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Royal College of Physicians 2016 National clinical guideline for stroke

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National clinical guideline for stroke

Prepared by the Intercollegiate Stroke Working Party

Fifth Edition 2016

Foreword

A lot has changed in the world of stroke over the four years since the last edition of the Royal College of Physicians National Clinical Guideline for Stroke was published. The quality of stroke care provided in the UK has continued to improve as judged by the Sentinel Stroke National Audit Programme, which started collecting data in 2013. The number of high-quality research publications has rapidly increased and we now have a much better understanding of what works and what doesn't, particularly in areas of rehabilitation. The randomised trials of intra-arterial treatment clearly show that for a proportion of patients, outcomes can be improved and we have further evidence showing that the way stroke care is organised and staffed can make a big difference to the chances of recovery.

This guideline is the most comprehensive and up to date document on how stroke care should be provided covering the whole pathway from pre-hospital care to long-term management. It is designed not just for clinicians but also for patients and their families and carers, and those with responsibility for commissioning stroke services. However, there are still too many areas where the recommendations are based on a consensus of the experts on the guideline development group. We desperately need the research to confirm or refute these views, so the other important role for this guideline is to help researchers and the funding bodies to identify the key questions that still need to be answered through research.

The work involved in developing a clinical guideline is enormous, and unlike some guideline development organisations the stroke team at the Royal College of Physicians do not have a big group of people to undertake the searching, critical appraisal, drafting and editing. We are very grateful to all the members of the Intercollegiate Stroke Working Party who in addition to their day jobs have devoted huge amounts of time to undertaking these tasks. Audrey Bowen, Martin James and Gavin Young have skilfully performed the role of editors, and Kaili Stanley has been fantastic at co-ordinating the process and ensuring that everyone does as instructed. Alex Hoffman as the Stroke Programme Manager has as usual provided the expertise and wisdom necessary to see the project through to its successful conclusion. We are also grateful to everyone who has supported the Working Party either through reviewing papers or peer reviewing drafts of the guidelines. A special mention needs to go to the our user representatives who in addition to providing advice throughout the whole process have worked very hard to produce the patient version of the guideline, which we hope those who suffer a stroke and those who support people who have had a stroke will find helpful.

Professor Tony Rudd FRCP CBE

Chair of Intercollegiate Stroke Working Party

Professor of Stroke Medicine, King's College London

Preface

We are delighted to introduce the 2016 edition of the National Clinical Guideline for Stroke, developed by the Intercollegiate Stroke Working Party. Despite changes in policy emphasis at a national level, stroke remains a substantial and increasing challenge to the health of the population of the UK. Wider still, the Global Burden of Disease Study highlights how stroke represents one of the foremost burdens of lifelong disability around the world. The need for clear, evidence-based guidance for the everyday practice of many thousands of practitioners in stroke thus remains as great as ever. At the same time, quite apart from the worldwide scale of the human burden of stroke-related disability, the inevitable constraints on finite healthcare resources demand that the care and treatment of all major diseases, including stroke, are focussed ever more intently on effective and efficient treatments that reduce long-term disability and dependency. Each specialist area is therefore rightly obliged to scrutinise and modernise practice according to the latest available evidence, constantly aware that things can never be allowed to stand still.

The available evidence for the treatment of stroke continues to grow steeply, signs of which include the growth in new journals on the topic and the increased number of systematic reviews in stroke available through the Cochrane collaboration. The growth of the evidence base means that this latest edition of the guideline includes some significant updates from the 2012 edition, just a few of which are listed below. It also lies behind the Working Party's decision to move publication of the guideline to online-only, to facilitate a more responsive cycle of evidence-based updates.

What's new in 2016

1. Mechanical thrombectomy for acute ischaemic stroke (Section 3.5)
2. Urgent brain imaging within 1 hour of hospital arrival for suspected acute stroke (Section 3.4)
3. Acute blood pressure management in intracerebral haemorrhage (Section 3.6)
4. Urgent management of suspected minor stroke and TIA irrespective of risk stratification (Section 3.2)
5. Incorporation of clinical psychology/clinical neuropsychology, dietetics and orthoptics expertise into the multidisciplinary stroke rehabilitation team (Section 2.4)
6. Changes in the practice of early mobilisation after acute stroke (Section 3.12)
7. Pragmatic management of swallowing difficulties in end-of-life stroke care (Section 2.15)
8. Mechanically-assisted methods for gait training in people unable to walk after stroke (Section 4.9.4)
9. Lower blood pressure targets for secondary stroke prevention compared with previous NICE guidelines (Section 5.4).

The editors would like to express their gratitude to all the members of the guideline development group who have worked in their 'spare' time to produce this guideline under the wise leadership of the chair and clinical lead of the RCP Stroke Programme, Professor Tony Rudd CBE. We also wish to gratefully acknowledge the many contributions of a huge number of other topic group contributors and experts drawn from a wide range of specialist societies and interested parties, together with reviewers of the draft guideline (listed in the online appendices). We would reserve our greatest appreciation for the unfailingly patient and cheerful work of our guidelines co-ordinator Kaili Stanley and the Stroke Programme manager Alex Hoffman, without whom this guideline would never have seen the light of day.

The pursuit of continuous quality improvement in stroke care has been the foremost aim of the Stroke Programme at the Royal College of Physicians of London since the first (and much slimmer) edition of this guideline in 2000 and the linked Sentinel Stroke National Audit Programme (SSNAP and its precursors), now funded by the Healthcare Quality Improvement Programme at the English Department of Health. The quality improvement efforts of the Stroke Programme also include a joint stroke services peer review scheme with the British Association of Stroke Physicians and the Stroke Association. The guideline itself is supported with the production of profession-specific concise guides for each of the major disciplines involved in stroke care, and a version of the guideline for people with stroke and their family/carers, for which we want to specifically record our appreciation of the efforts of the lay members of the Working Party. As jobbing stroke clinicians and researchers ourselves, we are acutely aware of the unstinting efforts of all clinicians to deliver high-quality, compassionate care to people with stroke and their families and carers on a daily basis, and we trust that all those who use this guideline will find that it helps them to deliver that care more effectively.

The Editors

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Dr Martin James, Consultant Stroke Physician, Royal Devon and Exeter NHS Foundation Trust; Honorary Associate Professor, University of Exeter Medical School

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

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Key Recommendations

Overall structure of stroke services

6.1.1A Commissioning organisations should ensure that their commissioning portfolio includes the whole stroke pathway from prevention (including neurovascular services) through acute care, early rehabilitation, secondary prevention, early supported discharge, community rehabilitation, systematic follow-up, palliative care and long-term support.

Commissioning acute stroke services

6.2.1B Commissioners should commission acute stroke services in accordance with the recommendations in this guideline to provide:

- urgent brain imaging for patients with suspected acute stroke;
- treatment with alteplase for patients with acute ischaemic stroke;
- an endovascular service for patients with acute ischaemic stroke;
- a neuroscience service to admit, investigate and manage patients referred with subarachnoid haemorrhage, both surgically and with interventional radiology;
- a neuroscience service delivering neurosurgical interventions for intracerebral haemorrhage, malignant cerebral oedema, and hydrocephalus;
- direct admission of patients with acute stroke to a hyperacute stroke unit providing active management of physiological status and homeostasis within 4 hours of arrival at hospital;
- an acute neurovascular service for the diagnosis and treatment of people with suspected TIA;
- an acute vascular surgical service to investigate and manage patients with TIA and non-disabling stroke due to carotid artery stenosis.

Commissioning rehabilitation services

6.4.1A Commissioners should commission stroke rehabilitation services in accordance with the recommendations in this guideline to provide:

- an inpatient stroke unit capable of providing stroke rehabilitation for all people with stroke admitted to hospital;
- a specialist early supported discharge service to enable people with stroke to receive rehabilitation at home or in a care home;
- specialist rehabilitation services capable of meeting the specific health, social and vocational needs of people with stroke of all ages;
- services capable of delivering specialist rehabilitation in out-patient and community settings in liaison with in-patient services.

Overall organisation of acute stroke services

2.2.1A Community medical services and ambulance services (including call handlers and primary care reception staff) should be trained to recognise people with symptoms indicating an acute stroke as an emergency requiring transfer to a hyperacute stroke centre.

Specialist stroke services

2.3.1B People with suspected acute stroke (including when occurring in people already in hospital) should be admitted directly to a hyperacute stroke unit and be assessed for emergency stroke treatments by a specialist physician without delay.

Resources

2.4.1A People with stroke should be treated on a specialist stroke unit throughout their hospital stay unless their stroke is not the predominant clinical problem.

2.4.1B A hyperacute and/or acute stroke service should provide specialist medical, nursing, and rehabilitation staffing levels matching the recommendations in Table 2.1.

2.4.1D A hyperacute stroke unit should have continuous access to a consultant with expertise in stroke medicine, with consultant review 7 days per week.

2.4.1K A facility that provides treatment for in-patients with stroke should include:

- a geographically-defined unit;
- a co-ordinated multi-disciplinary team that meets at least once a week for the exchange of information about in-patients with stroke;
- information, advice and support for people with stroke and their family/carers;
- management protocols for common problems, based upon the best available evidence;
- close links and protocols for the transfer of care with other in-patient stroke services, early supported discharge teams and community services;
- training for healthcare professionals in the specialty of stroke.

Transfers of care from hospital to home

2.7.1A Hospital in-patients with stroke who have mild to moderate disability should be offered early supported discharge, with treatment at home beginning within 24 hours of discharge.

2.7.1K People with stroke, including those living in care homes, should continue to have access to specialist services after leaving hospital, and should be provided with information about how to contact them.

Service governance and quality improvement

2.8.1B Services for people with stroke should take responsibility for all aspects of service quality by:

- keeping a quality register of all people admitted to their organisation with a stroke;
- regularly reviewing service provision against the evidence-based standards set out in relevant national clinical guidelines;
- providing practical support and multi-disciplinary leadership to the process of clinical audit;
- participating actively in regional and national quality improvement initiatives such as Clinical Networks.

2.8.1D The views of people with stroke and their family/carers should be actively sought when evaluating service quality and safety, and when planning service developments.

Rehabilitation approach – intensity of therapy

2.11.1A People with stroke should accumulate at least 45 minutes of each appropriate therapy every day, at a frequency that enables them to meet their rehabilitation goals, and for as long as they are willing and capable of participating and showing measurable benefit from treatment.

Psychological care – organisation and delivery

2.12.1A Services for people with stroke should have a comprehensive approach to delivering psychological care that includes specialist clinical neuropsychology/clinical psychology input within the multi-disciplinary team.

End-of-life (palliative) care

2.15.1A Services providing acute and long-term care for people with stroke should provide high-quality end-of-life care for those who need it.

People with stroke in care homes

2.17.1A People with stroke living in care homes should be offered assessment and treatment from community stroke rehabilitation services to identify activities and adaptations that might improve quality of life.

Management of TIA – assessment and diagnosis

3.2.1A Patients with acute neurological symptoms that resolve completely within 24 hours (i.e. suspected TIA) should be given aspirin 300 mg immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic or an acute stroke unit.

Diagnosis of acute stroke

3.4.1B Patients with suspected acute stroke should receive brain imaging urgently and at most within 1 hour of arrival at hospital.

Management of ischaemic stroke

3.5.1A Patients with acute ischaemic stroke, regardless of age or stroke severity, in whom treatment can be started within 3 hours of known onset should be considered for treatment with alteplase.

3.5.1G Patients with acute ischaemic stroke should be considered for combination intravenous thrombolysis and intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have a proximal intracranial large vessel occlusion causing a disabling neurological deficit (National Institutes of Health Stroke Scale [NIHSS] score of 6 or more) and the procedure can begin (arterial puncture) within 5 hours of known onset.

Management of primary intracerebral haemorrhage

3.6.1D Patients with primary intracerebral haemorrhage who present within 6 hours of onset with a systolic blood pressure above 150mmHg should be treated urgently using a locally agreed protocol for blood pressure lowering to a systolic blood pressure of 140 mmHg for at least 7 days, unless:

- the Glasgow Coma Scale score is 5 or less;
- the haematoma is very large and death is expected;
- a structural cause for the haematoma is identified;
- immediate surgery to evacuate the haematoma is planned.

Acute stroke care

3.10.1E Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within four hours of arrival at hospital and before being given any oral food, fluid or medication.

Early mobilisation

3.12.1B Patients with difficulty moving early after stroke who are medically stable should be offered frequent, short daily mobilisations (sitting out of bed, standing or walking) by appropriately trained staff with access to appropriate equipment, typically beginning between 24 and 48 hours of stroke onset. Mobilisation within 24 hours of onset should only be for patients who require little or no assistance to mobilise.

Deep vein thrombosis and pulmonary embolism

3.13.1A Patients with immobility after acute stroke should be offered intermittent pneumatic compression within 3 days of admission to hospital for the prevention of deep vein thrombosis. Treatment should be continuous for 30 days or until the patient is mobile or discharged, whichever is sooner.

Work and leisure

4.1.4.1B People who wish to return to work after stroke (paid or unpaid employment) should:

- have their work requirements established with their employer (provided the person with stroke agrees);
- be assessed cognitively, linguistically and practically to establish their potential for return;
- be advised on the most suitable time and way to return to work, if return is feasible;
- be referred through the job centre to a specialist in employment for people with disability if extra support or advice is needed;
- be referred to a specialist vocational rehabilitation team if the job centre specialist is unable to provide the necessary rehabilitation.

Aphasia

4.4.1.1A People with communication problems after stroke should be assessed by a speech and language therapist to diagnose the problem and to explain the nature and implications to the person, their family/carers and the multidisciplinary team. Reassessment in the first four months should only be undertaken if the results will affect decision-making or are required for mental capacity assessment.

Hydration and nutrition

4.7.1F Patients with stroke who are unable to maintain adequate nutrition and fluids orally should be:

- referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- be considered for nasogastric tube feeding within 24 hours of admission;
- assessed for a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols;
- assessed for gastrostomy if they are unable to tolerate a nasogastric tube with nasal bridle.

Blood pressure

5.4.1A People with stroke or TIA should have their blood pressure checked, and treatment should be initiated and/or increased as tolerated to consistently achieve a clinic systolic blood pressure below 130 mmHg, except for people with severe bilateral carotid artery stenosis, for whom a systolic blood pressure target of 140–150 mmHg is appropriate.

Life after stroke - further rehabilitation

5.9.1.1A People with stroke, including those living in a care home, should be offered a structured health and social care review at six months and 1 year after the stroke, and then annually. The review should consider whether further interventions are needed, and the person should be referred for further specialist assessment if:

- new problems are present;
- the person's physical or psychological condition, or social environment has changed.

Choosing Wisely

As part of the worldwide 'Choosing Wisely' initiative (Section 1.3.3), the Academy of Medical Royal Colleges is asking its member colleges to promote informed choice through the identification of tests or interventions commonly used in their field, the necessity or practice of which should be questioned or avoided. The Intercollegiate Stroke Working Party provide here a list of interventions of questionable value in stroke (together with alternatives) to promote discussion between healthcare professionals and patients and encourage the selective use of limited resources. For more information visit www.choosingwisely.org.

1. **Do not** give heparin (in any dose) for the prevention of DVT and PE in patients who are immobile after acute stroke, and do not attempt to select those patients in whom the risk of VTE is sufficiently high to warrant the use of heparin.
   Do use intermittent pneumatic compression instead (Section 3.13).
2. **Do not** treat recurrent TIA in patients in sinus rhythm with anticoagulants.
   Do use antiplatelet treatment and investigate for carotid stenosis and paroxysmal atrial fibrillation before considering unusual causes of TIA or an alternative diagnosis (Section 3.3).
3. **Do not** routinely perform echocardiography in people with stroke or TIA.
   Do select those patients in whom an echocardiogram may be appropriate according to a history of structural cardiac disease or abnormal physical or ECG findings (Section 5.2).
4. **Do not** routinely use a urinary catheter or continence pads as first line management for people with continence problems after a stroke.
   Do use behavioural interventions such as timed toileting and prompted voiding first (Section 4.5).
5. **Do not** routinely offer oral nutritional supplements to patients with acute stroke who are adequately nourished on admission.
   Do assess hydration and risk of malnutrition in patients admitted to hospital with acute stroke (Section 4.7.1).
6. **Do not** use overhead arm slings and pulleys in people with stroke who have functional loss in the arm.
   Do ensure careful positioning of the affected arm and that carers and family handle the arm correctly (Section 4.12.3).
7. **Do not** assess driving eligibility with cognitive tests if the person's language impairment would invalidate the results.
   Do refer for an on-road assessment if there is uncertainty about eligibility for driving (Section 4.1.3).
8. **Do not** routinely provide specialist occupational therapy for people who have reached the end of their stroke rehabilitation and are now living in a care home.
   Do offer assessment and activities that might improve quality of life (Sections 2.17 and 5.9).
9. **Do not** routinely close a patent foramen ovale in a patient with stroke.
   Do offer antiplatelet treatment for the prevention of recurrent stroke (Section 5.7).

10. **Do not** use fibrates, ezetimibe, bile acid sequestrants, nicotinic acid or omega-3 fatty acids for cholesterol-lowering after stroke if the patient is unable to tolerate a statin.
Do try alternative methods to improve the tolerability of a statin such as a reduced dose, alternate-day dosing or a lower-intensity statin (Section 5.5).

Acronyms and Abbreviations

ADL	Activities of daily living
AF	Atrial fibrillation
AFO	Ankle Foot Orthoses
AMED	Allied and Complementary Medicine Database
APS	Antiphospholipid Syndrome
ASA	Atrial Septal Aneurysm
BADS	Behavioural Assessment of the Dysexecutive Sydrom
BASP	British Association of Stroke Physicians
BMI	Body Mass Index
BOA	Behavioural Outcomes of Anxiety
BP	Blood pressure
CEA	Carotid endarterectomy
CIMT	Constraint induced movement therapy
CINAHL	Cumulative index to nursing and allied health literature (Registered name of a bibliographic database)
COC	Combined oral contraceptive
CPAP	Continuous positive airways pressure
CPSP	Central post-stroke pain
CT	Computed tomography
CVT	Cerebral venous thrombosis
DISCs	Depression Intensity Scale Circles
DVLA	Driver and Vehicle Licencing Agency
DVT	Deep vein thrombosis
DWI	MRI with diffusion weight imaging
EADL	Extended activities of daily living
ECG	Electrocardiogram
ESD	Early Supported Discharge
FAST	Face Arm Speech Test
GP	General practitioner
HAS-BLED	Hypertension, Abnormal score renal and liver function, Stroke, Bleeding, Labile INRs, Elderly, Drugs or alcohol score
HRT	Hormone replacement therapy
HTA	Health Technology Assessment
ICF	International Classification of Functioning, Disability and Health
ICH	Intracerebral haemorrhage
INR	International normalized ratio (for blood clotting time)
IVT	Intravenous thrombolysis
LDL	Low-density lipoprotein
MCA	Middle cerebral artery
MDT	Multidisciplinary team
MHRA	Medicines and Healthcare Products Regulatory Agency
MI	Myocardial infarction
MOCA	Montreal Cognitive Assessment
MRI	Magnetic resonance imaging
MUST	Malnutrition Universal Screening Tool
NICE	National Institute for Health and Clinical Excellence
NIHSS	National Institute of Health Stroke Scale
NMES	Neuromuscular electrical stimulation

NOAC	Non-vitamin K anticoagulant
OCS	Oxford Cognitive Screen
OR	Odds ratio
OSA	Obstructive sleep apnoea
PADL	Personal activities of daily living
PAF	Paroxysmal atrial fibrilation
PCC	Prothrombin
PE	Pulmonary embolism
PFO	Patent foramen ovale
POC	Progestin only contraceptive
RATS	Relevance, Appropriateness, Transparency and Soundness
RBMT	Rivermead Behavioural Memory Test
RCPL	Royal College of Physicians London
RCT	Randomised controlled trial
ROSIER	Recognition of Stroke in the Emergency Room
SAD-Q	Severity of Alcohol Dependence Questionnaire
SAH	Subarachnoid haemorrhage
SARA	Scale for the Assessment and Rating of Ataxia
tDCS	Transcranial direct current stimulation
TENS	Transcutaneous electrical nerve stimulation
TIA	Transient ischaemic attack
TMS	Transcranial magnetic stimulation
TOE	Transesophogeal echocardiogram
TTE	Transthoracic echocardiogram
TTR	Time in therapeutic range
TULIA	Test of Upper Limb Apraxia
UK NHS	United Kingdom's National Health Service
VOSP	Visual Object and Space Perception battery
VTE	Venous thromboembolism
WHO	World Health Organization

Glossary

Activities of daily living	Refers to activities that people normally undertake (eg bathing, dressing, self-feeding).
Acupuncture	A complementary medicine that involves inserting thin needles into the skin.
Aerobic exercise	Low to moderate intensity exercise that can be sustained for long periods of time (eg cycling, swimming or walking).
Alteplase	A drug used for thrombolysis.
Aneurysm	A bulge in the wall of a blood vessel that is filled with blood. This can burst and cause a haemorrhage.
Angiography	A technique that uses X-ray technology to image blood vessels.
Anticoagulants	A group of drugs used to reduce the risk of clots by thinning the blood.
Antifibrinolytic agents	Drugs used to prevent excess bleeding by maintaining blood clot stability.
Antiphospholipid syndrome	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.
Antiplatelets	A group of drugs used to prevent the formation of clots by stopping platelets in the blood sticking together.
Antithrombotics	The generic name for all drugs that prevent the formation of blood clots. This includes antiplatelets and anticoagulants.
Arterial dissection	This is caused as a result of a small tear forming in the lining of the arterial wall.
Atherosclerosis	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.
Atrial fibrillation	A heart condition that causes an irregular heartbeat, often faster than the normal heart rate.
Audit (clinical)	A method of evaluating the performance of a clinical service against a set of standards/criteria.
Barthel Index	A scale that measures daily functioning specifically relating to the activities of daily living or mobility. Scores range from 0 to 100.
Biofeedback	A technique that provides feedback about bodily functions such as heart rate with the aim of bringing them under voluntary control.
Body mass index (BMI)	An index of body weight corrected for height.
Botulinum toxin	An injection which can relax muscles to reduce spasticity.
Cardiovascular disease	Disease of the heart and/or blood vessels.
Care pathway	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.
Carotid angioplasty	A surgical procedure that widens the internal diameter of the carotid artery, after it has been narrowed by atherosclerosis.
Carotid arteries	Main blood vessels in the neck, which supply oxygenated blood to the brain.
Carotid duplex ultrasound	A technique that evaluates blood flow through a blood vessel, in this case the carotid artery.
Carotid endarterectomy (CEA)	A surgical procedure used to clear the inside of the carotid artery of atheroma.
Carotid stenosis	The narrowing of the carotid arteries in the neck.
Carotid stenting	Insertion of a tube into the carotid artery in order to prop the artery open and reduce narrowing.
Caval filter	A device that is inserted into the veins to prevent a blood clot entering the lungs.
Cerebral venous sinus thrombosis	A blood clot that forms within a vein inside the brain.
Cochrane review	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).
Commissioner (health services)	Person or organisation that decides how to allocate the health budget for a service.
Compensatory strategies	Learning an alternative way of completing a task.
Computed tomography (CT)	An X-ray technique used to examine the brain.
Confidence interval (CI)	When analysing a research study, this is the range ('interval') of possible results that statisticians are 95% confident the actual result lies between.
Constraint induced movement therapy	Therapy that involves preventing the use of the unaffected side of the body thus forcing the use of the affected side.
Cost-effectiveness analysis	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'.
Decompressive hemicraniectomy	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.
Deep vein thrombosis (DVT)	A blood clot that develops in the large veins usually in the legs.
Diabetes mellitus	A metabolic disease in which a person has high blood sugar.
Diagnostic accuracy	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'.
Doppler ultrasound	An imaging technique that measures blood flow and velocity through blood vessels.
Dyspepsia	Indigestion.
Dysphagia	Difficulty in swallowing.
Early supported	A team offering rehabilitation in the community that replicates the stroke

discharge	unit care; this enables earlier home discharge than would be possible if the team was not available.
Endarterectomy	The surgical removal of plaque from a blocked artery to restore blood flow.
Face arm speech test (FAST)	A test used to screen for the diagnosis of stroke or TIA.
Foot drop	A condition in which the foot hangs limply whilst walking.
Gastrointestinal bleeding	Bleeding anywhere between the throat and the rectum.
Gastrostomy	A surgical opening into the stomach to enable feeding.
Goal attainment scaling	Rehabilitation goals for particular tasks are set by the patient and therapists together.
Haemorrhage	Bleeding caused by blood escaping into the tissues.
Health Technology Appraisal (HTA)	A way of comparing the cost-effectiveness (see above) of treatments,funded by the NHS.
Hemianopia	Blindness or some loss of vision in one part of the visual field.
Homeostasis	Regulation of internal environment (eg temperature regulated at 37°C).
Hydrocephalus	A build up of fluid within the skull.
Hyperacute stroke unit	A stroke unit that treats patients in the first few days of symptom onset.
Hyperlipidaemia	Raised levels of lipids (cholesterol, triglycerides or both) in the blood serum.
Hypertension	Raised blood pressure.
Hypertensive encephalopathy	Brain damage caused by raised blood pressure.
Hypoglycaemia	Blood sugar levels lower than the normal range.
Hypoxia	Blood oxygen levels outside the normal range, eg below 95% saturation.
Incontinence	Inability to control passing of urine and/or faeces.
Infarct	An area of cell death due to the result of a deprived blood supply.
International Functioning, Disability and Health (ICF)	A classification of health used as a framework by the World Health Classification of Organization (WHO) to measure health and disability.
International normalised ratio (INR)	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.
Lumbar puncture	A diagnostic or therapeutic procedure that involves collection of fluid from the base of the spine.
Magnetic resonance imaging (MRI)	A non-invasive imaging technique that allows for detailed examination of the brain.
Malnutrition Universal Screening Tool (MUST)	A screening tool that is comprised of five steps to help identify which adults are malnourished or at risk of malnourishment.
Meta-analysis	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.

MRI with diffusion weighted imaging (DWI)	This scan shows areas of recent ischaemic brain damage.
Musculoskeletal pain	Pain of the muscles and/or joints.
National Institute for Health and Clinical Excellence(NICE)	A special health authority set up within the NHS to develop appropriate and consistent advice on healthcare technologies, and to commission evidence-based guidelines.
National Institute of Health Stroke Scale (NIHSS)	A score to assess the severity of a stroke.
Neuropathic pain	Pain caused by damage to nerves.
Orthosis	An appliance used to support or align an area of the body to facilitate movement, prevent or correct damage.
Palliative care	Care that relieves rather than treats symptoms.
Papilloedema	Swelling of the optic discs in the eyes.
Pneumonia	An inflammatory condition of the lungs usually caused by infection.
Pulmonary embolism	A blood clot in the lungs.
Quality of life	Refers to the level of comfort, enjoyment, and ability to pursue daily activities.
Quality standard	A standard set by NICE that is used to define whether the quality of care is of a high standard.
Randomised controlled trial (RCT)	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.
Recognition of stroke in the emergency room (ROSIER)	A tool used to establish the diagnosis of stroke or TIA.
Saturated fat	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.
Self-efficacy	A person's belief in their own competency.
Sensitivity	The ability of a test to detect a problem.
Side effect	An adverse event that occurs because of a therapeutic intervention.
Spasticity	Increased stiffness of the muscles, that occurs in the paralysed limbs after stroke.
Specialist	A clinician whose practice is limited to a particular branch of medicine or surgery, especially one who is certified by a higher educational organisation.
Specificity	The ability of a test to detect the right problem.
Splint	A custom or ready-made external device to support a joint or limb in a certain position.
Stenosis	Abnormal narrowing of a blood vessel.
Stenting	A metal mesh tube is placed in an artery or blood vessel to increase blood flow to an area blocked by stenosis.

Stroke	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.
Stroke liaison worker	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.
Subluxation	An incomplete or partial dislocation of a joint.
Systematic review	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.
Telemedicine	The use of telecommunication and information technologies in order to provide clinical healthcare at a distance.
Thrombectomy	The excision of a blood clot from a blood vessel.
Thrombolysis	The use of drugs to break up a blood clot. An example of a thrombolysis drug is alteplase, also sometimes called tPA.
Thrombosis	A formation of a blood clot.
Transdermal	A route of administration where active ingredients are delivered across the skin.
Transient ischaemic attack (TIA)	A stroke that recovers within 24 hours from the onset of symptoms.
Venography	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.
Video fluoroscopy	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.
Agnosia	The inability for a patient to recognise or make proper sense of sensory information.
Visual analogue scale	A scoring system used in questionnaires that assesses for subjective characteristics or attitudes that cannot be directly measured.
WHO	World Health Organization.
Xanthochromia	The yellowish appearance of cerebrospinal fluid that occurs after bleeding into the fluid usually after subarachnoid haemorrhage.

1 Guideline Development

1.0 Introduction

This is the fifth edition of the *National Clinical Guideline for Stroke* produced by the Intercollegiate Stroke Working Party of the Royal College of Physicians of London (the 'Working Party'). In the four years since the previous edition, the evidence base for the treatment of people with stroke has moved on substantially once again, and these advances are reflected in the recommendations contained in this fifth edition. It also marks a significant departure from previous editions in that it is the first not to be produced in paper-printed form or sold as a book, and is exclusively available as a download. It will also be accompanied by a version for people with stroke and their family/carers produced with the lay members of the Working Party. In making the *National Clinical Guideline for Stroke* available in a range of formats, the Working Party hopes to increase the reach and accessibility of the guideline to healthcare professionals and the public, including elsewhere in the world other than just the UK. The Working Party also intends that this move to electronic-only publishing will enable the guideline to be more responsive to the ever-expanding evidence base in the years to come.

This edition includes updated evidence published since 2012, with literature searches completed up to September 2015 and with some major publications since that date also included. In updating the guideline, the Working Party has had to relinquish the previous link to the clinical guideline for stroke produced by the National Institute for Health and Care Excellence (NICE). Whereas previous editions of this guideline have sought to match the recommendations contained in NICE Clinical Guideline 68 *Stroke and transient ischaemic attack in over 16s: diagnosis and initial management* (National Institute for Health and Care Excellence, 2008a), such has been the progress in the treatment of stroke since the NICE guideline was produced that maintaining the link is no longer appropriate. There are therefore some important areas of divergence from NICE recommendations for the management of acute stroke and stroke rehabilitation. However, following the 2016 update to the NICE Quality Standard (QS2) *Stroke in adults* (2016) the Working Party has sought to align this guideline with those updated recommendations.

This latest edition also contains a major change of emphasis regarding recovery and rehabilitation from stroke. Previous editions have categorised rehabilitation in terms of *interventions*, whereas this edition has altered the focus to that of *problems*. Chapter 4 (Recovery and Rehabilitation) is therefore more person-centred in being subdivided according to the common problems that people with stroke encounter, and each section could be prefaced by the phrase 'My patient has/I have a problem with…'. In making this change the Working Party wishes to shift the focus of the evidence base towards what it can offer the person with stroke in solving their problems, rather than making the patient conform to the interventions that have been studied. In some instances this has simply served to emphasise the deficiencies of the available evidence in addressing the issues that people face when recovering from stroke.

As with the 2012 edition, the Working Party has:

> sought to separate recommendations that relate to the organisation and provision of stroke services to populations (Chapter 2) from those that relate to the management of individuals with stroke (Chapters 3-5) – although an absolute separation cannot be achieved and there remains some overlap between these chapters;

> included specific recommendations for those who commission and plan services for people with stroke (now in Chapter 6);

> used quantitative and qualitative evidence where appropriate. The full breadth of stroke interventions and care cannot be evaluated in the 'gold-standard' of a randomised controlled trial (RCT), so in choosing between making a recommendation based on less than perfect evidence and making no recommendation at all, the Working Party has sought to guide practice using the best available evidence;

> In areas of practice where evidence is absent or of such poor quality and/or quantity that a recommendation cannot be derived, expert consensus has been agreed on behalf of the entire Working Party.

1.1 Scope

This guideline covers the management in adults (i.e. people aged over 16 years) of:

> stroke (ischaemic stroke and primary intracerebral haemorrhage) and transient ischaemic attack (TIA), including ocular or retinal stroke and amaurosis fugax:

- acute diagnosis and treatment
- prevention of complications
- all aspects of rehabilitation
- long-term care and support
- secondary prevention
- organisation of stroke services.

> subarachnoid haemorrhage (SAH):

- immediate management required at an admitting hospital. The guideline does not cover surgical or neuroradiological interventions for SAH.

The guideline does not include:

> primary prevention of stroke

> detailed recommendations on (neuro-)surgical techniques (but the role of surgery is addressed)

> management of children with stroke – guidelines concerning children are presently in development by the Royal College of Paediatrics and Child Health

> general aspects of healthcare, unless there are specific issues relating to stroke.

1.2 Aim of the guideline

The aim of this guideline is to guide clinical practice in stroke by the latest and best available evidence, and in so doing improve the quality of care for all people affected by stroke in the UK regardless of age, gender, type of stroke, location, care setting or any other feature. However, any expert group is well advised not to deceive itself into believing that the publication of a clinical guideline is itself sufficient to lead to changes in clinical care, and clinical practice can be frustratingly slow to change in response to the evidence. These guidelines are but one part of an integrated quality improvement programme, the Royal College of Physicians Stroke Programme, which also includes national audit (the Sentinel Stroke National Audit Programme 'SSNAP') and a peer review scheme run jointly with the British Association of Stroke Physicians (BASP) and the Stroke Association. National comparative audit of the quality of care against the recommendations in this guideline has been, and will remain, integral to raising the standard of stroke care. Not only has audit had a direct influence on care delivery but also indirectly through its influence on other organisations (e.g. National Audit Office reports in 2005 and 2010) and policies (e.g. the National Service Framework for Older People (Department of Health, 2001) and the English National Stroke Strategy (Department of Health, 2007)), and the Working Party expects this guideline and its supporting audit to continue to guide policy and the provision of stroke services.

This guideline has been written with several audiences in mind:

> commissioners involved in planning and purchasing services for people with stroke

> clinical staff involved in the daily care of people with stroke
> managers involved in providing services for people with stroke
> people with stroke, and their relatives and friends.

A version is available for non-healthcare professionals 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 healthcare settings.

1.3 Structure of the guideline

1.3.1 Content

The guideline is organised into six chapters:

Chapter 1 – Guideline Development
This sets out the scope of the guideline, the methods by which it was developed, the conceptual framework for the guideline and how it should be used.

Chapter 2 – Organisation of Stroke Services
This chapter relates to interventions at the level of a stroke service, and contains recommendations regarding the organisation of stroke care, the principles and practice of rehabilitation and the provision of services for particular groups of people with stroke and their family/carers.

Chapter 3 – Acute Care
This chapter covers interventions for stroke or TIA during the acute phase, when the diagnosis is made, medical stability is achieved and early complications prevented, which approximates to the first 72 hours of care but in some instances extends into the post-acute/rehabilitation phase. It is principally concerned with interventions at the level of individual patients and their family/carers. The need to avoid an artificial distinction between acute and rehabilitation care is acknowledged, but for simplicity most aspects of rehabilitation and recovery are contained in Chapter 4.

Chapter 4 – Recovery and Rehabilitation
This chapter is the largest, and it focuses on the common problems that people with stroke will encounter as they recover from their stroke over the course of days, weeks and months. It is therefore focused on the person-centred outcomes of activities and participation (see below) rather than interventions aimed at pathology or impairments.

Chapter 5 – Long-term Management and Secondary Prevention
This chapter focuses on the long-term management of people with stroke, but only in relation to stroke-specific issues. It combines long-term medical management, principally around secondary vascular prevention and the treatment of less common causes of stroke, with aspects of social participation. It is concerned with the process of care as applied to people with stroke and their family/carers, and it is not intended to suggest a distinction between the activities and interventions described in Chapters 4 and 5 where none exists. The long-term management of medical co-morbidities is not covered.

Chapter 6 – Commissioning Stroke Services
This chapter addresses the aspects that commissioners (in England, those who plan and purchase NHS care on behalf of the local population) need to take into account when commissioning stroke services. For healthcare systems different from that in England, these recommendations will relate to those with responsibility for planning services at a population level. NHS commissioners have a particularly important role in ensuring that services are appropriately organised and delivered to a high standard, and in identifying the whole-system efficiencies that can be achieved by altering where and how

services are delivered. Commissioners should reasonably expect that the services they obtain will deliver all the recommendations outlined in the preceding chapters of this guideline.

Supplementary material
By popular request we have retained the profession-specific guidelines seen with previous editions, which have been compiled from the recommendations contained in the main chapters and can be accessed separately. The risk with these profession-specific sections is that they may be the only part of the guideline that a particular healthcare professional reads, leading to fragmentation of the multi-disciplinary working that is the hallmark of high-quality stroke care. The Working Party cautions against this potentially harmful approach to what is an integrated and multi-professional guideline.

1.3.2 Structure of each topic

Each topic has a similar general structure:

> **Introduction**: defining the topic and giving a brief background and clinical context

> **Evidence to recommendations**: examining in more detail the evidence behind a particular set of recommendations. This section may include some evidence that the Working Party considered important but not sufficient to justify a recommendation. This may not be appropriate for all sections where the evidence base is weak or absent, or where recommendations regarding the organisation of services (as in Chapter 2) are concerned with the optimal means of delivering evidence-based interventions

> **Recommendations**: given as a structured set (listed A, B, C etc.). Each set of recommendations is framed by the clinical process of care, so that a clinician should start with the first and will generally find that the order reflects clinical priorities and practice. Typically, assessment and diagnosis will precede intervention, and common, simple and safe actions will precede complex, expensive and rarely needed actions. There are also a small number of recommendations about interventions or actions *not* to do. As a general rule, readers can assume that if an action or intervention is not specifically mentioned in the guideline, then it is not recommended and should not be offered to people with stroke other than as part of a research trial

> **Sources:** giving a few major references for each recommendation or stating that the recommendation was arrived at by expert consensus of the Working Party

> **Implications:** identifying, where appropriate, the broader implications for implementation of the recommendations, including cost, workforce implications and what local teams need to do.

1.3.3 'Choosing Wisely'

For the first time the *National Clinical Guideline for Stroke* provides a separate list of interventions to be questioned by healthcare professionals and patients or avoided altogether, as part of the worldwide 'Choosing Wisely' initiative (known in Wales as 'Prudent Healthcare') to which the Academy of Medical Royal Colleges is a signatory. Choosing Wisely started as a clinician-led initiative in the USA and Canada with the aim of promoting joint decision-making between doctors and patients, to help people choose care that is:

- supported by the evidence
- not duplicative of other tests or procedures already received
- free from harm (including the harm that results from diverting resources away from other care)
- truly necessary.

In a healthcare system where resources are inevitably constrained it is unethical and wasteful to provide treatments or interventions which have no clinical value. In response to this challenge, the Academy of Medical Royal Colleges in collaboration with other clinical, patient, and healthcare organisations, is

asking its member colleges to promote 'Choosing Wisely' through the identification of tests or procedures commonly used in their field, the necessity or practice of which should be questioned or avoided. More information is available from www.choosingwisely.org.

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). First-ever stroke affects about 230 people per 100,000 population in the UK each year (Rothwell et al, 2005a), and accounts for 11% of all deaths. In England and Wales alone, over 80,000 people are hospitalised with acute stroke each year (Intercollegiate Stroke Working Party, 2016), and cerebrovascular disease is the third leading cause of disability in the UK (Newton et al, 2015). Approximately 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 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 recently suggested 'tissue-based' definition is 'an event lasting less than 1 hour without cerebral infarction on a magnetic resonance imaging brain scan', but this requires early scanning and is thus limited in generalisability, especially in low-income countries. In practice the precise definition used is not of great importance as however quickly or slowly recovery occurs and whether or not there is evidence of permanent damage on brain imaging, the investigations and medical treatment will be broadly similar. A conservative estimate for the incidence of first-ever TIA in the UK is 50 people per 100,000 population per year (Rothwell et al, 2005a), but this is a substantial underestimate when the overall burden of definite or possible, first or recurrent TIA is considered. TIA is associated with a very high risk of stroke in the first month after the event and up to 1 year afterwards, and all suspected cerebrovascular events need to be investigated and treated urgently.

Subarachnoid haemorrhage (SAH) is a haemorrhage from a cerebral blood vessel, aneurysm or vascular malformation into the subarachnoid space (the space surrounding the brain where blood vessels lie between the arachnoid and pia mater). The presentation of SAH is usually different from the presentation of other types of stroke, as it typically presents with sudden onset of severe headache and vomiting, with non-focal neurological signs which may include loss of consciousness and neck stiffness. It affects 6–12 people per 100,000 population per year in the UK. 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).

1.5 Context and use of this guideline

This guideline relates to those aspects of clinical management that are specific to stroke; it does not seek to address areas of routine clinical practice and good governance such as courtesy and respect for the individual, shared decision-making and supporting patient choice, accurate record keeping etc. Guidance on these aspects is contained in the NICE Clinical Guideline CG138 *Patient experience in adult NHS services: Improving the experience of care for people using adult NHS services* (National Institute for Health and Care Excellence, 2012a), and the associated NICE Quality Standard QS15 *Patient experience in adult NHS services* (National Institute for Health and Care Excellence, 2012c). It is assumed that this guideline will be used within the context of the NHS and non-NHS services available in the UK, and that clinicians will be operating within the recognised standards of practice laid out by their professional and regulatory bodies.

This guideline is set in the context of the current legal framework in 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, and it should be considered in conjunction with them – for example the Care Act (2014) in England. Within this framework, the intention is the guideline will facilitate practice not only in health services but also in social services and other organisations.

No clinical guideline can account for every eventuality, and recommendations should be taken as statements that inform the clinician, the patient and any other user, and not as rigid rules. The clinician remains responsible for interpreting recommendations taking into account the specific circumstances at hand, and for considering whether new evidence might exist that could alter the recommendation. In doing so, the clinician would do well to consider Sweeney's three levels of significance when applying the evidence to the person in front of them: statistical significance (is the evidence valid?), clinical significance (does the evidence apply to this clinical situation?) and personal significance (does the evidence apply to this person's particular circumstances and priorities?) (Sweeney et al, 1998). Clinicians can reasonably expect guidelines to be unambiguous about the first and to give guidance about the second, but the third level of significance can only be understood within the relationship between the treating clinician and their patient, and may provide the justification for deviations from recommended management in particular cases.

1.6 Models underpinning guideline development

This guideline has used several models or frameworks to structure its recommendations and layout. In summary these are:

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

The WHO ICF model is a particularly useful conceptual framework for disease management, particularly one with such long-term impact as stroke. This framework is articulated in terms of:

> pathology (the disease processes within organs)
> impairment (symptoms/signs; the manifestations of disease in the individual)
> activities (previously termed 'disability'; the impact of impairments on the person's usual activities)
> participation (previously termed 'handicap'; the impact of activity limitations on a person's place in family and society).

Early interventions are typically aimed at the pathology of stroke, and at limiting the extent of damage at a cellular or organ level (e.g. lysing a thrombus in a blocked artery to limit infarct size). Later interventions seek to modify the impact of the established pathology on the person's activities and their participation in society (e.g. adaptations to a car to enable a person with stroke to return to driving). These 'levels' always need to be understood in terms of the individual's physical, personal and social context. It is important for healthcare professionals to keep in mind that although many of their interventions are treating disease at the level of pathology and impairment, patients almost always interpret their illness in terms of its impact on their activities and social participation. Person-centred care should always seek to operate at the closest possible level to the person's own interpretation of their illness. Failing to meet the patient at their level of understanding always risks a mis-match in goals and expectations that can hinder the response to treatment and recovery.

1.7 Methodology of guideline development

This *National Clinical Guideline* was produced by the Intercollegiate Stroke Working Party and co-ordinated by the Clinical Effectiveness and Evaluation Unit (CEEU) of the Royal College of Physicians of London (RCPL). Full details on the development of the guideline are listed in the Appendices. The Working Party functions as the guideline development group, chaired by the Director of the RCPL Stroke Programme, Professor Tony Rudd CBE. The members of the Working Party (see Guideline Development Group of the Intercollegiate Stroke Working Party), were nominated by professional organisations and societies to give wide representation from all the disciplines involved in stroke care who will use the guideline, and including the views of people with stroke and their families. Most members have a longstanding professional interest and expertise in the field of stroke. The Working Party includes considerable methodological expertise in clinical trials, evidence synthesis and evaluation, including qualitative methods and health economic evaluation. Members are required to liaise with their professional bodies and with other experts in the field to ensure consistent professional representation throughout the process of guideline development. The Working Party chair and the editors are very grateful to all members of the Working Party who gave freely of their time and expertise to produce this guideline. Searches, the selection and extraction of studies, and the evaluation of the evidence were undertaken by a large number of people, listed in the Appendices. The three editors are extremely grateful to each and every one of them and the guideline would not exist without their hard work.

1.7.1 Development of scope

Section 1.1 outlines the scope of this guideline, which is very similar to previous editions. Scoping of questions within the Working Party followed by multi-professional and lay consultation led to the generation of 165 questions to be searched (see Appendices for full list of questions and search strategies).

1.7.2 Searching the scientific literature

Literature searches consisted of systematic searching of computerised databases including Medline, AMED, CINAHL, Psychinfo and Embase. The Cochrane Database of Systematic Reviews was used extensively, and other national guidelines were reviewed including those of the Scottish Intercollegiate Guidelines Network and NICE. Health Technology Appraisal (HTA) reports were used, and members of the Working Party brought their own expertise and consensus from their organisations and professional bodies. For topics newly added since 2012 searches included the time period from 1966 onwards; for the remainder of the topics searches were performed from 2012 until September 2015, although some major publications beyond this date have also been included.

If a Cochrane or other high-quality systematic review and meta-analysis relevant to a topic has been published within the last 2 years, further searches were not undertaken and the constituent papers within the meta-analysis were not individually reviewed. If there was substantial high-quality evidence available, additional new small trials were generally not reviewed. From the initial searches of 165 questions, a total of almost 2,000 papers were considered; of these, 670 were reviewed.

1.7.3 Selection of studies for inclusion

Abstract lists of studies published in English were reviewed by two individuals – the topic lead and the topic editor. Full papers were then obtained for studies that were within the topic scope. Studies were excluded by evidence of weak methodology or flawed study design, if research was not in people with stroke, or if the study was underpowered to derive any conclusions regarding effectiveness - usually by being too small, and studies with fewer than 20-30 participants were typically excluded, depending on

the plausible effect size. Differences of opinion regarding the need to review a study in full were resolved by discussion between the topic lead and the topic editor.
Evidence was obtained from published studies 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, studies including participants with other appropriate, usually neurological, conditions were used.
- Evidence from uncontrolled trials or large observational studies was used only when there was limited or no evidence from RCTs. In general, evidence from case series or single-case studies was not used. For some topics, evidence from high-quality qualitative studies was included.

1.7.4 Assessing the quality of research

The nature, quality and strength of the evidence behind each recommendation is summarised in the *Evidence to recommendations* paragraph for each topic – the evidence itself is evaluated in tables available in the Appendices. By necessity the paragraph is brief, but justifies the recommendations and explain the link to the primary evidence or the reason for expert consensus being used instead. The quality of the primary evidence was assessed using:

> the van Tulder assessment system for the quality of RCTs (van Tulder et al, 1997);

> the checklist that was developed for the third edition of the guideline and the widely used PRISMA checklist for systematic reviews and meta-analyses (Moher et al, 2009);

> 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 reproducibility.

1.7.5 Evidence to recommendations

Published evidence cannot always provide answers that can be translated directly into recommendations for clinical practice, particularly with complex interventions in which the precise mechanism of effect is difficult to discern. One result is that the evidence relating to specific individual interventions, usually drugs, is generally stronger, because it is methodologically simpler to study them in contrast to investigating multi-faceted or complex interventions over longer periods of time. This does not necessarily mean that interventions with so-called strong evidence are more important than those for which the evidence is weak. The 'Evidence to recommendations' sections of the guideline explain the balanced rationale behind a decision on whether to make a recommendation or not, particularly for contentious areas, and acknowledges areas of uncertainty.

Principal considerations for any intervention were the health benefits to people with stroke, balanced against risks and potential adverse effects. In the many areas of important clinical practice where evidence was not available or uncertain, the Working Party made consensus recommendations based on a collective view, but also drawing on any other relevant consensus statements, professional guidelines or recommendations.

The quality and strength of evidence supporting any recommendation was discussed in a meeting of the topic subgroup, chaired by the topic lead and overseen by the topic editor. Lay members contributed to the subgroup meetings, reviewed the outputs and suggested amendments. A draft recommendation was agreed, which was then submitted to the Working Party for approval or wider discussion as necessary. Responsibility for the final adjudication of unresolved issues lay with the three editors and the Working Party chair, with voting as necessary.

1.7.6 Grading of recommendations

In many clinical guidelines, recommendations are given a grade which derives entirely from the design of the studies providing the evidence. Although superficially appealing, this system introduces potential bias in the application of the evidence, particularly when it comes to complex areas of clinical practice. Methodologically strong evidence for less important interventions gives the linked recommendation an apparently higher priority than a vital recommendation where the evidence is weaker. The strength depends solely upon the study design and ignores other important features of the evidence such as its plausibility, generalisability, and the absolute benefit to the total population of people with stroke. Grading recommendations in this way fails to give readers guidance on what is important in the wider context.

For this guideline, as with previous editions, the Working Party has not adopted a hierarchical grading system for the 'strength' of recommendations. Instead, once all the recommendations were finalised, a formal consensus approach was used to identify the key recommendations in terms of their wider impact on stroke, and these are listed in the 'Key Recommendations' section.

1.7.7 Health economic considerations

A full cost-benefit analysis of every intervention is beyond the resources and scope of this guideline. In some instances, the evidence base provided sufficient information about cost-effectiveness to permit a health economic consideration and where this has been possible it has been included. Some of the new and existing recommendations in this guideline will have significant resource implications, and any organisational or financial barriers to implementation are identified within the linked 'Implications' sections so that commissioners and clinical networks can consider the means for local and regional implementation and service re-design.

1.7.8 External peer review

Following review of the literature and agreement on the draft content of the guideline by the Working Party, there was a period of external peer review during which key stakeholders including experts in all disciplines both from the UK and internationally, and patient and carer organisations, were asked to review the guideline and respond in a standard format. Changes were made to the guideline following discussion of the collated responses at a full meeting of the Working Party. Grateful thanks are due to the stakeholders (listed in Appendices) who took so much time and effort to give the benefit of their knowledge and expertise in improving the guideline before final publication.

1.7.9 Funding and conflicts of interest

This guideline was developed as an integral part of the Stroke Programme at the CEEU of the RCPL. No external funding was received or sought from any statutory, commercial or voluntary body, and the Working Party retains complete editorial independence over the guideline development process and content. Competing interests of the Working Party members are fully declared in the Appendices, following a policy and procedure based on the NICE *Policy on Conflicts of Interest* (National Institute for Health and Care Excellence, 2014f). The chair of the guideline development group has no pecuniary competing interests. When discussion occurred in relation to a declared competing interest of a member, that member was required to reiterate their interest and, depending on the nature and level of interest as judged by the Working Party chair, was excluded from contributing to the discussion or the development of any related recommendation.

1.7.10 Updating the guideline

It is recognised that research evidence changes continuously. The Working Party will be reviewing the evidence on a regular basis in response to submissions from members and constituent organisations, with the first anticipated partial review in 2018. It is anticipated that the previous four-yearly cycle of reviews and updating will be amended, taking advantage of the new digital publishing format to permit interim updates to the guideline in response to significant advances in the clinical evidence.

Feedback is always welcome, at stroke@rcplondon.ac.uk. 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 the Working Party is immensely grateful.

1.8 Treatments not mentioned in this guideline

This guideline was completed in July 2016, and is based on evidence and clinical practice in the UK at the time. It covers, as far as possible, all interventions for which evidence from RCTs is available, and many other interventions with other forms of evidence to support their use. Clinicians can apply the general rule that if an intervention is not mentioned in this guideline, then it is not recommended for use, and commissioners are not obliged to obtain it for the populations they serve. However, there are many areas where, even in a comprehensive guideline of this kind, it has not been possible to provide a recommendation, including in exploratory or emerging treatments about which there is often a great deal of professional and public anticipation (e.g. stem cell therapy). Any clinician who wishes to use an intervention not considered within this guideline should:

- impartially consider whether an intervention that is recommended in the guideline offers an equivalent or better prospect of benefit to their patient;
- thoroughly evaluate the available evidence for the proposed intervention, particularly with regard to safety;
- investigate whether participation in a clinical trial of the proposed intervention is possible for their patient;
- discuss the risks and benefits of the proposed intervention, as far as they are known, with the person with stroke, including a recognition that the intervention lies outside mainstream practice, so that they can make a fully informed decision.

1.9 Participation in clinical research

There are many areas of stroke care where the evidence base is weak and there is the pressing need for further research. Thus it is quite acceptable to offer patients participation in clinical trials which may lead to contravention of the recommendations in this guideline, where such research has received ethical approval and been subject to peer review. Stroke teams should be encouraged to participate in well-conducted multi-centre trials and other high-quality research. Involvement in research not only advances scientific knowledge but also helps to improve the quality of care, and increases staff and patient satisfaction. All clinical staff should be supporting the work of their local Clinical Research Network, and should remain aware of the many opportunities for their patients to participate in clinical research.

A small number of specific recommendations that patients should not be offered 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 benefits and harms, but there is insufficient evidence to either recommend an intervention, or to avoid its use.

1.10 Licensing of drugs

Recommendations about the use of specific drugs do not take into account whether the drug is licensed by the Medicines and Healthcare products Regulatory Agency (MHRA) for that particular use. It is up to the individual clinician and their healthcare provider 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 (e.g. aspirin in acute ischaemic stroke). In other circumstances, most notably the use of alteplase for acute ischaemic stroke, the recommendations implicitly acknowledge the licencing restrictions and contraindications to its use, or specifically address an area outside the current European licence (e.g. the upper age and time limits for its use).

2 Organisation of Stroke Services

2.0 Introduction

This chapter considers stroke management from a population perspective, addressing the means of organising services to deliver high quality stroke care. If services for people with stroke are poorly organised, outcomes will also be poor despite the evidence-based practice and best endeavours of individual clinicians. Furthermore, if clinical teams do not have sufficient knowledge and skills, and are not consistent in their clinical practice, many people will receive sub-optimal care.

The recommendations in this chapter fall under three headings: the organisation of in-patient stroke care (Sections 2.1-2.8), the principles and practice of rehabilitation (Sections 2.9-2.12), and the provision of services for particular groups of patients or their family/carers (Sections 2.13-2.17). These recommendations affect the full range of services within a comprehensive acute and community stroke service, and many of them have a strong evidence base and are among the most important contained in this guideline.

2.1 Public awareness of stroke

In recent years mass media campaigns such as the Face Arm Speech Time (FAST) campaign, have been delivered with the aim of increasing public awareness of the symptoms and signs of stroke (available at http://www.nhs.uk/actfast/Pages/know-the-signs.aspx). Public awareness of stroke prevention and treatment are also important.

Evidence to recommendations

The available research indicates some trends with regard to mass media campaigns, for example: television may be more effective than posters and newspaper advertisements; campaigns need to be repeated rather than short-term and one-off, and there are methodological weaknesses in the research (Lecouturier et al, 2010a). The evidence for a direct link between awareness and recommended behaviour is weak, especially among older members of the population, ethnic minority groups and those with lower levels of education – population groups at greater risk of stroke (Jones et al, 2010). Campaigns aimed at both public and healthcare professionals may have more impact on professionals than the public (Lecouturier et al, 2010b). More research in the area of improving public awareness and appropriate action is needed.

2.1.1 Recommendation

A Public awareness campaigns of the symptoms of stroke should be recurrent, targeted at those most at risk of stroke, and formally evaluated.

2.1.2 Sources

A Lecouturier et al 2010a,b; Working Party consensus

2.2 Overall organisation of acute stroke services

Effective stroke care will only occur if the organisational structure facilitates the delivery of the best treatments at the optimal time. This section makes recommendations that are consequential from the primary evidence; for example, intravenous thrombolysis (a recommended treatment) can only be given within 4.5 hours of stroke onset if people arrive in the appropriate setting within that time. Major urban

reorganisations of stroke services have taken place in some parts of the UK to improve access to hyperacute stroke unit care. Recent evidence from Manchester and London suggests that such care should be available in 24 hours a day, 7 days a week hyperacute stroke centres and should be for all people with acute stroke, not just those who might be suitable for intravenous thrombolysis (Ramsay et al, 2015).

2.2.1 Recommendations

A Community medical services and ambulance services (including call handlers and primary care reception staff) should be trained to recognise people with symptoms indicating an acute stroke as an emergency requiring transfer to a hyperacute stroke centre.

B People with an acute neurological presentation suspected to be a stroke should be admitted directly to a hyperacute stroke unit which cares predominantly for stroke patients.

C Acute hospitals receiving medical admissions that include people with suspected stroke should have arrangements to admit them directly to a hyperacute stroke unit on site or at a neighbouring hospital, to monitor and regulate basic physiological functions such as neurological status, blood glucose, oxygenation, and blood pressure.

D Acute hospitals that admit people with stroke should have immediate access to a specialist stroke rehabilitation unit on site or at a neighbouring hospital.

E Local health economies (geographic areas or populations covered by an integrated group of health commissioners and/or providers) should have a specialist neurovascular service capable of assessing and treating people within 24 hours of transient cerebrovascular symptoms.

F Public and professional education programmes should be run to increase awareness of stroke and the need for urgent diagnosis and treatment.

2.2.2 Sources

A, B Follows from the evidence concerning the emergency diagnosis and treatment of stroke (Sections 3.4-3.7)

C Follows from the evidence concerning acute stroke care (Section 3.10)

D Follows from the evidence concerning specialist stroke units (Sections 2.3-2.4)

E Follows from the evidence concerning TIA diagnosis and treatment (Section 3.2-3.3)

F Follows from the evidence concerning the emergency diagnosis and treatment of stroke (Sections 3.4-3.7)

2.2.3 Implications

These recommendations have significant implications for the organisation of acute medical services within any 'health economy' (locality). At a regional or sub-regional level, those who commission and provide stroke services are required to configure these services to achieve the maximum benefit to the population from the delivery of time-sensitive treatments, and to consider issues relating to the co-location of other emergency services that are beyond the scope of this guideline. The health and societal cost consequences should be positive because more effective stroke care will reduce long-term rehabilitation and care costs.

2.3 Specialist stroke services

There is strong evidence that specialised stroke unit care initiated as soon as possible after the onset of stroke provides effective treatments that reduce long-term brain damage, disability and healthcare costs. An acute stroke service consists of either: a) a hyperacute stroke unit which cares for in-patients for up to 72 hours followed by transfer to an acute stroke unit; b) a stroke unit which provides both hyperacute and acute stroke care; c) a comprehensive stroke unit which provides all components of hyperacute, acute and

rehabilitation stroke care. All components of a specialist acute stroke service should be based in a hospital which has the requisite facilities to investigate and manage people with acute stroke and the medical and neurological complications. This requirement does not apply to services designed for stroke care in the rehabilitation phase.

Given that one in 20 strokes occur in people already in hospital (Intercollegiate Stroke Working Party, 2016), clinicians in high-risk clinical areas (e.g. cardiology or renal wards, cardiothoracic units) should have a high level of awareness of the need to identify and treat acute neurological presentations urgently, including direct admission to a hyperacute stroke unit for emergency stroke treatments.

In this context:

– A ***specialist*** is defined as a healthcare professional with the necessary knowledge and skills in managing people with stroke and conditions that mimic stroke, usually by having a relevant further qualification and keeping up to date through continuing professional development. This does not require the healthcare professional exclusively to manage people with stroke, but does require them to have specific knowledge and practical experience of stroke.

– A ***specialist team*** or service is defined as a group of specialists who work together regularly managing people with stroke and conditions that mimic 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 or service must be able to deliver all the relevant recommendations made in this guideline. This does not require the team exclusively to manage people with stroke, but the team should have specific knowledge and practical experience of stroke.

2.3.1 Recommendations

A People seen by community-based clinicians (e.g. ambulance paramedics) with the sudden onset of focal neurological symptoms should be screened for hypoglycaemia with a capillary blood glucose, and for stroke or TIA using a validated tool. Those people with persisting neurological symptoms who screen positive using a validated tool should be transferred to a hyperacute stroke unit as soon as possible.

B People with suspected acute stroke (including when occurring in people already in hospital) should be admitted directly to a hyperacute stroke unit and be assessed for emergency stroke treatments by a specialist physician without delay.

C Acute stroke services should provide specialist multi-disciplinary care for diagnosis, hyperacute and acute treatments, normalisation of homeostasis, early rehabilitation, prevention of complications and secondary prevention.

D Acute stroke services should have management protocols for the admission pathway including links with the ambulance service, emergency stroke treatments, acute imaging, neurological and physiological monitoring, swallowing assessment, hydration and nutrition, vascular surgical referrals, rehabilitation, end-of-life (palliative) care, secondary prevention, the prevention and management of complications, communication with people with stroke and their family/carers and discharge planning.

E Acute stroke services should have continuous access to brain imaging including CT angiography and should be capable of undertaking immediate brain imaging when clinically indicated.

F Acute stroke services should have protocols for the monitoring, referral and transfer of patients to regional neurosurgical centres for decompressive hemicraniectomy, surgical management of intracranial haemorrhage and the management of symptomatic hydrocephalus including external ventricular drain insertion.

G Acute stroke services should ensure that people with conditions that mimic stroke are transferred without delay into a care pathway appropriate to their diagnosis.

H People with a diagnosis of stroke that was not made on admission should be transferred without delay into that part of the stroke service most appropriate to their needs.

I People with acute neurological symptoms that resolve completely within 24 hours (i.e. suspected TIA) should be given aspirin 300 mg immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic or on an acute stroke unit.

J Acute stroke services should have an education programme for all staff providing acute stroke care (including ambulance services and the emergency department as appropriate) and should provide training for healthcare professionals in the specialty of stroke.

K Acute stroke services should participate in national and local audit, multi-centre research and quality improvement programmes.

2.3.2 Sources

A, B Follows from the evidence concerning emergency stroke treatments (Sections 3.4-3.7)

C Follows from the evidence concerning emergency treatments and monitoring (Sections 3.5-3.7, 3.10)

D Follows from the evidence concerning specialist stroke units (Section 2.4)

E Wardlaw et al, 2004, 2014

F Follows from the evidence concerning emergency stroke treatments

G, H Working Party consensus

I Follows from the evidence concerning TIA diagnosis and treatment (Section 3.2-3.3)

J Follows from the evidence concerning specialist stroke units (Section 2.4)

K Working Party consensus

2.3.3 Implications

These recommendations have significant implications for the organisation of medical services within acute hospitals. Systems need to be adapted to ensure that people with acute stroke have rapid access to an acute stroke unit and to facilitate rapid transfer out of the unit once acute management is complete.

2.4 Resources

The provision of a well-led, appropriately trained and skilled workforce providing holistic and compassionate care to patients and their family/carers is one of the principal implications of the pivotal 2013 report produced by Robert Francis into the failings in care at Mid-Staffordshire NHS Foundation Trust (Francis, 2013). An appropriately staffed and skilled multi-disciplinary stroke unit is the cornerstone of the holistic care of people with stroke.

Evidence to recommendations

The evidence supporting stroke unit care from the Stroke Unit Trialists in the 1990s has been updated in a 2013 Cochrane review, which found that people with stroke who receive organised in-patient care in a stroke unit are more likely to be alive, independent, and living at home one year after their stroke (Stroke Unit Trialists' Collaboration, 2013). The benefits were only apparent in units based in a discrete ward. Increased access to stroke unit care underlies the recent improvements in stroke mortality in the NHS and remains an imperative for all in-patients with stroke.

The previous two sections have been concerned with the organisational structure of the stroke service. It is equally important to have appropriate resources available for the care of people with stroke: the workforce, buildings, and technological support required. Evidence for the appropriate amount of the different resources needed is limited. Trials have not been undertaken comparing different levels or

distributions of resources, and many services (e.g. radiology, psychology) will be shared with other in-patient provision. Minimum staffing levels on stroke units have been defined in hyperacute stroke service reconfigurations such as that in London, and observational evidence is accumulating from national registries about acute care processes that are associated with substantial benefits, including outside office hours and at weekends (Ramsay et al, 2015, Turner et al, 2016). In view of this observational evidence, the Working Party endorses the recommended staffing levels expressed as whole-time equivalents (WTE) in table 2.1, although the therapy levels in the table are based on weekday working and will need adjustment for therapy delivered across seven days, whilst also considering skill-mix and the use of therapy assistants delivering rehabilitation under the supervision of a qualified therapist.

Table 2.1 Recommended staffing levels for stroke units

	Physio-therapist	Occupational therapist	Speech and language therapist	Clinical neuro-psychologist/ clinical psychologist	Dietitian	Nurse	Consultant stroke physician
	Whole-time equivalent (WTE) per 5 beds					WTE per bed	
Hyperacute Stroke Unit	0.73	0.68	0.34	0.20	0.15	2.9 (80:20 registered: unregistered)	24/7 availability; minimum 6 thrombolysis trained physicians on rota
Acute Stroke Unit	0.84	0.81	0.40	0.20	0.15	1.35 (65:35 registered: unregistered)	Consultant-led ward round 5 days/week

The evidence regarding the optimum size of a hyperacute stroke unit is similarly confined to observational studies, reflecting a level of institutional experience and competence in the provision of specialist hyperacute treatments such as intravenous thrombolysis (Bray et al, 2013) that corresponds with a volume of at least 500 acute stroke admissions per year.

Telemedicine is used in some centres to support decision-making in hyperacute stroke because of significant practical or geographical obstacles. Observational evidence suggests that telemedicine is associated with more protocol violations and longer treatment times (Meyer et al, 2008, Dutta et al, 2015). Furthermore, unless telemedicine is used as part of an otherwise well-developed acute stroke service, outcomes may suffer (Heffner et al, 2015).

2.4.1 Recommendations

A People with stroke should be treated on a specialist stroke unit throughout their hospital stay unless their stroke is not the predominant clinical problem.

B A hyperacute and/or acute stroke service should provide specialist medical, nursing, and rehabilitation staffing levels matching the recommendations in Table 2.1.

C A hyperacute stroke unit should have immediate access to:

- specialist medical staff trained in the hyperacute and acute management of people with stroke, including the diagnostic and administrative procedures needed for the safe and

timely delivery of emergency stroke treatments;
- specialist nursing staff trained in the hyperacute and acute management of people with stroke, covering neurological, general medical and rehabilitation aspects;
- stroke specialist rehabilitation staff;
- diagnostic, imaging and cardiology services;
- tertiary services for endovascular therapy, neurosurgery and vascular surgery.

D A hyperacute stroke unit should have continuous access to a consultant with expertise in stroke medicine, with consultant review 7 days per week.

E An acute stroke unit should provide:
- specialist medical staff trained in the acute management of people with stroke;
- specialist nursing staff trained in the acute management of people with stroke, covering neurological, general medical and rehabilitation aspects;
- stroke specialist rehabilitation staff;
- access to diagnostic, imaging and cardiology services;
- access to tertiary services for neurosurgery and vascular surgery.

F An acute stroke unit should have continuous access to a consultant with expertise in stroke medicine, with consultant review 5 days per week.

G Where telemedicine is used for the assessment of people with suspected stroke by a specialist physician, the system should enable the physician to discuss the case with the assessing clinician, talk to the patient and/or family/carers directly and review radiological investigations. Telemedicine should include a high-quality video link to enable the remote physician to observe the clinical examination.

H Staff providing care via telemedicine (at both ends of the system) should be appropriately trained in the hyperacute assessment of people with suspected acute stroke, in the delivery of thrombolysis and the use of this approach and technology. The quality of care and decision-making using telemedicine should be regularly audited.

I A stroke rehabilitation unit should predominantly care for people with stroke.

J A stroke rehabilitation unit should have a single multi-disciplinary team including specialists in:
- medicine;
- nursing;
- physiotherapy;
- occupational therapy;
- speech and language therapy;
- dietetics;
- clinical neuropsychology/clinical psychology;
- social work;
- orthoptics;
- with easy access to pharmacy, orthotics, specialist seating, assistive technology and information, advice and support for people with stroke and their family/carers.

K A facility that provides treatment for in-patients with stroke should include:
- a geographically-defined unit;
- a co-ordinated multi-disciplinary team that meets at least once a week for the exchange of information about in-patients with stroke;
- information, advice and support for people with stroke and their family/carers;
- management protocols for common problems, based upon the best available evidence;
- close links and protocols for the transfer of care with other in-patient stroke services, early supported discharge teams and community services;

– training for healthcare professionals in the specialty of stroke.

2.4.2 Sources

A Stroke Unit Trialists' Collaboration, 2013

B Bray et al, 2014; Ramsay et al, 2015; Working Party consensus

C-F Follows from the evidence and recommendations concerning emergency treatments and monitoring (Sections 3.4-3.7, 3.10)

G, H Meyer et al, 2008; Working Party consensus

I-K Stroke Unit Trialists' Collaboration, 2013; NICE, 2016

2.4.3 Implications

These recommendations will require a considerable increase in the provision of some specialties in stroke services, especially clinical neuropsychology/clinical psychology and social work. The Working Party were particularly concerned by the findings of national registries indicating continued poor provision of these specialties for people with stroke. Patterns of work 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. Restoring adequate social work provision will require close integration with social services.

2.5 Location of service delivery

Stroke services should be organised to treat a sufficient number of patients to ensure that the specialist skills of the workforce are maintained. At the same time, the closer a rehabilitation service is to the person's home the more that family/carers can be engaged and the more targeted the rehabilitation can be. This section provides a recommendation on the location of delivery of services, aiming for an appropriate balance between care in hospital, on an out-patient basis and at home.

2.5.1 Recommendation

A People with acute stroke who cannot be admitted to hospital should be seen by the specialist team at home or as an out-patient within 24 hours for diagnosis, treatment, rehabilitation, and risk factor management at a standard comparable to that for in-patients.

2.5.2 Source

A Working Party consensus

2.6 Transfers of care – general principles

Many people who survive a stroke will interact with several different services during their recovery: primary care, specialist acute stroke services, specialist rehabilitation services, social services, housing, generic community services etc. This section covers general principles around the transfers of care between these agencies. Transfers of care out of hospital are covered in the next section.

2.6.1 Recommendations

A Transfers of care for people with stroke between different teams or organisations should:

- occur at the appropriate time, without delay;
- not require the person to provide information already given;
- ensure that all relevant information is transferred, especially concerning medication;
- maintain a set of person-centred goals;

- preserve any decisions about medical care made in the person's best interests.

B People with stroke should be:
- involved in decisions about transfers of their care if they are able;
- offered copies of written communication between organisations and teams involved in their care.

C Organisations and teams regularly involved in caring for people with stroke should use a common, agreed terminology and set of data collection measures, assessments and documentation.

2.6.2 Sources

A Working Party consensus

B Asplund et al 2009; Working Party consensus

C Working Party consensus

2.6.3 Implications

These recommendations require those who commission and provide services across health and social care to consider the current situation and how it might be redesigned to reduce transfers of care between organisations and improve continuity. The person recovering from stroke and their family should experience seamless care without artificial distinctions between service providers or between health and social care.

2.7 Transfers of care from hospital to home

The most common transfer of care, and the most stressful for people with stroke and their family/carers, is that from in-hospital care to their home or to a care home. Many people report feeling afraid and unsupported, and carers report feelings of abandonment (Stroke Association, 2015). There is much that services can do to support and reassure people with stroke and their family/carers regarding the smooth transfer of care into the community. In most areas services are now provided to support people to leave hospital earlier ('Early Supported Discharge', ESD) but often there are insufficient community stroke specialist services to support those with severe disability in their transfer from hospital to home.

Evidence to recommendations

A Cochrane review found high-quality evidence for the provision of ESD for people with mild to moderate disability after stroke to reduce dependency and admission to institutional care (Fearon et al, 2012). The greatest benefits are seen with a co-ordinated, stroke specialist team, but there remain uncertainties about how such teams should be configured or treatment delivered in practice, and in the impact of ESD teams now that length of stay for all in-patients with stroke is so much shorter than when many of the trials were conducted. Stroke specialist staffing in an ESD team should at least match the levels in the trials that provided the evidence of effectiveness (Fearon et al, 2012) and should be sufficient to deliver treatment at the recommended intensity (see Section 2.11).

A feasibility RCT investigating occupational therapy pre-discharge home visits after stroke (Drummond et al, 2013) was not sufficiently powered but provided useful data on the costs of home visits and tested an alternative method of conducting visits using photographs or videos.

A large cluster RCT of a structured training programme for caregivers of in-patients after stroke (Forster et al, 2013) showed no benefit of the intervention over usual care, although a subsequent process evaluation (Clarke et al, 2013) questioned whether the intervention had been undermined by not being delivered as intended. On the strength of the current evidence, the best means to support the caregivers of people with stroke in preparation for the transfer of care from hospital to home is not known.

2.7.1 Recommendations

A Hospital in-patients with stroke who have mild to moderate disability should be offered early supported discharge, with treatment at home beginning within 24 hours of discharge.

B An early supported discharge team should care predominantly for people with stroke and should provide rehabilitation and care at the same intensity as would be provided if the person were to remain on a stroke unit.

C A stroke early supported discharge team should be organised as a single multi-disciplinary team including specialists in:
- medicine;
- nursing;
- physiotherapy;
- occupational therapy;
- speech and language therapy;
- clinical neuropsychology/clinical psychology;
- with easy access to social work, dietetics, pharmacy, orthotics, orthoptics, specialist seating, assistive technology and information, advice and support for people with stroke and their family/carers.

D A stroke early supported discharge team should include:
- a co-ordinated multi-disciplinary team that meets at least once a week for the exchange of information about people with stroke in their care;
- information, advice and support for people with stroke and their family/carers;
- management protocols for common problems, based upon the best available evidence;
- close links and protocols for the transfer of care with in-patient stroke services, primary care and community services;
- training for healthcare professionals in the specialty of stroke.

E A stroke early supported discharge team should participate in national and local audit, multi-centre research and quality improvement programmes.

F People with stroke and their family/carers should be involved in decisions about the transfer of their care out of hospital, and the care that will be provided.

G Before the transfer of care for a person with stroke from hospital to home (including a care home) occurs:
- the person and their family/carers should be prepared, and have been involved in planning their transfer of care, if they are able;
- primary healthcare teams and social services should be informed before or at the time of the transfer of care;
- all equipment and support services necessary for a safe transfer of care should be in place;
- any continuing treatment the person requires should be provided without delay by a co-ordinated, specialist multi-disciplinary service;
- the person and their family/carers should be given information and offered contact with relevant statutory and voluntary agencies.

H Before the transfer home of a person with stroke who is dependent in any activities, the person's home environment should be assessed by a visit with an occupational therapist. If a home visit is not considered appropriate they should be offered an access visit or an interview about the home environment including photographs or videos taken by family/carers.

I People with stroke who are dependent in personal activities (e.g. dressing, toileting) should be offered a transition package before being transferred home that includes:

- visits/leave at home prior to the final transfer of care;
- training and education for their carers specific to their needs;
- telephone advice and support for three months.

J Before the transfer of care for a person with stroke from hospital to home (including a care home) they should be provided with:
- a named point of contact for information and advice;
- written information about their diagnosis, medication and management plan.

K People with stroke, including those living in care homes, should continue to have access to specialist services after leaving hospital, and should be provided with information about how to contact them.

2.7.2 Sources

A-D Fearon et al, 2012; NICE, 2013b, 2016; Working Party consensus

E-G Working Party consensus

H Drummond et al, 2013; Working Party consensus

I Gräsel et al, 2006; Lannin et al, 2007b; Barras et al, 2010

J, K Working Party consensus

2.7.3 Implications

All of the recommendations about transfers of care require close collaboration between those who commission and provide care in hospital and in the community. Service redesign based around the needs of the person with stroke often requires a willingness to shift resources from one sector to another if that is where care is more appropriately and effectively provided. Service redesign or extra resources may be required to ensure equity of access for people living in care homes.

2.8 Service governance and quality improvement

Stroke services should develop a culture of continuous quality improvement, and attention to good governance is mandatory. The obligation to seek and respond to information regarding service quality, safety and patient experience is another of the principal implications of the 2013 Francis report into the failings in hospital care at Mid-Staffordshire NHS Foundation Trust (Francis, 2013). The process of clinical governance should be embedded within all healthcare organisations, and this section only considers the stroke-specific aspects. People's perceptions of the quality of care they receive do not always match the clinicians' views of the care that they have delivered and these views need to be separately audited, in a manner that enables the participation of those with significant disabilities. The process of quality improvement includes collecting appropriate data in a timely manner, analysing the data and acting upon the findings.

2.8.1 Recommendations

A Clinicians providing care for people with stroke should participate in national stroke audit to enable comparison of the clinical and organisational quality of their services, and use the findings to plan and deliver service improvements.

B Services for people with stroke should take responsibility for all aspects of service quality by:
- keeping a quality register of all people admitted to their organisation with a stroke;
- regularly reviewing service provision against the evidence-based standards set out in relevant national clinical guidelines;
- providing practical support and multi-disciplinary leadership to the process of clinical audit;

- participating actively in regional and national quality improvement initiatives such as Clinical Networks.

C General practitioners should regularly audit the primary and secondary prevention of stroke within their practice, and maintain a register of people with stroke or TIA.

D The views of people with stroke and their family/carers should be actively sought when evaluating service quality and safety, and when planning service developments.

E People with stroke and their family/carers should be offered any practical support necessary to enable participation in service user consultations.

2.8.2 Sources

A, B Working Party consensus; obligations under the NHS Standard Contract

C-E Working Party consensus

2.8.3 Implications

Data collection and quality control procedures require specific resources, including staff time and unfortunately these are often not made available, particularly for continuous audit. It also requires commitment to the process by the whole multi-disciplinary team. Regulators and other 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.

Some resources need to be allocated to facilitate the involvement of service users who have limitations with mobility or communication. These recommendations require organisations to be supportive and listening in their attitude to the opinions of service users.

2.9 Rehabilitation approach – measurement

The measurement of function is central to the rehabilitation process. A review of the literature relating to assessment and measurement is beyond the scope of this guideline, and the Working Party does not specify which measures should be used beyond a small number of specific circumstances and giving examples. Many valid tools exist and it is important when considering the use of an assessment measure to understand which domain of the WHO ICF framework the instrument is measuring, and to ensure that the instrument is appropriate to the intervention in question (Wade, 1992). Clinicians should be trained in the use of measurement scales to ensure consistent use within the team and to provide an understanding of their properties and limitations. This section therefore only considers the general principles of measurement in stroke rehabilitation.

2.9.1 Recommendations

A Assessment measures used in stroke rehabilitation should meet the following criteria as far as possible:

- they should collect relevant data across the required range (i.e. they are valid and fulfil a need);
- they should have sufficient sensitivity to detect change within a person and differences between people;
- their reliability should be known when used by different people on different occasions and in different settings;
- they should be simple to use under a variety of circumstances;
- they should provide scores that are easily understood.

B A stroke service should agree on a standard set of assessment measures that should be collected and recorded routinely.

C A stroke service should have protocols for determining the routine collection and use of data that:
- specify the reason for and proposed use of each assessment measure;
- provide individual clinicians with a choice of assessment measures where no measure is obviously superior;
- review the utility of each assessment measure regularly.

D A stroke service should have protocols for the use of more complex assessment measures, describing:
- when it is appropriate or necessary to consider their use;
- which assessment measure(s) should be used;
- what specific training or experience is needed to use the assessment measure(s).

2.9.2 Sources

A–D Wade, 1992; Wikander et al, 1998; Working Party consensus

2.9.3 Implications

Services should consider the assessment measures that best serve their patients with stroke. These are likely to vary according to where they are in their treatment and recovery, but the preference should always be towards assessment measures that describe activities and participation, as opposed to impairments (see the WHO ICF framework in Section 1.6).

2.10 Rehabilitation approach – goal setting

Goal setting can be defined as a behavioural target that is central to rehabilitation, but is also effective in secondary risk factor reduction such as weight loss, smoking cessation or alcohol reduction. Goal setting is the process by which the person with stroke (and their family or carers if they wish) and members of the stroke team identify individual treatment goals which are meaningful, challenging and have personal value. Goals are worked towards over a specified period of time, both short and long term. Traditionally goals have been therapy-led and orientated to specific therapy targets which are realistic and measurable. This method has proved to be an effective and efficient rehabilitation tool when used flexibly to reflect that the person's ability and motivation to participate may fluctuate over time. A balance should be made between practicality, working in a step wise approach and supporting the aspirations of the person with stroke. Recently a move towards self-management and self-efficacy has been promoted as a more person-oriented approach to goal setting.

Evidence to recommendations

Recent literature includes one systematic review of qualitative and quantitative studies (Sugavanam et al, 2013) which examined 17 trials and concluded that no consistent approach was used and there were difficulties implementing a self-management approach. A qualitative paper by Jones et al (2013) highlighted a lack of training and awareness of the self-management approach. A Cochrane review of 39 RCTs in 2846 subjects participating in rehabilitation with a variety of conditions including acquired brain injury (Levack et al, 2015) concluded there was low-quality evidence that goal setting may improve health-related quality of life and other psychosocial outcomes such as emotional status and self-efficacy. Goal setting should involve the person with stroke and their family/carers where appropriate, and be measured and evaluated in a consistent and standardised way.

2.10.1 Recommendations

A People with stroke should be actively involved in their rehabilitation through:
- having their feelings, wishes and expectations for recovery understood and

acknowledged;
  - participating in the process of goal setting unless they choose not to, or are unable to because of the severity of their cognitive or linguistic impairments;
  - being given help to understand the process of goal setting, and to define and articulate their personal goals.

B People with stroke should be helped to identify goals that:
  - are meaningful and relevant to them;
  - are challenging but achievable;
  - aim to achieve both short-term (days/weeks) and long-term (weeks/months) objectives;
  - are documented, with specific, time-bound and measurable outcomes;
  - have achievement measured and evaluated in a consistent way;
  - include family/carers where this is appropriate;
  - are used to guide and inform therapy and treatment.

C People with stroke should be supported and involved in a self-management approach to their rehabilitation goals.

2.10.2 Sources

A, B Malec et al 1991; Wressle et al 2002; Stein et al 2003; Hurn et al 2006; Levack et al 2006; Holliday et al, 2007a, b; Working Party consensus

C Rosewilliams et al, 2011; Sugavanam et al, 2013; Taylor, 2012

2.11 Rehabilitation approach – intensity of therapy

There is much debate about the amount and frequency of therapy that is needed for stroke rehabilitation, and each person with stroke should be assessed individually and reassessed regularly. Rehabilitation is an adaptive process, and practice and repetition are likely to be key components with optimal recovery often requiring many months of treatment. It is plausible that an increased intensity of rehabilitation may accelerate the process of recovery, even if the final outcome is unaltered, but the timing and intensity of delivery should be carefully considered. This is especially the case within the first few weeks as both high dropout (e.g. aphasia) and worse outcomes (e.g. very early mobilisation) have been seen in high-quality studies of early intensive therapy.

Evidence to recommendations

Comparative studies suggest that in the UK face-to-face therapist-patient contact time is lower than in other European countries (Putman et al, 2006, Putman et al, 2007). There is good-quality evidence that more therapy improves the rate of recovery and outcome within the first six months after stroke, but there is little evidence to guide precisely how much therapy should be regarded as a minimum (Kwakkel et al, 2004, Lohse et al, 2014). There are few trials to guide practice, and interpretation is confounded by the services that delivered more therapy being more organised and expert when compared with the control group (Kwakkel et al, 1997), and more intensive early therapy tending to result in a higher rate of dropouts (Brady et al, 2016). For the 2012 edition, the available evidence was debated by the Working Party and subsequently by the NICE Quality Standards Development Group and a consensus reached that 45 minutes of active treatment with each relevant therapy each working day was a reasonable and achievable target, delivered by therapists or therapy assistants in one-to-one, computer-assisted or group sessions. Evidence that has emerged since then has resulted in the need to qualify this target in early stroke rehabilitation. The large international AVERT trial (AVERT Trial Collaboration group, 2015, Bernhardt et al, 2016) suggested that in the first two weeks after stroke, therapy targeted at the recovery of mobility should be redesigned around frequent, short interventions, except for those people who require little or no assistance to mobilise (see Section 3.12). Therapy targeted at other activities of daily living should be task-specific, progressive and practised frequently, and incorporated by the entire healthcare team into routine activities

on the stroke unit every day of the week rather than confined to lengthy sessions separated by long periods of inactivity. The objective is that rehabilitation is a pervasive activity, combining time spent with therapists in assessment and treatment with time spent practising with other professional staff, or with family/carers or alone. Rehabilitation intensity in both acute and longer-term settings is an area which requires more research.

2.11.1 Recommendations

A People with stroke should accumulate at least 45 minutes of each appropriate therapy every day, at a frequency that enables them to meet their rehabilitation goals, and for as long as they are willing and capable of participating and showing measurable benefit from treatment.

B In the first two weeks after stroke, therapy targeted at the recovery of mobility should consist of frequent, short interventions every day, typically beginning between 24 and 48 hours after stroke onset.

C Multi-disciplinary stroke teams should incorporate the practising of functional skills gained in therapy into the person's daily routine in a consistent manner, and the care environment should support people with stroke to practise their activities as much as possible.

D Healthcare staff who support people with stroke to practise their activities should do so under the guidance of a qualified therapist.

2.11.2 Sources

A Langhorne et al, 1996; Kwakkel et al, 1997, 2004; Lohse et al, 2014; NICE, 2016; Working Party consensus

B AVERT Group, 2015; Bernhardt et al, 2016

C Smith et al, 1981; Langhorne et al, 1996; Kwakkel et al, 1997, 2004; Lincoln et al, 1999; Kwakkel and Wagenaar, 2002

D Working Party consensus

2.11.3 Implications

These recommendations have significant implications for the design of treatment programmes for people with stroke, particularly with regard to mobility. Frequent short episodes of treatment should become the predominant pattern in the first 14 days after stroke onset. As stamina increases beyond the first two weeks, longer sessions may become the norm provided fatigue does not intervene. In UK practice, there remains a priority on increasing face-to-face therapy time and reducing time spent on administration. The number of available therapists should be increased and rehabilitation services should reorganise to increase the proportion of time each therapist spends in face-to-face contact. This might mean reducing administration and/or employing other staff to undertake these tasks so as to allow more treatment time. The training of nurses in stroke care should enable them to take on a more active role in supporting functional practice of activities of daily living, and more nursing resource may be needed to achieve this. The environment of stroke units should be designed to support rehabilitation activity. Research into intensity of therapy and how to deliver it should be a high priority.

2.12 Psychological care – organisation and delivery

Psychological care should be provided by stroke services across acute and community settings. National audits continue to highlight inadequate service provision, and surveys of the long term needs of people with stroke echo the need for service improvement. This section covers issues of service organisation and delivery, with recommendations for the rehabilitation of specific cognitive and mood difficulties contained in Chapter 4.

The three main models (collaborative care, matched care and stepped care) are summarised by NICE Clinical Guideline 91: Depression in adults with a chronic physical health problem (National Institute for Health and Care Excellence, 2010a). Stepped care involves starting all people at the lowest level intervention and stepping up to the next level if they do not adequately respond. Matched (or stratified) care includes an initial triage so that people start on the most appropriate step, which may be the highest level. Stepped or matched care can be part of collaborative care, a model for the management of chronic disease. