rehabilitation (**A**)

b All patients should be assessed by an occupational therapist within four working days of referral (**C**)

c Patients showing unexplained persistent difficulties in ADL should be assessed specifically for perceptual impairments (**B**)

d Patients with difficulties in ADL should be treated by a specialist multidisciplinary team that includes an occupational therapist (**A**)

e All patients must be given opportunities to practise personal ADL and, as appropriate, relevant domestic and community activities (**D**)

f Patients should be offered advice on, and treatment aimed to achieve, employment or wanted leisure activities as appropriate (**D**)

Evidence (Table 4.7.1)

a Walker *et al* 1999; Gilbertson *et al* 2000 (**Ib**)

b National Association of Neurological Occupational Therapists (NANOT) standards 2002

c Lincoln *et al* 1997 (**IIb**)

d Stroke Unit Trialists' Collaboration 2004; Walker *et al* 1999 (**Ia**)

e Consensus of working party (**IV**)

f Consensus of working party (**IV**)

Local guidelines

Local guidelines will need to specify:

1 the availability of, and means of access to, therapeutic areas such as kitchens;

2 how to undertake and achieve expert advice and treatment to return to employment.

Patient's view: *Letting me do things on my own, which is wonderful really. Even buttering bread – they see I was having difficulty but they were just standing there, 'Go on Bill!' (73 year old man)*

Patient's view: *The only thing that worries me is that I mustn't let my husband do everything for me. Yes, but he knows. I've already prepared him that he has to let me, doesn't matter if it takes me all day. I have to do it. He understands that. (68 year old woman)*

4.7.2 Equipment and adaptations (personal aids)

Small timely changes in an individual's local 'environment' can greatly increase independence, for example the use of a wheelchair, walking stick or adapted cutlery. Many of these 'treatments' are so simple and small that it is unlikely that anyone will ever research into them. This section covers small items for personal use.

Recommendations

a The need for special equipment should be assessed on an individual basis; once provided the value and need for equipment should be evaluated on a regular basis (**B**)

b Patients should be supplied as soon as possible with all aids, adaptations and equipment they need (**A**)

Evidence (Tables 4.7.2)

a Gladman *et al* 1995; Mann *et al* 1995; Logan *et al* 1997 (**IIa**)

b Huck & Bonhotal 1997; Mann *et al* 1999 demonstrated cost effectiveness of equipment provision for elderly patients (not just stroke) (**Ib**)

Local guidelines

Local clinicians will need to:

1 formulate local policies concerning assessment for equipment, and its supply and retrieval;

2 agree funding arrangements and budgets with all funding organisations (eg social services);

3 ensure that orthoses are made or fitted correctly for the individual patient.

Patient's view: *What I'd really like, I'd like one of them reclining chairs …. that you can lie back and at night when I can't sleep in my bed, cos I can't sleep on my back. I've got chronic bronchitis, I can't sleep on the other side with my shoulder and it's very awkward. I've not had, I've never had a night's sleep since I came out of hospital. (65 year old man)*

4.7.3 Equipment and adaptations (environment)

Equipment and adaptations in this context refers to any larger items or structural changes needed to alleviate the impact of a stroke-related impairment. Many patients have residual disability that can be helped by adapting their environment on a larger scale, for example with stairlifts, hoists, perching stools or adaptations to buildings.

Recommendations

a Every patient who is at home or leaving hospital should be assessed fully to determine whether equipment or adaptations can increase safety or independence (**A**)

b Prescription of equipment and adaptations should be based on careful assessment of the patient and the physical and social environment in which it is to be used (**B**)

c All equipment supplied should have proven reliability and safety (**C**)

d The patient and/or caregiver should be thoroughly trained in the safe and effective use of any equipment supplied (**D**)

e The suitability and use of equipment should be reviewed over time as needs will change (**B**)

f All patients should be given a contact number for future advice or help with equipment provided (**D**)

Evidence (Tables 4.7.3)

The evidence is largely secondary, derived from observations in RCTs or from surveys.

a Chamberlain *et al* 1981; Hesse *et al* 1996b; Mann *et al* 1999; Logan *et al* 1997; Audit Commission Report 'Fully equipped' 2000, and 2002 (**Ib**)

b Gitlin *et al* 1993: Neville-Jan *et al* 1993 (**III**)

c Gardner *et al* 1993 (**IV**)

d Consensus of working party (**IV**)

e Bynum & Rogers 1987; Sonn *et al* 1996 (**III**)

f Consensus of working party (**IV**)

Local guidelines

Local guidelines will need to specify:

1 how equipment is accessed locally;

2 local eligibility criteria for each piece of equipment;

3 how it is funded locally.

Patient's view: *I couldn't get in and out [of my house]... I could hardly get up my drive... I waited one full year before I could have the rail from the front door down to the gate. It took us a year to get that, and a lot of trouble for the wife.*

Carer's view: *We got a lot of help when he came out, more than I would have thought, but I think we're probably quite lucky living in this area because the help is there. It just appeared, all this help – I never asked for anything.*

Patient's view: *Financial, financially, you know. Financially, it's come down, down, down. (61 year old man)*

---

5 Transfer to community

The majority of patients will be managed in hospital initially. The time of transfer from inpatient hospital care to home (or residential or nursing home care) constitutes an important watershed. There is some research-based evidence that this is often poorly managed.

5.1 Discharge planning

The process of transferring responsibility for management from a specialised inpatient service, where co-ordination is relatively easy, to an outpatient or domiciliary service or to nursing homes and residential care homes, requires considerable planning. Although this is recognised in several Department of Health circulars, insufficient attention and resources are given to the process. Discharge planning refers to any process that formally involves the team or service in transferring responsibility from one group of people or team to another.

Recommendations

a Hospital services should have a protocol and local guidelines (**A**) to ensure that, before discharge occurs:

- **i** patients and families are prepared and fully involved in plans for transfer (**D**)
- **ii** general practitioners, primary healthcare teams and community social services departments are all informed (**D**)
- **iii** all necessary equipment and support services are in place (**D**)
- **iv** any continuing treatment required should be provided without delay by a specialist service in the community, a day hospital or outpatients (**A**)
- **v** patients are given information about, and offered contact with, appropriate local statutory and voluntary agencies (**D**)

b Early hospital discharge (before the end of acute rehabilitation) should only be undertaken if there is a specialist stroke rehabilitation team in the community and if the patient is able to transfer safely from bed to chair (**A**)

c Early hospital discharge to generic (non-specialist) community services should not be undertaken (**A**)

d Carers should receive all necessary equipment and training in moving and handling, in order to position and transfer the patient safely in the home environment (**B**)

e Patients should continue to have access to specialist stroke care and rehabilitation after leaving hospital (**A**)

Evidence *(Table 5.1)*

a Evans & Hendricks 1993; Naylor *et al* 1994 (**Ib**); i-iii v) Consensus of working party (**IV**); iv) Outpatient Service Trialists 2004 (**Ib**)

b Early Supported Discharge Trialists 2004 (**Ia**)

c Ronning & Guldvog 1998b; Indredavik 2000 (**Ib**)

d Hakim & Bakheit 1998; Audit Commission 2002 (**III**)

e Outpatient Service Trialists 2004 (**Ia**)

Local guidelines

Local guidelines are essential, and must ensure that a smooth transfer of responsibility for each and every aspect of management occurs. They will need to cover:

1 discharge protocols and documentation;

2 contacting all necessary statutory organisations (who, how and when);

3 action to take if delays occur in setting up community services;

4 mechanisms to monitor process of handover;

5 names of, and methods for contacting, all relevant local voluntary agencies.

Patient's view: *And when I got home there was just nothing. I was quite desperate at the time.*

Carer's view: *There should be somebody who actually talks to the carer and tells them about all the different facilities, you know – everyone should have somebody assigned to them*

5.2 Long-term management

This section covers matters that relate to the long term, after the period of 'active rehabilitation' and applies to patients wherever they are being cared for, including those living in care homes. In most patients this phase starts soon after transfer from hospital, though for some it will not start until a programme of outpatient or domiciliary rehabilitation has been completed. This usually refers to any time after three to six months post-stroke.

The areas covered in this section include:

- episodes of further rehabilitation after transfer to community (5.2.1)
- secondary prevention (5.2.2)
- social function (5.2.3).

5.2.1 Further rehabilitation

Many patients request continuing involvement of therapy services after discharge from formal rehabilitation. Usually this is rejected on the grounds that no further benefit can accrue. However, there is now evidence that, after stroke, patients show a continuing decline, which can be reversed by further rehabilitation input, and may also prevent hospital readmission. Rehabilitation after stroke must also address 'participation'. This may require planned withdrawal of medical and rehabilitation services and substituting them with leisure and social activity to encourage independence and reintegration to normal life.

Recommendations

a Any patient with reduced activity at six months or later after stroke should be assessed for a period of further targeted rehabilitation (**A**). (Refer back to 4.3e for longer term speech and language therapy)

b Independence should be encouraged. As patients become more active, consideration should be given to withdrawal of physical and psychological support, enteral tubes, cessation of therapy and withdrawal of personal care support (**D**)

Evidence (Table 5.2.1)

The evidence is strong and comes from controlled clinical trials investigating change in 'stable' patients, and in RCTs that focus on particular outcomes.

a Outpatient Service Trialists 2004 (**Ia**); Wade *et al* 1992; Drummond & Walker 1995; Walker *et al* 1996; Werner & Kessler 1996; Corr & Bayer 1995 (**Ib**)

b Consensus of working party (**IV**)

Local guidelines

Local guidelines will need to specify:

1 mechanisms for monitoring and re-referral to specialist service(s);

2 responsibility (health or social services) for treatments and other interventions to maintain function;

3 mechanisms to co-ordinate health and social services provision.

Carer's view: *I don't think we've had any. Is it my fault, am I supposed to go and say: 'Come and help us, we need something'? Or is this something that should be provided automatically?*

Carer's view: *I think this is one of the problems. There's no co-operation between the various agencies, so you stand the chance of coming out and having nothing. No-one to talk to or anything.*

Carer's view: *We need some help for my husband as well. If he could get more therapy. His leg is getting weaker and he can't go upstairs. So if it is getting worse and worse... after two years... what's the use of that?*

5.2.2 Prevention of further stroke

After a first stroke the risk of recurrence is high in the first year, and remains higher than for the general population for the rest of the individual's life. Specific measures for secondary prevention are covered in section 3.5.

Recommendations

a All patients will require regular review and appropriate treatment of risk factors for vascular disease lifelong after stroke (**B**)

b All GPs should keep a register of stroke patients and conduct regular audit of secondary prevention (**C**)

Evidence (Tables 3.5.1–3.5.7)

i Extrapolation from sections on secondary prevention (3.5.1 – 3.5.7)

ii National Service Framework Older People (Department of Health 2001); General Medical Services contract (Department of Health 2004)

5.2.3 Social function

After discharge the patient and family lose the social, emotional and practical support offered by an inpatient service, so support may need to be offered specifically as an additional resource (see also section 2.3).

Recommendations

a Patients and their carers should have their individual psychosocial and support needs reviewed on a regular basis (**A**)

b Health and social services professionals should ensure that patients and their families have information about the statutory and voluntary organisations offering services specific to these needs (**D**)

c Patients who used to drive before their stroke must be given accurate, up-to-date advice on their responsibilities (**D**)

d Patients who wish to drive should be assessed for:

- **i** any absolute contraindications
- **ii** their cognitive ability to drive safely
- **iii** their motor ability to control a car
- **iv** their need for any adaptations (**D**)

Evidence *(Table 5.2.3)*

Whilst the only benefit shown is for improved patient and carer satisfaction where support services are provided, the consensus of working party opinion is that the correct strategies are yet to be found.

a Anderson 1992 and Pound *et al* 1998 (**III**) show the long-term needs of patients and their carers. Evans *et al* 1988 (**Ia**) showed benefits of counselling and education on problem solving and adjustment

b The College of Health Report showed the need for additional support once patients get home (Kelson *et al* 1998) (**IV**)

c www.dvla.gov.uk/ (IV)

d Extrapolation from Nouri & Lincoln 1993 (**IV**)

Local guidelines

Local health and social commissioners will have to agree:

1 policies on providing financial support to voluntary organisations giving longer-term support to disabled patients;

2 how services are accessed, and by whom.

Stroke services will need to:

3 have up-to-date information on the medical requirements of the DVLA (www.dvla.gov.uk/drivers/dmed1.htm);

4 agree protocols on assessing patients for driving safety;

5 collate and provide information on local resources able to assess driving and advise on adaptations.

Patient's view of Stroke Association stroke clubs: *The best time I had after my stroke really is the stroke club that I went to. And I am very glad [to have the opportunity to] really to thank them specially. The most support I got is from the stroke club.*

Patient's view on Stroke Association volunteers visiting them at home: *They do a marvellous job. People from Stroke, yes they come to my house to see me. Marvellous they come.*

Carer's view of Different Strokes: *The main thing is that Different Strokes is so much more personal and also that it caters for younger stroke survivors.*

Carer's view of Different Strokes exercise meetings: *He loves it, he comes alive... They're all the same and they know what each other has gone through. He enjoys the exercise and they're such a friendly bunch. There's no pressure. It's wonderful. We come every week.*

Carer's view: *In the borough still there is a respite care package. You say, look I need a week away from it all – [he] either goes into respite care and lives there residential for a week or a fortnight or a month or whatever. But that is done through social services. And you have to press them a bit you know.*

Carer's view: *[You need] a sort of a named person who can link all the different agencies... [and] somebody you can contact if you need help.*

Appendices

Appendix 1
Peer reviewers

Clinical psychology	
Ms Jane Barton	Department of Psychology, University of Sheffield
Prof Nadina Lincoln	School of Psychology, University of Nottingham
Prof Tom McMillan	Department of Psychological Medicine, Academic Centre, Glasgow
Prof Ian Robertson	Psychology Department, Trinity College, Dublin
Dr Alan Sunderland	School of Psychology, University of Nottingham
Prof Barbara Wilson	MRC Cognition and Brain Sciences Unit, Cambridge
Consumers	
Mr Brian Archibald	Strokewatch Hull and East Riding, Hull
Ms Val Cobbett	Strokewatch Hull and East Riding, Hull
Prof Peter Fentem	Research and Development Committee, The Stroke Association, London
Ms Margaret Goose	The Stroke Association, London
Mrs Alison Hunter	Strokelink West Cumbria, Workington, Cumbria
Dr Ben Jabuni	The Stroke Association, London
Dietetics	
Ms June Copeman	Faculty of Health Sciences, Leeds Metropolitan University
Ms Jane Eaton	British Dietetic Association, Birmingham
General practice	
Dr Andrew Farmer	Department of Primary Care, Institute of Health Sciences, Oxford
Dr Stewart Findlay	Bishopgate Medical Centre, Bishop Auckland, Co Durham
Prof Godfrey Fowler	Oxford
Prof Richard Hobbs	Department of Primary Care and General Practice, Birmingham
Dr George Kassianos	Wokingham, Berkshire
Dr Andrew Mimnagh	East View Surgery, Liverpool
Dr Peter White	Wealden, Timsbury, Hants
Medicine	
Dr Marion Barlow	Cinical Advisor, Stroke Services Scotland
Dr Peter Berman	Stroke Unit, City Hospital, Nottingham
Dr Rod Brookes	Stroke Unit, Manor Hospital, Walsall
Dr David Cohen	Care of the Elderly, Northwick Park Hospital, Harrow

Dr Morgan Crowe	The Royal College of Physicians of Ireland, Dublin
Dr Richard Curless	North Tyneside District General Hospital, North Shields
Prof Martin Dennis	Department of Clinical Neurosciences, Western General Hospital, Edinburgh
Prof Gary Ford	Wolfson Unit of Clinical Pharmacology, University of Newcastle upon Tyne
Dr Martin James	Royal Devon and Exeter Hospital, Exeter
Prof Peter Langhorne	Glasgow Royal Infirmary
Dr Jonathan Mant	Primary Care Department, School of Medicine, University of Birmingham
Dr Michael Power	Department of Care of Elderly People, The Ulster Hospital, Belfast
Dr Peter Rothwell	Department of Clinical Neurology, Radcliffe Infirmary, Oxford
Prof Peter Sandercock	Department of Clinical Neurosciences, Western General Hospital, Edinburgh
Dr GMH Shetty	University Hospital of Wales NHS Trust, Cardiff
Prof Ray Tallis	Care of the Elderly Department, Hope Hospital, Salford
Dr Pippa Tyrrell	Stroke Services, Hope Hospital, Salford
Dr Graham Venables	Department of Neurology, Royal Hallamshire Hospital, Sheffield
Dr Peter Wanklyn	Stroke Unit, Leeds General Infirmary
Prof Charles Warlow	Department of Neurosciences, Western General Hospital, Edinburgh
Prof John Young	Department of Medicine for the Elderly, St Luke's Hospital, Bradford

Neurosurgery

Mr Neil Kitchen	Department of Neurosurgery, National Hospital, Queen Square, London
Mr Donald Shaw	Walton Centre for Neurology and Neurosurgery, Liverpool

Nursing

Mr Tim Ayers	East Devon Primary Care Trust, Honiton, Devon
Ms Louise Bereton	Community, Ageing, Rehabilitation, Education and Research, University of Sheffield, Rotherham
Dr Chris Burton	Community, Ageing, Rehabilitation, Education and Research, University of Sheffield, Rotherham
Ms Dinah Fuller	Community Ward, Westwood Hospital, Beverley, East Yorkshire
Ms Dawn Good	Stroke Unit, City Hospital, Nottingham
Ms Lin Perry	St Bartholomew School of Nursing and Midwifery, City University, London
Ms Maggie Scott	Cambourne/Redruth Community Hospital, Redruth, Cornwall
Ms Jane Williams	Department for Elderly People, Queen Alexandra Hospital, Portsmouth

Occupational therapy

Dr Avril Drummond	Division of Ageing and Rehabilitation, Medical School, Nottingham
Dr Judi Edmans	Beeston Ward, City Hospital, Nottingham
Dr Caroline Ellis	School of Health Professions and Rehabilitation Sciences, University of Southampton
Mrs Lynn Legg	Stroke Therapy Evaluation Programme, Glasgow Royal Infirmary

Pharmacy

Prof Mojgan Sani	Guy's and St Thomas' Hospital, London

Physiotherapy

Ms Anthea Dendy	Physiotherapy Department, St George's Hospital, London
Prof Anne Forster	School of Healthcare Studies, University of Leeds
Ms Cherry Kilbride	Physiotherapy Department, Royal Free Hospital, London
Dr Gert Kwakkel	Department of Physiotherapy, De Boelelaan, Amsterdam, The Netherlands
Dr Janathan McCrae	Stroke Therapy Evaluation Programme, Glasgow Royal Infirmary
Dr Paulette van Vliet	Ageing and Disability Research Unit, University of Nottingham Medical School
Ms Maggie Webster	Stroke Unit, Cardiff Royal Infirmary

Radiology

Dr Margaret Hourihan	Department of Radiology, University of Wales, Cardiff
Prof Rolf Jaeger	Department of Imaging, National Hospital for Neurology and Neurosurgery, London
Dr JM Jarosz	Department of Neuroradiology, King's College Hospital, London

Speech and language therapy

Prof Karen Bryan	European Institute of Health and Medical Sciences, University of Surrey, Guildford
Prof Pam Enderby	Faculty of Medicine, University of Sheffield
Ms Maxine Power	Stroke Services, Hope Hospital, Salford
Mr Cameron Sellars	Department of Speech and Language Therapy, Glasgow Royal Infirmary
Ms Anne Whateley	The Royal College of Speech and Language Therapists, London

Appendix 2
Recommmended indicators for audit of stroke

The 'top ten' process indicators of stroke from the National Sentinel Audit of Stroke

Since 1998 the Royal College of Physicians has conducted a national audit of stroke care in England, Wales and Northern Ireland every two years. How the standards were derived, and the audit developed, are described in the Royal College of Physicians' *Stroke audit package* (Intercollegiate Stroke Working Party 2002). Statistical testing following several rounds of the audit has shown the indicators below (when used all together) are a useful summary of the overall quality of stroke care.

A. The proportion of patients spending more than 50% of stay on a stroke unit.

B. Process standards.

1. Screening for swallowing disorders within the first 24 hours of stroke.
2. Brain scan within 24 hours of stroke.*
3. Patient commenced aspirin by 48 hours after stroke.
4. Physiotherapy assessment within first 72 hours.
5. Assessment by an occupational therapist within seven days.
6. Patient was weighed at least once during admission.
7. Patient's mood was assessed during admission.
8. The patient was on antithrombotic therapy by the time of discharge.
9. Rehabilitation goals agreed by the multidisciplinary team.
10. A home visit is performed before discharge for applicable patients.

Primary care – summary indicators for stroke from GP Contract

The *General Medical Services (GMS) contract* (Department of Health 2003) for general practitioners requires monitoring of the following indicators for the management and prevention of stroke and TIA in primary care.

1. The practice can produce a register of patients with stroke and TIA.
2. The percentage of new patients with presumptive stroke (presenting after 01/04/03) who have been referred for confirmation of the diagnosis by CT or MRI scan.
3. The percentage of patients with TIA or stroke who have a record of smoking status in the last 15 months, except those who have never smoked where smoking status should be recorded at least once since diagnosis.
4. The percentage of patients with a history of TIA or stroke who smoke and whose notes contain a record that smoking cessation advice has been offered in the last 15 months.
5. The percentage of patients with TIA or stroke who have a record of blood pressure in the notes in the preceding 15 months.

