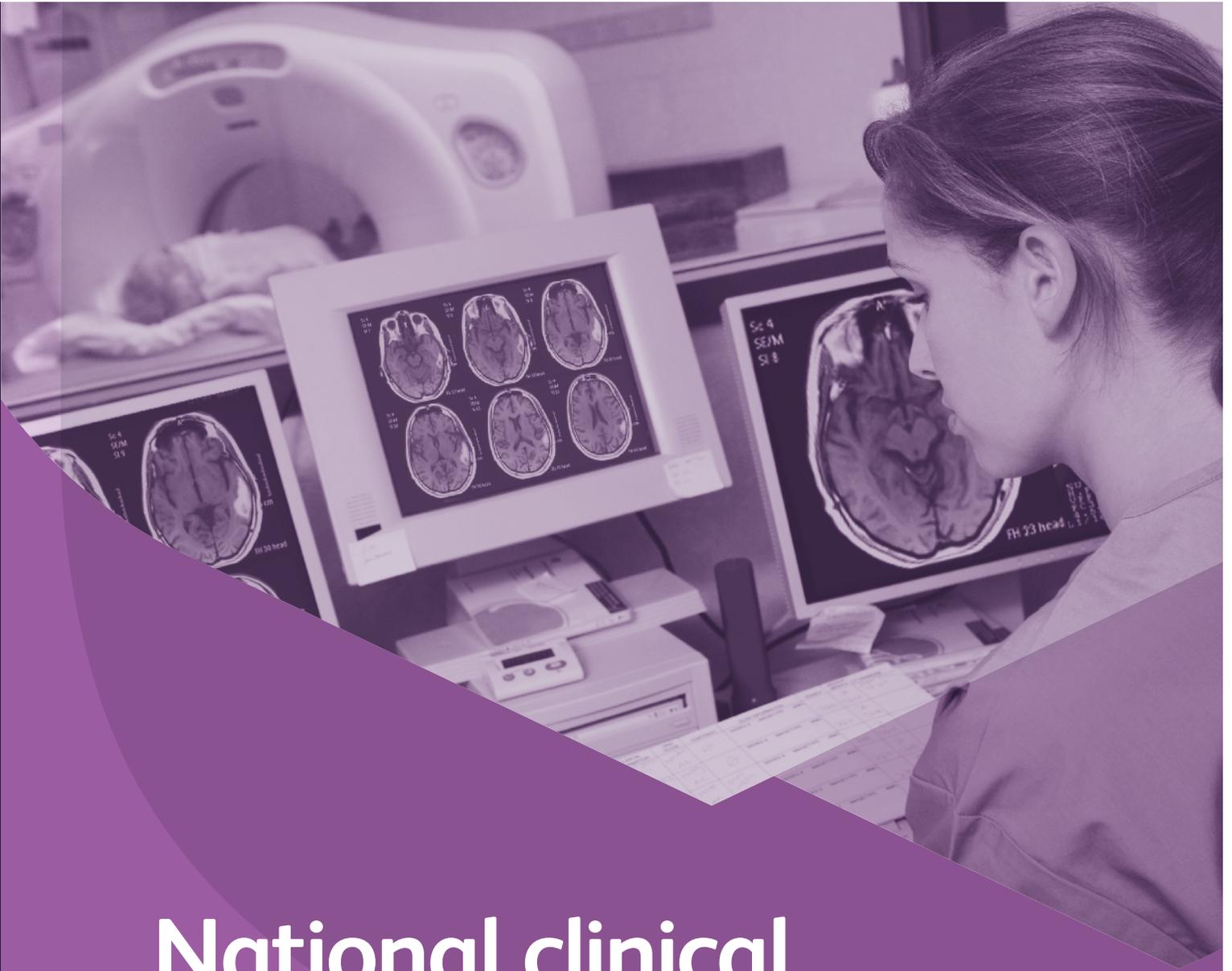




Royal College  
of Physicians



# National clinical guideline for stroke

Prepared by the Intercollegiate  
Stroke Working Party

**Fourth edition 2012**



Royal College  
of Physicians

# National clinical guideline for stroke

Fourth edition

September 2012

Prepared by the Intercollegiate  
Stroke Working Party

## The Royal College of Physicians

The Royal College of Physicians is a registered charity that aims to ensure high-quality care for patients by promoting the highest standards of medical practice. It provides and sets standards in clinical practice and education and training, conducts assessments and examinations, quality assures external audit programmes, supports doctors in their practice of medicine, and advises the government, public and the profession on healthcare issues.

## The Clinical Effectiveness and Evaluation Unit

The Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians runs projects that aim to improve healthcare in line with the best evidence for clinical practice: national comparative clinical audit, the measurement of clinical and patient outcomes, clinical change management and guideline development. All our work is carried out in collaboration with relevant specialist societies, patient groups and NHS bodies. The unit is self-funding, securing commissions and grants from various organisations, including the Department of Health and charities such as the Health Foundation.

### Citation for this document

Intercollegiate Stroke Working Party. *National clinical guideline for stroke*, 4th edition. London: Royal College of Physicians, 2012.

### Copyright

All rights reserved. No part of this publication may be reproduced in any form (including photocopying or storing it in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication) without the written permission of the copyright owner. Applications for the copyright owner's written permission to reproduce any part of this publication should be addressed to the publisher.

Copyright © Royal College of Physicians 2012

ISBN 978-1-86016-492-7

eISBN 978-1-86016-493-4

Review date: 2016

### Royal College of Physicians

11 St Andrews Place

Regent's Park

London NW1 4LE

[www.rcplondon.ac.uk](http://www.rcplondon.ac.uk)

Registered Charity No 210508

Typeset by Cambrian Typesetters, Camberley, Surrey

Printed in Great Britain, managed by TU ink Limited

# Contents

---

	The Intercollegiate Stroke Working Party	viii
	Conflicts of interest	x
	Preface	xi
	Key recommendations	xii
	Acknowledgements	xvi
	Acronyms and abbreviations	xvii
	Glossary	xviii
1	Introduction	1
	1.0 Introduction	1
	1.1 Scope	1
	1.2 Aims of the guideline	2
	1.3 Organisation of the guideline	2
	1.3.1 Chapter content	2
	1.3.2 Structure of each subject	3
	1.4 Definitions	4
	1.4.1 Duration of cerebrovascular events	5
	1.4.2 Resolved neurovascular events	5
	1.5 Context and use	5
	1.6 Methodology of guideline development	6
	1.6.1 Development of scope	6
	1.6.2 Searching the scientific literature	6
	1.6.3 Selection of articles for inclusion	7
	1.6.4 Assessing the quality of research	7
	1.6.5 From evidence to recommendation	7
	1.6.6 Strength of recommendation	8
	1.6.7 Peer review	8
	1.7 Models underlying guideline development	8
	1.7.1 Patient interactions – World Health Organization	8
	1.8 National Institute for Health and Clinical Excellence guidelines	9
	1.9 Participation in clinical research	9
	1.10 Cost of stroke care	10
	1.11 Licensing of drugs	10
	1.12 Updating the guideline	10
	1.13 Funding and conflicts of interest	10
	Table 1.1 Stroke management: WHO ICF framework and terminology	11
2	Commissioning of stroke services	13
	2.0 Introduction	13
	2.1 Structure – global cover	14

- 2.2 Commissioning acute stroke services 15
- 2.3 Commissioning secondary prevention services 16
- 2.4 Commissioning rehabilitation services 17
- 2.5 Commissioning in relation to the long-term consequences of stroke 17
  
- 3 Organisation of stroke services 19
  - 3.0 Introduction 19
  - 3.1 Overall organisation of acute services 19
  - 3.2 Specialist stroke services 20
  - 3.3 Resources 22
    - Table 3.1 Example of recommended staffing levels 22
  - 3.4 Telemedicine 23
  - 3.5 Location of service delivery 24
  - 3.6 Stroke services for younger adults 25
  - 3.7 Transfers of care – general 26
  - 3.8 Transfers of care – discharge from hospital 27
  - 3.9 Quality improvement (governance, audit) 28
  - 3.10 Service development 29
  - 3.11 Use of assessments/measures 30
  - 3.12 Goal setting 31
  - 3.13 Rehabilitation treatment approach 32
  - 3.14 Rehabilitation treatment quantity (intensity of therapy) 32
  - 3.15 End-of-life (palliative) care 34
  - 3.16 Treatments not mentioned in the guideline 34
  - 3.17 Improving public awareness of stroke 35
  
- 4 Acute phase care 37
  - 4.0 Introduction 37
  - 4.1 Prehospital care 37
  - 4.2 Initial diagnosis of acute transient event (TIA) 39
  - 4.3 Specialist diagnosis of acute transient event (TIA) 41
  - 4.4 Management of confirmed transient ischaemic attacks 42
  - 4.5 Diagnosis of acute stroke 44
  - 4.6 Immediate management of non-haemorrhagic stroke 45
  - 4.7 Immediate management of intracerebral haemorrhage 48
  - 4.8 Immediate diagnosis and management of subarachnoid haemorrhage 48
  - 4.9 Acute cervical arterial dissection 50
  - 4.10 Anticoagulation for people with acute stroke 50
  - 4.11 Cerebral venous thrombosis 52
  - 4.12 Early phase medical care of stroke – physiological monitoring and maintenance of homeostasis 52
  - 4.13 Initial, early rehabilitation assessment 54
  - 4.14 Deep vein thrombosis and pulmonary embolism 55

- 4.15 Early mobilisation 56
- 4.16 Positioning 57
- 4.17 Nutrition: feeding, swallowing and hydration 57
- 4.18 Bowel and bladder 58
- 5 Secondary prevention 61
  - 5.0 Introduction 61
  - 5.1 Identifying risk factors 61
  - 5.2 A personalised, comprehensive approach 62
  - 5.3 Lifestyle measures 63
  - 5.4 Blood pressure 65
  - 5.5 Antithrombotic treatment 66
  - 5.6 Lipid-lowering therapy 70
  - 5.7 Carotid stenosis 72
    - 5.7.1 Management of symptomatic carotid stenosis 72
    - 5.7.2 Management of asymptomatic carotid stenosis 74
  - 5.8 Treatment of unusual causes of stroke 75
    - 5.8.1 Vertebral artery disease 75
    - 5.8.2 Intracranial arterial disease 75
    - 5.8.3 Patent foramen ovale 75
    - 5.8.4 Cerebral venous sinus thrombosis 76
    - 5.8.5 Cervical artery dissection 76
    - 5.8.6 Antiphospholipid syndrome 76
  - 5.9 Oral contraception 77
  - 5.10 Hormone replacement therapy 77
- 6 Recovery phase from impairments and limited activities: rehabilitation 79
  - 6.0 Introduction 79
  - 6.1 General principles of rehabilitation 79
  - 6.2 Rehabilitation treatment quantity (intensity of therapy) 80
  - 6.3 Evaluating and stopping treatments 80
  - 6.4 Motor control – reduced movement, weakness and incoordination 81
  - 6.5 Sensation 81
  - 6.6 Exercise 82
  - 6.7 Arm re-education 83
  - 6.8 Gait retraining, treadmill retraining, walking aids (including orthoses) 84
  - 6.9 Balance impairment and risk of falling: assessment and intervention 85
  - 6.10 Impaired tone – spasticity and spasms 87
  - 6.11 Splinting (to prevent and treat contractures) 88
  - 6.12 Biofeedback 89
  - 6.13 Neuromuscular electrical stimulation (including functional electrical stimulation) 90
  - 6.14 Acupuncture 90
  - 6.15 Robotics 91
  - 6.16 Repetitive task training 91

6.17	Mental practice	92
6.18	Self-efficacy training	92
6.19	Pain management	93
	6.19.2 Shoulder pain and subluxation	94
	6.19.3 Neuropathic pain (central post-stroke pain)	95
	6.19.4 Musculoskeletal pain	96
6.20	Communication	96
	6.20.1 Aphasia	97
	6.20.2 Dysarthria	98
	6.20.3 Apraxia of speech	99
6.21	Swallowing problems: assessment and management	100
6.22	Oral health	102
6.23	Nutrition: assessment and management	103
6.24	Bowel and bladder impairment	103
6.25	Personal activities of daily living	104
6.26	Extended activities of daily living (domestic and community)	105
6.27	Driving	106
6.28	Visual impairments	106
6.29	Work and leisure	107
6.30	Social interaction	108
6.31	Sexual dysfunction	108
6.32	Personal equipment and adaptations	109
6.33	Environmental equipment and adaptations	110
6.34	Psychological care	111
6.35	Depression and anxiety	113
6.36	Emotionalism	115
6.37	Fatigue	115
6.38	Cognitive impairments – general	116
6.39	Attention and concentration	117
6.40	Memory	118
6.41	Spatial awareness (eg neglect)	119
6.42	Perception	120
6.43	Apraxia	121
6.44	Executive functioning	122
6.45	Mental capacity (decision-making by the patient)	122
6.46	Drugs affecting recovery/reduction of impairment	123
<b>7</b>	<b>Long-term management</b>	<b>125</b>
7.0	Introduction	125
7.1	Further rehabilitation	125
7.2	Promoting physical activity	126
7.3	Community integration and participation	126
7.4	Support (practical and emotional)	127

7.5 People with stroke in care homes 128

7.6 Carers (informal, unpaid) 129

### Profession-specific concise guidelines

Nursing concise guide 132

Nutrition and dietetics concise guide 140

Occupational therapy concise guide 145

Physiotherapy concise guide 153

Primary care concise guide 160

Psychology concise guide 168

Speech and language therapy concise guide 172

### Appendices

Appendix 1 Evidence table reviewers 181

Appendix 2 Peer reviewers 183

Appendix 3 National Stroke Strategy quality markers 186

References 189

Index 203

**Tables of evidence** Available online at [www.rcplondon.ac.uk/publications/national-clinical-guidelines-stroke](http://www.rcplondon.ac.uk/publications/national-clinical-guidelines-stroke)

# The Intercollegiate Stroke Working Party

---

## Chair

**Professor Anthony Rudd** Professor of stroke medicine, King's College London; consultant stroke physician, Guy's and St Thomas' NHS Foundation Trust

## Associate directors from the Stroke Programme at the Royal College of Physicians

**Professor Pippa Tyrrell** Professor of stroke medicine, University of Manchester; consultant stroke physician, Salford Royal NHS Foundation Trust

**Dr Geoffrey Cloud** Consultant stroke physician, honorary senior lecturer clinical neuroscience, St George's Healthcare NHS Trust, London

**Dr Martin James** Honorary associate professor, Peninsula College of Medicine and Dentistry; consultant stroke physician, Royal Devon and Exeter Hospital

## Association of Chartered Physiotherapists In Neurology

**Mrs Nicola Hancock** Lecturer in physiotherapy, Restorative Neurology Group, University of East Anglia

## AGILE – Professional Network of the Chartered Society of Physiotherapy

**Miss Louise Briggs** Allied health professional therapy consultant, St George's Healthcare NHS Trust, London

## Association of British Neurologists

**Dr Gavin Young** Consultant neurologist, The James Cook University Hospital, South Tees Hospitals NHS Foundation Trust

## British Association of Social Workers/National Institute for Health Research School for Social Care Research

**Professor Jill Manthorpe** Professor of social work, King's College London

## British Association of Stroke Physicians

**Dr Neil Baldwin** Consultant stroke physician, North Bristol NHS Trust

## British Association of Stroke Physicians

**Dr Peter Humphrey** Consultant neurologist, Walton Centre for Neurology and Neurosurgery

## British Society of Rehabilitation Medicine

**Professor Derick Wade** Consultant in rehabilitation medicine, The Oxford Centre for Enablement

## British Dietetic Association

**Ms Cheryl Hookway** Senior specialist dietitian – stroke, Imperial College Healthcare NHS Trust, London

## British Dietetic Association

**Dr Elizabeth Weekes** Consultant dietitian and research lead, Guy's and St Thomas' NHS Foundation Trust, London

## British Geriatrics Society/Stroke Research Network

**Professor Helen Rodgers** Professor of stroke care, Newcastle University

## British Primary Care Neurology Society

**Dr Helen Hosker** Clinical commissioning lead for stroke, NHS Manchester

## British Psychological Society

**Dr Peter Knapp** Senior lecturer, University of York

## British Psychological Society

**Dr Audrey Bowen** Senior lecturer in psychology, University of Manchester

## British Society of Neuroradiologists

**Dr Andrew Clifton** Interventional neuroradiologist, St George's Healthcare NHS Trust, London

## Chartered Society of Physiotherapy

**Dr Cherry Kilbride** Lecturer in physiotherapy, Centre for Research in Rehabilitation, Brunel University, London

College of Occupational Therapists and Special Section Neurological Practice

**Dr Judi Edmans** Senior research fellow, University of Nottingham

College of Occupational Therapists and Special Section Neurological Practice

**Professor Avril Drummond** Professor of healthcare research, University of Nottingham

Do Once and Share project

**Dr Helen Newton** Oxford University Hospitals NHS Trust

NHS Stroke Improvement Programme

**Dr Damian Jenkinson** National clinical lead, NHS Stroke Improvement Programme

NHS Stroke Improvement Programme

**Mr Ian Golton** Director, NHS Stroke Improvement Programme

NHS Stroke Improvement Programme

**Ms Sarah Gillham** National improvement lead, NHS Stroke Improvement Programme

Qualitative Research Advice

**Dr Chris McKeivitt** Qualitative stroke researcher and reader in social science and health, King's College London

Royal College of Nursing

**Mrs Diana Day** Stroke consultant nurse, Addenbrooke's Hospital, Cambridge University Hospitals NHS Foundation Trust

Royal College of Nursing

**Ms Amanda Jones** Stroke nurse consultant, Sheffield Teaching Hospitals NHS Foundation Trust

Royal College of Nursing

**Dr Christopher Burton** Senior research fellow in evidence based practice, Bangor University

Royal College of Radiologists

**Dr Philip White** Consultant interventional neuroradiologist, Western General Hospital, Edinburgh

Royal College of Speech & Language Therapists

**Ms Rosemary Cunningham** Speech and language therapy team manager, Royal Derby Hospital (Derbyshire Community Health Services)

Royal College of Speech & Language Therapists

**Dr Sue Pownall** Speech and language therapy team leader, Sheffield Teaching Hospitals NHS Foundation Trust

Speakability

**Mrs Melanie Derbyshire** Chief executive, Speakability (Action for Dysphasic Adults)

Stroke Association

**Mr Jon Barrick** Chief executive, Stroke Association

Stroke Association

**Mr Joe Korner** Director of communications, Stroke Association

Patient representative

**Mr Stephen Simpson**

College of Paramedics

**Mr Steve Hatton** Paramedic – emergency care practitioner, Yorkshire Ambulance Service

The Cochrane Stroke Group

**Professor Peter Langhorne** Professor of stroke care medicine, University of Glasgow

Welsh Stroke Physicians

**Dr Anne Freeman** Clinical lead for Wales, Delivery and Support Unit, NHS Wales

# Conflicts of interest

---

All working party members signed a form to declare any potential conflicts of interest with the guidelines. Nearly all professionals worked for an organisation whose work is related in some way to the guidelines. Details of appointments and affiliations are therefore listed. Financial interest information can be obtained on request from the Royal College of Physicians.

Representative	Conflict of interest
Dr Neil Baldwin	Advisory board member, Boehringer Ingelheim, Bayer and Bristol, Meyer, Squibb; and director, British Association of Stroke Physicians
Mr Jon Barrick	Board member, Stroke Alliance for Europe; Board member, World Stroke Organisation; Steering Committee, UK Stroke Forum; Steering Committee, US Stroke Assembly
Dr Geoffrey Cloud	Educational travel bursary and advisory board member for Boehringer Ingelheim in 2011/12
Dr Anne Freeman	Trustee of the Stroke Association
Dr Martin James	Received sponsorship support to attend the European Stroke Conference in Barcelona from Boehringer Ingelheim 2010
Dr Damian Jenkinson	Received honoraria to speak from Boehringer Ingelheim, Lundbeck and Sanofi Aventis; and trustee of Stroke Association
Professor Peter Langhorne	Director of Chest, Heart and Stroke, Scotland
Professor Jill Manthorpe	Trustee for the Centre for Policy on Ageing; associate director of NIHR School for Social Care Research; director, Social Care Workforce Research Unit, King's College London; member of various research advisory groups: Alzheimer's Society, Red Cross
Professor Helen Rodgers	Associate director, Stroke Research Network
Professor Anthony Rudd	Trustee of the Stroke Association
Mr Stephen Simpson	Works for the Stroke Association
Professor Pippa Tyrrell	Travel grant from Boehringer Inghelheim for European Stroke Conference 2012
Professor Derick Wade	None directly: has been paid consultancy for multiple sclerosis work and spasticity work by Almirall and Ipsen
Dr Philip White	Consultancy work for education/training purposes for Microvention Terumo Inc. – a manufacturer of devices used in the treatment of aneurysmal subarachnoid haemorrhage (SAH); Research grants within last five years from Codman, Coviden and Microvention – manufacturers of devices used in haemorrhagic stroke and in case of Codman/Coviden ischaemic stroke

The following members declared no conflicts of interest: Dr Audrey Bowen, Miss Louise Briggs, Dr Christopher Burton, Dr Andrew Clifton, Ms Rosemary Cunningham, Mrs Diana Day, Mrs Melanie Derbyshire, Professor Avril Drummond, Dr Judi Edmans, Ms Sarah Gillham, Mr Ian Golton, Mrs Nicola Hancock, Mr Steve Hatton, Ms Cheryl Hookway, Dr Helen Hosker, Dr Peter Humphrey, Mrs Amanda Jones, Dr Cherry Kilbride, Mr Joe Korner, Dr Peter Knapp, Dr Chris McKevitt, Dr Helen Newton, Dr Sue Pownall, Dr Elizabeth Weekes, Dr Gavin Young.

# Preface

---

This is the fourth edition of the UK *National clinical guideline for stroke*. It is an integral part of the broader goal of the Intercollegiate Stroke Working Party to improve the care of people who have had a stroke in the UK. The guideline and evidence tables form the evidence base for much other work undertaken by the group, and by other organisations.

Guidelines can never provide the answer for every situation and do not replace sound clinical judgement and good common sense. Clinical guidelines are only likely to be applicable to 80% of clinical situations, 80% of the time. This guideline does, however, provide a framework for care and is intended to be practical and relevant for stroke specialists and non-specialists alike.

The guideline contains over 300 specific recommendations covering almost every aspect of stroke management. No one can expect to know them all, and no single person or organisation will need to use them all.

Everyone, however, should be aware of the most important recommendations. The group identified 28 key recommendations which, if followed, will greatly enhance stroke care in the UK. These recommendations are given overleaf, with their numbers, so that they can be found in the main guideline.

This guideline is the culmination of several years' work by a very large number of people (well over 100), most of whom worked freely in their spare time. We are extremely grateful to each and every person who has helped and supported this work and we hope that the final guideline reflects their commitment and expertise well.

**Professor Anthony Rudd**  
Chair, The Intercollegiate Stroke Working Party

# Key recommendations

---

Number	Recommendation
2.1.1A	Commissioning organisations should ensure that their commissioning portfolio encompasses the whole stroke pathway from prevention through acute care, early rehabilitation and initiation of secondary prevention on to palliation, later rehabilitation in the community and long-term support.
2.2.1A	Ambulance services, including call handlers, should be commissioned to respond to every patient presenting with a possible acute stroke as a medical emergency.
2.2.1B	Acute services should be commissioned to provide: <ul style="list-style-type: none"><li>• imaging of all patients in the next slot or within 1 hour if required to plan urgent treatment (eg thrombolysis), and always within 12 hours</li><li>• thrombolysis in accordance with recommendations in this guideline</li><li>• active management of physiological status and homeostasis</li><li>• completion of all investigations and treatments to reduce risk of stroke for transient ischaemic attacks and minor strokes within 1 week or within 24 hours for high-risk cases</li><li>• an acute vascular surgical service to investigate and manage people with neurovascular episodes in ways and in timescales recommended in this guideline</li><li>• a neuroscience service to admit, investigate and manage all patients referred with potential subarachnoid haemorrhage, both surgically and with interventional radiology</li><li>• a neuroscience service delivering neurosurgical interventions as recommended for major intracerebral haemorrhage, malignant cerebral oedema, and hydrocephalus.</li></ul>
2.3.1A	Commissioners should ensure that every provider specifically enacts all the secondary prevention measures recommended, and this should be the subject of regular audit or monitoring by commissioners.
2.4.1A	Commissioning organisations should commission: <ul style="list-style-type: none"><li>• an inpatient stroke unit capable of delivering stroke rehabilitation as recommended in this guideline for all people with stroke admitted to hospital</li><li>• early supported discharge to deliver specialist rehabilitation at home or in a care home</li><li>• rehabilitation services capable of meeting the specific health, social and vocational needs of people of all ages</li><li>• services capable of delivering specialist rehabilitation in outpatient and community settings in liaison with inpatient services, as recommended in this guideline.</li></ul>
3.1.1C	All hospitals receiving acute medical admissions that include patients with potential stroke should have arrangements to admit them directly to a specialist acute stroke unit (onsite or at a neighbouring hospital) to monitor and regulate basic physiological functions such as blood glucose, oxygenation, and blood pressure.
3.2.1B	Patients with suspected stroke should be admitted directly to a specialist acute stroke unit and assessed for thrombolysis, receiving it if clinically indicated.

---

3.2.1C	Patients with stroke should be assessed and managed by stroke nursing staff and at least one member of the specialist rehabilitation team within 24 hours of admission to hospital, and by all relevant members of the specialist rehabilitation team within 72 hours, with documented multidisciplinary goals agreed within 5 days.
<hr/>	
3.2.1F	<p>Patients who need ongoing inpatient rehabilitation after completion of their acute diagnosis and treatment should be treated in a specialist stroke rehabilitation unit, which should fulfil the following criteria:</p> <ul style="list-style-type: none"> <li>● it should be a geographically identified unit</li> <li>● it should have a coordinated multidisciplinary team that meets at least once a week for the interchange of information about individual patients</li> <li>● the staff should have specialist expertise in stroke and rehabilitation</li> <li>● educational programmes and information are provided for staff, patients and carers</li> <li>● it has agreed management protocols for common problems, based on available evidence.</li> </ul>
<hr/>	
3.7.1A	<p>All transfers between different teams and between different organisations should:</p> <ul style="list-style-type: none"> <li>● occur at the appropriate time, without delay</li> <li>● not require the patient to provide complex information already given</li> <li>● ensure that all relevant information is transferred, especially concerning medication</li> <li>● maintain a set of patient-centred goals</li> <li>● transfer any decisions made concerning ‘best interest decisions’ about medical care.</li> </ul>
<hr/>	
3.8.1E	Provide early supported discharge to patients who are able to transfer independently or with the assistance of one person. Early supported discharge should be considered a specialist stroke service and consist of the same intensity and skillmix as available in hospital, without delay in delivery.
<hr/>	
3.10.1A	The views of stroke patients and their carers should be considered when evaluating a service; one method that should be used is to ask about their experiences and which specific aspects of a service need improvement.
<hr/>	
3.14.1A	Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days per week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.
<hr/>	
4.2.1A	All patients whose acute symptoms and signs resolve within 24 hours (ie TIA) should be seen by a specialist in neurovascular disease (eg in a specialist neurovascular clinic or an acute stroke unit).
<hr/>	
4.5.1A	<p>Brain imaging should be performed immediately (ideally the next imaging slot and definitely within 1 hour of admission, whichever is sooner) for people with acute stroke if any of the following apply:</p> <ul style="list-style-type: none"> <li>● indications for thrombolysis or early anticoagulation</li> <li>● on anticoagulant treatment</li> <li>● a known bleeding tendency</li> <li>● a depressed level of consciousness (Glasgow Coma Score below 13)</li> <li>● unexplained progressive or fluctuating symptoms</li> <li>● papilloedema, neck stiffness or fever</li> <li>● severe headache at onset of stroke symptoms.</li> </ul>
<hr/>	
4.6.1A	Any patient, regardless of age or stroke severity, where treatment can be started within 3 hours of known symptom onset and who has been shown not to have an

	intracerebral haemorrhage or other contraindications should be considered for treatment using alteplase.
4.6.1B	Between 3 and 4.5 hours of known symptom onset, patients under 80 years who have been shown not to have an intracerebral haemorrhage or other contraindication, should be considered for treatment with alteplase.
4.13.1A	All patients should be assessed within a maximum of 4 hours of admission for their: <ul style="list-style-type: none"> <li>• ability to swallow, using a validated swallow screening test (eg 50 ml water swallow) administered by an appropriately trained person</li> <li>• immediate needs in relation to positioning, mobilisation, moving and handling</li> <li>• bladder control</li> <li>• risk of developing skin pressure ulcers</li> <li>• capacity to understand and follow instructions</li> <li>• capacity to communicate their needs and wishes</li> <li>• nutritional status and hydration</li> <li>• ability to hear, and need for hearing aids</li> <li>• ability to see, and need for glasses.</li> </ul>
4.15.1B	People with acute stroke should be mobilised within 24 hours of stroke onset, unless medically unstable, by an appropriately trained healthcare professional with access to appropriate equipment.
5.4.1A	All patients with stroke or TIA should have their blood pressure checked. Treatment should be initiated and/or increased as is necessary or tolerated to consistently achieve a clinic blood pressure below 130/80, except for patients with severe bilateral carotid stenosis, for whom a systolic blood pressure target of 130–150 is appropriate.
5.5.1A	For patients with ischaemic stroke or TIA in sinus rhythm, clopidogrel should be the standard antithrombotic treatment: <ul style="list-style-type: none"> <li>• clopidogrel should be used at a dose of 75 mg daily.</li> </ul>
6.21.1A	Until a safe swallowing method has been established, all patients with identified swallowing difficulties should: <ul style="list-style-type: none"> <li>• be considered for alternative fluids with immediate effect</li> <li>• have a comprehensive assessment of their swallowing function undertaken by a specialist in dysphagia</li> <li>• be considered for nasogastric tube feeding within 24 hours</li> <li>• be referred for specialist nutritional assessment, advice and monitoring</li> <li>• receive adequate hydration, nutrition and medication by alternative means</li> <li>• be considered for the additional use of a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols.</li> </ul>
6.24.1B	Patients with stroke who have continued loss of bladder control 2 weeks after diagnosis should be reassessed to identify the cause of incontinence, and have an ongoing treatment plan involving both patients and carers. The patient should: <ul style="list-style-type: none"> <li>• have any identified causes of incontinence treated</li> <li>• have an active plan of management documented</li> <li>• be offered simple treatments such as bladder retraining, pelvic floor exercises and external equipment first</li> <li>• only be discharged with continuing incontinence after the carer (family member) or patient has been fully trained in its management and adequate arrangements for a continuing supply of continence aids and services are confirmed and in place.</li> </ul>

---

6.34.1A	Services should adopt a comprehensive approach to the delivery of psychological care after stroke, which should be delivered by using a 'stepped care' model from the acute stage to long-term management.
7.1.1C	Any patient with residual impairment after the end of initial rehabilitation should be offered a formal review at least every 6 months, to consider whether further interventions are warranted, and should be referred for specialist assessment if: <ul style="list-style-type: none"><li>• new problems, not present when last seen by the specialist service, are present</li><li>• the patient's physical state or social environment has changed.</li></ul>
7.4.1A	Patients and their carers should have their individual practical and emotional support needs identified: <ul style="list-style-type: none"><li>• before they leave hospital</li><li>• when rehabilitation ends or at their 6-month review</li><li>• annually thereafter.</li></ul>
7.5.1B	All staff in care homes should have training on the physical, psychological and social effects of stroke and the optimal management of common impairments and activity limitations.
7.6.1B	The carer(s) of every person with a stroke should be involved with the management process from the outset, specifically: <ul style="list-style-type: none"><li>• as an additional source of important information about the patient both clinically and socially</li><li>• being given accurate information about the stroke, its nature and prognosis, and what to do in the event of a further stroke or other problems, for example post-stroke epilepsy</li><li>• being given emotional and practical support.</li></ul>

---

# Acknowledgements

---

The Intercollegiate Stroke Working Party wishes to acknowledge the funding provided by the Royal College of Physicians Trusts Funds, the Stroke Association and the British Association of Stroke Physicians that enabled the production of the fourth edition of *National clinical guideline for stroke*.

We would like to thank the many people who reviewed the evidence for the guideline during its development (see appendix 1).

We would like to thank the following people for their kind help creating this version of the guideline:

Professor Ross Naylor (Professor of vascular surgery, University Hospitals of Leicester) for his help with drafting the carotid interventions sections.

From the Royal College of Physicians:

Without Miss Sarah Martin's enthusiasm and hard work this guideline would not have materialised. She coordinated the whole process and ensured that work promised from members of the working party was delivered. Dr Daniel Rudd ran most of the initial searches and set the guideline updating process up in a wonderfully logical and thorough manner. Mrs Alex Hoffman as the stroke programme manager was, as ever, supportive and wise. We would also like to thank Miss Rebecca Polley for her administrative support.

We would also like to thank the National Clinical Guideline Centre, particularly Lina Gulhane, Sharon Swain and Paul Miller for training and support.

The following people performed literature searches:

Ms Filomena Gomes, King's College London

Ms Rachel Goodwin, Oliver Zangwill Centre for Neuropsychological Rehabilitation

Mrs Marion Kelt, Glasgow Caledonian University Library

Ms Sara Simblett, the National Institute for Health Research (NIHR) Collaborations for Leadership in Applied Health Research and Care (CLAHRC) for Cambridgeshire and Peterborough, UK and the University of Cambridge

Mrs Brenda Thomas, Cochrane Stroke Group.

# Acronyms and abbreviations

---

ABCD <sup>2</sup> score	Age, blood pressure, clinical features, duration of TIA, diabetes score	MDT	Multidisciplinary team
AF	Atrial fibrillation	NASCET	The North American Symptomatic Carotid Endarterectomy Trial
AMED	Allied and Complementary Medicine Database	NICE	National Institute for Health and Clinical Excellence
BP	Blood pressure	PE	Pulmonary embolism
CAPRIE trial	Clopidogrel versus Aspirin in Patients at Risk of Ischaemic Events trial	PROFESS trial	Prevention Regimen for Successfully Avoiding Second Strokes trial
CIMT	Constraint induced movement therapy	QUOROM	Quality of Reporting of Meta-Analyses
CINAHL	Cumulative index to nursing and allied health literature (Registered name of a bibliographic database)	RATS	Relevance, Appropriateness, Transparency and Soundness
CLOTS trial	Clots in legs or stockings after stroke trial	RCP	Royal College of Physicians
CT	Computed tomography	RCT	Randomised controlled trial
DVT	Deep vein thrombosis	RE-LY	Randomised Evaluation of Long-Term Anticoagulation Therapy
DISCs	Depression Intensity Scale Circles	SAD-Q	Severity of Alcohol Dependence Questionnaire
ESPRIT trial	European/Australasian Stroke Prevention in Reversible Ischemia trial	SAH	Subarachnoid haemorrhage
FAST	Face Arm Speech Test	SIGN	Scottish Intercollegiate Guidelines Network
FOOD trial	Feed or ordinary diet trial	SPARCL	Stroke Prevention by Aggressive Reduction in Cholesterol Levels
GP	General practitioner	STRoKE DOC	Stroke Team Evaluation using a Digital Observation Camera
HAS-BLED score	Hypertension, Abnormal renal and liver function, Stroke, Bleeding, Labile INRs, Elderly, Drugs or alcohol score	TIA	Transient ischaemic attack
INR	International normalised ratio (for blood clotting time)	TTR	Time in therapeutic range
IST	International Stroke Trial	UK NHS	United Kingdom's National Health Service
LDL	Low-density lipoprotein	VITATOPS trial	Vitamins to Prevent Stroke trial
MRI	Magnetic resonance imaging		

# Glossary

---

<b>ABCD<sup>2</sup> score</b>	<p>Prognostic scores to identify people at high risk of stroke after a transient ischaemic attack (TIA).</p> <p>It is calculated based on:</p> <p><b>A</b> – age (≥60 years, 1 point)</p> <p><b>B</b> – blood pressure at presentation (≥140/90 mmHg, 1 point)</p> <p><b>C</b> – clinical features (unilateral weakness, 2 points, or speech disturbance without weakness, 1 point)</p> <p><b>D</b> – duration of symptoms (≥60 minutes, 2 points, or 10–59 minutes, 1 point)</p> <p>The calculation of ABCD<sup>2</sup> also includes the presence of diabetes (1 point). Total scores range from 0 (low risk) to 7 (high risk).</p>
<b>Activities of daily living</b>	<p>Refers to activities that people normally undertake (eg bathing, dressing, self-feeding).</p>
<b>Acupuncture</b>	<p>A complementary medicine that involves inserting thin needles into the skin.</p>
<b>Aerobic exercise</b>	<p>Low to moderate intensity exercise that can be sustained for long periods of time (eg cycling, swimming or walking).</p>
<b>Alteplase</b>	<p>A drug used for thrombolysis.</p>
<b>Aneurysm</b>	<p>A bulge in the wall of a blood vessel that is filled with blood. This can burst and cause a haemorrhage.</p>
<b>Angiography</b>	<p>A technique that uses X-ray technology to image blood vessels.</p>
<b>Anticoagulants</b>	<p>A group of drugs used to reduce the risk of clots by thinning the blood.</p>
<b>Antifibrinolytic agents</b>	<p>Drugs used to prevent excess bleeding by maintaining blood clot stability.</p>
<b>Antiphospholipid syndrome</b>	<p>Sometimes called ‘sticky blood syndrome’ because blood clots form too quickly; this is due to antibodies against the body’s phospholipids part of every cell in the body.</p>
<b>Antiplatelets</b>	<p>A group of drugs used to prevent the formation of clots by stopping platelets in the blood sticking together.</p>
<b>Antithrombotics</b>	<p>The generic name for all drugs that prevent the formation of blood clots. This includes antiplatelets and anticoagulants.</p>
<b>Arterial dissection</b>	<p>This is caused as a result of a small tear forming in the lining of the arterial wall.</p>
<b>Atherosclerosis</b>	<p>Fatty deposits that harden on the inner wall of the arteries (atheroma) and roughen its surface; this makes the artery susceptible to blockage either by narrowing or by formation of a blood clot.</p>
<b>Atrial fibrillation</b>	<p>A heart condition that causes an irregular heartbeat, often faster than the normal heart rate.</p>
<b>Audit (clinical)</b>	<p>A method of evaluating the performance of a clinical service against a set of standards/criteria.</p>
<b>Barthel Index</b>	<p>A scale that measures daily functioning specifically relating to the activities of daily living or mobility. Scores range from 0 to 100.</p>
<b>Biofeedback</b>	<p>A technique that provides feedback about bodily functions such as heart rate with the aim of bringing them under voluntary control.</p>

<b>Body mass index (BMI)</b>	An index of body weight corrected for height.
<b>Botulinum toxin</b>	An injection which can relax muscles to reduce spasticity.
<b>Cardiovascular disease</b>	Disease of the heart and/or blood vessels.
<b>Care pathway</b>	A tool used by healthcare professionals to define the sequence and timings of a set of tasks or interventions that should be performed on a patient who enters a healthcare setting (eg a hospital) with a specific problem.
<b>Carotid angioplasty</b>	A surgical procedure that widens the internal diameter of the carotid artery, after it has been narrowed by atherosclerosis.
<b>Carotid arteries</b>	Main blood vessels in the neck, which supply oxygenated blood to the brain.
<b>Carotid duplex ultrasound</b>	A technique that evaluates blood flow through a blood vessel, in this case the carotid artery.
<b>Carotid endarterectomy (CEA)</b>	A surgical procedure used to clear the inside of the carotid artery of atheroma.
<b>Carotid stenosis</b>	The narrowing of the carotid arteries in the neck.
<b>Carotid stenting</b>	Insertion of a tube into the carotid artery in order to prop the artery open and reduce narrowing.
<b>Caval filter</b>	A device that is inserted into the veins to prevent a blood clot entering the lungs.
<b>Cerebral venous sinus thrombosis</b>	A blood clot that forms within a vein inside the brain.
<b>Cochrane review</b>	The Cochrane Library consists of a regularly updated collection of evidence-based medicine databases including the Cochrane Database of Systematic Reviews (reviews of randomised controlled trials prepared by the Cochrane Collaboration).
<b>Commissioner (health services)</b>	Person or organisation that decides how to allocate the health budget for a service.
<b>Compensatory strategies</b>	Learning an alternative way of completing a task.
<b>Computed tomography (CT)</b>	An X-ray technique used to examine the brain.
<b>Confidence interval (CI)</b>	When analysing a research study, this is the range ('interval') of possible results that statisticians are 95% confident the actual result lies between.
<b>Constraint induced movement therapy</b>	Therapy that involves preventing the use of the unaffected side of the body thus forcing the use of the affected side.
<b>Cost-effectiveness analysis</b>	A sophisticated analysis looking at the costs and benefits of a treatment, to enable different treatments to be compared. Often expressed in terms of 'life-years gained' or 'diseases or deaths avoided'.
<b>Decompressive hemicraniectomy</b>	A surgical procedure for the treatment of raised pressure inside the brain from fluid, blood or swelling. A piece of skull is removed to allow the brain to swell.
<b>Deep vein thrombosis (DVT)</b>	A blood clot that develops in the large veins usually in the legs.
<b>Diabetes mellitus</b>	A metabolic disease in which a person has high blood sugar.
<b>Diagnostic accuracy</b>	The degree to which a diagnostic (or screening) tool or procedure is able to distinguish between cases and non-cases. See also 'sensitivity' or 'specificity'.

<b>Doppler ultrasound</b>	An imaging technique that measures blood flow and velocity through blood vessels.
<b>Dyspepsia</b>	Indigestion.
<b>Dysphagia</b>	Difficulty in swallowing.
<b>Early supported discharge</b>	A team offering rehabilitation in the community that replicates the stroke unit care; this enables earlier home discharge than would be possible if the team was not available.
<b>Endarterectomy</b>	The surgical removal of plaque from a blocked artery to restore blood flow.
<b>Face arm speech test (FAST)</b>	A test used to screen for the diagnosis of stroke or TIA.
<b>Foot drop</b>	A condition in which the foot hangs limply whilst walking.
<b>Gastrointestinal bleeding</b>	Bleeding anywhere between the throat and the rectum.
<b>Gastrostomy</b>	A surgical opening into the stomach to enable feeding.
<b>Goal attainment scaling</b>	Rehabilitation goals for particular tasks are set by the patient and therapists together.
<b>Haemorrhage</b>	Bleeding caused by blood escaping into the tissues.
<b>Health Technology Appraisal (HTA)</b>	A way of comparing the cost-effectiveness (see above) of treatments, funded by the NHS.
<b>Hemianopia</b>	Blindness or some loss of vision in one part of the visual field.
<b>Homeostasis</b>	Regulation of internal environment (eg temperature regulated at 37°C).
<b>Hydrocephalus</b>	A build up of fluid within the skull.
<b>Hyperacute stroke unit</b>	A stroke unit that treats patients in the first few days of symptom onset.
<b>Hyperlipidaemia</b>	Raised levels of lipids (cholesterol, triglycerides or both) in the blood serum.
<b>Hypertension</b>	Raised blood pressure.
<b>Hypertensive encephalopathy</b>	Brain damage caused by raised blood pressure.
<b>Hypoglycaemia</b>	Blood sugar levels lower than the normal range.
<b>Hypoxia</b>	Blood oxygen levels outside the normal range, eg below 95% saturation.
<b>Incontinence</b>	Inability to control passing of urine and/or faeces.
<b>Infarct</b>	An area of cell death due to the result of a deprived blood supply.
<b>International Classification of Functioning, Disability and Health (ICF)</b>	A classification of health used as a framework by the World Health Organization (WHO) to measure health and disability.
<b>International normalised ratio (INR), prothrombin time (PTT) and activated partial thromboplastin time (aPTT)</b>	A measure of the clotting ability of blood, usually following the use of some anticoagulant drugs (warfarin/heparin). It is calculated as the ratio of the length of time it takes blood to clot over the time it would take the blood of a normal subject to clot.
<b>Lumbar puncture</b>	A diagnostic or therapeutic procedure that involves collection of fluid from the base of the spine.

<b>Magnetic resonance imaging (MRI)</b>	A non-invasive imaging technique that allows for detailed examination of the brain.
<b>Malnutrition Universal Screening Tool (MUST)</b>	A screening tool that is comprised of five steps to help identify which adults are malnourished or at risk of malnourishment.
<b>Meta-analysis</b>	A statistical technique for combining the results of a number of studies that address the same question and report on the same outcomes to produce a summary result.
<b>MRI with diffusion-weighted imaging (DWI)</b>	This scan shows areas of recent ischaemic brain damage.
<b>Musculoskeletal pain</b>	Pain of the muscles and/or joints.
<b>National Institute for Health and Clinical Excellence (NICE)</b>	A special health authority set up within the NHS to develop appropriate and consistent advice on healthcare technologies, and to commission evidence-based guidelines.
<b>National Institute of Health Stroke Scale (NIHSS)</b>	A score to assess the severity of a stroke.
<b>Neuropathic pain</b>	Pain caused by damage to nerves.
<b>Orthosis</b>	An appliance used to support or align an area of the body to facilitate movement, prevent or correct damage.
<b>Palliative care</b>	Care that relieves rather than treats symptoms.
<b>Papilloedema</b>	Swelling of the optic discs in the eyes.
<b>Pneumonia</b>	An inflammatory condition of the lungs usually caused by infection.
<b>Pulmonary embolism</b>	A blood clot in the lungs.
<b>Quality of life</b>	Refers to the level of comfort, enjoyment, and ability to pursue daily activities.
<b>Quality standard</b>	A standard set by NICE that is used to define whether the quality of care is of a high standard.
<b>Randomised controlled trial (RCT)</b>	A trial in which people are randomly assigned to two (or more) groups: one (the experimental group) receiving the treatment that is being tested, and the other (the comparison or control group) receiving an alternative treatment, a placebo (dummy treatment) or no treatment. The two groups are followed up to compare differences in outcomes to see how effective the experimental treatment was. Such trial designs help minimise experimental bias.
<b>Recognition of stroke in the emergency room (ROSIER)</b>	A tool used to establish the diagnosis of stroke or TIA.
<b>Saturated fat</b>	A type of fat that is commonly found in meat and dairy products as opposed to fats found in plants and fish, which may be unsaturated.
<b>Self-efficacy</b>	A person's belief in their own competency.
<b>Sensitivity</b>	The ability of a test to detect a problem.
<b>Side effect</b>	An adverse event that occurs because of a therapeutic intervention.
<b>Spasticity</b>	Increased stiffness of the muscles, that occurs in the paralysed limbs after stroke.

<b>Specialist</b>	A clinician whose practice is limited to a particular branch of medicine or surgery, especially one who is certified by a higher educational organisation.
<b>Specificity</b>	The ability of a test to detect the right problem.
<b>Splint</b>	A custom or ready-made external device to support a joint or limb in a certain position.
<b>Stenosis</b>	Abnormal narrowing of a blood vessel.
<b>Stenting</b>	A metal mesh tube is placed in an artery or blood vessel to increase blood flow to an area blocked by stenosis.
<b>Stroke</b>	The damaging or killing of brain cells starved of oxygen as a result of the blood supply to part of the brain being cut off. Types of stroke include: ischaemic stroke caused by blood clots to the brain, or haemorrhagic stroke caused by bleeding into the brain.
<b>Stroke liaison worker</b>	Someone whose aim is to return patients and their carers to normal roles by providing emotional and social support and information, and liaising with services to improve aspects of participation and quality of life.
<b>Subluxation</b>	An incomplete or partial dislocation of a joint.
<b>Systematic review</b>	A way of combining the findings from a variety of different research studies, to better analyse whether the studies have provided a convincing answer to a research question.
<b>Telemedicine</b>	The use of telecommunication and information technologies in order to provide clinical healthcare at a distance.
<b>Thrombolysis</b>	The use of drugs to break up a blood clot. An example of a thrombolysis drug is alteplase, also sometimes called tPA.
<b>Thrombosis</b>	A formation of a blood clot.
<b>Transdermal</b>	A route of administration where active ingredients are delivered across the skin.
<b>Transient ischaemic attack (TIA)</b>	A stroke that recovers within 24 hours from the onset of symptoms.
<b>Venography</b>	An X-ray test that provides an image of the leg veins after a contrast dye is injected into a vein in the patient's foot.
<b>Video fluoroscopy</b>	A test for assessing the integrity of the oral and pharyngeal stages of the swallowing process. It involves videotaping X-ray images as the patient swallows a bolus of barium.
<b>Agnosia</b>	The inability for a patient to recognise or make proper sense of sensory information.
<b>Visual analogue scale</b>	A scoring system used in questionnaires that assesses for subjective characteristics or attitudes that cannot be directly measured.
<b>WHO</b>	World Health Organization.
<b>Xanthochromia</b>	The yellowish appearance of cerebrospinal fluid that occurs after bleeding into the fluid usually after subarachnoid haemorrhage.

# 1 Introduction

---

## 1.0 Introduction

This is the fourth edition of the UK *National clinical guideline for stroke*. Significant changes from the first three editions include:

- > the use of evidence published since 2008
- > updating of some of the areas covered by the National Institute for Health and Clinical Excellence (NICE) guideline *National clinical guideline for diagnosis and initial management of acute stroke and transient ischaemic attack (TIA)* (National Institute for Health and Clinical Excellence 2008b), (see section 1.8)
- > ‘Evidence to recommendations’ sections, outlining in more detail why a particular recommendation has or has not been made. This section may include some references or evidence that the Intercollegiate Stroke Working Party (henceforth known as ‘the working party’) thought important but not sufficiently strong to justify a recommendation.

We have, as with the third edition:

- > included specific recommendations for those who commission (purchase) services for people with stroke
- > identified areas where consideration of when actions may reasonably **not** be undertaken, or may be limited or stopped
- > used qualitative evidence where appropriate
- > referred to and incorporated relevant national documents including: the *National stroke strategy* (Department of Health, 2007), *Quality standards for stroke* (National Institute for Health and Clinical Excellence 2010d) and *The national service framework for long-term conditions* (Department of Health 2005).

## 1.1 Scope

This guideline covers the management in adults (ie over 16 years) of:

- > stroke and transient ischaemic attack (TIA)
  - acute diagnosis and treatments
  - rehabilitation, all aspects
  - long-term care and support
  - secondary prevention
  - prevention of complications
  - organisation of stroke services
- > subarachnoid haemorrhage (SAH)
  - immediate management required by physicians at an admitting hospital. It does not cover surgical or neuro-radiological interventions.

The guideline does not cover:

- > primary prevention of stroke (other guidelines concerning prevention of vascular disease should be used)

- > detailed recommendations on (neuro-)surgical techniques, (but the role of surgery is considered)
- > management of children with stroke; guidelines concerning children are published separately (Paediatric Stroke Working Group 2004)
- > general aspects of healthcare, unless there are very specific issues relating to stroke.

## 1.2 Aims of the guideline

There have been major developments in stroke care over the last four years necessitating this new edition.

The goal of this guideline is to improve the quality of care delivered to everyone who has a stroke in the country regardless of age, gender, type of stroke, location or any other feature. Guidelines can only be one part of a quality improvement programme. Audit of the quality of care through national audit has been, and will in the future be, integral to raising the standards of stroke care. Not only has audit had a direct influence on care delivery but also indirectly through its influence on other organisations (eg National Audit Office 2005; National Audit Office 2010) and policies (eg the *National service framework for older people* (Department of Health 2001) and the *English National Stroke Strategy* (Department of Health 2007)).

The guideline has been written with several specific audiences in mind:

- > commissioners involved in purchasing services for people with stroke
- > clinical staff who are involved with stroke patients
- > managers involved in providing services for people with stroke
- > patients with stroke, and their relatives and friends.

A version is available for non-healthcare staff but we hope that the main document may also be useful to the lay public.

The guideline is primarily developed for use in the UK, but many of the recommendations will be applicable in other countries and settings.

## 1.3 Organisation of the guideline

### 1.3.1 Chapter content

#### 1.3.1.1 Chapter 1 – introduction

This sets out the scope of the guideline, the methods by which it was developed and how it should be used.

#### 1.3.1.2 Chapter 2 – commissioning

This chapter covers the aspects that commissioners need to take into account when commissioning stroke services. Commissioners have a particularly important role in ensuring that services are appropriately organised and in identifying the efficiencies that can be achieved by altering where and how services are delivered.

### 1.3.1.3 Chapter 3 – structure and general principles of stroke care

This chapter covers organisation of services, resources needed, and general principles which apply across the whole patient pathway, for example on transfers of care and on management of individual patients.

### 1.3.1.4 Chapter 4 – acute phase stroke management

This chapter covers diagnosis and interventions in the acute stages of stroke or TIA over the first 48 hours and in some instances up to 2 weeks. It is largely concerned with process as applied to individual patients and their families. The need to start managing activity limitation (ie rehabilitation) is acknowledged but details are given later. It also covers prevention of some specific complications.

### 1.3.1.5 Chapter 5 – secondary prevention

Primary prevention is not within the scope of this guideline, however, guidance on preventing recurrent strokes is included.

### 1.3.1.6 Chapter 6 – recovery phase stroke management

The next chapter is the largest, and it focuses on the recovery (ie rehabilitation) phase which may be as short as a few days or span many months. It largely concerns the process of care as applied to individual patients and their families, and it focuses on impairments, activity limitations and contexts.

### 1.3.1.7 Chapter 7 – long-term phase of stroke management

The last chapter focuses on the longer-term management of patients after stroke, but only in relation to the stroke-specific issues. It is concerned with the process of care as applied to patients and their families, focusing on social participation and social context, with additional consideration of returning to rehabilitation. The management of comorbidities and underlying causes is not covered.

## 1.3.2 Structure of each subject

Each subject has a similar general structure:

- > **Introduction**, defining the domain and giving a very brief background on its relevance
- > **Evidence to recommendations**, outlining in more detail why a particular recommendation has or has not been made. This section may include some references or evidence that the working party thought important but not sufficiently strong to justify developing a recommendation from it. This may not be appropriate for all sections
- > **Recommendations**, given as a structured set (see below)
- > **Source**, giving a few major references for each identified recommendation or stating that the recommendation was arrived at by consensus
- > **Implications**, discussing any broader implications including cost and what local teams need to do. Every recommendation is likely to have some implication, but a

comment will only be added when there are significant consequences to be considered; many sets of recommendations will have no stated implications.

Each set of recommendations is framed around a clinical process. The general structure of a set is framed around the clinical process so that a clinician should start with the first and will generally find that the order reflects clinical priorities and practice. Generally, assessment/diagnosis will precede intervention, and common, simple and safe actions will precede complex, expensive and rarely needed actions. We have avoided recommending that interventions need to be done by specific professionals or groups, rather identifying what needs to happen to a patient providing some freedom for clinical services to decide who within the organisation is best equipped to deliver that intervention.

## 1.4 Definitions

*Stroke* is defined as 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 Organization 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. It is accepted that 85% of strokes are due to cerebral infarction, 10% due to primary haemorrhage and 5% due to subarachnoid haemorrhage. The risk of recurrent stroke is 26% within 5 years of a first stroke and 39% by 10 years (Mohan *et al* 2011).

*Transient ischaemic attack* (TIA) is traditionally defined as an acute loss of focal cerebral or ocular function with symptoms lasting less than 24 hours and which 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 and Warlow 1994). A definition more recently suggested is: 'an event lasting less than 1 hour without cerebral infarction on a magnetic resonance imaging brain scan', but this requires early scanning. In practice the precise definitions used are not of great importance as however quickly or slowly recovery occurs and whether or not there is evidence of neuronal damage on brain imaging, the investigations and medical treatment will be broadly similar. All cerebrovascular events need to be taken seriously and treated with urgency. TIAs affect 35 people per 100,000 of the population each year and are associated with a very high risk of stroke in the first month after the event and up to 1 year afterwards.

*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. It affects 6–12 people per 100,000 of the population per year and constitutes about 5% of 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 (van Gijn and Rinkel 2001). Clinically the acute presentation is usually different from the presentation of other strokes, specifically because it presents with sudden onset of severe headache, and non-focal neurological symptoms which may include loss of consciousness.

### 1.4.1 *Duration of cerebrovascular events*

The distinction between stroke and TIA is based simply on the duration of symptoms. However, it is not a useful or sustainable distinction.

The reasons for not distinguishing stroke from traditionally defined TIAs include:

- > evidence that some people with transient symptoms nonetheless have cerebral infarction or haemorrhage
- > a similar natural history in terms of further episodes of cerebral and non-cerebral vascular events
- > a similar clinical need for people with mild and short-lived stroke as for people with TIA
- > the logical impossibility of knowing the distinction within the first few hours, the precise time when decisions on acute treatment need to be made.

Despite these issues we have chosen to address the conditions separately as the research evidence usually separates them. We do however wish to stress that nearly always what is appropriate for non-disabling stroke is also appropriate for TIA.

### 1.4.2 *Resolved neurovascular events*

Three facts must be recognised:

First, there are patients who have neurological symptoms secondary to vascular disease lasting only a very short time. Clinically most recover in about 1 hour or less.

Second, there will inevitably be patients who first present to health services later after onset (within a few days) and have few or no residual symptoms. They have events that recover quickly if not completely but the events still need diagnosis and management.

Last, there will be patients who recover more or less completely from their stroke within a few days without any specific treatment. They may have a few symptoms, but have no appreciable limitation on normal daily activities.

All of these patients have had resolved neurovascular events and all remain at risk of further vascular episodes, and should be managed in a similar way.

## 1.5 **Context and use**

A guideline cannot cover every eventuality, and new evidence is published every day so parts of the guideline will become out of date. Thus the recommendations should be taken as statements that inform the clinician or other user, not as rigid rules. The clinician is responsible for interpreting recommendations, taking into account the specific circumstances being considered, and for considering whether new evidence might exist that would alter the recommendation.

This guideline relates to the aspects of management that are specific to stroke; it does not specifically cover areas of routine good clinical practice such as courtesy, managing associated illness, and accurate record keeping. It is assumed that this guideline 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 guideline is set within the context of the current legal framework within the UK governing the provision of services, for example concerning community care or social services care management. This guideline is not intended to overrule such regulations. It should be considered in conjunction with them. Hopefully they will facilitate practice not only in health services but also in social services and other organisations. ('Social services' are currently termed 'adult services' in much of the UK.)

Feedback is always welcome. This guideline is only as good as it is because hundreds of people have contributed their comments to drafts and editions since 2000 for which we are grateful. We also wish to acknowledge other guideline developers from around the world who have published since our last edition, particularly the Canadian and Australian guidelines. We had access to these documents during their development phase and shamelessly used the information within them to contribute to the development of this guideline. Hopefully in due course international stroke guideline developers will have access to a common database so that the work can be shared routinely, avoiding duplication of effort.

## **1.6 Methodology of guideline development**

The guideline was developed by the Intercollegiate Stroke Working Party (ICSWP) and coordinated by the Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians (RCP) in London. The current members of the working party, listed on pages viii–ix, 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 professional bodies and with other experts in the field as they felt appropriate throughout the process. Most members have a longstanding personal interest and expertise in the field of stroke management. We are very grateful to all members of the working party, who gave their time and expertise freely to produce the guideline. Searches, selection of studies, and reviews of studies were undertaken by a large number of people. We are extremely grateful to each and every one of them and the guideline would not exist without their hard work. They are acknowledged in appendix 1.

### *1.6.1 Development of scope*

See section 1.1 for details of the content of the scope. This led to the generation of 260 questions (see the RCP website for full search strategies) to be searched initially. Agreement was made that topics to be covered in the ongoing NICE guideline for stroke rehabilitation would not be considered by us. However, when the publication date for this guideline was delayed, we expanded our scope to include most of these topics for completeness. There was insufficient time to do full searches on all of these topics but we took guidance from the work already completed by the guideline development group at the National Clinical Guideline Centre.

### *1.6.2 Searching the scientific literature*

The searches consisted of systematic searching of computerised databases including: Medline, AMED, CINAHL, Psychinfo and Embase. The Cochrane Collaboration database was used extensively, and other national guidelines were reviewed including those of the Scottish Intercollegiate Guidelines Network (SIGN) and NICE. Health Technology

Appraisal (HTA) reports were used, and members of the working party brought their own expertise and information from their organisations and professional bodies. For topics newly added since 2008 searches included the time period from 1966 onwards; for the remainder of the topics searches were performed from 2007 until February 2012. Some papers in press beyond this date have also been included.

If a Cochrane systematic review and meta-analysis relevant to a topic has been published within the last 1–2 years, further searches were not undertaken and the constituent papers within were not individually reviewed. If there was substantial strong evidence available, additional new small trials were generally not reviewed. From the initial searches, a total of almost 1,600 papers were considered relevant for inclusion; out of these, 607 were then reviewed.

### 1.6.3 Selection of articles for inclusion

Evidence was obtained from published material using the following principles:

Where sufficient evidence specifically relating to stroke was available, this alone was used. In areas where limited research specific to stroke was available, then studies including patients with other appropriate, usually neurological, diseases were used.

Evidence from uncontrolled studies was only used when there was limited or no evidence from randomised controlled trials (RCTs). In general, evidence from single-case studies was not used, primarily because it is usually difficult to draw general conclusions from them. In addition, some evidence from qualitative studies has been included.

### 1.6.4 Assessing the quality of research

The nature and strength of the evidence behind each recommendation is summarised; the actual evidence itself is in tables that are available on the RCP website. This statement is brief, but should justify the recommendation and explain the link. We used:

- > the van Tulder quality assessment system to assess quality of RCTs (van Tulder *et al* 1997)
- > the checklist that was developed for the third edition of the guideline based on and the widely used QUOROM checklist systematic reviews (Moher *et al* 1999)
- > the RATS qualitative checklist for qualitative research (Clark 2003).

All studies that were likely to result in the development of a recommendation were assessed by a second reviewer to ensure consistency and to reduce inter-rater variability.

### 1.6.5 From evidence to recommendation

Published evidence rarely gives answers that can be translated directly into clinical practice or into recommendations; interpretation is essential, taking the contextual factors into account. The ‘evidence to recommendation’ sections explain the reasoning underlying a decision on whether to make a recommendation or not, particularly for contentious areas.

In the many areas of important clinical practice where evidence was not available, we made consensus recommendations based on our collective views, but also drawing on

any other relevant consensus statements or recommendations and also evidence from qualitative studies which were often powerful and informative.

It is important to note that the evidence relating to specific individual interventions, usually drugs, is generally stronger, because it is methodologically easier to study them in contrast to investigating multifaceted interventions over longer periods of time. This does not necessarily mean that interventions with so-called strong evidence are more important than those where the evidence is weak.

### 1.6.6 *Strength of recommendation*

Traditionally, recommendations have been given a strength which derived entirely from the design of the studies providing evidence. This system has several flaws. Strong evidence for less important recommendations gives them an apparent higher priority than a vital recommendation where the evidence is weaker. The strength depends solely upon study design and ignores other important features of the evidence such as its plausibility, selection bias, and sample size. It fails to give readers guidance on what is important; it only gives information on evidence, and even that is limited information.

For this guideline, an alternative approach was taken.

Once all the recommendations were finalised, a formal consensus approach was used to identify the key recommendations, these are listed in the key recommendations section.

### 1.6.7 *Peer review*

Following review of the literature and initial agreement of the guideline by the working party, there was a period of peer review during which experts in all disciplines both from the UK and internationally, including patients' organisations, were asked to review the guideline. Changes were made to the guideline accordingly. Thanks are due to the reviewers (listed in appendix 2) who took so much time and trouble to give the benefit of their knowledge and expertise.

## 1.7 **Models underlying guideline development**

The guideline has used several models or frameworks to structure its work and layout. In summary these were:

- > the Donabedian model (Donabedian 1978) for considering healthcare: structure, process and outcome
- > the healthcare process: diagnosis/assessment, goal setting, intervention (treatment and support), and re-evaluation
- > the WHO's international classification of functioning, disability and health (WHO ICF) model (Wade and Halligan 2004; World Health Organization 2001)
- > time: prevention, acute, subacute (recovery) and long-term.

### 1.7.1 *Patient interactions – World Health Organization*

The document uses the WHO ICF model (see table 1.1) especially as a basis for recommendations that relate to direct patient interactions. Thus we consider:

- > pathology (disease)
- > impairment (symptoms/signs)
- > activities (disability)
- > participation (handicap)
- > context:
  - physical
  - social
  - personal.

## 1.8 National Institute for Health and Clinical Excellence guidelines

In 2006, NICE commissioned a guideline to cover the acute phase of stroke (National Institute for Health and Clinical Excellence 2008b). This commission coincided with starting work on the third edition (2008) of the *National clinical guideline for stroke*. Consequently the working party agreed with NICE to provide recommendations on all areas not included within their guideline, but would not consider any questions that NICE was addressing. All of the 2008 NICE recommendations were included in the third edition. In 2012, NICE reviewed the evidence for the topics covered in the 2008 guideline on diagnosis and management of acute stroke and TIA and made the decision that although there is some new evidence, it is insufficient to justify updating the guideline immediately. The working party has therefore undertaken this work for some of the topics but not all. Unreviewed questions and therefore unchanged recommendations are identified in the text using squared brackets around the recommendation letter, for example 4.6.1[M]. NICE is also in the process of developing a guideline on stroke rehabilitation, which was not ready in time for us to integrate their recommendations into this edition. There will therefore be some overlap and possibly some conflict between the two sets of recommendations when the NICE stroke rehabilitation guideline is finally published. This is inevitable and hopefully does not lead to confusion. It is likely that the core elements of care being proposed will not differ substantially.

## 1.9 Participation in clinical research

There are many areas in stroke care where the evidence base is weak and there is a need for research.

Thus it is quite acceptable to enter patients into clinical trials which may lead to contravention of the recommendations in this document, where such research has received ethical approval and been subjected to peer review. Stroke teams should be encouraged to participate in well-conducted multicentre trials and other good-quality research projects. Involvement in research not only advances scientific knowledge but also helps improve quality of care, staff satisfaction and retention. All clinical staff should be supporting the work of the Stroke Research Network ([www.crncc.nihr.ac.uk/about\\_us/stroke\\_research\\_network](http://www.crncc.nihr.ac.uk/about_us/stroke_research_network)).

Specific recommendations that patients should **not** be given a treatment ‘except in the context of clinical trial’ have been included. This has been done when there is already some research which leaves uncertainty about the benefit or harm, but there is sufficient doubt, either due to the resource implications or due to the potential harms, to advise at least some caution.

### **1.10 Cost of stroke care**

Although implementation of this guideline may have cost implications, this document does not undertake a full cost-benefit analysis. Where we recognise that recommendations have significant resource implications, we have suggested that this needs to be considered locally.

### **1.11 Licensing of drugs**

Recommendations about the use of specific drugs do not take into account whether the drug is licensed by the Medicines and Healthcare products Regulatory Agency (MHRA) for that particular use. It is up to the individual physician and their trust to decide whether to permit the unlicensed use of drugs in their formulary.

There are many situations where it may be appropriate to use medication which has not been licensed for specific situations (eg aspirin in acute ischaemic stroke). There are others where the rules of the licence are so strong that if broken it may result in the use of the therapy being legally withdrawn or funding discontinued if NICE guidance restricts its use.

### **1.12 Updating the guideline**

It is recognised that research evidence changes continuously. The ICSWP will be reviewing the evidence on an ongoing basis. It is anticipated that a full review and fifth edition will be developed for 2016.

### **1.13 Funding and conflicts of interest**

The guideline was developed as part of the Stroke Programme at the Clinical Effectiveness and Evaluation Unit, RCP. Funding for the programme was provided by a consortium from the Royal College of Physicians Trust Fund, the British Association of Stroke Physicians and the Stroke Association. Competing interests of the working party members were fully declared.

**Table 1.1** Stroke management: WHO ICF framework and terminology

<b>Illness of person</b>	<b>Synonym</b>	<b>Level of description</b>
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
<b>Contextual factors</b>	<b>Examples</b>	<b>Comment</b>
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
<b>Rehabilitation</b>		
<b>Aims</b>	<b>Synonym</b>	<b>Comment</b>
Maximise patient's social rehabilitation	Minimise activity limitations/ 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, and maximise satisfaction with life	Helping people come to terms with the effects of their stroke
Minimise stress on and distress of the family losses	Provide emotional and practical help	Takes matters well outside health; also takes much effort and time unrelated to 'objective'
<b>Processes</b>	<b>Explanation</b>	<b>Comment</b>
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
<b>Intervention</b>		
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	Reiterative until no further goals remain
<b>Other terminology</b>		
<b>Term/word</b>	<b>Definition</b>	<b>Comment</b>
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 of improving service quality on a continuing basis. Interpretation should take into account casemix 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

ICF = International classification of functioning, disability and health: ICF (World Health Organization 2001).



## 2 Commissioning of stroke services

---

### 2.0 Introduction

Guideline documents usually focus on how an individual patient should be treated, and draw upon evidence concerning the effectiveness, risks and costs of specific interventions. This chapter brings together key recommendations to assist commissioners in commissioning the entire stroke system. Clinical teams can only provide services that are paid for. Clinical and organisational recommendations are of little benefit to patients if the organisation that pays for or commissions healthcare does not support the provision of the recommendation.

In practice, commissioning organisations often do not include people with expertise in specific areas of clinical practice, such as stroke care and therefore it is important that there is close collaboration between commissioners and providers. The recommendations given in this chapter are derived from and based on specific clinical and organisational recommendations made in the remainder of the guideline. Unless services are commissioned as recommended (whilst taking into account local circumstances), it will not be possible to implement the remaining recommendations. In the UK, the NHS and local authorities hold commissioning budgets and are the accountable commissioning organisations.

In England, the responsibility for commissioning health services is being transferred from primary care organisations to GP-led Clinical Commissioning Groups, while public health responsibilities are transferring from the NHS to local authorities. Given the often complex and long-term requirements of stroke patients, collaboration between commissioners from health and social care is needed to deliver integrated and joined-up services. Collaboration and partnership working may also be required between commissioners working across geographical boundaries, for example in providing hyperacute stroke care and thrombolysis services. There needs to be an acknowledgement that investment of resources in one particular part of the pathway, for example acute stroke care by health services, may lead to a change in demand for another service in another part of the pathway, for example long-term care needs. Commissioners and providers need to work closely to ensure that financial disincentives do not become barriers to the provision of evidence-based care and ensuring better outcomes for patients.

Networks with an understanding of the stroke pathway and complexity of the stroke system, which have brought both commissioners and providers together, have proved to be successful in adding value. They have supported the development and delivery of high-quality services in hospitals and the community.

Service specifications need to be written taking into account evidence contained within evidence-based guidelines. Individual contracts should be monitored against the service specification which should include meaningful performance and outcome measures. Agreements which require cooperation and partnership working between providers should be in place. All services should be required to participate in national audit, and undertake periodic patient and carer surveys.

## 2.1 Structure – global cover

Patients who have a stroke present health services with a large number of problems to be resolved, covering all illness domains over a prolonged time. Consequently, it is vital to have an organised service that can respond in a timely, appropriate and effective way to each person's unique needs as they arise. The challenge to commissioners and providers is to achieve this.

---

### 2.1.1 Recommendations

- A Commissioning organisations should ensure that their commissioning portfolio encompasses the whole stroke pathway from prevention through acute care, early rehabilitation and initiation of secondary prevention on to palliation to later rehabilitation in the community and long-term support.
- B The stroke services commissioned should be based upon an estimate of the needs of the population covered, derived from the best available evidence locally and nationally.
- C Commissioners need to be satisfied that all those caring for stroke patients have the required knowledge and skills to provide safe care for those with restricted mobility, sensory loss, impaired communication and neuropsychological impairments.
- D Commissioners should also commission to ensure that:
  - people dying with stroke receive palliative care from the acute stroke service or where possible in their own homes
  - people with stroke who are in care homes or are unable to leave their own home have full access to specialist stroke services after discharge from hospital
  - adequate support services are available to patients with long-term disability covering the full spectrum of needs (eg nursing, therapy, emotional support, practical support, carer support)
  - patients can re-access specialist services long after stroke.
- E A public education and professional training strategy should be devised and commissioned to ensure that the public and emergency contact healthcare professionals (eg in emergency call centres) can recognise when someone has a potential stroke and know how to respond. This should be commissioned in such a way that it can be formally evaluated.
- F Commissioners should ensure that there is sufficient information provided to patients and their carers covering what services are available and how to access them at all stages of the pathway. All information – both stroke related and other – should be written in an accessible form that benefits both those with communication disability and others.
- G Commissioners should require participation in national audit, for the services they pay for, auditing practice against the specific recommendations made in this guideline.
- H Health commissioners should ensure that there are:
  - formal protocols between health organisations and social services that facilitate seamless and safe transfers of care at the appropriate time
  - protocols in place that facilitate rapid assessment for and provision of all equipment, aids (including communication aids), and structural adaptations

needed by patients with a disability, especially but not restricted to patients in hospital awaiting discharge and those in care homes.

### 2.1.2 *Implications*

These recommendations should result in a stroke service that is more cost efficient than any other. In many instances there will be potential costs associated with start-up or with changes in practice, but the evidence suggests that well-organised services generally deliver an equal or better outcome at about the same cost. In addition to any initial resources needed, achieving change consistent with these recommendations will require considerable initial effort and commitment involving discussions and negotiations with many parties including health services, local government, voluntary and community groups, patient and carer groups and private providers. Consideration should be given to decommissioning any service or part of the pathway with a provider which falls short of these requirements and recommissioning the service or pathway from an alternative source or provider.

## 2.2 Commissioning acute stroke services

This part covers aspects of acute care that might be of particular relevance to commissioners of healthcare.

### 2.2.1 *Recommendations*

- A Ambulance services, including call handlers, should be commissioned to respond to every patient presenting with a possible acute stroke as a medical emergency.
- B Acute services should be commissioned to provide:
- imaging of all patients in the next slot or within 1 hour if required to plan urgent treatment (eg thrombolysis) and always within 12 hours
  - thrombolysis in accordance with the recommendations in this guideline
  - active management of physiological status and homeostasis
  - completion of all investigations and treatments to reduce risk of stroke for transient ischaemic attacks and minor strokes within 1 week or within 24 hours for high-risk cases
  - an acute vascular surgical service to investigate and manage people with neurovascular episodes in ways and in timescales recommended in this guideline
  - a neuroscience service to admit, investigate and manage all patients referred with potential subarachnoid haemorrhage, both surgically and with interventional radiology
  - a neuroscience service delivering neurosurgical interventions as recommended for major intracerebral haemorrhage, malignant cerebral oedema, and hydrocephalus.
- C The commissioning of acute services should:
- ensure active involvement of specialist rehabilitation services with patients from the time of admission, wherever they are admitted, and
  - ensure patients are seen by at least one member of the specialist rehabilitation team within 24 hours for assessment and by all team members within 5 days for treatment.

- D An acute neurovascular service should be commissioned to assess and manage any patient presenting with a transient neurovascular episode in accordance with the recommendations made by NICE, and in this guideline.
- 

### 2.2.2 *Implications*

Commissioning of acute services may require the development of: hub and spoke models of care (where a few hospitals in a region are designated to provide the hyperacute care for all patients); telemedicine networks or other forms of cross-site/trust working. Evidence suggests that provision of high-quality acute stroke care is clinically and cost effective.

## 2.3 **Commissioning secondary prevention services**

Secondary prevention is essential to reduce the burden of stroke, and commissioners should have a great interest in ensuring that services are effective in this sphere. It is a matter that concerns all parts of the stroke care system, and cannot easily be commissioned from any single provider.

---

### 2.3.1 *Recommendations*

- A Commissioners should ensure that every provider enacts all the secondary prevention measures recommended, and this should be the subject of regular audit or monitoring by commissioners.
- B Commissioners should commission acute hospital health services to:
- identify and initiate treatment for all treatable risk factors as soon as possible
  - give all patients written information and advice on lifestyle changes that reduce the risk of stroke, tailored to the needs of the individual person
  - liaise with general practitioners about the long-term management of any identified risk factors for each patient.
- C Commissioners should facilitate the lifestyle recommendations made through:
- supporting smoking cessation
  - working with other organisations to make it easier for people with disability to participate in exercise
  - supporting healthy eating
  - supporting those with an alcohol problem to abstain or maintain their intake within recommended limits.
- 

### 2.3.2 *Implications*

Commissioners have an active role to play in secondary prevention, which is a matter for the population as well as being relevant to individual people. Addressing medical risk factors and making lifestyle changes are likely to be effective in reducing the risk of recurrent stroke.

## 2.4 Commissioning rehabilitation services

Rehabilitation services should be commissioned to reduce impairment, promote recovery and increase ability to participate and improve quality of life using adaptive rehabilitation strategies.

### 2.4.1 Recommendations

A Commissioning organisations should commission:

- an inpatient stroke unit capable of delivering stroke rehabilitation as recommended in this guideline for all people with stroke admitted to hospital
- early supported discharge to deliver stroke specialist rehabilitation at home or in a care home
- rehabilitation services capable of meeting the specific health, social and vocational needs of people of all ages
- services capable of delivering specialist rehabilitation in outpatient and community settings in liaison with inpatient services, as recommended in this guideline.

B In addition to commissioning an overall stroke rehabilitation service, commissioners should ensure that they specify within it, or commission separately, services capable of meeting all needs identified following assessments by members of the specialist stroke teams.

C Commissioners should ensure that patients who have had a stroke can gain specialist advice and treatments in relation to:

- driving
- work
- advocacy.

### 2.4.2 Implications

Commissioners will need to consider the commissioning of specialist services in relation to the overall population need, rather than specifically in relation to stroke (or multiple sclerosis, Parkinson's disease or any other single diagnosis).

## 2.5 Commissioning in relation to the long-term consequences of stroke

Stroke is only one of many causes of long-term disability shared with patients with other conditions such as head injury and multiple sclerosis. Furthermore, many of their needs will relate to other conditions experienced by the patient, such as osteoarthritis. The recommendations will be general to an extent, but will focus on the specific needs of stroke patients.

### 2.5.1 Recommendations

A Healthcare commissioners should commission a system that provides:

- routine follow-up of patients 6 months post discharge and annually after a stroke
- reassessment and where appropriate offers further treatment for patients no longer receiving rehabilitation. Referral should be considered from primary or secondary health services, social (adult) services or by self referral.

- B Healthcare commissioners should ensure that, between health and social services and other agencies:
- patients receive the practical (eg housing, employment) and emotional support they need
  - patients at home can access suitable social opportunities outside their homes if they want, usually through voluntary organisations
  - patients receive ongoing maintenance interventions (eg provision of specialist stroke exercise programmes and peer-support programmes) needed to enhance and maintain well-being.
- C Commissioners in health and social care should ensure:
- carers are aware that their needs can be assessed separately and carers are able to access the support and help they require
  - carers are provided with written information and given appropriate instruction (eg manual handling) to enable them to provide care for someone following a stroke.
- 

### 2.5.2 *Implications*

In this context, commissioners will be concerned with the wider population of people with long-term disability from many causes.

# 3 Organisation of stroke services

---

## 3.0 Introduction

This chapter considers stroke management from a population perspective, defining how the whole stroke population should receive the highest quality stroke care possible. This depends primarily upon the structures and processes that exist locally: how stroke services are organised, what resources are available, and how the clinical teams undertake their work.

If the organisation of stroke care is poor or if there are inadequate resources, then the recommendations given in the other chapters of this guideline cannot be delivered. Furthermore, if the clinical teams do not have sufficient knowledge and skills, and are not consistent in their clinical practice, many patients will receive suboptimal care.

Thus, this chapter should be of great concern to all parties – patients and their families, individual clinical staff, hospital and community managers, and service commissioners. The recommendations made here are among the most important ones made in this guideline and many of them have a strong evidence base to support them.

## 3.1 Overall organisation of acute services

Effective stroke care will only occur if the organisational structure allows and facilitates the delivery of the best treatments at the optimal time. This section makes recommendations that are primarily derived through logic and not directly from evidence; for example, thrombolytic treatment (a recommended treatment) can only be given within 3 hours if patients arrive in the appropriate setting within that time. These recommendations apply to all stroke care.

---

### 3.1.1 Recommendations

- A All community medical services and ambulance services (including call handlers) should be trained to treat patients with symptoms suggestive of an acute stroke as an emergency requiring urgent transfer to a centre with specialised hyperacute stroke services.
- B All patients seen with an acute neurological syndrome suspected to be a stroke should be transferred directly to a specialised hyperacute stroke unit that will assess for thrombolysis and other urgent interventions and deliver them if clinically indicated.
- C All hospitals receiving acute medical admissions that include patients with potential stroke should have arrangements to admit them directly to a specialist acute stroke unit (onsite or at a neighbouring hospital) to monitor and regulate basic physiological functions such as blood glucose, oxygenation, and blood pressure.
- D All hospitals admitting stroke patients should have a specialist stroke rehabilitation ward, or should have immediate access to one.
- E All 'health economies' (geographic areas or populations covered by an integrated group of health commissioners and providers) should have a specialist neurovascular

(TIA) service able to assess and initiate management of patients within 24 hours of transient cerebrovascular symptoms.

- F There should be public and professional education programmes to increase awareness of stroke and the need for urgent diagnosis and treatment (see section 3.17).
- 

### 3.1.2 Sources

- A–B Follows on from evidence concerning thrombolysis (4.6.1 A–D)
- C Follows on from evidence and recommendations concerning physiological management (4.12.1 A, B)
- D Follows on from evidence concerning stroke units (3.2.1 B)
- E Follows on from evidence concerning transient ischaemic attacks (4.2.1 C)
- F Follows on from evidence concerning immediate treatments (eg 4.6.1 A–D) and quality marker one of the English Stroke Strategy (Department of Health 2007)

### 3.1.3 Implications

These recommendations have major implications for the organisation of acute medical services within any ‘health economy’ (locality). In principle, the cost consequences should be positive because more effective stroke care will reduce long-term rehabilitation and care costs. However, it will be important to maintain the effectiveness of other acute services when improving stroke services.

## 3.2 Specialist stroke services

There is strong evidence in favour of specialised stroke unit care to deliver effective acute treatments that reduce long-term brain damage and disability if given within a few hours.

In this context:

- > a specialist is defined as a healthcare professional with the necessary knowledge and skills in managing people with the problem concerned, usually by having a relevant further qualification and keeping up to date through continuing professional development. It will usually also require a good knowledge of stroke, especially in acute care settings. It does not require the person exclusively to see people with stroke, but does require them to have specific knowledge and experience of stroke.
- > 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 this guideline, stroke) and who between them have the knowledge and skills to assess and resolve the majority of problems. At a minimum, any specialist unit (team, service) must be able to fulfil all the relevant recommendations made in this guideline. As above, the team does not have to manage stroke exclusively, but the team should have specific experience of and knowledge about people with stroke.

---

### 3.2.1 Recommendations

- A People seen by ambulance staff outside hospital, who have sudden onset of neurological symptoms, should be screened using a validated tool to diagnose stroke or transient ischaemic attack (TIA). Those people with persisting neurological

- symptoms who screen positive using a validated tool, in whom hypoglycaemia has been excluded, and who have a possible diagnosis of stroke, should be transferred to a specialist acute stroke unit as soon as possible and always within 1 hour.
- B Patients with suspected stroke should be admitted directly to a specialist acute stroke unit and assessed for thrombolysis, receiving it if clinically indicated.
- C Patients with stroke should be assessed and managed by stroke nursing staff and at least one member of the specialist rehabilitation team within 24 hours of admission to hospital, and by all relevant members of the specialist rehabilitation team within 72 hours, with documented multidisciplinary goals agreed within 5 days.
- D Patients with acute stroke should receive brain imaging within 1 hour of arrival at the hospital if they meet any of the indications for immediate imaging.
- E Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a specially trained healthcare professional within 4 hours of admission to hospital, before being given any oral food, fluid or medication, and they should have an ongoing management plan for the provision of adequate nutrition.
- F Patients who need ongoing inpatient rehabilitation after completion of their acute diagnosis and treatment should be treated in a specialist stroke rehabilitation unit, which should fulfil the following criteria:
- it should be a geographically identified unit
  - it should have a coordinated multidisciplinary team that meets at least once a week for the interchange of information about individual patients
  - the staff should have specialist expertise in stroke and rehabilitation
  - educational programmes and information are provided for staff, patients and carers
  - it has agreed management protocols for common problems, based on available evidence.
- G Patients with stroke who have continued loss of bladder control 2 weeks after diagnosis should be reassessed to identify the cause of incontinence, and have an ongoing treatment plan involving both patients and carers.
- H All patients after stroke should be screened within 6 weeks of diagnosis, using a validated tool, to identify mood disturbance and cognitive impairment.
- I All patients whose acute symptoms remit within 24 hours (ie TIA) should be seen by a specialist physician (eg in a specialist neurovascular clinic or an acute stroke unit) within the time determined by their clinical features (see section 4.2).

### 3.2.2 Sources

- A–E Consensus; National Institute for Health and Clinical Excellence 2010d
- F Consensus; National Institute for Health and Clinical Excellence 2010d; Stroke Unit Trialists' Collaboration 2007; Quality markers nine and ten of the National Stroke Strategy (Department of Health 2007)
- G–H Consensus; National Institute for Health and Clinical Excellence 2010d
- I Follows on from evidence concerning management of transient ischaemic attacks (4.2.1 C, D, E)

### 3.2.3 Implications

These recommendations have major implications for the organisation of acute medical services within hospitals. Systems need to be adapted to ensure both rapid transport into the acute stroke unit and also rapid discharge from the acute stroke unit once acute management is complete (to allow further admissions).

## 3.3 Resources

The previous two sections (3.1, 3.2) have been concerned with organisational structure. However, it is equally important to have appropriate physical structures available: staff, buildings, technological support and so on. Evidence on the appropriate amount of the different resources needed is limited. Trials have not been undertaken comparing different levels or distributions of resources, and many structures (eg radiology) will be shared with other services managing patients with other problems. Nonetheless most service providers want guidance. One example where minimum staffing levels on stroke units have been defined is that for London, where a major reorganisation of care has taken place with predefined standards, which when met, trigger an enhanced tariff. The first 72 hours for all stroke patients are spent on a hyperacute stroke unit (HASU) with subsequent inpatient care on a stroke unit. The staffing levels are expressed as whole-time equivalents (WTE) in table 3.1.

**Table 3.1** Example of recommended staffing levels

	Professional cover				
	Physiotherapist (WTE per 5 beds)	Occupational therapist (WTE per 5 beds)	Speech and language therapist (WTE per 10 beds)	Nurses (WTE per bed)	Consultant cover
Hyperacute stroke unit	0.73	0.68	0.68	2.9 (80:20 trained: untrained skillmix)	24/7, 6 BASP thrombolysis trained physicians on a rota
Stroke unit	0.84	0.81	0.81	1.35 (65:35 trained: untrained skillmix)	Patients should be seen on a daily ward round 5 days a week

WTE = whole-time equivalent; BASP = British Association of Stroke Physicians.

These figures are given as an example and until formal evaluation of the London model is completed and published, cannot be regarded as evidence based. Therapy ratios are given on the assumption of normal working hours. Nursing cover on wards should be provided 24 hours a day, 7 days a week.

### 3.3.1 Recommendations

A Each acute stroke unit should have immediate access to:

- medical staff specially trained in the delivery of acute medical care to stroke patients, including the diagnostic and administrative procedures needed for safe, effective delivery of thrombolysis

- nursing staff specifically trained and competent in the management of acute stroke, covering neurological, general medical and rehabilitation aspects
  - imaging and laboratory services
  - rehabilitation specialist staff.
- B Each stroke rehabilitation unit and service should be organised as a single team of staff with specialist knowledge and experience of stroke and neurological rehabilitation including:
- consultant physician(s)
  - nurses
  - physiotherapists
  - occupational therapists
  - speech and language therapists
  - dietitians
  - psychologists
  - social workers
  - easy access to services providing: pharmacy; orthotics; orthoptists; specialist seating; patient information, advice and support; and assistive devices.
- C Each specialist stroke rehabilitation service should in addition:
- have an education programme for all staff providing the stroke service
  - offer training for junior professionals in the specialty of stroke.

### 3.3.2 Sources

- A Follows on from evidence and recommendations concerning acute stroke care (4.5 and 4.6)
- B Follows on from evidence concerning stroke rehabilitation units (3.2.1 F) and Langhorne *et al* 1998
- C Follows on from stroke rehabilitation unit evidence and many recommendations made in chapter 6

### 3.3.3 Implications

The recommendations will require a considerable increase in the provision of some specialties in stroke services, especially clinical psychology and social workers. Patterns of work also need to be reviewed to deliver sufficient direct therapy, perhaps removing some administrative duties and ensuring that time is not spent by qualified therapists on tasks that could be done by less qualified staff. Social work provision will require collaborative funding with social services.

## 3.4 Telemedicine

Direct delivery of acute stroke care by specialists cannot always be achieved in every hospital because of geographical issues or staffing shortages. Telemedicine, allowing a stroke physician to talk to the patient and/or carer, watch a clinical examination and view the imaging can be used safely for evaluation of the appropriateness of thrombolysis and other acute treatments, as an alternative to face to face in a specialist stroke centre. Various forms of telemedicine (using telephone consultation, video camera linkage with or without remote access to radiology) have therefore been tested in a number of settings over recent years.

### *Evidence to recommendations*

The literature consists of one underpowered RCT of telemedicine for thrombolysis decision-making, STRokEDOC (Meyer *et al* 2008) and many observational studies. The STRokEDOC trial compared telephone consultation to video link and found that correct treatment decisions were made significantly more often in the video-link arm than the telephone-consultation arm. However, there was no statistically significant difference in functional outcomes at 90 days (Meyer *et al* 2008). From the evidence available, it is not yet possible to conclude whether any form of telemedicine for acute decision-making is as good as a standard bedside assessment or whether telephone consultation is better or worse than video-link telemedicine services; however consensus of the working party is that video-linked telemedicine is preferable to telephone. All telemedicine services should have immediate access to Information Technology (IT) support to ensure that the service is available whenever needed.

---

#### **3.4.1 Recommendations**

- A A telemedicine service in an acute stroke unit should consist of:
- a video link which enables the stroke physician to observe a clinical examination and/or
  - a telephone which enables the stroke physician to discuss the case with a trained assessing clinician and talk to the patient and carer directly.
- B All telemedicine services should have a link which enables the stroke physician to review radiological investigations remotely.
- C An acute stroke unit using a telemedicine service should still include specialist stroke nurses at the admitting hospital.
- D Staff providing care through telemedicine (at both ends of the system) should be specifically trained in:
- the use of the technology
  - assessment of acute stroke patients, delivery of thrombolysis and other acute interventions in the context of the remote system being used.
- E The quality of decisions made through telemedicine should be regularly audited.
- 

#### **3.4.2 Source**

A–E Consensus

### **3.5 Location of service delivery**

All stroke services should be organised to treat a sufficient volume of patients to ensure that their skills are maintained. At the same time, the closer a rehabilitation service is to the person's home the more carers can be engaged and the more targeted the rehabilitation can be. This section gives recommendations on the location of delivery of services, aiming for an appropriate balance between care in hospital, on an outpatient basis and at home.

### 3.5.1 Recommendation

- A Any patient with a stroke who cannot be admitted to hospital and who is not receiving palliative care should be seen by the specialist teams at home or on an outpatient basis within 24 hours for diagnosis, treatment, rehabilitation, and risk factor reduction at a standard comparable to other patients.
- 

### 3.5.2 Source

- A Consensus

## 3.6 Stroke services for younger adults

Stroke occurs at all ages and a significant number (about 25%) are aged under 65 years. Some younger adults feel that general stroke services, of which the majority of users are older adults, do not meet their needs. For example, younger adults are more likely to have a specific and unusual cause for their stroke, prognosis may be different, rehabilitation may require specific and specialised attention to work prospects and bringing up children, and social needs may be different.

Thus, although **all stroke services** should respond to the **particular needs of each individual patient**, regardless of age or other factors, it is appropriate to draw attention to this group of patients. A separate guideline covering stroke in children has been produced (Paediatric Stroke Working Group 2004).

---

### 3.6.1 Recommendations

- A Younger adults who have had a stroke should be managed within specialist medical and rehabilitation services that:
- recognise and manage the particular physical, psychological and social needs of younger patients with stroke (eg vocational rehabilitation, childcare activities)
  - are provided in an environment suited to their specific social needs.
- B People who had a stroke in childhood and require healthcare supervision on reaching adulthood should have their care transferred in a planned manner to appropriate adult services.
- 

### 3.6.2 Sources

- A Consensus  
 B Consensus; Department of Health 2005

### 3.6.3 Implications

These recommendations can most easily be fulfilled by a specialist neurological rehabilitation service as such services generally, though not exclusively, focus on people of working age. Each locality (health economy) should already have a specialist neurological rehabilitation service (for example to comply with the NICE guidance on services for people with multiple sclerosis (National Institute for Health and Clinical Excellence

2003) and the National Service Framework for Long-term (neurological) Conditions (Department of Health 2005)).

Thus, there are two consequences. First, all health districts without specialist neurological rehabilitation services specifically able to manage younger people will need to develop them. Second, there needs to be a close link between neurological and stroke rehabilitation services and a system in place to ensure that there is a seamless transfer of patients from paediatric to adult services.

### **3.7 Transfers of care – general**

Many people who survive stroke will interact with several different services over the first 6 months: general practice, specialist acute stroke services, specialist rehabilitation services, social services, housing, community-based services etc. This section covers general principles. Discharge from hospital care is covered in the next section.

---

#### *3.7.1 Recommendations*

- A All transfers between different teams and between different organisations should:
- occur at the appropriate time, without delay
  - not require the patient to provide complex information already given
  - ensure that all relevant information is transferred, especially concerning medication
  - maintain a set of patient-centred goals
  - transfer any decisions made concerning ‘best interest decisions’ about medical care.
- B All organisations and teams regularly involved in seeing patients after stroke should use:
- a common, agreed set of data-collection tools (measures and assessments)
  - a common, agreed terminology
  - a common, agreed document layout (structure) and content.
- C Patients should be:
- involved in making decisions about transfer
  - offered copies of transfer documents.

---

#### *3.7.2 Sources*

A–B Consensus

C Asplund *et al* 2009; consensus

#### *3.7.3 Implications*

These recommendations require all parties, including service commissioners, to discuss the current situation and how it might be improved locally. This should lead to the development of stroke and/or rehabilitation networks.

### 3.8 Transfers of care – discharge from hospital

The most common transfer and the most stressful to patients is that from hospital inpatient care to their home. Many patients feel afraid and unsupported. Carers can feel that health services have ‘given up hope’. Communication between services is often poor with inadequate information being delivered too late. The terminology used below for different services may change (eg social services may now be termed ‘adult services’).

#### 3.8.1 Recommendations

- A All patients discharged from hospital, including those to care homes, who have residual stroke-related problems should be followed up within 72 hours by specialist stroke rehabilitation services for assessment and ongoing management.
- B Hospital services should have a protocol, locally negotiated, to ensure that before discharge occurs:
- patients and carers are prepared, and have been fully involved in planning discharge
  - general practitioners, primary healthcare teams and social services departments (adult services) are all informed before, or at the time of, discharge
  - all equipment and support services necessary for a safe discharge are in place
  - any continuing specialist treatment required will be provided without delay by an appropriate coordinated, specialist multidisciplinary service
  - patients and carers are given information about and offered contact with appropriate statutory and voluntary agencies.
- C Patients being discharged who remain dependent in some personal activities (eg dressing, toileting) should have access to, where appropriate, a transition package of:
- pre-discharge visits (eg at weekends)
  - individual training and education for their carers
  - telephone counselling support for 3 months.
- D Before discharge of a patient who remains dependent in some activities, the patient’s home environment should be assessed and optimised, usually by a home visit by an occupational therapist.
- E Provide early supported discharge to patients who are able to transfer independently or with the assistance of one person. Early supported discharge should be considered a specialist stroke service and consist of the same intensity and skillmix as available in hospital, without delay in delivery.
- F Hospitals should have clear systems in place to ensure:
- patients and their families are involved in planning for discharge and carers receive training in care, for example, moving, handling and dressing
  - patients and carers feel adequately prepared and supported to carry out care
  - appropriate agencies (including GPs) are informed before discharge and an agreed health and social care plan is in place, essential equipment has been delivered (including wheelchairs if needed), and patients know who to contact if difficulties arise.
- G Carers of patients unable to transfer independently should receive training in moving and handling and the use of any equipment provided until they are demonstrably able to transfer and position the patient safely in the home environment.

- H All patients should continue to have access to specialist stroke services after leaving hospital, and should know how to contact them.
  - I Carers of patients with stroke should be provided with:
    - a named point of contact for stroke information
    - written information about the patient's diagnosis and management plan
    - sufficient practical training to enable them to provide care.
  - J Health and social service organisations should provide a single point of access to all services for support and advice run by and/or for disabled people.
- 

### 3.8.2 Sources

- A Consensus; National Institute for Health and Clinical Excellence 2012d
- B Consensus; Shepperd *et al* 2010; Asplund *et al* 2009
- C Lannin *et al* 2007b; Gräsel *et al* 2006; Barras *et al* 2010
- D Consensus; Lannin *et al* 2007b
- E Early Supported Discharge Trialists 2005; Shepperd *et al* 2010
- F Early Supported Discharge Trialists 2005; Asplund *et al* 2009; Shepperd *et al* 2010
- G–H Consensus
- I Consensus; National Institute for Health and Clinical Excellence 2010d
- J Consensus; Department of Health 2007

### 3.8.3 Implications

All of the recommendations about transfer of care require close collaboration between commissioners and providers of care in hospital and the community and a willingness to shift resources from one sector to another, if that is where care is more appropriately provided.

## 3.9 Quality improvement (governance, audit)

Stroke services should undertake quality improvement, and attention to governance is essential. Primarily this includes collecting appropriate data in a timely manner, to analysing the data and then acting upon the findings. The process of clinical governance should be embedded within all healthcare organisations, and this section only considers the stroke-specific aspects. Patient perceptions of the quality of care they receive do not always match the clinicians' views of the care that they have delivered and therefore need to be separately audited.

---

### 3.9.1 Recommendations

- A Clinical services should take responsibility for all aspects of data collection:
  - keeping a stroke register of all patients admitted to their organisation with a stroke
  - providing leadership in clinical audit.

- B Clinicians in all settings should participate in national stroke audit so that they can compare the clinical and organisational quality of their services against national data and use the results to plan and deliver service improvements.
  - C General practitioners should routinely audit both primary and secondary prevention of stroke, and maintain a register of their patients with stroke or TIA.
- 

### 3.9.2 Sources

A–B Consensus

- C Consensus; Department of Health 2012 ([www.nhsemployers.org/Aboutus/Publications/Documents/QOF\\_2012-13.pdf](http://www.nhsemployers.org/Aboutus/Publications/Documents/QOF_2012-13.pdf))

### 3.9.3 Implications

Data collection and quality control procedures require specific resources, including staff time and unfortunately these are often not available, particularly for continuous audit. It also requires commitment to the process by all staff. Organisations that monitor performance should use data that are collected routinely or through national audit, rather than demanding data that require additional resources to deliver.

## 3.10 Service development

Quality improvement often requires relatively small-scale changes at the level of individual clinicians. However, sometimes it will require broader service change or development. The NHS already has regulations and guidance concerning the process of service change and development which should be considered. Stroke-specific matters are considered here.

Service users can offer considerable help in evaluating and improving service delivery. However, it is important to recognise that stroke can greatly affect the ability of an individual to give feedback. Carers' views should not necessarily be taken to reflect those of patients who are unable to communicate or participate easily in opinion gathering exercises (Low *et al* 1999; Sneeuw *et al* 2002). Furthermore, it is important to recognise that patient-satisfaction questionnaires are not a good way to measure dissatisfaction with services.

### 3.10.1 Recommendations

- A The views of stroke patients and their carers should be considered when evaluating a service; one method that should be used is to ask about their experiences and which specific aspects of a service need improvement.
  - B The planning process for any service development should include active involvement of stroke patients and carers, with particular consideration of the views of patients who are unable to participate in the planning process directly.
  - C Stroke patients should be offered any support needed to enable participation.
-

### 3.10.2 Sources

- A–B Consensus, and quality marker four of the National Stroke Strategy (Department of Health 2007): ‘People who have had a stroke and their carers are meaningfully involved in the planning, development, delivery and monitoring of services. People are regularly informed about how their views have influenced services.’
- C Consensus

### 3.10.3 Implications

These recommendations have two consequences. Some resources need to be allocated to facilitate active involvement of service users especially those who have limitations with mobility or communication. The recommendations also require organisations to be supportive and engaging in their attitude; it is not adequate to consult but then to carry on, ignoring the opinions of service users.

## 3.11 Use of assessments/measures

Measurement of function is central to rehabilitation. Many valid tools exist and although this guideline does not specify which ones should be used, some suggestions are made in the appropriate parts of the document. It is important when using measures to understand which domain of the ICF framework (see section 1.7.1) they are addressing and to ensure that the tools are appropriate to the interventions that are being assessed. It is important that staff are trained in the use of whichever scales are chosen to ensure consistency of their use within the team and an understanding of their purposes and limitations. This section only considers general principles.

---

### 3.11.1 Recommendations

A stroke service should:

- A agree on standard sets of data that should be collected and recorded routinely
- B use data-collection tools that fulfil the following criteria as much as possible:
- collect relevant data covering the required range (ie are valid and fulfil a need)
  - have sufficient sensitivity to detect change expected in one patient or difference expected between groups of patients
  - are of known reliability when used by different people on different occasions
  - are simple to use under a variety of circumstances
  - have easily understood scores
- C have protocols determining the routine collection and use of data in their service
- determining reason for and proposed use of each item
  - allowing individual clinicians choice from two or three tools where no measure is obviously superior
  - reviewing the utility of each item regularly
- D train all staff in the recognition and management of emotional, communication and cognitive problems

- E have protocols to guide the use of more complex assessment tools, describing:
- when it is appropriate or necessary to consider their use
  - which tool(s) should be used
  - what specific training or experience is needed to use the tool(s)
- F measure (change in) function at appropriate intervals.
- 

### 3.11.2 Sources

A–B Consensus

C Consensus (Wade 1998; Wikander *et al* 1998)

D–F Consensus

### 3.11.3 Implications

In the absence of any national guidance or requirement, this will require individual services to undertake some work on making choices and developing protocols. However, this process is likely to lead to the selected tools and developed protocols being used, whereas imposed guidance rarely succeeds. Appropriate use should improve effectiveness and efficiency, covering the costs of additional training of staff that may be needed.

## 3.12 Goal setting

Goal setting can be defined as the identification of and agreement on a behavioural target which the patient, therapist or team will work towards over a specified period of time. The setting of goals is central to effective and efficient rehabilitation. This section focuses on goal setting in stroke rehabilitation.

---

### 3.12.1 Recommendations

Every patient involved in the rehabilitation process should:

- A have their feelings, wishes and expectations established and acknowledged
- B participate in the process of setting goals unless they choose not to or are unable to participate because of the severity of their cognitive or linguistic impairments
- C be given help to understand the nature and process of goal setting, and be given help (eg using established tools) to define and articulate their personal goals
- D have goals that:
- are meaningful and relevant to the patient
  - are challenging but achievable
  - include both short-term (days/weeks) and long-term (weeks/months) targets
  - include both single clinicians and also the whole team
  - are documented, with specified, time-bound measurable outcomes
  - have achievement evaluated using goal attainment
  - include carers where appropriate
  - are used to guide and inform therapy and treatment.
-

### 3.12.2 Sources

A–B Consensus

C Holliday *et al* 2007a; Holliday *et al* 2007b; Wressle *et al* 2002

D Holliday *et al* 2007a; Holliday *et al* 2007b; Hurn *et al* 2006; Levack *et al* 2006; Malec *et al* 1991; Stein *et al* 2003

### 3.12.3 Implications

Goal setting takes time because the patient and team need to meet to agree and set goals. There is no evidence yet on the balance between this cost and the achievement of a better outcome and/or a more efficient use of resources.

## 3.13 Rehabilitation treatment approach

Rehabilitation uses a wide variety of treatments and techniques to reduce activity limitation, often through improving motor control. It is important for all team members to implement a consistent approach to rehabilitation and to maximise the carry-over outside of formal therapy by giving patients opportunities for informal practice.

---

### 3.13.1 Recommendations

All members of a stroke service should:

- A use an agreed consistent approach for each problem faced by a patient, ensuring the patient is given the same advice and taught the same technique to ameliorate or overcome it
  - B give as much opportunity as possible for a patient to practise repeatedly and in different settings any tasks or activities that are affected (see section 6.16)
  - C work within their own knowledge, skills, competence and limits in handling patients and using equipment, being taught safe and appropriate ways to move and handle specific patients if necessary.
- 

### 3.13.2 Sources

A Consensus

B French *et al* 2007; follows on from later evidence (3.14)

C Consensus

## 3.14 Rehabilitation treatment quantity (intensity of therapy)

There is much debate about the amount of therapy that is needed and clearly each patient should be assessed individually. Rehabilitation is a process of re-education. We all know from our own experience that if we are trying to acquire a new skill or improve an existing skill that the more we work at it the more successful we are likely to be. One important but unanswered question asks whether there is a minimum threshold for the amount of therapy, below which there is no benefit at all.

### *Evidence to recommendations*

It is rare for patients to receive more than 2 hours of therapy each day even in well-organised services. Comparative European studies suggest that in the UK face-to-face therapist–patient contact time is lower than in other countries (De Wit *et al* 2005; De Wit *et al* 2006; De Wit *et al* 2007; Putman *et al* 2007; Putman *et al* 2006).

Rehabilitation should be a combination of time spent with the therapist assessing and treating and with the patient practising either with other professionals (eg nurses), or with carers or alone. However, many patients particularly at the start of their rehabilitation programme will not be in a position to practise unsupervised. There is evidence to show that more intense therapy can improve outcomes but there is little evidence to guide precisely how much therapy should be regarded as a minimum. This has been debated at length by the working party and subsequently by the NICE Quality Standards Development Group and the consensus reached was that 45 minutes of time spent being actively treated with each of the relevant therapists is a reasonable and achievable target. This could be individual therapy on a one-to-one basis, group therapy or supervised therapy using technical or computer software. Rehabilitation intensity is an area which requires urgent further research. 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.

#### *3.14.1 Recommendations*

- A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days per week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.
- B The team should promote the practice of skills gained in therapy in the patient's daily routine in a consistent manner and patients should be enabled and encouraged to practise that activity as much as possible.
- C Therapy assistants and nurses should facilitate practice under the guidance of a qualified therapist.

#### *3.14.2 Sources*

- A Consensus; National Institute for Health and Clinical Excellence 2010d
- B Kwakkel *et al* 1997; Kwakkel and Wagenaar 2002; Kwakkel *et al* 2004; Langhorne *et al* 1996; Lincoln *et al* 1999; Smith *et al* 1981
- C Consensus

#### *3.14.3 Implications*

If it is accepted that face-to-face contact time should be increased, then there are various ways of achieving this. First, the number of available therapists could be increased. Alternatively, rehabilitation services could reorganise to increase the proportion of time each therapist spends on face-to-face contact. This might mean reducing bureaucratic demands and/or employing other staff with less training to undertake bureaucratic tasks,

so as to allow more treatment time. Third, nurses could take on an increased role in facilitating practice; more nursing resource might be needed to achieve this. Research into intensity of therapy and how to deliver it should be a high priority.

### **3.15 End-of-life (palliative) care**

Skilled management of a patient where death is inevitable after stroke is a core role of the stroke team. Stroke may cause a range of distressing symptoms that need to be managed, even if it is felt that death is inevitable. These may include pain, depression, confusion and agitation and problems with nutrition and hydration.

---

#### *3.15.1 Recommendations*

- A Teams providing care for patients after stroke should be taught how to recognise patients who might benefit from palliative care.
  - B All staff caring for people dying with a stroke should be trained in the principles and practice of palliative care.
  - C All patients who are dying should have access to specialist palliative care expertise when needed.
  - D All patients who are dying should be given the opportunity of timely/fast-track discharge home or to a hospice or care home according to wishes of the patient and/or carers.
  - E After stroke, all 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 and take prior directives into consideration (see section 6.45).
- 

#### *3.15.2 Sources*

- A Consensus
- B Extrapolation from National Institute for Health and Clinical Excellence 2004; Department of Health 2008
- C Extrapolation from National Institute for Health and Clinical Excellence 2004; Payne *et al* 2010; Department of Health 2008
- D Payne *et al* 2010
- E British Medical Association 2007

#### *3.15.3 Implications*

The main consequence of these recommendations is that the personnel in stroke teams will need to increase their awareness of and expertise in positive end-of-life palliative care, and to accept that this is part of the work of a comprehensive stroke service.

### **3.16 Treatments not mentioned in the guideline**

This guideline was completed in July 2012, based on evidence and current practice in the country at that time. It has covered, as far as possible, all specific interventions where

evidence from randomised trials is available, and many other interventions that are used reasonably frequently. However, it has not made recommendations concerning new and emerging therapies. Because we are frequently asked about these, we have put together the recommendations below – which reflect good clinical practice.

### 3.16.1 Recommendations

- A Any clinician wishing to use an intervention not considered within this guideline should:
- investigate and review the available evidence, especially the risks and disadvantages
  - investigate whether there are any relevant clinical trials available to take part in locally
  - offer the patient (or his or her representative if s/he is unable to participate in decision-making) information about any research study available, and arrange for entry to the trial if the patient agrees
  - discuss with the patient (or his or her representative if s/he is unable to participate in decision-making) the risks and benefits of the intervention so that an informed choice can be made.
- B Interventions not considered within this guideline may be used provided that:
- any available opportunity for participation in evaluative research has been considered
  - the clinician or clinical team has the appropriate knowledge and skill
  - the patient (or his or her representative if s/he is unable to participate in decision-making) is aware of the lack of evidence, and the perceived risks and benefits.

### 3.16.2 Source

A–B Consensus

## 3.17 Improving public awareness of stroke

In recent years mass-media campaigns, such as the Face Arm Speech Test (FAST) campaign, have been launched with the aim of increasing public awareness of the symptoms and signs of stroke. Awareness of stroke treatments and stroke prevention are also important.

### *Evidence to recommendations*

The current research does indicate some potential trends with regards to mass media campaigns, for example: television may be more effective than posters and newspaper advertisements; campaigns need to be re-occurring rather than short-term and one-off and there are methodological weaknesses in the research (Jones *et al* 2010). Furthermore, the evidence of a direct link between awareness and recommended behaviour is very weak. Much more research in the whole area of improving awareness and appropriate behaviour is needed (Lecouturier *et al* 2010a).

Increasing public awareness of stroke is an area of huge investment and importance and more robust research is needed which could:

- > ascertain the level of stroke awareness and response in an appropriate and representative sample of the UK population in a robust manner probably based on both unprompted and prompted recall
  - > be supported by qualitative work to explore the relationship between awareness and response
  - > specifically investigate further beliefs and attitudes which may influence response
  - > involve the development of campaigns that are theoretically well developed for the target audience. This would be appropriate for both mass media and more directed campaigns
  - > include the robust evaluation of campaigns in a manner that allows for clear relationships to be drawn between intervention and result.
- 

### 3.17.1 Recommendation

- A Mass-media public awareness campaigns should be conducted within the framework of a formal evaluation.
- 

### 3.17.2 Source

- A Lecouturier *et al* 2010b; consensus

# 4 Acute phase care

---

## 4.0 Introduction

This chapter covers the acute phase of stroke or TIA from when the first symptoms suggesting a possible acute cerebrovascular event occur. It considers all actions that relate to the diagnosis and management of the underlying disease (pathology). It extends over the first 24 hours and up to about 7 days depending upon the severity and complexity of the underlying disease process; in most people this phase is complete within 3 days.

This chapter also considers:

- (a) immediate complications, such as deep venous thrombosis
- (b) early rehabilitation, which should begin as soon as possible in parallel with acute treatment, and is covered in more detail in chapter 6.

The majority of the evidence for this chapter was reviewed by NICE (NICE Guideline Development Group in 2008), and the recommendations from that group were incorporated into the previous edition of the *National clinical guideline for stroke*; the order of the sections may be different from that in the NICE guideline to maintain consistency of style in this guideline. The evidence is alluded to briefly here, but further detail can be found in the NICE guideline document (National Institute for Health and Clinical Excellence 2008b).

For this edition, we have searched most of the topics within the scope of the NICE 2008 guideline (CG68). Recommendations covering topics that have not been searched by the working party since NICE reviewed them in 2008, are marked with square brackets (eg [A]).

## 4.1 Prehospital care

Most (95%) people have their first symptoms outside of hospital. It is vital that members of the public (as patients or first person in contact) and healthcare professionals (eg GPs and their receptionists, telephone advice line nurses, paramedics, accident and emergency (A&E) staff) can recognise stroke as early and accurately as possible to facilitate appropriate emergency care.

A number of prehospital screening tools have been developed that are highly sensitive in detecting the majority of acute strokes that present with facial palsy, speech disturbances or unilateral upper-limb weakness. The FAST is accepted as the tool of choice for prehospital clinicians. However, there are patients who present with symptoms of stroke which will not be identified by FAST (eg sudden onset visual disturbance, lateralising cerebellar dysfunction) and where stroke may not be suspected. Therefore the working party advocates that prehospital clinicians treat a person as having a suspected stroke if they are suspicious of this diagnosis despite a negative FAST. Further evidence is required to recommend the use of screening tools (eg National Institutes of Health Stroke Scale, Miami Emergency Neurological Deficit exam, Recognition of Stroke in the emergency room) that examine non-FAST symptoms in the prehospital phase.

Prehospital clinicians are likely to assess people whose sudden onset neurological symptoms have already resolved or resolve before reaching hospital, suggesting a diagnosis of TIA rather than stroke. It is crucial these people are referred for further investigation within a specialist TIA clinic, since the risk of subsequent stroke is greatest in the first few days. It is possible that the prehospital clinicians will be the only witness to transient symptoms. Before diagnosing TIA and making a direct referral, prehospital clinicians need to be mindful that a person may have ongoing focal neurological deficits of acute stroke despite a negative FAST. Patients in whom ongoing focal neurological deficit(s) cannot be excluded should be managed along acute stroke pathways rather than TIA pathways. There was insufficient evidence for the group to make recommendations concerning the management of TIA and the use of risk tools (ie ABCD<sup>2</sup>) by prehospital clinicians. The working party suggests implementing more training around TIA and non-FAST stroke symptoms with further research to validate safe and appropriate care pathways.

Swallowing difficulties are common in stroke and this can lead to food and/or fluid and/or saliva entering the airway (aspiration), which increases the risk of pneumonia. Accepted prehospital practice is to keep all patients nil by mouth until the patient has been formally evaluated by a clinician trained in swallow screening.

### *Evidence to recommendations*

There is a paucity of research evidence on the management of the stroke patient before arrival at the hospital. Use of screening tools for diagnosis has been shown to have a high positive predictive value particularly for the recognition of anterior circulation events, although less so for posterior circulation. The recognition of stroke in the emergency room (ROSIER) is validated for use in the emergency department and is more detailed than the FAST. It is of value particularly when screening of admissions is performed by non-specialist staff. The remaining recommendations are based on consensus and widely accepted practice for the acute management of patients who are acutely unwell.

---

#### *4.1.1 Recommendations*

- A People seen by ambulance staff outside hospital, who have sudden onset of neurological symptoms, should be screened using a validated tool (eg FAST) to diagnose stroke or transient ischaemic attack (TIA). Those people with persisting neurological symptoms who screen positive using a validated tool, in whom hypoglycaemia has been excluded and who have a possible diagnosis of stroke, should be transferred to a hospital with a specialist acute stroke unit within a maximum of 1 hour.
- B If the patient is FAST negative, but stroke is still suspected, they should be treated as if they have stroke until it has been excluded by a stroke specialist.
- C People who are admitted to accident and emergency (A&E) with a suspected stroke or TIA should have the diagnosis or provisional diagnosis established rapidly by a stroke specialist or by using a validated tool.
- D Prehospital pathways should be in place to minimise time from call to arrival at hospital and should include a pre-alert to expedite specialist assessment and treatment.

- E All patients with residual neurological signs and symptoms should remain nil by mouth until swallow screening has been conducted.
  - F All patients whose airways are at risk (eg those people with impaired consciousness) should be assessed for their risk of aspiration and those risks managed appropriately (eg suction, positioning and airway support).
  - G Patients should be monitored for atrial fibrillation and other arrhythmias.
- 

#### 4.1.2 Sources

- A Harbison *et al* 2003; consensus
- B National Institute for Health and Clinical Excellence 2008b
- C–G Consensus

#### 4.1.3 Implications

The tools themselves have no immediate additional resource consequence. There are implications for the training of emergency paramedic staff and A&E staff.

### 4.2 Initial diagnosis of acute transient event (TIA)

Any person who is seen in hospital or in the community after a short-lived acute onset neurological syndrome, that might be due to cerebrovascular disturbance (fully resolved or resolving rapidly when first seen by a doctor), needs assessment to establish the diagnosis and to determine whether the cause is vascular (about 50% are not). Secondary prevention measures which can reduce the risk of recurrence should then be identified.

#### *Evidence to recommendations*

A systematic review of the risk of stroke within 7 days of TIA (Giles and Rothwell 2007) showed the risk of stroke at 2 days was 2.1% (95% confidence interval (CI) 2.0–4.1) and at 7 days 5.2% (95% CI 3.9–6.5). A subgroup of patients at particularly high risk can be identified using the ABCD<sup>2</sup> score (Johnston *et al* 2007) and the EXPRESS study (Rothwell *et al* 2007) has shown that early intervention is effective at reducing the risk of stroke. Under ideal circumstances all patients with suspected TIA will be seen immediately without the need for triaging. The use of scoring systems to identify high-risk patients may allow resources to be efficiently distributed; however, a low ABCD<sup>2</sup> score does not mean there is no risk of stroke (Lavalley *et al* 2007). There are no studies specifically addressing the value of early anticoagulation for patients with TIA and AF but the consensus of the working party is that the benefits are likely to outweigh the risks in the majority of patients.

---

#### 4.2.1 Recommendations

- A All patients whose acute symptoms and signs resolve within 24 hours (ie TIA) should be seen by a specialist in neurovascular disease (eg in a specialist neurovascular clinic or an acute stroke unit).

- B People with a suspected TIA, that is, they have no neurological symptoms at the time of assessment (within 24 hours), should be assessed as soon as possible for their risk of subsequent stroke by using a validated scoring system such as ABCD<sup>2</sup>.
  - C Patients with suspected TIA who are at high risk of stroke (eg an ABCD<sup>2</sup> score of 4 or above) should receive:
    - aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
    - specialist assessment and investigation within 24 hours of onset of symptoms
    - measures for secondary prevention introduced as soon as the diagnosis is confirmed including discussion of individual risk factors.
  - D People with crescendo TIA (two or more TIAs in a week), atrial fibrillation or those on anticoagulants should be treated as being at high risk of stroke (as described in recommendation 4.2.1C) even though they may have an ABCD<sup>2</sup> score of 3 or below.
  - E Patients with suspected TIA who are at low risk of stroke (eg an ABCD<sup>2</sup> score of 3 or below) should receive:
    - aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
    - specialist assessment and investigations as soon as possible, but definitely within 1 week of onset of symptoms
    - measures for secondary prevention introduced as soon as the diagnosis is confirmed, including discussion of individual risk factors.
  - F People who have had a TIA but present late (more than 1 week after their last symptom has resolved) should be treated as though they are at a lower risk of stroke (see recommendation 4.2.1E).
  - G Patients with TIA in atrial fibrillation should be anticoagulated with an agent that has rapid onset in the TIA clinic once intracranial bleeding has been excluded and if there are no other contraindications.
- 

#### 4.2.2 Sources

- A Consensus; National Institute for Health and Clinical Excellence 2010d
- B National Institute for Health and Clinical Excellence 2008b
- C National Institute for Health and Clinical Excellence 2008b; Luengo-Fernandez *et al* 2009; Rothwell *et al* 2007
- D National Institute for Health and Clinical Excellence 2008b
- E National Institute for Health and Clinical Excellence 2008b; Luengo-Fernandez *et al* 2009; Rothwell *et al* 2007
- F National Institute for Health and Clinical Excellence 2008b
- G Consensus

#### 4.2.3 Implications

To achieve these recommendations additional training of staff will be required so that they are able to assess immediate risk in people presenting with a possible TIA, and to significantly streamline the process of investigation. This may require additional

resources to respond to the need. Protocols should be in place for the use of the new oral anticoagulants in the setting of TIA clinics, with processes to supervise the transition from acute to longer-term anticoagulation.

### 4.3 Specialist diagnosis of acute transient event (TIA)

Following the recommendations above, all patients identified as having a potential transient ischaemic event should be assessed and investigated at a specialist clinic either within 24 hours or for low-risk patients, within a maximum of 1 week. This section describes the further diagnostic process which has two goals: alternative diagnoses for the transient neurological event must be ruled out as far as possible and the vascular territory affected must be determined. Both are largely clinically driven processes depending upon skilful history taking.

#### *Evidence to recommendations*

There is little evidence to guide the use of brain imaging after TIA. The consensus of the working party is that imaging all patients referred to a neurovascular clinic is not a clinically appropriate or cost-effective strategy given the high rate of TIA mimics in most clinics. Imaging should be restricted to those patients where the results of such imaging are likely to influence management such as confirming the territory of ischaemia prior to making a decision about carotid artery surgery, and only once the patient has been assessed clinically by a stroke specialist. Where imaging is considered desirable, then the greater sensitivity of magnetic resonance imaging (MRI) to detect ischaemic lesions, particularly using diffusion-weighted imaging, makes it the modality of choice.

#### 4.3.1 Recommendations

- A People who have had a suspected TIA should be assessed by a specialist (within 1 week of symptom onset) before a decision on brain imaging is made.
- B People who have had a suspected TIA who need brain imaging (that is, those in whom vascular territory or pathology is uncertain) should undergo diffusion-weighted MRI except where contraindicated, in which case computed tomography (CT) should be used.
- C People who have a suspected TIA at high risk of stroke (eg an ABCD<sup>2</sup> score of 4 or above or with crescendo TIA) in whom vascular territory or pathology is uncertain, should undergo urgent brain imaging (preferably diffusion-weighted MRI).
- D People with a suspected TIA at low risk of stroke (eg an ABCD<sup>2</sup> score of less than 4) in whom vascular territory or pathology is uncertain should undergo brain imaging within 1 week of onset of symptoms (preferably diffusion-weighted MRI).

#### 4.3.2 Sources

- A National Institute for Health and Clinical Excellence 2008b; Ay *et al* 2009
- B–C National Institute for Health and Clinical Excellence 2008b
- D National Institute for Health and Clinical Excellence 2008b; consensus

## 4.4 Management of confirmed transient ischaemic attacks

Patients who have short-lived symptoms due to cerebrovascular events remain at high risk of further events, and this risk is highest in the first few weeks. Consequently their management is urgent. The diagnostic process has been outlined, and this section covers subsequent medical and surgical management. The ideal timing for surgery has been shortened since the 2008 guideline because of the recognition that a significant number of patients will have an avoidable stroke if surgery is delayed even for just 2 weeks.

### *Evidence to recommendations*

Stroke and TIA are a spectrum of a single syndrome and there should be few differences in their management. Treatment of TIA is urgent given the high risk of subsequent stroke. Longer-term management is reviewed in chapter 5 on secondary prevention. Carotid imaging is essential for any patient presenting with symptoms suggestive of anterior circulation cerebral ischaemia who might be suitable for carotid surgery or stenting. The reporting of the degree of carotid stenosis has the potential to cause serious confusion as there are two separate methods that give differing results, North American Symptomatic Carotid Surgery Trials (NASCET) and European Carotid Surgery Trial (ECST). Both are equally valid but the working party considered that it was important that there should be a single method of reporting implemented and that the system most widely used at present (NASCET) should be the preferred measure.

There is still uncertainty about the role of carotid stenting for symptomatic carotid stenosis. It carries a higher risk of both short- and long-term stroke complications, especially in patients 70 years and older, but a lower risk of peri-procedural myocardial infarction and cranial nerve injury. The working party considers that stenting should not be used as part of routine practice.

Although there are potential benefits for asymptomatic carotid surgery in some patients, the numbers needed to treat are so high (over 30) that the working party consensus was that surgery should not be offered routinely to patients who are asymptomatic (see section 5.7).

---

### 4.4.1 Recommendations

- A Patients with confirmed TIA should receive:
- aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
  - measures for secondary prevention, introduced as soon as the diagnosis is confirmed, including discussion of individual risk factors.
- B All people with suspected non-disabling stroke or TIA, who after specialist assessment are considered candidates for carotid endarterectomy, should have carotid imaging conducted urgently to facilitate carotid surgery which should be undertaken within 7 days of onset of symptoms.
- C All carotid imaging reports should use the North American Symptomatic Carotid Surgery Trials (NASCET) criteria when reporting the extent of carotid stenosis.

- 
- D People with an acute non-disabling stroke with stable neurological symptoms or with a TIA who have symptomatic carotid stenosis of 50–99% according to the NASCET criteria should:
- be assessed and referred for carotid endarterectomy to be performed within 1 week of onset of symptoms
  - receive best medical treatment (control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, and lifestyle advice including smoking cessation).
- E People with an acute non-disabling stroke or TIA who have carotid stenosis of less than 50% according to the NASCET criteria should:
- not undergo surgery
  - receive best medical treatment (eg control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, and lifestyle advice including smoking cessation).
- F The process and outcomes of carotid interventions should be routinely measured using national audit.
- G Where patients have repeated attacks of transient neurological symptoms despite best medical treatment, and an embolic source has been excluded, an alternative neurological diagnosis should be considered.
- H Carotid endarterectomy should be the treatment of choice for patients with symptomatic carotid stenosis, particularly those who are 70 years of age and over.
- I Carotid angioplasty and stenting should be considered in patients meeting the criteria for carotid endarterectomy but are considered unsuitable for open surgery (eg high carotid bifurcation, symptomatic re-stenosis following endarterectomy, radiotherapy associated carotid stenosis).
- 

#### 4.4.2 Sources

- A Rothwell *et al* 2007; Consensus
- B National Institute for Health and Clinical Excellence 2008b
- C Consensus
- D–E National Institute for Health and Clinical Excellence 2008b
- F–G Consensus
- H–I Economopoulos *et al* 2011; International Carotid Stenting Study investigators *et al* 2010

#### 4.4.3 Implications

These recommendations will require significant streamlining of clinical pathways. They may increase the total number of carotid endarterectomies undertaken in the UK but the number of operations performed for asymptomatic disease should fall and certainly not increase.

## 4.5 Diagnosis of acute stroke

Stroke is a medical emergency and if outcomes are to be optimised there should be no time delays in accessing treatment. Any person who arrives at hospital with an acute onset neurological syndrome with persisting symptoms and signs (ie potential stroke) needs full diagnosis to differentiate between acute cerebrovascular causes and others, especially those such as hypoglycaemia or head injury needing other specific treatments. Major reorganisation of stroke care has taken place over recent years in some parts of the UK to improve access to acute stroke care. This should be for all stroke patients and not just those who might be suitable for thrombolysis. There are clear indications for immediate scanning. Even for those patients without these specific indications, it has been shown that immediate scanning is the most cost-effective strategy (Wardlaw *et al* 2004). It is also necessary to delineate the type of vascular event as soon as is practicable because management and prognosis are determined by aetiology (eg thrombosis, embolism and haemorrhage). The working party has reduced the maximum time between admission and scanning to 12 hours to ensure that all patients admitted out of hours are scanned at the latest during the following day. Finally, any underlying causes such as heart disease, diabetes and hypertension need diagnosis and management in their own right (these are not discussed further within this guideline).

---

### 4.5.1 Recommendations

- A Brain imaging should be performed immediately (ideally the next imaging slot and definitely within 1 hour of admission, whichever is sooner) for people with acute stroke if any of the following apply:
- indications for thrombolysis or early anticoagulation treatment
  - on anticoagulant treatment
  - a known bleeding tendency
  - a depressed level of consciousness (Glasgow Coma Score below 13)
  - unexplained progressive or fluctuating symptoms
  - papilloedema, neck stiffness or fever
  - severe headache at onset of stroke symptoms.
- B For all people with acute stroke without indications for immediate brain imaging, scanning should be performed as soon as possible (at most within 12 hours of admission).
- C Patients with suspected stroke should be assessed for thrombolysis, receiving it if clinically indicated and be admitted directly to a specialist acute stroke unit.
- D All patients should have immediate access to a stroke physician to ensure patients get access to appropriate medical interventions.
- 

### 4.5.2 Sources

- A National Institute for Health and Clinical Excellence 2008b, consistent with National Institute for Health and Clinical Excellence 2010d
- B National Institute for Health and Clinical Excellence 2008b; consensus
- C National Institute for Health and Clinical Excellence 2010d; consensus

- D Consensus; quality marker eight of National Stroke Strategy: ‘Patients with suspected acute stroke receive an immediate structured clinical assessment from the right people.’

### 4.5.3 Implications

Virtually all stroke patients now have a brain scan during their admission. However, often this is not done as quickly as the recommendations suggest. There should not be an increase in total scans performed but there may need to be a reorganisation of services to allow for scanning to be performed urgently when indicated and ensure that all hospitals admitting acute stroke patients have access to brain scanning 24 hours a day and 7 days a week. All acute stroke patients should have their scan completed by the next day even during weekends. There should be sufficient CT and MRI capacity to satisfy these requirements, and it is primarily a matter of scheduling scans and running a service out of hours for emergencies.

## 4.6 Immediate management of non-haemorrhagic stroke

Thrombolysis for ischaemic stroke is becoming universally available in the UK. Treatment with alteplase should only be given in units where staff are trained and experienced in the provision of stroke thrombolysis, with a thorough knowledge of the contraindications to treatment (which includes the prior use of all anticoagulants including the new oral anticoagulants) and the management of complications such as neurological deterioration and anaphylaxis.

Research has recently established that the existing licensed indications for alteplase treatment should be widened. The IST3 trial and the linked Cochrane review have added significantly to the understanding of when and to whom thrombolysis should be offered. The results emphasise how critical it is that treatment is given as quickly as possible after the onset of stroke. The benefits of treatment rapidly diminish with time and beyond 4.5 hours the benefits are unproven. Despite the higher risk of early (within 7 days) fatal and non-fatal intracerebral haemorrhage with thrombolysis, mortality at 6 months is not increased compared to patients who do not receive thrombolysis. The Cochrane review shows that older patients benefit at least as much as those below the age of 80 years, so there is no upper-age limit for treatment, particularly within the first 3 hours. Patients with severe stroke and those with early signs of infarction on the initial scan also benefit from treatment (as long as these early radiological signs are subtle and consistent with the stated time of onset and do not suggest a lesion older than 6 hours). However, IST3 only recruited patients with a prestroke Oxford Handicap Score of less than 3, ie not having a level of disability that significantly restricted activities of daily living. Great care should therefore be taken in making the decision to thrombolyse a patient who has significant prestroke comorbidity. Ongoing research may clarify the remaining uncertainties regarding the ‘latest time for treatment benefit’ between 4.5 and 6 hours after onset, and the role of advanced imaging to select patients up to 9 hours after onset. A planned updated individual patient meta-analysis may also provide future additional guidance.

### 4.6.1 Recommendations

- A Any patient, regardless of age or stroke severity, where treatment can be started within 3 hours of known symptom onset and who has been shown not to have an intracerebral haemorrhage or other contraindications should be considered for treatment using alteplase.
- B Between 3 and 4.5 hours of known stroke symptom onset, patients under 80 years who have been shown not to have an intracerebral haemorrhage or other contraindication, should be considered for treatment with alteplase.
- C Between 3 and 6 hours of known stroke symptom onset, patients should be considered for treatment with alteplase on an individual basis, recognising that the benefits of treatment are likely to be smaller than those treated earlier, but that the risks of a worse outcome, including death, will on average not be increased.
- D Alteplase should only be administered within a well-organised stroke service with:
- staff trained in the delivery of thrombolysis and monitoring for post-thrombolysis complications
  - nurse staffing levels equivalent to those required in level 1 or level 2 nursing care with staff trained in acute stroke and thrombolysis
  - immediate access to imaging and re-imaging, and staff appropriately trained to interpret the images
  - processes throughout the emergency care pathway for the minimisation of in-hospital delays to treatment, to ensure that thrombolysis is administered as soon as possible after stroke onset
  - protocols in place for the management of post-thrombolysis complications.
- E Emergency medical staff, if appropriately trained and supported, can administer alteplase for the treatment of acute ischaemic stroke provided that patients can be managed within an acute service with appropriate neuroradiological and stroke physician support.
- F Intra-arterial interventions should only be used in the context of a clinical trial.
- G Perfusion scanning, eg to determine suitability for thrombolysis in patients where time of onset is unknown or where the patient presents beyond 4.5 hours, should only be used in the context of research trials.
- H Every patient treated with thrombolysis should be started on an antiplatelet after 24 hours, unless contraindicated (eg after significant haemorrhage has been excluded).
- I All people presenting with acute stroke who have had the diagnosis of primary intracerebral haemorrhage excluded by brain imaging should, as soon as possible but certainly within 24 hours, be given:
- an antiplatelet orally if they are not dysphagic
  - an antiplatelet rectally or by enteral tube if they are dysphagic.
  - Thereafter aspirin 300 mg should be continued until 2 weeks after the onset of stroke, at which time definitive long-term antithrombotic treatment should be initiated. People being discharged before 2 weeks can be started on long-term treatments earlier.
- J Any person with acute ischaemic stroke for whom previous dyspepsia associated with an antiplatelet is reported should be given a proton pump inhibitor in addition to aspirin.

- [K] Any person with acute ischaemic stroke who is allergic to or genuinely intolerant of aspirin should be given an alternative antiplatelet agent (eg clopidogrel).
- [L] Anticoagulation should not be used routinely for the treatment of acute ischaemic stroke.
- M People with middle cerebral artery (MCA) infarction who meet all of the criteria defined below should be considered for decompressive hemicraniectomy. They should be referred within 24 hours of onset of symptoms and treated within a maximum of 48 hours:
- aged 60 years or under
  - clinical deficits suggestive of infarction in the territory of the middle cerebral artery
  - a score on the National Institute of Health Stroke Scale (NIHSS) of above 15
  - a decrease in the level of consciousness to a score of 1 or more on item 1a of the NIHSS
  - signs on CT of an infarct of at least 50% of the MCA territory with or without additional infarction in the territory of the anterior or posterior cerebral artery on the same side, *or* infarct volume greater than 145 cubic centimetres as shown on diffusion-weighted MRI.
- N People who are considered for decompressive hemicraniectomy should be monitored by appropriately trained professionals skilled in neurological assessment.
- O Stroke services should agree protocols for monitoring, referral and transfer of patients to regional neurosurgical centres for the management of symptomatic hydrocephalus.
- P Immediate initiation of statin treatment is not recommended in people with acute stroke.
- Q People with acute stroke who are already receiving statins should continue their statin treatment.

#### 4.6.2 Sources

- A The IST3 Collaborative Group 2012
- B Hacke *et al* 2008; Lees *et al* 2010
- C The IST3 Collaborative Group 2012
- D–E National Institute for Health and Clinical Excellence 2008b; consensus
- F–H Consensus
- I National Institute for Health and Clinical Excellence 2008b; consensus
- J–Q National Institute for Health and Clinical Excellence 2008b

#### 4.6.3 Implications

These recommendations underlie the earlier recommendations concerning the organisation of acute stroke care. The evidence suggests that alteplase is cost-effective in itself (National Institute for Health and Clinical Excellence 2007a), not taking into account any costs associated with ensuring a high standard of care and the associated organisation. Although craniectomies are likely to be required in only about 1% of all

incident stroke (equivalent to about 1/100,000 population/year), the number may impose some stress on neurosurgical services.

## 4.7 Immediate management of intracerebral haemorrhage

About 10% of all patients presenting with acute stroke have primary intracerebral haemorrhage (PIH) as the cause. There is no antidote to the direct thrombin or factor Xa inhibitors currently available so patients admitted with PIH when taking these drugs need to be managed with supportive care.

---

### 4.7.1 Recommendations

- A Clotting levels in people with a primary intracerebral haemorrhage who were receiving anticoagulation with a vitamin K antagonist (eg warfarin) before their stroke, should be returned to a normal international normalised ratio (INR) as soon as possible, by reversing the effects of the warfarin/vitamin K antagonist treatment using a combination of prothrombin complex concentrate and intravenous vitamin K.
  - B People with an intracerebral haemorrhage should be monitored by specialists in neurosurgical or stroke care for deterioration in consciousness level and referred immediately for brain imaging when necessary.
  - C People should be considered for surgical intervention following primary intracranial haemorrhage if they have hydrocephalus.
  - D People with any of the following rarely require surgical intervention and should receive medical treatment initially:
    - small deep haemorrhages
    - lobar haemorrhage without either hydrocephalus or rapid neurological deterioration
    - a large haemorrhage and significant prior comorbidities before the stroke
    - supratentorial haemorrhage with a Glasgow Coma Score of less than 8 unless this is because of hydrocephalus.
- 

### 4.7.2 Sources

A–D National Institute for Health and Clinical Excellence 2008b

## 4.8 Immediate diagnosis and management of subarachnoid haemorrhage

Subarachnoid haemorrhage accounts for approximately 5% of all acute strokes. 10–15% of those affected die before reaching hospital and about 25% die within 24 hours of the bleed (ictus). Overall survival is about 50%, half of whom will have residual disability and most of whom will experience long-term symptoms, especially fatigue and cognitive symptoms. However, amongst patients admitted to a neurosurgical unit with a confirmed aneurysm, 85% will survive (Society of British Neurosurgeons 2006). Case fatality and unfavourable outcome rates rise with age and are higher in the over 65 age group (Society of British Neurosurgeons 2006). Rebleeding is the most frequent cause of death after the initial presentation. Thus diagnosis, referral to a tertiary centre and treatment to

prevent rebleeding are urgent. CT scanning is the most sensitive non-invasive way to detect subarachnoid blood reducing the need for lumbar puncture. Usually angiography (CT, magnetic resonance or intra-arterial) should be done in the neurosciences centre rather than the referring centre.

#### 4.8.1 Recommendations

- A Every patient presenting with sudden severe headache and an altered neurological state should have the possible diagnosis of subarachnoid haemorrhage investigated by:
- immediate CT brain scan
  - lumbar puncture between 12 hours and 14 days if the CT brain scan is negative and does not show any contraindication
  - spectrophotometry of the cerebrospinal fluid for xanthochromia.
- B Every patient diagnosed as having a subarachnoid haemorrhage should be referred immediately to a tertiary neuroscience centre and:
- be started on oral nimodipine 60 mg 4 hourly unless there are specific contraindications
  - not be given anti-fibrinolytic agents or steroids.
- C In the specialist service the patient should have:
- CT angiography (if this has not been done by agreed protocol in the referring hospital) with or without catheter angiography to identify the site of bleeding
  - specific treatment of any aneurysm related to the haemorrhage by endovascular embolisation or surgical clipping if appropriate. Treatment to secure the aneurysm should be available within 48 hours of ictus, especially for good grade patients.
- D After any immediate treatment, all patients should be observed for the development of treatable complications, especially hydrocephalus and delayed cerebral ischaemia.
- E Every patient who survives should be assessed for treatable risk factors (ie hypertension and smoking), and have these treated.
- F Every patient who survives and has any residual symptoms or disability should be referred for, and transferred to, specialist rehabilitation as soon as possible after definitive treatment.
- G Every patient with a strong family history of two or more affected first-degree relatives and/or a history of polycystic renal disease should:
- be advised that their family may be at increased risk of subarachnoid haemorrhage
  - be considered for a referral to a neurovascular and/or neurogenetic specialist for up-to-date information and advice.
- H Patients with subarachnoid haemorrhage with focal neurological signs should receive their rehabilitation in a stroke specialist service.

#### 4.8.2 Sources

- A Consensus
- B Allen *et al* 1983; Barker and Ogilvy 1996; Pickard *et al* 1989
- C Molyneux *et al* 2005; Society of British Neurological Surgeons 2004

- D Consensus; Society of British Neurological Surgeons 2004
- E–F Consensus
- G Bor *et al* 2008
- H Consensus

## 4.9 Acute cervical arterial dissection

A small proportion of patients with acute ischaemic stroke will have a dissection of a carotid or vertebral artery as the underlying cause. This group of patients tends to be younger, and may have experienced preceding neck trauma. As carotid and vertebral imaging becomes more accessible and of higher quality, the number of patients diagnosed with dissection increases.

### *Evidence to recommendations*

There is no adequate evidence to guide treatment of carotid or vertebral artery dissection. There is no evidence to suggest that thrombolysis carries any greater risk in these patients than stroke due to other causes.

---

### 4.9.1 Recommendations

- A Any patient suspected of having arterial dissection should be investigated with appropriate imaging (eg non-invasive angiographic techniques).
  - B Patients with stroke secondary to arterial dissection and who meet the indications for thrombolysis should receive it.
  - C Any patient with stroke secondary to acute arterial dissection should be treated with either anticoagulants or antiplatelet agents, preferably as part of a randomised clinical trial to compare the effects of the two treatments.
- 

### 4.9.2 Sources

- A–B Consensus
- C National Institute for Health and Clinical Excellence 2008b

## 4.10 Anticoagulation for people with acute stroke

About one quarter of people presenting with stroke are in atrial fibrillation. It is probable that any stroke occurring in a person with an arrhythmia has had an embolic stroke from a thrombus within the heart. A small number of patients presenting with stroke have cardiac valvular disease or prosthetic heart valves.

### *Evidence to recommendations*

Up to 6% of ischaemic stroke patients will sustain a symptomatic haemorrhagic transformation and more will have asymptomatic bleeding. The risk of haemorrhagic transformation is greater with larger infarcts and therefore the risks of starting or continuing anticoagulation immediately after a significant infarct are high. New oral

anticoagulants including direct thrombin inhibitors and factor Xa inhibitors may ultimately replace warfarin in stroke secondary prevention in patients with creatinine clearance greater than 30 ml/min. These drugs have a rapid onset of action suggesting a specific practical advantage following cardioembolic TIA, and have few interactions with other drugs and food-stuffs, and do not require coagulation monitoring. Due to the lack of an antidote, patients on such drugs should be excluded from thrombolysis should they have a stroke, unless, in the case of dabigatran, the prothrombin time (PTT) and activated partial thromboplastin time (aPTT) are both normal. There are currently no monitoring tests for rivaroxaban. A NICE technology appraisal recommends dabigatran as an option for secondary prevention following TIA or ischaemic stroke in patients with non-valvular AF (National Institute for Health and Clinical Excellence 2012a). However, in the RE-LY study the benefit of dabigatran over warfarin in the prevention of thromboembolic events was greatly reduced in centres where the quality of anticoagulant control was high, assessed by the centre-specific time in the therapeutic range (TTR) (average TTR in UK centres was 72%; Wallentin *et al* 2010). Among people with AF not considered appropriate for warfarin, apixaban was superior to aspirin in the prevention of thromboembolism, offering an alternative in some specific circumstances (Connolly *et al* 2011). Bearing in mind that in all the comparative studies of new oral anticoagulants with warfarin, participants had to be eligible for both treatments, the existing studies provide no evidence regarding the safety or efficacy of the new agents in patients where the bleeding risk is considered to be too high to safely use warfarin.

#### 4.10.1 Recommendations

- A Anticoagulation should not be used routinely for the treatment of acute ischaemic stroke.
- B In people with prosthetic valves who have disabling cerebral infarction and who are at significant risk of haemorrhagic transformation, anticoagulation treatment should be stopped for 1 week and aspirin 300 mg substituted.
- C For patients with ischaemic stroke or TIA in paroxysmal, persistent or permanent atrial fibrillation (valvular or non-valvular) anticoagulation should be the standard treatment. Anticoagulation:
  - should not be given after stroke or TIA until brain imaging has excluded haemorrhage
  - should not be commenced in patients with uncontrolled hypertension
  - of patients with disabling ischaemic stroke should be deferred until at least 14 days have passed from the onset; aspirin 300 mg daily should be used until this time
  - of patients with non-disabling ischaemic stroke should be deferred for an interval at the discretion of the prescriber, but no later than 14 days from the onset
  - should be commenced immediately following a TIA once brain imaging has ruled out haemorrhage, using an agent with a rapid onset such as low molecular weight heparin or an oral direct thrombin or factor Xa inhibitor.

#### 4.10.2 Sources

- A–B National Institute for Health and Clinical Excellence 2008b
- C EAFT (European Atrial Fibrillation Trial) Study Group 1993; consensus

## 4.11 Cerebral venous thrombosis

One rare specific cause of the acute stroke syndrome is thrombosis of the cerebral venous system. This is more likely in patients who have a prothrombotic tendency (eg around the time of pregnancy), who have local infection, who are dehydrated, or who have widespread malignancy. Headache and seizures are common. It is important to investigate for a possible underlying pathology for the thrombosis.

### *Evidence to recommendations*

There is no good-quality evidence to suggest a role for corticosteroids in the management of cerebral venous sinus thrombosis. What information is available is likely to be affected by selection bias and does not support their use, and may even suggest some circumstances where their use may be harmful (Canhao *et al* 2008). Case series suggest that anticoagulation is the treatment of choice after cerebral venous sinus thrombosis, even when haemorrhage is seen on brain imaging, with a reduction in death and dependency (Stam *et al* 2002). A Cochrane review (Coutinho *et al* 2011) identified two small trials of anticoagulation after venous sinus thrombosis. Although not reaching statistical significance, there was a trend toward a positive benefit from anticoagulation.

---

### 4.11.1 Recommendations

- A Any patient suspected of having cerebral venous thrombosis should be investigated by appropriate imaging techniques (eg CT or MRI with CT or MR venography).
- B People diagnosed with cerebral venous sinus thrombosis (including those with secondary cerebral haemorrhage) should be given full-dose anticoagulation (initially full-dose heparin and then warfarin (INR 2–3)) unless there are comorbidities that preclude use.

---

### 4.11.2 Sources

- A Consensus
- B Coutinho *et al* 2011; National Institute for Health and Clinical Excellence 2008b; consensus

## 4.12 Early phase medical care of stroke – physiological monitoring and maintenance of homeostasis

Many patients presenting with an acute neurological deficit secondary to vascular disease will have other problems requiring attention during and after initial diagnosis and specific (disease-focused) treatments. They will need care focused initially on preserving life, preventing complications and starting rehabilitation. People who have had a stroke often have significant disturbance of physiological homeostasis with raised temperature, raised blood glucose, hypoxia, etc. Changes are probably more common in people with more severe stroke, but generally the significance and importance of these changes are poorly researched.

### Evidence to recommendations

Studies have shown that stroke patients are at high risk of developing dehydration, malnutrition, infections, hypoxia and hyperglycaemia. The evidence for stroke unit management rather than non-specialist care is robust. Middleton *et al* 2011 have shown that introducing protocols and training into stroke unit care can significantly improve outcomes. Management of blood pressure after stroke remains an area where there is little evidence to guide care and the recommendations made are based upon the consensus of the working party and the NICE Guideline Development Group. There is no evidence for the use of hyperbaric oxygen therapy in stroke (Bennett *et al* 2009) and from the evidence available, the working party feels that mannitol for the treatment of cerebral oedema should not be used outside of the context of a clinical trial.

#### 4.12.1 Recommendations

- A All patients with acute stroke should be admitted directly to a stroke unit that has protocols to maintain normal physiological status, and has staff trained in their use.
- B The patient's physiological state should be monitored closely to include:
  - blood glucose
  - blood pressure
  - oxygenation
  - nourishment and hydration
  - temperature.
- C People who have had a stroke should receive supplemental oxygen only if their oxygen saturation drops below 95% and there is no contraindication. The routine use of supplemental oxygen is not recommended in people with acute stroke who are not hypoxic.
- D People with acute stroke should be treated to maintain a blood glucose concentration between 4 and 11 mmol/L.
- E Optimal insulin therapy, which can be achieved by the use of intravenous insulin and glucose, should be provided to all adults with diabetes who have stroke. Critical care and emergency departments should have a protocol for such management.
- F Antihypertensive treatment in people with acute stroke is recommended only if there is a hypertensive emergency or one or more of the following serious concomitant medical issues:
  - hypertensive encephalopathy
  - hypertensive nephropathy
  - hypertensive cardiac failure/myocardial infarction
  - aortic dissection
  - pre-eclampsia/eclampsia
  - intracerebral haemorrhage with systolic blood pressure over 200 mmHg.
- G Blood pressure reduction to 185/110 mmHg or lower should be considered in people who are candidates for thrombolysis.
- H Non-dysphagic patients admitted on antihypertensive medication should continue oral treatment unless there is a contraindication or they are being included in a trial of blood-pressure control.

- I Parenteral drugs aimed at lowering blood pressure should only normally be given to people with acute stroke in the context of a clinical trial, apart from people with acute intracerebral haemorrhage and a systolic blood pressure of more than 200 mmHg who may need parenteral treatment, or people who need acute blood-pressure lowering in preparation for thrombolysis.
  - J Parenteral drugs aimed at raising blood pressure should only normally be used as part of a clinical trial.
  - K Prescription of antibiotics to prevent infection after stroke should only be given in the context of a clinical trial.
- 

#### 4.12.2 Sources

- A Middleton *et al* 2011
- B Consensus
- C–G National Institute for Health and Clinical Excellence 2008b
- H Consensus
- I Geeganage and Bath 2008; Geeganage and Bath 2010; Potter *et al* 2009; consensus
- J Potter *et al* 2009
- K van de Beek *et al* 2009

#### 4.12.3 Implications

It is essential that all hospitals admitting people with acute cerebrovascular events have an acute stroke unit able to provide specialised high-dependency nursing and medical care.

### 4.13 Initial, early rehabilitation assessment

A majority of patients will have some disability after stroke, and a mixture of specific impairments. Some problems are common, others less so; some problems are obvious, others less so. This set of recommendations concerns the initial assessment undertaken while the patient is still in the acute phase, often quite ill. Further assessments can and should be undertaken later, but this set of recommendations focuses on those that are important in the first 48 hours.

The goals of the early rehabilitation assessment are to identify major impairments that may not be obvious but that may have an influence on early management, guide prognosis and draw attention to immediate rehabilitation needs.

---

#### 4.13.1 Recommendations

- A All patients should be assessed within a maximum of 4 hours of admission for their:
  - ability to swallow, using a validated swallow screening test (eg 50 ml water swallow) administered by an appropriately trained person
  - immediate needs in relation to positioning, mobilisation, moving and handling
  - bladder control

- risk of developing skin pressure ulcers
  - capacity to understand and follow instructions
  - capacity to communicate their needs and wishes
  - nutritional status and hydration
  - ability to hear, and need for hearing aids
  - ability to see, and need for glasses.
- B All patients with any impairment at 24 hours should receive a full multidisciplinary assessment using an agreed procedure or protocol within 5 working days, and this should be documented in the notes.

---

#### 4.13.2 Sources

- A Consensus; National Stroke Strategy quality marker eight: ‘Patients with suspected acute stroke receive an immediate structured clinical assessment from the right people’
- B Consensus; National Stroke Strategy quality marker eight: ‘Patients diagnosed with stroke receive early multidisciplinary assessment – to include swallow screening (within 24 hours) and identification of cognitive and perceptive problems’

### 4.14 Deep vein thrombosis and pulmonary embolism

Deep vein thrombosis (DVT) and pulmonary embolism (PE) are common complications of hemiplegic stroke with up to 50% of patients having thrombus in either the calf or thigh of the paretic limb (Kelly *et al* 2004).

#### *Evidence to recommendations*

The risks of routine anticoagulation with heparin following stroke balance any benefits, haemorrhagic transformation of infarction versus DVT reduction (International Stroke Trial Collaborative Group 1997). The CLOTS trials show that compression stockings are ineffective. There is an ongoing study (CLOTS 3) testing whether intermittent compression devices are effective in reducing the risk of developing DVT post stroke. There is some weak evidence (Sherman *et al* 2007) to suggest that low molecular weight heparin may be safer than unfractionated heparin. The risks of PE in patients with established proximal vein thrombus are very high and these patients should receive treatment dose anticoagulation.

---

#### 4.14.1 Recommendations

- A Deep vein thrombosis (DVT) prophylaxis using anticoagulants should not be used routinely after acute stroke.
- B Graduated support stockings (either full length or below knee) should not be used for DVT prophylaxis after stroke.
- C Where anticoagulation is needed for venous thromboembolism prevention low molecular weight heparin should be administered in preference to unfractionated heparin.
- D People with ischaemic stroke and symptomatic proximal DVT or pulmonary embolism (PE) should receive anticoagulation treatment in preference to treatment with aspirin unless there are other contraindications to anticoagulation.

- E People with haemorrhagic stroke and symptomatic DVT or PE should have treatment to prevent further pulmonary emboli using either anticoagulation or a caval filter.
- 

#### 4.14.2 Sources

- A International Stroke Trial Collaborative Group 1997
- B Dennis *et al* 2009; CLOTS Trials Collaboration 2010
- C Sherman *et al* 2007
- D–E National Institute for Health and Clinical Excellence 2008b

### 4.15 Early mobilisation

A stroke often results in immobility secondary to motor and other impairments. The acute care environment may also impact on mobility. The deleterious effects of even brief periods of bed rest are well documented.

#### *Evidence to recommendations*

Results from two Phase II RCTs (Sorbello *et al* 2009; Bernhardt *et al* 2008) investigating the safety and feasibility of very early mobilisation after acute stroke suggest that very early and intensive mobilisation may be associated with better functional recovery and may reduce the risk of complications of immobility. Phase III trials are currently underway.

---

#### 4.15.1 Recommendations

- A Every patient with reduced mobility following stroke should be regularly assessed by an appropriately trained healthcare professional to determine the most appropriate and safe methods of transfer and mobilisation.
  - B People with acute stroke should be mobilised within 24 hours of stroke onset, unless medically unstable, by an appropriately trained healthcare professional with access to appropriate equipment.
  - C People with stroke should be offered frequent opportunity to practise functional activities (eg getting out of bed, sitting, standing, and walking) by an appropriately trained healthcare professional.
- 

#### 4.15.2 Sources

- A Consensus
- B–C Bernhardt *et al* 2009; Cumming *et al* 2011

#### 4.15.3 Implications

The two main implications are for staff and the acute stroke unit environment. Early mobilisation, and at regular intervals thereafter, may have an impact on staffing in terms of skillmix, service delivery and training; as well as the need for appropriate equipment to ensure safe early mobilisation.

## 4.16 Positioning

Impairment of motor control reduces the ability of a patient to change their position and posture. The consequent risks include skin pressure ulceration, respiratory complications, limb swelling, subluxation or other damage to joints, the development of contractures and pain. Patients need careful handling and positioning to reduce potential harm.

---

### 4.16.1 Recommendations

- A Healthcare professionals should be given training on how to position patients correctly after stroke.
- B When lying and when sitting, patients should be positioned in such a way that minimises the risk of complications such as aspiration and other respiratory complications, shoulder pain, contractures and skin pressure ulceration.
- C People with acute stroke should be helped to sit up as soon as possible.

---

### 4.16.2 Sources

A–B Consensus

C National Institute for Health and Clinical Excellence 2008b

## 4.17 Nutrition: feeding, swallowing and hydration

Malnutrition is common in hospital inpatients ranging in studies from 6–60%, depending on the method used for measurement (Foley *et al* 2008) and is an independent predictor for poor outcome (FOOD Trial Collaboration 2003). Dehydration is unpleasant and clinically unacceptable. Multiple factors may contribute to a high risk of malnutrition after stroke including physical, social and psychological issues. These include swallowing problems, restricted arm function, absence of teeth and dentures, poor mouth hygiene, depression or anxiety, unfamiliar foods and fatigue.

Dysphagia (swallowing difficulty associated with foods, liquids and saliva) is common after acute stroke with incidence reported to be around 40% and in some studies as high as 78% (Martino *et al* 2005). There is good evidence for a link between dysphagia and poor clinical outcomes including a higher incidence of death, disability, chest infection and longer hospital stay (Martino *et al* 2005).

As patients with dysphagia are likely to have poorer outcomes, the need for timely detection of dysphagia for all patients with acute stroke is essential. In those with identified dysphagia a more detailed swallowing assessment is indicated which includes consideration of function and cognition with a broader range of food and fluids of varying texture.

Some stroke-specific recommendations on swallowing, feeding, nutrition and oral health are made in chapter 6.

#### 4.17.1 Recommendations

- A Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within 4 hours of admission to hospital, before being given any oral food, fluid or medication, and they should have an ongoing management plan for the provision of adequate hydration and nutrition.
  - B All patients should be screened for malnutrition and the risk of malnutrition at the time of admission and at least weekly thereafter. Screening should be undertaken by trained staff using a structured assessment such as the Malnutrition Universal Screen Tool (MUST).
  - C All people with acute stroke should have their hydration assessed on admission, reviewed regularly and managed so that normal hydration is maintained.
  - D People with suspected aspiration on specialist assessment or who require tube feeding or dietary modification for 3 days should be:
    - reassessed and be considered for instrumental examination (such as videofluoroscopy or fibre-optic endoscopic evaluation of swallowing)
    - referred for specialist nutritional assessment.
  - E People with acute stroke who are unable to take adequate nutrition and fluids orally should be:
    - considered for tube feeding with a nasogastric tube within 24 hours of admission
    - considered for a nasal bridge tube or gastrostomy if they are unable to tolerate a nasogastric tube
    - referred to an appropriately trained healthcare professional for detailed nutritional assessment, individualised advice and monitoring.
  - F Nutritional support should be initiated for people with stroke who are at risk of malnutrition. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding.
  - G People with dysphagia should be given food, fluids and medications in a form that can be swallowed without aspiration following specialist assessment of swallowing.
  - [H] Routine oral nutritional supplements are not recommended for people with acute stroke who are adequately nourished on admission and are able to take a full diet while in hospital.
- 

#### 4.17.2 Sources

- A National Institute for Health and Clinical Excellence 2010d
- B–C National Institute for Health and Clinical Excellence 2008b
- D National Institute for Health and Clinical Excellence 2006a; National Institute for Health and Clinical Excellence 2008b
- E–H National Institute for Health and Clinical Excellence 2008b

### 4.18 Bowel and bladder

Disturbance of bowel and bladder control is common immediately after stroke. Urinary incontinence at 1 week is one of the strongest clinical markers of poor prognosis. This

section covers only the immediate, acute phase management of bladder function. For treatment of persistent bowel and bladder problems, see section 6.24.

---

#### *4.18.1 Recommendations*

- A All wards and stroke units should have established assessment and management protocols for both urinary and faecal incontinence, and for constipation in stroke patients.
  - B Patients should not have an indwelling (urethral) catheter inserted unless indicated to relieve urinary retention or where fluid balance is critical.
- 

#### *4.18.2 Sources*

A–B Consensus



# 5 Secondary prevention

---

## 5.0 Introduction

This chapter covers secondary prevention. From the moment a person has an acute cerebrovascular event (of any sort), they are at increased risk of further events. The risk is substantial, 26% within 5 years of a first stroke and 39% by 10 years (Mohan *et al* 2011); there are additional risks of about the same magnitude for other vascular events (eg myocardial infarction). There are a few exceptions, for example patients who have a stroke secondary to arterial dissection.

The risk of further stroke is highest early after stroke or TIA and may be as high as 5% within the first week and 20% within the first month. Appropriate secondary prevention should therefore be commenced **as soon as possible**, usually in the acute phase provided it is safe to do so. However, it is also vital that attention to secondary prevention should be continued throughout the recovery and rehabilitation phase and for the rest of the person's life.

Some of the recommendations in the acute phase, such as starting aspirin immediately after ischaemic stroke, are part of secondary prevention. This chapter assumes that all the recommendations made in chapter 4 have been implemented. **The recommendations concerning the early reduction of risk are not repeated here, but it is essential that immediate treatments are carried out as part of secondary prevention.**

## 5.1 Identifying risk factors

The risk of recurrent vascular events may vary significantly between individuals according to underlying pathology, comorbidities and lifestyle factors. This guideline applies to the vast majority of patients with TIA and stroke, including those not admitted to hospital, although some of the recommendations may not be appropriate for the small minority of patients with unusual stroke pathologies.

---

### 5.1.1 Recommendations

- A Every patient who has had a stroke or TIA and in whom secondary prevention is appropriate should be investigated for risk factors as soon as possible and certainly within 1 week of onset.
  - B For patients who have had an ischaemic stroke or TIA, the following risk factors should also be checked for:
    - atrial fibrillation and other arrhythmias
    - carotid artery stenosis (only for people likely to benefit from surgery)
    - structural and functional cardiac disease.
-

### 5.1.2 Sources

Some of the evidence has already been reviewed in chapter 4. The specific evidence here is:

- A Coull *et al* 2004; Koton and Rothwell 2007; Lovett *et al* 2003
- B Johnston *et al* 2007

## 5.2 A personalised, comprehensive approach

There are many potential interventions to reduce risk. Ensuring identification and reduction of all risk factors, including aspects of lifestyle, will lead to more effective secondary prevention of stroke and other vascular events. Specific interventions are covered in subsequent sections. This section covers advice and general aspects of management.

---

### 5.2.1 Recommendations

- A For each patient, an individualised and comprehensive strategy for stroke prevention should be implemented as soon as possible following a TIA or stroke and continue in the long term.
- B For each patient, information about, and treatment for, stroke and risk factors should be:
  - given first in the hospital setting
  - reinforced at every opportunity by all health professionals involved in the care of the patient
  - provided in an appropriate format for the patient.
- C Patients should have their risk factors reviewed and monitored regularly in primary care, at a minimum on a yearly basis.
- D All patients receiving medication for secondary prevention should:
  - be given information about the reason for the medication, how and when to take it and any possible common side effects
  - receive verbal and written information about their medicines in a format appropriate to their needs and abilities
  - have compliance aids such as large-print labels and non-childproof tops provided, dosette boxes according to their level of manual dexterity, cognitive impairment and personal preference and compatibility with safety in the home environment
  - be aware of how to obtain further supplies of medication
  - have a regular review of their medication
  - have their capacity (eg cognition, manual dexterity, ability to swallow) to take full responsibility for self-medication assessed by the multidisciplinary team prior to discharge as part of their rehabilitation.

---

### 5.2.2 Sources

- A Consensus
- B Maasland *et al* 2007; Ovbiagele *et al* 2004; Sit *et al* 2007

- C Consensus; Department of Health 2012; National Stroke Strategy quality marker two
- D Consensus

### 5.2.3 Implications

Identification of risk factors for stroke and TIA should be part of the assessment during the acute phase. Regular review of risk factors and secondary prevention in general practice may require additional resources.

## 5.3 Lifestyle measures

The evidence in this area relates to primary prevention of vascular events; little research has concentrated specifically upon secondary prevention. However, changes in lifestyle are as important in secondary prevention as they are in primary prevention. This requires changes in behaviour by the patient in areas such as smoking, exercise, diet and alcohol consumption. Although it is the responsibility of the person to change his or her own behaviour, the health system has the responsibility of giving accurate advice and information and providing support for patients to make and maintain lifestyle changes. Wider society also has some responsibility in enabling behaviour change and the charitable sector often provides support through the provision of information and organising peer support and groups.

Long-term adherence to cardio-protective diets, together with other lifestyle modifications such as smoking cessation, increased physical activity and reduced alcohol intake, may have a beneficial effect on stroke recurrence (Appel *et al* 1997; Appel *et al* 2003; Fung *et al* 2008). Research is required to determine the specific effect of dietary modification on outcomes. While there is evidence that tailored dietary modifications result in improvements in cardiovascular risk factors, there is no evidence that there is a reduction of stroke recurrence and mortality (Brunner *et al* 2009). The role of other nutrients, eg plant stanols/sterols and antioxidants, eg vitamins A and C or selenium, in the secondary prevention of stroke, has yet to be determined and merits further research (Alkhenizan and Al-Omran 2004; Bin *et al* 2011; Eidelman *et al* 2004).

### 5.3.1 Recommendations

- A All patients who smoke should be advised to stop. Smoking cessation should be promoted in the initial prevention plan using individualised programmes which may include pharmacological agents and/or psychological support.
- B All patients should be advised to take regular exercise as far as they are able:
- Exercise programmes should be tailored to the individual following appropriate assessment, starting with low-intensity physical activity and gradually increasing to moderate levels.
  - All adults should aim to be active daily and minimise the amount of time spent being sedentary (sitting) for extended periods.
  - For adults over the age of 19 years, this activity should add up to at least 150 minutes of moderate intensity, over a week, in bouts of 10 minutes or more (eg 30

- minutes on at least 5 days per week). They should also engage in muscle strengthening activities at least twice per week.
- For older people at risk of falls, additional physical activity which incorporates balance and coordination, at least twice per week, is also recommended.
- C All patients should be advised to eat the optimum diet:
- eating five or more portions of fruit and vegetables per day from a variety of sources
  - eating two portions of oily fish per week (salmon, trout, herring, pilchards, sardines, fresh tuna).
- D All patients should be advised to reduce and replace saturated fats in their diet with polyunsaturated or monounsaturated fats by:
- using low-fat dairy products
  - replacing butter, ghee and lard with products based on vegetable and plant oils
  - limiting red meat intake especially fatty cuts and processed forms.
- E Patients who are overweight or obese should be offered advice and support to aid weight loss, which may include diet, behavioural therapy and physical activity.
- F All patients, but especially people with hypertension, should be advised to reduce their salt intake by:
- not adding salt to food at the table
  - using as little salt as possible in cooking
  - avoiding high-salt foods, eg processed meat products, such as ham and salami, cheese, stock cubes, pre-prepared soups and savoury snacks such as crisps and salted nuts.
- G Patients who drink alcohol should be advised to keep within recognised safe drinking limits of no more than three units per day for men and two units per day for women.
- H The following interventions have not been shown to reduce stroke reoccurrence:
- vitamin B and folate supplementation
  - vitamin E
  - supplementation with calcium with or without vitamin D.

### 5.3.2 Sources

- A Cahill *et al* 2008; Silagy *et al* 2002; Lancaster and Stead 2005
- B Consensus; Department of Health 2011
- C National Institute for Health and Clinical Excellence 2007c; Brunner *et al* 2009; He *et al* 2006; Wang *et al* 2006; Giannuzzi *et al* 2008
- D Giannuzzi *et al* 2008; Galan *et al* 2010; Hooper *et al* 2011; Marik and Varon 2009
- E National Institute for Health and Clinical Excellence 2006a
- F He and MacGregor 2004; Jürgens G 2004; Brunner *et al* 2009; Suckling *et al* 2010
- G Consensus
- H Alkhenizan and Al-Omran 2004; Bazzano *et al* 2006; Bin *et al* 2011; Bolland *et al* 2010; Bolland *et al* 2011; Eidelman *et al* 2004; Elamin *et al* 2011; Galan *et al* 2010; Hsia *et al* 2007; LaCroix *et al* 2009; Marti-Carvajal *et al* 2009; VITATOPS Trial Study Group 2010

### 5.3.3 Implications

Most of these lifestyle changes will require resources and changes at a societal level but are likely to be cost-effective given the high cost of stroke.

## 5.4 Blood pressure

### *Evidence to recommendations*

Blood pressure (BP) is the pre-eminent treatable risk factor for first and recurrent stroke. There is robust evidence that blood-pressure reduction after stroke or TIA prevents further vascular events (PROGRESS Collaborative Group 2001). In PROGRESS, the addition of two more BP-lowering drugs to people after stroke or TIA, 52% of whom were normotensive at entry (mean entry BP 136/79), reduced BP by 12/5 mmHg and resulted in a 42% reduction in recurrent stroke and 35% fewer major coronary events. Meta-analysis indicates the benefits of more intensive BP-lowering in the prevention of stroke and other vascular events at least among younger patients, with an additional reduction in risk of stroke and major cardiovascular events of 15–20% for a systolic blood pressure/diastolic blood pressure reduction of 3/3 mmHg (Blood Pressure Lowering Treatment Trialists' Collaboration 2000). However, there is also significant evidence of a failure to fully implement the available evidence for the secondary prevention of stroke, principally blood-pressure management, which may lead to persisting elevated risk for many patients after stroke and TIA (Bernard *et al* 2008; Johnson *et al* 2007; Mouradian *et al* 2002).

### 5.4.1 Recommendations

- A All patients with stroke or TIA should have their blood pressure checked. Treatment should be initiated and/or increased as is necessary or tolerated to consistently achieve a clinic blood pressure below 130/80, except for patients with severe bilateral carotid stenosis, for whom a systolic blood pressure target of 130–150 is appropriate.
- B For patients aged 55 or over, and African or Caribbean patients of any age, antihypertensive treatment should typically be initiated with a long-acting dihydropyridine calcium channel blocker or a thiazide-like diuretic. If target blood pressure is not achieved, an angiotensin-converting enzyme inhibitor (ACE-I) or angiotensin-II receptor blocker (ARB) should be added.
- C For patients, not of African or Caribbean origin younger than 55 years, the first choice for initial antihypertensive therapy should be an angiotensin-converting enzyme (ACE) inhibitor or a low-cost angiotensin-II receptor blocker (ARB).
- D Blood-pressure lowering treatment should be initiated after stroke or TIA prior to hospital discharge or at 2 weeks, whichever is the soonest, or at the first clinic visit for non-admitted patients. Thereafter, treatment should be monitored frequently and increased as necessary to achieve target blood pressure as quickly as tolerated and safe in primary care. Patients who do not achieve target blood pressure should be referred for a specialist opinion.

### 5.4.2 Sources

- A Prepared by: British Cardiac Society 2005; Rothwell *et al* 2003; Lakhan and Sapko 2009
- B National Institute for Health and Clinical Excellence 2011; PROGRESS Collaborative Group 2001
- C National Institute for Health and Clinical Excellence 2011
- D National Institute for Health and Clinical Excellence 2011; Rothwell *et al* 2007

## 5.5 Antithrombotic treatment

### *Evidence to recommendations*

The Antithrombotic Trialists' Collaboration demonstrated a 22% reduction in the odds of a vascular event (myocardial infarction, stroke or vascular death) in patients with a previous stroke or TIA treated with antiplatelet drugs. In absolute terms, this equated to 36 fewer serious vascular events (25 fewer strokes) per 1,000 patients treated for a mean of 29 months (Antithrombotic Trialists' Collaboration 2002).

Aspirin, modified-release dipyridamole and clopidogrel are the three drugs almost exclusively used in secondary prevention following TIA or ischaemic stroke in the UK. Comparative trials such as CAPRIE, ESPRIT and PROFESS show that aspirin plus modified-release dipyridamole and clopidogrel monotherapy are equally effective, with both options superior to aspirin monotherapy. In absolute terms, these newer antiplatelet regimens result in about one fewer vascular event per year for every 100 patients treated compared with aspirin alone (Halkes *et al* 2008).

The combination of aspirin and clopidogrel has been compared to clopidogrel monotherapy in patients with recent TIA or stroke (Diener *et al* 2004). The combination was not superior to monotherapy, with some evidence of increased side-effects, particularly bleeding. Nonetheless, this combination is still widely used particularly in the acute setting and after revascularisation procedures, though the evidence to support this practice is weak. There is evidence that even in short-term use the combination carries an increased risk of bleeding complications, particularly in aspirin-naive individuals (Geraghty *et al* 2010).

A recent NICE technology appraisal recommends generic clopidogrel as the most cost-effective antiplatelet therapy for secondary prevention following ischaemic stroke (National Institute for Health and Clinical Excellence 2010a). Aspirin plus modified-release dipyridamole is recommended for those unable to take clopidogrel, although this combination may be more difficult to tolerate, with a 29% discontinuation rate compared with 23% for clopidogrel in the PROFESS study.

Clopidogrel is not licensed for the management of TIA and therefore NICE recommends aspirin plus modified-release dipyridamole for this indication. Clinicians have tended to treat TIA and ischaemic stroke as different manifestations of the same disease and therefore it is illogical to have different treatment strategies for the two presentations. In producing this guideline the members of the working party felt that a unified approach to the treatment of TIA and ischaemic stroke would be appropriate. Whilst clopidogrel

does not have a licence for use after TIA, as the more cost-effective and better tolerated option, it was felt that the benefits of recommending this drug as first-line outweighed any disadvantages.

Simultaneous administration of clopidogrel and proton pump inhibitor (PPI) drugs, particularly omeprazole and esomeprazole, may result in a diminished antiplatelet effect. Whilst there is good pharmacological evidence to support an interaction, evidence of an effect on clinical outcomes is less clear-cut. The EU Committee for Medicinal Products for Human Use recommends that the use of either omeprazole or esomeprazole with clopidogrel should be discouraged.

Anticoagulation is no more effective than antiplatelet therapy in patients with non-cardioembolic ischaemic stroke or TIA and carries a greater risk of bleeding complications (Mohr *et al* 2001; Sandercock *et al* 2009). There is, however, clear evidence of the superiority of anticoagulation as secondary prevention for patients with AF (Saxena and Koudstaal 2004). The NICE clinical guideline for AF (CG36) recommends anticoagulation as soon as possible following TIA (National Institute for Health and Clinical Excellence 2006c). In the case of patients with acute cardioembolic stroke, there is concern that anticoagulation may increase the risk of haemorrhagic transformation, and a delay for an arbitrary 2 week period is recommended. For patients with minor, non-disabling stroke and a low risk of haemorrhagic transformation it may be appropriate to commence treatment sooner, at the discretion of the treating clinician.

For patients with mechanical heart valves, there is evidence that combining antiplatelet drugs with warfarin reduces the risk of thromboembolic complications, but with an increased risk of bleeding complications (Dentali *et al* 2007; Little and Massel 2003). Apart from some high-risk patients with mechanical heart valves and patients in AF requiring antiplatelet therapy after coronary stenting, there is no evidence that combining antiplatelet drugs with warfarin is of benefit, but there is clear evidence of harm (Hart *et al* 2005).

In patients for whom anticoagulation is considered inappropriate for the primary prevention of stroke in AF, NICE guidelines recommend the use of aspirin provided this is not also contraindicated (National Institute for Health and Clinical Excellence 2006c). In secondary prevention, the higher attributable risk of recurrent stroke (about 12% per year; EAFT (European Atrial Fibrillation Trial) Study Group 1993) substantially alters the balance of risk and benefit in favour of anticoagulation in almost every instance. Absolute contraindications to anticoagulation (such as undiagnosed bleeding) usually also act as contraindications to antiplatelet treatment.

In patients with relative contraindications to anticoagulation identified through the use of a tool such as HAS-BLED (Pisters *et al* 2010), it may be possible to intervene to reduce the bleeding risk. Other issues such as recurrent falls have been shown not to act as risk factors for intracranial bleeding to the extent once feared (Man-Son-Hing *et al* 1999) and should not affect risk:benefit considerations. Given the high attributable risk of recurrent stroke in AF, unmodifiable relative contraindications (eg age, history of stroke) should not dissuade prescribers from the use of anticoagulation, as these same risk factors also increase the risk of recurrent stroke to an even greater extent (Olesen *et al* 2011). If, despite addressing modifiable risk factors for bleeding, the bleeding risk is still considered to be too high to use an anticoagulant safely, then aspirin cannot be regarded as a safer

alternative, particularly among older patients (Mant *et al* 2007). In the only RCT of anticoagulation and antiplatelet treatment after cardioembolic stroke or TIA (EAFT Study Group 1993), aspirin was no more effective than placebo in the prevention of disabling stroke or thromboembolic events. In selected cases it may be appropriate to consider a left atrial appendage occlusion device if patients could safely take the short-term anticoagulation required following the procedure (Holmes *et al* 2009).

New oral anticoagulants including direct thrombin inhibitors and factor Xa inhibitors may ultimately replace warfarin in stroke secondary prevention in patients with creatinine clearance greater than 30 ml/min. These drugs have a rapid onset of action suggesting a specific practical advantage following cardioembolic TIA and have few interactions with other drugs and food-stuffs, and do not require coagulation monitoring. Due to the lack of an antidote patients on such drugs should be excluded from thrombolysis should they have a stroke, unless, in the case of dabigatran, the prothrombin time (PTT) and activated partial thromboplastin time (aPTT) are both normal. There are currently no monitoring tests for rixaroxaban.

NICE technology appraisals recommend dabigatran or rivaroxaban as an option for secondary prevention following TIA or ischaemic stroke in patients with non-valvular AF (National Institute for Health and Clinical Excellence 2012a; National Institute for Health and Clinical Excellence 2012b). Among people with AF not considered appropriate for warfarin, apixaban was superior to aspirin in the prevention of thromboembolism, offering another alternative in some specific circumstances (Connolly *et al* 2011). In the RE-LY study the benefit of dabigatran over warfarin in the prevention of thromboembolic events was greatly reduced in centres where the quality of anticoagulant control was high, as assessed by the centre-specific time in the therapeutic range (TTR) (Connolly *et al* 2009). Average TTR in UK centres was 72% (Wallentin *et al* 2010). Bearing in mind that participants had to be eligible for both treatments in all the comparative studies of new oral anticoagulants with warfarin, the existing studies provide no evidence regarding the safety or efficacy of the new agents in patients where the bleeding risk is considered to be too high to use warfarin safely.

---

### 5.5.1 Recommendations

- A For patients with ischaemic stroke or TIA in sinus rhythm, clopidogrel should be the standard antithrombotic treatment:
- Clopidogrel should be used at a dose of 75 mg daily.
  - For patients who are unable to tolerate clopidogrel, offer aspirin 75 mg daily in combination with modified-release dipyridamole 200 mg twice daily.
  - If both clopidogrel and modified-release dipyridamole are contraindicated or not tolerated, offer aspirin 75 mg daily.
  - If both clopidogrel and aspirin are contraindicated or not tolerated offer modified-release dipyridamole 200 mg twice daily.
  - The combination of aspirin and clopidogrel is not recommended for long-term prevention after TIA or stroke unless there is another indication such as acute coronary syndrome or recent coronary stent procedure.
- B For patients with ischaemic stroke or TIA in paroxysmal, persistent or permanent atrial fibrillation (valvular or non-valvular) anticoagulation should be the standard treatment. Anticoagulation:

- should not be given after stroke or TIA until brain imaging has excluded haemorrhage
  - should not be commenced in patients with uncontrolled hypertension
  - of patients with disabling ischaemic stroke should be deferred until at least 14 days have passed from the onset; aspirin 300 mg daily should be used until this time
  - of patients with non-disabling ischaemic stroke should be deferred for an interval at the discretion of the prescriber, but no later than 14 days from the onset
  - should be commenced immediately following a TIA once brain imaging has ruled out haemorrhage, using an agent with a rapid onset such as low molecular weight heparin or an oral direct thrombin or factor Xa inhibitor.
- C Anticoagulation should not be used for patients in sinus rhythm unless there is another indication such as a major cardiac source of embolism, cerebral venous thrombosis or arterial dissection.
- D Anticoagulation therapy should be with adjusted-dose warfarin, target INR 2.5 (range 2.0 to 3.0), with a target time in the therapeutic range (TTR) of >72%. If rapid onset is required warfarin should be preceded by full dose low molecular weight heparin, or an oral direct thrombin inhibitor or factor Xa inhibitor should be used.
- E For patients with cardioembolic stroke for whom treatment with warfarin is considered inappropriate, one of the following three options should be considered:
- For patients with absolute contraindications to anticoagulation (eg undiagnosed bleeding) antiplatelet treatment should not be used as an alternative.
  - For patients with relative contraindications to anticoagulation, measures should be taken to reduce bleeding risk, using a tool such as HAS-BLED to identify modifiable risk factors. If after intervention for relevant risk factors the bleeding risk is considered too high for anticoagulation, antiplatelet treatment should not be used as an alternative. In selected cases, a left atrial appendage occlusion device may be appropriate.
  - For patients where treatment with warfarin has proved impractical or poorly controlled, or resulted in allergy or intolerance, a direct thrombin inhibitor or factor Xa inhibitor should be used.
- F Antithrombotic treatment for patients with recurrent TIA or stroke should be the same as for those who have had a single event. More intensive antiplatelet therapy or anticoagulation treatment should only be given as part of a clinical trial or in exceptional clinical circumstances.

### 5.5.2 Sources

- A Diener *et al* 2004; National Institute for Health and Clinical Excellence 2010a; consensus
- B EAFT (European Atrial Fibrillation Trial) Study Group 1993; consensus
- C Mohr *et al* 2001; consensus
- D EAFT (European Atrial Fibrillation Trial) Study Group 1993; consensus
- E EAFT (European Atrial Fibrillation Trial) Study Group 1993; Connolly *et al* 2011; Olesen *et al* 2011; National Institute for Health and Clinical Excellence 2012a; National Institute for Health and Clinical Excellence 2012b; consensus
- F Algra *et al* 2006; National Institute for Health and Clinical Excellence 2008b; consensus

### 5.5.3 Implications

The Quality and Outcomes Framework of the contract for general practice includes incentives to ensure that people who have had a stroke are on an appropriate antiplatelet or anticoagulant regimen. Provision of community-based anticoagulation services, particularly for those with mobility problems will need consideration and may require additional resource. This guideline is likely to lead to an increase in the prescribing of the new oral anticoagulants, which are expensive but considered by NICE to be cost-effective, particularly when used for secondary prevention where the attributable risk of stroke is several times higher than in primary prevention.

## 5.6 Lipid-lowering therapy

Raised lipid levels, especially hypercholesterolaemia is a well-known risk factor for atherothrombotic events, especially myocardial infarction. Lowering lipid levels is an effective primary and secondary prevention treatment for vascular events, including stroke.

### *Evidence to recommendations*

The benefit of lipid-lowering therapy with statins has been confirmed in RCTs and systematic reviews both for individuals with cardiovascular disease and more specifically those with cerebrovascular disease (Amarenco *et al* 2006; Heart Protection Study Collaborative Group 2002). The Heart Protection Study (HPS) investigated the effect of simvastatin 40 mg daily in individuals at high risk of cardiovascular events and found a relative risk reduction of 17% in vascular deaths, 27% in major coronary events and 25% in stroke. On this evidence, treating 92 individuals with simvastatin should prevent one major vascular event each year.

The SPARCL trial investigated the effect of atorvastatin 80 mg daily in individuals with a history of TIA or stroke in the preceding 6 months and demonstrated a relative risk reduction of 15% in stroke and 35% in major coronary events with treatment. In this study population, treating 158 individuals with atorvastatin should prevent one major vascular event each year.

Lowering low density lipoprotein (LDL) cholesterol by 1 mmol/L reduces cardiovascular events by 21% and total mortality by 12% irrespective of baseline cholesterol level (National Institute for Health and Clinical Excellence 2008a). This suggests that the decision to initiate treatment should be determined by reference to an individual's absolute cardiovascular risk rather than their cholesterol level. The fact that even at low LDL cholesterol levels, further reduction will achieve consistent relative risk reductions, raises the question of whether it may be beneficial to pursue more aggressive treatment regimens.

The Cholesterol Treatment Trialists' Collaboration (2010) compared more intensive (eg 40–80 mg atorvastatin) to less intensive (eg 20–40 mg simvastatin) statin therapy in patients with a history of coronary heart disease by means of a meta-analysis of individual participant data. They confirmed a 22% reduction in the risk of major vascular events per 1 mmol/L reduction in LDL cholesterol, even at levels below 2 mmol/L, with more intensive regimens providing a 15% relative risk reduction when compared to less intensive. The calculated absolute risk reduction achieved by intensive

therapy in this analysis was 0.8% per annum, suggesting that 125 individuals would need to be treated with the intensive regimen to prevent one major vascular event. It is estimated that about two-thirds of the gain from statin therapy is realised by the initial dose (National Institute for Health and Clinical Excellence 2008a). Whilst the relative risk reductions remain consistent as LDL cholesterol is lowered further, the absolute benefits become smaller.

Modelling carried out for the NICE lipid-modification guideline suggests that it is not cost-effective to pursue an absolute LDL cholesterol target and instead recommends a simple two-step titration strategy of simvastatin 40 mg daily, intensified to 80 mg daily if total cholesterol remains  $\geq 4.0$  mmol/L or LDL cholesterol remains  $\geq 2.0$  mmol/L. In recognition of the fact that a minority of patients will achieve this target, a total cholesterol level of 5 mmol/L is suggested for audit purposes.

In the HPS, 3,280 patients had a history of stroke, TIA or carotid revascularisation procedure and in this group there was a 91% (95% CI -8 to 395) increase in the risk of haemorrhagic stroke with statin therapy. The risk of haemorrhagic stroke in SPARCL was increased by 67% (95% CI 9 to 156) for those on a statin. No increased risk of haemorrhage has been identified in primary prevention studies involving statins and if there is indeed a genuine association, it may require the presence of pre-existing intracranial small vessel disease (Goldstein *et al* 2008). More prospective data are required to confirm any association between statin therapy and haemorrhagic stroke but in the meantime the working party suggests a precautionary approach to prescribing in patients with a history of primary intracerebral haemorrhage, consistent with other guidelines.

---

### 5.6.1 Recommendations

- A All patients who have had an ischaemic stroke or TIA should be offered treatment with a statin drug unless contraindicated. Treatment:
- should be initiated using a drug with low acquisition cost such as simvastatin 40 mg daily
  - should be intensified if a total cholesterol of  $< 4.0$  mmol/L or an LDL cholesterol of  $< 2.0$  mmol/L is not attained with initial therapy.
- B All patients who have had an ischaemic stroke or TIA should receive advice on lifestyle factors that may modify lipid levels, including diet, physical activity, weight, alcohol and smoking (see section 5.3).
- C Treatment with statin therapy should be avoided and only used with caution, if required for other indications, in individuals with a recent primary intracerebral haemorrhage.
- 

### 5.6.2 Sources

- A National Institute for Health and Clinical Excellence 2008a  
B See sources 5.3.2  
C Vergouwen *et al* 2008; consensus

## 5.7 Carotid stenosis

Narrowing of the carotid arteries is commonly associated with stroke and TIA, and surgical intervention (including radiologically guided surgery and stenting) has been used in attempts to reduce both initial stroke and further stroke. The NICE guideline on acute stroke (National Institute for Health and Clinical Excellence 2008b) has specific recommendations and this guideline's recommendations are consistent with those (see section 4.4).

### 5.7.1 Management of symptomatic carotid stenosis

#### *Evidence to recommendations*

Identifying individuals with symptomatic severe internal carotid stenosis and instituting appropriate management is a vital part of the management of ischaemic stroke and TIA. The principal evidence supporting carotid endarterectomy for symptomatic patients is derived from the European Carotid Surgery Trial (ECST) and the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and particularly from the pooled analyses combining data from both trials (Rerkasem and Rothwell 2011). Only patients with non-disabling stroke or TIA were included in these trials and the benefits of surgery cannot be assumed to apply to those with more disabling strokes. Patients with possible cardioembolic source were also excluded.

When allowances are made for the different methods used to measure stenosis from angiograms, the two studies report consistent findings. To avoid confusion when discussing levels of stenosis there is agreement that the technique used in NASCET should be used (the ratio of the diameter of the residual lumen at the point of maximum narrowing to that of the distal internal carotid artery, expressed as a percentage). All references to percentage stenosis in this guideline refer to the NASCET method of measurement.

In a pooled analysis of individual patient data involving 6,092 patients, surgery reduced the 5-year absolute risk of ipsilateral ischaemic stroke by 16.0% ( $p < 0.001$ ) in patients with 70–99% stenosis and by 4.6% ( $p = 0.04$ ) in patients with 50–69%. There was no significant effect identified for patients with 30–49% stenosis (absolute risk reduction (ARR) 3.2%  $p = 0.6$ ) and surgery increased the risk in patients with <30% stenosis (ARR -2.2%  $p = 0.05$ ). There was no evidence of benefit for patients with a nearly occluded carotid artery (ARR -1.7%  $p = 0.9$ ). The operative risk of stroke (ocular or cerebral) and death within 30 days of endarterectomy was 7% in the pooled analysis.

There is no reason to suspect that the risks associated with carotid surgery for patients with TIA are influenced by the timing of the surgery. Following stroke however, emergency surgery could carry higher risks. In a systematic review of operative risks in relation to timing of surgery, no statistically significant difference in risks for early versus late surgery in patients with stable stroke was identified, using various thresholds ranging from 1 day to 6 weeks from symptoms (Rerkasem and Rothwell 2009). The timing of surgery appears to be a more important factor in neurologically unstable patients, such as those experiencing high frequency or crescendo TIA (more than 2 episodes in a week or a fluctuating or progressive stroke deficit sometimes referred to as 'stroke in evolution'). In patients undergoing emergency surgery the pooled absolute risk of stroke and death was

20.2% (95% CI 12.0 to 28.4) for those with stroke in evolution and 11.4% (95% CI 6.1 to 16.7) for those with crescendo TIA. The relative odds of operative stroke or death following emergency surgery in unstable patients was 4.6 (95% CI 3.4 to 6.3,  $p < 0.001$ ) compared with non-emergency surgery. There are methodological difficulties with this kind of analysis and neurologically unstable patients are likely to be at increased risk if surgery is not performed. Nonetheless, given the high risks associated with surgery as well as the increased effectiveness of modern medical interventions, it cannot be assumed that emergency surgery is beneficial in neurologically unstable patients.

#### 5.7.1.1 Recommendations

- A Any patient with a carotid artery territory TIA or stroke but without severe disability should be considered for carotid endarterectomy, and if the patient agrees:
- they should have carotid imaging for example duplex ultrasound, magnetic resonance angiography or computed tomography angiography performed urgently to estimate the degree of stenosis
  - in the event of the initial test identifying a relevant stenosis, a second urgent non-invasive imaging investigation (such as magnetic resonance angiography or a second ultrasound) is needed to confirm the degree of stenosis. The confirmatory test should also be carried out urgently so as to avoid introducing delay.
- B Carotid endarterectomy should be considered if the symptomatic internal carotid artery is greater than or equal to 50% stenosed, using the NASCET method of measurement. People with carotid stenosis less than 50% should not undergo surgical or interventional procedures to the carotid artery unless as part of a randomised trial.
- C Final decisions regarding surgery:
- should be made on the basis of individualised risk estimates taking into account factors such as the time from event, gender, age and the type of qualifying event
  - should be supported by risk tables or web-based risk calculator (eg the Oxford University Stroke Prevention Research Unit calculator, [www.stroke.ox.ac.uk/model/form1.html](http://www.stroke.ox.ac.uk/model/form1.html)).
- D Carotid endarterectomy surgery should:
- be the treatment of choice for patients with symptomatic carotid stenosis, particularly those who are 70 years of age and over
  - be performed in neurologically stable patients who are fit for surgery
  - be performed as soon as possible and within 1 week of symptoms
  - only be undertaken by a specialist surgeon in centres where outcomes of carotid surgery are routinely audited.
- E Carotid angioplasty and stenting should be considered in patients meeting the criteria for carotid endarterectomy but who are considered unsuitable for open surgery (eg high carotid bifurcation, symptomatic re-stenosis following endarterectomy, radiotherapy-associated carotid stenosis).
- F All patients with carotid stenosis should receive full medical preventative measures as detailed elsewhere in this chapter, whether or not they undergo surgical intervention.
- G Patients with atrial fibrillation and symptomatic severe internal carotid artery stenosis should be managed for both conditions unless there are contraindications.

### 5.7.1.2 Sources

- A–B Wardlaw *et al* 2006; Rerkasem and Rothwell 2011
- C Rerkasem and Rothwell 2009; Rothwell *et al* 2005; consensus
- D Rothwell *et al* 2004
- E Economopoulos *et al* 2011; International Carotid Stenting Study investigators *et al* 2010; consensus
- F–G Consensus

## 5.7.2 Management of asymptomatic carotid stenosis

### *Evidence to recommendations*

Surgery for asymptomatic carotid stenosis has been shown to provide sizeable relative reductions in the risk of stroke (about 50%) but, with a low overall risk of stroke in this population, the absolute risk reductions are small (about 5% over 10 years) (Chambers and Donnan 2005; Halliday *et al* 2010). The benefit appears to be restricted to those less than 75 years of age and may be smaller in women than in men (Chambers and Donnan 2005). On the basis of the asymptomatic carotid surgery trial data, the number needed to undergo surgery to prevent one extra stroke over 10 years is about 20 and roughly twice this to prevent one extra disabling or fatal stroke.

There have been significant developments in medical secondary prevention since the carotid surgery trials recruited their patients. It seems highly likely that the risk of stroke and other vascular outcomes for patients would be less if these trials were conducted now. With small absolute benefits, likely made smaller still or negated by modern medical management, the consensus of the working party is that carotid endarterectomy for asymptomatic stenosis cannot be considered a cost-effective intervention and should therefore not be routinely undertaken (Abbott 2009; Henriksson *et al* 2008). In exceptional cases asymptomatic surgery may be considered, such as in individuals who are unable to tolerate antihypertensive medication because of symptomatic cerebral hypoperfusion. Otherwise this treatment is not recommended outside clinical trials.

---

### 5.7.2.1 Recommendations

- A Screening for asymptomatic carotid stenosis should not be performed.
- B Surgery or angioplasty/stenting for asymptomatic carotid artery stenosis should not routinely be performed unless as part of a randomised trial.
- C Carotid endarterectomy or stenting should not be performed routinely in patients with asymptomatic carotid stenosis prior to coronary artery surgery.

---

### 5.7.2.2 Sources

- A Consensus
- B Abbott 2009; Halliday *et al* 2010 consensus
- C Consensus

## 5.8 Treatment of unusual causes of stroke

In about 25% of stroke cases, and more commonly in younger patients, no cause is evident on initial screening. Other causes that should be considered include paroxysmal atrial fibrillation, which may require 3- or 7-day cardiac monitoring to detect, intracranial arterial disease, cervical artery dissection, antiphospholipid syndrome and other prothrombotic conditions, and patent foramen ovale (PFO). In patients where no cause is identified and particularly where there is a history of venous or arterial thrombosis or early miscarriage, a thrombophilia screen should be performed.

### 5.8.1 Vertebral artery disease

---

#### 5.8.1.1 Recommendation

A Angioplasty and stenting of the vertebral artery should only be performed in the context of a clinical trial.

---

#### 5.8.1.2 Source

A Consensus

### 5.8.2 Intracranial arterial disease

---

#### 5.8.2.1 Recommendations

- A Patients with symptomatic intracranial stenosis should be offered an intensive antiplatelet regime (eg aspirin and clopidogrel) for 3 months in addition to usual recommendations for secondary prevention intervention and lifestyle modification.
  - B Endovascular intervention for intracranial stenosis should not be performed except in the context of a clinical trial.
- 

#### 5.8.2.2 Source

A–B Chimowitz *et al* 2011

### 5.8.3 Patent foramen ovale

#### *Evidence to recommendation*

Patent foramen ovale is found in 25% of the healthy population and it is therefore difficult to know whether the finding of a PFO is relevant in a patient with cryptogenic stroke. It is more likely if there is a good history of the stroke occurring during or shortly after a Valsalva manoeuvre or where there are recurrent strokes in different arterial territories. No adequate trials have been performed to indicate whether treatment should be antiplatelet drugs, anticoagulation or closure of the PFO. Natural history studies would suggest a low recurrence rate that probably does not justify the risk of closure unless there is recurrent

stroke or an atrial septal aneurysm. Decisions need to be made by a multidisciplinary team (MDT) with a specialist cardiologist based on individual circumstances and patients should be provided with unbiased information on which to judge the balance of risk and benefit. Ideally patients should be entered into a clinical trial.

---

#### 5.8.3.1 Recommendation

A Closure of patent foramen ovale should not be routinely performed outside of the context of a clinical trial.

---

#### 5.8.3.2 Source

A Furlan *et al* 2012

### 5.8.4 Cerebral venous sinus thrombosis

---

#### 5.8.4.1 Recommendation

A People with cerebral venous sinus thrombosis (including those with secondary cerebral haemorrhage) should be treated with full-dose anticoagulation (initially full-dose heparin and then warfain (INR 2–3)) unless there are comorbidities that preclude its use (see section 4.11).

---

#### 5.8.4.2 Sources

A National Institute for Health and Clinical Excellence 2008b; Coutinho *et al* 2011

### 5.8.5 Cervical artery dissection

---

#### 5.8.5.1 Recommendation

A Any patient with stroke secondary to acute arterial dissection should be treated with either anticoagulants or antiplatelet agents, preferably as part of a clinical trial (see section 4.10).

---

#### 5.8.5.2 Source

A National Institute for Health and Clinical Excellence 2008b

### 5.8.6 Antiphospholipid syndrome

---

#### 5.8.6.1 Recommendation

A People with antiphospholipid syndrome who have an acute ischaemic stroke should be managed in the same way as people without antiphospholipid syndrome.

---

### 5.8.6.2 Sources

A Consensus; De Schryver *et al* 2006; Ringleb *et al* 2004; National Institute for Health and Clinical Excellence 2008b

## 5.9 Oral contraception

Primary prevention studies indicate that there may be an approximate doubling of the relative risk of ischaemic stroke in women using combined (low-dose) oestrogen oral contraception. This equates to a very small increase in the absolute risk of one ischaemic stroke per year per 20,000 women using low-dose oestrogen oral contraception. It is unclear how this risk is influenced by a prior history of TIA or stroke. There is limited evidence from primary prevention studies that contraceptive methods containing progesterone (oral, implant and injectable) showed no significant increase in the risk of stroke and can be used if oral contraception is necessary. For every woman who has had a stroke the risks of pregnancy need to be weighed up against the risks associated with the use of contraception. The full range of contraceptive methods (hormonal and non-hormonal) should be considered when making a decision.

### *Evidence to recommendation*

There is strong evidence from primary prevention studies that there is a risk of stroke associated with the use of oestrogen containing contraception (Faculty of Sexual and Reproductive Health 2009). The increased risk is mainly for ischaemic stroke. There is limited evidence from a meta-analysis of primary prevention studies (Chakhtoura *et al* 2009) that progesterone-only methods of contraception appear to have no significant increase in risk of stroke (ischaemic and haemorrhagic). Due to variation in the design and populations included in the studies, it is difficult to compare the risk associated with different modes of delivery of progesterone (oral, injectable and implant) and make any recommendations. There are no studies looking at the safety of the progesterone containing intra-uterine system. There is no evidence on the risk of stroke associated with use of higher doses of progesterone in the treatment of menstrual disorders but if oral contraception is required, there is limited evidence that progesterone-only contraceptives appear to have the least risk.

### 5.9.1 Recommendation

A The combined oral contraceptive pill should not be routinely prescribed following ischaemic stroke.

### 5.9.2 Source

A Faculty of Sexual and Reproductive Health 2009

## 5.10 Hormone replacement therapy

Some women who have had a stroke may wish to continue with hormone replacement therapy treatment for control of symptoms and an enhanced quality of life.

### *Evidence to recommendation*

There is strong evidence from a meta-analysis (Farquhar *et al* 2009) of an increased risk of stroke with the use of oestrogen-only and combined (oestrogen and progesterone) hormone replacement therapy in relatively healthy women. Giving hormone therapy must be balanced against clinical need (treatment of premature menopause or relief of menopausal symptoms). There is limited evidence from one case control study (Renoux *et al* 2010) that transdermal hormone replacement therapy may not be associated with an increased risk of stroke and that lower doses of oestrogen have a lower risk of stroke. One study looking at tibolone (Cummings *et al* 2008) was ended prematurely due to an increased risk of stroke. Tibolone is not recommended in the use of treatment of menopausal-related symptoms or treatment of osteoporosis in women who have had a stroke.

---

#### *5.10.1 Recommendation*

- A The decision whether to start or continue hormone replacement therapy should be discussed with the individual patient and based on an overall assessment of risk and benefit. Consideration should be given to the dosage and formulation (eg oral or transdermal preparations).
- 

#### *5.10.2 Source*

- A Magliano *et al* 2006

# 6 Recovery phase from impairments and limited activities: rehabilitation

---

## 6.0 Introduction

This chapter covers a range of general and specific recommendations on the management of specific losses and limitations that arise following the brain damage that occurs with stroke. Many such problems are present from the onset of stroke. There is no absolute end to recovery, but most rapid improvement is within the first 6 months. The content of this chapter is therefore relevant from stroke onset until the patient's function has returned to pre-stroke levels, or is stable. Hence there is some overlap with the long-term care chapter (chapter 7). This chapter starts with some general topics and moves on to specific treatments. Next it covers a large number of the more common impairments seen after stroke, followed by activity limitations. It then addresses the environment – equipment and adaptations – and concludes with psychological aspects.

## 6.1 General principles of rehabilitation

This guideline generally focuses on stroke-specific matters. However, because rehabilitation is central to a high-quality, effective service, some recommendations based on general principles are given (see section 1.7.1).

### *Evidence to recommendations*

All the recommendations (A–E) are by consensus; these are general principles that should apply to all healthcare but are especially important for patients with complex and multifactorial problems.

---

### 6.1.1 Recommendations

- A All patients entering a period of rehabilitation should be screened for common impairments using locally agreed tools and protocols.
- B Patients should be informed of realistic recovery prospects and should have realistic goals set.
- C Specific treatments should only be undertaken in the context of, and after considering, the overall goals of rehabilitation and any potential interactions with other treatments.
- D For any treatments that involve significant risk/discomfort to the patient and/or resource use, specific goals should be set and monitored using appropriate clinical measures such as numerical rating scales, visual analogue scales, goal attainment rating or a standardised measure appropriate for the impairment.
- E The nature and consequences of a patient's impairments should always be explained to the patient and to the carer(s), and if necessary and possible they should be taught

strategies or offered treatments to overcome or compensate for any impairment affecting activities or safety, or causing distress.

---

### 6.1.2 *Source*

A–E Consensus

## 6.2 **Rehabilitation treatment quantity (intensity of therapy)**

See section 3.14 for more detail.

---

### 6.2.1 *Recommendation*

A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days a week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.

---

### 6.2.2 *Sources*

A Consensus; National Institute for Health and Clinical Excellence 2010d

## 6.3 **Evaluating and stopping treatments**

The rehabilitation process is cyclical. It starts with problem identification, analysis and understanding (ie diagnosis of the problems) and moves on to an evaluation of progress made in terms of the goals set. While the cycle may reiterate several times, as existing problems are resolved and as new problems are identified, it is appropriate for the process to end when all achievable goals have been reached and no new attainable goals can be set. Many stroke survivors report that they continue their recovery many months and even years after their stroke. Although this does not mean that it is necessarily appropriate for rehabilitation support to continue, it does mean that access to regular reviews to assess ongoing needs is vital.

---

### 6.3.1 *Recommendations*

- A Every patient should have their progress measured against goals set at regular intervals determined by their rate of change, for example using goal attainment scaling.
- B When a patient's goal is not achieved, the reason(s) should be established and:
- the goal should be adjusted, *or*
  - the intervention should be adjusted, *or*
  - no further intervention should be given towards that goal and a further goal set as appropriate.
- C When a therapist or team is planning to stop giving rehabilitation, the therapist or service should:
- discuss the reasons for this decision with the patient and carer
  - ensure that any continuing support that the patient needs to maintain and/or improve health is provided

- teach the patient and, if necessary, carers how to maintain health
  - provide clear information on how to contact the service for reassessment
  - outline what specific events or changes should trigger further contact
  - consider referral to communication support services, if the patient has persistent aphasia, to pursue compensatory strategies to enhance their communication.
- 

### 6.3.2 Sources

- A–B Consensus; see section 3.12
- C Consensus

### 6.3.3 Implications

Stopping treatment when it is no longer beneficial should save resources. Circumstances may alter so it is essential to have a simple method whereby the patient can return for reassessment. The existence of such a system will facilitate the stopping of therapy but it has implications for the commissioning of services. The NICE multiple sclerosis guideline (National Institute for Health and Clinical Excellence 2003) has a similar recommendation.

## 6.4 Motor control – reduced movement, weakness and incoordination

Impaired motor control after stroke includes sequelae such as lack of coordination in movement, loss of selective movement, and lack of motor control. Weakness (impaired motor control) on one side (hemiparesis) is a hallmark of stroke, but in fact only affects 80% of patients. Nonetheless, it is probably the single most disabling factor, certainly in terms of limiting mobility.

---

### 6.4.1 Recommendations

- A All patients should be assessed for motor impairment using a standardised approach to quantify the impairment, eg the Motricity Index.
  - B All patients with significant loss of motor control (ie sufficient to limit an activity) should be assessed by a therapist with experience in neurological rehabilitation.
  - C Any patient with persistent motor impairment should be taught exercises or activities that will increase voluntary motor control and strength.
- 

### 6.4.2 Sources

- A–C Consensus

## 6.5 Sensation

Sensory loss after stroke is a recognised impairment. Reported prevalence rates vary, some estimating that up to 80% of people have loss or alteration in various somatic sensations – touch, position sense, temperature, pain, etc (Doyle *et al* 2010). The severity of sensory loss is associated with the extent of motor loss, and so the independent

importance of sensory loss is difficult to quantify. It does limit ability, for example use of the upper limb. Sensory retraining can be passive, ie using electrical stimulation, or active which incorporates repeated exposure to varying stimuli, for example texture, temperature, joint position sense or shape.

### *Evidence to recommendations*

The review of sensory interventions shows that there is no strong evidence to support any particular passive or active intervention. Although overall the evidence is not strong, the studies undertaking mirror therapy and studies evaluating peripheral nerve stimulation do appear to show some promising results and further research studies are needed.

---

#### **6.5.1 Recommendations**

- A All patients should be assessed for alteration in sensation. If indicated, a more formal assessment of sensory loss should be undertaken (eg using the Nottingham Sensory Assessment, Erasmus medical centre version).
- B Any patient who has sensory loss should be taught how to take care of the limb and avoid injury.
- C Sensory discrimination training should be offered to people with sensory impairment after stroke, as part of goal directed rehabilitation.

---

#### **6.5.2 Sources**

- A Consensus; Connell *et al* 2008; Stolk-Hornsveld *et al* 2006
- B Consensus
- C Carey *et al* 2011; Carey and Matyas 2005; Stolk-Hornsveld *et al* 2006

### **6.6 Exercise**

Exercise programmes to improve aerobic fitness and/or muscle strength have been implemented without adverse effects in stroke patients with muscle weakness and/or reduced fitness. Exercise programmes have been devised to target one or more components of physical fitness and task-orientated exercises have been incorporated into these programmes. While exercise programmes may predominantly benefit physical function, evidence supports the use of aerobic exercise and mixed training programmes to improve gait (Brazzelli *et al* 2011; English and Hillier 2010; Saunders *et al* 2009; van de Port *et al* 2007).

### *Evidence to recommendations*

There are good-quality, small to moderate sized RCTs, systematic reviews and Cochrane reviews on exercise after stroke. Overall, the weight of evidence shows that exercise programmes have a positive effect on physical outcome, albeit in the predominantly ambulant stroke population.

### 6.6.1 Recommendations

- A Clinicians with the relevant skills and training in the diagnosis, assessment and management of movement in people with stroke should regularly monitor and treat people with movement difficulties until they are able to maintain or progress function either independently or with assistance from others (for example rehabilitation assistants, carers, fitness instructors).
- B After stroke, patients should participate in exercise with the aim of improving aerobic fitness and/or muscle strength unless there are contraindications.
- C Task-orientated exercises should be used as components of exercise programmes.

### 6.6.2 Sources

- A Consensus
- B Ada *et al* 2006; Brazzelli *et al* 2011; Meek *et al* 2003; Pang *et al* 2006; Saunders *et al* 2004
- C English and Hillier 2010; van de Port *et al* 2007; Wevers *et al* 2009

## 6.7 Arm re-education

Approximately 70% of patients experience altered arm function after a stroke, and it is estimated that 40% of survivors are left with a persistent lack of function in the affected arm. This section covers some treatments (constraint-induced motor therapy (CIMT) and bilateral training) that have improvement of arm function as their specific goal. Other relevant sections include mental practice (6.17), robotic treatment (6.15), repetitive task training (6.16) and shoulder problems (6.19.2). The evidence base for virtual reality based interventions for the upper limb after stroke is growing, and further research is needed (Laver *et al* 2011).

### *Evidence to recommendations*

Treatment interventions shown to be most effective are characterised by high-intensity, repetitive and task-specific properties; CIMT and bilateral training can include all of these factors.

The evidence base for using CIMT after stroke contains small to large sized RCTs, systematic reviews, and a Cochrane review. Other terms such as ‘forced use’ and ‘restraint’ have been used in the literature; common factors are an extended period of daily constraint of the non-paretic arm and regular sessions of repetitive task training for the paretic arm (shaping). Outcomes used generally relate to gross arm function rather than dexterity.

The literature relating to bilateral arm training contains small to moderate sized RCTs, systematic reviews and a Cochrane review. Bilateral training can be defined as bimanual task practice (eg functional movements that require the coordinated use of both hands), or synchronised or asynchronous repetitive movements of the arms. In some study protocols, movements are coupled with auditory cueing, in others with neuromuscular stimulation. The evidence suggests that the coupled protocols (eg with auditory training

or neuromuscular stimulation) may lead to greater improvements in the outcomes assessed (Cauraugh *et al* 2010). However, the Cochrane review looked specifically at simultaneous bilateral upper limb training (and excluded studies that included neuromuscular stimulation) and found bilateral training may be no more (or less) effective than usual care or other upper limb interventions (Coupar *et al* 2010). Furthermore, emerging evidence suggests that unilateral training may be the preferred intervention for mild arm paresis, whereas bilateral training can be considered as preferential for severe to moderate arm paresis (van Delden *et al* 2012).

---

### 6.7.1 Recommendations

- A Patients who have some arm movement should be given every opportunity to practise activities within their capacity.
  - B Constraint induced movement therapy (CIMT) should only be considered in people who have 20 degrees of active wrist extension and 10 degrees of active finger extension, and should only be started if the team has the necessary training and the patient is expected to participate fully and safely.
  - C Bilateral arm training involving functional tasks and repetitive arm movement to improve dexterity and grip strength should be used in any patient with continuing limitation on arm function.
- 

### 6.7.2 Sources

- A Langhorne *et al* 2009
- B Page *et al* 2008; Wolf *et al* 2006
- C Consensus

### 6.7.3 Implications

Constraint-induced motor therapy requires great commitment from the patient and considerable health resource. Consequently, it should only be used when the selection criteria are met.

## 6.8 Gait retraining, treadmill retraining, walking aids (including orthoses)

Almost all patients with limited mobility choose a return to independent mobility as their highest priority. This is not surprising because almost all other activities and many social roles are predicated upon adequate mobility. Mobility encompasses a wide range of activities, but this section focuses on treatments aiming to improve walking. Orthoses are external devices that support or enhance an impaired limb. The ones most commonly used after stroke are ankle–foot orthoses (AFOs) to support a dropped foot.

### *Evidence to recommendations*

The literature on gait retraining largely consists of small to medium sized research studies. Treadmill retraining, with or without partial body weight, provides a way for stroke patients who can already walk with some support to practise their walking skills

repetitively. Treadmills have not been shown to be of any greater benefit than conventional physiotherapy intervention. Stroke patients may choose to use a walking aid to help them practise walking earlier rather than waiting until they can walk without one (Tyson and Rogerson 2009). The use of a walking stick for balance (ie light touch) seems to produce better results than use of a stick for weight bearing (Boonsinsukh *et al* 2009).

---

### 6.8.1 Recommendations

- A Every patient who has limited mobility following stroke should be assessed by a specialist in neurological physiotherapy to guide management.
  - B Patients with limited mobility should be assessed for, provided with and taught how to use appropriate mobility aids (including a wheelchair) to facilitate safe independent mobility.
  - C People who are able to walk with or without assistance should undergo walking training to improve endurance and speed.
  - D An ankle–foot orthosis should only be used to improve walking and/or balance, and should be:
    - tried in patients with foot-drop (reduced ability to dorsiflex the foot during walking) that impedes safe and efficient walking
    - evaluated on an individual patient basis before long-term use
    - individually fitted.
- 

### 6.8.2 Sources

- A Consensus
- B Laufer 2002; Singh *et al* 2006; Boonsinsukh *et al* 2009; consensus
- C Jorgensen *et al* 2010; van de Port *et al* 2007
- D de Wit *et al* 2004; Pohl *et al* 2006; Tyson and Rogerson 2009

### 6.8.3 Implications

All stroke services should have therapists who are knowledgeable about the use of aids and appliances to improve function after stroke, and have easy access to a well resourced wheelchair and orthotics service.

## 6.9 Balance impairment and risk of falling: assessment and intervention

Many patients experience reduced balance control after stroke, usually due to a combination of reduced limb and trunk motor control, altered sensation of one side and, sometimes, centrally determined alteration in body representation such that the person misperceives their posture in relation to upright. Whatever its cause, impaired balance is important because it reduces confidence and increases the risk of falls. This section covers interventions other than biofeedback which is covered in section 6.12.

### *Evidence to recommendations*

The literature on balance training post-stroke contains small RCTs and systematic reviews. These papers demonstrate a small consistent positive effect of balance training but the research does not distinguish the optimum intervention and fails to report on long-term follow-up beyond the intervention period.

Stroke survivors are often at high risk of falls at all stages post stroke. Stroke-related balance deficits include reduced postural stability during standing, and delayed and less coordinated responses to both self-induced and external balance perturbations. Gait deficits include reduced propulsion at push-off, decreased hip and knee flexion at swing-phase and reduced stability at stance-phase. The high incidence of falls in stroke survivors may be attributable to impaired cognitive function, and impaired planning and execution of tasks. Factors that increase the risk of falling in older people are also common impairments in stroke survivors. Falls may have serious consequences, both physically and psychologically. Individuals with stroke have increased risk of hip fracture (usually on the paretic side) and greater mortality and morbidity rates compared to people without stroke. Fear of falling may lead to decreased physical activity, social isolation and loss of independence.

Several studies have aimed to identify people with stroke at risk of falls using composite and single tests. None have convincingly identified the person with stroke who is going to fall. Despite evidence for the effectiveness of falls prevention (progressive muscle strengthening and balance training) in older people living in the community, the applicability of these interventions has not been evaluated in stroke patients. More research is needed to evaluate interventions aimed at reducing falls in people with stroke. Future studies should evaluate multifactorial interventions including strength and balance training, vitamin D supplementation and strategies that target risk factors for falls.

---

#### *6.9.1 Recommendations*

- A Any patient with significant impairment in maintaining their balance should receive progressive balance training.
  - B Any patient with moderate to severe limitation of their walking ability should be given a walking aid to improve their stability.
  - C Falls and injury prevention, and assessment of bone health, should be part of every stroke rehabilitation plan including providing training for patients and carers about how to get up after a fall.
  - D Stroke patients should have their nutritional status assessed and should be given vitamin D<sub>3</sub> (800 to 2000 International Units per day) and calcium supplementation if they are at risk of deficiency, particularly if they are house-bound or reside in care homes (see section 7.5).
- 

#### *6.9.2 Sources*

- A Marigold *et al* 2005; Duncan *et al* 2003; Goljar *et al* 2010; Lubetzky and Kartin 2010; Tung *et al* 2010
- B See section 6.8

- C Consensus
- D Consensus; Sato *et al* 2005

## 6.10 Impaired tone – spasticity and spasms

There is considerable debate on the definition, physiological nature and importance of spasticity. Increased tone, abnormal posturing and involuntary spasms may cause discomfort for the patient and difficulties for carers, and are associated with activity limitation. Their close association with other impairments of motor control makes it difficult to determine the extent to which spasticity is a specific cause of disability. Spasticity is common, especially in the non-functional arm. Estimates of prevalence vary from 19% at 3 months after stroke (Sommerfeld *et al* 2004) to 38% of patients at 12 months (Watkins *et al* 2002).

### *Evidence to recommendations*

The spasticity literature contains moderately sized RCTs, two recent larger RCTs (McCrary *et al* 2009; Shaw *et al* 2011) related to botulinum toxin, systematic reviews and a Cochrane review related to upper limb splinting and stretching. These studies and reviews show that improvements after botulinum toxin administration are identified in spasticity (modified Ashworth scale), range of movement and ease of care (also referred to as passive function). In RCTs, significant group differences have not been demonstrated in activities performed by the patient, although a small minority of individuals have reportedly made these changes. Inability to demonstrate improvements in activity indicates that these changes are unlikely in the majority of patients receiving botulinum toxin, but may also reflect limitations in some of the measurement tools used. Improvements in activity for lower limb spasticity require further evaluation.

### 6.10.1 Recommendations

- A Any patient with motor weakness should be assessed for the presence of spasticity as a cause of pain, as a factor limiting activities or care, and as a risk factor for the development of contractures.
- B For all the interventions given below, specific goals should be set and monitored using appropriate clinical measures (eg numerical rating scales for ease of care (eg Arm Activity measure (ArmA)) or pain (eg 10-point numerical rating scale), the modified Ashworth scale, and range of movement).
- C In any patient where spasticity is causing concern, the extent of the problem should be monitored and simple procedures to reduce spasticity should be started. This may include positioning, active movement and monitoring range of movement for deterioration of function, passive movement and pain control.
- D Patients with persistent or progressing troublesome focal spasticity affecting one or two joints and in whom a therapeutic goal can be identified (usually ease of care also referred to as passive function) should be given intramuscular botulinum toxin. This should be in the context of a specialist multidisciplinary team service accompanied by rehabilitation therapy or physical maintenance strategies (eg splinting or casting) over the next 2–12 weeks following botulinum toxin injection. Functional assessment

should be carried out at 3–4 months post injection and further botulinum toxin and physical treatments planned as required.

- E For patients experiencing troublesome general spasticity after initial treatment, anti-spastic drugs should be tried unless contraindicated. Either baclofen or tizanidine should be tried first. Other drugs and combinations of drugs should only be started by people with specific expertise in managing spasticity.
  - F Intrathecal baclofen, intra-neural phenol and other rare procedures should only be used in the context of a specialist multidisciplinary spasticity service or a clinical trial.
- 

### 6.10.2 Sources

A–B Consensus

C Consensus; Royal College of Physicians *et al* 2009

D McCrory *et al* 2009; Shaw *et al* 2011; Royal College of Physicians *et al* 2009

E Montane *et al* 2004

F Sampson *et al* 2002

### 6.10.3 Implications

There are two implications. First, every health economy (geographical area) should have a service that specialises in assessing and managing patients with more severe spasticity. The second area of concern is financial. At present the overall cost-consequences of spasticity are unknown; the costs of botulinum toxin and necessary staff time are reasonably large health costs but it is probable that the cost of managing people with poorly controlled spasticity is also very large in total, though the costs fall on to other budgets. The primary practical concern should be to give repeated injections only to patients who have significant ongoing problems that cannot be controlled in any other way.

## 6.11 Splinting (to prevent and treat contractures)

Any joint that does not move regularly is at risk of developing shortening of surrounding tissues, eventually restricting movement. This is referred to as a contracture, and is not uncommon in limbs affected by high muscle tone (spasticity). Contractures can impede care, for example cleaning skin or putting on clothes. They may also be uncomfortable or painful and may limit sitting or mobility (see section 6.10).

### *Evidence to recommendations*

Splinting after stroke is usually concerned with maintaining or extending the range of movement around a joint; it is an intervention designed to prevent or reduce contractures. The evidence base for splinting remains limited. A recent systematic review containing 25 small to medium sized RCTs reported that people with, or at risk of, contractures were unlikely to benefit from programmes of stretch applied for less than 7 months. The review combined quite different stretch interventions (including splints), and different intensities (median 36 minutes per day (interquartile range 30 to 72)) for

between 2 days and 7 months across a broad range of pathologies in adults and children. The majority of studies looked at stretch interventions of 0–6 weeks duration and in most instances to 4 weeks. Until the evidence base is more conclusive therapists must be analytical and critical in their practice in identifying who and when to splint and when not to splint. Splinting may be used to help manage tone, reduce pain and improve range of movement and function (passive and active). Splints should only be assessed, fitted and reviewed by appropriately skilled staff.

---

### 6.11.1 Recommendations

- A Any patient who has increased tone sufficient to reduce passive or active movement around a joint should have their range of passive joint movement assessed and monitored.
  - B Splinting of the arm and hand should not be used routinely after stroke.
- 

### 6.11.2 Sources

- A Consensus
- B Lannin *et al* 2007a

## 6.12 Biofeedback

One key aspect of any therapist's work is to provide the patient with feedback on their performance of an activity or exercise. One method of enhancing feedback is to use technology which can often also provide more consistent, detailed and sometimes individually adapted feedback. Performance measures monitored in this way include muscle activity (electromyography (EMG)) and balance (force platform), and the feedback may be auditory or visual. For biofeedback for dysphagia see section 6.21.

### *Evidence to recommendations*

The stroke literature on biofeedback contains small to moderate sized RCTs and systematic reviews. From the current evidence it is not possible to determine which combinations or characteristics of feedback are most beneficial, but augmented visual feedback in general has added value (Molier *et al* 2010). When feedback is directed towards Knowledge of Performance (KP), quality of movement improves more than when Knowledge of Results (KR) feedback is given (Cirstea and Levin 2007).

Many biofeedback machines are promoted for use after stroke but there remains insufficient evidence of benefit to justify their use outside the context of a clinical trial (van Dijk *et al* 2005; Woodford and Price 2007).

---

### 6.12.1 Recommendation

- A Stroke patients should not be offered biofeedback outside the context of a clinical trial.
-

### 6.12.2 Sources

A Molier *et al* 2010; van Dijk *et al* 2005; Woodford and Price 2007

## 6.13 Neuromuscular electrical stimulation (including functional electrical stimulation)

Neuromuscular electrical stimulation (NMES or ES) has been used as an adjunct treatment for stroke for many years in many forms. The principle is that, if the brain cannot control muscles, electrical stimulation of the relevant nerve(s) may generate a muscle contraction that improves function. The most common forms used to treat stroke patients are: functional electrical stimulation where the immediate effect aims to improve function, and therapeutic electrical stimulation in which longer-term use aims to improve recovery of function or reduce pain.

### *Evidence to recommendations*

The stroke literature on therapeutic electrical stimulation for rehabilitation of the upper limb contains small to moderate sized RCTs and systematic reviews. Findings are inconclusive: they report reductions in impairment and improved function but these are not translated into improved activities of daily living or quality of life. Similarly, the therapeutic electrical stimulation studies of lower limb rehabilitation after stroke (small RCTs and papers) report contradictory findings at the level of impairment or activity. Overall, these findings may result from studies being underpowered and lacking internal validity. There are no cost-effectiveness studies in this area.

---

### 6.13.1 Recommendations

- A Functional electrical stimulation can be used for drop foot of central neurological origin provided normal arrangements are in place for clinical governance, consent and audit.
  - B Therapeutic electrical stimulation for treatment of the upper and lower limbs following stroke should only be used in the context of a clinical trial.
- 

### 6.13.2 Sources

- A National Institute for Health and Clinical Excellence 2009b
- B Consensus

## 6.14 Acupuncture

Acupuncture has been used as a treatment for several impairments seen after stroke including loss of motor control, pain, sensory loss, and reduced balance, as well as in a more generic manner to improve function and well-being.

### *Evidence to recommendation*

The literature on acupuncture post stroke contains small RCTs and systematic reviews. Although the quality of studies is improving, further robust evidence is required before recommending change in clinical practice.

---

#### 6.14.1 Recommendation

A Stroke patients should not be offered acupuncture outside a clinical trial.

---

#### 6.14.2 Sources

A Wu *et al* 2010; Hopwood *et al* 2008; Kong *et al* 2010

### **6.15 Robotics**

Automated devices controlled by microprocessors that can move a limb are an attractive treatment method because they could, potentially, allow both extended periods of treatment and treatments that are responsive to the particular needs of an individual patient (by using patient movement as feedback) as ability changes over time. They are referred to as robotic treatments.

### *Evidence to recommendations*

The stroke upper limb robotics literature contains a Cochrane review, systematic reviews and small to moderate sized RCTs. Although changes are being observed at an impairment level (eg Fugl-Meyer Assessment, range of movement, strength, movement time, and peak velocity), they are not carried over into changes in activities of daily living. However, it should be noted that these studies predominantly focused on the shoulder and elbow. The wrist and hand are now increasingly the focus of research studies.

---

#### 6.15.1 Recommendation

A Robot-assisted movement therapy should only be used as an adjunct to conventional therapy when the goal is to reduce arm impairment or in the context of a clinical trial.

---

#### 6.15.2 Sources

A Kwakkel *et al* 2008; Hu *et al* 2009; Lo *et al* 2010; Mehrholz *et al* 2008

### **6.16 Repetitive task training**

Ultimately much treatment aims to increase ability at a task or activity, and consequently one approach to treatment is simply to practise the task itself. This is task-specific training.

### 6.16.1 Recommendation

- A Repetitive task training should be used to improve activities of daily living and mobility: standing up and sitting down, gait speed and gait.
  - B Repetitive task training for the upper limb, such as reaching, grasping and other functionally meaningful tasks, should be used to assist in rehabilitation of the arm post stroke.
  - C Every patient should be encouraged and facilitated to undertake repetitive training and performance of any task (activity) that is limited by their stroke and can be practised safely.
- 

### 6.16.2 Sources

- A French *et al* 2007
- B–C Consensus

## 6.17 Mental practice

Mental practice with motor imagery (the practising of movements and activities ‘in the mind’ for the purpose of improvement in performance) has been advocated to aid recovery following stroke (Barclay *et al* 2011; Zimmermann-Schlatter *et al* 2008).

### *Evidence to recommendations*

The mental practice stroke literature includes a Cochrane review, systematic reviews and small to moderate sized trials. Only very limited meta-analysis has been possible due to different study protocols. However, in general, the mental practice literature provides support for the use of mental practice as an adjunct to conventional therapy techniques for upper limb rehabilitation in acute, sub-acute and chronic phases of stroke. More robust research is required on the use of mental practice in the rehabilitation of gait, and the correct intensity and the optimal time following stroke to initiate mental practice.

---

### 6.17.1 Recommendation

- A People with stroke should be taught and encouraged to use mental practice of an activity to improve arm function, as an adjunct to conventional therapy.
- 

### 6.17.2 Sources

- A Barclay *et al* 2011; Page *et al* 2009; Zimmermann-Schlatter *et al* 2008

## 6.18 Self-efficacy training

More attention has been paid recently to psychological factors that may influence engagement and success with rehabilitation. One particular area is that of self-efficacy: the extent to which a person believes in their own capability to achieve an outcome or goal. The concept of self-efficacy is closely related to other concepts such as mood and

self-esteem, and there are relationships between self-efficacy and emotional states (depression, anxiety), and quality of life.

### *Evidence to recommendations*

There is a small emerging evidence base (systematic reviews and RCTs) on the utility of changing self-efficacy in attempts to increase independence. Self-efficacy can also be one of many predictors of independence. One way has been to promote self-management skills through individual or group-based programmes.

---

#### **6.18.1 Recommendations**

- A All patients should be offered training in self-management skills, to include active problem-solving and individual goal setting.
  - B Any patient whose motivation and engagement in rehabilitation seems reduced should be assessed for changes in self-identity, self-esteem and self-efficacy (as well as changes in mood; see section 6.35).
  - C Any patient with significant changes in self-esteem, self-efficacy or identity should be offered additional (to A) psychological interventions such as those referred to in section 6.35.
- 

#### **6.18.2 Sources**

A–B Consensus

- C Kendall *et al* 2007; Watkins *et al* 2007; De Man-van Ginkel *et al* 2010; Jones and Riazi A 2010

## **6.19 Pain management**

Pain is a frequent problem after stroke and can be due to many causes such as neuropathic pain, musculoskeletal pain including spasticity, and depression. It may also be due to a pre-existing problem which is not directly related to the stroke. As with many post-stroke issues, it may be more difficult to evaluate in patients with communication problems.

---

### **6.19.1.1 Recommendations**

- A Every patient with stroke should be asked whether they have any pain, and its severity assessed using a validated score at onset and regular intervals thereafter. Each review should include assessment of:
  - pain reduction
  - adverse effects
  - daily activities and participation (such as ability to work and drive)
  - mood (in particular, whether the person may have depression and/or anxiety)
  - quality of sleep
  - overall improvement as reported by the person.
- B All patients complaining of, or experiencing pain, should have the cause of the pain diagnosed.

- C Patients should be referred to a specialist pain service if, after the local service has tried management, the patient's pain is:
- still severe and causing distress and not controlled rapidly, *or*
  - still leading to significant limitation on activities or social participation.
- 

### 6.19.1.2 Sources

- A Consensus; National Institute for Health and Clinical Excellence 2010c  
B Consensus  
C National Institute for Health and Clinical Excellence 2010c

## 6.19.2 Shoulder pain and subluxation

Estimates of the prevalence of shoulder pain after stroke range from 17% of patients initially, increasing to 25% at 6 months. It is usually rated as moderate to severe. The precise aetiology is unknown, but it is often associated with subluxation of the joint and, in the later stages, spasticity. Shoulder subluxation is not always associated with pain.

### *Evidence to recommendations*

The recently published literature concerned with hemiplegic shoulder pain in stroke contains one Cochrane review, a systematic review and a number of small RCTs. They evaluated interventions such as: electrical stimulation; circuit class therapy; local injections of steroid and local anaesthetic; and aromatherapy acupressure. The recommendations regarding electrical stimulation in the presence of shoulder subluxation remain unchanged as a result of this new evidence. Other treatments showed some modest positive benefits, but low statistical power means that those interventions could not be confidently recommended as clinically beneficial, and so further research involving large high-quality trials is required in this area. There is little evidence to support shoulder strapping as a way of preventing or treating shoulder subluxation. However, it may be useful if only to make it clear to carers that the shoulder is at risk of damage from incorrect handling or positioning.

---

### 6.19.2.1 Recommendations

- A Every patient with functional loss in their arm should have the risk of developing shoulder pain reduced by:
- ensuring that everybody handles the weak arm correctly, avoiding mechanical stress and excessive range of movement
  - avoiding the use of overhead arm slings
  - careful positioning of the arm.
- B Every patient with arm weakness should be regularly asked about shoulder pain.
- C Every patient who develops shoulder pain should:
- have its severity assessed, recorded and monitored regularly
  - have preventative measures put in place
  - be offered regular simple analgesia.

- D Any patient who has developed, or is developing, shoulder subluxation should be considered for functional electrical stimulation of the supraspinatus and deltoid muscles.
- E In the absence of inflammatory disorders, intra-articular steroid injections should not be used for post-stroke shoulder pain.
- 

### 6.19.2.2 Sources

A–C Consensus

D Fil *et al* 2011; Koyuncu *et al* 2010

E Kalita *et al* 2006; Lakse *et al* 2009

### 6.19.3 Neuropathic pain (central post-stroke pain)

Stroke is one cause of pain following damage to neural tissues (so-called neuropathic pain, or central post-stroke pain). The incidence of neuropathic pain is uncertain, with estimates varying between 5% and 20%. However, if present it is unpleasant and warrants treatment. There may be some overlap with both spasticity which can cause pain, and with sensory loss which can be associated with unpleasant sensory phenomena. It is, in principle, separate from musculoskeletal pain, which is considered in the next section (6.19.4).

#### *Evidence to recommendations*

There is very little trial evidence on the management of neuropathic pain specific to post-stroke patients, and it may well be that post-stroke neuropathic pain is different from neuropathic pain resulting from other conditions such as peripheral neuropathies or spinal cord pathology. The recommendations below are largely taken from the NICE guidance on neuropathic pain. The group that developed the guidance considered that pregabalin was preferable to gabapentin because evidence from indirect comparisons of meta-analyses of the two treatments showed that pregabalin has lower number needed to treat (NNT) values for at least 30% pain reduction and at least 50% pain reduction compared with gabapentin, with a similar adverse-effect profile. Pregabalin also has simple dosing and titration compared with gabapentin. Cost-effectiveness analysis conducted by NICE also suggested that pregabalin should be the initial treatment of choice. There is no evidence to show that simple or opioid analgesics have any role in the treatment of neuropathic pain.

---

#### 6.19.3.1 Recommendations

- A Every patient whose pain has been diagnosed by someone with appropriate expertise in neuropathic pain should be given oral amitriptyline, gabapentin or pregabalin as first-line treatment:
- amitriptyline: start at 10 mg per day, with gradual upward titration to an effective dose or the person's maximum tolerated dose of no higher than 75 mg per day (higher doses could be considered in consultation with a specialist pain service)
  - gabapentin: use 300 mg twice daily increasing to a maximum of 3.6 g per day

- pregabalin: start at 150 mg per day (divided into two doses; a lower starting dose may be appropriate for some people), with upward titration to an effective dose or the person's maximum tolerated dose of no higher than 600 mg per day (divided into two doses).
- B Based on both the early and subsequent regular clinical reviews:
- if there is satisfactory improvement, continue the treatment; consider gradually reducing the dose over time if improvement is sustained
  - if amitriptyline as first-line treatment results in satisfactory pain reduction but the person cannot tolerate the adverse effects, consider oral imipramine or nortriptyline as an alternative.
- C If satisfactory pain reduction is not achieved with first-line treatment at the maximum tolerated dose, offer treatment with another drug instead of or in combination with the original drug:
- if first-line treatment was with amitriptyline switch to or combine with oral pregabalin
  - if first-line treatment was with pregabalin, switch to or combine with oral amitriptyline.
- 

### 6.19.3.2 Sources

A–C National Institute for Health and Clinical Excellence 2010c

## 6.19.4 Musculoskeletal pain

Musculoskeletal pain is not uncommon in people with stroke. Many patients have pre-existing osteoarthritis or other painful arthritic conditions. Immobility and abnormal posture can cause pain. The most important specific musculoskeletal pain problem after stroke, post-stroke shoulder pain, has already been considered (see section 6.19.2).

---

### 6.19.4.1 Recommendations

- A Any patient with musculoskeletal pain should be carefully assessed to ensure that movement, posture and moving and handling techniques are optimised to reduce the pain.
- B Any patient continuing to experience pain should be offered pharmacological treatment with simple analgesic drugs taken regularly.
- 

### 6.19.4.2 Source

A–B Consensus

## 6.20 Communication

This section covers all aspects of communication including aphasia (a central abnormality of language, including both comprehension and expression), dysarthria (abnormality of articulation of speech which can result from both central and peripheral lesions) and apraxia of speech (specific isolated impairment of the ability to plan and execute the

multiple skilled oral motor tasks that underlie successful talking). Aphasia, dysarthria and apraxia of speech often co-occur and cannot be assessed/treated in isolation. Differential diagnosis and detailed analysis of the contribution of each type of impairment are important and ongoing issues should be considered for the holistic management of the patient.

### 6.20.1 Aphasia

Aphasia/dysphasia refers to the specific impairment of language functions – the ability to form and understand words whether communicated orally or in writing. About a third of people with a stroke are likely to be aphasic. Aphasia can have a significant impact on all aspects of an individual's life, as well as that of their carers, often affecting mood, self-image, well-being, relationships, employment and recreational opportunities. Subtle difficulties with communication can also occur following damage to the non-dominant hemisphere.

Several methods of treatment have been evaluated (for example cognitive-linguistic therapy, communication/conversation therapy, constraint-induced speech and language therapy, drug therapy). There have been systematic reviews but there is a need for further research in this area (Brady *et al* 2012). In order to strengthen the evidence, it is important that any new interventions are incorporated into clinical trials.

#### *Evidence to recommendations*

Much of the research evidence in aphasia has been carried out with small groups or single cases. Large-scale, randomised, controlled studies generally give little support for specialist intervention but they mostly investigate one aspect of management – impairment-based face-to-face 'treatment'. Cochrane level evidence shows that some intervention is better than none and that some patients may benefit from more intense intervention but that no one type of intervention appears to be better than another.

There is also little randomised, controlled study evidence to inform other aspects of language rehabilitation such as promoting adaptation and compensation, changing the context by training others, or adapting the environment, or concerning the effects of an accurate assessment of the patient's abilities. There is a cohort of well-designed case-series studies which support the use of semantic and phonological therapies for anomia (Royal College of Speech and Language Therapists 2005) and there is evidence that communication partner training can improve participation (Simmons-Mackie *et al* 2010).

#### 6.20.1.1 Recommendations

- A All patients with communication problems following stroke should have an initial assessment by a speech and language therapist to diagnose the communication problem and to explain the nature and implications to the patient, family and multidisciplinary team. Routine reassessment of the impairment or diagnosis in the early stages of stroke (immediate and up to 4 months) should not be performed unless there is a specific purpose, eg to assess mental capacity.

- B In the early stages of stroke (immediate and up to 4 months) patients identified as having aphasia as the cause of the impairment should be given the opportunity to practise their language and communication skills as tolerated by the patient.
  - C Beyond the early stages of stroke (immediate and up to 4 months), patients with communication problems caused by aphasia should be reassessed to determine whether they are more suitable for more intensive treatment with the aim of developing greater participation in social activities. This may include a range of approaches such as using an assistant or volunteer, family member or communication partner guided by the speech and language therapist, computer-based practice programmes and other functional methods.
  - D Patients with impaired communication should be considered for assistive technology and communication aids by an appropriately trained clinician.
  - E Patients with aphasia whose first language is not English should be offered assessment and communication practice in their preferred language.
  - F Education and training of health/social care staff, carers and relatives regarding the stroke patient's communication impairments should be provided by a speech and language therapist. Any education and training should enable communication partners to use appropriate communication strategies to optimise patient engagement and choice, and the delivery of other rehabilitation programmes.
  - G Any person with stroke at home who has continuing communication difficulty due to aphasia and whose social interactions are limited by it should be provided with information about any local or national groups for people with long-term aphasia, and referred to the group as appropriate.
- 

### 6.20.1.2 Sources

- A Brady *et al* 2012; Bowen *et al* 2012a; Bowen *et al* 2012b; consensus
- B Bowen *et al* 2012b; Brady *et al* 2012; de Jong-Hagelstein 2011; Godecke *et al* 2011; Young *et al* 2012
- C Brady *et al* 2012; consensus
- D–E Consensus
- F Kagan *et al* 2001; consensus
- G Consensus

## 6.20.2 Dysarthria

Dysarthria refers to the vocal consequences of impaired control over the muscles responsible for producing intelligible speech, usually described as slurred or blurred. Yorkston (1996) defined dysarthria as neurologic motor speech impairment that is characterised by slow, weak, imprecise and/or uncoordinated movements of the speech musculature and may involve respiration, phonation, resonance, and/or oral articulation. It is common in the early stages of stroke, and is often associated with dysphagia (swallowing difficulties).

### *Evidence to recommendations*

There is only one trial on this topic which included a small planned subgroup of 66 people with dysarthria (Bowen *et al* 2012a). There was no significant difference between speech and language therapy treatment and attention control for people with dysarthria in the first few months of stroke, but a nested, qualitative study found that early, regular and frequent contact (from a therapist or a visitor) was positively rated by patients and carers (Young *et al* 2012).

---

#### **6.20.2.1 Recommendations**

- A Any patient whose speech is unclear or unintelligible following stroke so that communication is limited or unreliable should be assessed by a speech and language therapist to determine the nature and cause of the speech impairment and communication restriction.
  - B Any person who has dysarthria following stroke which is sufficiently severe to limit communication should:
    - be taught techniques to improve the clarity of their speech
    - be assessed for compensatory alternative and augmentative communication techniques (eg letter board, communication aids) if speech remains unintelligible.
  - C The communication partners (eg carers, staff) of a person with severe dysarthria following stroke should be taught how to assist the person in their communication.
- 

#### **6.20.2.2 Sources**

- A Consensus
- B King and Gallegos-Santillan 1999; Mackenzie and Lowit 2007; Palmer and Enderby 2007
- C King and Gallegos-Santillan 1999

### **6.20.3 Apraxia of speech**

A few patients have specific and relatively isolated impairment of the ability to plan and execute the multiple skilled oral motor tasks that underlie successful talking; this is apraxia of speech. It is usually associated with left hemisphere damage, and hence requires careful separation from aphasia as well as from dysarthria. Studies are often small, no trials were identified in a Cochrane review (West *et al* 2005) or in subsequent searches for this guideline, and therefore the evidence of treatment effects is limited. Interventions such as syllable level therapy and metrical pacing have been studied and the use of computers to increase intensity of practice has been suggested.

---

#### **6.20.3.1 Recommendations**

- A Any stroke patient who has marked difficulty articulating words should be formally assessed for apraxia of speech and treated to maximise articulation of targeted words and rate of speech to improve intelligibility.

- B Any stroke patient with severe communication difficulties but reasonable cognition and language function should be assessed for and provided with appropriate alternative or augmentative communication strategies or aids.
- 

### 6.20.3.2 Sources

- A Aichert and Ziegler 2008; Brendel and Ziegler 2008; Wambaugh *et al* 2006a; Wambaugh *et al* 2006b; consensus
- B Consensus; Wambaugh *et al* 2006a; Wambaugh *et al* 2006b

## 6.21 Swallowing problems: assessment and management

The majority of patients presenting with dysphagia following stroke will recover, in part due to bilateral cortical representation of neurological pathways (Hamdy *et al* 1998). However, a proportion will have persistent abnormal swallowing physiology and continued aspiration at 6 months (Mann *et al* 1999a). A small proportion of patients with dysphagia, particularly those with brainstem lesions, will have chronic severe swallowing difficulties. Patients with persistent swallowing problems may avoid eating in social settings, and thus lose the physical and social pleasures normally associated with food.

Aspiration and silent aspiration are common after stroke. There is good evidence that the investigation of dysphagia using instrumental assessments that provide direct imaging for evaluation of swallowing physiology, helps to predict outcomes and improve treatment planning.

### *Evidence to recommendations*

A number of treatments are available for the management of dysphagia in acute stroke, and several are controversial. Despite this, there is an expanding body of evidence in relation to dysphagia therapy programmes and a reduced risk of pneumonia in the acute stage of stroke (Foley *et al* 2008; Speyer *et al* 2010). Evidence with respect to alternative treatment modalities such as transcranial magnetic stimulation, black pepper oil, nifedipine and biofeedback are showing promising results for treatment of those with chronic dysphagia, although more research is needed (Teasell *et al* 2011). Other treatments such as neuromuscular electrical stimulation or acupuncture show equivocal results. Treatments such as thermal tactile stimulation have no supportive evidence in the literature (Teasell *et al* 2011; Foley *et al* 2008).

---

### 6.21.1 Recommendations

- A Until a safe swallowing method has been established, all patients with identified swallowing difficulties should:
- be considered for alternative fluids with immediate effect
  - have a comprehensive assessment of their swallowing function undertaken by a specialist in dysphagia
  - be considered for nasogastric tube feeding within 24 hours
  - be referred for specialist nutritional assessment, advice and monitoring

- receive adequate hydration, nutrition and medication by alternative means
  - be considered for the additional use of a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols.
- B Any stroke patient unable to swallow food safely 1 week after stroke should be considered for an oropharyngeal swallowing rehabilitation programme designed and monitored by a specialist in dysphagia. This should include one or more of:
- compensatory strategies such as postural changes (eg chin tuck) or different swallowing manoeuvres (eg supraglottic swallow)
  - restorative strategies to improve oropharyngeal motor function (eg Shaker head-lifting exercises)
  - sensory modification, such as altering taste and temperature of foods or carbonation of fluids
  - texture modification of solids and/or liquids.
- C Every stroke patient who requires food or fluid of a modified consistency should:
- be referred for specialist nutritional assessment
  - have texture of modified food or liquids prescribed using nationally agreed descriptors
  - have both fluid balance and nutritional intake monitored.
- D Stroke patients with difficulties self-feeding should be assessed and provided with the appropriate equipment and assistance (including physical help and verbal encouragement) to promote independent and safe feeding as far as possible.
- E All stroke patients with swallowing problems should have written guidance for all staff/carers to use when feeding or providing liquid.
- F Nutrition support should be initiated for people with stroke who are at risk of malnutrition which should incorporate specialist dietary advice and may include oral nutritional supplements, and/or tube feeding.
- G Instrumental direct investigation of oropharyngeal swallowing mechanisms (eg by videofluoroscopy or flexible endoscopic evaluation of swallowing) for stroke patients should only be undertaken:
- in conjunction with a specialist in dysphagia
  - if needed to direct an active treatment/rehabilitation technique for swallowing difficulties, *or*
  - to investigate the nature and causes of aspiration.
- H Gastrostomy feeding should be considered for stroke patients who:
- need but are unable to tolerate nasogastric tube feeding
  - are unable to swallow adequate amounts of food and fluid orally by 4 weeks
  - are at long-term high risk of malnutrition.
- I Any stroke patient discharged from specialist care services with continuing problems with swallowing food or liquid safely should:
- be trained, or have carers trained, in the identification and management of swallowing difficulties
  - should have regular reassessment of their dysphagia beyond the initial acute assessment to enable accurate diagnosis and management
  - should have their nutritional status and dietary intake monitored regularly by a suitably trained professional.
-

### 6.21.2 Sources

- A National Institute for Health and Clinical Excellence 2008b
- B Foley *et al* 2008; Speyer *et al* 2010
- C Carnaby *et al* 2006; National Patient Safety Agency 2011; Royal College of Speech and Language Therapists and British Dietetic Association 2003
- D–E Consensus
- F National Institute for Health and Clinical Excellence 2006a
- G Royal College of Speech and Language Therapists 2007; Royal College of Speech and Language Therapists 2008; Martino *et al* 2005; Carnaby *et al* 2006; consensus
- H National Institute for Health and Clinical Excellence 2006a; Dennis *et al* 2005; Beavan *et al* 2010
- I Consensus; Heckert *et al* 2009; National Institute for Health and Clinical Excellence 2006a

## 6.22 Oral health

Oral health refers to the promotion and maintenance of healthy teeth and gums, and a clean oral cavity. A clean mouth not only feels good but the practice of oral hygiene (removing dental plaque and traces of food) is a crucial factor in maintaining the health of the mouth, teeth and gums and may prevent chest infection in patients with dysphagia. A clean and healthy mouth will also prevent pain or discomfort and allow people to eat a range of nutritious foods. Maintaining good oral hygiene is often difficult after a stroke due to cognitive impairment, dysphagia, visuospatial neglect or upper limb weakness, and made worse by medication side effects such as dry mouth and inadequate salivary control.

---

### 6.22.1 Recommendations

- A All stroke patients, especially those who have difficulty swallowing, and are tube fed, should have oral and dental hygiene maintained (involving the patient or carers) through regular (at least 3 times a day):
    - brushing of teeth with a toothbrush, and dentures and gums with a suitable cleaning agent (toothpaste or chlorhexidine gluconate dental gel)
    - removal of excess secretions.
  - B All patients with dentures should have their dentures:
    - put in appropriately during the day
    - cleaned regularly
    - checked and replaced if ill-fitting, damaged or lost.
  - C Those responsible for the care of patients disabled by stroke (in hospital, in residential and in home care settings) should be trained in:
    - assessment of oral hygiene
    - selection and use of appropriate oral hygiene equipment and cleaning agents
    - provision of oral care routines
    - recognition and management of swallowing difficulties.
-

### 6.22.2 Sources

- A Brady *et al* 2006
- B Consensus
- C Brady *et al* 2006

## 6.23 Nutrition: assessment and management

Malnutrition, poor dietary intake and dehydration are common after stroke, being present in up to 30% of patients (Davis *et al* 2004; FOOD Trial Collaboration 2003; Martineau *et al* 2005; Yoo *et al* 2008). The risk of malnutrition increases with increasing hospital stay (Yoo *et al* 2008). Malnutrition and dehydration are associated with a worse outcome and a slower rate of recovery (Davis *et al* 2004; FOOD Trial Collaboration 2003; Yoo *et al* 2008) and stroke patients with dysphagia are more at risk due to the multiple impairments associated with difficulty/inability to eat and drink normally (Crary *et al* 2006; Martineau *et al* 2005).

### 6.23.1 Recommendations

- A All stroke patients, on admission, should be screened for malnutrition and the risk of malnutrition by a trained person using a validated procedure (eg Malnutrition Universal Screening Tool (MUST)).
- B Screening for malnutrition in stroke patients should be repeated:
  - weekly for hospital inpatients
  - at first appointment in outpatients
  - on admission and where there is clinical concern in care homes or rehabilitation units.
- C Nutritional support should be initiated for all stroke patients identified as malnourished or at risk of malnutrition. This may include specialist dietary advice, oral nutrition supplements, and/or tube feeding.
- D Fluid balance and nutritional intake should be monitored in all stroke patients who are at high risk of malnutrition, are malnourished and/or have swallowing problems.

### 6.23.2 Sources

- A National Institute for Health and Clinical Excellence 2006a; Mead *et al* 2006
- B National Institute for Health and Clinical Excellence 2006a
- C National Institute for Health and Clinical Excellence 2006a; Ha *et al* 2010; Rabadi *et al* 2008
- D Consensus

## 6.24 Bowel and bladder impairment

Disturbance of control of excretion is common in the acute phase of stroke and it remains a problem for a significant minority of patients. Incontinence has many consequences: it causes stress for carers and patients; it greatly increases the risk of skin pressure ulceration; and it can be distressing for the patient.

### 6.24.1 Recommendations

- A All wards and stroke units should have established assessment and management protocols for both urinary and faecal incontinence, and for constipation in stroke patients.
  - B Patients with stroke who have continued loss of bladder control 2 weeks after diagnosis should be reassessed to identify the cause of incontinence, and have an ongoing treatment plan involving both patients and carers. The patient should:
    - have any identified causes of incontinence treated
    - have an active plan of management documented
    - be offered simple treatments such as bladder retraining, pelvic floor exercises and external equipment first
    - only be discharged with continuing incontinence after the carer (family member) or patient has been fully trained in its management and adequate arrangements for a continuing supply of continence aids and services are confirmed and in place.
  - C All stroke patients with a persistent loss of control over their bowels should:
    - be assessed for other causes of incontinence, which should be treated if identified
    - have a documented, active plan of management
    - be referred for specialist treatments if the patient is able to participate in treatments
    - only be discharged with continuing incontinence after the carer (family member) or patient has been fully trained in its management and adequate arrangements for a continuing supply of continence aids and services are confirmed and in place.
  - D Stroke patients with troublesome constipation should:
    - have a prescribed drug review to minimise use of constipating drugs
    - be given advice on diet, fluid intake and exercise
    - be offered oral laxatives
    - be offered rectal laxatives only if severe problems remain.
- 

### 6.24.2 Sources

- A Consensus
- B National Institute for Health and Clinical Excellence 2010d; Thomas *et al* 2008; consensus
- C National Institute for Health and Clinical Excellence 2007b; Coggrave *et al* 2006; consensus
- D [www.cks.library.nhs.uk/Constipation/in\\_summary/scenario\\_adults](http://www.cks.library.nhs.uk/Constipation/in_summary/scenario_adults); consensus

## 6.25 Personal activities of daily living

This refers to a range of activities that usually depend on ability to transfer and use of at least one hand – activities such as dressing, washing and feeding as well as using a toilet or bath or shower. In essence it refers to basic activities that would allow someone to live alone provided that more complex activities such as cooking and housework were undertaken by someone else, as needed, during the day.

### 6.25.1 Recommendations

- A Every patient who has had a stroke should be assessed formally for their safety and independence in all personal activities of daily living by a clinician with the appropriate expertise, and results should be recorded using a standardised assessment tool.
- B Any patient who has limitations on any aspect of personal activities after stroke should:
- be referred to an occupational therapist with experience in neurological disability, *and*
  - be seen for further assessment within 4 working days of referral, *and*
  - have treatment of identified problems from the occupational therapist who should also guide and involve other members of the specialist multidisciplinary team.
- C Specific treatments that should be offered to stroke patients (according to need) include:
- dressing practice as a specific intervention for patients with residual dressing problems
  - as many opportunities as appropriate for repeated practice of self-care
  - assessment for provision of and training in the use of equipment and adaptations that increase safe independence
  - training of family and carers in how to help the patient.
- 

### 6.25.2 Sources

- A Consensus
- B Legg *et al* 2006; consensus
- C Walker *et al* 2011; consensus

## 6.26 Extended activities of daily living (domestic and community)

The phrase ‘extended activities of daily living’ encompasses two domains: domestic activities and community activities. It refers to activities that allow complete independence such as shopping, cooking and housework.

---

### 6.26.1 Recommendations

- A Any patient whose activities have been limited should be:
- assessed by an occupational therapist with expertise in neurological disability
  - taught how to achieve activities safely and given as many opportunities to practise as reasonable under supervision, provided that the activities are potentially achievable
  - assessed for, provided with and taught how to use any adaptations or equipment needed to perform activities safely.
- B Where a patient cannot undertake a necessary activity safely themselves, then alternative means of achieving the goal must be put in place to ensure safety and well-being.
-

### 6.26.2 Sources

- A Legg 2004; Logan *et al* 2004; Logan *et al* 2007
- B Consensus

## 6.27 Driving

Being able to drive is usually important to stroke patients, both for practical reasons and because it influences self-esteem and mood. However, there are significant potential risks associated with driving after stroke. There is evidence that healthcare professionals often do not even discuss or give advice on driving and that, when they do, it is incorrect. The Stroke Association publishes a factsheet outlining the current regulations relevant to stroke and driving ([www.stroke.org.uk](http://www.stroke.org.uk)).

---

### 6.27.1 Recommendations

- A Before they leave hospital (or the specialist outpatient clinic if not admitted), every person who has had a stroke or transient ischaemic attack should be asked whether they drive or wish to drive.
  - B The person or team responsible for any stroke patient who wishes to drive should:
    - ask about and identify any absolute bars to driving
    - consider the patient's capacity to drive safely
    - discuss driving and give advice to the patient
    - document the findings and conclusions, inform the GP and give a written record to the patient.
  - C The person or team responsible for any patient who wishes to drive should consult current guidance from the Driver and Vehicle Licensing Agency (DVLA) for full details of driving regulations before giving advice: [www.dft.gov.uk/dvla/medical/ata glance.aspx](http://www.dft.gov.uk/dvla/medical/ata glance.aspx).
  - D Road Sign Recognition and Compass Card tests from the Stroke Driver's Screening Assessment and Trail Making Test B should be used to identify which patients should be referred for on-road screening and evaluation.
- 

### 6.27.2 Sources

- A Consensus
- B Consensus
- C [www.dft.gov.uk/dvla/medical/ata glance.aspx](http://www.dft.gov.uk/dvla/medical/ata glance.aspx)
- D Devos *et al* 2011

## 6.28 Visual impairments

Patients with stroke often have visual problems including disruption of eye movement control causing diplopia, nystagmus, blurred vision and loss of depth perception. Visual field loss such as hemianopia is also common. Other age-related visual problems may also be present, such as cataract, macular degeneration, glaucoma and uncorrected refractive errors. Cognitive disorders such as visual agnosia and visuospatial neglect

should not be confused with visual impairments. There are a range of specialists, including orthoptists, ophthalmologists, opticians and low vision rehabilitation workers, who should be available to provide specific advice for the management of post-stroke visual impairment.

### *Evidence to recommendations*

Interventions aimed at improving function in patients with visual field defects and eye movement disorders have not been shown to be effective. Only very small studies have been conducted and more research is needed (Pollock *et al* 2011a; Pollock *et al* 2011b).

---

#### 6.28.1 Recommendations

- A Every patient should have:
- assessment of visual acuity whilst wearing the appropriate glasses to check their ability to read newspaper text and see distant objects clearly
  - examination for the presence of hemianopia (visual field deficit).
- B Treatment for hemianopia using prisms should only be provided if:
- the treatment is supervised by someone with expertise in this treatment
  - the effects are evaluated
  - the patient is aware of the limitations of the treatment.
- 

#### 6.28.2 Sources

A–B Consensus

### **6.29 Work and leisure**

This refers to two related but often different classes of activity: productive work (paid or voluntary) and leisure activities (many of which are also productive). People who have a stroke are likely to have at least some, and often many, vocational activities.

---

#### 6.29.1 Recommendations

- A Every person should be asked about the work and/or leisure activities they undertook before their stroke.
- B Patients who wish to return to work (paid or unpaid employment) should:
- have their work requirements established with their employer (provided the patient agrees)
  - be assessed cognitively, linguistically and practically to establish their potential
  - be advised on the most suitable time and way to return to work, if this is practical
  - be referred to a specialist in employment for people with disability if extra assistance or advice is needed (a disability employment advisor, in England)
  - be referred to a specialist vocational rehabilitation team if the disability employment advisor is unable to provide the necessary rehabilitation.

- C Patients who wish to return to or take up a leisure activity should have their cognitive and practical skills assessed, and should be given advice and help in pursuing their activity if appropriate.
- 

### 6.29.2 Sources

- A Consensus; National Stroke Strategy quality markers 15 and 16  
B Consensus; National Stroke Strategy quality marker 16  
C Consensus; National Stroke Strategy quality marker 15

## 6.30 Social interaction

This refers to interpersonal behaviour, and encompasses all aspects of communication (including verbal, non-verbal) and also includes the style and consequences for others, for example disinhibited and aggressive behaviour.

---

### 6.30.1 Recommendations

- A Any patient whose social interaction after stroke is causing stress or distress to others should be assessed by a clinical psychologist or other specialist and, if necessary, by others to determine the underlying causes (eg pain, infection, depression).
- B Following the assessment:
- the nature of the problems and their causes should be explained to family, to other people in social contact and to the rehabilitation team
  - the patient should be helped to learn the best way to interact successfully without causing distress
  - all those involved in social interactions should be taught how best to respond to inappropriate or distressing behaviour
  - psychosocial management approaches should be considered
  - antipsychotic medicines may be indicated if other causes have been excluded and the patient is causing distress and is at possible risk of harm to self or others. Given the high rates of adverse effects, including risk of stroke, the use of antipsychotics should be carefully considered. Treatment should be started on a low dose and increased slowly according to symptoms. Ideally treatment should be short-term (eg 1 week) and withdrawn slowly.
- 

### 6.30.2 Sources

- A–B Consensus; National Institute for Health and Clinical Excellence 2006b; National Institute for Health and Clinical Excellence 2010b

## 6.31 Sexual dysfunction

Sexual dysfunction is common after stroke, affecting both the patients and their partners, men and women (Korpelainen *et al* 1999; Monga *et al* 1986; Thompson and Ryan 2009). It appears to be frequently multifactorial including other vascular disease, altered sensation, limited mobility, effect of drugs, mood changes and fear of precipitating

further strokes. Despite its importance for quality of life it is an area that is frequently neglected by clinicians when seeing patients after stroke.

### *Evidence to recommendations*

There is little evidence of the risks and benefits of using sildenafil and similar drugs after stroke. No patients within 6 months of stroke and ischaemic heart disease were included in the original trials. There is no reason to suspect that people are at increased risk of side effects after stroke but the consensus of the working party is to wait for 3 months after stroke onset before prescribing, as long as blood pressure is controlled. A study of cerebral blood flow after administering sildenafil to people with cerebrovascular risk factors did not appear to cause any detrimental effects (Lorberboym *et al* 2010).

---

#### 6.31.1 Recommendations

- A Every patient should be asked, soon after discharge and at their 6-months and annual reviews, whether they have any concerns about their sexual functioning. Partners should additionally be given an opportunity to raise any problems they may have.
- B Any patient who has a limitation on sexual functioning and who wants further help should:
- be assessed for treatable causes
  - be reassured that sexual activity is not contraindicated after stroke and is extremely unlikely to precipitate a further stroke
  - if suffering from erectile dysfunction, be assessed for the use of sildenafil or an equivalent drug
  - avoid the use of sildenafil or equivalent drug for 3 months after stroke and until blood pressure is controlled
  - be referred to a person with expertise in psychosexual problems if the problems remain unresolved.
- 

#### 6.31.2 Sources

- A Consensus; Schmitz and Finkelstein 2010; Thompson and Ryan 2009
- B Consensus; Cheitlin *et al* 1999; Lorberboym *et al* 2010; Melnik *et al* 2007; Song *et al* 2011

## 6.32 Personal equipment and adaptations

People with a disability may have specific difficulties in using objects or in moving around their environment. Sometimes special equipment or adaptations may enable them to have more autonomy, and/or to be safer. Often specialist equipment may become more widely used (eg remote controls for televisions) and the distinction between health-related equipment and normal choice is not always clear. This section refers to equipment that is small and can move with the patient.

### 6.32.1 Recommendations

- A Every patient should have their need for specialist equipment assessed individually in relation to their particular limitations and environment, the need being judged against its effects on:
- safety of the patient or other person during activity, *and/or*
  - independence of the patient undertaking activity, *and/or*
  - speed, ease or quality of activity being undertaken.
- B All aids, adaptations and equipment should be:
- appropriate to the patient's physical and social context
  - of known safety and reliability
  - provided as soon as possible.
- C All people (patient or carers) using any equipment or aids should be:
- trained in their safe and effective use
  - given details on who to contact, and how, in case problems arise.
- D The equipment should be reassessed at appropriate intervals to check:
- it is being used safely and effectively
  - it is still needed
  - it is still safe.
- 

### 6.32.2 Sources

- A Consensus; Logan *et al* 2004; Mann *et al* 1999b; Sackley *et al* 2006
- B Consensus; [www.scope.org.uk/help-and-information/communication/aac](http://www.scope.org.uk/help-and-information/communication/aac) or [www.scope.org.uk/help-and-information/publications/no-voice-no-choice-final-report](http://www.scope.org.uk/help-and-information/publications/no-voice-no-choice-final-report)
- C Consensus
- D Consensus; legal requirement

## 6.33 Environmental equipment and adaptations

This refers to larger-scale equipment or adaptations, such as providing specialist hoists, or adapting kitchens.

---

### 6.33.1 Recommendations

- A Every patient after stroke who remains dependent in some activities should be assessed and should have their home assessed to determine whether equipment or adaptations can increase safety or independence.
- B Prescription and provision of equipment should be based on a careful assessment of:
- the patient and their particular impairments, *and*
  - the physical environment it is to be used in, *and*
  - the social environment it is to be used in.
- C All equipment supplied should be:
- of known (certified) reliability and safety
  - checked at appropriate intervals.

- D The patient and/or carer(s) should be:
- trained in the safe and effective use of any equipment provided
  - given a contact point for future advice about, or help with, any equipment provided.
- E The clinical suitability and use of equipment provided should be reviewed at appropriate intervals, removing equipment that is no longer needed or used.
- 

### 6.33.2 Sources

- A Consensus; and as in 6.32.2A  
 B Consensus; and as in 6.32.2B  
 C–E Consensus

## 6.34 Psychological care

Psychological care after stroke has a number of components and its efficacy may be increased by considering its organisation and delivery. The comprehensive and stepped care approaches are potential models of care and their background and relevance are outlined below.

### *Comprehensive model of psychological care after stroke*

The work of individual practitioners and the stroke MDT is directed at specific mood disorders or cognitive impairments that patients experience. However, there appear to be additional benefits from adopting a comprehensive framework based on a biopsychosocial model of illness for the organisation and delivery of psychological care after stroke.

The comprehensive model was developed because domain-specific cognitive rehabilitation interventions (eg memory rehabilitation) tend not to address the complexity of life after stroke. The same limitation applies to interventions that focus on a specific mood disorder and this may lead to ineffective treatment (eg cognitive problems misdiagnosed as depression). Comprehensive-holistic rehabilitation programmes integrate evaluations of cognition, behaviour and mood to formulate the individual's difficulties. They then assist in the development of alternative or compensatory expectations and behaviours, leading towards independent self-management. They acknowledge that people with stroke may have limited awareness of their impairments or their impact (anosognosia), and that many therapies require motivation for engagement.

Although there are a number of studies of comprehensive-holistic rehabilitation programmes after acquired brain injury, including stroke, most of the evidence comes from case series or cohort studies. Two recent RCTs in acquired brain injury support the integration of cognitive, interpersonal and functional skills (Cicerone *et al* 2008; Salazar *et al* 2000). Evidence for long-term improvement is mixed. Methodological concerns were reported in two recent reviews on traumatic brain injury (Cattalani *et al* 2010; Cicerone *et al* 2009); they suggest a need for well-designed studies. Recommendations for the broad-based approach were formed by consensus of the working party.

### *Delivery of services: stepped care model*

Stroke services should adopt a 'stepped care' approach to delivering psychological care. The stepped care model is intended to be dynamic; a patient might, for example, progress straight from Step 1 to Step 3.

**Step 1** comprises the routine assessments conducted within the MDT of all admitted patients, and the more detailed assessment of patients exhibiting symptoms of psychological disorder at any time after stroke.

**Step 2** comprises the management of mild or moderate problems by MDT members who have been appropriately trained and where possible working under specialist supervision.

**Step 3** comprises the management of more severe or persistent disorder, usually by a specialist.

If the MDT does not routinely include professionals with specialist mental health or neuropsychology skills, particular members of the team should be identified as having received appropriate training and supervision to lead on Step 2 care. Stroke services will need to choose specific assessment measures and define what levels of symptoms denote 'mild', 'moderate' and 'severe'.

There is no specific evidence for the stepped care approach in stroke populations, but it is supported by RCT-level evidence in the general adult population. It has been adopted both by NICE (National Institute for Health and Clinical Excellence 2009a) for the general adult population and the NHS Stroke Improvement Programme (SIP) (Gillham and Clark 2011). The 2011 SIP publication includes more details on the implementation of the stepped care model. Recommendations on the stepped care approach were formed by consensus of the working party; research into the use of the stepped care model for psychological care after stroke, would be valuable.

---

#### **6.34.1 Recommendations**

- A Services should adopt a comprehensive approach to the delivery of psychological care after stroke, which should be delivered by using a 'stepped care' model from the acute stage to long-term management (see chapter 7).
- B Interventions for individual disorders of mood or cognition should be applied within the framework of a stepped care and comprehensive model.
- C Patients with continuing disorders should be considered for comprehensive interventions tailored towards developing compensatory behaviours and the learning of adaptive skills.
- D Within Step 1 care all patients after stroke should be screened within 6 weeks of diagnosis, using a validated tool, to identify mood disturbance and cognitive impairment.
- E Assessment measures should be adapted for use with patients with expressive or minor receptive aphasia. In patients with more severe aphasia, an assessment tool designed specifically for this purpose, such as the SAD-Q or DISCS, should be used. In patients with aphasia or other impairments that complicate assessment, careful observations over time (including response to a trial of antidepressant medication if considered necessary) should be used.

- F Within Step 2 care, patients identified as having symptoms of mood disorder should be offered a more detailed assessment, seeking information on past history, potential causes and impact, and treatment preferences.
- G In patients with mild or moderate symptoms of mood disorder, patients and carers should be provided with information, support and advice about the mood disorder as the first line of intervention. This may be from within the MDT by nominated staff who are suitably trained and supervised, and may also involve the voluntary sector.
- H Within Step 3 care, patients with severe or persistent symptoms of mood disorder should be considered for referral to a specialist in the management of mood disorder in stroke.
- I Psychological or pharmaceutical treatment (or a combination) for mood disorder should be provided if: recommended by a clinician with expertise in managing mood disorder after stroke; or, as the second line of intervention, if the patient has not responded to information, support and advice. Any treatment should be monitored for effectiveness and kept under review.
- J Any patient assessed as having a cognitive impairment should be considered for referral to a specialist in cognitive aspects of stroke.
- K Patients identified as having cognitive impairment or mood disorder should be reassessed before discharge decisions are taken.

#### 6.34.2 Sources

- A Cicerone *et al* 2008; Salazar *et al* 2000; consensus
- B–C Consensus
- D National Institute for Health and Clinical Excellence 2010d; consensus
- E–K Consensus

### 6.35 Depression and anxiety

Mood disturbance is common after stroke and may present as depression or anxiety, both of which may be part of a single emotional response to stroke, and one that varies from patient to patient. The severity of mood disturbance is associated with the severity of cognitive and motor impairments and activity limitation. Furthermore, depression may exacerbate other impairments, limit functional recovery and be associated with increased mortality rates (House *et al* 2001; Morris *et al* 1993). Although they are closely linked, depression and anxiety are usually considered separately.

Depression occurs frequently after stroke, and commonly persists for up to 1 year if untreated (Hackett *et al* 2005; Hackett *et al* 2008a; House *et al* 2001). Anxiety is also common and may persist; it may be evident for the first time some months after stroke, for example after discharge from hospital (Campbell Burton *et al* 2012). Patients troubled by psychological distress that does not meet diagnostic criteria should still have their needs identified and addressed. A majority of long-term stroke survivors with emotional needs reported that they did not receive adequate help to deal with them (McKevitt *et al* 2011).

### *Evidence to recommendations*

Psychological interventions and drug treatments may be helpful in treating depression and anxiety after stroke, but there is no evidence to determine the choice of drug treatment (Campbell Burton *et al* 2011; Hackett *et al* 2008b). Brief psychological interventions, such as motivational interviewing (see section 6.18) or problem-solving therapy, may be helpful in the prevention and treatment of depression after stroke.

Evidence for some recommendations is stroke-specific and based on systematic reviews of trials; other recommendations are at consensus level due to a lack of evidence. Research is needed into psychological interventions, in particular for anxiety after stroke.

---

#### *6.35.1 Recommendations*

- A Any patient considered to have depression or anxiety should be assessed for other mood disorders.
  - B Patients with mild or moderate symptoms of depression should be given information, support and advice (see recommendation 6.34.1G) and considered for one or more of the following interventions:
    - increased social interaction
    - increased exercise
    - goal setting
    - other psychosocial interventions.
  - C Patients prescribed antidepressant drug treatment for depression or anxiety should be monitored for known adverse effects, and treatment continued for at least 4 months beyond initial recovery. If the patient's mood has not improved 2–4 weeks after initiating treatment, check that the patient is taking the medicine as prescribed. If they are, then consider increasing the dose or changing to another antidepressant.
  - D Patients receiving drug treatment for depression or anxiety should have it reviewed regularly to assess continued need.
  - E Brief, structured psychological therapy should be considered for patients with depression. Therapy will need to be adapted for use in those with neurological conditions.
  - F Antidepressant treatment should not be used routinely to prevent the onset of depression.
- 

#### *6.35.2 Sources*

- A–C Consensus
- D Hackett *et al* 2008a; Hackett *et al* 2008b; Mitchell *et al* 2009; National Institute for Health and Clinical Excellence 2009a
- E National Institute for Health and Clinical Excellence 2009a; Pinguart and Duberstein 2007; Wolitzky *et al* 2008; Cicerone *et al* 2008; Mitchell *et al* 2009; Watkins *et al* 2011
- F Hackett *et al* 2008a

### 6.36 Emotionalism

Emotionalism is an increase in emotional behaviour (crying or, less commonly, laughing) following minimal provoking stimuli. Around 20% of patients are affected in the first 6 months after stroke and although frequency decreases by 12 months, more than 10% of patients remain affected (Hackett *et al* 2010). Emotionalism can be distressing for patients and their families and can interfere with rehabilitation.

#### *Evidence to recommendations*

Recommendations are based on consensus opinion and one Cochrane review (Hackett *et al* 2010). There is no evidence to recommend choice of antidepressant or length of treatment. Future studies should be adequately powered, systematically assess emotionalism, provide treatment for sufficient duration, and follow up and report adverse events.

#### 6.36.1 Recommendations

- A Any patient who persistently cries or laughs in unexpected situations or who is upset by their fluctuating emotional state should be assessed by a specialist or member of the stroke team trained in the assessment of emotionalism.
- B Any patient diagnosed with emotionalism should, when they show increased emotional behaviour, be appropriately distracted from the provoking stimuli.
- C Patients with severe, persistent or troublesome emotionalism should be given antidepressant drug treatment, monitoring the frequency of crying to check effectiveness. Patients should be monitored for known adverse effects. If the emotionalism has not improved 2–4 weeks after initiating treatment, check that the patient is taking the medicine as prescribed. If they are, then consider increasing the dose or changing to another antidepressant.

#### 6.36.2 Sources

- A–B Consensus
- C Hackett *et al* 2010

### 6.37 Fatigue

Fatigue is common after stroke, although prevalence estimates vary greatly, and in patients who have made an otherwise complete physical recovery it may be the sole residual problem. Its most common features are a lack of energy or an increased need to rest every day. It can be a source of distress and yet the causes are unknown.

Fatigue is associated with depression, both after stroke and in the non-stroke population, and may be a predictor of shorter survival after stroke. Factors that may be associated with fatigue include side effects of medication, disturbed sleep as a result of pain, anxiety or respiratory problems. Half of long-term stroke survivors said they had experienced fatigue since the stroke and, of these, 43% said they had not received the help they needed (McKevitt *et al* 2011).

Fatigue can be assessed by the routine use of a structured assessment scale, or by asking one or two questions.

### *Evidence to recommendations*

Recommendations in this section are based on systematic reviews of intervention trials and of assessment measures. There is no evidence that pharmacological treatment improves outcomes in fatigue (McGeough *et al* 2009). Graduated exercise and cognitive behavioural approaches, such as activity scheduling, may be useful.

Research is needed into the treatment of fatigue after stroke. Future studies should be adequately powered, assess fatigue systematically, provide treatment for a sufficient duration, follow up participants for sufficient time, and report adverse effects.

---

#### 6.37.1 Recommendations

- A Fatigue in medically stable patients should be assessed particularly where engagement with rehabilitation, or quality of life is affected.
- B Patients with fatigue and their families should be given information and reassurance that the symptom is likely to improve with time.

---

#### 6.37.2 Sources

- A Mead *et al* 2007
- B Consensus

### 6.38 Cognitive impairments – general

Although stroke is typically considered to be a condition causing limb weakness and paralysis, up to 20% of stroke survivors have no significant motor difficulties. Individuals without weakness or paralysis may, however, experience alterations in cognitive functioning. Many studies, involving a wide range of stroke patients, have shown that cognitive impairment is associated with poor rehabilitation outcomes, such as increased length of hospital stay and reduced functional independence.

The evidence suggests that cognitive losses are probably present – at least in the early post-stroke period – for the majority of patients. Screening tools provide a general overview of a patient’s cognitive functioning, but can fail to detect specific problems, and have limited ability to highlight specific cognitive strengths and weaknesses. Some individuals will therefore need a more detailed assessment, the administration and interpretation of which require specialist training.

It is important to note that each cognitive domain (eg perception, attention or memory) cannot be considered in isolation because most everyday activities draw on a range of abilities. Both assessment and treatment need to take this overlap into account. The results of cognitive assessment should be fully explained to the patient, their family and the treating team.

This section covers general principles; recommendations for particular cognitive domains are covered in subsequent sections and mental capacity is covered separately.

### 6.38.1 Recommendations

- A Interventions or patient management should be organised so that people with cognitive difficulties can participate in the treatments and are regularly reviewed and evaluated.
- B Every patient seen after a stroke should be considered to have at least some cognitive losses in the early phase. Routine screening should be undertaken to identify the patient's broad level of functioning, using simple standardised measures (eg Montreal Cognitive Assessment (MOCA)).
- C Any patient not progressing as expected in rehabilitation should have a more detailed cognitive assessment to determine whether cognitive losses are causing specific problems or hindering progress.
- D Care should be taken when assessing patients who have a communication impairment. The advice from a speech and language therapist should be sought where there is any uncertainty about these individuals' cognitive test results (see section 6.20).
- E The patient's cognitive status should be taken into account by all members of the multidisciplinary team when planning and delivering treatment.
- F Planning for discharge from hospital should include an assessment of any safety risks from persisting cognitive impairments.
- G Patients returning to cognitively demanding activities (eg some work, driving) should have their cognition assessed formally beforehand.

### 6.38.2 Sources

A–G Consensus

## 6.39 Attention and concentration

Attention is a prerequisite for almost all cognitive functions and everyday activities. Disturbed alertness is common after stroke especially in the first few days and weeks, and more so following right hemisphere stroke. Problems may be specific (eg focusing, dividing or sustaining attention) or more generalised, affecting alertness and speed of processing as characterised by poor engagement and general slowness. Attention problems may lead to fatigue, low mood and difficulty with independent living.

### *Evidence to recommendations*

Recommendations have not changed greatly since the previous edition of the *National clinical guideline for stroke* (2008) when they were based on consensus opinion and on two reviews (Lincoln *et al* 2000; Michel and Mateer 2006) of a small number of poor-quality studies. The only new evidence of sufficient quality is one RCT (Winkens *et al* 2009). This is small and inconclusive but suggests that Time Pressure Management (TPM) shows promise with younger, more physically independent stroke survivors and that it is feasible to train staff to deliver it in hospital or community stroke services. Adequately powered trials of TPM and other interventions (eg Attention Process Training) would greatly improve the evidence base for these common, disabling impairments.

### 6.39.1 Recommendations

- A Any person after stroke who appears easily distracted or unable to concentrate should have their attentional abilities (eg focused, sustained and divided) formally assessed.
  - B Any person with impaired attention should have cognitive demands reduced through:
    - having shorter treatment sessions
    - taking planned rests
    - reducing background distractions
    - avoiding work when tired.
  - C Any person with impaired attention should:
    - be offered an attentional intervention (eg Time Pressure Management, Attention Process Training, environmental manipulation), ideally in the context of a clinical trial
    - receive repeated practice of activities they are learning.
- 

### 6.39.2 Sources

A–B Consensus

C Lincoln *et al* 2000; Winkens *et al* 2009; consensus

## 6.40 Memory

Subjective problems with memory are very common after stroke, and memory deficits are often revealed on formal testing. Memory deficits can lead to longer hospital stays, poorer functional outcomes, risks to personal safety, and can cause subjective distress to patients and their families. Memory loss is a characteristic feature of dementia, which affects about 20% of people 6 months after stroke. However, this section is not directly concerned with the losses associated with diffuse cerebrovascular disease.

### *Evidence to recommendations*

Since the previous edition of the *National clinical guideline for stroke* (2008), one RCT has been published of sufficient quality to add to the current recommendations. Fish *et al* (2008) provided some evidence for the benefits of electronic paging reminder systems, although the effects were temporary, and from a small, crossover study of individuals who were younger than the typical stroke patient, and most had subarachnoid haemorrhage. Interesting work has been carried out on the impact of active music listening (Sarkamo *et al* 2010; Winkens *et al* 2009), but further research needs to determine whether this is effective for memory problems. Research is needed to establish both the clinical effectiveness (particularly at an activity level) and the patient acceptability of different memory rehabilitation approaches, recruiting larger, more representative, groups of stroke patients.

---

### 6.40.1 Recommendations

- A Patients who complain of memory problems and those clinically considered to have difficulty in learning and remembering should have their memory assessed using a standardised measure such as the Rivermead Behavioural Memory Test (RBMT).

- B Any patient found to have memory impairment causing difficulties in rehabilitation or undertaking activities should:
- be assessed medically to check that there is not another treatable cause or contributing factor (eg delirium, hypothyroidism)
  - have their profile of impaired and preserved memory abilities determined (as well as the impact of any other cognitive deficits on memory performance, for example attentional impairment)
  - have nursing and therapy sessions altered to capitalise on preserved abilities
  - be taught approaches that help them to encode, store and retrieve new information, for example, spaced retrieval (increasing time intervals between review of information) or deep encoding of material (emphasising semantic features)
  - be taught compensatory techniques to reduce their prospective memory problems, such as using notebooks, diaries, electronic organisers, pager systems and audio alarms
  - have therapy delivered in an environment that is as similar to the usual environment for that patient as possible.
- 

#### 6.40.2 Sources

- A Consensus  
B Hildebrandt *et al* 2006; Hildebrandt *et al* 2011; das Nair and Lincoln 2007; Fish *et al* 2008; consensus

### 6.41 Spatial awareness (eg neglect)

Disturbance of spatial awareness refers to a group of behaviours where the patient acts as if they had reduced or absent knowledge about (or awareness of) some part of their person or environment, usually the left side. Other terms used include neglect, visuospatial neglect, and sensory inattention. It is more common in people with right hemisphere brain damage, and is usually associated with hemianopia.

#### *Evidence to recommendations*

Recommendations have not changed greatly since the previous edition of the *National clinical guideline for stroke* (2008) when they were based on consensus opinion and one Cochrane review (das Nair and Lincoln 2007). Eight trials have since been published: four testing visual scanning training, and four using eye patching or prisms to alter the visual image. Some of these suggest promise, in terms of short-term changes on impairment but not activity level measures. However, they are mostly small (underpowered) pilot trials, lacking longer-term follow-up, functional measures, and clear reporting of research methods (high risk of bias). Adequately powered randomised controlled trials, including a usual care comparator, would greatly improve the evidence base.

---

#### 6.41.1 Recommendations

- A Any patient with a stroke affecting the right cerebral hemisphere should be considered at risk of reduced awareness on the left side and should be tested formally if this is suspected clinically.

- B Due to the fluctuating presentation of neglect, a standardised test battery such as the Behavioural Inattention Test should be used in preference to a single subtest, and the effect on functional tasks such as dressing and mobility should be determined.
- C Any patient shown to have impaired attention to one side should be:
- given a clear explanation of the impairment
  - taught compensatory strategies to help reduce impact on functional activities such as reading
  - given cues to draw attention to the affected side during therapy and nursing procedures
  - monitored to ensure that they do not eat too little through missing food on one side of the plate
  - offered interventions aimed at reducing the functional impact of the neglect (eg visual scanning training, limb activation, sensory stimulation, eye patching, prism wearing, prism adaptation training), ideally within the context of a clinical trial.
- 

### 6.41.2 Sources

- A Consensus
- B Jehkonen *et al* 2006
- C Consensus; Bowen and Lincoln 2007; Ferreira *et al* 2011; Fong *et al* 2007; Luukkainen-Markkula *et al* 2009; Nys *et al* 2008; Polanowska *et al* 2009; Schroder *et al* 2008; Tsang *et al* 2009; Turton *et al* 2009

## 6.42 Perception

Perception involves processing and interpretation of incoming sensations, which is essential to successful everyday functioning. Perceptual functions include awareness, recognition, discrimination and orientation. Disorders of perception are common after stroke, especially in the first month, and may affect any sensory modality. However, visual perception has been the most widely studied, particularly visual agnosia (ie impaired object recognition). It is important to distinguish between deficits affecting the whole perceptual field, and unilateral deficits, such as unilateral neglect, where the patient is unaware of sensations or environment on one side only (see section 6.41).

### *Evidence to recommendations*

A high-quality systematic review (Bowen *et al* 2011) examined the evidence for the four main intervention approaches that are used, often in combination, in clinical practice: functional training, sensory stimulation, strategy training and task repetition. There is uncertainty over the possible merits of any one approach over any other. An updated literature search for the current guideline did not find any further evidence.

---

### 6.42.1 Recommendations

- A Any person who appears to have perceptual difficulties should have a formal perceptual assessment (eg the Visual Object and Space Perception battery (VOSP)).
- B Any person found to have agnosia should:

- have the impairment explained to them, their carers and their treating team
  - be offered a perceptual intervention, ideally within the context of a clinical trial.
- 

### 6.42.2 Sources

- A Consensus
- B Bowen *et al* 2011; consensus

## 6.43 Apraxia

Apraxia is an inability to perform purposeful actions such as using everyday tools (called transitive actions) and/or making meaningful gestures not involving tools (called intransitive actions). It is the loss or disturbance of the conceptual ability to organise actions to achieve a goal. People with apraxia often have difficulty carrying out everyday activities such as making a hot drink despite adequate muscle strength and sensation. They may also have difficulties in selecting the right object at the right time and/or in using objects (such as a spoon) correctly. It is usually associated with damage to the left cerebral hemisphere, although it can arise after right hemisphere damage (see section 6.20.3).

### *Evidence to recommendations*

A high-quality systematic review examined the evidence for strategy training, transfer of training and gesture training (West *et al* 2008). There was insufficient evidence to support or refute the effectiveness of any intervention. There have been no subsequent high-quality research studies to alter that conclusion. Case series research suggests that the types of observed action errors are important clues for the type of retraining needed (Sunderland *et al* 2006). Future research needs to provide detailed descriptions of the interventions and measure the impact on everyday function.

---

### 6.43.1 Recommendations

- A Any person who has difficulties in executing tasks despite apparently adequate limb movement should be assessed formally for the presence of apraxia.
  - B Any person found to have apraxia should:
    - have their profile of impaired and preserved action abilities determined using a standardised approach (eg Test of Upper Limb Apraxia (TULIA))
    - have the impairment and the impact on function explained to them, their family, and their treating team
    - be given therapies and/or taught compensatory strategies specific to the deficits identified ideally in the context of a clinical trial.
- 

### 6.43.2 Sources

- A Consensus
- B Vanbellinggen *et al* 2010; Vanbellinggen *et al* 2011; West *et al* 2008

## 6.44 Executive functioning

Executive functioning refers to the ability to plan and execute a series of tasks, and also to the ability to foresee the (social) consequences of actions. The ‘dysexecutive syndrome’ encompasses several impairments including difficulties with planning, organising, initiating, and monitoring behaviour and adapting it as circumstances change.

### *Evidence to recommendations*

A trial by Spikman *et al* (2010) evaluated a multifaceted, individualised intervention consisting of training internal strategies (Ylvisaker’s eight aspects of executive function: self-awareness, goal setting, planning, self-initiation, self-monitoring, self-inhibition, flexibility, and strategic behaviour (Ylvisaker 1998)) plus transfer of training (eg via home assignments) and use of external strategies (eg diary, mobile phone). The intervention was well described. This study provides promising evidence of efficacy but requires replication with a larger sample and one that is more representative of the stroke population, including older people.

---

### 6.44.1 Recommendations

- A Any person who appears to have adequate skills to perform complex activities but who fails to organise the tasks needed should be formally assessed for the dysexecutive syndrome, for example using the Behavioural Assessment of the Dysexecutive Syndrome (BADS).
  - B Any person with an executive disorder and activity limitation should be taught compensatory techniques. This may include internal strategies (eg self-awareness and goal setting) and/or external strategies (eg use of electronic organisers or pagers, or use of written checklists) ideally in the context of a clinical trial.
  - C When a patient’s activities are affected by an executive disorder, the nature and effects of the impairment and ways of supporting and helping the patient should be discussed with others involved (eg family, staff).
- 

### 6.44.2 Sources

- A Consensus
- B Consensus; Spikman *et al* 2010
- C Consensus

## 6.45 Mental capacity (decision-making by the patient)

This section covers the ability of patients to make decisions about and participate in health management.

---

### 6.45.1 Recommendations

- A Professionals involved in the management of stroke patients should be familiar with, and adhere to, the policies defined in the Mental Capacity Act 2005, especially the

advice on factors to be taken into account when deciding on best interests and recognising that relatives cannot make or determine healthcare decisions.

---

#### 6.45.2 Sources

- A [www.justice.gov.uk/downloads/guidance/protecting-the-vulnerable/mca/opg-603-0409.pdf](http://www.justice.gov.uk/downloads/guidance/protecting-the-vulnerable/mca/opg-603-0409.pdf)

### 6.46 Drugs affecting recovery/reduction of impairment

After stroke, patients are often taking many drugs for a wide variety of reasons. Some of these drugs could potentially limit recovery or performance. Others have been proposed as enhancing recovery. This section gives recommendations based on the evidence available. It only mentions drugs where some evidence is available, and inclusion or failure to be mentioned in the recommendations carries no implications concerning safety. There has been a recent small trial of fluoxetine reporting positive results (Chollet *et al* 2011) but this needs confirmation with a larger trial before it can be recommended for routine use.

---

#### 6.46.1 Recommendations

- A The following drugs should not be given with the goal of enhancing recovery outside the context of clinical trials:
- amphetamines
  - bromocriptine and other dopamine agonists
  - piracetam
  - meprobamate
  - fluoxetine and other selective serotonin reuptake inhibitor (SSRI) antidepressants
  - benzodiazepines
  - chlormethiazole.
- B Benzodiazepines and other drugs with effects on the central nervous system, should be prescribed with caution.
- 

#### 6.46.2 Sources

- A Greener *et al* 2001; Chollet *et al* 2011  
B Goldstein 1998; Paolucci and de Angelis 2006



# 7 Long-term management

---

## 7.0 Introduction

This chapter covers the long-term management of people with stroke after the initial recovery phase. The division between the recovery and long-term phases is based on the observation that, in general, recovery of independence most commonly occurs within the first 6 months after stroke. It must be stressed that this is not an absolute rule; some people, especially but not only younger people, may continue to improve after that time. In contrast, it must also be recognised that many people enter a stage of increasing dependence either due to recurrent stroke, to ageing and/or development of other disorders.

This chapter covers:

- > monitoring disability and episodes of further rehabilitation
- > long-term support/care at home
- > people with stroke in care homes
- > carer support.

## 7.1 Further rehabilitation

Many patients wish to have rehabilitation therapy in the long term, either continuously or intermittently. Therapy should be continued for as long as there are gains being made.

### *Evidence to recommendations*

It is a challenge to identify those patients who may or may not benefit from rehabilitation in the long term after stroke. Forster *et al* (2009) found no evidence for a clinically significant benefit for mildly to moderately disabled patients or carers from a structured reassessment system at 6 months post stroke. The consensus of the working party is that patients are reassessed at 6 months because there is evidence of benefit from physiotherapy treatment at 6 months and afterwards. Although there are few trials in this area, these have shown improvements in walking and function in patients who received such interventions after 6 months (Duncan *et al* 2011; Ferrarello *et al* 2011).

---

### 7.1.1 Recommendations

- A Any patient whose situation changes (eg new problems or changed environment) should be offered further assessment by the specialist stroke rehabilitation service.
- B A named person and/or contact point should be identified and communicated to the patient to provide further information and advice if needed.
- C Any patient with residual impairment after the end of initial rehabilitation should be offered a formal review at least every 6 months, to consider whether further interventions are warranted, and should be referred for specialist assessment if:
  - new problems, not present when last seen by the specialist service, are present
  - the patient's physical state or social environment has changed.

- D Further therapy following 6-month review should only be offered if clear goals are agreed.
  - E Patients should have their stroke risk factors and prevention plan reviewed at least every year.
- 

### 7.1.2 Sources

- A Consensus; English Stroke Strategy quality marker 14: ‘This is followed by an annual health and social care check, which facilitates a clear pathway back to further specialist review, advice, information, support and rehabilitation where required’
- B–E Consensus

## 7.2 Promoting physical activity

There is an increasing body of evidence that exercise is of benefit to stroke survivors (Brazzelli *et al* 2011). However, there is a paucity of knowledge about the barriers and motivators to physical activity after stroke (Morris *et al* 2012). See sections 5.3 and 6.6 for more information about physical activity after stroke.

---

### 7.2.1 Recommendation

- A All people following stroke should take sufficient physical exercise to achieve national levels of physical activity (see sections 5.3.1 and 6.6.1).
- 

### 7.2.2 Source

- A Consensus (see sources 5.3.2 and 6.6.2)

## 7.3 Community integration and participation

The goal of healthcare is to help a person integrate back into the community in the way that they want. Most healthcare focuses on improving a person’s capacity to undertake activities. The wider task of achieving community integration also depends upon additional factors such as availability of suitable and accessible social settings, and appropriate training for community providers of leisure and social activities. Stroke specialist voluntary sector services and peer support groups can play an important role in aiding community integration. Lack of suitable and accessible transport is often a significant barrier to participation for disabled people.

---

### 7.3.1 Recommendations

- A The rehabilitation service should establish with each patient specific social and leisure activities that they would like to undertake in the community and:
  - advise the person with stroke on the potential for undertaking an activity
  - identify any barriers to success (for example low self-confidence), give advice and work with the patient on how to overcome those barriers

- where appropriate refer the person with stroke on to community organisations (statutory and non-statutory) that can support the patient in fulfilling their wanted roles.
- B Local commissioners should ensure that community integration and participation for disabled people is facilitated through:
- ensuring a suitable community transport system that is accessible and available
  - organising and supporting venues for social and leisure activities able to accommodate disabled people, especially people with communication and cognitive problems
  - organising and supporting social networks for disabled people (eg through voluntary groups)
  - making sure appropriate stroke specialist and generic voluntary sector services and peer support (eg communication support groups, stroke clubs, self-help groups and communication partner schemes) are available and that information and signposting to them are given.

### 7.3.2 Sources

A–B Consensus; National Stroke Strategy quality markers 13 and 15

## 7.4 Support (practical and emotional)

Many people need considerable care from others after stroke, both for personal activities such as washing and dressing, and more so for domestic and community activities. Provision of this support is rarely the responsibility of the healthcare system, but healthcare teams do have a responsibility to identify and specify the support needs of each patient, and to help organise this support from the responsible organisations.

### *Evidence to recommendations*

There is evidence of unmet need in nearly 50% of stroke survivors, between 1 and 5 years after stroke. This includes problems related to mobility, falls, fatigue, pain, emotion, memory, reading and concentration (McKevitt *et al* 2011). Services should ensure that mechanisms are in place to identify and address such issues. The research evidence to inform service development and delivery in this area is limited. One approach has been to employ and train healthcare workers or volunteers (eg a stroke liaison worker) to provide education and social support (including counselling) and liaison with services for people with stroke and carers. A meta-analysis of trials of such interventions reported that these were associated with significant reductions in disability and death in patients with mild to moderate disability (Ellis *et al* 2010). There is no trial evidence that they improve subjective health status or activities of daily living.

### 7.4.1 Recommendations

- A Patients and their carers should have their individual practical and emotional support needs identified:

- before they leave hospital
  - when rehabilitation ends or at their 6-month review
  - annually thereafter.
- B Health and social services personnel should ensure that:
- any identified support needs are met
  - support services appropriate to the needs of the patient and carers are provided
  - patients are informed about organisations able to provide other relevant services, and how to contact them
  - patients and carers receive all the financial and practical support to which they are entitled.
- C Patients should be provided with information tailored to their own specific needs regularly during the acute, rehabilitation and longer-term care phases of the illness.
- 

#### 7.4.2 Sources

- A Consensus; National Stroke Strategy quality marker 13: ‘A range of services are in place and easily accessible to support the individual long-term needs of individuals and their carers’
- B Consensus; National Stroke Strategy
- C Consensus; National Stroke Strategy; McKevitt *et al* 2011; Ireland 2009

### 7.5 People with stroke in care homes

Between 5% and 15% of patients are discharged into care homes and, conversely, about 25% of care home residents have had a stroke. At present these people rarely receive any treatment from rehabilitation services; indeed, care home residents are not even provided with standard wheelchairs by the NHS. These are usually the most severely affected people and therefore those most likely to need treatment and support. Improving the quality of life of people with stroke in care homes should be an integral component of all stroke services and include active management of their impairments, abilities and participation.

---

#### 7.5.1 Recommendations

- A All people with stroke in care homes should receive assessment and treatment from stroke rehabilitation services in the same way as patients living in their own homes.
- B All staff in care homes should have training on the physical, psychological and social effects of stroke and the optimal management of common impairments and activity limitations.
- 

#### 7.5.2 Sources

- A Consensus; Sackley *et al* 2006
- B Consensus; National Stroke Strategy quality markers 18 and 19: ‘All people with stroke, and at risk of stroke, receive care from staff with the skills, competence and

experience appropriate to meet their needs’, and ‘Commissioners and employers undertake a review of the current workforce and develop a plan supporting development and training to create a stroke-skilled workforce’

### 7.5.3 Implications

The extent of unmet need in the care home population is unknown, but resource implications are likely. First, the need may be considerable and not easily met within existing resources. Second, it will usually be more appropriate for staff from the stroke service to visit the care home which has implications for travel and use of time. Third, in practice it would be difficult within a single home, both morally and practically, to restrict input to patients who have had a stroke when it is probable that many other people would also need and benefit from specialist rehabilitation assessment, advice and interventions.

## 7.6 Carers (informal, unpaid)

The word ‘carers’ can refer both to formal, paid carers (people with professional training) and to informal and unpaid carers – people such as family and friends who undertake care for a variety of reasons. This section is relevant to **informal, unpaid carers**. Their role and their involvement with the person with a stroke is vital from the outset and is likely to be the only constant and continuing relationship with the patient, long after other services have stopped.

### 7.6.1 Recommendations

- A At all times the views of the patient on the involvement of their carers should be sought, to establish if possible the extent to which the patient wants family members and others involved.
- B The carer(s) of every person with a stroke should be involved with the management process from the outset, specifically:
  - as an additional source of important information about the patient both clinically and socially
  - being given accurate information about the stroke, its nature and prognosis, and what to do in the event of a further stroke or other problems, for example post-stroke epilepsy
  - being given emotional and practical support.
- C With the patient’s agreement carers should be involved in all important decisions, as the patient’s advocate, if necessary and appropriate.
- D During the rehabilitation phase, carers should be encouraged to participate in an educational programme that:
  - explains the nature of stroke and its consequences
  - teaches them how to provide care and support
  - gives them opportunities to practise care with the patient
  - emphasises and reiterates all advice on secondary prevention, especially lifestyle changes.

- E At the time of transfer of care to the home (or care home) setting, the carer should:
- be offered an assessment of their own support needs (separate to those of the patient) by social services
  - be offered the support identified as necessary
  - be given clear guidance on how to seek help if problems develop.
- F After the patient has returned to the home (or care home) setting, the carer should:
- have their need for information and support reassessed whenever there is a significant change in circumstances (eg if the health of either the patient or the carer deteriorates)
  - be reminded and assisted to seek further help and support.
- 

### 7.6.2 Sources

A–C Consensus

D Smith *et al* 2008

E Consensus; National Stroke Strategy quality marker 12: ‘A workable, clear discharge plan that has fully involved the individual (and their family where appropriate) and responded to the individual’s particular circumstances and aspirations is developed by health and social care services, together with other services such as transport and housing’

F Consensus

# Profession-specific concise guidelines

# Nursing concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations below, compiled by members of the National Stroke Nursing Forum, have direct implications for nursing practice and aim to provide nurses with ready access to the latest guidance.

## Specialist stroke services (3.2.1)

- C Patients with stroke should be assessed and managed by stroke nursing staff and at least one member of the specialist rehabilitation team within 24 hours of admission to hospital, and by all relevant members of the specialist rehabilitation team within 72 hours, with documented multidisciplinary goals agreed within 5 days.
- F Patients who need ongoing inpatient rehabilitation after completion of their acute diagnosis and treatment should be treated in a specialist stroke rehabilitation unit, which should fulfil the following criteria:
- it should be a geographically identified unit
  - it should have a coordinated multidisciplinary team that meets at least once a week for the interchange of information about individual patients
  - the staff should have specialist expertise in stroke and rehabilitation
  - educational programmes and information are provided for staff, patients and carers
  - it has agreed management protocols for common problems, based on available evidence.
- stroke, covering neurological, general medical and rehabilitation aspects.
- B Each stroke rehabilitation unit and service should be organised as a single team of staff with specialist knowledge and experience of stroke and neurological rehabilitation including:
- consultant physician(s)
  - nurses
  - physiotherapists
  - occupational therapists
  - speech and language therapists
  - dietitians
  - psychologists
  - social workers
  - easy access to services providing: pharmacy; orthotics; orthoptists; specialist seating; patient information, advice and support; and assistive devices.
- C Each specialist stroke rehabilitation service should in addition:
- have an education programme for all staff providing the stroke service
  - offer training for junior professionals in the specialty of stroke.

## Resources (3.3.1)

- A Each acute stroke unit should have immediate access to:
- nursing staff specifically trained and competent in the management of acute

## Transfers of care – general (3.7.1)

- A All transfers between different teams and between different organisations should:
- occur at the appropriate time, without delay
  - not require the patient to provide complex information already given

- ensure that all relevant information is transferred, especially concerning medication
- maintain a set of patient-centred goals
- transfer any decisions made concerning 'best interest decisions' about medical care.

### Transfers of care – discharge from hospital (3.8.1)

B Hospital services should have a protocol, locally negotiated, to ensure that before discharge occurs:

- patients and carers are prepared, and have been fully involved in planning discharge
- general practitioners, primary healthcare teams and social services departments (adult services) are all informed before, or at the time of, discharge
- all equipment and support services necessary for a safe discharge are in place
- any continuing specialist treatment required will be provided without delay by an appropriate coordinated, specialist multidisciplinary service
- patients and carers are given information about and offered contact with appropriate statutory and voluntary agencies.

H All patients should continue to have access to specialist stroke services after leaving hospital, and should know how to contact them.

### Use of assessments/measures (3.11.1)

A stroke service should:

- A agree on standard sets of data that should be collected and recorded routinely
- D train all staff in the recognition and management of emotional, communication and cognitive problems
- F measure (change in) function at appropriate intervals.

### Goal setting (3.12.1)

Every patient involved in the rehabilitation process should:

- A have their feelings, wishes and expectations established and acknowledged
- B participate in the process of setting goals unless they choose not to or are unable to participate because of the severity of their cognitive or linguistic impairments
- C be given help to understand the nature and process of goal setting, and be given help (eg using established tools) to define and articulate their personal goals.

### Rehabilitation treatment approach (3.13.1)

All members of a stroke service should:

- A use an agreed consistent approach for each problem faced by a patient, ensuring the patient is given the same advice and taught the same technique to ameliorate or overcome it
- B give as much opportunity as possible for a patient to practise repeatedly and in different settings any tasks or activities that are affected (see section 6.16)
- C work within their own knowledge, skills, competence and limits in handling patients and using equipment, being taught safe and appropriate ways to move and handle specific patients if necessary.

### Rehabilitation treatment quantity (intensity of therapy) (3.14.1)

- B The team should promote the practice of skills gained in therapy in the patient's daily routine in a consistent manner and patients should be enabled and encouraged to practise that activity as much as possible.
- C Therapy assistants and nurses should facilitate practice under the guidance of a qualified therapist.

### End-of-life (palliative) care (3.15.1)

- A Teams providing care for patients after stroke should be taught how to recognise patients who might benefit from palliative care.

- B All staff caring for people dying with a stroke should be trained in the principles and practice of palliative care.

### Initial diagnosis of acute transient event (TIA) (4.2.1)

- B People with a suspected TIA, that is, they have no neurological symptoms at the time of assessment (within 24 hours), should be assessed as soon as possible for their risk of subsequent stroke by using a validated scoring system such as ABCD<sup>2</sup>.

### Immediate management of non-haemorrhagic stroke (4.6.1)

- D Alteplase should only be administered within a well-organised stroke service with:
- staff trained in the delivery of thrombolysis and monitoring for post-thrombolysis complications
  - nurse staffing levels equivalent to those required in level 1 or level 2 nursing care with staff trained in acute stroke and thrombolysis
  - immediate access to imaging and re-imaging, and staff appropriately trained to interpret the images
  - processes throughout the emergency care pathway for the minimisation of in-hospital delays to treatment, to ensure that thrombolysis is administered as soon as possible after stroke onset
  - protocols in place for the management of post-thrombolysis complications.

### Immediate diagnosis and management of subarachnoid haemorrhage (4.8.1)

- D After any immediate treatment, all patients should be observed for the development of treatable complications, especially hydrocephalus and delayed cerebral ischaemia.

### Early phase medical care of stroke – physiological monitoring and maintenance of homeostasis (4.12.1)

- C People who have had a stroke should receive supplemental oxygen only if their oxygen saturation drops below 95% and there is no contraindication. The routine use of supplemental oxygen is not recommended in people with acute stroke who are not hypoxic.
- D People with acute stroke should be treated to maintain a blood glucose concentration between 4 and 11 mmol/L.

### Initial, early rehabilitation assessment (4.13.1)

- A All patients should be assessed within a maximum of 4 hours of admission for their:
- ability to swallow, using a validated swallow screening test (eg 50 ml water swallow) administered by an appropriately trained person
  - immediate needs in relation to positioning, mobilisation, moving and handling
  - bladder control
  - risk of developing skin pressure ulcers
  - capacity to understand and follow instructions
  - capacity to communicate their needs and wishes
  - nutritional status and hydration
  - ability to hear, and need for hearing aids
  - ability to see, and need for glasses.

### Early mobilisation (4.15.1)

- A Every patient with reduced mobility following stroke should be regularly assessed by an appropriately trained healthcare professional to determine the most appropriate and safe methods of transfer and mobilisation.
- B People with acute stroke should be mobilised within 24 hours of stroke onset, unless medically unstable, by an appropriately trained healthcare professional with access to appropriate equipment.

- C People with stroke should be offered frequent opportunity to practise functional activities (eg getting out of bed, sitting, standing, and walking) by an appropriately trained healthcare professional.

### Positioning (4.16.1)

- A Healthcare professionals should be given training on how to position patients correctly after stroke.
- B When lying and when sitting, patients should be positioned in such a way that minimises the risk of complications such as aspiration and other respiratory complications, shoulder pain, contractures and skin pressure ulceration.

### Nutrition: feeding, swallowing and hydration (4.17.1)

- A Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within 4 hours of admission to hospital, before being given any oral food, fluid or medication, and they should have an ongoing management plan for the provision of adequate hydration and nutrition.
- B All patients should be screened for malnutrition and the risk of malnutrition at the time of admission and at least weekly thereafter. Screening should be undertaken by trained staff using a structured assessment such as the Malnutrition Universal Screen Tool (MUST).
- E People with acute stroke who are unable to take adequate nutrition and fluids orally should be:
- considered for tube feeding with a nasogastric tube within 24 hours of admission
  - considered for a nasal bridle tube or gastrostomy if they are unable to tolerate a nasogastric tube
  - referred to an appropriately trained healthcare professional for detailed nutritional assessment, individualised advice and monitoring.

### A personalised, comprehensive approach (5.2.1)

- A For each patient, an individualised and comprehensive strategy for stroke prevention should be implemented as soon as possible following a TIA or stroke and continue in the long term.
- B For each patient, information about, and treatment for, stroke and risk factors should be:
- given first in the hospital setting
  - reinforced at every opportunity by all health professionals involved in the care of the patient
  - provided in an appropriate format for the patient.
- C Patients should have their risk factors reviewed and monitored regularly in primary care, at a minimum on a yearly basis.
- D All patients receiving medication for secondary prevention should:
- be given information about the reason for the medication, how and when to take it and any possible common side effects
  - receive verbal and written information about their medicines in a format appropriate to their needs and abilities
  - have compliance aids such as large-print labels and non-childproof tops provided, dosette boxes according to their level of manual dexterity, cognitive impairment and personal preference and compatibility with safety in the home environment
  - be aware of how to obtain further supplies of medication
  - have a regular review of their medication
  - have their capacity (eg cognition, manual dexterity, ability to swallow) to take full responsibility for self-medication assessed by the multidisciplinary team prior to discharge as part of their rehabilitation.

### Lifestyle measures (5.3.1)

- A All patients who smoke should be advised to stop. Smoking cessation should be promoted in the initial prevention plan using individualised

programmes which may include pharmacological agents and/or psychological support.

- B All patients should be advised to take regular exercise as far as they are able:
- Exercise programmes should be tailored to the individual following appropriate assessment, starting with low-intensity physical activity and gradually increasing to moderate levels.
  - All adults should aim to be active daily and minimise the amount of time spent being sedentary (sitting) for extended periods.
  - For adults over the age of 19 years, this activity should add up to at least 150 minutes of moderate intensity, over a week, in bouts of 10 minutes or more (eg 30 minutes on at least 5 days per week). They should also engage in muscle strengthening activities at least twice per week.
  - For older people at risk of falls, additional physical activity which incorporates balance and coordination, at least twice per week, is also recommended.
- C All patients should be advised to eat the optimum diet:
- eating five or more portions of fruit and vegetables per day from a variety of sources
  - eating two portions of oily fish per week (salmon, trout, herring, pilchards, sardines, fresh tuna).
- D All patients should be advised to reduce and replace saturated fats in their diet with polyunsaturated or monounsaturated fats by:
- using low-fat dairy products
  - replacing butter, ghee and lard with products based on vegetable and plant oils
  - limiting red meat intake especially fatty cuts and processed forms.
- E Patients who are overweight or obese should be offered advice and support to aid weight loss, which may include diet, behavioural therapy and physical activity.
- F All patients, but especially people with hypertension, should be advised to reduce their salt intake by:

- not adding salt to food at the table
- using as little salt as possible in cooking
- avoiding high-salt foods, eg processed meat products, such as ham and salami, cheese, stock cubes, pre-prepared soups and savoury snacks such as crisps and salted nuts.

- G Patients who drink alcohol should be advised to keep within recognised safe drinking limits of no more than three units per day for men and two units per day for women.

### Blood pressure (5.4.1)

- A All patients with stroke or TIA should have their blood pressure checked. Treatment should be initiated and/or increased as is necessary or tolerated to consistently achieve a clinic blood pressure below 130/80, except for patients with severe bilateral carotid stenosis, for whom a systolic blood pressure target of 130–150 is appropriate.

### Pain management (6.19.1.1)

- A Every patient with stroke should be asked whether they have any pain, and severity assessed using a validated score at onset and regular intervals thereafter. Each review should include assessment of:
- pain reduction
  - adverse effects
  - daily activities and participation (such as ability to work and drive)
  - mood (in particular, whether the person may have depression and/or anxiety)
  - quality of sleep
  - overall improvement as reported by the person.

### Shoulder pain and subluxation (6.19.2.1)

- A Every patient with functional loss in their arm should have the risk of developing shoulder pain reduced by:
- ensuring that everybody handles the weak arm correctly, avoiding mechanical stress and excessive range of movement

- avoiding the use of overhead arm slings
- careful positioning of the arm.

B Every patient with arm weakness should be regularly asked about shoulder pain.

C Every patient who develops shoulder pain should:

- have its severity assessed, recorded and monitored regularly
- have preventative measures put in place
- be offered regular simple analgesia.

### Musculoskeletal pain (6.19.4.1)

A Any patient with musculoskeletal pain should be carefully assessed to ensure that movement, posture and moving and handling techniques are optimised to reduce the pain.

B Any patient continuing to experience pain should be offered pharmacological treatment with simple analgesic drugs taken regularly.

### Oral health (6.22.1)

A All stroke patients especially those who have difficulty swallowing, and are tube fed, should have oral and dental hygiene maintained (involving the patient or carers) through regular (at least 3 times a day):

- brushing of teeth with a toothbrush, and dentures and gums with a suitable cleaning agent (toothpaste or chlorhexidene gluconate dental gel)
- removal of excess secretions.

B All patients with dentures should have their dentures:

- put in appropriately during the day
- cleaned regularly
- checked and replaced if ill-fitting, damaged or lost.

C Those responsible for the care of patients disabled by stroke (in hospital, in residential and in home care settings) should be trained in:

- assessment of oral hygiene
- selection and use of appropriate oral hygiene equipment and cleaning agents

- provision of oral care routines
- recognition and management of swallowing difficulties.

### Nutrition: assessment and management (6.23.1)

B Screening for malnutrition in stroke patients should be repeated:

- weekly for hospital inpatients
- at first appointment in outpatients
- on admission and where there is clinical concern in care homes or rehabilitation units.

C Nutritional support should be initiated for all stroke patients identified as malnourished or at risk of malnutrition. This may include specialist dietary advice, oral nutrition supplements, and/or tube feeding.

### Bowel and bladder impairment (6.24.1)

A All wards and stroke units should have established assessment and management protocols for both urinary and faecal incontinence, and for constipation in stroke patients.

B Patients with stroke who have continued loss of bladder control 2 weeks after diagnosis should be reassessed to identify the cause of incontinence, and have an ongoing treatment plan involving both patients and carers. The patient should:

- have any identified causes of incontinence treated
- have an active plan of management documented
- be offered simple treatments such as bladder retraining, pelvic floor exercises and external equipment first
- only be discharged with continuing incontinence after the carer (family member) or patient has been fully trained in its management and adequate arrangements for a continuing supply of continence aids and services are confirmed and in place.

- C All stroke patients with a persistent loss of control over their bowels should:
- be assessed for other causes of incontinence, which should be treated if identified
  - have a documented, active plan of management
  - be referred for specialist treatments if the patient is able to participate in treatments
  - only be discharged with continuing incontinence after the carer (family member) or patient has been fully trained in its management and adequate arrangements for a continuing supply of continence aids and services are confirmed and in place.
- D Stroke patients with troublesome constipation should:
- have a prescribed drug review to minimise use of constipating drugs
  - be given advice on diet, fluid intake and exercise
  - be offered oral laxatives
  - be offered rectal laxatives only if severe problems remain.

### Driving (6.27.1)

- A Before they leave hospital (or the specialist outpatient clinic if not admitted), every person who has had a stroke or transient ischaemic attack should be asked whether they drive or wish to drive.

### Work and leisure (6.29.1)

- A Every person should be asked about the work and/or leisure activities they undertook before their stroke.
- C Patients who wish to return to or take up a leisure activity should have their cognitive and practical skills assessed, and should be given advice and help in pursuing their activity if appropriate.

### Sexual dysfunction (6.31.1)

- A Every patient should be asked, soon after discharge and at their 6-month and annual reviews, whether they have any concerns about their sexual functioning. Partners should additionally be given an opportunity to raise any problems they may have.
- B Any patient who has a limitation on sexual functioning and who wants further help should:
- be assessed for treatable causes
  - be reassured that sexual activity is not contraindicated after stroke and is extremely unlikely to precipitate a further stroke
  - if suffering from erectile dysfunction, be assessed for the use of sildenafil or an equivalent drug
  - avoid the use of sildenafil or equivalent drug for 3 months after stroke and until blood pressure is controlled
  - be referred to a person with expertise in psychosexual problems if the problems remain unresolved.

### Further rehabilitation (7.1.1)

- A Any patient whose situation changes (eg new problems or changed environment) should be offered further assessment by the specialist stroke rehabilitation service.

### People with stroke in care homes (7.5.1)

- A All people with stroke in care homes should receive assessment and treatment from stroke rehabilitation services in the same way as patients living in their own homes.
- B All staff in care homes should have training on the physical, psychological and social effects of stroke and the optimal management of common impairments and activity limitations.

### Carers (informal, unpaid) (7.6.1)

- A At all times the views of the patient on the involvement of their carers should be sought, to establish if possible the extent to which the patient wants family members and others involved.
- F After the patient has returned to the home (or care home) setting, the carer should:
- have their need for information and support reassessed whenever there is a significant change in circumstances (eg if the health of either the patient or the carer deteriorates)
  - be reminded and assisted to seek further help and support.

### Contacts

Ms Amanda Jones, stroke nurse consultant,  
Sheffield Teaching Hospitals NHS Foundation  
Trust, Sheffield, S10 2JF  
Email: amanda.jones@sth.nhs.uk

Mrs Diana Day, stroke nurse consultant,  
Addenbrooke's Hospital, Cambridge, CB2 0QQ  
Email: diana.day@addenbrookes.nhs.uk

Dr Christopher Burton, senior research fellow in  
evidence based practice, Centre for Health  
Related Research, College of Health and  
Behavioural Sciences, Bangor University,  
Gwynedd, LL57 2EF  
Email: c.burton@bangor.ac.uk

# Nutrition and dietetics concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations below have direct implications for dietitians. These should not be read in isolation and as members of the stroke multidisciplinary team, dietitians should consider the guideline in full.

## Structure – global cover (2.1.1)

- C Commissioners need to be satisfied that all those caring for stroke patients have the required knowledge and skills to provide safe care for those with restricted mobility, sensory loss, impaired communication and neuropsychological impairments.

## Commissioning secondary prevention services (2.3.1)

- B Commissioners should commission acute hospital health services to:
- identify and initiate treatment for all treatable risk factors as soon as possible
  - give all patients written information and advice on lifestyle changes that reduce the risk of stroke, tailored to the needs of the individual person
  - liaise with general practitioners about the long-term management of any identified risk factors for each patient.
- C Commissioners should facilitate the lifestyle recommendations made through:
- supporting smoking cessation
  - working with other organisations to make it easier for people with disability to participate in exercise
  - supporting healthy eating
  - supporting those with an alcohol problem to abstain or maintain their intake within recommended limits.

## Specialist stroke services (3.2.1)

- E Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a specially trained healthcare professional within 4 hours of admission to hospital, before being given any oral food, fluid or medication, and they should have an ongoing management plan for the provision of adequate nutrition.

## Resources (3.3.1)

- B Each stroke rehabilitation unit and service should be organised as a single team of staff with specialist knowledge and experience of stroke and neurological rehabilitation including:
- dietitians.

## Transfers of care – discharge from hospital (3.8.1)

- B Hospital services should have a protocol, locally negotiated, to ensure that before discharge occurs:
- patients and carers are prepared, and have been fully involved in planning discharge
  - general practitioners, primary healthcare teams and social services departments (adult services) are all informed before, or at the time of, discharge
  - all equipment and support services necessary for a safe discharge are in place

- any continuing specialist treatment required will be provided without delay by an appropriate coordinated, specialist multidisciplinary service
- patients and carers are given information about and offered contact with appropriate statutory and voluntary agencies.

### Quality improvement (governance, audit) (3.9.1)

- B Clinicians in all settings should participate in national stroke audit so that they can compare the clinical and organisational quality of their services against national data and use the results to plan and deliver service improvements.

### Service development (3.10.1)

- A The views of stroke patients and their carers should be considered when evaluating a service; one method that should be used is to ask about their experiences and which specific aspects of a service need improvement.

### End-of-life (palliative) care (3.15.1)

- E After stroke, all 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 and take prior directives into consideration (see section 6.45).

### Treatments not mentioned in the guideline (3.16.1)

- A Any clinician wishing to use an intervention not considered within this guideline should:
- investigate and review the available evidence, especially the risks and disadvantages
  - investigate whether there are any relevant clinical trials available to take part in locally
  - offer the patient (or his or her representative if s/he is unable to participate in decision-making)

information about any research study available, and arrange for entry to the trial if the patient agrees

- discuss with the patient (or his or her representative if s/he is unable to participate in decision-making) the risks and benefits of the intervention so that an informed choice can be made.
- B Interventions not considered within this guideline may be used provided that:
- any available opportunity for participation in evaluative research has been considered
  - the clinician or clinical team has the appropriate knowledge and skill
  - the patient (or his or her representative if s/he is unable to participate in decision-making) is aware of the lack of evidence, and the perceived risks and benefits.

### Early phase medical care of stroke – physiological monitoring and maintenance of homeostasis (4.12.1)

- B The patient's physiological state should be monitored closely to include:
- nourishment and hydration.

### Initial, early rehabilitation assessment (4.13.1)

- A All patients should be assessed within a maximum of 4 hours of admission for their:
- ability to swallow, using a validated swallow screening test (eg 50 ml water swallow) administered by an appropriately trained person
  - nutritional status and hydration.

### Nutrition: feeding, swallowing and hydration (4.17.1)

- A Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within 4 hours of admission to hospital, before being given any oral food, fluid or medication, and they should have an

ongoing management plan for the provision of adequate hydration and nutrition.

- B All patients should be screened for malnutrition and the risk of malnutrition at the time of admission and at least weekly thereafter. Screening should be undertaken by trained staff using a structured assessment such as the Malnutrition Universal Screen Tool (MUST).
- C All people with acute stroke should have their hydration assessed on admission, reviewed regularly and managed so that normal hydration is maintained.
- D People with suspected aspiration on specialist assessment or who require tube feeding or dietary modification for 3 days should be:
- reassessed and be considered for instrumental examination (such as videofluoroscopy or fibre-optic endoscopic evaluation of swallowing)
  - referred for specialist nutritional assessment.
- E People with acute stroke who are unable to take adequate nutrition and fluids orally should be:
- considered for tube feeding with a nasogastric tube within 24 hours of admission
  - considered for a nasal bridle tube or gastrostomy if they are unable to tolerate a nasogastric tube
  - referred to an appropriately trained healthcare professional for detailed nutritional assessment, individualised advice and monitoring.
- F Nutritional support should be initiated for people with stroke who are at risk of malnutrition. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding.
- G People with dysphagia should be given food, fluids and medications in a form that can be swallowed without aspiration following specialist assessment of swallowing.
- [H] Routine oral nutritional supplements are not recommended for people with acute stroke

who are adequately nourished on admission and are able to take a full diet while in hospital.

### Lifestyle measures (5.3.1)

- C All patients should be advised to eat the optimum diet:
- eating five or more portions of fruit and vegetables per day from a variety of sources
  - eating two portions of oily fish per week (salmon, trout, herring, pilchards, sardines, fresh tuna).
- D All patients should be advised to reduce and replace saturated fats in their diet with polyunsaturated or monounsaturated fats by:
- using low-fat dairy products
  - replacing butter, ghee and lard with products based on vegetable and plant oils
  - limiting red meat intake especially fatty cuts and processed forms.
- E Patients who are overweight or obese should be offered advice and support to aid weight loss, which may include diet, behavioural therapy and physical activity.
- F All patients, but especially people with hypertension, should be advised to reduce their salt intake by:
- not adding salt to food at the table
  - using as little salt as possible in cooking
  - avoiding high-salt foods, eg processed meat products, such as ham and salami, cheese, stock cubes, pre-prepared soups and savoury snacks such as crisps and salted nuts.
- G Patients who drink alcohol should be advised to keep within recognised safe drinking limits of no more than three units per day for men and two units per day for women.
- H The following interventions have not been shown to reduce stroke reoccurrence:
- vitamin B and folate supplementation
  - vitamin E
  - supplementation with calcium with or without vitamin D.

### Lipid-lowering therapy (5.6.1)

- B All patients who have had an ischaemic stroke or TIA should receive advice on lifestyle factors that may modify lipid levels, including diet, physical activity, weight, alcohol and smoking (see section 5.3).

### General principles of rehabilitation (6.1.1)

- A All patients entering a period of rehabilitation should be screened for common impairments using locally agreed tools and protocols.

### Swallowing problems: assessment and management (6.21.1)

- A Until a safe swallowing method has been established, all patients with identified swallowing difficulties should:
- be considered for alternative fluids with immediate effect
  - have a comprehensive assessment of their swallowing function undertaken by a specialist in dysphagia
  - be considered for nasogastric tube feeding within 24 hours
  - be referred for specialist nutritional assessment, advice and monitoring
  - receive adequate hydration, nutrition and medication by alternative means
  - be considered for the additional use of a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols.
- C Every stroke patient who requires food or fluid of a modified consistency should:
- be referred for specialist nutritional assessment
  - have texture of modified food or liquids prescribed using nationally agreed descriptors
  - have both fluid balance and nutritional intake monitored.
- D Stroke patients with difficulties self-feeding should be assessed and provided with the appropriate equipment and assistance

(including physical help and verbal encouragement) to promote independent and safe feeding as far as possible.

- E All stroke patients with swallowing problems should have written guidance for all staff/carers to use when feeding or providing liquid.
- F Nutrition support should be initiated for people with stroke who are at risk of malnutrition which should incorporate specialist dietary advice and may include oral nutritional supplements, and/or tube feeding.
- H Gastrostomy feeding should be considered for stroke patients who:
- need but are unable to tolerate nasogastric tube feeding
  - are unable to swallow adequate amounts of food and fluid orally by 4 weeks
  - are at long-term high risk of malnutrition.
- I Any stroke patient discharged from specialist care services with continuing problems with swallowing food or liquid safely should:
- be trained, or have carers trained, in the identification and management of swallowing difficulties
  - should have regular reassessment of their dysphagia beyond the initial acute assessment to enable accurate diagnosis and management
  - should have their nutritional status and dietary intake monitored regularly by a suitably trained professional.

### Nutrition: assessment and management (6.23.1)

- A All stroke patients, on admission, should be screened for malnutrition and the risk of malnutrition by a trained person using a validated procedure (eg Malnutrition Universal Screening Tool (MUST)).
- B Screening for malnutrition in stroke patients should be repeated:
- weekly for hospital inpatients
  - at first appointment in outpatients
  - on admission and where there is clinical concern in care homes or rehabilitation units.

- C Nutritional support should be initiated for all stroke patients identified as malnourished or at risk of malnutrition. This may include specialist dietary advice, oral nutrition supplements, and/or tube feeding.
- D Fluid balance and nutritional intake should be monitored in all stroke patients who are at high risk of malnutrition, are malnourished and/or have swallowing problems.

### Contacts

Dr Elizabeth Weekes, consultant dietitian and research lead, Department of Nutrition and Dietetics, Guy's and St Thomas' Hospital, London, SE1 7EH

Email: [elizabeth.weekes@gstt.nhs.uk](mailto:elizabeth.weekes@gstt.nhs.uk)

Ms Cheryl Hookway, senior specialist dietitian – stroke, Imperial College Healthcare NHS Trust, London, W6 8RF

Email: [cheryl.hookway@imperial.nhs.uk](mailto:cheryl.hookway@imperial.nhs.uk)

# Occupational therapy concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations in this document have direct implications for occupational therapy and aim to provide occupational therapists with ready access to the latest guidance.

This concise guide was compiled by Dr Judi Edmans and Professor Avril Drummond who represent the College of Occupational Therapists (COT) and the COT Specialist Section Neurological Practice.

## Transfers of care – discharge from hospital (3.8.1)

- A All patients discharged from hospital, including those to care homes, who have residual stroke-related problems should be followed up within 72 hours by specialist stroke rehabilitation services for assessment and ongoing management.
- C Patients being discharged who remain dependent in some personal activities (eg dressing, toileting) should have access to, where appropriate, a transition package of:
  - pre-discharge visits (eg at weekends)
  - individual training and education for their carers
  - telephone counselling support for 3 months.
- D Before discharge of a patient who remains dependent in some activities, the patient's home environment should be assessed and optimised, usually by a home visit by an occupational therapist.
- E Provide early supported discharge to patients who are able to transfer independently or with the assistance of one person. Early supported discharge should be considered a specialist stroke service and consist of the same intensity and skillmix as available in hospital, without delay in delivery.

- G Carers of patients unable to transfer independently should receive training in moving and handling and the use of any equipment provided until they are demonstrably able to transfer and position the patient safely in the home environment.

## Goal setting (3.12.1)

Every patient involved in the rehabilitation process should:

- A have their feelings, wishes and expectations established and acknowledged
- B participate in the process of setting goals unless they choose not to or are unable to participate because of the severity of their cognitive or linguistic impairments
- C be given help to understand the nature and process of goal setting, and be given help (eg using established tools) to define and articulate their personal goals
- D have goals that:
  - are meaningful and relevant to the patient
  - are challenging but achievable
  - include both short-term (days/weeks) and long-term (weeks/months) targets
  - include both single clinicians and also the whole team

- are documented, with specified, time-bound measurable outcomes
- have achievement evaluated using goal attainment
- include carers where appropriate
- are used to guide and inform therapy and treatment.

### Positioning (4.16.1)

- A Healthcare professionals should be given training on how to position patients correctly after stroke.
- B When lying and when sitting, patients should be positioned in such a way that minimises the risk of complications such as aspiration and other respiratory complications, shoulder pain, contractures and skin pressure ulceration.
- C People with acute stroke should be helped to sit up as soon as possible.

### Rehabilitation treatment quantity (intensity of therapy) (6.2.1)

- A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days a week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.

### Evaluating and stopping treatments (6.3.1)

- A Every patient should have their progress measured against goals set at regular intervals determined by their rate of change, for example using goal attainment scaling.
- B When a patient's goal is not achieved, the reason(s) should be established and:
- the goal should be adjusted, *or*
  - the intervention should be adjusted, *or*
  - no further intervention should be given towards that goal and a further goal set as appropriate.

- C When a therapist or team is planning to stop giving rehabilitation, the therapist or service should:
- discuss the reasons for this decision with the patient and carer
  - ensure that any continuing support that the patient needs to maintain and/or improve health is provided
  - teach the patient and, if necessary, carers how to maintain health
  - provide clear information on how to contact the service for reassessment
  - outline what specific events or changes should trigger further contact
  - consider referral to communication support services, if the patient has persistent aphasia, to pursue compensatory strategies to enhance their communication.

### Sensation (6.5.1)

- A All patients should be assessed for alteration in sensation. If indicated, a more formal assessment of sensory loss should be undertaken (eg using the Nottingham Sensory Assessment, Erasmus medical centre version).
- B Any patient who has sensory loss should be taught how to take care of the limb and avoid injury.
- C Sensory discrimination training should be offered to people with sensory impairment after stroke, as part of goal directed rehabilitation.

### Arm re-education (6.7.1)

- A Patients who have some arm movement should be given every opportunity to practise activities within their capacity.
- B Constraint induced movement therapy (CIMT) should only be considered in people who have 20 degrees of active wrist extension and 10 degrees of active finger extension, and should only be started if the team has the necessary training and the patient is expected to participate fully and safely.

- C Bilateral arm training involving functional tasks and repetitive arm movement to improve dexterity and grip strength should be used in any patient with continuing limitation on arm function.

### Impaired tone – spasticity and spasms (6.10.1)

- A Any patient with motor weakness should be assessed for the presence of spasticity as a cause of pain, as a factor limiting activities or care, and as a risk factor for the development of contractures.
- B For all the interventions given below, specific goals should be set and monitored using appropriate clinical measures (eg numerical rating scales for ease of care (eg Arm Activity measure (ArmA)) or pain (eg 10-point numerical rating scale), the modified Ashworth scale, and range of movement).
- C In any patient where spasticity is causing concern, the extent of the problem should be monitored and simple procedures to reduce spasticity should be started. This may include positioning, active movement and monitoring range of movement for deterioration of function, passive movement and pain control.
- D Patients with persistent or progressing troublesome focal spasticity affecting one or two joints and in whom a therapeutic goal can be identified (usually ease of care also referred to as passive function) should be given intramuscular botulinum toxin. This should be in the context of a specialist multidisciplinary team service accompanied by rehabilitation therapy or physical maintenance strategies (eg splinting or casting) over the next 2–12 weeks following botulinum toxin injection. Functional assessment should be carried out at 3–4 months post injection and further botulinum toxin and physical treatments planned as required.

### Splinting (to prevent and treat contractures) (6.11.1)

- A Any patient who has increased tone sufficient to reduce passive or active movement around a joint should have their range of passive joint movement assessed and monitored.
- B Splinting of the arm and hand should not be used routinely after stroke.

### Repetitive task training (6.16.1)

- C Every patient should be encouraged and facilitated to undertake repetitive training and performance of any task (activity) that is limited by their stroke and can be practised safely.

### Shoulder pain and subluxation (6.19.2.1)

- A Every patient with functional loss in their arm should have the risk of developing shoulder pain reduced by:
- ensuring that everybody handles the weak arm correctly, avoiding mechanical stress and excessive range of movement
  - avoiding the use of overhead arm slings
  - careful positioning of the arm.
- B Every patient with arm weakness should be regularly asked about shoulder pain.

### Personal activities of daily living (6.25.1)

- A Every patient who has had a stroke should be assessed formally for their safety and independence in all personal activities of daily living by a clinician with the appropriate expertise and results should be recorded using a standardised assessment tool.
- B Any patient who has limitations on any aspect of personal activities after stroke should:
- be referred to an occupational therapist with experience in neurological disability, *and*
  - be seen for further assessment within 4 working days of referral, *and*
  - have treatment of identified problems from the occupational therapist who should also

guide and involve other members of the specialist multidisciplinary team.

- C Specific treatments that should be offered to stroke patients (according to need) include:
- dressing practice as a specific intervention for patients with residual dressing problems
  - as many opportunities as appropriate for repeated practice of self-care
  - assessment for provision of and training in the use of equipment and adaptations that increase safe independence
  - training of family and carers in how to help the patient.

### Extended activities of daily living (domestic and community) (6.26.1)

- A Any patient whose activities have been limited should be:
- assessed by an occupational therapist with expertise in neurological disability
  - taught how to achieve activities safely and given as many opportunities to practise as reasonable under supervision, provided that the activities are potentially achievable
  - assessed for, provided with and taught how to use any adaptations or equipment needed to perform activities safely.
- B Where a patient cannot undertake a necessary activity safely themselves, then alternative means of achieving the goal must be put in place to ensure safety and well-being.

### Driving (6.27.1)

- A Before they leave hospital (or the specialist outpatient clinic if not admitted), every person who has had a stroke or transient ischaemic attack should be asked whether they drive or wish to drive.
- B The person or team responsible for any stroke patient who wishes to drive should:
- ask about and identify any absolute bars to driving
  - consider the patient's capacity to drive safely
  - discuss driving and give advice to the patient

- document the findings and conclusions, inform the GP and give a written record to the patient.

- C The person or team responsible for any patient who wishes to drive should consult current guidance from the Driver and Vehicle Licensing Agency (DVLA) for full details of driving regulations before giving advice:  
[www.dft.gov.uk/dvla/medical/ataglance.aspx](http://www.dft.gov.uk/dvla/medical/ataglance.aspx).
- D Road Sign Recognition and Compass Card tests from the Stroke Driver's Screening Assessment and Trail Making Test B should be used to identify which patients should be referred for on-road screening and evaluation.

### Visual impairments (6.28.1)

- A Every patient should have:
- assessment of visual acuity whilst wearing the appropriate glasses to check their ability to read newspaper text and see distant objects clearly
  - examination for the presence of hemianopia (visual field deficit).
- B Treatment for hemianopia using prisms should only be provided if:
- the treatment is supervised by someone with expertise in this treatment
  - the effects are evaluated
  - the patient is aware of the limitations of the treatment.

### Work and leisure (6.29.1)

- A Every person should be asked about the work and/or leisure activities they undertook before their stroke.
- B Patients who wish to return to work (paid or unpaid employment) should:
- have their work requirements established with their employer (provided the patient agrees)
  - be assessed cognitively, linguistically and practically to establish their potential
  - be advised on the most suitable time and way to return to work, if this is practical

- be referred to a specialist in employment for people with disability if extra assistance or advice is needed (a disability employment advisor, in England)
  - be referred to a specialist vocational rehabilitation team if the disability employment advisor is unable to provide the necessary rehabilitation.
- C Patients who wish to return to or take up a leisure activity should have their cognitive and practical skills assessed, and should be given advice and help in pursuing their activity if appropriate.

### Personal equipment and adaptations (6.32.1)

- A Every patient should have their need for specialist equipment assessed individually in relation to their particular limitations and environment, the need being judged against its effects on:
- safety of the patient or other person during activity, *and/or*
  - independence of the patient undertaking activity, *and/or*
  - speed, ease or quality of activity being undertaken.
- B All aids, adaptations and equipment should be:
- appropriate to the patient's physical and social context
  - of known safety and reliability
  - provided as soon as possible.
- C All people (patient or carers) using any equipment or aids should be:
- trained in their safe and effective use
  - given details on who to contact, and how, in case problems arise.
- D The equipment should be reassessed at appropriate intervals to check:
- it is being used safely and effectively
  - it is still needed
  - it is still safe.

### Environmental equipment and adaptations (6.33.1)

- A Every patient after stroke who remains dependent in some activities should be assessed and should have their home assessed to determine whether equipment or adaptations can increase safety or independence.
- B Prescription and provision of equipment should be based on a careful assessment of:
- the patient and their particular impairments, *and*
  - the physical environment it is to be used in, *and*
  - the social environment it is to be used in.
- C All equipment supplied should be:
- of known (certified) reliability and safety
  - checked at appropriate intervals.
- D The patient and/or carer(s) should be:
- trained in the safe and effective use of any equipment provided
  - given a contact point for future advice about, or help with, any equipment provided.
- E The clinical suitability and use of equipment provided should be reviewed at appropriate intervals, removing equipment that is no longer needed or used.

### Psychological care (6.34.1)

- A Services should adopt a comprehensive approach to the delivery of psychological care after stroke, which should be delivered by using a 'stepped care' model from the acute stage to long-term management (see chapter 7).
- C Patients with continuing disorders should be considered for comprehensive interventions tailored towards developing compensatory behaviours and the learning of adaptive skills.
- D Within Step 1 care all patients after stroke should be screened within 6 weeks of diagnosis, using a validated tool, to identify mood disturbance and cognitive impairment.
- E Assessment measures should be adapted for use with patients with expressive or minor

receptive aphasia. In patients with more severe aphasia, an assessment tool designed specifically for this purpose, such as the SAD-Q or DISCS, should be used. In patients with aphasia or other impairments that complicate assessment, careful observations over time (including response to a trial of antidepressant medication if considered necessary) should be used.

- F Within Step 2 care, patients identified as having symptoms of mood disorder should be offered a more detailed assessment, seeking information on past history, potential causes and impact, and treatment preferences.
- G In patients with mild or moderate symptoms of mood disorder, patients and carers should be provided with information, support and advice about the mood disorder as the first line of intervention. This may be from within the multidisciplinary team by nominated staff who are suitably trained and supervised, and may also involve the voluntary sector.
- H Within Step 3 care, patients with severe or persistent symptoms of mood disorder should be considered for referral to a specialist in the management of mood disorder in stroke.
- J Any patient assessed as having a cognitive impairment should be considered for referral to a specialist in cognitive aspects of stroke.
- K Patients identified as having cognitive impairment or mood disorder should be reassessed before discharge decisions are taken.

### Fatigue (6.37.1)

- A Fatigue in medically stable patients should be assessed particularly where engagement with rehabilitation, or quality of life is affected.
- B Patients with fatigue and their families should be given information and reassurance that the symptom is likely to improve with time.

### Attention and concentration (6.39.1)

- A Any person after stroke who appears easily distracted or unable to concentrate should have

their attentional abilities (eg focussed, sustained and divided) formally assessed.

- B Any person with impaired attention should have cognitive demands reduced through:
  - having shorter treatment sessions
  - taking planned rests
  - reducing background distractions
  - avoiding work when tired.
- C Any person with impaired attention should:
  - be offered an attentional intervention (eg Time Pressure Management, Attention Process Training, environmental manipulation), ideally in the context of a clinical trial
  - receive repeated practice of activities they are learning.

### Memory (6.40.1)

- A Patients who complain of memory problems and those clinically considered to have difficulty in learning and remembering should have their memory assessed using a standardised measure such as the Rivermead Behavioural Memory Test (RBMT).
- B Any patient found to have memory impairment causing difficulties in rehabilitation or undertaking activities should:
  - be assessed medically to check that there is not another treatable cause or contributing factor (eg delirium, hypothyroidism)
  - have their profile of impaired and preserved memory abilities determined (as well as the impact of any other cognitive deficits on memory performance, for example attentional impairment)
  - have nursing and therapy sessions altered to capitalise on preserved abilities
  - be taught approaches that help them to encode, store and retrieve new information, for example, spaced retrieval (increasing time intervals between review of information) or deep encoding of material (emphasising semantic features)
  - be taught compensatory techniques to reduce their prospective memory

problems, such as using notebooks, diaries, electronic organisers, pager systems and audio alarms

- have therapy delivered in an environment that is as similar to the usual environment for that patient as possible.

### Spatial awareness (eg neglect) (6.41.1)

- A Any patient with a stroke affecting the right cerebral hemisphere should be considered at risk of reduced awareness on the left side and should be tested formally if this is suspected clinically.
- B Due to the fluctuating presentation of neglect, a standardised test battery such as the Behavioural Inattention Test should be used in preference to a single subtest, and the effect on functional tasks such as dressing and mobility should be determined.
- C Any patient shown to have impaired attention to one side should be:
- given a clear explanation of the impairment
  - taught compensatory strategies to help reduce impact on functional activities such as reading
  - given cues to draw attention to the affected side during therapy and nursing procedures
  - monitored to ensure that they do not eat too little through missing food on one side of the plate
  - offered interventions aimed at reducing the functional impact of the neglect (eg visual scanning training, limb activation, sensory stimulation, eye patching, prism wearing, prism adaptation training), ideally within the context of a clinical trial.

### Perception (6.42.1)

- A Any person who appears to have perceptual difficulties should have a formal perceptual assessment (eg the Visual Object and Space Perception battery (VOSP)).
- B Any person found to have agnosia should:
- have the impairment explained to them, their carers and their treating team

- be offered a perceptual intervention, ideally within the context of a clinical trial.

### Apraxia (6.43.1)

- A Any person who has difficulties in executing tasks despite apparently adequate limb movement should be assessed formally for the presence of apraxia.
- B Any person found to have apraxia should:
- have their profile of impaired and preserved action abilities determined using a standardised approach (eg Test of Upper Limb Apraxia (TULIA))
  - have the impairment and the impact on function explained to them, their family, and their treating team
  - be given therapies and/or taught compensatory strategies specific to the deficits identified ideally in the context of a clinical trial.

### Executive functioning (6.44.1)

- A Any person who appears to have adequate skills to perform complex activities but who fails to organise the tasks needed should be formally assessed for the dysexecutive syndrome, for example using the Behavioural Assessment of the Dysexecutive Syndrome (BADS).
- B Any person with an executive disorder and activity limitation should be taught compensatory techniques. This may include internal strategies (eg self-awareness and goal setting) and/or external strategies (eg use of electronic organisers or pagers, or use of written checklists) ideally in the context of a clinical trial.
- C When a patient's activities are affected by an executive disorder, the nature and effects of the impairment and ways of supporting and helping the patient should be discussed with others involved (eg family, staff).

### Further rehabilitation (7.1.1)

- A Any patient whose situation changes (eg new problems or changed environment) should be offered further assessment by the specialist stroke rehabilitation service.
- C Any patient with residual impairment after the end of initial rehabilitation should be offered a formal review at least every 6 months, to consider whether further interventions are warranted, and should be referred for specialist assessment if:
- new problems, not present when last seen by the specialist service, are present
  - the patient's physical state or social environment has changed.
- D Further therapy following 6-month review should only be offered if clear goals are agreed.

### Community integration and participation (7.3.1)

- A The rehabilitation service should establish with each patient specific social and leisure activities

that they would like to undertake in the community and:

- advise the person with stroke on the potential for undertaking an activity
- identify any barriers to success (for example low self-confidence), give advice and work with the patient on how to overcome those barriers
- where appropriate refer the person with stroke on to community organisations (statutory and non-statutory) that can support the patient in fulfilling their wanted roles.

### Contact

Dr Judi Edmans, Division of Rehabilitation and Ageing, University of Nottingham, Medical School, Queens Medical Centre, Nottingham NG7 2UH

Email: judi.edmans@nottingham.ac.uk

Neurological practice is a specialist section of the College of Occupational Therapists, 106–114 Borough High Street, Southwark, London SE1 1LB

# Physiotherapy concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations below have direct implications for physiotherapists and aim to provide them with ready access to the latest guidance.

## Specialist stroke services (3.2.1)

- F Patients who need ongoing inpatient rehabilitation after completion of their acute diagnosis and treatment should be treated in a specialist stroke rehabilitation unit, which should fulfil the following criteria:
- it should be a geographically identified unit
  - it should have a coordinated multidisciplinary team that meets at least once a week for the interchange of information about individual patients
  - the staff should have specialist expertise in stroke and rehabilitation
  - educational programmes and information are provided for staff, patients and carers
  - it has agreed management protocols for common problems, based on available evidence.

## Resources (3.3.1)

- A Each acute stroke unit should have immediate access to:
- medical staff specially trained in the delivery of acute medical care to stroke patients, including the diagnostic and administrative procedures needed for safe, effective delivery of thrombolysis
  - nursing staff specifically trained and competent in the management of acute stroke, covering neurological, general medical and rehabilitation aspects
  - imaging and laboratory services
  - rehabilitation specialist staff.

## Stroke services for younger adults (3.6.1)

- A Younger adults who have had a stroke should be managed within specialist medical and rehabilitation services that:
- recognise and manage the particular physical, psychological and social needs of younger patients with stroke (eg vocational rehabilitation, childcare activities)
  - are provided in an environment suited to their specific social needs.

## Transfers of care – discharge from hospital (3.8.1)

- E Provide early supported discharge to patients who are able to transfer independently or with the assistance of one person. Early supported discharge should be considered a specialist stroke service and consist of the same intensity and skillmix as available in hospital, without delay in delivery.
- G Carers of patients unable to transfer independently should receive training in moving and handling and the use of any equipment provided until they are demonstrably able to transfer and position the patient safely in the home environment.
- H All patients should continue to have access to specialist stroke services after leaving hospital, and should know how to contact them.

**Quality improvement (governance, audit) (3.9.1)**

B Clinicians in all settings should participate in national stroke audit so that they can compare the clinical and organisational quality of their services against national data and use the results to plan and deliver service improvements.

**Goal setting (3.12.1)**

Every patient involved in the rehabilitation process should:

- A have their feelings, wishes and expectations established and acknowledged
- B participate in the process of setting goals unless they choose not to or are unable to participate because of the severity of their cognitive or linguistic impairments
- C be given help to understand the nature and process of goal setting, and be given help (eg using established tools) to define and articulate their personal goals
- D have goals that:
  - are meaningful and relevant to the patient
  - are challenging but achievable
  - include both short-term (days/weeks) and long-term (weeks/months) targets
  - include both single clinicians and also the whole team
  - are documented, with specified, time-bound measurable outcomes
  - have achievement evaluated using goal attainment
  - include carers where appropriate
  - are used to guide and inform therapy and treatment.

**Rehabilitation treatment approach (3.13.1)**

All members of a stroke service should:

- A use an agreed consistent approach for each problem faced by a patient, ensuring the patient is given the same advice and taught the same technique to ameliorate or overcome it

- B give as much opportunity as possible for a patient to practise repeatedly and in different settings any tasks or activities that are affected (see section 6.16)
- C work within their own knowledge, skills, competence and limits in handling patients and using equipment, being taught safe and appropriate ways to move and handle specific patients if necessary.

**Rehabilitation treatment quantity (intensity of therapy) (3.14.1)**

- A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days per week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.
- B The team should promote the practice of skills gained in therapy in the patient's daily routine in a consistent manner and patients should be enabled and encouraged to practise that activity as much as possible.
- C Therapy assistants and nurses should facilitate practice under the guidance of a qualified therapist.

**Initial, early rehabilitation assessment (4.13.1)**

- B All patients with any impairment at 24 hours should receive a full multidisciplinary assessment using an agreed procedure or protocol within 5 working days, and this should be documented in the notes.

**Early mobilisation (4.15.1)**

- A Every patient with reduced mobility following stroke should be regularly assessed by an appropriately trained healthcare professional to determine the most appropriate and safe methods of transfer and mobilisation.
- B People with acute stroke should be mobilised within 24 hours of stroke onset, unless

medically unstable, by an appropriately trained healthcare professional with access to appropriate equipment.

- C People with stroke should be offered frequent opportunity to practise functional activities (eg getting out of bed, sitting, standing, and walking) by an appropriately trained healthcare professional.

### Positioning (4.16.1)

- A Healthcare professionals should be given training on how to position patients correctly after stroke.
- B When lying and when sitting, patients should be positioned in such a way that minimises the risk of complications such as aspiration and other respiratory complications, shoulder pain, contractures and skin pressure ulceration.
- C People with acute stroke should be helped to sit up as soon as possible.

### Lifestyle measures (5.3.1)

- B All patients should be advised to take regular exercise as far as they are able:
- Exercise programmes should be tailored to the individual following appropriate assessment, starting with low-intensity physical activity and gradually increasing to moderate levels.
  - All adults should aim to be active daily and minimise the amount of time spent being sedentary (sitting) for extended periods.
  - For adults over the age of 19 years, this activity should add up to at least 150 minutes of moderate intensity, over a week, in bouts of 10 minutes or more (eg 30 minutes on at least 5 days per week). They should also engage in muscle strengthening activities at least twice per week.
  - For older people at risk of falls, additional physical activity which incorporates balance and coordination, at least twice per week, is also recommended.

### Evaluating and stopping treatments (6.3.1)

- C When a therapist or team is planning to stop giving rehabilitation, the therapist or service should:
- discuss the reasons for this decision with the patient and carer
  - ensure that any continuing support that the patient needs to maintain and/or improve health is provided
  - teach the patient and, if necessary, carers how to maintain health
  - provide clear information on how to contact the service for reassessment
  - outline what specific events or changes should trigger further contact
  - consider referral to communication support services, if the patient has persistent aphasia, to pursue compensatory strategies to enhance their communication.

### Motor control – reduced movement, weakness and incoordination (6.4.1)

- A All patients should be assessed for motor impairment using a standardised approach to quantify the impairment, eg the Motricity Index.
- B All patients with significant loss of motor control (ie sufficient to limit an activity) should be assessed by a therapist with experience in neurological rehabilitation.
- C Any patient with persistent motor impairment should be taught exercises or activities that will increase voluntary motor control and strength.

### Sensation (6.5.1)

- A All patients should be assessed for alteration in sensation. If indicated, a more formal assessment of sensory loss should be undertaken (eg using the Nottingham Sensory Assessment, Erasmus medical centre version).
- B Any patient who has sensory loss should be taught how to take care of the limb and avoid injury.

- C Sensory discrimination training should be offered to people with sensory impairment after stroke, as part of goal directed rehabilitation.

### Exercise (6.6.1)

- A Clinicians with the relevant skills and training in the diagnosis, assessment and management of movement in people with stroke should regularly monitor and treat people with movement difficulties until they are able to maintain or progress function either independently or with assistance from others (for example rehabilitation assistants, carers, fitness instructors).
- B After stroke, patients should participate in exercise with the aim of improving aerobic fitness and/or muscle strength unless there are contraindications.
- C Task-orientated exercises should be used as components of exercise programmes.

### Arm re-education (6.7.1)

- A Patients who have some arm movement should be given every opportunity to practise activities within their capacity.
- B Constraint induced movement therapy (CIMT) should only be considered in people who have 20 degrees of active wrist extension and 10 degrees of active finger extension, and should only be started if the team has the necessary training and the patient is expected to participate fully and safely.
- C Bilateral arm training involving functional tasks and repetitive arm movement to improve dexterity and grip strength should be used in any patient with continuing limitation on arm function.

### Gait retraining, treadmill retraining, walking aids (including orthoses) (6.8.1)

- A Every patient who has limited mobility following stroke should be assessed by a specialist in neurological physiotherapy to guide management.

- B Patients with limited mobility should be assessed for, provided with and taught how to use appropriate mobility aids (including a wheelchair) to facilitate safe independent mobility.

- C People who are able to walk with or without assistance should undergo walking training to improve endurance and speed.

- D An ankle-foot orthosis should only be used to improve walking and/or balance, and should be:

- tried in patients with foot-drop (reduced ability to dorsiflex the foot during walking) that impedes safe and efficient walking
- evaluated on an individual patient basis before long-term use
- individually fitted.

### Balance impairment; risk of falling: assessment and intervention (6.9.1)

- A Any patient with significant impairment in maintaining their balance should receive progressive balance training.
- B Any patient with moderate to severe limitation of their walking ability should be given a walking aid to improve their stability.
- C Falls and injury prevention, and assessment of bone health, should be part of every stroke rehabilitation plan including providing training for patients and carers about how to get up after a fall.

### Impaired tone – spasticity and spasms (6.10.1)

- A Any patient with motor weakness should be assessed for the presence of spasticity as a cause of pain, as a factor limiting activities or care, and as a risk factor for the development of contractures.
- B For all the interventions given below, specific goals should be set and monitored using appropriate clinical measures (eg numerical rating scales for ease of care (eg Arm Activity measure (ArmA)) or pain (eg 10-point

numerical rating scale), the modified Ashworth scale, and range of movement).

- C In any patient where spasticity is causing concern, the extent of the problem should be monitored and simple procedures to reduce spasticity should be started. This may include positioning, active movement and monitoring range of movement for deterioration of function, passive movement and pain control.
- D Patients with persistent or progressing troublesome focal spasticity affecting one or two joints and in whom a therapeutic goal can be identified (usually ease of care also referred to as passive function) should be given intramuscular botulinum toxin. This should be in the context of a specialist multidisciplinary team service accompanied by rehabilitation therapy or physical maintenance strategies (eg splinting or casting) over the next 2–12 weeks following botulinum toxin injection. Functional assessment should be carried out at 3–4 months post injection and further botulinum toxin and physical treatments planned as required.
- E For patients experiencing troublesome general spasticity after initial treatment, anti-spastic drugs should be tried unless contraindicated. Either baclofen or tizanidine should be tried first. Other drugs and combinations of drugs should only be started by people with specific expertise in managing spasticity.
- F Intrathecal baclofen, intra-neural phenol and other rare procedures should only be used in the context of a specialist multidisciplinary spasticity service or a clinical trial.

### **Splinting (to prevent and treat contractures) (6.11.1)**

- A Any patient who has increased tone sufficient to reduce passive or active movement around a joint should have their range of passive joint movement assessed and monitored.
- B Splinting of the arm and hand should not be used routinely after stroke.

### **Biofeedback (6.12.1)**

- A Stroke patients should not be offered biofeedback outside the context of a clinical trial.

### **Neuromuscular electrical stimulation (including functional electrical stimulation) (6.13.1)**

- A Functional electrical stimulation can be used for drop foot of central neurological origin provided normal arrangements are in place for clinical governance, consent and audit.
- B Therapeutic electrical stimulation for treatment of the upper and lower limbs following stroke should only be used in the context of a clinical trial.

### **Acupuncture (6.14.1)**

- A Stroke patients should not be offered acupuncture outside a clinical trial.

### **Robotics (6.15.1)**

- A Robot-assisted movement therapy should only be used as an adjunct to conventional therapy when the goal is to reduce arm impairment or in the context of a clinical trial.

### **Repetitive task training (6.16.1)**

- C Every patient should be encouraged and facilitated to undertake repetitive training and performance of any task (activity) that is limited by their stroke and can be practised safely.

### **Mental practice (6.17.1)**

- A People with stroke should be taught and encouraged to use mental practice of an activity to improve arm function, as an adjunct to conventional therapy.

**Self-efficacy training (6.18.1)**

- A All patients should be offered training in self-management skills, to include active problem-solving and individual goal setting.
- B Any patient whose motivation and engagement in rehabilitation seems reduced should be assessed for changes in self-identity, self-esteem and self-efficacy (as well as changes in mood; see section 6.35).
- C Any patient with significant changes in self-esteem, self-efficacy or identity should be offered additional (to A) psychological interventions such as those referred to in section 6.35.

**Shoulder pain and subluxation (6.19.2.1)**

- A Every patient with functional loss in their arm should have the risk of developing shoulder pain reduced by:
  - ensuring that everybody handles the weak arm correctly, avoiding mechanical stress and excessive range of movement
  - avoiding the use of overhead arm slings
  - careful positioning of the arm.
- B Every patient with arm weakness should be regularly asked about shoulder pain.
- C Every patient who develops shoulder pain should:
  - have its severity assessed, recorded and monitored regularly
  - have preventative measures put in place
  - be offered regular simple analgesia.
- D Any patient who has developed, or is developing, shoulder subluxation should be considered for functional electrical stimulation of the supraspinatus and deltoid muscles.
- E In the absence of inflammatory disorders intra-articular steroid injections should not be used for post-stroke shoulder pain.

**Musculoskeletal pain (6.19.4.1)**

- A Any patient with musculoskeletal pain should be carefully assessed to ensure that movement,

posture and moving and handling techniques are optimised to reduce the pain.

- B Any patient continuing to experience pain should be offered pharmacological treatment with simple analgesic drugs taken regularly.

**Personal equipment and adaptations (6.32.1)**

- A Every patient should have their need for specialist equipment assessed individually in relation to their particular limitations and environment, the need being judged against its effects on:
  - safety of the patient or other person during activity, *and/or*
  - independence of the patient undertaking activity, *and/or*
  - speed, ease or quality of activity being undertaken.
- B All aids, adaptations and equipment should be:
  - appropriate to the patient's physical and social context
  - of known safety and reliability
  - provided as soon as possible.
- C All people (patient or carers) using any equipment or aids should be:
  - trained in their safe and effective use
  - given details on who to contact, and how, in case problems arise.
- D The equipment should be reassessed at appropriate intervals to check:
  - it is being used safely and effectively
  - it is still needed
  - it is still safe.

**Fatigue (6.37.1)**

- A Fatigue in medically stable patients should be assessed particularly where engagement with rehabilitation, or quality of life is affected.
- B Patients with fatigue and their families should be given information and reassurance that the symptom is likely to improve with time.

### Cognitive impairments – general (6.38.1)

E The patient's cognitive status should be taken into account by all members of the multidisciplinary team when planning and delivering treatment.

### Further rehabilitation (7.1.1)

B A named person and/or contact point should be identified and communicated to the patient to provide further information and advice if needed.

### People with stroke in care homes (7.5.1)

A All people with stroke in care homes should receive assessment and treatment from stroke rehabilitation services in the same way as patients living in their own homes.

### Carers (informal, unpaid) (7.6.1)

A At all times the views of the patient on the involvement of their carers should be sought, to establish if possible the extent to which the patient wants family members and others involved.

B The carer(s) of every person with a stroke should be involved with the management process from the outset, specifically:

- as an additional source of important information about the patient both clinically and socially
  - being given accurate information about the stroke, its nature and prognosis, and what to do in the event of a further stroke or other problems, for example post-stroke epilepsy
  - being given emotional and practical support.
- C With the patient's agreement carers should be involved in all important decisions, as the patient's advocate, if necessary and appropriate.

### Contacts

Dr Cherry Kilbride, lecturer in physiotherapy, Centre for Research in Rehabilitation, School of Health Sciences and Social Care, Brunel University, Uxbridge, UB8 3PH  
Email: cherry.kilbride@brunel.ac.uk

Mrs Nicola Hancock, lecturer in physiotherapy, Restorative Neurology Group, Health & Social Science Research Institute, University of East Anglia, Norwich, NR4 7TJ  
Email: n.hancock@uea.ac.uk

Miss Louise Briggs, allied health professional therapy consultant, St George's Healthcare NHS Trust, Blackshaw Road, London, SW17 0QT  
Email: louise.briggs@stgeorges.nhs.uk

# Primary care concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations below were compiled by Dr Helen Hosker. They aim to provide clinicians working in primary care with ready access to the latest guidance.

## Overall organisation of acute services (3.1.1)

- B All patients seen with an acute neurological syndrome suspected to be a stroke should be transferred directly to a specialised hyperacute stroke unit that will assess for thrombolysis and other urgent interventions and deliver them if clinically indicated.

## Specialist stroke services (3.2.1)

- H All patients after stroke should be screened within 6 weeks of diagnosis, using a validated tool, to identify mood disturbance and cognitive impairment.

## Transfers of care – discharge from hospital (3.8.1)

- C Patients being discharged who remain dependent in some personal activities (eg dressing, toileting) should have access to, where appropriate, a transition package of:
- pre-discharge visits (eg at weekends)
  - individual training and education for their carers
  - telephone counselling support for 3 months.

## End-of-life (palliative) care (3.15.1)

- D All patients who are dying should be given the opportunity of timely/fast-track discharge home or to a hospice or care home according to wishes of the patient and/or carers.

## Initial diagnosis of acute transient event (TIA) (4.2.1)

- A All patients whose acute symptoms and signs resolve within 24 hours (ie TIA) should be seen by a specialist in neurovascular disease (eg in a specialist neurovascular clinic or an acute stroke unit).
- B People with a suspected TIA, that is, they have no neurological symptoms at the time of assessment (within 24 hours), should be assessed as soon as possible for their risk of subsequent stroke by using a validated scoring system such as ABCD<sup>2</sup>.
- C Patients with suspected TIA who are at high risk of stroke (eg an ABCD<sup>2</sup> score of 4 or above) should receive:
- aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
  - specialist assessment and investigation within 24 hours of onset of symptoms
  - measures for secondary prevention introduced as soon as the diagnosis is confirmed including discussion of individual risk factors.
- D People with crescendo TIA (two or more TIAs in a week), atrial fibrillation or those on anticoagulants should be treated as being at high risk of stroke (as described in recommendation 4.2.1C) even though they may have an ABCD<sup>2</sup> score of 3 or below.

- E Patients with suspected TIA who are at low risk of stroke (eg an ABCD<sup>2</sup> score of 3 or below) should receive:
- aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
  - specialist assessment and investigations as soon as possible, but definitely within 1 week of onset of symptoms
  - measures for secondary prevention introduced as soon as the diagnosis is confirmed, including discussion of individual risk factors.
- F People who have had a TIA but present late (more than 1 week after their last symptom has resolved) should be treated as though they are at a lower risk of stroke (see recommendation 4.2.1E).

#### Management of confirmed transient ischaemic attacks (4.4.1)

- A Patients with confirmed TIA should receive:
- aspirin or clopidogrel (each as a 300 mg loading dose and 75 mg thereafter) and a statin, eg simvastatin 40 mg started immediately
  - measures for secondary prevention, introduced as soon as the diagnosis is confirmed, including discussion of individual risk factors.
- B All people with suspected non-disabling stroke or TIA, who after specialist assessment are considered candidates for carotid endarterectomy, should have carotid imaging conducted urgently to facilitate carotid surgery which should be undertaken within 7 days of onset of symptoms.
- C All carotid imaging reports should use the North American Symptomatic Carotid Surgery Trials (NASCET) criteria when reporting the extent of carotid stenosis.

#### Identifying risk factors (5.1.1)

- A Every patient who has had a stroke or TIA and in whom secondary prevention is appropriate should be investigated for risk factors as soon as possible and certainly within 1 week of onset.
- B For patients who have had an ischaemic stroke or TIA, the following risk factors should also be checked for:
- atrial fibrillation and other arrhythmias
  - carotid artery stenosis (only for people likely to benefit from surgery)
  - structural and functional cardiac disease.

#### A personalised, comprehensive approach (5.2.1)

- A For each patient, an individualised and comprehensive strategy for stroke prevention should be implemented as soon as possible following a TIA or stroke and continue in the long term.
- B For each patient, information about, and treatment for, stroke and risk factors should be:
- given first in the hospital setting
  - reinforced at every opportunity by all health professionals involved in the care of the patient
  - provided in an appropriate format for the patient.
- C Patients should have their risk factors reviewed and monitored regularly in primary care, at a minimum on a yearly basis.
- D All patients receiving medication for secondary prevention should:
- be given information about the reason for the medication, how and when to take it and any possible common side effects
  - receive verbal and written information about their medicines in a format appropriate to their needs and abilities
  - have compliance aids such as large-print labels and non-childproof tops provided, dosette boxes according to their level of manual dexterity, cognitive impairment and

personal preference and compatibility with safety in the home environment

- be aware of how to obtain further supplies of medication
- have a regular review of their medication
- have their capacity (eg cognition, manual dexterity, ability to swallow) to take full responsibility for self-medication assessed by the multidisciplinary team prior to discharge as part of their rehabilitation.

### Blood pressure (5.4.1)

A All patients with stroke or TIA should have their blood pressure checked. Treatment should be initiated and/or increased as is necessary or tolerated to consistently achieve a clinic blood pressure below 130/80, except for patients with severe bilateral carotid stenosis, for whom a systolic blood pressure target of 130–150 is appropriate.

### Antithrombotic treatment (5.5.1)

A recent NICE technology appraisal recommends generic clopidogrel as the most cost-effective antiplatelet therapy for secondary prevention following ischaemic stroke (National Institute for Health and Clinical Excellence 2010a). Aspirin plus modified-release dipyridamole is recommended for those unable to take clopidogrel, although this combination may be more difficult to tolerate, with a 29% discontinuation rate compared with 23% for clopidogrel in the PROFESS study.

Clopidogrel is not licensed for the management of TIA and therefore NICE recommends aspirin plus modified-release dipyridamole for this indication. Clinicians have tended to treat TIA and ischaemic stroke as different manifestations of the same disease and therefore it is illogical to have different treatment strategies for the two presentations. In producing this guideline, the members of the working party felt that a unified approach to the treatment of TIA and ischaemic stroke would be appropriate. Whilst clopidogrel does not have a licence for use after TIA, as the more cost-effective and better tolerated option, it was felt that the

benefits of recommending this drug as first-line outweighed any disadvantages.

A For patients with ischaemic stroke or TIA in sinus rhythm, clopidogrel should be the standard antithrombotic treatment:

- Clopidogrel should be used at a dose of 75 mg daily.
- For patients who are unable to tolerate clopidogrel, offer aspirin 75 mg daily in combination with modified-release dipyridamole 200 mg twice daily.
- If both clopidogrel and modified-release dipyridamole are contraindicated or not tolerated, offer aspirin 75 mg daily.
- If both clopidogrel and aspirin are contraindicated or not tolerated, offer modified-release dipyridamole 200 mg twice daily.
- The combination of aspirin and clopidogrel is not recommended for long-term prevention after TIA or stroke unless there is another indication such as acute coronary syndrome or recent coronary stent procedure.

B For patients with ischaemic stroke or TIA in paroxysmal, persistent or permanent atrial fibrillation (valvular or non-valvular) anticoagulation should be the standard treatment. Anticoagulation:

- should not be given after stroke or TIA until brain imaging has excluded haemorrhage
- should not be commenced in patients with uncontrolled hypertension
- of patients with disabling ischaemic stroke should be deferred until at least 14 days have passed from the onset; aspirin 300 mg daily should be used until this time
- of patients with non-disabling ischaemic stroke should be deferred for an interval at the discretion of the prescriber, but no later than 14 days from the onset
- should be commenced immediately following a TIA once brain imaging has ruled out haemorrhage, using an agent with a rapid onset such as low molecular weight heparin or an oral direct thrombin or factor Xa inhibitor.

### Lipid-lowering therapy (5.6.1)

- A All patients who have had an ischaemic stroke or TIA should be offered treatment with a statin drug unless contraindicated. Treatment:
- should be initiated using a drug with low acquisition cost such as simvastatin 40 mg daily
  - should be intensified if a total cholesterol of <4.0 mmol/L or an LDL cholesterol of <2.0 mmol/L is not attained with initial therapy.
- B All patients who have had an ischaemic stroke or TIA should receive advice on lifestyle factors that may modify lipid levels, including diet, physical activity, weight, alcohol and smoking (see section 5.3).
- C Treatment with statin therapy should be avoided and only used with caution, if required for other indications, in individuals with a recent primary intracerebral haemorrhage.

### Management of symptomatic carotid stenosis (5.7.1.1)

- F All patients with carotid stenosis should receive full medical preventative measures as detailed in chapter 5 of *National clinical guideline for stroke*, 4th edition, whether or not they undergo surgical intervention.

### Management of asymptomatic carotid stenosis (5.7.2.1)

- A Screening for asymptomatic carotid stenosis should not be performed.
- B Surgery or angioplasty/stenting for asymptomatic carotid artery stenosis should not routinely be performed unless as part of a randomised trial.

### Oral contraception (5.9.1)

There is strong evidence from primary prevention studies that there is a risk of stroke associated with the use of oestrogen containing contraception (Faculty of Sexual and Reproductive Health, 2009). The increased risk is mainly for ischaemic stroke.

There is limited evidence from a meta-analysis of primary prevention studies (Chakhtoura *et al* 2009) that progesterone-only methods of contraception appear to have no significant increase in risk of stroke (ischaemic and haemorrhagic). Due to variation in the design and populations included in the studies it is difficult to compare the risk associated with different modes of delivery of progesterone (oral, injectable and implant) and make any recommendations. There are no studies looking at the safety of the progesterone containing intra-uterine system. There is no evidence on the risk of stroke associated with use of higher doses of progesterone in the treatment of menstrual disorders but if oral contraception is required there is limited evidence that progesterone-only contraceptives appear to have the least risk.

- A The combined oral contraceptive pill should not be routinely prescribed following ischaemic stroke.

### Hormone replacement therapy (5.10.1)

- A The decision whether to start or continue hormone replacement therapy should be discussed with the individual patient and based on an overall assessment of risk and benefit. Consideration should be given to the dosage and formulation (eg oral or transdermal preparations).

### Rehabilitation treatment quantity (intensity of therapy) (6.2.1)

- A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5 days a week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.

### Motor control – reduced movement, weakness and incoordination (6.4.1)

- B All patients with significant loss of motor control (ie sufficient to limit an activity)

should be assessed by a therapist with experience in neurological rehabilitation.

### **Pain management (6.19.1.1)**

- B All patients complaining of, or experiencing pain, should have the cause of the pain diagnosed.
- C Patients should be referred to a specialist pain service if, after the local service has tried management, the patient's pain is:
- still severe and causing distress and not controlled rapidly, *or*
  - still leading to significant limitation on activities or social participation.

### **Neuropathic pain (central post-stroke pain) (6.19.3.1)**

- A Every patient whose pain has been diagnosed by someone with appropriate expertise in neuropathic pain should be given oral amitriptyline, gabapentin or pregabalin as first-line treatment.

### **Musculoskeletal pain (6.19.4.1)**

- A Any patient with musculoskeletal pain should be carefully assessed to ensure that movement, posture and moving and handling techniques are optimised to reduce the pain.
- B Any patient continuing to experience pain should be offered pharmacological treatment with simple analgesic drugs taken regularly.

### **Swallowing problems: assessment and management (6.21.1)**

- I Any stroke patient discharged from specialist care services with continuing problems with swallowing food or liquid safely should:
- be trained, or have carers trained, in the identification and management of swallowing difficulties
  - should have regular reassessment of their dysphagia beyond the initial acute

assessment to enable accurate diagnosis and management

- should have their nutritional status and dietary intake monitored regularly by a suitably trained professional.

### **Nutrition: assessment and management (6.23.1)**

- C Nutritional support should be initiated for all stroke patients identified as malnourished or at risk of malnutrition. This may include specialist dietary advice, oral nutrition supplements, and/or tube feeding.

### **Bowel and bladder impairment (6.24.1)**

- D Stroke patients with troublesome constipation should:
- have a prescribed drug review to minimise use of constipating drugs
  - be given advice on diet, fluid intake and exercise
  - be offered oral laxatives
  - be offered rectal laxatives only if severe problems remain.

### **Extended activities of daily living (domestic and community) (6.26.1)**

- A Any patient whose activities have been limited should be:
- assessed by an occupational therapist with expertise in neurological disability
  - taught how to achieve activities safely and given as many opportunities to practise as reasonable under supervision, provided that the activities are potentially achievable
  - assessed for, provided with and taught how to use any adaptations or equipment needed to perform activities safely.

### **Driving (6.27.1)**

- B The person or team responsible for any stroke patient who wishes to drive should:

- ask about and identify any absolute bars to driving
- consider the patient's capacity to drive safely
- discuss driving and give advice to the patient
- document the findings and conclusions, inform the GP and give a written record to the patient.

### Work and leisure (6.29.1)

B Patients who wish to return to work (paid or unpaid employment) should:

- have their work requirements established with their employer (provided the patient agrees)
- be assessed cognitively, linguistically and practically to establish their potential
- be advised on the most suitable time and way to return to work, if this is practical
- be referred to a specialist in employment for people with disability if extra assistance or advice is needed (a disability employment advisor, in England)
- be referred to a specialist vocational rehabilitation team if the disability employment advisor is unable to provide the necessary rehabilitation.

### Social interaction (6.30.1)

A Any patient whose social interaction after stroke is causing stress or distress to others should be assessed by a clinical psychologist or other specialist and, if necessary, by others to determine the underlying causes (eg pain, infection, depression).

B Following the assessment:

- the nature of the problems and their causes should be explained to family, to other people in social contact and to the rehabilitation team
- the patient should be helped to learn the best way to interact successfully without causing distress

- all those involved in social interactions should be taught how best to respond to inappropriate or distressing behaviour
- psychosocial management approaches should be considered
- antipsychotic medicines may be indicated if other causes have been excluded and the patient is causing distress and is at possible risk of harm to self or others. Given the high rates of adverse effects, including risk of stroke, the use of antipsychotics should be carefully considered. Treatment should be started on a low dose and increased slowly according to symptoms. Ideally treatment should be short-term (eg 1 week) and withdrawn slowly.

### Sexual dysfunction (6.31.1)

A Every patient should be asked, soon after discharge and at their 6-month and annual reviews, whether they have any concerns about their sexual functioning. Partners should additionally be given an opportunity to raise any problems they may have.

B Any patient who has a limitation on sexual functioning and who wants further help should:

- be assessed for treatable causes
- be reassured that sexual activity is not contraindicated after stroke and is extremely unlikely to precipitate a further stroke
- if suffering from erectile dysfunction, be assessed for the use of sildenafil or an equivalent drug
- avoid the use of sildenafil or equivalent drug for 3 months after stroke and until blood pressure is controlled
- be referred to a person with expertise in psychosexual problems if the problems remain unresolved.

### Psychological care (6.34)

Please see the Stroke Improvement Programme 'stepped care model' (Gillham S, Clark L (2011)).

*Psychological care after stroke: improving stroke services for people with cognitive and mood disorders.* Leicester: NHS Improvement – Stroke.)

### Depression and anxiety (6.35.1)

- A Any patient considered to have depression or anxiety should be assessed for other mood disorders.
- B Patients with mild or moderate symptoms of depression should be given information, support and advice (see recommendation 6.34.1G) and considered for one or more of the following interventions:
  - increased social interaction
  - increased exercise
  - goal setting
  - other psychosocial interventions.
- C Patients prescribed antidepressant drug treatment for depression or anxiety should be monitored for known adverse effects, and treatment continued for at least 4 months beyond initial recovery. If the patient's mood has not improved 2–4 weeks after initiating treatment, check that the patient is taking the medicine as prescribed. If they are, then consider increasing the dose or changing to another antidepressant.
- E Brief, structured psychological therapy should be considered for patients with depression. Therapy will need to be adapted for use in those with neurological conditions.

### Emotionalism (6.36.1)

- A Any patient who persistently cries or laughs in unexpected situations or who is upset by their fluctuating emotional state should be assessed by a specialist or member of the stroke team trained in the assessment of emotionalism.

### Fatigue (6.37.1)

- A Fatigue in medically stable patients should be assessed particularly where engagement with rehabilitation, or quality of life is affected.

- B Patients with fatigue and their families should be given information and reassurance that the symptom is likely to improve with time.

### Cognitive impairments – general (6.38.1)

- C Any patient not progressing as expected in rehabilitation should have a more detailed cognitive assessment to determine whether cognitive losses are causing specific problems or hindering progress.
- G Patients returning to cognitively demanding activities (eg some work, driving) should have their cognition assessed formally beforehand.

### Attention and concentration (6.39.1)

- A Any person after stroke who appears easily distracted or unable to concentrate should have their attentional abilities (eg focused, sustained and divided) formally assessed.

### Memory (6.40.1)

- B Any patient found to have memory impairment causing difficulties in rehabilitation or undertaking activities should:
  - be assessed medically to check that there is not another treatable cause or contributing factor (eg delirium, hypothyroidism)
  - be taught compensatory techniques to reduce their prospective memory problems, such as using notebooks, diaries, electronic organisers, pager systems and audio alarms.

### Further rehabilitation (7.1.1)

- A Any patient whose situation changes (eg new problems or changed environment) should be offered further assessment by the specialist stroke rehabilitation service.
- B A named person and/or contact point should be identified and communicated to the patient to provide further information and advice if needed.
- C Any patient with residual impairment after the end of initial rehabilitation should be offered a

formal review at least every 6 months, to consider whether further interventions are warranted, and should be referred for specialist assessment if:

- new problems, not present when last seen by the specialist service, are present
- the patient's physical state or social environment has changed.

D Further therapy following 6-month review should only be offered if clear goals are agreed.

### Support (practical and emotional) (7.4.1)

A Patients and their carers should have their individual practical and emotional support needs identified:

- before they leave hospital
- when rehabilitation ends or at their 6-month review
- annually thereafter.

C Patients should be provided with information tailored to their own specific needs regularly during the acute, rehabilitation and longer-term care phases of the illness.

### Carers (informal, unpaid) (7.6.1)

E At the time of transfer of care to the home (or care home) setting, the carer should:

- be offered an assessment of their own support needs (separate to those of the patient) by social services
- be offered the support identified as necessary
- be given clear guidance on how to seek help if problems develop.

F After the patient has returned to the home (or care home) setting, the carer should:

- have their need for information and support reassessed whenever there is a significant change in circumstances (eg if the health of either the patient or the carer deteriorates)
- be reminded and assisted to seek further help and support.

### Contact

Dr Helen Hosker, general practitioner, Princess Road Surgery, 471–5 Princess Road, Manchester, M20 1BH

Email: [helen.hosker@nhs.net](mailto:helen.hosker@nhs.net)

# Psychology concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The psychological consequences of stroke are relevant to all service providers.

This guide was compiled by members of the working party psychology subgroup: Janet Cockburn, Audrey Bowen, Peter Knapp, Andrew Bateman, David Gillespie, Jane Barton, Najma Khan-Bourne, Nicola Kitching, Shuli Reich and Shirley Thomas.

## Psychological care (6.34.1)

- A Services should adopt a comprehensive approach to the delivery of psychological care after stroke, which should be delivered by using a 'stepped care' model from the acute stage to long-term management (see chapter 7).
- B Interventions for individual disorders of mood or cognition should be applied within the framework of a stepped care and comprehensive model.
- C Patients with continuing disorders should be considered for comprehensive interventions tailored towards developing compensatory behaviours and the learning of adaptive skills.
- D Within Step 1 care all patients after stroke should be screened within 6 weeks of diagnosis, using a validated tool, to identify mood disturbance and cognitive impairment.
- E Assessment measures should be adapted for use with patients with expressive or minor receptive aphasia. In patients with more severe aphasia, an assessment tool designed specifically for this purpose, such as the SAD-Q or DISCS, should be used. In patients with aphasia or other impairments that complicate assessment, careful observations over time (including response to a trial of antidepressant medication if considered necessary) should be used.
- F Within Step 2 care, patients identified as having symptoms of mood disorder should be offered a more detailed assessment, seeking information on past history, potential causes and impact, and treatment preferences.
- G In patients with mild or moderate symptoms of mood disorder, patients and carers should be provided with information, support and advice about the mood disorder as the first line of intervention. This may be from within the multidisciplinary team by nominated staff who are suitably trained and supervised, and may also involve the voluntary sector.
- H Within Step 3 care, patients with severe or persistent symptoms of mood disorder should be considered for referral to a specialist in the management of mood disorder in stroke.
- I Psychological or pharmaceutical treatment (or a combination) for mood disorder should be provided if: recommended by a clinician with expertise in managing mood disorder after stroke; or, as the second line of intervention, if the patient has not responded to information, support and advice. Any treatment should be monitored for effectiveness and kept under review.
- J Any patient assessed as having a cognitive impairment should be considered for referral to a specialist in cognitive aspects of stroke.
- K Patients identified as having cognitive impairment or mood disorder should be reassessed before discharge decisions are taken.

### Depression and anxiety (6.35.1)

- A Any patient considered to have depression or anxiety should be assessed for other mood disorders.
- B Patients with mild or moderate symptoms of depression should be given information, support and advice (see recommendation 6.34.1G) and considered for one or more of the following interventions:
  - increased social interaction
  - increased exercise
  - goal setting
  - other psychosocial interventions.
- C Patients prescribed antidepressant drug treatment for depression or anxiety should be monitored for known adverse effects, and treatment continued for at least 4 months beyond initial recovery. If the patient's mood has not improved 2–4 weeks after initiating treatment, check that the patient is taking the medicine as prescribed. If they are, then consider increasing the dose or changing to another antidepressant.
- D Patients receiving drug treatment for depression or anxiety should have it reviewed regularly to assess continued need.
- E Brief, structured psychological therapy should be considered for patients with depression. Therapy will need to be adapted for use in those with neurological conditions.
- F Antidepressant treatment should not be used routinely to prevent the onset of depression.

### Emotionalism (6.36.1)

- A Any patient who persistently cries or laughs in unexpected situations or who is upset by their fluctuating emotional state should be assessed by a specialist or member of the stroke team trained in the assessment of emotionalism.
- B Any patient diagnosed with emotionalism should, when they show increased emotional behaviour, be appropriately distracted from the provoking stimuli.
- C Patients with severe, persistent or troublesome emotionalism should be given antidepressant

drug treatment, monitoring the frequency of crying to check effectiveness. Patients should be monitored for known adverse effects. If the emotionalism has not improved 2–4 weeks after initiating treatment, check that the patient is taking the medicine as prescribed. If they are then consider increasing the dose or changing to another antidepressant.

### Fatigue (6.37.1)

- A Fatigue in medically stable patients should be assessed particularly where engagement with rehabilitation, or quality of life is affected.

### Cognitive impairments – general (6.38.1)

- A Interventions or patient management should be organised so that people with cognitive difficulties can participate in the treatments and are regularly reviewed and evaluated.
- B Every patient seen after a stroke should be considered to have at least some cognitive losses in the early phase. Routine screening should be undertaken to identify the patient's broad level of functioning, using simple standardised measures (eg Montreal Cognitive Assessment (MOCA)).
- C Any patient not progressing as expected in rehabilitation should have a more detailed cognitive assessment to determine whether cognitive losses are causing specific problems or hindering progress.
- D Care should be taken when assessing patients who have a communication impairment. The advice from a speech and language therapist should be sought where there is any uncertainty about these individuals' cognitive test results (see section 6.20).
- E The patient's cognitive status should be taken into account by all members of the multidisciplinary team when planning and delivering treatment.
- F Planning for discharge from hospital should include an assessment of any safety risks from persisting cognitive impairments.

- G Patients returning to cognitively demanding activities (eg some work, driving) should have their cognition assessed formally beforehand.

### Attention and concentration (6.39.1)

- A Any person after stroke who appears easily distracted or unable to concentrate should have their attentional abilities (eg focused, sustained and divided) formally assessed.
- B Any person with impaired attention should have cognitive demands reduced through:
- having shorter treatment sessions
  - taking planned rests
  - reducing background distractions
  - avoiding work when tired.
- C Any person with impaired attention should:
- be offered an attentional intervention (eg Time Pressure Management, Attention Process Training, environmental manipulation), ideally in the context of a clinical trial
  - receive repeated practice of activities they are learning.

### Memory (6.40.1)

- A Patients who complain of memory problems and those clinically considered to have difficulty in learning and remembering should have their memory assessed using a standardised measure such as the Rivermead Behavioural Memory Test (RBMT).
- B Any patient found to have memory impairment causing difficulties in rehabilitation or undertaking activities should:
- be assessed medically to check that there is not another treatable cause or contributing factor (eg delirium, hypothyroidism)
  - have their profile of impaired and preserved memory abilities determined (as well as the impact of any other cognitive deficits on memory performance, for example attentional impairment)
  - have nursing and therapy sessions altered to capitalise on preserved abilities

- be taught approaches that help them to encode, store and retrieve new information, for example, spaced retrieval (increasing time intervals between review of information) or deep encoding of material (emphasising semantic features)
- be taught compensatory techniques to reduce their prospective memory problems, such as using notebooks, diaries, electronic organisers, pager systems and audio alarms
- have therapy delivered in an environment that is as similar to the usual environment for that patient as possible.

### Spatial awareness (eg neglect) (6.41.1)

- A Any patient with a stroke affecting the right cerebral hemisphere should be considered at risk of reduced awareness on the left side and should be tested formally if this is suspected clinically.
- B Due to the fluctuating presentation of neglect, a standardised test battery such as the Behavioural Inattention Test should be used in preference to a single subtest, and the effect on functional tasks such as dressing and mobility should be determined.
- C Any patient shown to have impaired attention to one side should be:
- given a clear explanation of the impairment
  - taught compensatory strategies to help reduce impact on functional activities such as reading
  - given cues to draw attention to the affected side during therapy and nursing procedures
  - monitored to ensure that they do not eat too little through missing food on one side of the plate
  - offered interventions aimed at reducing the functional impact of the neglect (eg visual scanning training, limb activation, sensory stimulation, eye patching, prism wearing, prism adaptation training), ideally within the context of a clinical trial.

**Perception (6.42.1)**

- A Any person who appears to have perceptual difficulties should have a formal perceptual assessment (eg the Visual Object and Space Perception battery (VOSP)).
- B Any person found to have agnosia should:
- have the impairment explained to them, their carers and their treating team
  - be offered a perceptual intervention, ideally within the context of a clinical trial.

**Apraxia (6.43.1)**

- A Any person who has difficulties in executing tasks despite apparently adequate limb movement should be assessed formally for the presence of apraxia.
- B Any person found to have apraxia should:
- have their profile of impaired and preserved action abilities determined using a standardised approach (eg Test of Upper Limb Apraxia (TULIA))
  - have the impairment and the impact on function explained to them, their family, and their treating team
  - be given therapies and/or taught compensatory strategies specific to the deficits identified ideally in the context of a clinical trial.

**Executive functioning (6.44.1)**

- A Any person who appears to have adequate skills to perform complex activities but who fails to organise the tasks needed should be formally assessed for the dysexecutive syndrome, for example using the Behavioural Assessment of the Dysexecutive Syndrome (BADs).
- B Any person with an executive disorder and activity limitation should be taught compensatory techniques. This may include internal strategies (eg self-awareness and goal setting) and/or external strategies (eg use of electronic organisers or pagers, or use of written checklists) ideally in the context of a clinical trial.
- C When a patient's activities are affected by an executive disorder, the nature and effects of the impairment and ways of supporting and helping the patient should be discussed with others involved (eg family, staff).

**Contacts**

Dr Audrey Bowen, senior lecturer in psychology, University of Manchester, Oxford Road, Manchester, M13 9PL  
Email: [audrey.bowen@manchester.ac.uk](mailto:audrey.bowen@manchester.ac.uk)

Dr Peter Knapp, senior lecturer, School of Healthcare, University of York, North Yorkshire, YO 10  
Email: [peter.knapp@york.ac.uk](mailto:peter.knapp@york.ac.uk)

# Speech and language therapy concise guide for stroke 2012

These profession-specific concise guidelines contain recommendations extracted from the *National clinical guideline for stroke*, 4th edition, which contains over 300 recommendations covering almost every aspect of stroke management. The recommendations for each profession are given with their numbers, so that they can be found in the main guideline.

The recommendations below have direct implications for speech and language therapists and aim to provide them with ready access to the latest guidance.

## Specialist stroke services (3.2.1)

- C Patients with stroke should be assessed and managed by stroke nursing staff and at least one member of the specialist rehabilitation team within 24 hours of admission to hospital, and by all relevant members of the specialist rehabilitation team within 72 hours, with documented multidisciplinary goals agreed within 5 days.

## Transfers of care – discharge from hospital (3.8.1)

- H All patients should continue to have access to specialist stroke services after leaving hospital, and should know how to contact them.
- I Carers of patients with stroke should be provided with:
- a named point of contact for stroke information
  - written information about the patient's diagnosis and management plan
  - sufficient practical training to enable them to provide care.

## Service development (3.10.1)

- B The planning process for any service development should include active involvement of stroke patients and carers, with particular consideration of the views of patients who are unable to participate in the planning process directly.

- C Stroke patients should be offered any support needed to enable participation.

## Use of assessments/measures (3.11.1)

- A stroke service should:
- D train all staff in the recognition and management of emotional, communication and cognitive problems
- E have protocols to guide the use of more complex assessment tools, describing:
- when it is appropriate or necessary to consider their use
  - which tool(s) should be used
  - what specific training or experience is needed to use the tool(s)
- F measure (change in) function at appropriate intervals.

## Rehabilitation treatment approach (3.13.1)

- All members of a stroke service should:
- A use an agreed consistent approach for each problem faced by a patient, ensuring the patient is given the same advice and taught the same technique to ameliorate or overcome it.

## Rehabilitation treatment quantity (intensity of therapy) (3.14.1)

- A Patients with stroke should be offered a minimum of 45 minutes of each appropriate therapy that is required, for a minimum of 5

days per week, at a level that enables the patient to meet their rehabilitation goals for as long as they are continuing to benefit from the therapy and are able to tolerate it.

- B The team should promote the practice of skills gained in therapy in the patient's daily routine in a consistent manner and patients should be enabled and encouraged to practise that activity as much as possible.
- C Therapy assistants and nurses should facilitate practice under the guidance of a qualified therapist.

### Prehospital care (4.1.1)

- E All patients with residual neurological signs and symptoms should remain nil by mouth until swallow screening has been conducted.

### Initial, early rehabilitation assessment (4.13.1)

- A All patients should be assessed within a maximum of 4 hours of admission for their:
  - ability to swallow, using a validated swallow screening test (eg 50 ml water swallow) administered by an appropriately trained person
  - immediate needs in relation to positioning, mobilisation, moving and handling
  - bladder control
  - risk of developing skin pressure ulcers
  - capacity to understand and follow instructions
  - capacity to communicate their needs and wishes
  - nutritional status and hydration
  - ability to hear, and need for hearing aids
  - ability to see, and need for glasses.

### Nutrition: feeding, swallowing and hydration (4.17.1)

- A Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within 4 hours of admission to

hospital, before being given any oral food, fluid or medication, and they should have an ongoing management plan for the provision of adequate hydration and nutrition.

- B All patients should be screened for malnutrition and the risk of malnutrition at the time of admission and at least weekly thereafter. Screening should be undertaken by trained staff using a structured assessment such as the Malnutrition Universal Screen Tool (MUST).
- C All people with acute stroke should have their hydration assessed on admission, reviewed regularly and managed so that normal hydration is maintained.
- F Nutritional support should be initiated for people with stroke who are at risk of malnutrition. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding.
- G People with dysphagia should be given food, fluids and medications in a form that can be swallowed without aspiration following specialist assessment of swallowing.
- [H] Routine oral nutritional supplements are not recommended for people with acute stroke who are adequately nourished on admission and are able to take a full diet while in hospital.

### General principles of rehabilitation (6.1.1)

- A All patients entering a period of rehabilitation should be screened for common impairments using locally agreed tools and protocols.
- B Patients should be informed of realistic recovery prospects and should have realistic goals set.
- C Specific treatments should only be undertaken in the context of, and after considering, the overall goals of rehabilitation and any potential interactions with other treatments.
- D For any treatments that involve significant risk/discomfort to the patient and/or resource use, specific goals should be set and

monitored using appropriate clinical measures such as numerical rating scales, visual analogue scales, goal attainment rating or a standardised measure appropriate for the impairment.

- E The nature and consequences of a patient's impairments should always be explained to the patient and to the carer(s), and if necessary and possible they should be taught strategies or offered treatments to overcome or compensate for any impairment affecting activities or safety, or causing distress.

### Aphasia (6.20.1.1)

- A All patients with communication problems following stroke should have an initial assessment by a speech and language therapist to diagnose the communication problem and to explain the nature and implications to the patient, family and multidisciplinary team. Routine reassessment of the impairment or diagnosis in the early stages of stroke (immediate and up to 4 months) should not be performed unless there is a specific purpose eg to assess mental capacity.
- B In the early stages of stroke (immediate and up to 4 months) patients identified as having aphasia as the cause of the impairment should be given the opportunity to practise their language and communication skills as tolerated by the patient.
- C Beyond the early stages of stroke (immediate and up to 4 months), patients with communication problems caused by aphasia should be reassessed to determine whether they are more suitable for more intensive treatment with the aim of developing greater participation in social activities. This may include a range of approaches such as using an assistant or volunteer, family member or communication partner guided by the speech and language therapist, computer-based practice programmes and other functional methods.
- D Patients with impaired communication should be considered for assistive technology and communication aids by an appropriately trained clinician.

- E Patients with aphasia whose first language is not English should be offered assessment and communication practice in their preferred language.

- F Education and training of health/social care staff, carers and relatives regarding the stroke patient's communication impairments should be provided by a speech and language therapist. Any education and training should enable communication partners to use appropriate communication strategies to optimise patient engagement and choice, and the delivery of other rehabilitation programmes.

### Dysarthria (6.20.2.1)

- A Any patient whose speech is unclear or unintelligible following stroke so that communication is limited or unreliable should be assessed by a speech and language therapist to determine the nature and cause of the speech impairment and communication restriction.
- B Any person who has dysarthria following stroke which is sufficiently severe to limit communication should:
  - be taught techniques to improve the clarity of their speech
  - be assessed for compensatory alternative and augmentative communication techniques (eg letter board, communication aids) if speech remains unintelligible.
- C The communication partners (eg carers, staff) of a person with severe dysarthria following stroke should be taught how to assist the person in their communication.

### Apraxia of speech (6.20.3.1)

- A Any stroke patient who has marked difficulty articulating words should be formally assessed for apraxia of speech and treated to maximise articulation of targeted words and rate of speech to improve intelligibility.
- B Any stroke patient with severe communication difficulties but reasonable cognition and

language function should be assessed for and provided with appropriate alternative or augmentative communication strategies or aids.

### Swallowing problems: assessment and management (6.21.1)

- A Until a safe swallowing method has been established, all patients with identified swallowing difficulties should:
- be considered for alternative fluids with immediate effect
  - have a comprehensive assessment of their swallowing function undertaken by a specialist in dysphagia
  - be considered for nasogastric tube feeding within 24 hours
  - be referred for specialist nutritional assessment, advice and monitoring
  - receive adequate hydration, nutrition and medication by alternative means
  - be considered for the additional use of a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols.
- B Any stroke patient unable to swallow food safely 1 week after stroke should be considered for an oropharyngeal swallowing rehabilitation programme designed and monitored by a specialist in dysphagia. This should include one or more of:
- compensatory strategies such as postural changes (eg chin tuck) or different swallowing manoeuvres (eg supraglottic swallow)
  - restorative strategies to improve oropharyngeal motor function (eg Shaker head-lifting exercises)
  - sensory modification, such as altering taste and temperature of foods or carbonation of fluids
  - texture modification of solids and/or liquids.
- C Every stroke patient who requires food or fluid of a modified consistency should:
- be referred for specialist nutritional assessment
- have texture of modified food or liquids prescribed using nationally agreed descriptors
  - have both fluid balance and nutritional intake monitored.
- D Stroke patients with difficulties self-feeding should be assessed and provided with the appropriate equipment and assistance (including physical help and verbal encouragement) to promote independent and safe feeding as far as possible.
- E All stroke patients with swallowing problems should have written guidance for all staff/carers to use when feeding or providing liquid.
- F Nutrition support should be initiated for people with stroke who are at risk of malnutrition which should incorporate specialist dietary advice and may include oral nutritional supplements, and/or tube feeding.
- G Instrumental direct investigation of oropharyngeal swallowing mechanisms (eg by videofluoroscopy or flexible endoscopic evaluation of swallowing) for stroke patients should only be undertaken:
- in conjunction with a specialist in dysphagia
  - if needed to direct an active treatment/rehabilitation technique for swallowing difficulties, *or*
  - to investigate the nature and causes of aspiration.
- H Gastrostomy feeding should be considered for stroke patients who:
- need but are unable to tolerate nasogastric tube feeding
  - are unable to swallow adequate amounts of food and fluid orally by 4 weeks
  - are at long-term high risk of malnutrition.
- I Any stroke patient discharged from specialist care services with continuing problems with swallowing food or liquid safely should:
- be trained, or have carers trained, in the identification and management of swallowing difficulties
  - should have regular reassessment of their dysphagia beyond the initial acute

assessment to enable accurate diagnosis and management

- should have their nutritional status and dietary intake monitored regularly by a suitably trained professional.

### Oral health (6.22.1)

A All stroke patients, especially those who have difficulty swallowing, and are tube fed, should have oral and dental hygiene maintained (involving the patient or carers) through regular (at least 3 times a day):

- brushing of teeth with a toothbrush, and dentures and gums with a suitable cleaning agent (toothpaste or chlorhexidene gluconate dental gel)
- removal of excess secretions.

B All patients with dentures should have their dentures:

- put in appropriately during the day
- cleaned regularly
- checked and replaced if ill-fitting, damaged or lost.

C Those responsible for the care of patients disabled by stroke (in hospital, in residential and in home care settings) should be trained in:

- assessment of oral hygiene
- selection and use of appropriate oral hygiene equipment and cleaning agents
- provision of oral care routines
- recognition and management of swallowing difficulties.

### Psychological care (6.34.1)

E Assessment measures should be adapted for use with patients with expressive or minor receptive aphasia. In patients with more severe aphasia, an assessment tool designed specifically for this purpose, such as the SAD-Q or DISCS, should be used. In patients with aphasia or other impairments that complicate assessment, careful observations over time (including response to a trial of antidepressant medication if considered necessary) should be used.

### Cognitive impairments – general (6.38.1)

D Care should be taken when assessing patients who have a communication impairment. The advice from a speech and language therapist should be sought where there is any uncertainty about these individuals' cognitive test results (see section 6.20).

E The patient's cognitive status should be taken into account by all members of the multidisciplinary team when planning and delivering treatment.

### Further rehabilitation (7.1.1)

A Any patient whose situation changes (eg new problems or changed environment) should be offered further assessment by the specialist stroke rehabilitation service.

B A named person and/or contact point should be identified and communicated to the patient to provide further information and advice if needed.

### Community integration and participation (7.3.1)

A The rehabilitation service should establish with each patient specific social and leisure activities that they would like to undertake in the community and:

- advise the person with stroke on the potential for undertaking an activity
- identify any barriers to success (for example low self-confidence), give advice and work with the patient on how to overcome those barriers
- where appropriate refer the person with stroke on to community organisations (statutory and non-statutory) that can support the patient in fulfilling their wanted roles.

B Local commissioners should ensure that community integration and participation for disabled people is facilitated through:

- ensuring a suitable community transport system that is accessible and available

- organising and supporting venues for social and leisure activities able to accommodate disabled people, especially people with communication and cognitive problems
- organising and supporting social networks for disabled people (eg through voluntary groups)
- making sure appropriate stroke specialist and generic voluntary sector services and peer support (eg communication support groups, stroke clubs, self-help groups and communication partner schemes) are available and that information and signposting to them are given.

### Support (practical and emotional) (7.4.1)

- C Patients should be provided with information tailored to their own specific needs regularly during the acute, rehabilitation and longer-term care phases of the illness.

### People with stroke in care homes (7.5.1)

- A All people with stroke in care homes should receive assessment and treatment from stroke rehabilitation services in the same way as patients living in their own homes.
- B All staff in care homes should have training on the physical, psychological and social effects of stroke and the optimal management of common impairments and activity limitations.

### Carers (informal, unpaid) (7.6.1)

- A At all times the views of the patient on the involvement of their carers should be sought, to establish if possible the extent to which the patient wants family members and others involved.

- B The carer(s) of every person with a stroke should be involved with the management process from the outset, specifically:
- as an additional source of important information about the patient both clinically and socially
  - being given accurate information about the stroke, its nature and prognosis, and what to do in the event of a further stroke or other problems, for example post-stroke epilepsy
  - being given emotional and practical support.
- C With the patient's agreement carers should be involved in all important decisions, as the patient's advocate, if necessary and appropriate.
- D During the rehabilitation phase, carers should be encouraged to participate in an educational programme that:
- explains the nature of stroke and its consequences
  - teaches them how to provide care and support
  - gives them opportunities to practise care with the patient
  - emphasises and reiterates all advice on secondary prevention, especially lifestyle changes.

### Contacts

Ms Rosemary Cunningham, speech & language therapy team manager, Royal Derby Hospital, Uttoxeter Road, Derby, DE22 3NE  
Email: [rosemary.cunningham@derbyhospitals.nhs.uk](mailto:rosemary.cunningham@derbyhospitals.nhs.uk)

Dr Sue Pownall, SLT team leader/dysphagia specialist/professional services research lead, Sheffield Teaching Hospitals NHS Foundation, Sheffield, S10 2JF  
Email: [sue.pownall@sth.nhs.uk](mailto:sue.pownall@sth.nhs.uk)



# Appendices



## Appendix 1 Evidence table reviewers

---

In addition to the members of the working party, the following individuals also reviewed evidence and we are grateful for their time and expertise.

Ms Sara Alderdice	Norfolk Community Health & Care NHS Trust
Mrs Helen Armitage	Guy's and St Thomas' NHS Foundation Trust
Professor Ann Ashburn	University of Southampton
Dr Stephen Ashford	North West London Hospitals NHS Trust and King's College London
Miss Preetpal Atwal	North West London Hospitals NHS Trust
Miss Tracey Barron	College of Paramedics
Dr Jane Barton	Sheffield Health & Social Care NHS Foundation Trust
Dr Andrew Bateman	Princess of Wales Hospital, Cambridgeshire
Mrs Fotoula Blias	Norfolk Community Health & Care NHS Trust
Miss Angeline Bonney	University College London NHS Foundation Trust
Miss Sabrina Booth	Sheffield Teaching Hospitals NHS Foundation Trust
Professor Jane Burridge	University of Southampton
Mrs Berenice Carter	York Hospitals NHS Foundation Trust
Dr Janet Cockburn	University of Reading
Dr Emma Cooke	St George's Healthcare NHS Trust, London
Dr Mary Cramp	University of East London
Mrs Janet Darby	University of Nottingham
Mrs Tammy Davidson-Thompson	Norfolk Community Health & Care NHS Trust
Mrs Jackie Davies	Cardiff & Vale University Health Board
Mr David Davis	South East Coast Ambulance Service NHS Foundation Trust
Mrs Nicole Dodsworth	Guy's and St Thomas' NHS Foundation Trust
Professor Pamela Enderby	University of Sheffield
Mrs Joanna Fletcher-Smith	University of Nottingham
Mrs Michelle Gibbs	King's College London
Dr Jo Gibson	University of Central Lancashire
Dr Louise Gilbertson	Southern Health NHS Foundation Trust, Southampton
Dr David Gillespie	Astley Ainslie Hospital, Scotland
Ms Filomena Gomes	King's College London
Mrs Mary Grant	University of Nottingham
Dr Linda Hammett	National Hospital for Neurology and Neurosurgery
Mrs Sarah Haynes	Royal Hospital for Neuro-disability
Ms Susannah Hinchliff	Norfolk Community Health & Care NHS Trust
Dr Val Hopwood	Coventry University
Mrs Jane Horne	University of Nottingham
Dr Ann-Marie Hughes	University of Southampton
Mrs Kathryn Jarvis	University of Liverpool
Dr Fiona Jones	St George's University, London
Mrs Stephanie Jones	University of Central Lancashire
Dr Najma Khan-Bourne	King's College Hospital NHS Foundation Trust
Dr Nicola Kitching	Brain and Spinal Injury Centre, Manchester
Dr Praveen Kumar	University of the West of England
Dr Michael Leathley	University of Central Lancashire
Dr Pip Logan	University of Nottingham
Ms Kay Martin	Peterborough City Care Centre
Ms Fay McCaffer	Cardiff & Vale University Health Board
Mrs Carolee McLaughlin	Belfast City Hospital

Mrs Charlotte Mistry	Norfolk & Norwich University Hospitals NHS Foundation Trust
Miss Natalie Mohr	North Bristol NHS Trust
Dr Meriel Norris	Brunel University, London
Dr Anthony Pereira	St George's Hospital, London
Mr Daniel Philips	East of England Ambulance Service NHS Trust
Professor Tom Quinn	University of Surrey
Dr Kate Radford	University of Central Lancashire
Dr Jill Ramsay	University of Birmingham
Dr Shuli Reich	Hertfordshire Community Services NHS Trust
Ms Kate Richardson	Norfolk & Norwich University Hospitals NHS Foundation Trust
Mr Mark Smith	NHS Lothian
Ms Beth Stevens	Poole Hospital
Mrs Melanie Stevenson	Norfolk Community Health & Care NHS Trust
Mrs Kate Tucker	Cardiff Metropolitan University
Mrs Alyson Warland	Brunel University, London
Professor Caroline Watkins	University of Central Lancashire
Mrs Dorothy Wilson	Norfolk Community Health & Care NHS Trust

## Appendix 2 Peer reviewers

---

### Commissioner

Dr Andrew Lee North Lincolnshire Clinical Commissioning Group

### Guideline developers

Dr Mark Barber On behalf of Scottish Intercollegiate Guidelines Network

Dr Charlie Chung On behalf of Scottish Intercollegiate Guidelines Network

Dr Anne Kinnear On behalf of Scottish Intercollegiate Guidelines Network

### Medicine

Professor Martin Brown University College London

Professor Martin Dennis University of Edinburgh

Dr Patrick Gompertz Barts and the London NHS Trust

Dr Amer Jafar Aneurin Bevan Health Board

Dr Anthony Kenton University Hospital, Coventry

Dr Gillian Mead University of Edinburgh and NHS Lothian, on behalf of National Advisory Committee for Stroke

Dr Priya Nair NHS Tayside

Dr Mark O'Donnell Cumbria and Lancashire Cardiac and Stroke Networks

Professor John Potter University of East Anglia and Norfolk & Norwich University

Hospitals NHS Foundation Trust, on behalf of British Geriatrics Society

Dr Michael Power Ulster Hospital

Professor Tom G Robinson Stroke Research Network

Professor Christine Roffe Stroke Research, Institute for Science and Technology in Medicine, Keele University; British Association of Stroke Physicians Clinical Standards Group; Acute Stroke CSG; Stroke Research Network

Dr Louise Shaw Royal United Hospital, Bath

Professor David Stott University of Glasgow

Dr Ganesh Subramanian On behalf of British Association of Stroke Physicians

Dr Graham Venables Sheffield Teaching Hospitals NHS Foundation Trust

Dr David Werring Stroke Research Network Prevention – Clinical Studies Group

### Network

Ms Sarah Morrison Surrey Community Health

### Nurses

Ms Moira Keating Colchester Hospital University Foundation Trust and National Stroke Nursing Forum

Ms Angela Keeney Mid Yorkshire Hospital NHS Trust

### Occupational therapy

Ms Stephanie Tempest Brunel University, London

### Orthoptics

Ms Fanny Freeman British and Irish Orthoptic Society

Ms Claire Howard British and Irish Orthoptic Society

Ms Sonia MacDiarmid British and Irish Orthoptic Society

Ms Annette Ray British and Irish Orthoptic Society

Dr Fiona Rowe British and Irish Orthoptic Society

Ms Claire Scott British and Irish Orthoptic Society

Ms Tracey Shipman British and Irish Orthoptic Society

**Paramedic**

Ms Kerry Crawley College of Paramedics

**Patients**

Mr John Collier Speakability  
 Mr Eric Sinclair Stroke survivor and volunteer with Stroke Association  
 Mr Robert Wilson Patient representative  
 Stroke research patients King's College London  
 and family group

**Pharmacy**

Dr Toni Campbell Ipsen Ltd

**Physiotherapy**

Ms Catherine Cornall National Rehabilitation Hospital  
 Professor Gert Kwakkel Vrije Universiteit University Medical Centre  
 Ms Zoë Pascucci Royal National Hospital for Rheumatic Diseases  
 Ms Joanne Veerbeek Vrije Universiteit University Medical Centre

**Psychology**

Dr Samantha Oakley Black Country Partnership Foundation Trust  
 Dr Rob Stephens Nottingham University Hospital NHS Trust

**Radiology**

Dr WK 'Kling' Chong Great Ormond Street Hospital for Children  
 Dr Gareth Tudor British Institute of Radiologists (Honorary Secretary – Medical)  
 Dr Sririam Vundavalli Brighton and Sussex University Hospitals NHS Trust

**Rehabilitation**

Dr Alex Pollock Nursing Midwifery and Allied Health Professions Research Unit  
 Dr Fiona Song Woking Community Hospital  
 Dr Frederike Van Wijck Glasgow Caledonian University  
 Ms Carrie Wedgwood Sirona Care & Health, Bath & North East Somerset

**Speech and language therapy**

Dr Wendy Best University College London  
 Ms Becky Blagdon Northamptonshire NHS Foundation Trust  
 Ms Liz Boaden Lancashire Teaching Hospitals Foundation Trust  
 Ms Sheena Borthwick NHS Lothian  
 Mr Tim Chetwood Cumbria Partnership NHS Foundation Trust  
 Ms Simone Coomber Cumbria Partnership NHS Foundation Trust  
 Ms Jenni Crisp Sheffield Teaching Hospitals NHS Trust; Royal College of Speech and  
 Language Therapists; British Aphasiology Society  
 Ms Sian Davies East Lancashire Hospitals Trust; Royal College of Speech and  
 Language Therapists  
 Ms Su Durrant Trafford Provider Services  
 Ms Lisa Everton County Health Partnerships; Nottingham University Hospitals NHS  
 Trust  
 Ms Mandy Galling East Lancashire Hospitals Trust  
 Ms Claire Gatehouse Plymouth Community Healthcare; British Aphasiology Society;  
 Royal College of Speech and Language Therapists; UK Stroke Forum  
 Education and Training  
 Ms Jane Giles Newcastle Hospitals Community Health  
 Ms Anne Guyon University of East Anglia  
 Ms Rachel Hemmingway Royal College of Speech and Language Therapists; Bolton Hospitals  
 NHS Foundation Trust

Dr Katerina Hilari	City University London
Ms Hannah Hawthorne	Cumbria Partnership NHS Foundation Trust
Mr Simon Horton	University of East Anglia, School of Allied Health Professionals
Professor David Howard	Newcastle University
Ms Jan Huddleston	Lancashire Teaching Hospitals Trust
Ms Jess Jones	Southport and Ormskirk NHS Trust; Royal College of Speech and Language Therapists
Ms Tamsyn Marsh-Patrick	Warrington & Halton Hospitals NHS Foundation Trust
Professor Jane Marshall	City University London
Dr Jane Maxim	University College London
Ms Sarah McClusky	Bolton Hospitals NHS Foundation Trust
Ms Carmell McNamee	Bolton Hospitals NHS Foundation Trust
Ms Victoria Merrill	East Cheshire NHS Trust
Ms Margaret Metcalfe	County Health Partnership; Nottinghamshire Healthcare Trust
Ms Natalie Mohr	North Bristol NHS Trust
Ms Jane Mortley	Royal College of Speech and Language Therapists; Steps Consulting Ltd
Ms Claire Moser	On behalf of the Royal College of Speech and Language Therapists
Ms Annette Munro	Lancashire Teaching Hospitals NHS Trust
Dr Rebecca Palmer	University of Sheffield
Ms Tessa Pemberton	Cumbria Partnership Foundation Trust
Ms Hannah Reynolds	Independent speech and language therapist
Ms Emma Richards	Royal National Hospital for Rheumatic Diseases
Ms Sally Rosenvinge	Guy's and St Thomas' NHS Foundation Trust; King's College London Biomedical Research Centre
Ms Sarah Russ	Salford Royal NHS Foundation Trust; Royal College of Speech and Language Therapists
Ms Karen Sage	University of Manchester; Royal College of Speech and Language Therapists
Dr Christos Salis	British Aphasiology Society
Mr Cameron Sellars	NHS Greater Glasgow and Clyde
Dr Claerwen Snell	Warrington & Halton Hospitals NHS Foundation Trust
Ms Lucinda Somerset	Gateshead Adult Speech and Language Therapy Services
Ms Helen Spear	Independent speech and language therapist
Ms Christine Springate	Oxford Health NHS Foundation Trust
Ms Stephanie Ticehurst	North Bristol NHS Trust
Dr Mieke Van de Sandt	Rijndam Rehabilitation Centre, the Netherlands
Professor Rosemary Varley	University College London
Ms Helen Vernon	Cumbria Partnership NHS Foundation Trust
<b>Vascular surgery</b>	
Mr Richard Bulbulia	Cheltenham General Hospital
Professor Alun Davies	Imperial College London
Professor Allison Halliday	University of Oxford
Mr Mohsen Javadpour	Society of British Neurological Surgeons
Mr Shane MacSweeney	Nottingham University Hospital
Dr Kazem Rahimi	University of Oxford
Mr Ankur Thapar	Imperial College London
<b>Voluntary sector</b>	
Ms Margaret Goose	RCP Stroke Committee; National Institute for Health Research Patient Public Involvement Clinical Studies Group
Ms Maddy Halliday	Stroke Association
Mr John Murray	Different Strokes; Stroke Research Network
Ms Victoria Smith	SkillsActive
Ms Kate Swinburn	UK Connect – communication disability network

# Appendix 3 National Stroke Strategy quality markers\*

---

## **QM1 Awareness raising**

Members of the public and health and care staff are able to recognise and identify the main symptoms of stroke and know it needs to be treated as an emergency.

## **QM2 Managing risk**

Those at risk of stroke and those who have had a stroke are assessed for and given information about risk factors and lifestyle management issues (exercise, smoking, diet, weight and alcohol), and are advised and supported in possible strategies to modify their lifestyle and risk factors.

Risk factors, including hypertension, obesity, high cholesterol, atrial fibrillation (irregular heartbeats) and diabetes, are managed according to clinical guidelines, and appropriate action is taken to reduce overall vascular risk.

## **QM3 Information, advice and support**

People who have had a stroke, and their relatives and carers, have access to practical advice, emotional support, advocacy and information throughout the care pathway and lifelong.

## **QM4 Involving individuals in developing services**

People who have had a stroke and their carers are meaningfully involved in the planning, development, delivery and monitoring of services. People are regularly informed about how their views have influenced services.

## **QM5 Assessment – referral to specialist**

Immediate referral for appropriately urgent specialist assessment and investigation is considered in all patients presenting with a recent TIA or minor stroke.

A system which identifies as urgent those with early risk of potentially preventable full stroke – to be assessed within 24 hours in high-risk cases; all other cases are assessed within seven days.

Provision to enable brain imaging within 24 hours and carotid intervention, echocardiography and ECG within 48 hours where clinically indicated.

## **QM6 Treatment**

All patients with TIA or minor stroke are followed up one month after the event, either in primary or secondary care.

---

\* Appendix 3 contains public sector information licensed under the Open Government Licence v1.0.

**QM7 Urgent response**

All patients with suspected acute stroke are immediately transferred by ambulance to a receiving hospital providing hyper-acute stroke services (where a stroke triage system, expert clinical assessment, timely imaging and the ability to deliver intravenous thrombolysis are available throughout the 24-hour period).

**QM8 Assessment**

Patients with suspected acute stroke receive an immediate structured clinical assessment from the right people.

Patients requiring urgent brain imaging are scanned in the next scan slot within usual working hours, and within 60 minutes of request out-of-hours with skilled radiological and clinical interpretation being available 24 hours a day.

Patients diagnosed with stroke receive early multidisciplinary assessment – to include swallow screening (within 24 hours) and identification of cognitive and perceptible problems.

**QM9 Treatment**

All stroke patients have prompt access to an acute stroke unit and spend the majority of their time at hospital in a stroke unit with high-quality stroke specialist care.

Hyper-acute stroke services provide, as a minimum, 24-hour access to brain imaging, expert interpretation and the opinion of a consultant stroke specialist, and thrombolysis is given to those who can benefit.

Specialist neuro-intensivist care including interventional neuroradiology/neurosurgery expertise is rapidly available.

Specialist nursing is available for monitoring of patients.

Appropriately qualified clinicians are available to address respiratory, swallowing, dietary and communication issues.

**QM10 High-quality specialist rehabilitation**

People who have had strokes access high-quality rehabilitation and, with their carer, receive support from stroke-skilled services as soon as possible after they have a stroke, available in hospital, immediately after transfer from hospital and for as long as they need it.

**QM11 End-of-life care**

People who are not likely to recover from their stroke receive care at the end of their lives which takes account of their needs and choices, and is delivered by a workforce with appropriate skills and experience in all care settings.

**QM12 Seamless transfer of care**

A workable, clear discharge plan that has fully involved the individual (and their family where appropriate) and responded to the individual's particular circumstances and aspirations is developed by health and social care services, together with other services such as transport and housing.

### **QM13 Long-term care and support**

A range of services are in place and easily accessible to support the individual long-term needs of individuals and their carers.

### **QM14 Assessment and review**

People who have had strokes and their carers, either living at home or in care homes, are offered a review from primary care services of their health and social care status and secondary prevention needs, typically within six weeks of discharge home or to care home and again before six months after leaving hospital.

This is followed by an annual health and social care check, which facilitates a clear pathway back to further specialist review, advice, information, support and rehabilitation where required.

### **QM15 Participation in community life**

People who have had a stroke, and their carers, are enabled to live a full life in the community.

### **QM16 Return to work**

People who have had a stroke and their carers are enabled to participate in paid, supported and voluntary employment.

### **QM17 Networks**

Networks are established covering populations of 0.5 to 2 million to review and organise delivery of stroke services across the care pathway.

### **QM18 Leadership and skills**

All people with stroke, and at risk of stroke, receive care from staff with the skills, competence and experience appropriate to meet their needs.

### **QM19 Workforce review and development**

Commissioners and employers undertake a review of the current workforce and develop a plan supporting development and training to create a stroke-skilled workforce.

### **QM20 Research and audit**

All trusts participate in quality research and audit, and make evidence for practice available.

# References

---

- Abbott AL (2009) Medical (nonsurgical) intervention alone is now best for prevention of stroke associated with asymptomatic severe carotid stenosis. *Stroke* 40 (10): e573–83.
- Ada L, Dorsch S, Canning C (2006) Strengthening interventions increase strength and improve activity after stroke: a systematic review. *Australian Journal of Physiotherapy* 52 (4): 241–8.
- Aichert I, Ziegler W (2008) Learning a syllable from its parts: cross-syllabic generalisation effects in patients with apraxia of speech. *Aphasiology* 22 (11): 1216–29.
- Algra A, De Schryver EL, van Gijn J, Kappelle LJ, Koudstaal PJ (2006) Oral anticoagulants versus antiplatelet therapy for preventing further vascular events after transient ischaemic attack or minor stroke of presumed arterial origin. *Cochrane Database of Systematic Reviews* (3): CD001342.
- Alkhenizan AH, Al-Omran MA (2004) The role of vitamin E in the prevention of coronary events and stroke – meta-analysis of randomized controlled trials. *Saudi Medical Journal* 25 (12): 1808–14.
- Allen GS, Ahn HS, Preziosi TJ, Battye R, Boone SC, Chou SN, Kelly DL, Weir BK, Crabbe RA, Lavik PJ, Rosenbloom SB, Dorsey FC, Ingram CR, Mellits DE, Bertsch LA, Boisvert DPJ, Hundley MB, Johnson RK, Strom JA, Transou CR (1983) Cerebral arterial spasm – a controlled trial of nimodipine in patients with subarachnoid hemorrhage. *New England Journal of Medicine* 308 (11): 619–24.
- Amarenco P, Bogousslavsky J, Callahan J 3rd, Goldstein L, Hennerici M, Rudolph A, Silleisen H, Simunovic L, Szarek M, Welch K, Zivin J (2006) Stroke Prevention by Aggressive Reduction in Cholesterol Levels (SPARCL). *New England Journal of Medicine* 355 (6): 549–59.
- 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. *BMJ* 324 (7329): 71–86.
- Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, Sacks FM, Bray GA, Vogt TM, Cutler JA, Windhauser MM, Lin PH, Karanja N, Simons-Morton D, McCullough M, Swain J, Steele P, Evans MA, Miller ER, Harsha DW (1997) A clinical trial of the effects of dietary patterns on blood pressure. *New England Journal of Medicine* 336 (16): 1117–24.
- Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, Stevens VJ, Vollmer WM, Lin PH, Svetkey LP, Stedman SW, Young DR, writing group of the PREMIER Collaborative Research Group (2003) Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *JAMA: The Journal of the American Medical Association* 298 (16): 2083–93.
- Asplund K, Jonsson F, Eriksson M, Stegmayr B, Appelros P, Norrving B, Terent A, Asberg KH (2009) Patient dissatisfaction with acute stroke care. *Stroke* 40 (12): 3851–6.
- Ay H, Arsava EM, Johnston SC, Vangel M, Schwamm LH, Furie KL, Koroshetz WJ, Sorensen AG (2009) Clinical- and imaging-based prediction of stroke risk after transient ischemic attack: the CIP model. *Stroke* 40 (1): 181–6.
- Barclay GRE, Stevenson TJ, Poluha W, Thalman L (2011) Mental practice for treating upper extremity deficits in individuals with hemiparesis after stroke. *Cochrane Database of Systematic Reviews* (5): CD005950.
- Barker FG, Ogilvy CS (1996) Efficacy of prophylactic nimodipine for delayed ischemic deficit after subarachnoid hemorrhage: a metaanalysis. *Journal of Neurosurgery* 84 (3): 405–14.
- Barras S, Grimmer-Somers K, May E (2010) Consensus on 'core/essential' and 'ideal world' criteria of a pre-discharge occupational therapy home assessment. *Journal of Evaluation in Clinical Practice* 16 (6): 1295–300.
- Bazzano LA, Reynolds K, Holder KN, He J (2006) Effect of folic acid supplementation on risk of cardiovascular diseases – a meta-analysis of randomized controlled trials. *JAMA: The Journal of the American Medical Association* 296 (22): 2720–26.
- Beavan J, Conroy SP, Harwood R, Gladman JR, Leonardi BJ, Sach T, Bowling T, Sunman W, Gaynor C (2010) Does looped nasogastric tube feeding improve nutritional delivery for patients with dysphagia after acute stroke? A randomised controlled trial. *Age and Ageing* 39 (5): 624–30.
- Bennett MH, Wasiak J, Schnabel A, Kranke P, French C (2009) Hyperbaric oxygen therapy for acute ischaemic stroke. *Cochrane Database of Systematic Reviews* (3): CD004954.
- Bernard V, Gabor V, Paulus K, John U, Michel B (2008) Adherence to prescribed antihypertensive drug treatments: longitudinal study of electronically compiled dosing histories. *BMJ* 336 (7653): 1114.
- Bernhardt J, Dewey H, Thrift A, Collier J, Donnan G (2008) A Very Early Rehabilitation Trial for Stroke (AVERT). *Stroke* 39 (2): 390–96.
- Bernhardt J, Thuy MN, Collier JM, Legg LA (2009) Very early versus delayed mobilisation after stroke. *Cochrane Database of Systematic Reviews* (1): CD006187.
- Bin Q, Hu X, Cao Y, Gao F (2011) The role of vitamin E (tocopherol) supplementation in the prevention of stroke: a meta-analysis of 13 randomised controlled trials. *Thrombosis and Haemostasis* 105 (4): 579–85.
- Blood Pressure Lowering Treatment Trialists' Collaboration (2000) Effects of ACE inhibitors, calcium antagonists, and other blood-pressure-lowering drugs: results of prospectively designed overviews of randomised trials. *Lancet* 356 (9246): 1955–64.
- Bolland MJ, Avenell A, Baron JA, Grey A, MacLennan GS, Gamble GD, Reid IR (2010) Effect of calcium supplements on risk of myocardial infarction and cardiovascular events: meta-analysis. *BMJ* 341: c3691.
- Bolland MJ, Grey A, Avenell A, Gamble GD, Reid IR (2011) Calcium supplements with or without vitamin D and risk of cardiovascular events: reanalysis of the Women's Health Initiative limited access dataset and meta-analysis. *BMJ* 342: d2040.
- Boonsinsukh R, Panichareon L, Phansuwan PP (2009) Light touch cue through a cane improves pelvic stability during

- walking in stroke. *Archives of Physical Medicine and Rehabilitation* 90 (6): 919–26.
- Bor AS, Rinkel GJE, Adami J, Koffijberg H, Ekbon A, Buskens E, Blomqvist P, Granath F (2008) Risk of subarachnoid haemorrhage according to number of affected relatives: a population based case–control study. *Brain* 131 (10): 2662–5.
- Bowen A, Lincoln N (2007) Cognitive rehabilitation for spatial neglect following stroke. *Cochrane Database of Systematic Reviews* (2): CD003586.
- Bowen A, Knapp P, Gillespie LD, Nicolson DJ, Vail A (2011) Non-pharmacological interventions for perceptual disorders following stroke and other adult-acquired, non-progressive brain injury. *Cochrane Database of Systematic Reviews* (2): CD007039.
- Bowen A, Hesketh A, Patchick E, Young A, Davies L, Vail A, Long AF, Watkins C, Wilkinson M, Pearl G, Lambon Ralph MA, Tyrrell P (2012a) Effectiveness of enhanced communication therapy in the first four months after stroke for aphasia and dysarthria: a randomised controlled trial. *BMJ* 345: e4407.
- Bowen A, Hesketh A, Patchick E, Young A, Davies L, Vail A, Long A, Watkins C, Wilkinson M, Pearl G, Lambon Ralph M, Tyrrell P, on behalf of the ACT NoW investigators (2012b) Clinical effectiveness, cost effectiveness and service users' perceptions of early, intensively resourced communication therapy following a stroke, a randomised controlled trial (The ACT NoW Study). *Health Technology Assessment* 26 (16): www.hta.ac.uk/1390
- Brady M, Kelly H, Godwin J, Enderby P (2012) Speech and language therapy for aphasia following stroke. *Cochrane Database of Systematic Reviews* (5): CD000425.
- Brady M, Furlanetto D, Hunter R, Lewis SC, Milne V (2006) Staff-led interventions for improving oral hygiene in patients following stroke. *Cochrane Database of Systematic Reviews* (7): CD003864.
- Brazzelli M, Saunders DH, Greig CA, Mead GE (2011) Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews* (11): CD003316.
- Brendel B, Ziegler W (2008) Effectiveness of metrical pacing in the treatment of apraxia of speech. *Aphasiology* 22 (1): 77–102.
- British Cardiac Society, British Hypertension Society, Diabetes UK, HEART UK, Primary Care Cardiovascular Society, Stroke Association (2005) JBS 2: joint British societies' guidelines on prevention of cardiovascular disease in clinical practice. *Heart* 91 (suppl 5): v1–52.
- British Medical Association (2007) *Withholding and withdrawing life-prolonging medical treatment: guidance for decision making*, 3rd edn. London: BMA.
- Brunner E, Rees K, Ward K, Burke M, Thorogood M (2009) Dietary advice for reducing cardiovascular risk. *Cochrane Database of Systematic Reviews* (4): CD002128.
- Cahill K, Stead LF, Lancaster T (2008) Nicotine receptor partial agonists for smoking cessation. *Cochrane Database of Systematic Reviews* (3): CD006103.
- Campbell Burton A, Holmes J, Gillespie D, Lightbody E, Watkins C, Knapp P (2011) Interventions for treating anxiety after stroke. *Cochrane Database of Systematic Reviews* (12): CD008860.
- Campbell Burton A, Murray BJ, Holmes J, Greenwood D, Astin F, Knapp P (2012) Frequency of anxiety after stroke: a systematic review and meta-analysis of observational studies. *International Journal of Stroke* In press.
- Canhao P, Cortesao A, Cabral M, Ferro JM, Stam J, Bousser MG, Barinagarrementeria F (2008) Are steroids useful to treat cerebral venous thrombosis? *Stroke* 39 (1): 105–10.
- Carey L, Macdonell R, Matyas TA (2011) SENSE: Study of the Effectiveness of Neurorehabilitation on Sensation – a randomized controlled trial. *Neurorehabilitation and Neural Repair* 25 (4): 304–13.
- Carey LM, Matyas TA (2005) Training of somatosensory discrimination after stroke: facilitation of stimulus generalization. *American Journal of Physical Medicine & Rehabilitation* 84 (6): 428–42.
- Carnaby G, Hankey G, Pizzi J (2006) Behavioural intervention for dysphagia in acute stroke: a randomised control trial. *Lancet Neurology* 5: 31–7.
- Cattelan R, Zettin M, Zocolotti P (2010) Rehabilitation treatments for adults with behavioral and psychosocial disorders following acquired brain injury: a systematic review. *Neuropsychological Reviews* 20 (1): 52–85.
- Cauraugh JH, Lodha N, Naik SK, Summers JJ (2010) Bilateral movement training and stroke motor recovery progress: a structured review and meta-analysis. *Human Movement Science* 29 (5): 853–70.
- Chakhtoura Z, Canonico M, Gompel A, Thalabard JC, Scarabin PY, Plu-Bureau G (2009) Progestogen-only contraceptives and the risk of stroke: a meta-analysis. *Stroke* 40 (4): 1059–62.
- Chambers BR, Donnan G (2005) Carotid endarterectomy for asymptomatic carotid stenosis. *Cochrane Database of Systematic Reviews* (4): CD001923.
- Cheitlin MD, Hutter AM, Brindis RG, Ganz P, Kaul S, Russell RO, Zusman RM, Forrester JS, Douglas PS, Faxon DP, Fisher JD, Gibbons RJ, Halperin JL, Hutter AM, Hochman JS, Kaul S, Weintraub WS, Winters WL, Wolk MJ (1999) Use of sildenafil (Viagra) in patients with cardiovascular disease. *Circulation* 99 (1): 168–77.
- Chimowitz MI, Lynn MJ, Derdeyn CP, Turan TN, Fiorella D, Lane BF, Janis LS, Lutsep HL, Barnwell SL, Waters MF, Hoh BL, Hourihane JM, Levy EI, Alexandrov AV, Harrigan MR, Chiu D, Klucznik RP, Clark JM, McDougall CG, Johnson MD, Pride GL, Torbey MT, Zaidat OO, Rumboldt Z, Cloft HJ (2011) Stenting versus aggressive medical therapy for intracranial arterial stenosis. *New England Journal of Medicine* 365: 993–1003.
- Cholesterol Treatment Trialists' Collaboration (2010) Efficacy and safety of more intensive lowering of LDL cholesterol: a meta-analysis of data from 170,000 participants in 26 randomised trials. *Lancet* 376 (9753): 1670–81.
- Chollet F, Tardy J, Albuchoer J, Thalamus C, Berard E, Lamy C, Bejot Y, Deltour S, Jaillard A, Niclot P, Guillon B, Moulin T, Marque P, Pariente J, Arnaud C, Loubinoux I (2011) Fluoxetine for motor recovery after acute ischaemic stroke (FLAME): a randomised placebo-controlled trial. *Lancet* 10 (2): 123–30.
- Cicerone K, Azulay J, Trott C (2009) Methodological quality of research on cognitive rehabilitation after traumatic brain injury. *Medical Rehabilitation* 90: S52–9.
- Cicerone KD, Mott T, Azulay J, Sharlow-Galella MA, Ellmo WJ, Paradise S, Friel JC (2008) A randomized controlled trial of holistic neuropsychologic rehabilitation after traumatic brain injury. *Archives of Physical Medicine and Rehabilitation* 89 (12): 2239–49.

- Cirstea MC, Levin MF (2007) Improvement of arm movement patterns and endpoint control depends on type of feedback during practice in stroke survivors. *Neurorehabilitation and Neural Repair* 21 (5): 398–411.
- Clark JP (2003) How to peer review a qualitative manuscript. In: Godlee F, Jefferson T (eds): *Peer review in health sciences*, 2nd edn. London: BMJ Books, 219–35.
- CLOTS Trials Collaboration (2010) Thigh-length versus below-knee stockings for deep venous thrombosis prophylaxis after stroke: a randomized trial. *Annals of Internal Medicine* 153 (9): 553–62.
- Coggrave M, Wiesel P, Norton CC (2006) Management of faecal incontinence and constipation in adults with central neurological diseases. *Cochrane Database of Systematic Reviews* (2): CD002115.
- Connell LA, Lincoln NB, Radford KA (2008) Somatosensory impairment after stroke: frequency of different deficits and their recovery. *Clinical Rehabilitation* 22 (8): 758–67.
- Connolly SJ, Eikelboom J, Parekh A, Pogue J, Reilly PA, Themeles E, Varrone J, Wang S, Alings M, Diener HC, Joyner CD, Alings AMW, Amerena JV, Avezum A, Baumgartner I, Brugada J, Budaj A, Caicedo V, Ceremuzynski L, Chen JH, Commerford PJ, Dans AL, Darius H, Di PG, Diaz R, Erol C, Ezekowitz MD, Ferreira J, Flaker GC, Flather MD, Franzosi MG, Gamboa R, Golitsyn SP, Gonzalez Hermosillo JA, Halon D, Heidbuchel H, Hohnloser SH, Hori M, Huber K, Jansky P, Kamensky G, Keltai M, Kim S, Lau CP, Le Heuzey JYF, Lewis BS, Liu LS, Nanas J, Oldgren J, Pais PS, Parkhomenko AN, Pedersen KE, Piegas LS, Raev D, Razali O, Simmers TA, Smith PJ, Talajic M, Tan RS, Tanomsup S, Toivonen L, Vinereanu D, Wallentin L, Xavier D, Yusuf S, Zhu J (2009) Dabigatran versus warfarin in patients with atrial fibrillation. *New England Journal of Medicine* 361 (12): 1139–51.
- Connolly SJ, Eikelboom J, Joyner C, Diener HC, Hart R, Golitsyn S, Flaker G, Avezum A, Hohnloser SH, Diaz R, Talajic M, Zhu J, Pais P, Budaj A, Parkhomenko A, Jansky P, Commerford P, Tan RS, Sim KH, Lewis BS, Van Mieghem W, Lip GYH, Kim JH, Lanus-Zanetti F, Gonzalez-Hermosillo A, Dans AL, Munawar M, O'Donnell M, Lawrence J, Lewis G, Afzal R, Yusuf S (2011) Apixaban in patients with atrial fibrillation. *New England Journal of Medicine* 364 (9): 806–17.
- 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.
- Coupar F, Pollock A, van Wijck F, Morris J, Langhorne P (2010) Simultaneous bilateral training for improving arm function after stroke. *Cochrane Database of Systematic Reviews* (4): CD006432.
- Coutinho J, de Bruijn SF, deVeber G, Stam J (2011) Anticoagulation for cerebral venous sinus thrombosis. *Cochrane Database of Systematic Reviews* (8): CD002005.
- Crary MA, Carnaby-Mann GD, Miller L, Antonios N, Silliman S (2006) Dysphagia and nutritional status at the time of hospital admission for ischemic stroke. *Journal of Stroke and Cerebrovascular Diseases: The Official Journal of National Stroke Association* 15 (4):164–71.
- Cumming TB, Thrift AG, Collier JM, Churilov L, Dewey HM, Donnan GA, Bernhardt J (2011) Very early mobilization after stroke fast-tracks return to walking: further results from the phase II AVERT randomized controlled trial. *Stroke* 42 (1): 153–8.
- Cummings SR, Ettinger B, Delmas PD, Kenemans P, Stathopoulos V, Verweij P, Mol AM, Kloosterboer L, Mosca L, Christiansen C, Bilezikian J, Kerzberg EM, Johnson S, Zanchetta J, Grobbee DE, Seifert W, Eastell R (2008) The effects of tibolone in older postmenopausal women. *New England Journal of Medicine* 359 (7): 697–708.
- Das Nair R, Lincoln N (2007) Cognitive rehabilitation for memory deficits following stroke. *Cochrane Database of Systematic Reviews* (3): CD002293.
- Davis JP, Wong AA, Schluter PJ, Henderson RD, O'Sullivan JD, Read SJ (2004) Impact of pre-morbid undernutrition on outcome in stroke patients. *Stroke* 35 (8): 1930–34.
- de Jong-Hagelstein M, van de Sandt-Koenderman WME, Prins ND, Dippel DWJ, Koudstaal PJ, Visch-Brink EG (2011) Efficacy of early cognitive-linguistic treatment and communicative treatment in aphasia after stroke: a randomised controlled trial (RATS-2). *Journal of Neurology, Neurosurgery & Psychiatry* 82 (4): 399–404.
- De Man-van Ginkel J, Gooskens F, Schuurmans MJ, Lindeman E, Hafsteinsdottir TB, on behalf of the Rehabilitation Guideline Stroke Working Group (2010) A systematic review of therapeutic interventions for poststroke depression and the role of nurses. *Journal of Clinical Nursing* 19 (23–24): 3274–90.
- De Schryver EL, Algra A, van Gijn J (2006) Dipyridamole for preventing stroke and other vascular events in patients with vascular disease. *Cochrane Database of Systematic Reviews* (2): CD001820.
- De Wit DC, Buurke JH, Nijlant JM, Ijzerman MJ, Hermens HJ (2004) The effect of an ankle-foot orthosis on walking ability in chronic stroke patients: a randomized controlled trial. *Clinical Rehabilitation* 18 (5): 550–57.
- De Wit L, Putman K, Dejaeger E, Baert I, Berman P, Bogaerts K (2005) Use of time by stroke patients: a comparison of four European rehabilitation centers. *Stroke* 36 (9): 1977–83.
- De Wit L, Putman K, Lincoln N, Baert I, Berman P, Beyens H, Bogaerts K, Brinkmann N, Connell L, Dejaeger E, De Weerd W, Jenni W, Lesaffre E, Leys M, Louckx F, Schuback B, Schupp W, Smith B, Feys H (2006) Stroke rehabilitation in Europe: what do physiotherapists and occupational therapists actually do? *Stroke* 37 (6): 1483–9.
- De Wit L, Putman K, Schuback B, Komárek A, Angst F, Baert I, Berman P, Bogaerts K, Brinkmann N, Connell L, Dejaeger E, Feys H, Jenni W, Kaske C, Lesaffre E, Leys M, Lincoln N, Louckx F, Schupp W, Smith B, De Weerd W (2007) Motor and functional recovery after stroke. *Stroke* 38 (7): 2101–7.
- Dennis M, Sandercock PA, Reid J, Graham C, Murray G, Venables G, Rudd A, Bowler G (2009) Effectiveness of thigh-length graduated compression stockings to reduce the risk of deep vein thrombosis after stroke (CLOTS trial 1): a multicentre, randomised controlled trial. *Lancet* 373 (9679): 1958–65.
- Dennis MS, Lewis SC, Warlow C, FOOD TC (2005) Effect of timing and method of enteral tube feeding for dysphagic stroke patients (FOOD): a multicentre randomised controlled trial. *Lancet* 365 (9461): 764–72.
- Dentali F, Douketis JD, Lim W, Crowther M (2007) Combined aspirin-oral anticoagulant therapy compared with oral

- anticoagulant therapy alone among patients at risk for cardiovascular disease: a meta-analysis of randomized trials. *Archives of Internal Medicine* 167 (2): 117–24.
- Department of Health (2001) *National service framework for older people*. London: DH ([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4003066](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4003066)).
- Department of Health (2005) *National service framework for long term conditions*. London: DH ([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4105361](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4105361)).
- Department of Health (2007) *National stroke strategy*. London: DH ([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_081062](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_081062)).
- Department of Health (2008) *End of life care strategy*. London: DH ([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_086277](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_086277)).
- Department of Health (2011) *UK physical activity guidelines*. London: DH ([www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_127931](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_127931)).
- Department of Health (2012) *Quality and outcomes framework for 2012/2013: guidance for PCOs and practices*. London: DH ([www.nhsemployers.org/Aboutus/Publications/Documents/QOF\\_2012-13.pdf](http://www.nhsemployers.org/Aboutus/Publications/Documents/QOF_2012-13.pdf)).
- Devos H, Akinwuntan AE, Nieuwboer A, Truijien S, Tant M, De Weerd W (2011) Screening for fitness to drive after stroke: a systematic review and meta-analysis. *Neurology* 76 (8): 747–56.
- Diener HC, Bogousslavsky J, Brass LM, Cimminiello C, Csiba L, Kaste M, Leys D, Matias-Guiu J, Rupprecht H (2004) Aspirin and clopidogrel compared with clopidogrel alone after recent ischaemic stroke or transient ischaemic attack in high-risk patients (MATCH): randomised, double-blind, placebo-controlled trial. *Lancet* 364 (9431): 331–7.
- Donabedian A (1978) The quality of healthcare. *Science* 200 (4344): 856–64.
- Doyle S, Bennett S, Fasoli SE, McKenna KT (2010) Interventions for sensory impairment in the upper limb after stroke. *Cochrane Database of Systematic Reviews* (6): CD006331.
- Duncan P, Studenski S, Richards L, Gollub S, Lai SM, Reker D, Perera S, Yates J, Koch V, Rigler S, Johnson D (2003) Randomized clinical trial of therapeutic exercise in subacute stroke. *Stroke* 34 (9): 2173–80.
- Duncan PW, Sullivan KJ, Behrman AL, Azen SP, Wu SS, Nadeau SE, Dobkin BH, Rose DK, Tilson JK, Cen S, Hayden SK (2011) Body-weight-supported treadmill rehabilitation after stroke. *New England Journal of Medicine* 364 (21): 2026–36.
- EAFT (European Atrial Fibrillation Trial) Study Group (1993) Secondary prevention in non-rheumatic atrial fibrillation after transient ischaemic attack or minor stroke. *Lancet* 342 (8882): 1255–62.
- Early Supported Discharge Trialists (2005) Services for reducing duration of hospital care for acute stroke patients. *Cochrane Database of Systematic Reviews* (2): CD000443.
- Economopoulos KP, Sergentanis TN, Tsvigoulis G, Mariolis AD, Stefanadis C (2011) Carotid artery stenting versus carotid endarterectomy: a comprehensive meta-analysis of short-term and long-term outcomes. *Stroke* 42 (3): 687–92.
- Eidelman RS, Hollar D, Hebert PR, Lamas GA, Hennekens CH (2004) Randomized trials of vitamin E in the treatment and prevention of cardiovascular disease. *Archives of Internal Medicine* 164 (14): 1552–6.
- Elamin MB, Abu Elnour NO, Elamin KB, Fatourehchi MM, Alkatib AA, Almandoz JB, Liu H, Lane MA, Mullan RJ, Hazem A, Erwin PJ, Hensrud DD, Murad MH, Montori VM (2011) Vitamin D and cardiovascular outcomes: a systematic review and meta-analysis. *Journal of Clinical Endocrinology and Metabolism* 96 (7): 1931–42.
- Ellis G, Mant J, Langhorne P, Dennis M, Winner S (2010) Stroke liaison workers for stroke patients and carers: an individual patient data meta-analysis. *Cochrane Database of Systematic Reviews* (5): CD005066.
- English C, Hillier SL (2010) Circuit class therapy for improving mobility after stroke. *Cochrane Database of Systematic Reviews* (7): CD007513.
- Faculty of Sexual & Reproductive Healthcare (2009) *UK medical eligibility criteria for contraceptive use*. London: FSRH ([www.fsrh.org/pdfs/UKMEC2009.pdf](http://www.fsrh.org/pdfs/UKMEC2009.pdf)).
- Farquhar C, Marjoribanks J, Lethaby A, Suckling JA, Lamberts Q (2009) Long term hormone therapy for perimenopausal and postmenopausal women. *Cochrane Database of Systematic Reviews* (2): CD004143.
- Ferrarello F, Baccini M, Rinaldi LA, Cavallini MC, Mossello E, Masotti G, Marchionni N, Di Bari M (2011) Efficacy of physiotherapy interventions late after stroke: a meta-analysis. *Journal of Neurology, Neurosurgery, and Psychiatry* 82 (2): 136–43.
- Ferreira HP, Lopes ALM, Luiz RR, Cardoso L, Andre C (2011) Is visual scanning better than mental practice in hemispatial neglect? Results from a pilot study. *Topics in Stroke Rehabilitation* 18 (2): 155–61.
- Fil A, Armutlu K, Atay AO, Kerimoglu U, Elilob B (2011) The effect of electrical stimulation in combination with Bobath techniques in the prevention of shoulder subluxation in acute stroke patients. *Clinical Rehabilitation* 25 (1): 51–9.
- Fish J, Manly T, Emslie H, Evans JJ, Wilson BA (2008) Compensatory strategies for acquired disorders of memory and planning: differential effects of a paging system for patients with brain injury of traumatic versus cerebrovascular aetiology. *Journal of Neurology, Neurosurgery, and Psychiatry* 79 (8): 930–35.
- Foley N, Teasell R, Salter K, Kruger E, Martino R (2008) Dysphagia treatment post stroke: a systematic review of randomised controlled trials. *Age and Ageing* 37 (3): 258–64.
- Fong KN, Chan MK, Ng PP, Tsang MH, Chow KK, Lau CW, Chan FS, Wong IP, Chan DY, Chan CC (2007) The effect of voluntary trunk rotation and half-field eye-patching for patients with unilateral neglect in stroke: a randomized controlled trial. *Clinical Rehabilitation* 21 (8): 729–41.
- FOOD Trial Collaboration (2003) Poor nutritional status on admission predicts poor outcomes after stroke: observational data from the food or ordinary diet (FOOD) trial. *Stroke* 34 (6): 1450–56.
- Forster A, Young J, Green J, Patterson C, Wanklyn P, Smith J, Murray J, Wild H, Bogle S, Lowson K (2009) Structured re-assessment system at 6 months after a disabling stroke: a randomised controlled trial with resource use and cost study. *Age and Ageing* 38 (5): 576–83.
- French B, Thomas LH, Leathley MJ, Sutton CJ, McAdam J, Forster A, Langhorne P, Price CI, Walker A, Watkins CL (2007) Repetitive task training for improving functional ability after stroke. *Cochrane Database of Systematic Reviews* (4): CD006073.

- Fung TT, Chiuvè SE, McCullough ML, Rexrode KM, Logroscino G (2008) Adherence to a DASH-style diet and risk of coronary heart disease and stroke in women. *Archives of Internal Medicine* 168 (7): 713–20.
- Furlan AJ, Reisman M, Massaro J, Mauri L, Adams H, Albers GW, Felberg R, Herrmann H, Kar S, Landzberg M, Raizner A, Wechsler L, CLOSURE I investigators (2012) Closure or medical therapy for cryptogenic stroke with patent foramen ovale. *New England Journal of Medicine* 366 (11): 991–9.
- Galan P, Kesse-Guyot E, Czernichow S, Briançon S, Blacher J, Hercberg S (2010) Effects of B vitamins and omega 3 fatty acids on cardiovascular diseases: a randomised placebo controlled trial. *BMJ* 341: c6273.
- Geeganage C, Bath PMW (2008) Interventions for deliberately altering blood pressure in acute stroke. *Cochrane Database of Systematic Reviews* (4): CD000039.
- Geeganage C, Bath PM (2010) Vasoactive drugs for acute stroke. *Cochrane Database of Systematic Reviews* (7): CD002839.
- Geraghty OC, Kennedy J, Chandratheva A, Marquardt L, Buchan AM, Rothwell PM (2010) Preliminary evidence of a high risk of bleeding on aspirin plus clopidogrel in aspirin-naïve patients in the acute phase after TIA or minor ischaemic stroke. *Cerebrovascular Diseases* 29 (5): 460–67.
- Giannuzzi P, Temporelli PL, Marchioli R, Maggioni AP, Balestroni G, Ceci V, Chieffo C, Gattone M, Griffo R, Schweiger C, Tavazzi L, Urbinati S, Valagussa F, Vanuzzo D (2008) Global secondary prevention strategies to limit event recurrence after myocardial infarction: results of the GOSPEL study, a multicenter, randomized controlled trial from the Italian Cardiac Rehabilitation Network. *Archives of Internal Medicine* 168 (20): 2194–204.
- Giles MF, Rothwell PM (2007) Risk of stroke early after transient ischaemic attack: a systematic review and meta-analysis. *Lancet Neurology* 6 (12): 1063–72.
- Gillham S, Clark L (2011) *Psychological care after stroke: improving stroke services for people with cognitive and mood disorders*. Leicester: NHS Improvement – Stroke.
- Godecke E, Hird K, Lalor EE, Rai T, Phillips MR (2011) Very early post stroke aphasia therapy: a pilot randomised controlled efficacy trial. *International Journal of Stroke* DOI: 10.1111/j.1747-4949.2011.00631.x: 1–10.
- Goldstein LB (1998) Potential effects of common drugs on stroke recovery. *Archives of Neurology* 55 (4): 454–6.
- Goldstein LB, Amarenco P, Szarek M, Callahan A, Hennerici M, Sillensen H, Zivin JA, Welch KMA, on behalf of the SPARCL Investigators (2008) Hemorrhagic stroke in the Stroke Prevention by Aggressive Reduction in Cholesterol Levels study. *Neurology* 70 (24 Part 2): 2364–70.
- Goljar N, Burger H, Rudolf M, Stanonik I (2010) Improving balance in subacute stroke patients: a randomized controlled study. *International Journal of Rehabilitation Research* 33 (3): 205–10.
- Gräsel E, Schmidt, Biehler, Schupp (2006) Long-term effects of the intensification of the transition between inpatient neurological rehabilitation and home care of stroke patients. *Clinical Rehabilitation* 20 (7): 577–83.
- Greener J, Enderby P, Whurr R (2001) Pharmacological treatment for aphasia following stroke. *Cochrane Database of Systematic Reviews* (4): CD000424.
- Ha L, Hauge T, Spenning AB, Iversen PO (2010) Individual, nutritional support prevents undernutrition, increases muscle strength and improves QoL among elderly at nutritional risk hospitalized for acute stroke: a randomized, controlled trial. *Clinical Nutrition* 29 (5): 567–73.
- Hacke W, Kaste M, Bluhmki E, Brozman M, Valos A, Guidetti D, Larrue V, Lees KR, Medeghri Z, Machnig T, Schneider D, von KR, Wahlgren N, Toni D, ECASS I (2008) Thrombolysis with alteplase 3 to 4.5 hours after acute ischemic stroke. *New England Journal of Medicine* 359 (13): 1317–29.
- Hackett ML, Yapa C, Parag V, Anderson CS (2005) Frequency of depression after stroke. *Stroke* 36 (6): 1330–40.
- Hackett ML, Anderson CS, House AO, Halteh C (2008a) Interventions for preventing depression after stroke. *Cochrane Database of Systematic Reviews* (3): CD003689.
- Hackett ML, Anderson CS, House AO, Xia J (2008b) Interventions for treating depression after stroke. *Cochrane Database of Systematic Reviews* (4): CD003437.
- Hackett ML, Yang M, Anderson CS, Horrocks JA, House A (2010) Pharmaceutical interventions for emotionalism after stroke. *Cochrane Database of Systematic Reviews* (2): CD003690.
- Halkes PHA, Gray LJ, Bath PMW, Diener HC, Guiraud-Chaumeil B, Yatsu FM, Algra A (2008) Dipyridamole plus aspirin versus aspirin alone in secondary prevention after TIA or stroke: a meta-analysis by risk. *Journal of Neurology, Neurosurgery, and Psychiatry* 79 (11): 1218–23.
- Halliday A, Harrison M, Hayter E, Kong X, Mansfield A, Marro J, Pan H, Peto R, Potter J, Rahimi K, Rau A, Robertson S, Streifler J, Thomas D, Asymptomatic Carotid Surgery Trial (ACST) Collaborative Group (2010) 10-year stroke prevention after successful carotid endarterectomy for asymptomatic stenosis (ACST-1): a multicentre randomised trial. *Lancet* 376 (9746): 1074–84.
- Hamdy S, Aziz Q, Rothwell JC, Power M, Singh KD, Nicholson DA, Tallis RC, Thompson DG (1998) Recovery of swallowing after dysphagic stroke relates to functional reorganization in the intact motor cortex. *Gastroenterology* 115 (5): 1104–12.
- Hankey G, Warlow C (1994) *Transient ischaemic attacks of the brain and eye*. London: WB Saunders.
- Harbison J, Hossain O, Jenkinson D, Davis J, Louw SJ, Ford GA (2003) Diagnostic accuracy of stroke referrals from primary care, emergency room physicians, and ambulance staff using the face arm speech test. *Stroke* 34 (1): 71–6.
- Hart RG, Tonarelli SB, Pearce LA (2005) Avoiding central nervous system bleeding during antithrombotic therapy. *Stroke* 36 (7): 1588–93.
- He F, MacGregor G (2004) Effect of longer-term modest salt reduction on blood pressure. *Cochrane Database of Systematic Reviews* (3): CD004937.
- He F, Nowson C, MacGregor G (2006) Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. *Lancet* 28 (367): 320–26.
- Heart Protection Study Collaborative Group (2002) MRC/BHF Heart Protection Study of cholesterol lowering with simvastatin in 20 536 high-risk individuals: a randomised placebo-controlled trial. *Lancet* 360 (9326): 7–22.
- Heckert KD, Komaroff E, Adler U, Barrett AM (2009) Postacute reevaluation may prevent dysphagia-associated morbidity. *Stroke* 40 (4): 1381–5.
- Henriksson M, Lundgren F, Carlsson P (2008) Cost-effectiveness of endarterectomy in patients with

- asymptomatic carotid artery stenosis. *British Journal of Surgery* 95 (6): 714–20.
- Hildebrandt H, Bussmann-Mork B, Schwendemann G (2006) Group therapy for memory impaired patients: a partial remediation is possible. *Journal of Neurology* 253 (4): 512–19.
- Hildebrandt H, Gehrman A, Modden C, Eling P (2011) Enhancing memory performance after organic brain disease relies on retrieval processes rather than encoding or consolidation. *Journal of Clinical and Experimental Neuropsychology* 33 (2): 257–70.
- Holliday RC, Ballinger C, Playford ED (2007a) Goal setting in neurological rehabilitation: patients' perspectives. *Disability and Rehabilitation* 29 (5): 389–94.
- Holliday RC, Cano S, Freeman JA, Playford ED (2007b) Should patients participate in clinical decision making? An optimised balance block design controlled study of goal setting in a rehabilitation unit. *Journal of Neurology, Neurosurgery, and Psychiatry* 78 (6): 576–80.
- Holmes DR, Reddy VY, Turi ZG, Dochi SK, Sievert H, Buchbinder M, Mullin CM, Sick P, PROTECT AF Investigators (2009) Percutaneous closure of the left atrial appendage versus warfarin therapy for prevention of stroke in patients with atrial fibrillation: a randomised non-inferiority trial. *Lancet* 374 (9689): 534–42.
- Hooper L, Summerbell CD, Thompson R, Sills D, Roberts FG, Moore H, Smith GD (2011) Reduced or modified dietary fat for preventing cardiovascular disease. *Cochrane Database of Systematic Reviews* (7): CD002137.
- Hopwood V, Lewith G, Prescott P, Campbell MJ (2008) Evaluating the efficacy of acupuncture in defined aspects of stroke recovery: a randomised, placebo controlled single blind study. *Journal of Neurology* 255 (6): 858–66.
- House A, Knapp P, Bamford J, Vail A (2001) Mortality at 12 and 24 months after stroke may be associated with depressive symptoms at 1 month. *Stroke* 32 (3): 696–701.
- Hsia J, Heiss G, Ren H, Allison M, Dolan NC, Greenland P, Heckbert SR, Johnson KC, Manson JE, Sidney S, Trevisan M (2007) Calcium/vitamin D supplementation and cardiovascular events. *Circulation* 115 (7): 846–54.
- Hu XL, Tong KY, Song R, Zheng XJ, Leung WW (2009) A comparison between electromyography-driven robot and passive motion device on wrist rehabilitation for chronic stroke. *Neurorehabilitation and Neural Repair* 23 (8): 837–46.
- Hurn J, Kneebone I, Cropley M (2006) Goal setting as an outcome measure: a systematic review. *Clinical Rehabilitation* 20 (9): 756–72.
- International Carotid Stenting Study investigators, Ederle J, Dobson J, Featherstone RL, Bonati LH, van der Worp HB, de Borst GJ, Lo TH, Gaines P, Dorman PJ, Macdonald S, Lyrer PA, Hendriks JM, McCollum C, Nederkoorn PJ, Brown MM (2010) Carotid artery stenting compared with endarterectomy in patients with symptomatic carotid stenosis (International Carotid Stenting Study): an interim analysis of a randomised controlled trial. *Lancet* 375 (9719): 985–97.
- 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 (9065): 1569–81.
- Ireland S (2009) Providing information improves subjective outcomes but may not improve clinical outcomes in patients with stroke or their carers. *Evidence-based nursing* 21 (1): 24.
- IST3 Collaborative Group (2012) The benefits and harms of intravenous thrombolysis with recombinant tissue plasminogen activator within 6 h of acute ischaemic stroke (the third international stroke trial [IST-3]): a randomised controlled trial. *Lancet* 379 (9834): 2352–63.
- Jehkonen M, Laihosalo M, Kettunen JE (2006) Impact of neglect on functional outcome after stroke – a review of methodological issues and recent research findings. *Restorative Neurology and Neuroscience* 24 (4–6): 209–15.
- Johnson P, Rosewell M, James MA (2007) How good is the management of vascular risk after stroke, transient ischaemic attack or carotid endarterectomy? *Cerebrovascular Diseases* 23 (2–3): 156–61.
- Johnston S, Rothwell PM, Nguyen-Huynh MN, Giles MF, Elkins JS, Bernstein AL, Sidney S (2007) Validation and refinement of scores to predict very early stroke risk after transient ischaemic attack. *Lancet* 369 (9558): 283–92.
- Jones F, Riazi A (2010) Self-efficacy and self-management after stroke: a systematic review. *Disability and Rehabilitation* 33 (10): 797–810.
- Jones SP, Jenkinson AJ, Leathley MJ, Watkins CL (2010) Stroke knowledge and awareness: an integrative review of the evidence. *Age and Ageing* 39 (1): 11–22.
- Jorgensen JR, Bech-Pedersen DT, Zeeman P, Sorensen J, Andersen LL, Schönberger M (2010) Effect of intensive outpatient physical training on gait performance and cardiovascular health in people with hemiparesis after stroke. *Physical Therapy* 90 (4): 527–37.
- Jürgens G, Graudal NA (2004) Effects of low sodium diet versus high sodium diet on blood pressure, renin, aldosterone, catecholamines, cholesterols, and triglyceride. *Cochrane Database of Systematic Reviews* (1): CD004022.
- Kagan A, Black SE, Duchan JF, 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 (3): 624–38.
- Kalita J, Vajpayee A, Misra UK (2006) Comparison of prednisolone with piroxicam in complex regional pain syndrome following stroke: a randomized controlled trial. *Quarterly Journal of Medicine* 99 (2): 89–95.
- Kelly J, Rudd A, Lewis RR, Coshall C, Moody A, Hunt BJ (2004) Venous thromboembolism after acute ischemic stroke. *Stroke* 35 (10): 2320–5.
- Kendall E, Catalano T, Kuipers P, Posner N, Buys N, Charker J (2007) Recovery following stroke: the role of self-management education. *Social Science & Medicine* 64 (3): 735–46.
- King JM, Gallegos-Santillan P (1999) Strategy use by speakers with dysarthria and both familiar and unfamiliar conversational partners. *Journal of Medical Speech-Language Pathology* 7 (2): 113–16.
- Kong JC, Lee MS, Shin BC, Song YS, Ernst E (2010) Acupuncture for functional recovery after stroke: a systematic review of sham-controlled randomized clinical trials. *CMAJ: Canadian Medical Association Journal* 182 (16): 1723–9.
- Korpelainen JT, Nieminen P, Myllylä VV (1999) Sexual functioning among stroke patients and their spouses. *Stroke* 30 (4): 715–19.
- Koton S, Rothwell PM (2007) Performance of the ABCD and ABCD2 scores in TIA patients with carotid stenosis and atrial fibrillation. *Cerebrovascular Diseases* 24 (2–3): 231–5.

- Koyuncu E, Nakipoglu YG, Dogan A, Ozgirgin N (2010) The effectiveness of functional electrical stimulation for the treatment of shoulder subluxation and shoulder pain in hemiplegic patients: a randomized controlled trial. *Disability and Rehabilitation* 32 (7): 560–66.
- 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 (5): 432–48.
- Kwakkel G, Wagenaar R, Koelman T (1997) Effects of intensity of rehabilitation after stroke: a research synthesis. *Stroke* 28 (8): 1550–56.
- Kwakkel G, Van PR, Wagenaar RC, Dauphinee SW, Richards C, Ashburn A, Miller K, Lincoln N, Partridge C, Wellwood I, Langhorne P (2004) Effects of augmented exercise therapy time after stroke: a meta-analysis. *Stroke* 35 (11): 2529–36.
- Kwakkel G, Kollen BJ, Krebs HI (2008) Effects of robot-assisted therapy on upper limb recovery after stroke: a systematic review. *Neurorehabilitation and Neural Repair* 22 (2): 111–21.
- LaCroix AZ, Kotchen J, Anderson G, Brzyski R, Cauley JA, Cummings SR, Gass M, Johnson KC, Ko M, Larson J, Manson JE, Stefanick ML, Wactawski-Wende J (2009) Calcium plus vitamin D supplementation and mortality in postmenopausal women: the Women's Health Initiative calcium-vitamin D randomized controlled trial. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences* 64 (5): 559–67.
- Lakhan SE, Sapko MT (2009) Blood pressure lowering treatment for preventing stroke recurrence: a systematic review and meta-analysis. *International Archives of Medicine* 2 (1): 30.
- Lakse E, Gunduz B, Erhan B, Celik EC (2009) The effect of local injections in hemiplegic shoulder pain: a prospective, randomized, controlled study. *American Journal of Physical Medicine & Rehabilitation* 88 (10): 805–11.
- Lancaster T, Stead L (2005) Individual behavioural counselling for smoking cessation. *Cochrane Database of Systematic Reviews* (2): CD001292.
- Langhorne P, Wagenaar R, Partridge C (1996) Physiotherapy after stroke: more is better. *Physiotherapy Research International* 1 (2): 75–88.
- Langhorne P, Dennis M, Stroke Unit Trialists' Collaboration (1998) *Stroke units: an evidence based approach*. London: BMJ Books.
- Langhorne P, Coupar F, Pollock A (2009) Motor recovery after stroke: a systematic review. *Lancet Neurology* 8 (8): 741–54.
- Lannin NA, Novak I, Cusick A (2007a) A systematic review of upper extremity casting for children and adults with central nervous system motor disorders. *Clinical Rehabilitation* 21 (11): 963–76.
- Lannin NA, Clemson L, McCluskey A, Lin CW, Cameron I, Barras S (2007b) Feasibility and results of a randomised pilot-study of pre-discharge occupational therapy home visits. *BMC Health Services Research* 7 (1): 42.
- Laufer Y (2002) Effects of one-point and four-point canes on balance and weight distribution in patients with hemiparesis. *Clinical Rehabilitation* 16 (2): 141–8.
- Lavallee P, Meseguer E, Abboud H, Cabrejo L, Olivot JM, Simon O, Mazighi M, Nifle C, Niclot P, Lapergue B, Klein IF, Brochet E, Steg PG, che G, Labreuche J, Touboul PJ, Amarenco P (2007) A transient ischaemic attack clinic with round-the-clock access (SOS-TIA): feasibility and effects. *Lancet Neurology* 6 (11): 953–60.
- Laver KE, George S, Thomas S, Deutsch JE, Crotty M (2011) Virtual reality for stroke rehabilitation. *Cochrane Database of Systematic Reviews* (9): CD008349.
- Lecouturier J, Murtagh MJ, Thomson RG, Ford G, White M, Rodgers H (2010a) Response to symptoms of stroke in the UK: a systematic review. *BMC Health Services Research* 10: 157.
- Lecouturier J, Rodgers H, Murtagh MJ, White M, Ford G, Thomson RG (2010b) Systematic review of mass media interventions designed to improve public recognition of stroke symptoms, emergency response and early treatment. *BMC Public Health* 10: 784.
- Lees KR, Bluhmki E, von Kummer R, Brott TG, Toni D, Grotta JC, Albers GW, Kaste M, Marler JR, Hamilton SA, Tilley BC, Davis SM, Donnan GA, Hacke W, ECASS, ATLANTIS, NINDS and EPITHET rt-PA Study Group, Allen K, Mau J, Meier D, del ZG, De Silva DA, Butcher KS, Parsons MW, Barber PA, Levi C, Bladin C, Byrnes G (2010) Time to treatment with intravenous alteplase and outcome in stroke: an updated pooled analysis of ECASS, ATLANTIS, NINDS, and EPITHET trials. *Lancet* 375 (9727): 1695–703.
- Legg L (2004) Rehabilitation therapy services for stroke patients living at home: systematic review of randomised trials. *Lancet* 363 (9406): 352–6.
- Legg LA, Drummond AE, Langhorne P (2006) Occupational therapy for patients with problems in activities of daily living after stroke. *Cochrane Database of Systematic Reviews* (4): CD003585.
- Levack W, Taylor K, Siegert R, Dean S, McPherson K, Weatherall M (2006) Is goal planning in rehabilitation effective? A systematic review. *Clinical Rehabilitation* 20: 739–55.
- Lincoln N, Parry R, Vass CD (1999) Randomized, controlled trial to evaluate increased intensity of physiotherapy treatment of arm function after stroke. *Stroke* 30 (3): 573–9.
- Lincoln N, Majid M, Weyman N (2000) Cognitive rehabilitation for attention deficits following stroke. *Cochrane Database of Systematic Reviews* (4): CD002842.
- Little SH, Massel DR (2003) Antiplatelet and anticoagulation for patients with prosthetic heart valves. *Cochrane Database of Systematic Reviews* (4): CD003464.
- Lo AC, Guarino PD, Richards LG, Haselkorn JK, Wittenberg GF, Federman DG, Ringer RJ, Wagner TH, Krebs HI, Volpe BT, Bever CT Jr, Bravata DM, Duncan PW, Corn BH, Maffucci AD, Nadeau SE, Conroy SS, Powell JM, Huang GD, Peduzzi P (2010) Robot-assisted therapy for long-term upper-limb impairment after stroke. *New England Journal of Medicine* 362 (19): 1772–83.
- Logan P, Murphy A, Drummond A, Bailey S, Radford K, Gladman J, Walker M, Robertson K, Edmans J, Conroy S (2007) An investigation of the number and cost of assistive devices used by older people who had fallen and called a 999 ambulance. *British Journal of Occupational Therapy* 70 (11): 457–78.
- Logan PA, Gladman JR, Avery A, Walker MF, Dyas J, Groom L (2004) Randomised controlled trial of an occupational therapy intervention to increase outdoor mobility after stroke. *BMJ* 329 (7479): 1372–5.
- Lorberboym M, Mena I, Wainstein J, Boaz M, Lampl Y (2010) The effect of sildenafil citrate (Viagra) on cerebral blood flow in patients with cerebrovascular risk factors. *Acta Neurologica Scandinavica* 121 (6): 370–76.

- Lovett J, Dennis M, Sandercock P, Bamford J, Warlow C, Rothwell P (2003) Very early risk of stroke after a first transient ischemic attack. *Stroke* 34 (8): e138–40.
- Low J, Payne S, Roderick P (1999) The impact of stroke on informal carers: a literature review. *Social Science & Medicine* 49: 711–25.
- Lubetzky VA, Kartin D (2010) The effect of balance training on balance performance in individuals poststroke: a systematic review. *Journal of Neurologic Physical Therapy* 34 (3): 127–37.
- Luengo-Fernandez R, Gray AM, Rothwell PM (2009) Effect of urgent treatment for transient ischaemic attack and minor stroke on disability and hospital costs (EXPRESS study): a prospective population-based sequential comparison. *Lancet Neurology* 8 (3): 235–43.
- Luukkainen-Markkula R, Tarkka IM, Pitkanen K, Sivenius J, Hamalainen H (2009) Rehabilitation of hemispatial neglect: a randomized study using either arm activation or visual scanning training. *Restorative Neurology and Neuroscience* 27 (6): 665–74.
- Maasland L, Koudstaal PJ, Habbema DE, Dippel DWJ (2007) Knowledge and understanding of disease process, risk factors and treatment modalities in patients with a recent TIA or minor ischemic stroke. *Cerebrovascular Diseases* 23 (5–6): 453–40.
- Mackenzie C, Lowit A (2007) Behavioural intervention effects in dysarthria following stroke: communication effectiveness, intelligibility and dysarthria impact. *International Journal of Language & Communication Disorders* 42 (2): 131–53.
- Magliano DJ, Rogers SL, Abramson MJ, Tonkin AM (2006) Hormone therapy and cardiovascular disease: a systematic review and meta-analysis. *BJOG: An International Journal of Obstetrics and Gynaecology* 113 (1): 5–14.
- Malec JF, Smigielski JS, DePompolo RW (1991) Goal attainment scaling and outcome measurement in postacute brain injury rehabilitation. *Archives of Physical Medicine and Rehabilitation* 72 (2): 138–43.
- Man-Son-Hing M, Nichol G, Lau A, Laupacis A (1999) Choosing antithrombotic therapy for elderly patients with atrial fibrillation who are at risk for falls. *Archives of Internal Medicine* 159 (7): 677–85.
- Mann G, Hankey GJ, Cameron D (1999a) Swallowing function after stroke: prognosis and prognostic factors at 6 months. *Stroke* 30 (4): 744–8.
- Mann WC, Ottenbacher KJ, Fraas L (1999b) Effectiveness of assistive technology and environmental interventions in maintaining independence and reducing home care costs for the elderly. *Archives of Family Medicine* 8 (3): 210–17.
- Mant J, Wade D, Winner S (2004) Health care needs assessment. In: Stevens *et al*, editor. *Health care needs assessment: the epidemiologically based needs assessment reviews*, 2nd edn. Oxford: Radcliffe Publishing.
- Mant J, Hobbs RFD, Fletcher K, Roalfe A, Fitzmaurice D, Lip GYH, Murray E, on behalf of the BAFTA investigators the Midland Research Practices Network (MidReC) (2007) Warfarin versus aspirin for stroke prevention in an elderly community population with atrial fibrillation (the Birmingham Atrial Fibrillation Treatment of the Aged Study, BAFTA): a randomised controlled trial. *Lancet* 370 (9586): 493–503.
- Marigold DS, Eng JJ, Dawson AS, Inglis JT, Harris JE, Gylfadottir S (2005) Exercise leads to faster postural reflexes, improved balance and mobility, and fewer falls in older persons with chronic stroke. *American Geriatrics Society* 53 (3): 416–23.
- Marik PE, Varon J (2009) Omega-3 dietary supplements and the risk of cardiovascular events: a systematic review. *Clinical Cardiology* 32 (7): 365–72.
- Marti-Carvajal AJ, Sola I, Lathyris D, Salanti G (2009) Homocysteine lowering interventions for preventing cardiovascular events. *Cochrane Database of Systematic Reviews* (4): CD006612.
- Martineau J, Bauer JD, Isenring E, Cohen S (2005) Malnutrition determined by the patient-generated subjective global assessment is associated with poor outcomes in acute stroke patients. *Clinical Nutrition* 24 (6): 1073–7.
- Martino R, Foley N, Bhogal S, Diamant N, Speechley M, Teasell R (2005) Dysphagia after stroke. *Stroke* 36 (12): 2756–63.
- McCrorry P, Turner SL, Baguley IJ, De GS, Katrak P, Sandanam J, Davies L, Munns M, Hughes A (2009) Botulinum toxin A for treatment of upper limb spasticity following stroke: a multi-centre randomized placebo-controlled study of the effects on quality of life and other person-centred outcomes. *Journal of Rehabilitation Medicine* 41 (7): 536–44.
- McGeough E, Pollock A, Smith LN, Dennis M, Sharpe M, Lewis S, Mead GE (2009) Interventions for post-stroke fatigue. *Cochrane Database of Systematic Reviews* (3): CD007030.
- McKevitt C, Fudge N, Redfern J, Sheldenkar A, Crichton S, Wolfe C (2011) *UK stroke survivor needs survey 2011*. London: Stroke Association and Kings College London.
- Mead A, Atkinson G, Albin (2006) Dietetic guidelines on food and nutrition in the secondary prevention of cardiovascular disease – evidence from systematic reviews of randomized controlled trials. *Journal of Human Nutrition and Dietetics* 19 (6): 401–19.
- Mead G, Lynch J, Greig C, Young A, Lewis S, Sharpe M (2007) Evaluation of fatigue scales in stroke patients. *Stroke* 38 (7): 2090–5.
- Meek C, Pollock A, Potter J, Langhorne P (2003) A systematic review of exercise trials post stroke. *Clinical Rehabilitation* 17 (1): 6–13.
- Mehrholtz J, Platz T, Kugler J, Pohl M (2008) Electromechanical and robot-assisted arm training for improving arm function and activities of daily living after stroke. *Cochrane Database of Systematic Reviews* (4): CD006876.
- Melnik T, Soares B, Nasello AG (2007) Psychosocial interventions for erectile dysfunction. *Cochrane Database of Systematic Reviews* (3): CD004825.
- Meyer BC, Raman R, Hemmen T, Obler R, Zivin JA, Rao R, Thomas RG, Lyden PD (2008) Efficacy of site-independent telemedicine in the STRoKE DOC trial: a randomised, blinded, prospective study. *Lancet Neurology* 7 (9): 787–95.
- Michel JA, Mateer CA (2006) Attention rehabilitation following stroke and traumatic brain injury: a review. *Europa Medicophysica* 42 (1): 59–67.
- Middleton S, McElduff P, Ward J, Grimshaw JM, Dale S, D'Este C, Drury P, Griffiths R, Cheung NW, Quinn C, Evans M, Cadilhac D, Levi C, on behalf of the QASC Trialists Group (2011) Implementation of evidence-based treatment protocols to manage fever, hyperglycaemia, and swallowing dysfunction in acute stroke (QASC): a cluster randomised controlled trial. *Lancet* 378 (9804): 1699–706.

- Mitchell PH, Veith RC, Becker KJ, Buzaitis A, Cain KC, Fruin M, Tirschwell D, Teri L (2009) Brief psychosocial-behavioral intervention with antidepressant reduces poststroke depression significantly more than usual care with antidepressant. *Stroke* 40 (9): 3073–8.
- Mohan KM, Wolfe CDA, Rudd AG, Heuschmann PU, Kolominsky-Rabas PL, Grieve AP (2011) Risk and cumulative risk of stroke recurrence. *Stroke* 42 (5): 1489–94.
- Moher D, Cook DJ, Eastwood S *et al* for the QUOROM group (1999) Improving the quality of reporting of meta-analysis of randomized controlled trials: The QUOROM statement. *Lancet* 354: 1896–1900.
- Mohr JP, Thompson JLP, Lazar RM, Levin B, Sacco RL, Furie KL, Kistler JP, Albers GW, Pettigrew LC, Adams HP, Jackson CM, Pullicino P (2001) A comparison of warfarin and aspirin for the prevention of recurrent ischemic stroke. *New England Journal of Medicine* 345 (20): 1444–51.
- Molier BI, Van Asseldonk EH, Hermens HJ, Jannink MJ (2010) Nature, timing, frequency and type of augmented feedback: does it influence motor relearning of the hemiparetic arm after stroke? A systematic review. *Disability and Rehabilitation* 32 (22): 1799–809.
- Molyneux AJ, Kerr RSC, Yu L, Clarke M, Sneade M, Yarnold JA, Sandercock P, for the International Subarachnoid Aneurysm Trial (ISAT) Collaborative Group (2005) International subarachnoid aneurysm trial (ISAT) of neurosurgical clipping versus endovascular coiling in 2143 patients with ruptured intracranial aneurysms: a randomised comparison of effects on survival, dependency, seizures, rebleeding, subgroups, and aneurysm occlusion. *Lancet* 366 (9488): 809–17.
- Monga TN, Lawson JS, Inglis J (1986) Sexual dysfunction in stroke patients. *Archives of Physical Medicine and Rehabilitation* 67 (1): 19–22.
- Montane E, Vallano A, Laporte JR (2004) Oral antispastic drugs in nonprogressive neurologic diseases: a systematic review. *Neurology* 63 (8): 1357–63.
- Morris J, Oliver T, Kroll T, Macgillivray S (2012) The importance of psychological and social factors in influencing the uptake and maintenance of physical activity after stroke: a structured review of the empirical literature. *Stroke Research and Treatment* 2012: 195249.
- Morris PL, Robinson RG, Andrzejewski P, Samuels J, Price TR (1993) Association of depression with 10-year post-stroke mortality. *American Journal of Psychiatry* 150 (1): 124–9.
- Mouradian MS, Majumdar SR, Senthilselvan A, Khan K, Shuaib A (2002) How well are hypertension, hyperlipidemia, diabetes, and smoking managed after a stroke or transient ischemic attack? *Stroke* 33 (6): 1656–9.
- National Audit Office (2005) *Reducing brain damage: faster access to better stroke care*. London: NAO.
- National Audit Office (2010) *Progress in improving stroke care*. London: NAO ([www.nao.org.uk/publications/0910/stroke.aspx](http://www.nao.org.uk/publications/0910/stroke.aspx)).
- National Institute for Health and Clinical Excellence (2003) *Management of multiple sclerosis in primary and secondary care*. London: NICE ([www.nice.org.uk/nicemedia/live/10930/29199/29199.pdf](http://www.nice.org.uk/nicemedia/live/10930/29199/29199.pdf)).
- National Institute for Health and Clinical Excellence (2004) *Supportive and palliative care for people with cancer: part A and part B*. London: NICE ([www.nice.org.uk/guidance/index.jsp?action=byId&o=10892&history=t](http://www.nice.org.uk/guidance/index.jsp?action=byId&o=10892&history=t)).
- National Institute for Health and Clinical Excellence (2006a) *Nutrition support in adults: oral nutrition support, enteral tube feeding and parenteral nutrition*. London: NICE ([www.nice.org.uk/CG32](http://www.nice.org.uk/CG32)).
- National Institute for Health and Clinical Excellence (2006b) *Supporting people with dementia and their carers in health and social care*. London: NICE (<http://guidance.nice.org.uk/CG42/NICEGuidance/pdf/English>).
- National Institute for Health and Clinical Excellence (2006c) *The management of atrial fibrillation*. London: NICE ([www.nice.org.uk/CG36](http://www.nice.org.uk/CG36)).
- National Institute for Health and Clinical Excellence (2007a) *Alteplase for the treatment of acute ischaemic stroke*. London: NICE ([www.nice.org.uk/TA122](http://www.nice.org.uk/TA122)).
- National Institute for Health and Clinical Excellence (2007b) *Faecal incontinence: the management of faecal incontinence in adults*. London: NICE ([www.nice.org.uk/CG49](http://www.nice.org.uk/CG49)).
- National Institute for Health and Clinical Excellence (2007c) *Secondary prevention in primary and secondary care for patients following a myocardial infarction*. London: NICE ([www.nice.org.uk/CG48](http://www.nice.org.uk/CG48)).
- National Institute for Health and Clinical Excellence (2008a) *Cardiovascular risk assessment and the modification of blood lipids for the primary and secondary prevention of cardiovascular disease*. London: NICE ([www.nice.org.uk/CG67](http://www.nice.org.uk/CG67)).
- National Institute for Health and Clinical Excellence (2008b) *Diagnosis and initial management of acute stroke and transient ischaemic attack (TIA)*. London: NICE ([www.nice.org.uk/CG68](http://www.nice.org.uk/CG68)).
- National Institute for Health and Clinical Excellence (2009a) *Depression: the treatment and management of depression in adults (update)*. London: NICE ([www.nice.org.uk/CG90](http://www.nice.org.uk/CG90)).
- National Institute for Health and Clinical Excellence (2009b) *Functional electrical stimulation for drop foot of central neurological origin*. London: NICE ([www.nice.org.uk/nicemedia/live/11932/42902/42902.pdf](http://www.nice.org.uk/nicemedia/live/11932/42902/42902.pdf)).
- National Institute for Health and Clinical Excellence (2010a) *Clopidogrel and modified-release dipyridamole for the prevention of occlusive vascular events (review of technology appraisal guidance 90)*. London: NICE ([www.nice.org.uk/guidance/TA210](http://www.nice.org.uk/guidance/TA210)).
- National Institute for Health and Clinical Excellence (2010b) *Delirium: diagnosis, prevention and management*. London: NICE ([www.nice.org.uk/cg103](http://www.nice.org.uk/cg103)).
- National Institute for Health and Clinical Excellence (2010c) *Neuropathic pain: the pharmacological management of neuropathic pain in adults in non-specialist settings*. London: NICE ([www.nice.org.uk/CG96](http://www.nice.org.uk/CG96)).
- National Institute for Health and Clinical Excellence (2010d) *Stroke quality standard*. London: NICE ([www.nice.org.uk/guidance/qualitystandards/stroke/strokequalitystandard.jsp](http://www.nice.org.uk/guidance/qualitystandards/stroke/strokequalitystandard.jsp)).
- National Institute for Health and Clinical Excellence (2011) *Hypertension: clinical management of primary hypertension in adults*. London: NICE (<http://guidance.nice.org.uk/CG127>).
- National Institute for Health and Clinical Excellence (2012a) *Atrial fibrillation – dabigatran exetilate*. London: NICE (<http://guidance.nice.org.uk/TA/Wave21/10>).
- National Institute for Health and Clinical Excellence (2012b) *Rivaroxaban for the prevention of stroke and systemic embolism in people with atrial fibrillation*. London: NICE

- (<http://publications.nice.org.uk/rivaroxaban-for-the-prevention-of-stroke-and-systemic-embolism-in-people-with-atrial-fibrillation-ta256>).
- National Patient Safety Agency (2011) *Dysphagia diet food texture descriptors*. London: NPSA ([www.bda.uk.com/publications/statements/NationalDescriptorsTextureModificationAdults.pdf](http://www.bda.uk.com/publications/statements/NationalDescriptorsTextureModificationAdults.pdf)).
- Nys GMS, de Haan EHF, Kunneman A, de Kort PLM, Dijkerman HC (2008) Acute neglect rehabilitation using repetitive prism adaptation: a randomized placebo-controlled trial. *Restorative Neurology and Neuroscience* 26 (1): 1–12.
- Olesen JB, Lip GYH, Lindhardsen J, Lane DA, Ahlehoff O, Hansen ML, Raunso J, Tolstrup JS, Hansen PR, Gislason GH, Torp-Pedersen C (2011) Risks of thromboembolism and bleeding with thromboprophylaxis in patients with atrial fibrillation: a net clinical benefit analysis using a 'real world' nationwide cohort study. *Thrombosis and Haemostasis* 106 (4): 739–49.
- Ovbiagele B, Venkatakrishna R, McNair N, Razina T, Kidwell C (2004) In-hospital initiation of secondary stroke prevention therapies yields high rates of adherence at follow up. *Stroke* 35: 2879–83.
- Paediatric Stroke Working Group (2004) *Stroke in childhood: clinical guidelines for diagnosis, management and rehabilitation*. London: RCP.
- Page SJ, Levine P, Leonard A, Szaflarski JP, Kissela BM (2008) Modified constraint-induced therapy in chronic stroke: results of a single-blinded randomized controlled trial. *Physical Therapy* 88 (3): 333–40.
- Page SJ, Levine P, Khoury JC (2009) Modified constraint-induced therapy combined with mental practice thinking through better motor outcomes. *Stroke* 40 (2): 551–4.
- Palmer R, Enderby P (2007) Methods of speech therapy treatment for stable dysarthria: a review. *Advances in Speech Language Pathology* 9 (2): 140–53.
- Pang MY, Harris JE, Eng JJ (2006) A community-based upper-extremity group exercise program improves motor function and performance of functional activities in chronic stroke: a randomized controlled trial. *Archives of Physical Medicine and Rehabilitation* 87 (1): 1–9.
- Paolucci S, de Angelis D (2006) New developments on drug treatment rehabilitation. *Clinical and Experimental Hypertension* 28 (3–4): 345–8.
- Payne S, Burton C, AddingtonHall J, Jones A (2010) End-of-life issues in acute stroke care: a qualitative study of the experiences and preferences of patients and families. *Palliative Medicine* 24 (2): 146–53.
- Pickard JD, Murray GD, Illingworth M, Shaw MD, Teasdale PM, Humphrey PR, Lang DA, Nelson R, Richards P (1989) Effect of oral nimodipine on cerebral infarction and outcome after subarachnoid haemorrhage: British aneurysm nimodipine trial. *BMJ* 298 (6674): 636–42.
- Pinquart M, Duberstein PR (2007) Treatment of anxiety disorders in older adults: a meta-analytic comparison of behavioral and pharmacological interventions. *American Journal of Geriatric Psychiatry* 15 (8): 639–51.
- Pisters R, Lane DA, Nieuwlaar R, de Vos CB, Crijns HJGM, Lip GYH (2010) A novel user-friendly score (HAS-BLED) to assess 1-year risk of major bleeding in patients with atrial fibrillation. *Chest* 138 (5): 1093–100.
- Pohl M, Mehrholz J, Pohl M, Mehrholz J (2006) Immediate effects of an individually designed functional ankle-foot orthosis on stance and gait in hemiparetic patients. *Clinical Rehabilitation* 20 (4): 324–30.
- Polanowska K, Seniow J, Paprot E, Lesniak M, Czlonkowska A (2009) Left-hand somatosensory stimulation combined with visual scanning training in rehabilitation for post-stroke hemineglect: a randomised, double-blind study. *Neuropsychological Rehabilitation* 19 (3): 364–82.
- Pollock A, Hazelton C, Henderson CA, Angilley J, Dhillon B, Langhorne P, Livingstone K, Munro FA, Orr H, Rowe FJ, Shahani U (2011a) Interventions for disorders of eye movement in patients with stroke. *Cochrane Database of Systematic Reviews* (10): CD008389.
- Pollock A, Hazelton C, Henderson CA, Angilley J, Dhillon B, Langhorne P, Livingstone K, Munro FA, Orr H, Rowe FJ, Shahani U (2011b) Interventions for visual field defects in patients with stroke. *Cochrane Database of Systematic Reviews* (10): CD008388.
- Potter J, Mistri A, Brodie F, Chernova J, Wilson E, Jagger C, James M, Ford G, Robinson T (2009) Controlling hypertension and hypotension immediately post stroke (CHHIPS) – a randomised controlled trial. *Lancet Neurology* 8 (1): 48–56.
- 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 (9287): 1033–41.
- Putman K, De Wit L, Schupp W, Ilse B, Berman P, Connell L, Dejaeger E, de Meyer AM, De Weerd W, Feys H, Walter J, Lincoln N, Louckx F, Anneleen M, Birgit S, Smith B, Leys M (2006) Use of time by physiotherapists and occupational therapists in a stroke rehabilitation unit: a comparison between four European rehabilitation centres. *Disability and Rehabilitation* 28 (22): 1417–24.
- Putman K, De Wit L, Schupp W, Beyens H, Dejaeger E, De Weerd W, Feys H, Jenni W, Louckx F, Leys M (2007) Inpatient stroke rehabilitation: a comparative study of admission criteria to stroke rehabilitation units in four European centres. *Journal of Rehabilitation Medicine* 39 (1): 21–6.
- Rabadi MH, Coar PL, Lukin M, Lesser M, Blass JP (2008) Intensive nutritional supplements can improve outcomes in stroke rehabilitation. *Neurology* 71 (23): 1856–61.
- Renoux C, Dell'aniello S, Garbe E, Suissa S (2010) Transdermal and oral hormone replacement therapy and the risk of stroke: a nested case-control study. *BMJ* 340: 2519.
- Rerkasem K, Rothwell PM (2009) Systematic review of the operative risks of carotid endarterectomy for recently symptomatic stenosis in relation to the timing of surgery. *Stroke* 40 (10): 564–72.
- Rerkasem K, Rothwell PM (2011) Carotid endarterectomy for symptomatic carotid stenosis. *Cochrane Database of Systematic Reviews* (4): CD001081.
- Ringleb P, Bhatt D, Hirsch A, Topol E, Hacke W, Clopidogrel Versus Aspirin in Patients at Risk of Ischemic Events investigators (2004) Benefit of clopidogrel over aspirin is amplified in patients with a history of ischemic events. *Stroke* 35 (2): 528–32.
- Rothwell P, Howard S, Spence J (2003) Relationship between blood pressure and stroke risk in patients with symptomatic carotid occlusive disease. *Stroke* 34: 2583–92.

- Rothwell P, Eliasziw M, Gutnikov S, Warlow C, Barnett H (2004) Sex difference in the effect of time from symptoms to surgery on benefit from carotid endarterectomy for transient ischaemic attack and non-disabling stroke. *Stroke* 35 (12): 2855–61.
- Rothwell PM, Mehta Z, Howard SC, Gutnikov SA, Warlow CP (2005) Treating individuals 3: from subgroups to individuals: general principles and the example of carotid endarterectomy. *Lancet* 365 (9455): 256–65.
- Rothwell PM, Giles MF, Chandratheva A, Marquardt L, Geraghty O, Redgrave JN, Lovelock CE, Binney LE, Bull LM, Cuthbertson FC, Welch SJ, Bosch S, Carasco-Alexander F, Silver LE, Gutnikov SA, Mehta Z (2007) Effect of urgent treatment of transient ischaemic attack and minor stroke on early recurrent stroke (EXPRESS study): a prospective population-based sequential comparison. *Lancet* 370 (9596): 1432–42.
- Royal College of Physicians, Chartered Society of Physiotherapy, British Society of Rehabilitation Medicine, Association of Chartered Physiotherapists Interested in Neurology (2009) *Spasticity in adults: management using botulinum toxin. National Guidelines*. London: Royal College of Physicians.
- Royal College of Speech and Language Therapists (2005) *Clinical guidelines*. Oxford: Speechmark Publishing.
- Royal College of Speech and Language Therapists (2007) *Position paper for video fluoroscopy screening*. London: RCSLT.
- Royal College of Speech and Language Therapists (2008) *Position for flexible endoscopic evaluation of swallowing*. London: RCSLT.
- Royal College of Speech and Language Therapists, British Dietetic Association (2003) *National descriptors for texture modification in adults*. Birmingham: British Dietetic Association.
- Sackley C, Wade DT, Mant D, Atkinson JC, Yudkin P, Cardoso K, Levin S, Lee VB, Reel K (2006) Cluster randomized pilot controlled trial of an occupational therapy intervention for residents with stroke in UK care homes. *Stroke* 37 (9): 2336–41.
- Salazar AM, Warden DL, Schwab K, Spector J, Braverman S, Walter J, Cole R, Rosner MM, Martin EM, Ecklund J, Ellenbogen RG, for the Defense and Veterans Head Injury Program (DVHIP) Study Group (2000) Cognitive rehabilitation for traumatic brain injury. *JAMA: The Journal of the American Medical Association* 283 (23): 3075–81.
- Sampson FC, Hayward A, Evans G, Morton R, Collett B (2002) Functional benefits and cost/benefit analysis of continuous intrathecal baclofen infusion for the management of severe spasticity. *Journal of Neurosurgery* 96 (6): 1052–7.
- Sandercock PAG, Gibson LM, Liu M (2009) Anticoagulants for preventing recurrence following presumed non-cardioembolic ischaemic stroke or transient ischaemic attack. *Cochrane Database of Systematic Reviews* (2): CD000248.
- Sarkamo T, Pihko E, Laitinen S, Forsblom A, Soinila S, Mikkonen M, Autti T, Silvennoinen HM, Erkkila J, Laine M, Peretz I, Hietanen M, Tervaniemi M (2010) Music and speech listening enhance the recovery of early sensory processing after stroke. *Journal of Cognitive Neuroscience* 22 (12): 2716–27.
- Sato Y, Iwamoto J, Kanoko T, Satoh K (2005) Low-dose vitamin D prevents muscular atrophy and reduces falls and hip fractures in women after stroke: a randomized controlled trial. *Cerebrovascular Diseases* 20 (3): 187–92.
- Saunders DH, Greig CA, Young A, Mead GE (2004) Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews* (1): CD003316.
- Saunders DH, Greig CA, Mead GE, Young A (2009) Physical fitness training for stroke patients. *Cochrane Database of Systematic Reviews* (4): CD003316.
- Saxena R, Koudstaal PJ (2004) Anticoagulants versus antiplatelet therapy for preventing stroke in patients with nonrheumatic atrial fibrillation and a history of stroke or transient ischaemic attack. *Cochrane Database of Systematic Reviews* (4): CD000187.
- Schmitz MA, Finkelstein M (2010) Perspectives on poststroke sexual issues and rehabilitation needs. *Topics in Stroke Rehabilitation* 17 (3): 204–13.
- Schroder A, Wist ER, Homberg V (2008) TENS and optokinetic stimulation in neglect therapy after cerebrovascular accident: a randomized controlled study. *European Journal of Neurology* 15 (9): 922–7.
- Shaw LC, Price CI, van Wijck FM, Shackley P, Steen N, Barnes MP, Ford GA, Graham LA, Rodgers H, on behalf of the BoTULS Investigators (2011) Botulinum Toxin for the Upper Limb After Stroke (BoTULS) trial: effect on impairment, activity limitation, and pain. *Stroke* 42 (5): 1371–9.
- Shepherd S, McClaran J, Phillips CO, Lannin NA, Clemson LM, McCluskey A, Cameron ID, Barras SL (2010) Discharge planning from hospital to home. *Cochrane Database of Systematic Reviews* (1): CD000313.
- Sherman DG, Albers GW, Bladin C, Fieschi C, Gabbai AA, Kase CS, O'Riordan W, Pineo GE, PREVAIL investigators (2007) The efficacy and safety of enoxaparin versus unfractionated heparin for the prevention of venous thromboembolism after acute ischaemic stroke (PREVAIL Study): an open-label randomised comparison. *Lancet* 369 (9570): 1347–55.
- Silagy C, Lancaster T, Mant D, Fowler G (2002) Nicotine replacement therapy for smoking cessation. *Cochrane Database of Systematic Reviews* (4): CD000146.
- Simmons-Mackie N, Raymer A, Armstrong E, Holland A, Cherney LR (2010) Communication partner training in aphasia: a systematic review. *Archives of Physical Medicine and Rehabilitation* 91 (12): 1814–37.
- Singh R, Hunter J, Philip A, Todd I (2006) Predicting those who will walk after rehabilitation in a specialist stroke unit. *Clinical Rehabilitation* 20 (2): 149–52.
- Sit J, Yip V, Ko S, Gun A, Lee J (2007) A quasi-experimental study on a community-based stroke prevention programme for clients with minor stroke. *Journal of Clinical Nursing* 16 (2): 272–81.
- Smith D, Goldenberg E, Ashburn A (1981) Remedial therapy after stroke: a randomised controlled trial. *British Medical Journal* 282 (6263): 517–20.
- Smith J, Forster A, House A, Knapp P, Wright JJ, Young J (2008) Information provision for stroke patients and their carers. *Cochrane Database of Systematic Reviews* (2): CD001919.
- 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: 1130–43.
- Society of British Neurological Surgeons (2004) *Report on consensus conference on neurovascular services*. London: SBNS ([www.bsnnr.org.uk/guidelines/resources/Consensus\\_Conference\\_Summary.pdf](http://www.bsnnr.org.uk/guidelines/resources/Consensus_Conference_Summary.pdf)).
- Society of British Neurosurgeons (2006) *National study of subarachnoid haemorrhage: final report of an audit carried out in 34 neurosurgical units in the UK and Ireland between 14 September 2001 to 13 September 2002*. London: SBNS.

- Sommerfeld DK, Eek EUB, Svensson AK, Holmqvist LWn, von Arbin MH (2004) Spasticity after stroke. *Stroke* 35 (1): 134–9.
- Song H, Oh H, Kim H, Seo W (2011) Effects of a sexual rehabilitation intervention program on stroke patients and their spouses. *Neurorehabilitation* 28 (2): 143–50.
- Sorbello D, Dewey HM, Churilov L, Thrift AG, Collier JM, Donnan G, Bernhardt J (2009) Very early mobilisation and complications in the first 3 months after stroke: further results from phase II of A Very Early Rehabilitation Trial (AVERT). *Cerebrovascular Diseases* 28 (4): 378–83.
- Speyer R, Baijens L, Heijnen M, Zwijnenberg I (2010) Effects of therapy in oropharyngeal dysphagia by speech and language therapists: a systematic review. *Dysphagia* 25 (1): 40–65.
- Spikman JM, Boelen DHE, Lamberts KF, Brouwer WH, Fasotti L (2010) Effects of a multifaceted treatment program for executive dysfunction after acquired brain injury on indications of executive functioning in daily life. *Journal of the International Neuropsychological Society* 16 (1): 118–29.
- Stam J, de Bruijn SF, deVeber G (2002) Anticoagulation for cerebral sinus thrombosis. *Cochrane Database of Systematic Reviews* (4): CD002005.
- Stein J, Shafiqat S, Doherty D, Frates EP, Furie KL (2003) Patient knowledge and expectations for functional recovery after stroke. *American Journal of Physical Medicine & Rehabilitation* 82 (8): 591–6.
- Stolk-Hornsveld F, Crow JL, Hendriks EP, van der Baan R, Harmeling-van der Wel BC (2006) The Erasmus MC modifications to the (revised) Nottingham Sensory Assessment: a reliable somatosensory assessment measure for patients with intracranial disorders. *Clinical Rehabilitation* 20 (2): 160–72.
- Stroke Unit Trialists' Collaboration (2007) Organised inpatient (stroke unit) care for stroke. *Cochrane Database of Systematic Reviews* (4): CD000197.
- Suckling RJ, He FJ, MacGregor GA (2010) Altered dietary salt intake for preventing and treating diabetic kidney disease. *Cochrane Database of Systematic Reviews* (12): CD006763.
- Sunderland A, Walker CM, Walker MF (2006) Action errors and dressing disability after stroke: an ecological approach to neuropsychological assessment and intervention. *Neuropsychological Rehabilitation* 16 (6): 666–83.
- Teasell R, Foley N, Martino R (2011) Dysphagia and aspiration post stroke. In: *Evidence-based review of stroke rehabilitation*, 14th edn. London, ON: EBRSSR.
- Thomas LH, Cross S, Barrett J, French B, Leathley M, Sutton CJ, Watkins C (2008) Treatment of urinary incontinence after stroke in adults. *Cochrane Database of Systematic Reviews* (1): CD004462.
- Thompson HS, Ryan A (2009) The impact of stroke consequences on spousal relationships from the perspective of the person with stroke. *Journal of Clinical Nursing* 18 (12): 1803–11.
- Tsang MHM, Sze KH, Fong KNK (2009) Occupational therapy treatment with right half-field eye-patching for patients with subacute stroke and unilateral neglect: a randomised controlled trial. *Disability and Rehabilitation* 31 (8): 630–7.
- Tung FL, Yang YR, Lee CC, Wang RY (2010) Balance outcomes after additional sit-to-stand training in subjects with stroke: a randomized controlled trial. *Clinical Rehabilitation* 24 (6): 533–42.
- Turton AJ, O'Leary K, Gabb J, Woodward R, Gilchrist ID (2009) A single blinded randomised controlled pilot trial of prism adaptation for improving self-care in stroke patients with neglect. *Neuropsychological Rehabilitation* 20 (2): 180–96.
- Tyson SE, Rogerson L (2009) Assistive walking devices in nonambulant patients undergoing rehabilitation after stroke: the effects on functional mobility, walking impairments, and patients' opinion. *Archives of Physical Medicine and Rehabilitation* 90 (3): 475–9.
- Van de Beek D, Wijdicks EF, Vermeij FH, De Haan RJ, Prins JM, Spanjaard L, Dippel DW, Nederkoorn PJ (2009) Preventive antibiotics for infections in acute stroke: a systematic review and meta-analysis. *Archives of Neurology* 66 (9): 1076–81.
- Van de Port I, Wood DS, Lindeman E, Kwakkel G (2007) Effects of exercise training programs on walking competency after stroke: a systematic review. *American Journal of Physical Medicine & Rehabilitation* 86 (11): 935–51.
- Van Delden AE, Peper CE, Beek PJ, Kwakkel G (2012) Unilateral versus bilateral upper limb exercise therapy after stroke: a systematic review. *Journal of Rehabilitation Medicine* 44 (2): 106–17.
- Van Dijk H, Jannink M, Hermens H (2005) Effect of augmented feedback on motor function of the affected upper extremity in rehabilitation patients: a systematic review of randomized controlled trials. *Journal of Rehabilitation Medicine* 37 (4): 202–11.
- Van Gijn J, Rinkel G (2001) Subarachnoid haemorrhage: diagnosis, causes and management. *Brain* 124: 249–78.
- van Tulder MW, Assendelff WJ, Koes BW, Bouter LM (1997) Method guidelines for systematic reviews in the Cochrane Collaboration Back Review Group for Spinal Disorders. *Spine* 22 (20): 2323–30.
- Vanbellingen T, Kersten B, Van de Winckel A, Bellion M, Baronti F, Müri R, Bohlhalter S (2011) A new bedside test of gestures in stroke: the apraxia screen of TULIA (AST). *Journal of Neurology, Neurosurgery, and Psychiatry* 82 (4): 389–92.
- Vanbellingen T, Kersten B, Van Hemelrijk B, Van de Winckel A, Bertschi M, Müri R, De Weerd W, Bohlhalter S (2010) Comprehensive assessment of gesture production: a new test of upper limb apraxia (TULIA). *European Journal of Neurology* 17 (1): 59–66.
- Vergouwen MDI, de Haan RJ, Vermeulen M, Roos YBWE (2008) Statin treatment and the occurrence of hemorrhagic stroke in patients with a history of cerebrovascular disease. *Stroke* 39 (2): 497–502.
- VITATOPS Trial Study Group (2010) B vitamins in patients with recent transient ischaemic attack or stroke in the VITamins TO Prevent Stroke (VITATOPS) trial: a randomised, double-blind, parallel, placebo-controlled trial. *Lancet Neurology* 9 (9): 855–65.
- Vrijens B, Vincze G, Kristanto P, Urquhart J, Bernier M (2008) Adherence to prescribed antihypertensive drug treatments: longitudinal study of electronically compiled dosing histories. *BMJ* 336 (7653): 1114.
- Wade D (1998) Evidence relating to assessment in rehabilitation. *Clinical Rehabilitation* 12: 183–6.
- Wade D, Halligan P (2004) Do biomedical models of illness make for good healthcare systems? *BMJ* 329 (7479): 1398–401.
- Walker MF, Sunderland A, Fletcher-Smith J, Drummond A, Logan P, Edmans JA, Garvey K, Dineen RA, Ince P, Horne J, Fisher RJ, Taylor J (2011) The DRESS trial: a feasibility randomized controlled trial of a neuropsychological approach to dressing

- therapy for stroke inpatients. *Clinical Rehabilitation* 26 (8): 675–85.
- Wallentin L, Yusuf S, Ezekowitz MD, Alings M, Flather M, Franzosi MG, Pais P, Dans A, Eikelboom J, Oldgren J, Pogue J, Rieley PA, Yang S, Connolly SJ, on behalf of the RE-LY investigators (2010) Efficacy and safety of dabigatran compared with warfarin at different levels of international normalised ratio control for stroke prevention in atrial fibrillation: an analysis of the RE-LY trial. *Lancet* 376 (9745): 975–83.
- Wambaugh JL, Duffy JR, McNeil MR, Robin DA, Rogers MA (2006a) ANCDs bulletin board: treatment guidelines for acquired apraxia of speech – a synthesis and evaluation of the evidence. *Journal of Medical Speech-Language Pathology* 14 (2): xv–xxxiii.
- Wambaugh JL, Duffy JR, McNeil MR, Robin DA, Rogers MA (2006b) Treatment guidelines for acquired apraxia of speech: treatment descriptions and recommendations ... second of two reports. *Journal of Medical Speech-Language Pathology* 14 (2): xxxv–lxvii.
- Wang C, Harris W, Chung M, Lichtenstein A, Balk E, Kupelnick B, Jordan H, Lau J (2006) n-3 Fatty acids from fish or fish-oil supplements, but not alpha-linolenic acid, benefit cardiovascular disease outcomes in primary-and secondary-prevention studies: a systematic review. *AMERICAN Journal of Clinical Nutrition* 84 (1): 5–17.
- Wardlaw JM, Seymour J, Cairns J, Keir S, Lewis S, Sandercock P (2004) Immediate computed tomography scanning of acute stroke is cost-effective and improves quality of life. *Stroke* 35 (11): 2477–83.
- Wardlaw JM, Chappell FM, Stevenson M, De NE, Thomas S, Gillard J, Berry E, Young G, Rothwell P, Roditi G, Gough M, Brennan A, Bamford J, Best J (2006) Accurate, practical and cost-effective assessment of carotid stenosis in the UK. *Health Technology Assessment* 10 (30): iii–x, 1.
- Watkins CL, Leathley MJ, Gregson JM, Moore AP, Smith TL, Sharma AK (2002) Prevalence of spasticity post stroke. *Clinical Rehabilitation* 16 (5): 515–22.
- Watkins CL, Auton MF, Deans CF, Dickinson HA, Jack CI, Lightbody CE, Sutton CJ, van den Broek, Leathley MJ (2007) Motivational interviewing early after acute stroke: a randomized, controlled trial. *Stroke* 38 (3): 1004–9.
- Watkins CL, Wathan JV, Leathley MJ, Auton MF, Deans CF, Dickinson HA, Jack CIA, Sutton CJ, van den Broek MD, Lightbody CE (2011) The 12-month effects of early motivational interviewing after acute stroke. *Stroke* 42 (7): 1956–61.
- West C, Hesketh A, Vail A, Bowen A (2005) Interventions for apraxia of speech following stroke. *Cochrane Database of Systematic Reviews* (4): CD004298.
- West C, Bowen A, Hesketh A, Vail A (2008) Interventions for motor apraxia following stroke. *Cochrane Database of Systematic Reviews* (1): CD004132.
- Wevers L, van dP, I, Vermue M, Mead G, Kwakkel G (2009) Effects of task-oriented circuit class training on walking competency after stroke: a systematic review. *Stroke* 40 (7): 2450–59.
- 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 (1): 15–21.
- Winkens I, Van Heugten CM, Wade DT, Habets EJ, Fasotti L (2009) Efficacy of time pressure management in stroke patients with slowed information processing: a randomized controlled trial. *Archives of Physical Medicine and Rehabilitation* 90 (10): 1672–9.
- Wolf SL, Winstein CJ, Miller JP, Taub E, Uswatte G, Morris D, Giuliani C, Light KE, Nichols-Larsen D, for the EXCITE Investigators (2006) Effect of constraint-induced movement therapy on upper extremity function 3 to 9 months after stroke. *JAMA: The Journal of the American Medical Association* 296 (17): 2095–104.
- Wolitzky TK, Horowitz JD, Powers MB, Telch MJ (2008) Psychological approaches in the treatment of specific phobias: a meta-analysis. *Clinical Psychology Review* 28 (6): 1021–37.
- Woodford H, Price C (2007) EMG biofeedback for the recovery of motor function after stroke. *Cochrane Database of Systematic Reviews* (2): CD004585.
- World Health Organization (1978) *Cerebrovascular diseases: a clinical and research classification*. Geneva: WHO.
- World Health Organization (2001) *International classification of functioning, disability and health: ICF*. Geneva: WHO.
- Wressle E, Eeg O, Marcusson J, Henriksson C (2002) Improved client participation in the rehabilitation process using a client-centred goal formulation structure. *Journal of Rehabilitation Medicine* 34 (1): 5–11.
- Wu P, Mills E, Moher D, Seely D (2010) Acupuncture in poststroke rehabilitation: a systematic review and meta-analysis of randomized trials. *Stroke* 41 (4): e171–9.
- Ylvisaker M (1998) *Traumatic brain injury rehabilitation*. Boston, MA: Butterworth Heinemann.
- Yoo SH, Kim JS, Kwon SU, Yun SC, Koh JY, Kang DW (2008) Undernutrition as a predictor of poor clinical outcomes in acute ischemic stroke patients. *Archives of Neurology* 65 (1): 39–43.
- Yorkston KM, Strand EA, Kennedy MRT (1996) Comprehensibility of dysarthric speech: implications for assessment and treatment of planning. *American Journal of Speech Language and Pathology* 5 (1): 55–66.
- Young A, Gomersall T, Bowen A (2012) Trial participants' experiences of early, enhanced speech and language therapy after stroke compared with employed visitor support. *Clinical Rehabilitation* doi: 10.1177/0269215512450042
- Zimmermann-Schlatter A, Schuster C, Puhon MA, Siekierka E, Steurer J (2008) Efficacy of motor imagery in post-stroke rehabilitation: a systematic review. *Journal of Neuroengineering and Rehabilitation* 5: 8.



# Index

## A

- activities of daily living 104–106
    - extended 105
    - personal 104
  - acupuncture 90–91, 100
  - acute care 15, 20, 37–59
  - adaptations (personal and environmental) 109–111
  - adaptations/aids 14, 105
    - computers 98
    - walking 84, 86
  - aerobic fitness 82–83
  - alcohol 64
  - alteplase *see* thrombolysis
  - amphetamine 123
  - anticoagulation 50–51
    - acute arterial dissection 50
    - atrial fibrillation 40, 51, 68
    - cerebral venous thrombosis 52
    - contraindications 69
    - deep vein thrombosis 55
    - new oral anticoagulants 45, 51, 69
    - reversal 48
    - secondary prevention 69
    - sinus rhythm 69
  - antidepressant drugs 114, 123
    - emotionalism 115
  - antihypertensive treatment 53, 65
  - antiphospholipid syndrome 76–77
  - antiplatelet treatment
    - acute arterial dissection 50
    - acute ischaemic stroke 46
    - atrial fibrillation 69
    - secondary prevention 68, 69
    - transient ischaemic attack 42
  - anti-spastic drugs 88
  - antithrombotic treatment *see* anticoagulation and antiplatelet treatment
    - secondary prevention 66–70
  - anxiety 57, 93, 113–114, 115
    - self-efficacy training 93
  - aphasia 97–98
    - assessment 97
    - psychological assessment modification 112
  - approach to therapy 31–34
    - goal setting 31–32
    - intensity 32–34
  - apraxia 121
  - apraxia (of speech) 99–100
  - arm slings 94
  - arm re-education 83–84
    - bilateral arm training 84
    - constraint induced movement therapy 84
  - arterial dissection 50, 76
    - anticoagulation 69
  - aspiration
    - feeding 58
    - positioning 57
    - prehospital 39
    - silent 100
    - specialist assessment 101
  - aspirin
    - atrial fibrillation 51, 69
    - deep vein thrombosis 55
    - intra cranial arterial disease 75
    - prehospital 39
    - pulmonary embolism 55
    - secondary prevention 51, 68
    - TIA 40, 42
  - atrial fibrillation 50, 67, 75
    - anticoagulation 51, 68
    - carotid artery stenosis 73
    - prehospital 39
    - secondary prevention 68
    - TIA 40
  - attention 117–118
  - audit 2, 16, 24, 28–29, 43, 73
- ## B
- balance impairment 85–87
  - biofeedback 89–90
    - dysphagia 100
  - biopsychosocial 111
  - bladder management
    - acute care 54, 58–59
    - continence aids 104
    - persistant urinary incontinence 21, 103–104
    - urinary catheter 59
  - blood glucose 19
    - physiological monitoring 53
  - blood pressure 19
    - physiological monitoring 53
    - secondary prevention 65–66
    - thrombolysis 53
    - TIA 43
  - body weight support 84
  - botulinum toxin 87
  - bowel management
    - acute care 58–59
    - persistent faecal incontinence 104
  - brain imaging
    - cerebral venous thrombosis 52
    - diagnosis of TIA 41
    - differentiation of TIA and stroke 4
    - intracerebral haemorrhage 48
    - timing 21, 44
  - bromocriptine 123

**C**

cardioembolic causes of stroke/TIA			
atrial fibrillation	see atrial fibrillation		
patent foramen ovale	75–76		
prosthetic heart valves	51		
care home	128–129		
carers	129–130		
communication training	98, 99		
discharge involvement	27		
feeding guidance	101		
goal setting	31		
informal, unpaid	129–130		
information giving	27, 28, 128		
involvement with therapy	33		
oral hygiene	102		
stroke liaison worker	127		
support needs	127–128		
training/education	27, 79, 81, 98, 101		
views of patients and carers	29		
carotid angioplasty	73		
carotid duplex ultrasound	73		
carotid endarterectomy			
asymptomatic carotid stenosis	74		
carotid imaging	42		
carotid stenosis measurement	43		
secondary prevention	72–74		
timing	43		
carotid stenosis			
blood pressure target	65		
carotid endarterectomy	see carotid endarterectomy		
carotid stenting	73, 74		
asymptomatic carotid artery stenosis	74		
casting			
spasticity	87		
cerebral oedema	15		
cerebral venous sinus thrombosis	52, 76		
anticoagulation	69, 76		
cholesterol			
dietary modification	64		
target blood level	71		
TIA	43		
lowering drugs	71		
clinical audit	2, 16, 24, 28–29, 73		
clinical psychologist	23, 108		
clopidogrel	75		
secondary prevention	68		
TIA	40		
cognitive impairment			
apraxia	121		
attention	117–118		
executive functioning	122		
general	116–117		
memory loss	118–119		
perception	120–121		
screening	112, 117		
spatial awareness (eg neglect)	119–120		
commissioning	13–18		
communication	96–100		
aids	14, 98, 99, 100		
aphasia	97–98		
apraxia of speech	99–100		
cognitive assessment	117		
dysarthria	98–99		
social interaction	108		
support services	81		
compression stockings	55		
computed tomography	41, 45		
TIA	41		
consciousness level	44		
aspiration risk	39		
subarachnoid haemorrhage	4		
consistency of fluids	101		
constraint induced movement therapy			
arm training	84		
continence aids	104		
contraception	77		
contractures	57, 87		
splinting	88–89		
cost effectiveness	15		
acute care	16, 20		
alteplase	47		
counselling	27, 127		
cueing	83		
<b>D</b>			
data collection		28, 29	
tools		26, 30	
deep vein thrombosis		55–56	
anticoagulants		55	
aspirin		55	
graduated support stockings		55	
haemorrhagic stroke		56	
prophylaxis		55	
depression		34, 57, 108, 113–114	
fatigue		115	
pain		93	
self-efficacy training		93	
diabetes mellitus		44, 53	
diagnosis			
acute ischaemic stroke		44–45	
pre-admission		37–39	
subarachnoid haemorrhage		49	
TIA, specialist		41	
TIA, initial		39–41	
diet		58, 64, 101, 103	
dietitian		23	
dipyridamole			
secondary prevention		68	
discharge		14, 27–28, 113	
capacity for self-medication		62	
early supported		27	
equipment/aids		15, 27	
home visits		27	
palliative care		34	
patients who remain dependent in some			
activities		27	
patients with cognitive impairments/mood			
disorders		113, 117	
patients with incontinence		104	
protocols		27	
transfer of care principles		26–27	

- dissection (cervical artery) 50  
 anticoagulation 69, 76  
 driving 17, 106  
 drug  
 alteplase 46  
 amitriptyline 95  
 amphetamine 123  
 analgesic 95, 96  
 anticoagulant 40, 50, 51, 68, 69  
 antidepressant 114, 115  
 antiplatelet 43, 46–47, 68  
 antispastic 88  
 antithrombotic 66–70  
 apixaban 51  
 aspirin 40, 51, 55, 68, 69, 75  
 benzodiazepine 123  
 botulinum toxin 87  
 bromocriptine 123  
 chlormethiazole 123  
 cholesterol lowering 71  
 clopidogrel 40, 68, 75  
 dabigatran 51, 68  
 dipyridamole 68  
 direct thrombin inhibitor 51, 68, 69  
 dopamine agonists 123  
 factor Xa inhibitor 51, 68, 69  
 fluoxetine 123  
 gabapentin 95  
 heparin 52, 55, 69  
 licensing 10  
 meprobamate 123  
 new oral anticoagulants 51, 68, 69  
 piracetam 123  
 pregabalin 96  
 selective serotonin reuptake inhibitor  
 antidepressant 123  
 statin 71  
 thrombolytic treatment 46  
 vitamin K antagonist 48  
 warfarin 48, 52, 69  
 drugs to reduce impairment 123  
 duration of therapy 80, 125  
 dysarthria 98–99  
 dysphagia 100–102
- E**  
 early mobilisation 56  
 early supported discharge 27  
 education 14, 20, 127, 129  
 arm re-education 83–84  
 carers 27, 98  
 gait re-education 84–85  
 public awareness of stroke 35–36  
 rehabilitation unit staff 21, 23  
 electrical stimulation 90  
 functional/neuromuscular/therapeutic 90  
 sensory training 82  
 shoulder subluxation 95  
 electromyography (EMG) 89  
 emotionalism 115
- employment 107  
 end-of-life decisions  
 mental capacity 122–123  
 palliative care 34  
 enteral feeding 58, 101  
 gastrostomy 101  
 equipment 14, 27, 32, 101, 104, 105, 109–111  
 executive function 122  
 exercise 82–83  
 aerobic and strength training 83  
 secondary prevention 63  
 in the long term 126
- F**  
 Face Arm Speech Test (FAST) 37  
 faecal incontinence 104  
 families see carers  
 fatigue 115–116  
 feeding 58  
 gastrostomy 101  
 self-feeding 101  
 fever 44, 52–53  
 temperature monitoring 53  
 fluids 58  
 modified consistency 101  
 swallowing problems 58, 100–102  
 fluoxetine 123  
 functional electrical stimulation 90  
 shoulder subluxation 95
- G**  
 gait  
 body weight support 84  
 exercise programmes 82  
 re-education 84–85  
 treadmill training 85  
 walking aid 85  
 general practitioners  
 commissioning services 13–18  
 discharge 27  
 Glasgow coma score 44  
 glucose see blood glucose  
 goal setting 31–32, 79  
 ICF framework 11
- H**  
 haemorrhage  
 primary intracerebral 48  
 subarachnoid 48–50  
 heparin 52, 55, 69  
 hoists 110  
 home  
 care home 128–129  
 communication difficulties 98  
 information giving 128  
 oral hygiene 102  
 palliative care 14, 34  
 transfer of care 27, 130  
 hormone replacement therapy 77–78  
 hydration 103  
 assessment 58

hydration – <i>continued</i>			
physiological monitoring	53	measurement	
hydrocephalus	47	assessments and measures	30
subarachnoid haemorrhage	49	carotid stenosis	72
surgical intervention	48	ICF framework	11
hypertension		memory loss	118–119
anticoagulation	51	meprobamate	123
salt intake	64	mobilisation	
secondary prevention	65–66	early	56
<b>I</b>		monitoring	
ICF framework	11	physiological	52–54
imaging		mood disturbance	112
arterial dissection	50	crying	115
carotid	42	depression and anxiety	113–114
carotid reporting criteria	42	emotionalism	115
diagnosis of acute event	44–45	fatigue	115–116
diagnosis of TIA	41	motor control	81
primary intracerebral haemorrhage	48	assessment	81
thrombolysis	46	biofeedback	89–90
impaired tone	87–88	electrical stimulation	90
impairment		electromyography	89
balance	85–87	positioning	57
bowel and bladder	103–104	moving and handling	
carer education about impairment	79	carer training	27
cognitive	116–117	musculoskeletal pain	96
communication	96–100	positioning	57
drugs to reduce	123	shoulder pain	94
initial assessment	54–55	shoulder subluxation	94
sensory	81–82	myocardial infarction	61, 70
visual	106–107, 120–121	<b>N</b>	
tone	87–88	nasogastric tube	see enteral feeding
inattention	117–118	neglect (spatial awareness)	119–120
sensory	119	neurovascular clinic	21, 39, 41
incontinence		nurses	23
aids	104	intensity of therapy	33
assessment	21	telemedicine services	24
faecal	103–104	thrombolysis	46
urinary	103–104	nursing home	see care home
information provision	28, 128	nutrition	
initial rehabilitation assessment	54–55	diet	see diet
intensity of therapy	32–34	dietitian	see dietitian
<b>J</b>		fluids	see fluids
joint pain		malnutrition	see malnutrition
musculoskeletal	96	nutritional status	58, 101, 103
shoulder	94–95	salt	64
<b>L</b>		vitamin supplements	64
leisure activities	108	<b>O</b>	
lifestyle	63–65	occupational therapist	23, 27–28, 105
lipid lowering	70–71	activity limitation	105
antiphospholipid syndrome	76–77	oedema (cerebral)	15
long-term management	125–130	oral hygiene	102–103
<b>M</b>		organisation of acute services	19–20
magnetic resonance imaging (MRI)	41, 45	orthosis/orthotics	
malnutrition	58, 101, 103	ankle–foot	85
gastrostomy feeding	101	splinting	88–89
nutritional support	58	oxygen saturation	53
screening	58	<b>P</b>	
		pain	93–96
		assessment	93

- musculoskeletal 96  
 neuropathic 95  
 shoulder 94–95  
 specialist pain services 94  
 palliative care 34  
 papilloedema 44  
 patient and carer see carer  
   education programme 129  
   support 127–128  
   views 129  
 perceptual impairments 120–121  
 percutaneous endoscopic gastrostomy (PEG) see enteral feeding  
 physician 21, 23, 25, 44, 46  
 physiological monitoring 52–54  
 physiotherapist 23  
 piracetam 123  
 positioning 39, 57  
 posture 57  
 pre-admission diagnosis 37–39  
 primary care 65  
   risk factor review 62  
 protocol  
   assessment (equipment and aids) 14, 110–111  
   data collection 28–30  
   discharge 27  
   impairment assessment 55  
   incontinence 59, 104  
   insulin therapy 53  
   physiological monitoring 53  
   rehabilitation assessment 79  
   rehabilitation unit 21  
   symptomatic hydrocephalus 47  
   transfer of care 14  
 psychological impairment  
   apraxia 121  
   cognitive 116–117  
   depression and anxiety 113–114  
   fatigue 115–116  
   emotionalism 115  
   executive function 122  
   neglect (spatial awareness) 119–120  
   reduced attention 117–118  
   reduced memory 118–119  
 psychosocial needs 108, 114  
 pulmonary embolism 55  
 pyrexia see fever
- R**
- reading 120  
   support 127  
 reduced attention 117–118  
 reduced memory 118–119  
 rehabilitation  
   approach 123  
   referral 81, 113  
   specialist rehabilitation team 15, 21, 23  
 research 35  
 residential care home see care home  
 resisted exercise 83
- respiratory complications  
   positioning 57  
 robotics 91
- S**
- salt 64  
 secondary prevention 61–78  
   antithrombotics 66–70  
   blood pressure/hypertension 65–66  
   carotid stenosis 72–74  
   lifestyle measures 63–65  
   lipid lowering 70–71  
   risk factors (unusual) 61  
 sedatives 123  
 self-efficacy 92–93  
 sensory impairment 81–82  
 sensory stimulation  
   acupuncture 90–91  
   electrical stimulation 90  
 services  
   development 30  
   evaluation 28–29  
   organisation 19–20  
   social (adult) see social services  
   voluntary organisations 18, 27, 113, 126  
 shoulder pain 94–95  
   arm slings 94  
   prevention 94  
 smoking cessation 63  
 social services  
   carer support needs 130  
   meeting support needs 128  
   resources 23  
   transfer of care 14, 26, 27  
 spasticity 87–88  
 spatial awareness 119–120  
 specialist rehabilitation team 15, 21, 23  
 specialist stroke services 20–22  
 speech and language therapist 23  
   aphasia assessment 97  
   dysarthria assessment 99  
 splinting/splints 88–89  
 statin  
   lipid lowering (secondary prevention) 71  
   treatment for acute stroke 47  
   treatment for suspected TIA 40  
 stenting  
   carotid artery 73  
   vertebral artery 75  
   stepped care model 112  
   strength training 83  
 stroke  
   definition 4  
   diagnosis 44–45  
   management of non-haemorrhagic stroke 45–48  
   physician 23, 25, 46  
   register 28  
   stroke services see services  
   subarachnoid haemorrhage 48–50  
   definition 4  
   diagnosis 49

surgery		diagnosis, initial	39–41
carotid endarterectomy	72–74	management	42–43
management of hydrocephalus	48	treadmill training	85
subarachnoid haemorrhage management	49	tricyclic antidepressants	
swallowing	see dysphagia	amitriptyline	95
<b>T</b>		selective serotonin reuptake inhibitors	123
tearfulness	see emotionalism	tube feeding	58, 101
temperature	see fever	<b>U</b>	
terminology		urinary catheter	59
ICF framework	11	urinary incontinence	see bladder management
therapist		<b>V</b>	
occupational therapist	see occupational therapist	venous thrombosis	
physiotherapist	see physiotherapist	cerebral	69, 76
speech and language therapist	see speech and language therapist	deep	55–56
therapy		videofluoroscopy	101
approach	32	visual impairment	106–107, 120–121
intensity	32–34	vocational activities	107–108
stopping	80	<b>W</b>	
thrombolysis	46	walking aid	85
brain imaging	44	wheelchair	27, 85
service organisation	21	work	107–108
transfer of care		<b>X</b>	
discharge	27–28	xanthochromia	49
general	26–27	<b>Y</b>	
transient ischaemic attack (TIA)		young stroke	26
definition	4		
diagnosis, specialist	41		

## National clinical guideline for stroke fourth edition

**Over a quarter of the population over the age of 45 will suffer a stroke. Timely assessment and modern high-quality treatment can now save the lives of and considerably reduce disability in stroke patients.**

This fourth edition of the stroke guideline, prepared by the Intercollegiate Stroke Working Party, provides comprehensive guidance on stroke care pathway, from acute care through rehabilitation and secondary prevention on to long-term support and terminal care. The guideline incorporates NICE recommendations where appropriate and other UK documents such as the National Stroke Strategy and the National Service Framework for Long-Term Conditions, making the document an essential, comprehensive resource for people working in stroke. It informs healthcare professionals and stroke survivors and carers and those responsible for commissioning services about the care stroke patients should receive and how this should be organised. Its goal is to improve the quality of care for everyone who has a stroke, regardless of age, gender, type of stroke, or where the patient is. The guideline is relevant to people in all countries.

This edition includes, for the first time, evidence to recommendations sections which explain in more detail, how certain recommendations were derived. There is a chapter on commissioning which makes the document relevant to everyone in stroke care – those who pay for it, those who manage it and those who deliver care of any sort at any time, to people after a stroke. It also contains profession-specific guidelines for nurses, dietitians, occupational therapists, physiotherapists, speech and language therapists, psychologists and those working in primary care. It is therefore an invaluable resource for everyone involved in stroke care. ■

ISBN 978–1–86016–492–7  
eISBN 978–1–86016–493–4

Royal College of Physicians  
11 St Andrews Place  
Regent's Park  
London NW1 4LE

[www.rcplondon.ac.uk](http://www.rcplondon.ac.uk)



**Royal College  
of Physicians**