*This was originally 48 hours, but has been changed to 24 for these guidelines.

6. The percentage of patients with a history of TIA or stroke in whom the last blood pressure reading (measured in the last 15 months) is 150/90 or less.
7. The percentage of patients with TIA or stroke who have a record of total cholesterol in the last 15 months.
8. The percentage of patients with TIA or stroke whose last measured total cholesterol (measured in the last 15 months) is 5 mmol/l or less.
9. The percentage of patients with a stroke shown to be non-haemorrhagic, or a history of TIA, who have a record that aspirin, an alternative antiplatelet therapy, or an anticoagulant is being taken (unless a contraindication or side effects are recorded).
10. The percentage of patients with TIA or stroke who have had influenza immunisation in the preceding 1 September to 31 March.

Appendix 3
Useful addresses

Safe Implementation of Thrombolysis in Stroke (SITS-MOST)

National co-ordinators:

Professor Gary Ford,
Wolfson Unit of Clinical Pharmacology,
Claremont Place
University of Newcastle upon Tyne,
Newcastle upon Tyne NE2 4HH.

E-mail: **g.a.ford@ncl.ac.uk**

Professor Kennedy Lees,
University Department of Medicine and Therapeutics,
Gardiner Institute,
Western Infirmary,
Glasgow G11 6NT.

E-mail:
kir.lees@clinmed.gla.ac.uk

Website for information:
www.acutestroke.org

National charities for the support of patients

Stroke Association,
Stroke House,
240 City Road,
London EC1V 2PR.

Tel: 020 7566 0305
Stroke helpline: 0845 30 33 100
Website: **www.stroke.org.uk**

Northern Ireland Chest, Heart & Stroke Association,
22 Great Victoria Street,
Belfast BT2 7LX.

Tel: 02890 320 184.
Fax: 02890 333 487.
Helpline: 08457 697 299.
Website: **www.nichsa.com**

Chest, Heart and Stroke Association, Scotland,
65 North Castle Street,
Edinburgh EH2 3LT.

Tel: 0131 225 6963.
Fax: 0131 220 6313.
Advice lines: 0845 077 6000.
Website: **www.chss.org.uk**

Different Strokes,
9 Canon Harnett Court,
Wolverton Mill,
Milton Keynes MK12 5NF.

Tel: 0845 130 7172.
Fax: 01908 313 501.
Website:
www.differentstrokes.co.uk

Speakability,
Canterbury House,
1 Royal Street,
London SE1 7LL.

Tel: 020 7261 9572 (admin).
Fax: 020 7928 9542.
Helpline: 080 8808 9572.
Website:
www.speakability.org.uk

Specialist advice for professionals and the public

Continence Foundation,
307 Hatton Square,
16 Baldwins Gardens,
London EC1N 7RJ.

Tel: 020 7404 6875.
Fax: 020 7404 6876.
Helpline: 0845 345 0165.
Website: **www.continence-foundation.org.uk**

References

Ada L, O'Dwyer N, Crosbie J, Vattanasilp W (1998) Does spasticity contribute to walking dysfunction after stroke? *Journal of Neurology, Neurosurgery and Psychiatry* **64**: 628–35.

Ada L, Foongchomcheay A (2002) Efficacy of electrical stimulation in preventing or reducing subluxation of the shoulder after stroke: a meta-analysis. *Australian Journal of Physiotherapy* **48**: 257–67.

Ada L, Dean CM, Hall JM, Bampton J, Crompton S (2003) A treadmill and overground walking program improves walking in persons residing in the community after stroke: a placebo-controlled, randomized trial. *Archives of Physical Medicine and Rehabilitation* **84**: 1486–91.

Ahmed N, Wahlgren N (2003) Effects of blood pressure lowering in the acute phase of total anterior circulation infarcts and other stroke subtypes. *Cerebrovascular Diseases* **15**: 235–43.

Alamowitch S, Eliasziw M, Algra A, Meldrum H, Barnett H, North American Symptomatic Carotid Endarterectomy Trial (NASCET) Group (2001) Risk, causes, and prevention of ischaemic stroke in elderly patients with symptomatic internal-carotid-artery stenosis. *Lancet* **357**: 1154–60.

Albers GW, Goldstein LB, Hall D, Lesko LM for the Antiplatelet Acute Stroke Investigators (2001) Aptiganel hydrochloride in acute ischemic stroke: a randomized controlled trial. *Journal of the American Medical Association* **286**: 2673–82.

Algra A, De Schryver E, van Gijn J, Kappelle L, Koudstaal P (2004) Oral anticoagulants versus antiplatelet therapy for preventing further vascular events after transient ischaemic attack or minor stroke of presumed arterial origin (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Allen GS, Ahn HS, Preziosi TJ, Battye R *et al* (1983) Cerebral arterial spasm—a controlled trial of nimodipine in patients with subarachnoid hemorrhage. *New England Journal of Medicine* **308**: 619–24.

Allman P, Hope T, Fairburn C (1992) Crying following stroke: a report of 30 cases. *General Hospital Psychiatry* **14**: 315–24.

Amaragiri SV, Lees TA (2004) Elastic compression stockings for prevention of deep vein thrombosis (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Ancliffe J (1992) Strapping the shoulder in patients following a cerebrovascular accident (CVA): a pilot study. *Australian Journal of Physiotherapy* **38**: 37–41.

Andersen G, Vestergaard K, Rils J (1993) Citalopram for post-stroke pathological crying. *Lancet* **342**: 837–9.

Andersen G, Vestergaard K, Lauritsen L (1994) Effective treatment of post-stroke depression with the selective serotonin re-uptake inhibitor citalopram. *Stroke* **25**: 1099–1104.

Andersen HE, Schultz LK, Kreiner S, Forchhammer BH *et al* (2000) Can readmission after stroke be prevented? Results of a randomized clinical study: a postdischarge follow-up service for stroke survivors. *Stroke* **31**: 1038–45.

Andersen HE, Eriksen K, Brown A, Schultz-Larsen K, Forchhammer BH (2002) Follow-up services for stroke survivors after hospital discharge: a randomized control study. *Clinical Rehabilitation* **16**: 593–603.

Anderson R (1992) *The aftermath of stroke: the experience of patients and their families*. Cambridge: Cambridge University Press.

Anderson C, Linto J, Stewart-Wynne E (1995) A population-based assessment of the impact and burden of caregiving for long-term stroke survivors. *Stroke* **26**: 843–49.

Anderson C, Laubscher S, Burns R (1996) Validation of the Short Form 36 (SF-36) health survey questionnaire among stroke patients. *Stroke* **27**: 1812–1816.

Anderson C, Rubenach S, Mhurchu CN, Clark M *et al* (2000a) Home or hospital for stroke rehabilitation? Results of a randomized controlled trial : I: Health outcomes at 6 months. *Stroke* **31**: 1024–31.

Anderson C, Mhurchu C, Rubenach S, Clark M *et al* (2000b) Home or hospital for stroke rehabilitation? Results of a randomized controlled trial : II: Cost minimization analysis at 6 months. *Stroke* **31**: 1032–7.

Anderson C, Ni Mhurchu C, Brown P, Carter K (2002) Stroke rehabilitation services to accelerate hospital discharge and provide home-based care: an overview and cost analysis. *Pharmacoeconomics* **20**: 537–52.

Anderson CS, Hackett ML, House AO (2004) Interventions for preventing depression after stroke (Cochrane Review). In: *The Cochrane Library*, Issue 2, 2004. Chichester, UK: John Wiley and Sons.

Antiplatelet Trialists Collaboration (1994) Collaborative overview of randomised trials of antiplatelet therapy. *British Medical Journal* **308**: 81–106.

Antithrombotic Trialists' Collaboration (2002) Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high risk patients. *British Medical Journal* **324**: 71–86.

Asano T, Takakura K, Sano K, Kikuchi H *et al* (1996) Effects of a hydroxyl radical scavenger on delayed ischemic neurological deficits following aneurysmal subarachnoid hemorrhage: results of a multicenter, placebo-controlled double-blind trial. *Journal of Neurosurgery* **84**: 792–803.

Ascione FJ, Shimp LA (1984) The effectiveness of four education strategies in the elderly. *Drug Intelligence and Clinical Pharmacy* **18**: 926–31.

Asplund K (2004) Haemodilution for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Association of Chartered Physiotherapists with Special Interest in Neurology (ACPIN) (1995) *Recommendations for physiotherapy practice and service development in neurology*. London: Chartered Society of Physiotherapy.

Association of Chartered Physiotherapists Interested in Neurology (ACPIN) (1998) *Clinical practice guidelines on splinting adults with neurological dysfunction*. London: Chartered Society of Physiotherapy.

Astrom G (1996) Generalised anxiety disorder in stroke patients: a 3 year longitudinal study. *Stroke* **27**: 270–75.

ATLANTIS, ECASS and NINDS rt-Pa Study Group Investigators (2004) Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS Rt-PA Stroke Trials. *Lancet* **363**: 768–774.

Audit Commission (2000) *Fully equipped: the provision of equipment to older or disabled people by the NHS and social services in England and Wales*. London: Audit Commission.

Aviv JE (2000) Prospective, randomized outcome study of endoscopy versus modified barium swallow in patients with dysphagia. *Laryngoscope* **110**: 563–74.

Axelsson R, Asplund K, Norberg A, Alafuzoff I (1988) Nutritional status in patients with acute stroke. *Acta Medica Scandinavia* **224**: 217–24.

Bakheit AM, Thilmann AF, Ward AB, Poewe W *et al* (2000) A randomized, double-blind, placebo-controlled, dose-ranging study to compare the efficacy and safety of three doses of botulinum toxin type A (Dysport) with placebo in upper limb spasticity after stroke. *Stroke* **31**: 2402–406.

Bakheit AM, Pittock S, Moore AP, Wurker M *et al* (2001) A randomized, double-blind, placebo-controlled study of the efficacy and safety of botulinum toxin type A in upper limb spasticity in patients with stroke. *European Journal of Neurology* **8**: 559–65.

Bamford J, Sandercock P, Dennis M, Burn J, Warlow C (1990) A prospective study of acute cerebrovascular disease in the community: the Oxfordshire Community Stroke Project – 1981–86. 2: incidence, case fatality rates and overall outcome at one year of cerebral infarction, primary intracerebral and subarachnoid haemorrhage. *Journal of Neurology, Neurosurgery and Psychiatry* **53**: 16–22.

Bar-Eli M, Hartman I, Levy-Kolker N (1994) Using goal setting to improve physical performance of adolescents with behaviour disorders: the effects of goal proximity. *Adapted Physical Activity Quarterly* **11**: 86–97.

Bar-Eli M, Tenenbaum G, Pie JS (1997) Effect of goal difficulty, goal specificity and duration of practice time intervals on muscular endurance performance. *Journal of Sports Sciences* **15**: 125–35.

Barbeau H, Visintin M (2003) Optimal outcomes obtained with body-weight support combined with treadmill training in stroke subjects. *Archives of Physical Medicine and Rehabilitation* **84**: 1458–65.

Barker FG, Ogilvy CS (1996) Efficacy of prophylactic nimodipine for delayed ischemic deficit after subarachnoid hemorrhage: a metaanalysis. *Journal of Neurosurgery* **84**: 405–14.

Barrett JA (2002) Bladder and bowel problems after stroke. *Reviews in Clinical Gerontology* **12**: 253–67.

Barrett JA, Watkins C, Plant R, Dickinson H *et al* (2001) The COSTAR wheelchair study: a two-centre pilot study of self-propulsion in a wheelchair in early stroke rehabilitation. *Clinical Rehabilitation* **15**: 32–41.

Baskett JJ, Broad JB, Reekie G, Hocking C, Green G (1999) Shared responsibility for ongoing rehabilitation: a new approach to home-based therapy after stroke. *Clinical Rehabilitation* **13**: 23–33.

Basmajian J, Gowland C, Finlayson M (1987) Stroke treatment: comparison of integrated behavioural-physical therapy *vs* traditional physical therapy programs. *Archives of Physical Medicine and Rehabilitation* **68**: 267–72.

Bath P, Bath F (2004) Prostacyclin and analogues for acute ischaemic stroke (Cochrane Review). *In The Cochrane Library, Issue 1, 2004* Chichester, UK: John Wiley and Sons.

Bath PM, Lindenstrom E, Boysen G, De Deyn P *et al* (2001) Tinzaparin in acute ischaemic stroke (TAIST): a randomised aspirin-controlled trial. *Lancet* **358**: 702–710.

Bath PM, Willmot M, Leonardi-Bee J, Bath FJ (2004) Nitric oxide donors (nitrates) L-arginine, or nitric oxide synthase inhibitors for acute stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Bath PMW, Bath FJ, Asplund K (2004) Pentoxifylline, propentofylline and pentifylline for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Bath PMW, Bath FJ, Smithard DG (2004). Interventions for dysphagia in acute stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Bautz-Holter E, Sveen U, Rygh J, Rodgers H, Bruun WT (2002) Early supported discharge of patients with acute stroke: a randomized controlled trial. *Disability and Rehabilitation* **24**(**7**): 348–55.

Beckerman H, Becher J, Lankhorst G, Verbeek A (1996b) Walking ability of stroke patients: efficacy of thermocoagulation of tibial nerve blocking and a polypropylene ankle-foot orthosis. *Archives of Physical Medicine and Rehabilitation* **77**: 1144–51.

Beckerman H, Becher J, Lankhorst G (1996a) The efficacy of thermo-coagulation of the tibial nerve and a polypropylene ankle-foot orthosis on spasticity of the leg in stroke patients: results of a randomised clinical trial. *Clinical Rehabilitation* **10**: 112–20.

Beech R, Rudd A (1999) Economic consequences of early inpatient discharge to community-based rehabilitation for stroke in an inner London teaching hospital. *Stroke* **30**: 729–35.

Benesch C, Witter DM, Wilder AL (1997) Inaccuracy of the International Classification of Disease (ICD-9-CM) in identifying the diagnosis of ischaemic cerebrovascular disease. *Neurology* **49**: 660–64.

Bereczki D, Fekete I (2004) Vinpocetine for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Berge E, Sandercock P (2004) Anticoagulants versus antiplatelet agents for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Berge E, Abdelnoor M, Nakstad P, Sandset P (2000) Low molecular-weight heparin versus aspirin in patients with acute ischaemic stroke and atrial fibrillation: a double-blind randomised study. HAEST Study Group. Heparin in Acute Embolic Stroke Trial. *Lancet* **355**: 1205–210.

Berry M, Rinke W, Smicklas-Wright H (1989) Work-site health promotion: the effects of a goal-setting program on nutrition-related behaviours. *Journal of the American Dietetic Association* **89**: 914–20.

Bertakis K (1991) Impact of a patient education intervention on appropriate utilisation of clinic services. *Journal of the American Board of Family Practitioners* **4**: 411–18.

Bhakta B, Cozens J, Bamford J, Chamberlain M (1996) Use of botulinum toxin in stroke patients with severe upper limb spasticity. *Journal of Neurology, Neurosurgery and Psychiatry* **61**: 30–35.

Bhalla A, Tilling K, Kolominsky-Rabas P, Heuschmann P *et al* (2003) Variation in the management of acute physiological parameters after ischaemic stroke: a European perspective. *European Journal of Neurology* **10**: 25–33.

Bhatt D, Hirsch A, Ringleb P, Hacke W, Topol E (2000) Reduction in the need for hospitalisation for recurrent ischaemic events and bleeding with clopidogrel instead of aspirin. CAPRIE Investigators. *American Heart Journal* **140**: 67–73.

Bhogal S, Teasell R, Speechley M (2003) Intensity of aphasia therapy, impact on recovery. *Stroke* **34**: 987–92.

Blair C (1995) Combining behaviour management and mutual goal setting to reduce physical dependency in nursing home residents. *Nursing Research* **44**: 160–65.

Blair C, Lewis R, Vieweg V, Tucker R (1996) Group and single-subject evaluation of a programme to promote self-care in elderly nursing home residents. *Journal of Advanced Nursing* **24**: 1207–13.

Blauw G, Lagaay A, Smelt A, Westendorp R (1997) Stroke, statins and cholesterol. A meta-analysis of randomised, placebo-controlled, double blind trials with HMG-CoA reductase inhibitors. *Stroke* **28**: 946–50.

Blight A, Pereira A, Brown M (2000) A single consultation cerebrovascular disease clinic is cost effective in the management of transient ischaemic attack and minor stroke. *Journal of the Royal College of Physicians of London* **34**: 452–5.

Blood Pressure in Acute Stroke Collaboration (BASC) (2004) Interventions for deliberately altering blood pressure in acute stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Blood Pressure in Acute Stroke Collaboration (BASC) (2004) Vasoactive drugs for acute stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Borello-France DF, Burdett RG, Gee ZL (1988) Modification of sitting posture of patients with hemiplegia using seat boards and backboards. *Physical Therapy* **68**: 67–71.

Bots ML, van der Wilk EC, Koudstaal PJ (1997) Transient neurological attacks in the general population. prevalence, risk factors, and clinical relevance. *Stroke* **28**: 768–73.

Bowen J, Yaste C (1994) Effect of a stroke protocol on hospital costs of stroke patients. *Neurology* **44**: 1961–4.

Bowen A, Lincoln NB, Dewey M (2004) Cognitive rehabilitation for spatial neglect following stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Bowman BR, Baker LL, Waters RL (1979) Positional feedback and electrical stimulation: an automated treatment for the hemiplegic wrist. *Archives of Physical Medicine and Rehabilitation* **60**: 497–502.

Bradley L, Hart BB, Mandana S (1998) Electromyographic biofeedback for gait training after stroke. *Clinical Rehabilitation* **12**: 11–22.

Bragoni M, Altieri M, Di P, Padovani A, Mostardini C, Lenzi GL (2000) Bromocriptine and speech therapy in non-fluent chronic aphasia after stroke. *Neurological Sciences* **21**: 19–22.

Braus D, Kraus J, Strobel J (1994) The shoulder-hand syndrome after stroke: a prospective clinical trial. *Annals of Neurology* **36**: 728–33.

Brazzelli, M, Shirran, E, Vale, L (2004) Absorbent products for containing urinary and/or faecal incontinence in adults (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Brindley P, Copeland M, Demain C, Martyn P (1989) A comparison of the speech of ten chronic Broca's aphasics following intensive and non-intensive periods of therapy. *Aphasiology* **3**: 695–707.

British Dietetic Association, Royal College of Speech and Language Therapists (2002) National descriptors for texture modification in adults. London: Royal College of Speech and Language Therapists.

British Medical Association (2002) *Withholding and withdrawing life-prolonging medical treatment: guidance for decision making* (2*nd Edition)*. London: BMJ Books.

British Medical Association and Royal Pharmaceutical Society of Great Britain (2004) *British national formulary*. Wallingford, Oxon: Pharmaceutical Press.

Brown D, Kautz S (1998) Increased workload enhances force output during pedalling exercise in persons with post-stroke hemiplegia. *Stroke* **29**: 598–606.

Brown K, Sloan R, Pentland B (1998) Fluoxetine as a treatment for post-stroke emotionalism. *Acta Psychiatrica Scandinavia* **98**: 455–8.

Burbaud P, Wiart L, Dubos J (1996) A randomised, double-blind, placebo-controlled trial of botulinum toxin in the treatment of spastic foot in hemiparetic patients. *Journal of Neurology, Neurosurgery and Psychiatry* **61**: 265–9.

Burridge J, Taylor P, Hagan S, Wood D, Swain I (1997) The effects of common peroneal stimulation on the effort and speed of walking: a randomised controlled trial with chronic hemiplegic patients. *Clinical Rehabilitation* **11**: 201–10.

Burt A, Currie S (1978) A double-blind controlled trial of baclofen and diazepam in spasticity due to cerebrovascular lesions. In: *Baclofen: spasticity and cerebral pathology* (Jukes A ed). Cambridge: Cambridge Medical Publications.

Butefisch C, Hummelsheim H, Denzler P, Mauritz K-H (1995) Repetitive training of isolated movements improves outcome of motor rehabilitation of the centrally paretic hand. *Journal of Neurological Sciences* **130**: 59–68.

Byington R, Davis B, Plehn J, White H *et al* (2001) Reduction of stroke events with pravastatin: the prospective pravastatin pooling (PPP) project. *Circulation* **103**: 387–92.

Bynum H, Rogers J (1987) The use and effectiveness of assistive devices possessed by patients seen in home care. *Occupational Therapy Journal of Research* **7**: 181–91.

Campion E, Jette A, Berkman B (1983) An interdisciplinary geriatric consultation service: a controlled trial. *Journal of the American Geriatric Society* **31**: 792–6.

Candelise L, Ciccone A (2004) Gangliosides for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Cao P, Giordano G, Rango P, Zannetti S *et al* and collaborators of the EVEREST study group (2000) Eversion versus conventional carotid endarterectomy: late results of a prospective multi-centre randomised trial. *Journal of Vascular Surgery* **31**: 19–30.

CAPRIE Steering Committee (1996) A randomised, blinded, trial of clopidogrel versus aspirin in patients at risk of ischaemic events (CAPRIE). *Lancet* **348**: 1329–39.

Carey J (1990) Manual stretch: effect on finger movement control and force control in stroke patients with spastic extrinsic finger flexor muscles. *Archives of Physical Medicine and Rehabilitation* **71**: 888–94.

Carr E, Kenney F (1992) Positioning of the stroke patient: a review of the literature. *International Journal of Nursing Studies* **29**: 355–69.

Carroll D, Moore R, McQuay H, Fairman F *et al* (2004) Transcutaneous electrical nerve stimulation (TENS) for chronic pain (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Cauraugh J, Kim S (2002) Two coupled motor recovery protocols are better than one: electromyogram-triggered neuromuscular stimulation and bilateral movements. *Stroke* **33**: 1589–94.

CAVATAS Investigators (2001) Endovascular versus surgical treatment in patients with carotid stenosis in the Carotid and Vertebral Artery Transluminal Angioplasty Study (CAVATAS): a Randomised Trial. *Lancet* **357**: 1729–37.

Chae J, Bethoux F, Bohine T (1998) Neuromuscular stimulation for upper extremity motor and functional recovery in acute hemiplegia. *Stroke* **29**: 975–9.

Chamberlain M, Thornley G, Stowe J, Wright V (1981) Evaluation of aids and equipment for the bath: II. A possible solution to the problem. *Rheumatology and Rehabilitation* **20**: 38–43.

Chambers B, Donnan G, Bladin P (1983) Patterns of stroke. an analysis of the first 700 consecutive admissions to the Austin Hospital stroke unit. *Australian and New Zealand Journal of Medicine* **13**: 57–64.

Chambers B, You R, Donnan GA (2004) Carotid endarterectomy for asymptomatic carotid stenosis (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Chantraine A, Baribeault A, Uebelhart D, Gremion G (1999) Shoulder pain and dysfunction in hemiplegia: effects of functional electrical stimulation. *Archives of Physical Medicine and Rehabilitation* **80**: 328–31.

Charles C, Gauld M, Chambers L (1994) How was your hospital stay? Patients' reports about their care in Canadian hospitals. *Canadian Medical Association Journal* **150**: 1813–22.

Chatterton H, Pomeroy V, Connolly M, Faragher E *et al* (2000) The effect of body position on arterial oxygen saturation in acute stroke. *Journals of Gerontology Series A, Biological Sciences and Medical Sciences* **55**: M239–M244.

Chen C, Yeung K, Wang C, Chu H, Yeh C (1999) Anterior ankle-foot orthosis effects on postural stability in hemiplegic patients. *Archives of Physical Medicine and Rehabilitation* **80**: 1587–92.

Chen Z, Sandercock P, Pan H, Counsell C *et al* (2000) Indications for early aspirin use in acute ischemic stroke : a combined analysis of 40 000 randomized patients from the Chinese Acute Stroke Trial and the International Stroke Trial. On behalf of the CAST and IST collaborative groups. *Stroke* **31**: 1240–9.

Chen I, Cheng P, Chen C, Chen S *et al* (2002) Effects of balance training on hemiplegic stroke patients. *Chang Gung Medical Journal* **25**: 583–90.

Cheng P, Wu S, Liaw M, Wong A, Tang F (2001) Symmetrical body-weight distribution training in stroke patients and its effect on fall prevention. *Archives of Physical Medicine and Rehabilitation* **82**: 1650–4.

Childers M, Stacy M, Cooke D, Stonnington H (1996) Comparison of two injection techniques using botulinum toxin in spastic hemiplegia. *American Journal of Physical Medicine and Rehabilitation* **75**: 462–469.

Childers M, Biswas S, Petroski G, Merveille O (1999) Inhibitory casting decreases a vibratory inhibition index of the H reflex in the spastic upper limb. *Archives of Physical Medicine and Rehabilitation* **80**: 714–716.

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

Christie D, Weigall D (1984) Social work effectiveness in two-year stroke survivors: a randomised controlled trial. *Community Health Studies* **8**: 26–32.

Chua K, Kong K (2000) Alcohol neurolysis of the sciatic nerve in the treatment of hemiplegic knee flexor spasticity: clinical outcomes. *Archives of Physical Medicine and Rehabilitation* **81**: 1432–5.

Churchill, R, Hunot, V, Corney, R, Knapp, M *et al* (2001) A systematic review of controlled trials of the effectiveness and cost-effectiveness of brief psychological treatments for depression. 5(35). HMSO, Norwich: Health Technology Assessment.

Cina CS, Clase CM, Haynes RB (2004). Carotid endarterectomy for symptomatic carotid stenosis (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Claesson L, Gosman-Hedstrom G, Johannesson M, Fagerberg B *et al* (2000) Resource utilization and costs of stroke unit care integrated in a care continuum: a 1-year controlled, prospective, randomized study in elderly patients: the Gotëborg 70+ Stroke Study. *Stroke* **31**: 2569–77.

Clark M, Smith D (1998) Factors contributing to patient satisfaction with rehabilitation following stroke. *International Journal of Rehabilitation Research* **21**: 143–54.

Clark W, Wissoman S, Albers G *et al* for the ATLANTIS Study Investigators (1999a) Recombinant tissue-type plasminogen activator (Alteplase) for ischemic stroke 3 to 5 hours after symptom onset. The ATLANTIS Study: a randomized controlled trial. *Journal of the American Medical Association* **282**: 2019–26.

Clark W, Williams B, Selzer K, Zweifler R *et al* (1999b) A randomized efficacy trial of citicoline in patients with acute ischemic stroke. *Stroke* **30**: 2592–7.

Clark W, Albers G, Madden K, Hamilton S for the Thrombolytic Therapy in Acute Ischemic Stroke Study Investigators (2000a) The RtPA (Alteplase) 0 to 6 Hour Acute Stroke Trial Part A (A0276g). Results of a double-blind, placebo-controlled, multicenter study. *Stroke* **31**: 811–16.

Clark W, Raps E, Tong D, Kelly R (2000b) Cervene (Nalmefene) in acute ischemic stroke : final results of a phase III efficacy study. The Cervene Stroke Study investigators. *Stroke* **31**: 1234–9.

Clark W, Wechsler L, Sabounjian L, Schwiderski U and Citicoline Stroke Study Group (2001) A phase III randomized efficacy trial of 2000 mg Citicoline in acute ischemic stroke patients. *Neurology* **57**: 1595–602.

Clark M, Rubenach S, Winsor A (2003) A randomized controlled trial of an education and counselling intervention for families after stroke. *Clinical Rehabilitation* **17***:* 703–12.

Clinical Standards Advisory Group (1998) Report on clinical effectiveness using stroke care as an example. London: Stationery Office.

Coast J, Richards S, Peters T (1998) Hospital at home or acute hospital care. A cost minimisation analysis. *British Medical Journal* **316**: 1802–1806.

Coggrave M, Wiesel P, Norton C, Brazzelli M (2004) Management of faecal incontinence and constipation in adults with central neurological diseases (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Colborne G, Olney S, Griffin M (1993) Feedback of ankle joint angle and soleus electromyography in the rehabilitation of hemiplegic gait. *Archives of Physical Medicine and Rehabilitation* **74**: 1100–1106.

Commission for Health Audit and Inspection (2003) *CHAI vision and purpose*. London: CHAI.

Corcoran P, Jebsen R, Brengelmann G, Simons B (1970) Effects of plastic and metal leg braces on speed and energy cost of hemiparetic ambulation. *Archives of Physical Medicine and Rehabilitation* **51**: 69–77.

Cornu C, Boutitie F, Candelise L, Boissel JP *et al* (2000) Streptokinase in acute ischemic stroke: an individual patient data meta-analysis: The Thrombolysis in Acute Stroke Pooling Project. *Stroke* **31**: 1555–60.

Corr S, Bayer A (1995) Occupational therapy for stroke patients after hospital discharge; a randomised controlled trial. *Clinical Rehabilitation* **9**: 291–296.

Corry I, Cosgrove A, Walsh E (1997) Botulinum toxin A in the hemiplegic upper limb: a double-blind trial. *Developmental Medicine and Child Neurology* **39**: 185–193.

Corry I, Cosgrove A, Duffy C (1998) Botulinum toxin A compared with stretching casts in the treatment of spastic equinus: a randomised prospective trial. *Journal of Paediatric Orthopaedics* **18**: 304–311.

Coull A, Lovett J, Rothwell P on behalf of the Oxford Vascular Study (2004) Population based study of early risk of stroke after transient ischaemic attack or minor stroke: implications for public education and organisation of services. *British Medical Journal* **328**: 326–8.

Counsell C, Sandercock P (2004) Low-molecular-weight heparins or heparinoids versus standard unfractionated heparin for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Cozean C, Pease W, Hubbell S (1988) Biofeedback and functional electrical stimulation in stroke rehabilitation. *Archives of Physical Medicine and Rehabilitation* **69**: 401–405.

Crawley F, Clifton A, Brown M (1999) Should we screen for familial intracranial aneurysm? *Stroke* **30**: 312–6.

Crisostomo E, Duncan P, Propst M (1988) Evidence that amphetamine with physical therapy promotes recovery of motor function in stroke patients. *Annals of Neurology* **23**: 94–97.

Crouse J (III), Byington R, Hoen H, Furberg C (1997) Reductase inhibitor monotherapy and stroke prevention. *Archives of Internal Medicine* **157**: 1305–10.

Crouse J (III), Byington R, Furberg C (1998) HMG-CoA reductase inhibitor therapy and stroke risk reduction: an analysis of clinical trials data. *Atherosclerosis* **138**: 11–24.

Cullum, N, Deeks, J, Sheldon, TA, Song, F, Fletcher, AW (2004). Beds, mattresses and cushions for pressure sore prevention and treatment (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Cummings V, Kerner J, Arones S, Steinbock C (1985) Day hospital service in rehabilitation medicine: an evaluation. *Archives of Physical Medicine and Rehabilitation* **66**: 86–91.

Cunningham C, Horgan F, Keane N (1996) Detection of disability by different members of an interdisciplinary team. *Clinical Rehabilitation* **10**: 247–54.

Cunningham C, Stoykov M, Walter C (2002a) Bilateral facilitation of motor control in chronic hemiplegia. *Acta Psychologia* **110**: 321–37.

Cunningham E, Bond R, Mehta Z, Mayberg M *et al* for the European Carotid Surgery Trialists Collaborative Group (2002b) Long-term durability of carotid endarterectomy for symptomatic stenosis and risk factors for late postoperative stroke. *Stroke* **33**: 2658–63.

Cutler J, Follmann D, Allender P (1997) Randomised trials of sodium reduction: an overview. *American Journal of Clinical Nutrition* **65 (Suppl S)**: 643S–651S.

Dam M, Tonin P, Casson S (1993) The effects of long-term rehabilitation therapy on post-stroke hemiplegic patients. *Stroke* **24**: 1186–91.

Dam M, Tonin P, De Boni A (1996) Effects of fluoxetine and maprotiline on functional recovery in post-stroke hemiplegic patients undergoing rehabilitation therapy. *Stroke* **27**: 1211–4.

Daniels S, Brailey K, Priestly D (1998) Aspiration in patients with acute stroke. *Archives of Physical Medicine and Rehabilitation* **79**: 14–19.

Davalos A, Ricart W, Gonzalez-Huix F (1996) Effect of early malnutrition after acute stroke on clinical outcome. *Stroke* **27**: 1028–32.

Davenport R, Dennis M, Warlow C (1996a) The accuracy of scottish morbidity record (SMR1) data for identifying hospitalised stroke patients. *Health Bulletin* **54**: 402–405.

Davenport R, Dennis M, Warlow C (1996b) Effect of correcting outcome data for case mix: an example from stroke medicine. *British Medical Journal* **312**: 1503–5.

David R, Enderby P, Baniton D (1982) Treatment of acquired aphasia: speech therapists and volunteers compared. *Journal of Neurology, Neurosurgery and Psychiatry* **45**: 957–961.

de Gans K, Nieuwkamp D, Rinkel G, Algra A (2002) Timing of aneurysm surgery in subarachnoid hemorrhage: a systematic review of the literature. *Neurosurgery* **50**: 336–40.

de Kroon J, van der Lee J, Ijzerman M, Lankhorst G (2002) Therapeutic electrical stimulation to improve motor control and functional abilities of the upper extremity after stroke: a systematic review. *Clinical Rehabilitation* **16**: 350–60.

De Schryver E, Algra A, van Gijn J (2002) Dipyridamole for preventing stroke and other vascular events in patients with vascular disease (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Dean C, Shepherd R (1997) Task-related training improves performance of seated reaching tasks after stroke: a randomised controlled trial. *Stroke* **28**: 722–8.

Dean C, Richards C, Malouin F (2000a) Task-related circuit training improves performance of locomotor tasks in chronic stroke: a randomized, controlled pilot trial. *Archives of Physical Medicine and Rehabilitation* **81**: 409–17.

Dean C, Mackey F, Katrak P (2000b) Examination of shoulder positioning after stroke: a randomised controlled pilot trial. *Australian Journal of Physiotherapy* **46**: 35–40.

Dekker J, Wagenaar R, Lankhorst G, de Jong B (1997) The painful hemiplegic shoulder: effects of intra-articular triamcinolone acetonide. *American Journal of Physical Medicine and Rehabilitation* **76**: 43–48.

Dekker R, Drost E, Groothof J (1998) Effects of day-hospital rehabilitation in stroke patients: a review of randomised clinical trials. *Scandinavian Journal of Rehabilitation Medicine* **30**: 87–94.

Dennis M, O'Rourke S, Slattery J (1997) Evaluation of a stroke family care worker: results of a randomised controlled trial. *British Medical Journal* **314**: 1071–6.

Dennis M, O'Rourke S, Lewis S (1998) A quantitative study of the emotional outcome of people caring for stroke survivors. *Stroke* **29**: 1867–72.

Dennis M, O'Rourke S, Lewis S, Sharpe H *et al* (2000) Emotional outcomes after stroke: factors associated with poor outcome. *Journal of Neurology, Neurosurgery & Psychiatry* **68**: 47–52.

Department of Health (2000) *Good practice in continence services.* London: The Stationery Office.

Department of Health (2000) *The NHS Plan: a plan for investment; a plan for reform.* London: The Stationary Office.

Department of Health (2001) *National service framework for older people.* London: Department of Health.

Department of Health (2003) *General medical services (GMS) contract.* London: HMSO.

DePippo K, Holas M, Reding M (1992) Validation of the 3-oz water swallow test for aspiration following stroke. *Archives of Neurology* **49**: 1259–61.

DePippo K, Holas M, Reding M (1994) Dysphagia therapy following stroke: a controlled trial. *Neurology* **44**: 1655–60.

Dickstein R, Hocherman S, Pillar T, Shaham R (1986) Stroke rehabilitation: three exercise therapy approaches. *Physical Therapy* **66**: 1233–8.

Diener H, Cinha L, Forbes C (1996) European Stroke Prevention Study 2 (ESPS2) Dipyridamole and acetylsalicylic acid in the secondary prevention of stroke. *Journal of the Neurological Sciences* **143**: 1–13.

Dippel D, van Breda E, van Gemert H, van der Worp HB *et al* (2001) Effect of paracetamol (acetaminophen) on body temperature in acute ischemic stroke: a double-blind, randomized phase II clinical trial. *Stroke* **32**: 1607–12.

Doggett D, Tappe K, Mitchell MD, Chapell R *et al* (2001) Prevention of pneumonia in elderly stroke patients by systematic diagnosis and treatment of dysphagia: an evidence-based comprehensive analysis of the literature. *Dysphagia* **16**: 279–95.

Dolecheck J, Schkade J (1999) The extent dynamic standing endurance is effected when CVA subjects perform personally meaningful activities rather than nonmeaningful tasks. *Occupational Therapy Journal of Research* **19**: 40–54.

Donkervoort M, Dekker J, Stehmann-Saris F, Deelman B (2001) Efficacy of strategy training in left hemisphere stroke patients with apraxia: a randomised clinical trial. *Neuropsychological Rehabilitation* **11**: 549–66.

Dorman P, Waddell F, Slattery J (1997) Is the EuroQol a valid measure of health-related quality of life after stroke. *Stroke* **28**: 1876–82.

Dorman P, Slattery J, Farrell B for the United Kingdom Collaborators in the International Stroke Trial (1998) Qualitative comparison of the reliability of health status assessments with the EuroQol and SF-36 questionnaires after stroke. *Stroke* **29**: 63–68.

Dorman P, Dennis M, Sandercock P on behalf of the United Kingdom Collaborators in the International Stroke Trial (1999) How do scores on the EuroQol relate to scores on the SF36 after stroke? *Stroke* **30**: 2146–51.

Draper B, Poulos C, Cole A (1992) A comparison of caregivers for elderly stroke and dementia victims. *Journal of the American Geriatrics Society* **40**: 896–901.

Dromerick A, Edwards D, Hahn M (2000) Does the application of constraint-induced movement therapy during acute rehabilitation reduce arm impairment after ischemic stroke? *Stroke* **31**: 2984–8.

Drummond A, Walker M (1995) A randomised controlled trial of leisure rehabilitation after stroke. *Clinical Rehabilitation* **9**: 283–90.

Duncan G, Ritchie L, Jamieson D, McLean M (1995) Acute stroke in South Ayrshire: comparative study of pre and post stroke units. *Health Bulletin* **53**: 159–66.

Duncan P, Samsa G, Weinberger M (1997) Health status in individuals with mild stroke. *Stroke* **28**: 740–5.

Duncan P, Richards L, Wallace D (1998) A randomised controlled pilot study of a home-based exercise program for individuals with mild and moderate stroke. *Stroke* **29**: 2055–60.

Duncan P, Studenski S, Richards L, Gollub S *et al* (2003) Randomized clinical trial of therapeutic exercise in subacute stroke. *Stroke* **34**: 2173–80.

Dursun E, Hamamci N, Donmez S (1996) Angular biofeedback device for sitting balance of stroke. *Stroke* **26**: 1354–7.

Eagle D, Guyatt G, Patterson C (1991) Effectiveness of a geriatric day hospital. *Canadian Medical Association Journal* **144**: 699–704.

Early Supported Discharge Trialists (2004) Services for reducing duration of hospital care for acute stroke patients (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Ebrahim S, Barer D, Nouri F (1987) An audit of follow-up services for stroke patients after discharge from hospital. *International Disability Studies* **9**: 103–5.

Edmans J, Webster J, Lincoln N (2000) A comparison of two approaches in the treatment of perceptual problems after stroke. *Clinical Rehabilitation* **14**: 230–43.

Elliott P, Stamler J, Nichols R (1996) Intersalt revisited: further analyses of 24 hour sodium excretion and blood pressure within and across populations. *British Medical Journal* **312**: 1249–53.

Elman R, Bernstein EE (1999) The efficacy of group communication treatment in adults with chronic aphasia. *Journal of Speech, Language, and Hearing Research* **42**: 411–19.

Elmstahl S, Malmberg B, Annerstedt L (1996) Caregiver's burden of patients 3 years after stroke assessed by a novel caregiver burden scale. *Archives of Physical Medicine and Rehabilitation* **77**: 177–182.

Enderby P, Broeckx J, Hospers W (1994) Effect of piracetam on recovery and rehabilitation after stroke: a double-blind, placebo-controlled study. *Clinical Neuropharmacology* **17**: 320–331.

Engardt M, Knutsson E, Jonsson E, Sternhag M (1995) Dynamic muscle strength training in stroke patients; effects on knee extension torque, electromyographic activity and motor function. *Archives of Physical Medicine and Rehabilitation* **76**: 419–25.

Esposito L (1995) The effects of medication education on adherence to medication regimens in an elderly population. *Journal of Advanced Nursing* **21**: 935–43.

European Atrial Fibrillation Trial (EAFT) Study Group (1993) Secondary prevention in non-rheumatic atrial fibrillation after transient ischaemic attack or minor stroke. *Lancet* **342**: 1255–62.

European Atrial Fibrillation Trial (EAFT) Study Group (1995) Optimal oral anticoagulation therapy in patients with nonrheumatic atrial fibrillation and recent cerebral ischemia. *New England Journal of Medicine* **333**: 5–10.

European Carotid Surgery Trialists (1998) Randomised trial of endarterectomy for recently symptomatic carotid stenosis: final results of the MRC European Carotid Surgery Trial (ECST). *Lancet* **351**: 1379–87.

Eustice S, Roe B, Paterson J (2004) Prompted voiding for the management of urinary incontinence in adults (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Evans R, Matlock A, Bishop D (1988) Family intervention after stroke: does counselling or education help? *Stroke* **19**: 1243–9.

Evans R, Hendricks R (1993) Evaluating hospital discharge planning: a randomised clinical trial. *Medical Care* **31**: 358–70.

Fagerberg B, Claesson L, Gosman-Hedstrom G, Blomstrand C (2000) Effect of acute stroke unit care integrated with care continuum versus conventional treatment: a randomized 1-year study of elderly patients: the Goteborg 70+ Stroke Study. *Stroke* **31**: 2578–84.

Faghri P, Rodgers M, Glaser R (1994) The effects of functional electrical stimulation on shoulder subluxation, arm function recovery, and shoulder pain in hemiplegic stroke patients. *Archives of Physical Medicine and Rehabilitation* **75**: 73–79.

Faghri P, Rodgers M (1997) The effects of functional neuromuscular stimulation-augmented physical therapy in the functional recovery of hemiplegic arm in stroke patients. *Clinical Kinesiology* **51**: 9–15.

Fang Y, Chen X, Li H, Lin J *et al* (2003) A study on additional early physiotherapy after stroke and factors affecting functional recovery. *Clinical Rehabilitation* **17**: 608–17.

Fanthome Y, Lincoln N, Drummond A, Walker M (1995) The treatment of visual neglect using feedback of eye movements: a pilot study. *Disability and Rehabilitation* **17**: 413–17.

Feigin V, Rinkel G, Algra A, van Gijn J (2004) Circulatory volume expansion for aneurysmal subarachnoid hemorrhage (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Ferro J, Pinto A, Falcao I *et al* (1998) Diagnosis of stroke by the non-neurologist: a validation study. *Stroke* **29**: 1106–9.

Feys H, Weerdt W, Selz B, Cox Steck G *et al* (1998) Effect of a therapeutic intervention for the hemiplegic upper limb in the acute phase after stroke: a single-blind, randomized, controlled multicenter trial. *Stroke* **29**: 785–92.

Finestone H, Greene-Finestone L, Wilson E, Teasell R (1995) Malnutrition in stroke patients in the rehabilitation service and at follow up: prevalence and predictors. *Archives of Physical Medicine and Rehabilitation* **76**: 310–16.

Fishbain D (2000) Evidence-based data on pain relief with antidepressants. *Annals of Medicine* **32**: 305–16.

Fjaertoft H, Indredavik B, Lydersen S (2003) Stroke unit care combined with early supported discharge: long-term follow-up of a randomized controlled trial. *Stroke* **34**: 2687–91.

Flaherty J, Miller D, Coe R (1992) Impact on caregivers of supporting urinary function in non-institutionalised, chronically ill seniors. *Gerontologist 32* **32**: 541–5.

FOOD Trial Collaboration (2003) Poor nutritional status on admission predicts poor outcomes after stroke: observational data from the FOOD trial. *Stroke* **34**: 1450–6.

Forster A, Young J (1996) Specialist nurse support for patients with stroke in the community: a randomised controlled trial. *British Medical Journal* **312**: 1642–6.

Forster A, Dowswell G, Young J, Bagley P *et al* (1999a) Effect of a physiotherapist-led stroke training programme on attitudes of nurses caring for patients after stroke. *Clinical Rehabilitation* **13**: 113–22.

Forster A, Young J, Langhorne P (1999b) Systematic review of day hospital care for elderly people: the day hospital group. *British Medical Journal* **318**: 837–41.

Forster A, Smith J, Young J, Knapp P *et al* (2004) Information provision for stroke patients and their caregivers (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Fredman L, Daly M (1997) Weight change: an indicator of caregiver stress. *Journal of Aging and Health* **9**: 43–69.

Friedland J, McColl M (1992) Social support intervention after stroke: results of a randomised trial. *Archives of Physical Medicine and Rehabilitation* **73**: 573–81.

Furlan A, Higashida R, Wechsler L, Gent M *et al* for the PROACT Investigators (1999) Intra-arterial prourokinase for acute ischemic stroke. the proact II study: a randomized controlled trial. *Journal of the American Medical Association* **282**: 2003–11.

Gardner L, Powell L, Page M (1993) An appraisal of a selection of products currently available to older consumers. *Applied Ergonomics* **24**: 35–9.

Gariballa S, Parker S, Taub N, Castleden M (1998) Nutritional status of hospitalised acute stroke patients. *British Journal of Nutrition* **79**: 481–7.

Garon B, Engle M, Ormiston C (1997) A randomised control study to determine the effects of unlimited oral intake of water in patients with identified aspiration. *Journal of Neurologic Rehabilitation* **11**: 139–48.

Geiger R, Allen J, O'Keefe J, Hicks R (2001) Balance and mobility following stroke: effects of physical therapy interventions with and without biofeedback/forceplate training. *Physical Therapy* **81**: 995–1005.

Gelber D, Good D, Laven L, Verhulst S (1993) Causes of urinary incontinence after acute hemispheric stroke. *Stroke* **24**: 378–82.

Gelber D, Josfcyle P, Herrman D (1995) Comparison of two therapy approaches in the rehabilitation of the pure motor hemiparetic stroke patient. *Journal of Neurological Rehabilitation* **9**: 191–6.

George J, Binns V, Clayden A, Mulley G (1988) Aids and adaptations for the elderly at home: underprovided, under-used and under-maintained. *British Medical Journal* **296**: 1365–6.

Gilbertson L, Langhorne P, Walker A, Murray G (2000) Domiciliary occupational therapy for patients with stroke discharged from hospital: randomised controlled trial. *British Medical Journal* **320**: 603–6.

Gitlin L, Levine R, Geiger C (1993) Adaptive device use by older adults with mixed disabilities. *Archives of Physical Medicine and Rehabilitation* **74**: 149–52.

Gitlin L, Schemm R, Landsberg L, Burgh D (1996) Factors predicting assistive device use in home by older people following rehabilitation. *Journal of Aging and Health* **8**: 554–75.

Gitlin L, Luborsky M, Schemm R (1998) Emerging concerns of older stroke patients about assistive device use. *Gerontologist* **38**: 169–80.

Glader EL, Stegmayr B, Johansson L, Hulter A, Wester P (2001) Differences in long-term outcome between patients treated in stroke units and in general wards: a 2-year follow-up of stroke patients in Sweden. *Stroke* **32**: 2124–30.

Gladman J, Lincoln N (1994) Follow-up of a controlled trial of domiciliary stroke rehabilitation (Domino Study). *Age and Ageing* **23**: 9–13.

Gladman J, Lincoln N, Barer D (1993) A randomised controlled trial of domiciliary and hospital-based rehabilitation for stroke patients after discharge from hospital. *Journal of Neurology, Neurosurgery and Psychiatry* **56**: 960–6.

Gladman J, Whynes D, Lincoln N (1994) Cost-comparison of domiciliary and hospital-based stroke rehabilitation. *Age and Ageing* **23**: 241–5.

Gladman J, Juby L, Clarke P (1995) Survey of a domiciliary stroke rehabilitation service. *Clinical Rehabilitation* **9**: 245–9.

Glanz M, Klawansky S, Stason W (1995) Biofeedback therapy in post-stroke rehabilitation: a meta-analysis of the randomised controlled trials. *Archives of Physical Medicine and Rehabilitation* **76**: 508–15.

Glanz M, Klawansky S, Stason W (1996) Functional electrostimulation in post-stroke rehabilitation: a meta-analysis of the randomised controlled trials. *Archives of Physical Medicine and Rehabilitation* **77**: 549–53.

Glasgow R, Toobert D, Hampson S (1996) Effects of a brief office-based intervention to facilitate diabetes dietary self-management. *Diabetes Care* **19**: 835–42.

Glasgow R, La Chance P, Toobert D, Brown J *et al* (1997) Long-term effects and costs of brief behavioural dietary intervention for patients with diabetes delivered from the medical office. *Patient Education and Counselling* **32**: 175–84.

Glazener C, Lapitan M (2004) Urodynamic investigations for management of urinary incontinence in adults (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Glennon T, Smith B (1990) Questions asked by patients and their support groups during family conferences on inpatient rehabilitation units. *Archives of Physical Medicine and Rehabilitation* **71**: 699–702.

Goldstein L, the Sygen In Acute Stroke Study Investigators (1995) Common drugs may influence motor recovery after stroke. *Neurology* **45**: 865–71.

Goldstein L (1998) Accuracy of ICD-9-CM coding for the identification of patients with acute ischaemic stroke: effect of modifier codes. *Stroke* **29**: 1602–1604.

Gompertz P, Pound P, Briffa J, Ebrahim S (1995) How useful are non-random comparisons of outcomes and quality of care in purchasing hospital stroke services. *Age and Ageing* **24**: 137–141.

Gosman-Hedstrom G, Claesson L, Klingenstierna U (1998) Effects of acupuncture treatment on daily life activities and quality of life: a controlled prospective and randomised study of acute stroke patients. *Stroke* **29**: 2100–8.

Gould R, Otto M, Pollack M, Yap L (1997) Cognitive behavioural and pharmacological treatment of generalized anxiety disorder: a preliminary meta-analysis. *Behaviour Therapy* **29**: 285–305.

Gracies J, Marosszeky J, Renton R, Sandanam J *et al* (2000) Short-term effects of dynamic lycra splints on upper limb in hemiplegic patients. *Archives of Physical Medicine and Rehabilitation* **81**: 1547–55.

Grade C, Redford B, Chrostowski J (1998) Methylphenidate in early poststroke recovery: a double-blind, placebo-controlled study. *Archives Physical Medicine and Rehabilitation* **79**: 1047–50.

Grazko M, Polo K, Jabbari B (1995) Botulinum toxin A for spasticity, muscle spasms, and rigidity. *Neurology* **45**: 712–17.

Green J, Forster A, Bogle S, Young J (2002) Physiotherapy for patients with mobility problems more than 1 year after stroke: a randomised controlled trial. *Lancet* **359**: 199–203.

Greener J, Enderby P, Whurr R (2004a) Speech and language therapy for aphasia following stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Greener J, Enderby P, Whurr R (2004b) Pharmacological treatment for aphasia following stroke. In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Greenfield S, Kaplan S, Ware J (1985) Expanding patient involvement in care: effects on patient outcomes. *Annals of Internal Medicine* **102**: 520–528.

Gross J (1998) A comparison of the characteristics of incontinent and continent stroke patients in a rehabilitation programme. *Rehabilitation Nursing* **23**: 132–140.

Grotta J and The Combination Therapy Stroke Trial Investigators (2001) Combination therapy stroke trial: recombinant tissue-type plasminogen activator with/without lubeluzole. *Cerebrovascular Diseases* **12**: 258–263.

Gubitz G, Counsell C, Sandercock P, Signorini D (2004) Anticoagulants for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Gupta S, Mlcoch A, Scolaro C, Moritz T (1995) Bromocriptine treatment of nonfluent aphasia. *Neurology* **45**: 2170–2173.

Gusev E, Skvortsova V, Dambinova S, Raevskiy K *et al* (2000) Neuroprotective effects of glycine for therapy of acute ischaemic stroke. *Cerebrovascular Diseases* **10**: 49–60.

Hachisuka K, Ogata H, Tajima F, Ohmine S (1998) Clinical evaluations of dorsiflexion assist controlled by spring ankle-foot orthosis for hemiplegic patients. *Journal of the University of Occupational and Environmental Health* **20:** 1–9.

Hakim E, Bakheit A (1998) A study of the factors which influence the length of hospital stay of stroke patients. *Clinical Rehabilitation* **12**: 151–156.

Haley EJ, Kassell N, Torner J (1993) A randomized controlled trial of high-dose intravenous nicardipine in aneurysmal subarachnoid hemorrhage. A report of the cooperative aneurysm study. *Journal of Neurosurgery* **78**: 537–547.

Haley EJ, Kassell N, Apperson-Hansen C, Maile M *et al* (1997) A randomized, double-blind, vehicle-controlled trial of tirilazad mesylate in patients with aneurysmal subarachnoid hemorrhage: a cooperative study in North America. *Journal of Neurosurgery* **86**: 467–474.

Hanger H, Whitewood P, Brown G, Ball M *et al* (2000) A randomized controlled trial of strapping to prevent post-stroke shoulder pain. *Clinical Rehabilitation* **14**: 370–380.

Hankey G, Warlow C (1994) *Transient ischaemic attacks of the brain and eye*. London: WB Saunders.

Hanlon R (1996) Motor learning following unilateral stroke. *Archives of Physical Medicine and Rehabilitation* **77**: 811–815.

Hansen R (1990) Social intervention at discharge: co-operation between a hospital department, general practice and the social sector. *Ugeskrift for Laeger* **152**: 2506–2510.

Harker L, Boissel J, Pilgrim A, Gent M (1999) Comparative safety and tolerability of clopidogrel and aspirin: results from CAPRIE. CAPRIE Steering Committee and Investigators. Clopidogrel versus aspirin in patients at high risk of ischaemic events. *Drug Safety* **21**: 325–335.

Hart R, Pearce L, McBride R, Rothbart R, Asinger R (1999) Factors associated with ischemic stroke during aspirin therapy in atrial fibrillation: analysis of 2012 participants in the SPAF I-III clinical trials. The Stroke Prevention in Atrial Fibrillation (SPAF) investigators. *Stroke* **30**: 1223–1229.

Hartke R, King R (2003) Telephone group intervention for older stroke caregivers. *Topics in Stroke Rehabilitation* **9**: 65–81.

Harwood R, Gompertz P, Ebrahim S (1994) Handicap one year after a stroke: validity of a new scale. *Journal of Neurology, Neurosurgery and Psychiatry* **57**: 825–829.

Haynes R, McDonald H, Garg A, Montague P (2004) Interventions for helping patients to follow prescriptions for medications (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Health and Safety Executive (1992) *Manual handling: guidance on regulations.* Sudbury, Suffolk: HSE.

Heart Outcomes Prevention Evaluation Study Investigators (HOPE) (2000a) Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. *New England Journal of Medicine* **342**: 145–153.

Heart Outcomes Prevention Evaluation Study Investigators (HOPE) (2000b) Effects of ramipril on cardiovascular and microvascular outcomes in people with diabetes mellitus: results of the HOPE Study and MICRO-HOPE substudy. *Lancet* **355**: 253–259.

Heart Protection Study Collaborative Group (2002a) MRC/BHF heart protection study of cholesterol lowering with simvastatin in 20,536 high-risk individuals: a randomised placebo-controlled trial. *Lancet* **360:** 7–22.

Heart Protection Study Collaborative Group (2002b) MRC/BHF heart protection study of antioxidant vitamin supplementation in 20,536 high-risk individuals: a randomised placebo-controlled trial. *Lancet* **360**: 23–33.

Heart Protection Study Collaborative Group (2004) Effects of cholesterol-lowering with Simvastatin on stroke and other major vascular events in 20,536 people with cerebrovascular disease or other high-risk conditions. *Lancet* **363**: 757–767.

Hebert P, Gaziano J, Chan K, Hennekens C (1997) Cholesterol lowering with statin drugs, risk of stroke and total mortality: an overview of randomised trials. *Journal of the American Medical Association* **278**: 313–321.

Hendricks H, Ijzerman M, de Kroon J, in 't Groen F, Zilvold G (2001) Functional electrical stimulation by means of the 'ness handmaster orthosis' in chronic stroke patients: an exploratory study. *Clinical Rehabilitation* **15**: 217–220.

Hesse S, Bertelt C, Schaffrin A (1994) Restoration of gait in non-ambulatory hemiparetic patients by treadmill training with partial body-weight support. *Archives of Physical Medicine and Rehabilitation* **75**: 1087–1093.

Hesse S, Jahnke M, Bertelt C, Schreiner C *et al* (1994) Gait outcome in ambulatory hemiparetic patients after a 4-week comprehensive rehabilitation program and prognostic factors. *Stroke* **25**: 1999–2004.

Hesse S, Malezic M, Schaffrin A, Mauritz K (1995a) Restoration of gait by combined treadmill training and multi-channel electrical stimulation in non-ambulatory hemiparetic patients. *Scandinavian Journal of Rehabilitation Medicine* **27**: 199–204.

Hesse S, Bertelt C, Jahnke M (1995b) Treadmill training with partial body weight support compared with physiotherapy in non-ambulatory hemiparetic patients. *Stroke* **26**: 976–981.

Hesse S, Krajnik J, Luecke D (1996a) Ankle muscle activity before and after botulinum toxin therapy for lower limb extensor spasticity in chronic hemiparetic patients. *Stroke* **27**: 455–460.

Hesse S, Gahein-Sama A, Mauritz K (1996b) Technical aids in hemiparetic patients: prescription costs and usage. *Clinical Rehabilitation* **10**: 328–333.

Hesse S, Luecke D, Jahnke M, Mauritz K (1996c) Gait function in spastic hemiparetic patients walking barefoot, with firm shoes, and with ankle-foot orthosis. *International Journal of Rehabilitation Research* **19**: 133–141.

Hesse S, Jahnke M, Schaffrin A, Lucke D *et al* (1998a) Immediate effects of therapeutic facilitation on the gait of hemiparetic patients as compared with walking with and without a cane. *Electroencephalography and Clinical Neurophysiology* **109**: 515–522.

Hesse S, Reiter F, Konrad M, Jahnke M (1998b) Botulinum toxin type A and short-term electrical stimulation in the treatment of upper limb flexor spasticity after stroke: a randomised, double-blind, placebo-controlled trial. *Clinical Rehabilitation* **12**: 381–388.

Hesse S, Konrad M, Uhlenbrock D (1999) Treadmill walking with partial body weight support versus floor walking in hemiparetic subjects. *Archives of Physical Medicine and Rehabilitation* **80**: 421–427.

Hill J (1994) The effects of casting on upper extremity motor disorders after brain injury. *American Journal of Occupational Therapy* **48**: 219–224.

Hillman J, Fridriksson S, Nilsson O, Yu Z *et al* (2002) Immediate administration of tranexamic acid and reduced incidence of early rebleeding after aneurysmal subarachnoid hemorrhage: a prospective randomized study. *Journal of Neurosurgery* **97**: 771–778.

Holmqvist L, von Koch L, Kostulas V (1998) A randomised controlled trial of rehabilitation at home after stroke in southwest Stockholm. *Stroke* **29**: 591–597.

Holmqvist L, von Koch L, de Pedro-Cuesta J (2000) Use of healthcare, impact on family caregivers and patient satisfaction of rehabilitation at home after stroke in southwest Stockholm. *Scandinavian Journal of Rehabilitation Medicine* **32**: 173–179.

Hooper L, Bartlett C, Davey Smith G, Ebrahim S (2004a) Advice to reduce dietary salt for prevention of cardiovascular disease (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Hooper L, Summerbell C, Higgins J, Thompson R *et al* (2004b) Reduced or modified dietary fat for preventing cardiovascular disease (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Horner J, Brazer S, Massey E (1993) Aspiration in bilateral stroke patients: a validation study. *Archives of Neurology* **43**: 430–433.

House AO, Hackett ML, Anderson CS, Horrocks JA (2004). Pharmaceutical interventions for emotionalism after stroke (Cochrane Review). In: *The Cochrane Library*, Issue 2, 2004. Chichester, UK: John Wiley and Sons.

Huber W, Willmes K, Poeck K (1997) Piracetam as an adjuvant to language therapy for aphasia: a randomised double-blind placebo-controlled pilot study. *Archives of Physical Medicine and Rehabilitation* **78**: 245–250.

Huck J, Bonhotal B (1997) Fastener systems on apparel for hemiplegic stroke victims. *Applied ergonomics* **28**: 277–282.

Hui E, Lum C, Woo J (1995) Outcomes of elderly stroke patients: day hospital versus conventional medical management. *Stroke* **26**: 1616–1619.

Hunt D, Young P, Simes J, Hague W *et al* (2001) Benefits of Pravastatin on cardiovascular events and mortality in older patients with coronary heart disease are equal to or exceed those seen in younger patients: results from the LIPID trial. *Annals of Internal Medicine* **134**: 931–940.

Husson B, Rodesch G, Lasjaunias P, Tardieu M, Sebire G (2002) Magnetic resonance angiography in childhood arterial brain infarcts: a comparative study with contrast angiography. *Stroke* **33**: 1280–1285.

Indredavik B, Slordahl S, Bakke F (1997) Stroke unit treatment. Long-term effects. *Stroke* **28**: 1861–6.

Indredavik B, Bakke F, Slordahl S (1998) Stroke unit treatment improves long-term quality of life: a randomised controlled trial. *Stroke* **29**: 895–899.

Indredavik B, Bakke F, Slordahl S, Rokseth R, Haheim L (1999a) Stroke unit treatment. 10-year follow-up. *Stroke* **30**: 1524–1527.

Indredavik B, Bakke F, Slordahl S, Rokseth R, Haheim L (1999b) Treatment in a combined acute and rehabilitation stroke unit: which aspects are most important? *Stroke* **30**: 917–923.

Indredavik B, Fjaertoft H, Ekeberg G, Loge A, Morch B (2000) Benefit of an extended stroke unit service with early supported discharge: a randomized, controlled trial. *Stroke* **31**: 2989–94.

Inglis J, Donald M, Monga T (1984) Electromyographic biofeedback and physical therapy of the hemiplegic upper limb. *Archives of Physical Medicine and Rehabilitation* **65**: 755–759.

Intercollegiate Working Party for Stroke (2000) *National clinical guidelines for stroke. Update Supplement 2002*. London: Royal College of Physicians.

Intercollegiate Working Party for Paediatric Stroke (2004) *Clinical guidelines for diagnosis and management of acute stroke in childhood*. London: Royal College of Physicians.

International Pharmaceutical Federation Statement on Professional Standards (2003) How pharmacists can encourage adherence to long-term treatments for chronic conditions. *The Pharmaceutical Journal* **271**: 513–514.

International Stroke Trial Collaborative Group (1997) The International Stroke Trial (IST): a randomised trial of aspirin, subcutaneous heparin, both, or neither among 19,435 patients with acute ischaemic stroke. *Lancet* **349**: 1569–1581.

International Study of Unruptured Intracranial Aneurysms Investigators (2003) Unruptured intracranial aneurysms: natural history, clinical outcome and risks of surgical and endovascular treatment. *Lancet* **362**: 103–110.

International Subarachnoid Aneurysm Trial (ISAT) Collaborative Group (2002) International Subarachnoid Aneurysm Trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomised trial. *Lancet* **360**: 1267–1274.

Intiso D, Santilli V, Grasso M (1994) Rehabilitation of walking with electromyographic biofeedback in foot-drop after stroke. *Stroke* **25**: 1189–1192.

Intravenous Magnesium Efficacy in Stroke Trial (Images) Study Investigators (2004) Magnesium for acute stroke (intravenous magnesium efficacy in stroke trial): randomised controlled trial. *Lancet* **363**: 439–445.

Jager H, Mansmann U, Hausmann O, Partzsch U *et al* (2000) MRA versus digital subtraction angiography in acute subarachnoid haemorrhage: a blinded multireader study of prospectively recruited patients. *Neuroradiology* **42**: 313–326.

Jessee W, Schranz C (1990) Medicare mortality rates and hospital quality: are they related? *Quality Assurance in Health Care* **2**: 137–144.

Johansson K, Lindgren I, Widner H (1993) Can sensory stimulation improve the functional outcome in stroke patients. *Neurology* **43**: 2189–2192.

Johansson B, Haker E, von Arbin M, Britton M *et al* and the Swedish Collaboration on Sensory Stimulation after Stroke (2001) Acupuncture and transcutaneous nerve stimulation in stroke rehabilitation: a randomized, controlled trial. *Stroke* **32**: 707–713.

Johnson L, Graham S, Harris K (1997) The effects of goal-setting and self-instruction on learning a reading comprehension strategy: a study of students with learning disabilities. *Journal of Learning Disabilities* **30**: 80–91.

Johnson C, Wood D, Swain I, Tromans A *et al* (2002) A pilot study to investigate the combined use of botulinum neurotoxin type A and functional electrical stimulation, with physiotherapy, in the treatment of spastic dropped foot in subacute stroke. *Artificial Organs* **26**: 263–266.

Johnson J, Pearson V (2000) The effects of a structured education course on stroke survivors living in the community. *Rehabilitation Nursing* **25**: 59–65.

Jones A, Carr E, Newham D, Wilson-Barnett J (1998) Positioning of stroke patients. evaluation of a teaching intervention with nurses. *Stroke* **29**: 1612–1617.

Jongbloed L, Stacey S, Brighton C (1989) Stroke rehabilitation: sensorimotor integrative treatment versus functional treatment. *American Journal of Occupational Therapy* **43**: 391–397.

Jongbloed L, Morgan D (1991) An investigation of involvement in leisure activities after stroke. *American Journal of Occupational Therapy* **45**: 420–427.

Jürgens G, Graudal N (2004) Effects of low sodium diet versus high sodium diet on blood pressure, renin, aldosterone, catecholamines, cholesterols, and triglyceride (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Kagan A, Black S, Duchan J, Simmons-Mackie N, Square P (2001) Training volunteers as conversation partners using 'Supported Conversation for Adults With Aphasia' (SCA): a controlled trial. *Journal of Speech, Language and Hearing Research* **44**: 624–638.

Kalra L (1994) The influence of stroke unit rehabilitation on functional recovery from stroke. *Stroke* **25**: 821–825.

Kalra L, Evans A, Perez I, Knapp M *et al* (2000) Alternative strategies for stroke care: a prospective randomised controlled trial. *Lancet* **356**: 894–899.

Kalra L, Evans A, Perez I, Melbourn A *et al* (2004) Training care givers of stroke patients: randomised controlled trial. *British Medical Journal* **328**: 1099–101.

Kassell N, Torner J, Haley EJ, Jane J *et al* (1990a) The International Cooperative Study on the Timing of Aneurysm Surgery. Part 1: overall management results. *Journal of Neurosurgery* **73**: 18–36.

Kassell N, Torner J, Jane J, Haley ECJ, Adams H (1990b) The International Cooperative Study on the Timing of Aneurysm Surgery. Part 2: surgical results. *Journal of Neurosurgery* **73**: 37–47.

Katrak P, Cole A, Poulos C, McCauley J (1992) Objective assessment of spasticity, strength, and function with early exhibition of dantrolene sodium after cerebrovascular accident: a randomised, double-blind study. *Archives of Physical Medicine and Rehabilitation* **73**: 4–9.

Katz R, Wertz R (1997) The efficacy of computer-provided reading treatment for chronic aphasic adults. *Journal of Speech, Language and Hearing Research* **40**: 493–507.

Kawachi I, Colditz G, Stamper M (1993) Smoking cessation and decreased risk of stroke in women. *Journal of the American Medical Association* **269**: 232–236.

Keir S, Wardlaw J, Warlow C (2002) Stroke epidemiology studies have underestimated the frequency of intracerebral haemorrhage. A systematic review of imaging in epidemiological studies. *Journal of Neurology* **249**: 1226–1231.

Kelson M, Ford C, Rigge M (1998) *Stroke rehabilitation: patient and carer views. A report by the College of Health for the Intercollegiate Working Party for Stroke*. London: Royal College of Physicians.

Kelson M, Riesel J, Kennelly C (2001) Speaking out about stroke services: the views of people affected by stroke: a survey to inform the implementation of the National service Framework for Older People. London: The College of Health and The Stroke Association.

Kennedy A, Brocklehurst J (1982) The nursing management of patients with long-term in-dwelling catheters. *Journal of Advanced Nursing* **7**: 411–417.

Kennedy A, Brocklehurst J, Lye M (1983) Factors related to the problems of long-term catheterisation. *Journal of Advanced Nursing* **8**: 207–212.

Kennedy L, Neidlinger S, Scroggins K (1987) Effective comprehensive discharge planning for hospitalised elderly. *Gerontologist* **27**: 577–580.

Kennedy P, Walker L, White D (1991) Ecological evaluation of goal planning and advocacy in a rehabilitation environment for spinal cord injured people. *Paraplegia* **29**: 197–202.

Kernan W, Viscoli C, Brass L, Makuch R *et al* (2000) Blood pressure exceeding national guidelines among women after stroke. *Stroke* **31**: 415–419.

Kersten P, Low J, Ashburn A, George S, McLellan D (2002) The unmet needs of young people who have had a stroke: results of a national UK survey. *Disability and Rehabilitation* **24**: 860–866.

Ketel W, Kolb M (1984) Long-term treatment with dantrolene sodium of stroke patients with spasticity limiting the return of function. *Current Medical Research and Opinion* **9**: 161–169.

Kidd D, Lawson J, Nesbitt R, MacMahon J (1993) Aspiration in acute stroke: a clinical study with videofluoroscopy. *Quarterly Journal of Medicine* **86**: 825–829.

Kim C, Eng J, MacIntyre D, Dawson A (2001) Effects of isokinetic strength training on walking in persons with stroke: a double-blind controlled pilot study. *Journal of Stroke & Cerebrovascular Diseases* **10:** 265–273.

Kimura M, Robinson R, Kosier J (2000) Treatment of cognitive impairment after poststroke depression: a double-blind treatment trial. *Stroke* **31**: 1482–1486.

Kimura M, Tateno A, Robinson R (2003) Treatment of poststroke generalized anxiety disorder comorbid with poststroke depression: merged analysis of Nortriptyline trials. *American Journal of Geriatric Psychiatry* **11**: 320–327.

Kissela B, Sauerbeck L, Woo D, Khoury J *et al* (2002) Subarachnoid hemorrhage: a preventable disease with a heritable component. *Stroke* **33:** 1321–1326.

Kjendahl A, Sallstrom S, Osten P (1997) A one year follow-up study on the effects of acupuncture in the treatment of stroke patients in the subacute stage. *Clinical Rehabilitation* **11**: 192–200.

Kollef M, Shapiro S, Silver P (1997) A randomised, controlled trial of protocol-directed versus physician-directed weaning from mechanical ventilation. *Critical Care Medicine* **25**: 567–574.

Kosak M, Reding M (2000) Comparison of partial body weight-supported treadmill gait training versus aggressive bracing assisted walking post stroke. *Neurorehabilitation And Neural Repair* **14**: 13–19.

Kothari R, Barsan W, Brott T (1995a) Frequency and accuracy of prehospital diagnosis of stroke. *Stroke* **26**: 937–941.

Kothari R, Brott T, Broderick J, Hamilton C (1995b) Emergency physicians' accuracy in the diagnosis of stroke. *Stroke* **26**: 2238–2241.

Kothari R, Hall K, Brott T, Broderick J (1997) Early stroke recognition: developing an out-of-hospital NIH stroke scale. *Academic Emergency Medicine* **4**: 986–990.

Kotzki N, Pelissier J, Dusotoit C (1991) Techniques de prévention du syndrome algodystrophique: évaluation d'un protocole d'installation au lit. *Annales Réadaptation Médicine Physique* **34**: 351–355.

Koudstaal P (2004a) Anticoagulants for preventing stroke in patients with non-rheumatic atrial fibrillation and a history of stroke or transient ischaemic attacks (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Koudstaal P (2004b) Anti-platelet therapy for preventing stroke in patients with non-rheumatic atrial fibrillation and a history of stroke or transient ischaemic attacks (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Kraaijeveld C, van Gijn J, Schouten H, Staal A (1984) Inter-observer agreement for the diagnosis of transient ischaemic attacks. *Stroke* **15**: 723–725.

Kuan T, Tsou J, Su F (1999) Hemiplegic gait of stroke patients: the effect of using a cane. *Archives of Physical Medicine and Rehabilitation* **80**: 777–784.

Kumar R, Metter E, Mehta A, Chew T (1990) Shoulder pain in hemiplegia: the role of exercise. *American Journal of Physical Medicine and Rehabilitation* **69**: 205–208.

Kunkel A, Kopp B, Muller G, Villringer K *et al* (1999) Constraint-induced movement therapy for motor recovery in chronic stroke patients. *Archives of Physical Medicine and Rehabilitation* **80**: 624–628.

Kuntz K, Kent C (1996) Is carotid endarterectomy cost-effective? an analysis of symptomatic and asymptomatic patients. *Stroke* **94 (Suppl II)**: 194–198.

Kwakkel G, Wagenaar R (2002) Effect of duration of upper- and lower-extremity rehabilitation sessions and walking speed on recovery of interlimb coordination in hemiplegic gait. *Physical Therapy* **82**: 432–448.

Kwakkel G, Wagenaar R, Koelman T (1997) Effects of intensity of rehabilitation after stroke: a research synthesis. *Stroke* **28**: 1550–1556.

Kwakkel G, Wagenaar R, Twisk J, Lankhorst G, Koetsier J (1999) Intensity of leg and arm training after primary middle-cerebral-artery stroke: a randomised trial. *Lancet* **354**: 191–196.

Kwakkel G, Kollen B, Wagenaar R (2002) Long term effects of intensity of upper and lower limb training after stroke: a randomised trial. *Journal of Neurology, Neurosurgery and Psychiatry* **72**: 473–479.

Kwan J, Sandercock P (2004) In-hospital care pathways for stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Lancaster T, Stead L (2004) Individual behavioural counselling for smoking cessation (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Landefeld C, Palmer R, Kresevic D (1995) A randomised trial of care in a hospital medical unit especially designed to improve the functional outcomes of acutely ill older patients. *New England Journal of Medicine* **332**: 1338–1344.

Langhammer B, Stanghelle J (2000) Bobath or motor relearning programme? A comparison of two different approaches of physiotherapy in stroke rehabilitation: a randomized controlled study. *Clinical Rehabilitation* **14**: 361–369.

Langhorne P, Pollock A (2002) What are the components of effective stroke unit care? *Age and Ageing* **31**: 365–371.

Langhorne P, Wagenaar R, Partridge C (1996) Physiotherapy after stroke: more is better. *Physiotherapy Research International* **1**: 75–88.

Langhorne P, Dennis M, Kalra L, Shepperd S *et al* (2004) Services for helping acute stroke patients avoid hospital admission (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Langmore S, Schatz K, Olson N (1991) Endoscopic and videofluoroscopic evaluations of swallowing and aspiration. *The Annals of Otology, Rhinology, and Laryngology* **100**: 678–681.

Langmore S, Terpenning M, Schork A, Chen Y *et al* (1998) Predictors of aspiration pneumonia: how important is dysphagia? *Dysphagia* **13**: 69–81.

Lannin N, Herbert R (2003) Is hand splinting effective for adults following stroke? A systematic review and methodological critique of published literature. *Clinical Rehabilitation* **17**: 807–816.

Lannin N, Horsley S, Herbert R, McCluskey M, Cusick A (2003) Splinting the hand in the functional position after brain impairment: a randomised controlled trial. *Archives of Physical Medicine and Rehabilitation* **84**: 297–302.

Lanzino G, Kassell N, Dorsch N, Pasqualin A *et al* (1999a) Double-blind, randomized, vehicle-controlled study of high-dose tirilazad mesylate in women with aneurysmal subarachnoid hemorrhage. Part I. A cooperative study in Europe, Australia, New Zealand, and South Africa. *Journal of Neurosurgery* **90**: 1011–1017.

Lanzino G, Kassell N (1999b) Double-blind, randomized, vehicle-controlled study of high-dose tirilazad mesylate in women with aneurysmal subarachnoid hemorrhage. Part II. A Cooperative Study in North America. *Journal of Neurosurgery* **90**: 1018–1024.

Laufer Y (2002) Effects of one-point and four-point canes on balance and weight distribution in patients with hemiparesis. *Clinical Rehabilitation* **16**: 141–148.

Laufer Y, Dickstein R, Chefez Y, Marcovitz E (2001) The effect of treadmill training on the ambulation of stroke survivors in the early stages of rehabilitation: a randomized study. *Journal of Rehabilitation Research and Development* **38**: 69–78.

Laursen S, Henriksen I, Dons U (1995) Intensiv apopleksirehabilitering – et kontrolleret pilotstudie. *Ugeskrift for Laeger* **157**: 1996–1999.

Lawson I, MacLeod R (1969) The use of Imipramine (Tofranil) and other psychotropic drugs in organic emotionalism. *British Journal of Psychiatry* **115**: 281–285.

Leandri M, Parodi C, Corrieri N, Rigard S (1990) Comparison of TENS treatments in hemiplegic shoulder pain. *Scandanavian Journal of Rehabilitation Medicine* **22**: 69–72.

Leder S, Espinosa J (2002) Aspiration risk after acute stroke: comparison of clinical examination and fiberoptic endoscopic evaluation of swallowing. *Dysphagia* **17**: 214–218.

Lee K, Hill E, Johnston R, Smiehorowski T (1976) Myo-feedback for muscle retraining in hemiplegic patients. *Archives of Physical Medicine and Rehabilitation* **57**: 588–591.

Lee A, Huber J, Stason W (1997) Factors contributing to practice variation in post-stroke rehabilitation. *Health Services Research* **32**: 197–221.

Lehman J, DeLateur B, Fowler R (1975) Stroke: does rehabilitation affect outcome? *Archives of Physical Medicine and Rehabilitation* **56**: 375–382.

Leibson C, Naessens J, Brown R, Whisnant J (1994) Accuracy of hospital discharge abstracts for identifying stroke. *Stroke* **25**: 2348–2355.

Leijon G, Boivie J (1989) Central post-stroke pain: a controlled trial of Amitriptyline and Carbamazepine. *Pain* **36**: 27–36.

Lemesle M, Madinier G, Menassa M (1998) Incidence of transient ischaemic attacks in Dijon, France: a 5-year community-based study. *Neuroepidemiology* **17**: 74–79.

Leung J, Moseley A (2003) Impact of ankle foot orthoses on gait and leg muscle activity in adults with hemiplegia: systematic literature review. *Physical Therapy* **89**: 39–55.

Levy D (1988) Transient CNS deficits: a common, benign syndrome in young adults. *Neurology* **38**: 831–836.

Lightowlers S, McGuire A (1998) Cost-effectiveness of anticoagulation in nonrheumatic atrial fibrillation in the primary prevention of ischaemic stroke. *Stroke* **29**: 1827–1832.

Lilford R, Kelly M, Baines A (1992) Effects of using protocols on medical care: randomised trial of three methods of taking an antenatal history. *British Medical Journal* **305**: 1181–1184.

Lim S, Lieu P, Phua S, Seshadri R *et al* (2001) Accuracy of bedside clinical methods compared with fiberoptic endoscopic examination of swallowing (FEES), in determining the risk of aspiration in acute stroke patients. *Dysphagia* **16** : 1–6.

Lincoln N, Willis D, Philips S (1996) Comparison of rehabilitation practice on hospital wards for stroke patients. *Stroke* **27**: 18–23.

Lincoln N, Drummond A, Berman P (1997) Perceptual impairment and its impact on rehabilitation outcome. *Disability and Rehabilitation* **19**: 231–234.

Lincoln N, Parry R, Vass C (1999) Randomized, controlled trial to evaluate increased intensity of physiotherapy treatment of arm function after stroke. *Stroke* **30**: 573–579.

Lincoln N, Husbands S, Trescoli C, Drummond A *et al* (2000a) Five year follow up of a randomised controlled trial of a stroke rehabilitation unit. *British Medical Journal* **320**: 549.

Lincoln N, Gladman J, Berman P, Noad R, Challen K (2000b) Functional recovery of community stroke patients. *Disability and Rehabilitation* **22**: 135–139.

Lincoln N, Francis V, Lilley S, Sharma J, Summerfield M (2003) Evaluation of a stroke family support organiser: a randomized controlled trial. *Stroke* **34**: 116–121.

Lincoln N, Majid M, Weyman N (2004) Cognitive rehabilitation for attention deficits following stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Lindley R, Warlow C, Wardlaw J (1993) Inter-observer reliability of a clinical classification of acute cerebral infarction. *Stroke* **24**: 1801–1804.

Lindley R, Waddell F, Livingstone M (1994) Can simple questions assess outcome after stroke? *Cerebrovascular Disease* **4**: 314–324.

Lindsay K (1987) Antifibrinolytic agents in subarachnoid haemorrhage. *Journal of Neurology* **234**: 1–8.

Linn F, Wijdicks E, van der Graaf Y, Weerdesteyn-van Vliet F *et al* (1994) Prospective study of sentinel headache in aneurysmal subarachnoid haemorrhage. *Lancet* **344**: 590–593.

Linn S, Granat M, Lees K (1999) Prevention of shoulder subluxation after stroke with electrical stimulation. *Stroke* **30**: 963–968.

Lipsey J, Robinson R, Pearlson G (1984) Nortriptyline treatment of post-stroke depression: a double-blind study. *Lancet* **1**: 297–300.

Liu M, Wardlaw J (2004) Thrombolysis (different doses, routes of administration and agents) for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Liu M, Counsell C, Zhao X, Wardlaw J (2004) Fibrinogen depleting agents for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Logan P, Ahern J, Gladman J, Lincoln N (1997) A randomised controlled trial of enhanced social services occupational therapy for stroke patients. *Clinical Rehabilitation* **11**: 107–113.

Logemann J, Veis S, Colangelo L (1999) A screening procedure for oropharyngeal dysphagia. *Dysphagia* **14**: 44–51.

Logigian M, Samuels M, Falconer J (1983) Clinical exercise trial for stroke patients. *Archives of Physical Medicine and Rehabilitation* **64**: 364–367.

Lord J, Hall K (1986) Neuromuscular re-education versus traditional programs for stroke rehabilitation. *Archives of Physical Medicine and Rehabilitation* **67**: 88–91.

Lovett J, Dennis M, Sandercock P, Bamford J *et al* (2003) Very early risk of stroke after a first transient ischemic attack. *Stroke* **34:** 138–40. Epub 2003 Jul 10.

Low J, Kersten P, Ashburn A, George S, McLellan D (2003) Study to evaluate the met and unmet needs of members belonging to young stroke groups affiliated with the Stroke Association. *Disability and Rehabilitation* **25**: 1052–1056.

Lu C, Yu B, Basford J (1997) Influences of cane length on the stability of stroke patients. *Journal of Rehabilitation Research and Development* **34**: 91–100.

Lum P, Burgar C, Shor P, Majmundar M, Van der Loos M (2002) Robot-assisted movement training compared with conventional therapy techniques for the rehabilitation of upper-limb motor function after stroke. *Archives of Physical Medicine and Rehabilitation* **83**: 952–959.

Lyden P, Jacoby M, Schim J, Albers G *et al* (2001) The Clomethiazole Acute Stroke Study in tissue-type plasminogen activator-treated stroke (CLASS-T): final results. *Neurology* **57**: 1199–1205.

Lyden P, Shuaib A, Ng K, Levin K *et al* on behalf of the CLASS-I/M/T Investigators (2002) Clomethiazole Acute Stroke Study in ischemic stroke (CLASS-I): final results. *Stroke* **33**: 122–128.

Lyrer P, Engelter S (2004) Antithrombotic drugs for carotid artery dissection (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Macko R, DeSouza C, Tretter L (1997) Treadmill aerobic exercise training reduces the energy expenditure and cardiovascular demands of hemiparetic gait in chronic stroke patients: a preliminary report. *Stroke* **28**: 326–330.

Madden K, Karanjia P, Adams H, Clarke W and the TOAST investigators (1995) Accuracy of initial stroke subtype diagnosis in the TOAST study. *Neurology* **45**: 1975–1979.

Magnetic Resonance Angiography in Relatives of Patients with Subarachnoid Hemorrhage Study Group (1999) Risks and benefits of screening for intracranial aneurysms in first-degree relatives of patients with sporadic subarachnoid hemorrhage. *New England Journal of Medicine* **341**: 1344–1350.

Majid M, Lincoln N, Weyman N (2004) Cognitive rehabilitation for memory deficits following stroke. (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Malouin F, Potvon M, Prevost J (1992) Use of an intensive task-oriented gait training program in a series of patients with acute cerebrovascular accidents. *Physical Therapy* **72**: 781–793.

Mamon J, Steinwachs D, Fahey M (1992) Impact of hospital discharge planning on meeting patient needs after returning home. *Health Services Research* **27**: 155–175.

Man-Son-Hing M, Laupacis A, O'Connor A, Biggs J *et al* for the Stroke Prevention in Atrial Fibrillation Investigators (1999) A patient decision aid regarding anti-thrombotic therapy for stroke prevention in atrial fibrillation. A randomised controlled trial. *Journal of the American Medical Association* **282**: 737–743.

Mandel A, Nymark J, Balmer S (1990) Electromyographic versus rhythmic positional biofeedback in computerised gait retraining with stroke patients. *Archives of Physical Medicine and Rehabilitation* **71**: 649–654.

Manktelow B, Gillies C, Potter J (2004) Interventions in the management of serum lipids for preventing stroke recurrence (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Mann W, Hurren D, Tomita M, Charvat L (1995) Assistive devices for home-based older stroke survivors. *Topics in Geriatric Rehabilitation* **10**: 75–86.

Mann W, Ottenbacher K, Fraas L (1999) Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the elderly. *Archives of Family Medicine* **8**: 210–217.

Manning C, Pomeroy V (2003) Effectiveness of treadmill retraining on gait of hemiparetic stroke patients: systematic review of current evidence. *Physiotherapy* **89**: 337–345.

Mant J, Hicks N (1995) Detecting differences in quality of care: the sensitivity of measures of process and outcome in treating myocardial infarction. *British Medical Journal* **311**: 793–796.

Mant J, Mant F, Winner S (1997) How good is routine information? Validation of coding for acute stroke in Oxford hospitals. *Health Trends* **29**: 96–99.

Mant J, Carter J, Wade D, Winner S (1998) The impact of an information pack on patients with stroke and their carers: a randomised controlled trial. *Clinical Rehabilitation* **12**: 465–476.

Mant J, Carter J, Wade D, and Winner S (2000) Family support for stroke: a randomised controlled trial. *Lancet* **356**: 808–813.

Mant J, Wade D, Winner S (2004) 'Health care needs assessment: stroke'. In: Stevens A, Raftery J, Mant J, Simpson S (eds) (2004) *Health care needs assessment: the epidemiologically based needs assessment reviews. Second edition.* Oxford: Radcliffe Medical Press.

Marshall E, Spiegelhalter D (1998) Reliability of league tables of in vitro fertilisation clinics: retrospective analysis of live birth rates. *British Medical Journal* **316**: 1701–1705.

Martin P, Young G, Enevoldson T, Humphrey P (1997) Overdiagnosis of TIA and minor stroke: experience at a regional neurovascular clinic. *Quarterly Journal of Medicine* **90**: 759–763.

Martino R, Pron G, Diamant N (2000) Screening for oropharyngeal dysphagia in stroke: insufficient evidence for guidelines. *Dysphagia* **15**: 19–30.

Martinsson L, Wahlgren N, Hardemark H (2004) Amphetamines for improving recovery after stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Mathew P, Teasdale G, Bannan A, Oluoch-Olunya D (1995) Neurological management of cerebellar haematoma and infarct. *Journal of Neurology, Neurosurgery and Psychiatry* **59**: 287–292.

Mathias S, Bates M, Pasta D (1997) Use of the health utilities index with stroke patients and their caregivers. *Stroke* **28**: 1888–1894.

Matias-Guiu J, Ferro J, Alvarez-Sabin J, Torres F *et al* and TACIP Investigators (2003) 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* **34**: 840–848.

Mayo N, Wood-Dauphinee S, Cote R, Gayton D *et al* (2000) There's no place like home: an evaluation of early supported discharge for stroke. *Stroke* **31**: 1016–1023.

Mazer B, Sofer S, Korner-Bitensky N, Gelinas I *et al* (2003) Effectiveness of a visual attention retraining program on the driving performance of clients with stroke. *Archives of Physical Medicine and Rehabilitation* **84**: 541–550.

Mazzone C, Chiodo-Grandi F, Sandercock P, Miccio M, Salvi R (2004) Physical methods for preventing deep vein thrombosis in stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

McCollum P, da Silva A, Ridler B, de Cossart L, the Audit Committee for the Vascular Surgical Society (1997) Carotid endarterectomy in the UK and Ireland: audit of 30-day outcome. *European Journal of Vascular and Endovascular Surgery* **14**: 386–391.

McGrath J, Davies A (1992) Rehabilitation: where are we going and how do we get there? *Clinical Rehabilitation* **6**: 225–235.

McGrath J, Marks J, Davies A (1995) Towards inter-disciplinary rehabilitation: further developments at Rivermead Rehabilitation Centre. *Clinical Rehabiliation* **9**: 320–326.

McKevitt, C, Wolfe, C (2004) An anthropological investigation of lay and professional meanings of quality of life. Swindon: Economic and Social Research Council.

McNaughton H (1996) Stroke audit in a New Zealand hospital. *New Zealand Medical Journal* **109**: 257–260.

McQuay H, Tramer M, Nye B, Carroll D *et al* (1996) A systematic review of antidepresssants in neuropathic pain. *Pain* **68**: 217–227.

Medici M, Pebet M, Ciblis D (1989) A double-blind, long-term study of Tizanidine (Sirdalud) in spasticity due to cerebrovascular lesions. *Current Medical Research and Opinion* **11**: 398–407.

Meek C, Pollock A, Potter J, Langhorne P (2003) A systematic review of exercise trials post stroke. *Clinical Rehabilitation* **17**: 6–13.

Mellegers M, Furlan A, Mailis A (2001) Gabapetin for neuropathic pain: systematic review of controlled and uncontrolled literature. *Clinical Journal of Pain* **17**: 284–295.

Michaels, J, Brazier, J, Palfreyman, S, Shackley, P, Slack, R (2000) Cost and outcome implications of the organisation of vascular services. Health Technology Assessment.

Midgley J, Matthew A, Greenwood C, Logan A (1996) Effect of reduced dietary sodium on blood pressure: a meta-analysis of randomised controlled trials. *Journal of the American Medical Association* **275**: 1590–1597.

Miller G, Light K (1997) Strength training in spastic hemiparesis: should it be avoided? *Neurorehabilitation* **9**: 17–28.

Miltner W, Bauder H, Sommer M, Dettmers C, Taub E (1999) Effects of constraint-induced movement therapy on patients with chronic motor deficits after stroke: a replication. *Stroke* **30**: 586–592.

Miyai I, Reding M (1998) Effects of anti-depressants on functional recovery following stroke: a double-blind study. *Journal of Neurologic Rehabilitation* **12**: 5–13.

Miyazaki S, Yamamoto S, Kubota T (1997) Effect of ankle-foot orthosis on active ankle moment in patients with hemiparesis. *Medical and biological engineering and computing* **35**: 381–385.

Mohiuddin A, Bath F, Bath P (2004) Theophylline, aminophylline, caffeine and analogues for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Montoya R, Dupui P, Pages B, Bessou P (1994) Step-length biofeedback device for walk rehabilitation. *Medical Biological Engineering and Computing* **32**: 416–420.

Moore W, Young B, Baker W and the ACAS investigators (1996) Surgical results: a justification of the surgeon selection process for the acas trial. *Journal of Vascular Surgery* **23**: 323–328.

Moreland J, Thomson M (1994) Efficacy of electromyographic biofeedback compared with conventional physical therapy for upper-extremity function in patients following stroke: a research overview and meta-analysis. *Physical Therapy* **74**: 534–547.

Moreland J, Thomson M, Fuoco A (1998) Electromyographic biofeedback to improve lower extremity function after stroke: a meta-analysis. *Archives of Physical Medicine and Rehabilitation* **79**: 134–140.

Morley NCD, Berge E, Cruz-Flores S, Whittle IR (2004) Surgical decompression for cerebral oedema in acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Morris M, Matyas T, Back T, Goldie P (1992) Electrogoniometric feedback: its effect on genu recurvatum in stroke. *Archives of Physical Medicine and Rehabilitation* **73**: 1147–1154.

Mortenson P, Eng J (2003) The use of casts in the management of joint mobility and hypertonia following brain injury in adults: a systematic review. *Physical Therapy* **83**: 648–658.

Moseley A, Stark A, Cameron I, Pollock A (2004) Treadmill training and body weight support for walking after stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Mudie M, Matyas T (1996) Upper extremity retraining following stroke: effects of bilateral practice. *Journal of Neurological Rehabilitation* **10**: 167–184.

Mudie M, Winzeler-Mercay U, Radwan S, Lee L (2002) Training symmetry of weight distribution after stroke: a randomized controlled pilot study comparing task-related reach, Bobath and feedback training approaches. *Clinical Rehabilitation* **16**: 582–592.

Mulrow C, Chiquette E, Angel L, Cornell J *et al* (2004) Dieting to reduce body weight for controlling hypertension in adults (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Multi-centre Acute Stroke Trial – Italy (MAST-I) (1995) Randomised controlled trial of streprokinase, aspirin and combination of both in treatment of acute ischaemic stroke. *Lancet* **346**: 1508–1514.

Nakayama H, Jorgensen H, Pedersen P (1997) Prevalence and risk factors of incontinence after stroke: the Copenhagen stroke study. *Stroke* **28**: 58–62.

National Association of Neurological Occupational Therapists (2002) *Standards of occupational therapy care for stroke.* London: Royal College of Physicians.

National Institute for Clinical Excellence (2001) *Pressure ulcers – risk assessment and prevention (Guideline B)*. London: National Institute for Clinical Excellence.

National Institute for Clinical Excellence (2003) *Infection control, prevention of healthcare-associated infection in primary and community care (Full guideline)*. London: National Institute for Clinical Excellence.

National Institute for Clinical Excellence (2004) *Depression: the management of depression in primary and secondary care*. London: National Institute for Clinical Excellence.

National Institute for Clinical Excellence (2004) *Supportive and palliative care for people with cancer: Part A and Part B*. London: National Institute for Clinical Excellence.

Naylor M, Brooten D, Jones R (1994) Comprehensive discharge planning for the hospitalised elderly: a randomised clinical trial. *Annals of Internal Medicine* **120**: 999–1006.

Naylor M (1990) Comprehensive discharge planning for hospitalised elderly: a pilot study. *Nursing Research* **39**: 156–161.

Neidlinger S, Scroggins K, Kennedy L (1987) Cost evaluation of discharge planning for hospitalised elderly. *Nursing Economics* **5**: 225–230.

Nelson D, Konosky K, Fleharty K (1996) The effects of an occupationally embedded exercise on bilaterally assisted supination in persons with hemiplegia. *American Journal of Occupational Therapy* **50**: 639–646.

Neville-Jan A, Piersol C, Keilhofner G, Davis K (1993) Adaptive equipment: a study of utilization after hospital discharge. *Occupational Therapy in Health Care* **8**: 3–18.

NINDS (The National Institute of Neurological Disorders and Stroke) rt-PA Stroke Study Group (2000) Effect of intravenous recombinant tissue plasminogen activator on ischemic stroke lesion size measured by computed tomography. *Stroke* **31**: 2912–2919.

Norris J, Hachinski V (1982) Misdiagnosis of stroke. *Lancet* **1**: 328–331.

North American Symptomatic Carotid Endarterectomy Trial Collaborators (NASCET) (1998) Benefit of carotid endarterectomy in patients with symptomatic moderate or severe stenosis. *New England Journal of Medicine* **337**: 1415–1425.

Norton B, Homer-Ward M, Donnelly M (1996) A randomised prospective comparison of percutaneous endoscopic gastrostomy and nasogastric tube feeding after acute dysphagic stroke. *British Medical Journal* **312**: 13–16.

Nouri F, Lincoln N (1993) Predicting diving performance stroke. *British Medical Journal* **307**: 482–483.

Nussbaum E, Heros R, Erickson D (1996) Cost-effectiveness of carotid endarterectomy. *Neurosurgery* **38** : 237–244.

Nuyens G, De Weerdt W, Spaepen A Jr, Kiekens C, Feys H (2002) Reduction of spastic hypertonia during repeated passive knee movements in stroke patients. *Archives of Physical Medicine and Rehabilitation* **83**: 930–935.

O'Mahony P, Rodgers H, Thomson R (1997) Satisfaction with information and advice received by stroke patients. *Clinical Rehabilitation* **11**: 68–72.

O'Mahony P, Rodgers H, Thomson R (1998) Is the SF-36 suitable for assessing health status of older stroke patients. *Age and Ageing* **27**: 19–22.

O'Rourke S, MacHale S, Signorini D, Dennis M (1998) Detecting psychiatric morbidity after stroke: comparison of the GHQ and the HAD Scale. *Stroke* **29**: 980–985.

Odderson I, Keaton J, McKenna B (1995) Swallow management in patients on an acute stroke pathway: quality is cost effective. *Archives of Physical Medicine and Rehabilitation* **76**: 1130–1133.

Ohman J, Heiskanen O (1989) Timing of operation for ruptured supratentorial aneurysms: a prospective randomized study. *Journal of Neurosurgery* **70**: 55–60.

Outpatient Service Trialists (2004) Therapy-based rehabilitation services for stroke patients at home (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Page S, Sisto S, Levine P, Johnston M, Hughes M (2001) Modified constraint induced therapy: a randomized feasibility and efficacy study. *Journal of Rehabilitation Research and Development* **38**: 583–590.

Pain H, McLellan D (1990) The use of individualised booklets after a stroke. *Clinical Rehabilitation* **4**: 265–272.

Palomaki H, Kaste M, Berg A (1999) Prevention of post-stroke depression: one year randomised placebo controlled double blind trial of mianserin with 6 month follow up after therapy. *Journal of Neurology, Neurosurgery and Psychiatry* **66**: 490–494.

Paolucci S, Grasso M, Antonucci G, Bragoni M *et al* (2001) Mobility status after inpatient stroke rehabilitation: 1-year follow-up and prognostic factors. *Archives of Physical Medicine and Rehabilitation* **82**: 2–8.

Parfrey P, Gardner E, Vavasour H (1994) The feasibility and efficacy of early discharge planning initiated by the admitting department in two acute care hospitals. *Clinical and Investigative Medicine* **17**: 88–96.

Park J, Hopwood V, White A, Ernst E (2001) Effectiveness of acupuncture for stroke: a systematic review. *Journal of Neurology* **248**: 558–563.

Parry R, Lincoln N, Vass C (1999) Effect of severity of arm impairment on response to additional physiotherapy early after stroke. *Clinical Rehabilitation* **13**: 187–198.

Partridge C, Edwards S, Mee R, van Langenberghe H (1990) Hemiplegic shoulder pain: a study of two methods of physiotherapy treatment. *Clinical Rehabilitation* **4**: 43–49.

Partridge C, Mackenzie M, Edwards S, Reid A *et al* (2000) Is dosage of physiotherapy a critical factor in deciding patterns of recovery from stroke? A pragmatic randomized controlled trial. *Physiotherapy Research International* **5**: 230–240.

Patel M, Potter J, Perez I, Kalra L (1998) The process of rehabilitation and discharge planning in stroke: a controlled comparison between stroke units. *Stroke* **29**: 2484–2487.

Patel A, Knapp M, Evans A *et al* (2004) Training care givers of stroke patients: economic evaluation. *British Medical Journal* **328**: 1102–1104.

Pedersen H, Bakke S, Hald J, Skalpe I *et al* (2001) CTA in patients with acute subarachnoid haemorrhage. A comparative study with selective, digital angiography and blinded, independent review. *Acta Radiologica* **42**: 43–49.

Penman J, Thomson M (1998) A review of the textured diets developed for the management of dysphagia. *Journal of Human Nutrition and Dietetics* **11**: 51–60.

Perennou D, Leblond C, Amblard B, Micallef J *et al* (2001) Transcutaneous electric nerve stimulation reduces neglect-related postural instability after stroke. *Archives of Physical Medicine and Rehabilitation* **82**: 440–448.

Perez I, Smithard D, Davies H, Kalra L (1998) Pharmacological treatment of dysphagia in stroke. *Dysphagia* **13**: 12–16.

Perry L, Love C (2001) Screening for dysphagia and aspiration in acute stroke: a systematic review. *Dysphagia* **16**: 7–18.

Petruk K, West M, Mohr G, Weir B *et al* (1988) Nimodipine treatment in poor-grade aneurysm patients. Results of a multicenter double-blind placebo-controlled trial. *Journal of Neurosurgery* **68**: 505–517.

Peurala S, Pitkanen K, Sivenius J, Tarkka I (2002) Cutaneous electrical stimulation may enhance sensorimotor recovery in chronic stroke. *Clinical Rehabilitation* **16**: 709–716.

Pickard J, Murray G, Illingworth R, Shaw M *et al* (1989) Effect of oral Nimodipine on cerebral infarction and outcome after subarachnoid haemorrhage: British Aneurysm Nimodipine Trial. *British Medical Journal* **298**: 636–642.

Pirozzo S, Summerbell C, Cameron C, Glasziou P (2004) Advice on low-fat diets for obesity (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Platz T, Winter T, Muller N, Pinkowski C *et al* (2001a) Arm ability training for stroke and traumatic brain injury patients with mild arm paresis: a single-blind, randomized, controlled trial. *Archives of Physical Medicine and Rehabilitation* **82**: 961–968.

Platz T, Bock S, Prass K (2001b) Reduced skilfulness of arm motor behaviour among motor stroke patients with good clinical recovery: does it indicate reduced automaticity? Can it be improved by unilateral or bilateral training? A kinematic motion analysis study. *Neuropsychologia* **39**: 687–698.

Plehn J, Davis B, Sacks F, Rouleau J *et al* (1999) Reduction of stroke incidence after myocardial infarction with pravastatin: the cholesterol and recurrent events (CARE) study. The Care Investigators. *Circulation* **99**: 216–223.

Poeck K, Humer W, Wilmess K (1989) Outcome of intensive language treatment in aphasia. *Aphasiology* **54**: 471–479.

Pohl M, Mehrholz J, Ritschel C, Ruckriem S (2002) Speed-dependent treadmill training in ambulatory hemiparetic stroke patients: a randomized controlled trial. *Stroke* **33**: 553–558.

Pollock A, Baer G, Pomeroy V, Langhorne P (2004) Physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Poloniecki J (1998) Half of all doctors are below average. *British Medical Journal* **316**: 1734–1736.

Poloniecki J, Valencia O, Littlejohns P (1998) Cumulative risk adjusted mortality chart for detecting changes in death rate: observational study of heart surgery. *British Medical Journal* **316**: 1697–1700.

Poole J, Whitney S (1990) The effectiveness of inflatable pressure splints on motor function in stroke patients. *Occupational Therapy Journal of Research* **10**: 360–366.

Popovic M, Popovic D, Sinkjaer T, Stefanovic A, Schwirtlich L (2002) Restitution of reaching and grasping promoted by functional electrical therapy. *Artificial Organs* **26**: 271–275.

Post-Stroke Antihypertensive Treatment Study (1995) Post stroke antihypertensive treatment study: a preliminary result. *Chinese Medical Journal* **108**: 710–717.

Potter J, Langhorne P, Roberts M (1998) Routine protein energy supplementation in adults: systematic review. *British Medical Journal* **317**: 495–501.

Pound P, Gompertz P, Ebrahim S (1998) A patient-centred study of the consequences of stroke. *Clinical Rehabilitation* **12**: 338–347.

Pound P, Tilling K, Rudd A, Wolfe C (1999) Does patient satisfaction reflect differences in care received after stroke. *Stroke* **30**: 49–55.

Poustie VJ, Rutherford P (2004) Dietary treatment for familial hypercholesterolaemia (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Powell J, Pandyan A, Granat M (1999) Electrical stimulation of wrist extensors in post-stroke hemiplegia. *Stroke* **30**: 1384–1389.

Prasad K, Shrivastava A (2000) Surgery for primary supratentorial intracerebral haemorrhage (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Price C, Pandyan A (2000) Electrical stimulation for preventing and treating post-stroke shoulder pain (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

PROGRESS Collaborative Group (2001) Randomized trial of a perindopril-based blood-pressure-lowering regimen among 6105 individuals with previous stroke or transient ischaemic attack. *Lancet* **358**: 1033–1041.

Qizilbash N, Lewington S, Lopez-Arrieta J (2004) Corticosteroids for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Raffaele R, Rompello L, Vecchio I (1996) Trazodone therapy of post-stroke depression. *Archives of Gerontology and Geriatrics* **5**: 217–220.

Rapoport J, Eerd M (1989) Impact of physical therapy weekend coverage on length of stay in an acute care community hospital. *Physical Therapy* **69**: 32–37.

Rashid P, Leonardi-Bee J, Bath P (2003) Blood pressure reduction and secondary prevention of stroke and other vascular events: a systematic review. *Stroke* **34**: 2741–2749.

Rasmussen A, Poulsen M, Sorensen K, Qvitzau S, Bech P (2003) A double-blind, placebo-controlled study of sertraline in the prevention of depression in stroke patients. *Psychosomatics* **44**: 216–221.

Raynor D, Booth T, Blenkinsopp A (1993) Effects of computer generated reminder charts on patients' compliance with drug regimens. *British Medical Journal* **306**: 1158–1161.

Reding M, Orto L, Winter S (1986) Anti-depressant therapy after stroke: a double blind study. *Archives of Neurology* **43**: 763–765.

Reilly H (1996) Screening for nutritional risk. *Proceedings of the Nutritional Society* **55**: 841–853.

Reiter F, Danni M, Lagalla G (1998) Low-dose botulinum toxin with ankle taping for the treatment of spastic equinovarus foot after stroke. *Archives of Physical Medicine and Rehabilitation* **79**: 532–535.

Ricci S, Celani M, La Rosa F (1991) SEPIVAC: a community based study of stroke incidence in Umbria, Italy. *Journal of Neurology, Neurosurgery and Psychiatry* **54**: 695–698.

Ricci S, Celani M, Cantisani A, Righetti E (2004) Piracetam for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Rice P, Paull A, Muller D (1987) An evaluation of a social support group for spouses of aphasic partners. *Aphasiology* **1**: 247–256.

Rice V, Stead L (2004) Nursing interventions for smoking cessation (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Richards C, Malouin F, Wood-Dauphinee S (1993) Task-specific physical therapy for optimisation of gait recovery in acute stroke patients. *Archives of Physical Medicine and Rehabilitation* **74**: 612–620.

Richards S, Coast J, Gunnell D (1998) Randomised controlled trial comparing effectiveness and acceptability of an early discharge, hospital at home scheme with acute hospital care. *British Medical Journal* **316**: 1796–1801.

Righetti E, Celani M, Cantisani T, Sterzi R *et al* (2004) Glycerol for acute stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Robertson I, McMillan T, MacLeod E, Edgeworth J, Brock D (2002) Rehabilitation by limb activation training (LAT) reduces impairment in unilateral neglect patients: a single blind RCT. *Neuropsychological Rehabilitation* **12**: 439–454.

Robey R (1998) A meta-analysis of clinical outcomes in the treatment of aphasia. *Journal of Speech, Language and Hearing Research* **41**: 172–187.

Robinson R, Parikh R, Lipsey J (1993) Pathological laughing and crying following stroke: validation of a measurement scale and a double blind treatment study. *American Journal of Psychiatry* **150**: 286–293.

Rockwood K, Stolee P, Fox R (1993) Use of goal attainment scaling in measuring clinically important change in the frail elderly. *Journal of Clinical Epidemiology* **46**: 1113–1118.

Rockwood K, Joyce B, Stolee P (1997) Use of goal attainment scaling in measuring clinically important change in cognitive rehabilitation patients. *Journal of Clinical Epidemiology* **50**: 581–588.

Roderick P, Low J, Day R, Peasgood T *et al* (2001) Stroke rehabilitation after hospital discharge: a randomized trial comparing domiciliary and day-hospital care. *Age and Ageing* **30**: 303–310.

Rodgers H, Soutter J, Kaiser W, Pearson P *et al* (1997) Early supported discharge following acute stroke: pilot study results. *Clinical Rehabilitation* **11**: 280–287.

Rodgers H, Dennis M, Cohen D, Rudd A, British Association of Stroke Physicians (2003a) British Association of Stroke Physicians: benchmarking survey of stroke services. *Age and Ageing* **32**: 211–217.

Rodgers H, Mackintosh J, Price C, Wood R *et al* (2003b) Does an early increased-intensity interdisciplinary upper limb therapy programme following acute stroke improve outcome? *Clinical Rehabilitation* **17**: 579–589.

Roding J, Lindstrom B, Malm J, Ohman A (2003) Frustrated and invisible – younger stroke patients' experiences of the rehabilitation process. *Disability and Rehabilitation* **25**: 867–874.

Rodriquez A, Black P, Kile K *et al* (1996) Gait training efficacy using a home-based practice model in chronic hemiplegia. *Archives of Physical Medicine & Rehabilitation* **77**: 801–805.

Ronning O, Guldvog B (1998a) Stroke units versus general medical wards, I: twelve- and eighteen-month survival: a randomized, controlled trial. *Stroke* **29**: 58–62.

Ronning O, Guldvog B (1998b) Stroke unit versus general medical wards, II: neurological deficits and activities of daily living. A quasi-randomised controlled trial. *Stroke* **29**: 586–590.

Ronning O, Guldvog B (1998c) Outcome of subacute stroke rehabilitation: a randomized controlled trial. *Stroke* **29**: 779–784.

Ronning O, Guldvog B (1999) Should stroke victims routinely receive supplemental oxygen? A quasi-randomized controlled trial. *Stroke* **30**: 2033–2037.

Ronning O, Guldvog B, Stavem K (2001) The benefit of an acute stroke unit in patients with intracranial haemorrhage: a controlled trial. *Journal of Neurology, Neurosurgery and Psychiatry* **70**: 631–634.

Roos Y, Beenen L, Groen R, Albrecht K, Vermeulen M (1997) Timing of surgery in patients with aneurysmal subarachnoid haemorrhage: rebleeding is still the major cause of poor outcome in neurosurgical units that aim at early surgery. *Journal of Neurology, Neurosurgery and Psychiatry* **63**: 490–493.

Roos Y, Rinkel G, Vermeulen M, Algra A, van Gijn J (2004) Antifibrinolytic therapy for aneurysmal subarachnoid haemorrhage (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Roper T, Redford S, Tallis R (1999) Intermittent compression for the treatment of the oedematous hand in hemiplegic stroke: a randomized controlled trial. *Age and Ageing* **28**: 9–13.

Rose V, Shah S (1987) A comparative study on the immediate effects of hand orthoses on reduction of hypertonus. *Australian Journal of Occupational Therapy* **34**: 59–64.

Rose F, Brooks B, Attree E, Parslow D *et al* (1999) A preliminary investigation into the use of virtual environments in memory retraining after vascular brain injury: indications for future strategy? *Disability and Rehabilitation* **21**: 548–554.

Rothwell P, Warlow C (1999) Prediction of benefit from carotid endarterectomy in individual patients: a risk-modelling study. European Carotid Surgery Trialists' Collaborative Group. *Lancet* **353**: 2105–2110.

Rothwell P, Gibson R, Warlow C on behalf of the European Carotid Surgery Trialists' Collaborative Group (2000) Interrelation between plaque surface morphology and degree of stenosis on carotid angiograms and the risk of ischemic stroke in patients with symptomatic carotid stenosis. *Stroke* **31**: 615–621.

Rothwell P, Eliasziw M, Gutnikov S, Fox A *et al* for the Carotid Endarterectomy Trialists' Collaboration (2003a) Analysis of pooled data from the randomised controlled trials of endarterectomy for symptomatic carotid stenosis. *Lancet* **361**: 107–116.

Rothwell P, Gutnikov S, Warlow C, European Carotid Surgery Trialists Collaboration (2003b) Reanalysis of the final results of the European Carotid Surgery Trial. *Stroke* **34**: 514–523.

Rothwell P, Howard S, Spence J and Carotid Endarterectomy Trialists' Collaboration (2003c) Relationship between blood pressure and stroke risk in patients with symptomatic carotid occlusive disease. *Stroke* **34**: 2583–2590.

Rothwell P, Eliasziw M, Gutnikov S *et al* and Carotid Endarterectomy Trialists' Collaboration (2004) Endarterectomy for symptomatic carotid stenosis in relation to clinical subgroups and timing of surgery. *Lancet* **363**: 915–924.

Rousseaux M, Kozlowski O, Froger J (2002) Efficacy of botulinum toxin A in upper limb function of hemiplegic patients. *Journal of Neurology* **249**: 76–84.

Royal College of Nursing (2002) *RCN Code of practice for patient handling. 2nd edition*. 2002. London: Royal College of Nursing.

Royal College of Physicians (1995) *Incontinence: causes, management and provision of services. A report of the Royal College of Physicians London*. London: RCP.

Royal College of Physicians (1998) *Promoting continence: clinical audit scheme for the management of urinary and faecal incontinence*. London: RCP.

Royal College of Physicians (2001) *Working for patients*. London: RCP.

Royal College of Physicians (2002) *Guidelines for the use of botulinum toxin (BTX) in the management of adult spasticity*. London: RCP.

Royal College of Physicians of Edinburgh (1998) Royal College of Physicians of Edinburgh Consensus Conference on Medical Management of Stroke, 26–27 May 1998. *Age and Ageing* **27**: 665–666.

Royal College of Physicians of Edinburgh (2000) *Consensus conference on stroke treatment and service delivery*. Edinburgh: RCPE.

Royal College of Radiologists (2003) *Making the best use of a department of clinical radiology*. London: RCR.

Royal College of Speech and Language Therapists (2002) *Core clinical guidelines*. London: RCSLT.

Royal College of Speech and Language Therapists (2004) *Clinical guideline for disorders of feeding, eating and swallowing*. London: RCSLT.

Royal College of Speech and Language Therapists and The British Dietetic Association (2002) *National descriptors for texture modification in adults*. London: RCSLT.

Rudd A, Wolfe C, Tilling K, Beech R (1997) Randomised controlled trial to evaluate early discharge scheme for patients with stroke. *British Medical Journal* **315**: 1039–1044.

Rudd AG, Irwin P, Rutledge Z (1999) The national sentinel audit of stroke: a tool for raising standards of care. *Journal of the Royal College of Physicians London* **33**: 460–464.

Rudd A, Lowe D, Irwin P, Rutledge Z, Pearson M (2001) National stroke audit: a tool for change? *Quality in Health Care* **10**: 141–151.

Ruff R, Yarnell S, Marinos J (1999) Are stroke patients discharged sooner if in-patient rehabilitation services are provided seven v six days per week? *American Journal of Physical Medicine and Rehabilitation* **78**: 143–146.

Sackley C, Lincoln N (1997) Single-blind randomised controlled trial of visual feedback after stroke: effects on stance symmetry and function. *Disability and Rehabilitation* **19**: 536–546.

Sampaio C, Ferreira J, Pinto A (1997) Botulinum toxin type A for the treatment of arm and hand spasticity in stroke patients. *Clinical Rehabilitation* **11**: 3–7.

Sandercock P, Allen C, Corston R (1985) Clinical diagnosis of intracranial haemorrhage using Guy's Hospital score. *British Medical Journal* **291**: 1675–1677.

Sandercock P, Mielke O, Liu M, Counsell C (2004) Anticoagulants for preventing recurrence following presumed non-cardioembolic ischaemic stroke or transient ischaemic attack (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Sandercock P, Gubitz G, Foley P, Counsell C (2004) Antiplatelet therapy for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Sarno M, Sarno J, Diller L (1972) The effect of hyperbaric oxygen on communication function in adults with aphasia secondary to stroke. *Journal of Speech and Hearing Research* **15**: 42–48.

Sato Y, Asoh T, Kaji M, Oizumi K (2000) Beneficial effect of intermittent cyclical etidronate therapy in hemiplegic patients following an acute stroke. *Journal of Bone and Mineral Research* **15**: 2487–2494.

Saunders, DH, Greig, CA, Young, A, Mead, GE (2004). Physical fitness training for stroke patients (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Saxena R, Lewis S, Berge E, Sandercock P, Koudstaal P and for the International Stroke Trial Collaborative Group (2001) Risk of early death and recurrent stroke and effect of heparin in 3169 patients with acute ischaemic stroke and atrial fibrillation in the international stroke trial. *Stroke* **32**: 2333–2337.

Schauer M, Steingruber W, Mauritz K (1996) The effect of music on gait symmetry in stroke patients walking on the treadmill. *Biomedizinische Technik* **41**: 291–296.

Schauer M, Mauritz K (2003) Musical Motor Feedback (MMF) in walking hemiparetic stroke patients: randomized trials of gait improvement. *Clinical Rehabilitation* **17**: 713–722.

Scheidtmann K, Fries W, Muller F, Koenig E (2001) Effect of Levodopa in combination with physiotherapy on functional motor recovery after stroke: a prospective, randomised, double-blind study. *Lancet* **358**: 787–790.

Schiffer RB, Herndon RM, Rudick RA (1985) Treatment of pathologic laughing and weeping with Amitriptyline. *New England Journal of Medicine* **312**: 1480–1482.

Schleenbaker R, Mainous A (1993) Electromyographic biofeedback for neuromuscular re-education in the hemiplegic stroke patient: a meta-analysis. *Archives of Physical Medicine and Rehabilitation* **74**: 1301–1304.

Schoettke H (1997) Rehabilitation von Aufmerksamkeits storungen nach einem Schlagenfall – Effectivitat eines verhaltensmedizinisch-neuropsychologischen Aufmerksamkeitstrainings. *Verhaltenstherapie* **7**: 21–23.

Scholte op Reimer W, de Haan R, van den Bos G (1996) Patients' satisfaction with care after stroke: relation with characteristics of patients and care. *Quality in Healthcare* **5**: 144–150.

Scholte op Reimer W, de Haan R, Pijnenborg J (1998a) Assessment of burden in partners of stroke patients with sense of competence questionnaire. *Stroke* **29**: 373–379.

Scholte op Reimer W, de Haan R, Rijnders P (1998b) The burden of caregiving in partners of long-term stroke survivors. *Stroke* **29**: 1605–1611.

Schrader J, Luders S, Kulschewski A *et al* and Acute Candesartan Cilexetil Therapy in Stroke Survivors Study Group (2003) The ACCESS Study: evaluation of acute candesartan cilexetil therapy in stroke survivors. *Stroke* **34**: 1699–1703.

Schultz S, Castillo C, Kosner J, Robinson R (1997) Generalised anxiety and depression: assessment over 2 years after stroke. *American Journal of Geriatric Psychiatry* **5**: 229–237.

Scott J, Robinson G, French J, O'Connell J, Alberti K, Gray C (1999) Glucose potassium insulin infusions in the treatment of acute stroke patients with mild to moderate hyperglycaemia. The Glucose Insulin in Stroke Trial (GIST). *Stroke* **30**: 793–799.

Scottish Intercollegiate Guidelines Network (SIGN) (2001) *SIGN 50: a guideline developers' handbook*. Edinburgh: SIGN.

Segal J, McNamara R, Miller M, Powe N *et al* (2004) Anticoagulants or antiplatelet therapy for non-rheumatic atrial fibrillation and flutter (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Sellars C, Hughes T, Langhorne P (2004) Speech and language therapy for dysarthria due to non-progressive brain damage (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Shah S, Vanclay F, Cooper B (1990) Efficiency, effectiveness and duration of stroke rehabilitation. *Stroke* **21**: 241–246.

Sharp S, Brouwer B (1997) Isokinetic strength training of the hemiparetic knee: effects on function and spasticity. *Archives of Physical Medicine and Rehabilitation* **78**: 1231–1236.

Shepperd S, Harwood D, Jenkinson C (1998a) Randomised controlled trial comparing hospital at home care with inpatient hospital care. I: three month follow-up of health outcomes. *British Medical Journal* **316**: 1786–1791.

Shepperd S, Harwood D, Gray A (1998b) Randomised controlled trial comparing hospital at home care with inpatient hospital care. II: cost minimisation analysis. *British Medical Journal* **316**: 1791–1796.

Shepperd S, Iliffe S (2004) Hospital at home versus in-patient hospital care (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Sherman D, Atkinson R, Chippendale T, Levin K *et al* (2000) Intravenous ancrod for treatment of acute ischemic stroke: the STAT study: a randomized controlled trial. Stroke treatment with ancrod trial. *Journal of the American Medical Association* **283**: 2395–2403.

Silagy C, Lancaster T, Mant D, Fowler G (2004) Nicotine replacement therapy for smoking cessation (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Simon J, Hsia J, Cauley J, Richards C *et al* (2001) Postmenopausal hormone therapy and risk of stroke: the Heart and Estrogen-Progestin Replacement Study (HERS). *Circulation* **103**: 638–642.

Simpson D, Alexander D, O'Brien C (1996) Botulinum toxin type A in the treatment of upper extremity spasticity: a randomised, double-blind, placebo-controlled trial. *Neurology* **46**: 1306–1310.

Slade A, Tennant A, Chamberlain M (2002) A randomised controlled trial to determine the effect of intensity of therapy upon length of stay in a neurological rehabilitation setting. *Journal of Rehabilitation Medicine* **34**: 260–266.

Smania N, Girardi F, Domenicali C, Lora E, Aglioti S (2000) The rehabilitation of limb apraxia: a study in left-brain-damaged patients. *Archives of Physical Medicine and Rehabilitation* **81**: 379–388.

Smith K (1979) Biofeedback in strokes. *Australian Journal of Physiotherapy* **25**: 155–161.

Smith D, Goldenberg E, Ashburn A (1981a) Remedial therapy after stroke: a randomised controlled trial. *British Medical Journal* **282**: 517–520.

Smith M, Walton M, Garraway W (1981b) The use of aids and adaptations in a study of stroke rehabilitation. *Health Bulletin, (Edinburgh)* **39**: 98–106.

Smith G, Silver K, Goldberg A, Macko R (1999) 'Task-oriented' exercise improves hamstring strength and spastic reflexes in chronic stroke patients. *Stroke* **30**: 2112–2118.

Smithard D, O'Neill P, Park C (1996) Complications and outcome after acute stroke: does dysphagia matter. *Stroke* **27**: 1200–1204.

Sneeuw KCA, Aaronson NK, de Haan RJ, Limburg M (1997) Assessing quality of life after stroke: the value and limitations of proxy ratings. *Stroke* **28**: 1541–1549.

Sneeuw K, Sprangers M, Aaronson N (2002) The role of health care providers and significant others in evaluating the quality of life of patients with chronic disease. *Journal of Clinical Epidemiology* **55**: 1130–1143.

Snels I, Beckerman H, Twisk J, Dekker J *et al* (2000) Effect of triamcinolone acetonide injections on hemiplegic shoulder pain : a randomized clinical trial. *Stroke* **31**: 2396–2401.

Snow B, Tsui J, Bhatt M (1990) Treatment of spasticity with botulinum toxin: a double-blind study. *Annals of Neurology* **28**: 512–515.

Sonde L, Fernaeus S, Nilsson C, Viitanen M (1998) Stimulation with low frequency (1.7 Hz) tanscutaneous electric nerve stimulation (Low-TENS) increases motor function of the post-stroke paretic arm. *Scandinavian Journal of Rehabilitation Medicine* **30**: 95–99.

Sonde L, Kalimo H, Fernaeus S, Viitanen M (2000) Low TENS treatment on post-stroke paretic arm: a three-year follow-up. *Clinical Rehabilitation* **14**: 14–19.

Sonde L, Nordstrom M, Nilsson C, Lokk J, Viitanen M (2001) A double-blind placebo-controlled study of the effects of amphetamine and physiotherapy after stroke. *Cerebrovascular Diseases* **12**: 253–257.

Sonn U, Davegardh H, Lindskog A, Steen B (1996) The use and effectiveness of assistive devices in an elderly urban population. *Ageing: Clinical and Experimental Research* **8**: 176–183.

Sotaniemi K, Pyhtinen J, Myllyla V (1990) Correlation of clinical and computed tomographic findings in stroke patients. *Stroke* **21**: 1562–1566.

Splaingard M, Hutchins B, Sulton L, Chauduri G (1988) Aspiration in rehabilitation patients: videofluoroscopy vs bedside clinical assessment. *Archives of Physical Medicine and Rehabilitation* **69**: 637–640.

Stam J, de Bruijn S, DeVeber G (2004) Anticoagulation for cerebral sinus thrombosis (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Stegmayr B, Asplund K, Hulter-Asberg K, Norrving B *et al* (1999) Stroke units in their natural habitat: can results of randomized trials be reproduced in routine clinical practice? Riks-Stroke Collaboration. *Stroke* **30**: 709–714.

Stenstrom C (1994) Home exercise in rheumatoid arthritis functional class II: goal setting versus pain attention. *Journal of Rheumatology* **21**: 627–634.

Sterr A, Elbert T, Berthold I, Kolbel S *et al* (2002) Longer versus shorter daily constraint-induced movement therapy of chronic hemiparesis: an exploratory study. *Archives of Physical Medicine and Rehabilitation* **83**: 1374–1377.

Stineman M, Granger C (1998) Outcome, efficiency, and time trend pattern analyses for stroke rehabilitation. *American Journal of Physical Medicine and Rehabilitation* **77**: 193–201.

Stolee P, Rockwood K, Fox R, Streiner D (1992) The use of goal attainment scaling in a geriatric care setting. *Journal of the American Geriatrics Society* **40**: 574–578.

Stroke Prevention in Atrial Fibrillation Investigators (1996) Adjusted-dose warfarin versus low-intensity, fixed-dose warfarin plus aspirin for high risk patients with atrial fibrillation: stroke prevention in atrial fibrillation iii randomised clinical trial. *Lancet* **348**: 633–638.

Stroke Prevention in Reversible Ischaemia Trial (1997) A randomised trial of anticoagulants versus aspirin after cerebral ischaemia of presumed arterial origin. *Annals of Neurology* **42** : 857–865.

Stroke Unit Trialists' Collaboration (2004) Organised inpatient (stroke unit) care for stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Stuck AE, Siu AL, Wieland GD (1993) Comprehensive geriatric assessment: a meta-analysis of controlled trials. *Lancet* **342**: 1032–1036.

Sturm W, Willmes K (1991) Efficacy of a reaction training on various attentional and cognitive functions in stroke patients. *Neuropsychological Rehabilitation* **1**: 259–280.

Sukthankar S, Reddy N, Canilang E (1994) Design and development of portable biofeedback systems for use in oral dysphagia rehabilitation. *Medical Engineering and Physics* **16**: 430–435.

Sullivan K, Knowlton B, Dobkin B (2002) Step training with body weight support: effect of treadmill speed and practice paradigms on poststroke locomotor recovery. *Archives of Physical Medicine and Rehabilitation* **83**: 683–691.

Sunderland A, Tinson D, Bradley L, Fletcher D *et al* (1992) Enhanced physical therapy for arm function after stroke. *Journal of Neurology, Neurosurgery and Psychiatry* **55**: 530–535.

Sunderland A, Fletcher D, Bradley L (1994) Enhanced physical therapy for arm function after stroke: a one year follow-up study. *Journal of Neurology, Neurosurgery and Psychiatry* **57**: 856–858.

Svensson B, Christiansen L, Jepsen E (1992) Treatment of central facial nerve paralysis with electromyography biofeedback and taping of cheek: a controlled clinical trial. *Ugeskrift for Laeger* **154**: 3593–3596.

Sze F, Wong E, Or K, Lau J, Woo J (2002a) Does acupuncture improve motor recovery after stroke: a meta-analysis of randomised controlled trials. *Stroke* **33**: 2604–2619.

Sze F, Wong E, Yi X, Woo J (2002b) Does acupuncture have additional value to standard poststroke motor rehabilitation? *Stroke* **33**: 186–194.

Tangeman P, Banaitis D, Williams A (1990) Rehabilitation of chronic stroke patients: changes in functional performance. *Archives of Physical Medicine and Rehabilitation* **71**: 876–880.

Taub E, Miller N, Novack T, Cook I *et al* (1993) Technique to improve chronic motor deficit after stroke. *Archives of Physical Medicine and Rehabilitation* **74**: 347–354.

Taylor D, Barnett H, Haynes R, Ferguson G *et al* (1999) Low-dose and high-dose acetylsalicylic acid for patients undergoing carotid endarterectomy: a randomised controlled trial. ASA and carotid endarterectomy (ACE) trial collaborators. *Lancet* **353**: 2179–2184.

Teasell R, McRae M, Marchuk Y, Finestone H (1996) Pneumonia associated with aspiration following stroke. *Archives of Physical Medicine and Rehabilitation* **77**: 707–709.

Teasell R, McRae M, Finestone H (2000) Social issues in the rehabilitation of younger stroke patients. *Archives of Physical Medicine and Rehabilitation* **81**: 205–209.

Teixeira-da-Cunha-Filho I, Lim P, Qureshy H, Henson H *et al* (2001) A comparison of regular rehabilitation and regular rehabilitation with supported treadmill ambulation training for acute stroke patients. *Journal of Rehabilitation Research and Development* **38**: 245–255.

Teixeira-Salmela L, Olney S, Nadeau S, Brouwer B (1999) Muscle strengthening and physical conditioning to reduce impairment and disability in chronic stroke survivors. *Archives of Physical Medicine and Rehabilitation* **80**: 1211–1218.

Tekeoolu Y, Adak B, Goksoy T (1998) Effect of Transcutaneous electrical nerve stimulation (TENS) on Barthel Activities of Daily Living (ADL) Index score following stroke. *Clinical Rehabilitation* **12**: 277–280.

Thaut M, McIntosh G, Rice R (1997) Rhythmic facilitation of gait training in hemiparetic stroke rehabilitation. *Journal of Neurological Sciences* **151**: 207–212.

The Abciximab in Ischemic Stroke Investigators (2000) Abciximab in acute ischemic stroke: a randomized, double-blind, placebo-controlled, dose-escalation study. *Stroke* **31**: 601–609.

Theodorakis Y, Beneca A, Malliou P, Goudas M (1997) Examining psychological factors during injury rehabilitation. *Journal of Sport Rehabilitation* **6**: 355–363.

Tirilazad International Steering Committee (2004) Tirilazad for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Toni D, Duca R, Fiorelli M (1994) Pure motor hemiparesis and sensorimotor stroke: accuracy of very early clinical diagnosis of lacunar strokes. *Stroke* **25**: 92–96.

Towle D, Lincoln N, Mayfield L (1989) Service provision and functional independence in depressed stroke patients and the effect of social work intervention on these. *Journal of Neurology, Neurosurgery and Psychiatry* **52**: 519–522.

Trombly C, Wu C (1999) Effect of rehabilitation tasks on organization of movement after stroke. *American Journal of Occupational Therapy* **53**: 333–344.

Tucker M, Davidson J, Ogle S (1984) Day hospital rehabilitation: effectiveness and cost in the elderly: a randomised controlled trial. *British Medical Journal* **289**: 1209–1212.

Turner-Stokes L, Jackson D (2002) Shoulder pain after stroke: a review of the evidence base to inform the development of an integrated care pathway. *Clinical Rehabilitation* **16**: 276–298.

Twomey C (1978) Brain tumours in the elderly. *Age and Ageing* **7**: 138–145.

Tyson S, Ashburn A (1994) The influence of walking aids on hemiplegic gait. *Physiotherapy Theory and Practice* **10**: 77–86.

Tyson S (1998) The support taken through walking aids during hemiplegic gait. *Clinical Rehabilitation* **12**: 395–401.

Tyson S, Thornton H (2001) The effect of a hinged ankle foot orthosis on hemiplegic gait: objective measures and users' opinions. *Clinical Rehabilitation* **15**: 53–58.

Tyson S, Chissim C (2002) The immediate effect of handling technique on range of movement in the hemiplegic shoulder. *Clinical Rehabilitation* **16**: 137–140.

UK National External Quality Assessment Scheme for Immunochemistry Working Group (2003) National guidelines for analysis of cerebrospinal fluid for bilirubin in suspected subarachnoid haemorrhage. *Annals of Clinical Biochemistry* **40**: 481–488.

Vallet G, Ahmaidi S, Serres I (1997) Comparison of two training programmes in chronic airway limitation patients: standardised versus individualised protocols. *European Respiratory Journal* **10**: 114–122.

van Balkom A, Bakker A, Spinhoven P, Blaauw B *et al* (1997) A meta-analysis of the treatment of panic disorder with or without agoraphobia: a comparison of psychopharmacological, cognitive-behavioral, and combination treatments. *Journal of Nervous and Mental Disease* **185**: 510–516.

van den Heuvel E, de Witte L, Nooyen-Haazen I, Sanderman R *et al* (2000) Short-term effects of a group support program and an individual support program for caregivers of stroke patients. *Patient Education and Counseling* **40**: 109–120.

van den Heuvel E, de Witte L, Schure L, Sanderman R *et al* (2001) Risk factors for burn-out in caregivers of stroke patients, and possibilities for intervention. *Clinical Rehabilitation* **15**: 669–677.

van den Heuvel E, Witte L, Stewart R, Schure L *et al* (2002) Long-term effects of a group support program and an individual support program for informal caregivers of stroke patients: which caregivers benefit the most? *Patient Education and Counseling* **47**: 291–299.

van der Lee J, Wagenaar R, Lankhorst G, Vogelaar T *et al* (1999) Forced use of the upper extremity in chronic stroke patients; results from a single-blind randomised clinical trial. *Stroke* **30**: 2369–2375.

van der Lee J, Snels I, Beckerman H, Lankhorst G *et al* (2001) Exercise therapy for arm function in stroke patients: a systematic review of randomized controlled trials. *Clinical Rehabilitation* **15**: 20–31.

van der Worp H, Claus S, Bar P, Ramos L *et al* (2001) Reproducibility of measurements of cerebral infarct volume on CT scans. *Stroke* **32**: 424–430.

van Vliet P, Sheridan M, Kerwin D, Fentem P (1995) The influence of functional goals on the kinematics of reaching following stroke. *Neurology report* **19**: 11–16.

Vermeulen M, Lindsay K, Murray G, Cheah F *et al* (1984) Antifibrinolytic treatment in subarachnoid hemorrhage. *New England Journal of Medicine* **311**: 432–437.

Vestergaard K, Andersen G, Gottrup H, Kristensen B *et al* (2001) Lamotrigine for central poststroke pain: a randomized controlled trial. *Neurology* **56**: 184–190.

Victor C, Vetter N (1988) Preparing the elderly for discharge from hospital: a neglected aspect of patient care. *Age and Ageing* **17**: 155–163.

Viscoli C, Brass L, Kernan W, Sarrel P *et al* (2001) A clinical trial of estrogen-replacement therapy after ischemic stroke. *New England Journal of Medicine* **345**: 1243–1249.

Visintin M, Barbeau H, Korner-Bitensky N, Mayo N (1998) A new approach to retrain gait in stroke patients through body weight support and treadmill stimulation. *Stroke* **29**: 1122–1128.

Visser M, Koudstaal P, Erdman R (1995) Measuring quality of life in patients with myocardial infarction or stroke: a feasibility study of four questionnaires in The Netherlands. *Journal of Epidemiology and Community Health* **49**: 513–517.

Vissers M, Hasman A, van der Linden C (1996) Impact of a protocol processing system (ProtoVIEW) on clinical behaviour of residents and treatment. *International Journal of Biomedical Computing* **42**: 143–150.

Volpe B, Krebs H, Hogan N, Edelsteinn L *et al* (1999) Robot training enhanced motor outcome in patients with stroke maintained over 3 years. *Neurology* **53**: 1874–1876.

Volpe B, Krebs H, Hogan N, Edelstein L *et al* (2000) A novel approach to stroke rehabilitation: robot-aided sensorimotor stimulation. *Neurology* **54**: 1938–1944.

von Arbin M, Britton M, de Faire U (1981) Accuracy of bedside diagnosis of stroke. *Stroke* **12**: 288–293.

von Koch L, Widen-Holmqvist L, Kostulas V, Almazan J, de Pedro-Cuesta J (2000) A randomized controlled trial of rehabilitation at home after stroke in southwest Stockholm: outcome at six months. *Scandinavian Journal of Rehabilitation Medicine* **32**: 80–86.

von Koch L, de Pedro-Cuesta J, Kostulas V, Almazan J, Widen-Holmqvist L (2001) Randomized controlled trial of rehabilitation at home after stroke: one-year follow-up of patient outcome, resource use and cost. *Cerebrovascular Diseases* **12**: 131–138.

Wade D, Langton-Hewer R, Skilbeck C, Bainton D, Burns-Cox C (1985a) Controlled trial of a home-care service for acute stroke patients. *Lancet* **1**: 323–326.

Wade D, Langton-Hewer R (1985b) Hospital admission for acute stroke: who, for how long, and to what effect. *Journal of Epidemiology and Community Health* **39**: 347–352.

Wade D, Legh-Smith J, Langton-Hewer R (1986) Effects of living with and looking after survivors of a stroke. *British Medical Journal* **293**: 418–420.

Wade D, Collen F, Robb G, Warlow C (1992) Physiotherapy intervention late after stroke and mobility. *British Medical Journal* **304**: 609–613.

Wade D (1998a) Evidence relating to assessment in rehabilitation. *Clinical Rehabilitation* **12**: 183–186.

Wade D (1998b) Evidence relating to goal planning in rehabilitation. *Clinical Rehabilitation* **12**: 273–275.

Wade D (1999) Goal planning in stroke rehabilitation: how? *Topics in Stroke Rehabilitation* **6**: 16–36.

Wade D (2003) Selection criteria for rehabilitation services. *Clinical Rehabilitation* **17:** 115–118.

Wagenaar R, Meijer O, van Wieringen P (1990) The functional recovery of stroke: a comparison between neuro-developmental treatment and the Brunnstrom Method. *Scandinavian Journal of Rehabilitation Medicine* **22**: 1–8.

Wahlgren N, Ranasinha K, Rosolacci T, Franke C *et al* (1999) Clomethiazole Acute Stroke Study (CLASS): results of a randomized, controlled trial of clomethiazole versus placebo in 1360 acute stroke patients. *Stroke* **30**: 21–28.

Wahlgren N, Diez-Tejedor E, Teitelbaum J, Arboix A *et al* (2000a) Results in 95 hemorrhagic stroke patients included in CLASS, a controlled trial of clomethiazole versus placebo in acute stroke patients. *Stroke* **31**: 82–85.

Wahlgren N, Matias-Guiu J, Lainez J, Veloso F *et al* (2000b) The Clomethiazole Acute Stroke Study (CLASS): safety results in 1,356 patients with acute hemispheric stroke. *Journal of Stroke and Cerebrovascular Diseases* **9**: 158–165.

Waldron R, Bohannon R (1989) Weight distribution when standing: the influence of a single point cane in patients with stroke. *Physiotherapy Practice* **5**: 171–175.

Walker-Batson D, Smith P, Curtis S (1995) Amphetamine paired with physical therapy accelerates motor recovery after stroke: further evidence. *Stroke* **26**: 2254–2259.

Walker-Batson D, Curtis S, Natarajan R, Ford J *et al* (2001) A double-blind, placebo-controlled study of the use of amphetamine in the treatment of aphasia. *Stroke* **32**: 2093–2098.

Walker M, Drummond A, Lincoln N (1996) Evaluation of dressing practice for stroke patients after discharge from hospital: a crossover design study. *Clinical Rehabilitation* **10**: 23–31.

Walker M, Gladman J, Lincoln N (1999) Occupational therapy for stroke patients not admitted to hospital: a randomised controlled trial. *Lancet* **354**: 278–280.

Walker C, Brouwer B, Culham E (2000) Use of visual feedback in retraining balance following acute stroke. *Physical Therapy* **80**: 886–895.

Walker M, Hawkins K, Gladman J, Lincoln N (2001) Randomised controlled trial of occupational therapy at home: results at 1 year. *Journal of Neurology, Neurosurgery and Psychiatry* **70**: 267.

Wall J, Turnbull G (1987) Evaluation of out-patient physiotherapy and a home exercise program in the management of gait asymmetry in residual stroke. *Journal of Neurologic Rehabilitation* **1**: 115–123.

Wallace S, Roe B, Williams K, Palmer M (2004) Bladder training for urinary incontinence in adults (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Wanklyn P, Forster A, Young J (1996) Hemiplegic shoulder pain (HSP): natural history and investigation of associated features. *Disability and Rehabilitation* **18**: 497–501.

Wannamethee S, Shaper A, Whincup P, Walker M (1995) Smoking cessation and the risk of stroke in middle-aged men. *Journal of the American Medical Association* **274**: 155–160.

Wannamethee S, Shaper A, Walker M, Ebrahim S (1998) Lifestyle and 15 year survival free of heart attack, stroke and diabetes in middle-aged British men. *Archives of Internal Medicine* **158**: 2433–2440.

Wardlaw J, Keir SL, Dennis M (2003) The impact of delays in computed tomography of the brain on the accuracy of diagnosis and subsequent management in patients with minor stroke. *Journal of Neurology, Neurosurgery and Psychiatry* **74**: 77–81.

Wardlaw J, del Zoppo G, Yamaguchi T, Berge E (2004a) Thrombolysis for acute ischaemic stroke (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Wardlaw JM, Keir SL, Seymour J, Lewis S *et al* (2004b) What is the best imaging strategy for acute stroke? NHS Health Technology Assessment, Volume 8, No:1, 2004.

Webb P, Glueckauf R (1994) The effects of direct involvement in goal setting on rehabilitation outcome for persons with traumatic brain injuries. *Rehabilitation Psychology* **39**: 179–188.

Webb D, Fayad P, Wilbur C (1995) Effects of a specialised team on stroke care: the first two years of the Yale stroke program. *Stroke* **26**: 1353–1357.

Wei F, Mark D, Hartz A, Campbell C (1995) Are PRO discharge screens associated with post-discharge adverse outcomes. *Health Services Research* **30**: 489–506.

Wells P, Lensing A, Hirsh J (1994) Graduated compression stockings in the prevention of post-operative venous thromboembolism: a meta-analysis. *Archives of Internal Medicine* **154**: 67–72.

Wellwood I, Dennis M, Warlow C (1995) A comparison of the Barthel Index and the OPCS instrument used to measure outcome after stroke. *Age and Ageing* **24**: 54–57.

Werner R, Kessler S (1996) Effectiveness of an intensive outpatient rehabilitation program for postacute stroke patients. *American Journal of Physical Medicine and Rehabilitation* **75**: 114–120.

Werner C, Von Frankenberg S, Treig T, Konrad M, Hesse S (2002a) Treadmill training with partial body weight support and an electromechanical gait trainer for restoration of gait in subacute stroke patients: a randomized crossover study. *Stroke* **33**: 2895–2901.

Werner C, Bardeleben A, Mauritz K, Kirker S, Hesse S (2002b) Treadmill training with partial body weight support and physiotherapy in stroke patients: a preliminary comparison. *European Journal of Neurology* **9**: 639–644.

West R, Stockel S (1965) The effect of meprobamate on recovery from aphasia. *Journal of Speech and Hearing Research* **8**: 57–62.

Westwood M, Kelly S, Berry E, Bamford J *et al* (2002) Use of magnetic resonance angiography to select candidates with recently symptomatic carotid stenosis for surgery: systematic review. *British Medical Journal* **324**: 198–201.

Whelton P, Appel L, Espeland M (1998) Sodium reduction and weight loss in the treatment of hypertension in older persons: a randomised controlled trial of non-pharmacologic interventions in the elderly (TONE). *Journal of the American Medical Association* **279**: 839–846.

Whitall J, Waller S, Silver K, Macko R (2000) Repetitive bilateral arm training with rhythmic auditory cueing improves motor function in chronic hemiparetic stroke. *Stroke* **31**: 2390–2395.

Whitfield P, Kirkpatrick P (2004) Timing of surgery for aneurysmal subarachnoid haemorrhage (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Whurr R, Lorch M, Nye C (1992) A meta-analysis of studies carried out between 1946 and 1988 concerned with the efficacy of speech and language therapy treatment for aphasic patients. *European Journal of Disorders of Communication* **27**: 1–18.

Wiffen P, Collins S, McQuay H, Carroll D *et al* (2004) Anticonvulsant drugs for acute and chronic pain (Cochrane Review). In: *The Cochrane Library*, Issue 1, 2004. Chichester, UK: John Wiley and Sons.

Wikander B, Ekelund P, Milsom I (1998) An evaluation of multidisciplinary intervention governed by functional independence measure (FIM) in incontinent stroke patients. *Scandinavian Journal of Rehabilitation Medicine* **30**: 15–21.

Williams A (1994) What bothers caregivers of stroke victims. *Journal of Neuroscience Nursing* **26**: 155–161.

Williams B, Poulter N, Brown M, Davies M *et al* (2004) Guidelines for management of hyperstension: report of the fourth working party of the British Hypertension Society 2004 – BHS IV. *Journal of Human Hypertension* **18**: 139–185.

Wilson B, Emslie H, Quirk K, Evans J (2001) Reducing everyday memory and planning problems by means of a paging system: a randomised control crossover study. *Journal of Neurology, Neurosurgery, and Psychiatry* **70**: 477–482.

Winchester P, Montgomery J, Bowman B, Hislop H (1983) Effects of feedback stimulation training and cyclical electrical stimulation on knee extension in hemiparetic patients. *Physical Therapy* **63**: 1096–1103.

Wolf S, Catlin P, Blanton S (1994) Overcoming limitations in elbow movement in the presence of antagonist hyperactivity. *Physical Therapy* **74**: 826–835.

Wolfe C, Tilling K, Rudd A (2000) The effectiveness of community-based rehabilitation for stroke patients who remain at home: a pilot randomized trial. *Clinical Rehabilitation* **14**: 563–569.

Wolfe C, Rudd A, Howard R, Coshall C *et al* (2002) Incidence and case fatality rates of stroke subtypes in a multiethnic population: the South London stroke register. *Journal of Neurology, Neurosurgery and Psychiatry* **72**: 211–216.

Wong A, Lee M, Kuo J, Tang F (1997) The development and clinical evaluation of a standing biofeedback trainer. *Journal of Rehabilitation Research and Development* **34**: 322–327.

World Health Organisation (1978) Cerebrovascular disorders: a clinical and research classification. 43. Geneva, World Health Organization.

World Health Organisation (2001) *International classification of functioning, disability and health: ICF*. Geneva: World Health Organization.

Wu C, Trombly C, Lin K, Tickle-Degnen L (2000) A kinematic study of contextual effects on reaching performance in persons with and without stroke: influences of object availability. *Archives of Physical Medicine and Rehabilitation* **81**: 95–101.

Yekutiel M, Guttman E (1993) A controlled trial of the retraining of the sensory function of the hand in stroke patients. *Journal of Neurology, Neurosurgery and Psychiatry* **56**: 241–244.

Young J, Forster A (1992) The Bradford Community Stroke Trial: results at six months. *British Medical Journal* **304**: 1085–1089.

Young J, Forster A (1993) Day hospital and home physiotherapy for stroke patients: a comparative cost-effectiveness study. *Journal of the Royal College of Physicians of London* **27**: 252–258.

Young G, Sandercock P, Slattery J (1996) Observer variation in the interpretation of intra-arterial angiograms and the risk of inappropriate decisions about carotid endarterectomy. *Journal of Neurology, Neurosurgery and Psychiatry* **60**: 152–157.

Zuccarello M, Brott T, Derex L, Kothari R *et al* (1999) Early surgical treatment for supratentorial intracerebral hemorrhage: a randomized feasibility study. *Stroke* **30**: 1833–1839.

Index

D

E

F

G

H

I

L

M

N

O

P

Q

R

S

T

U

V

W

Y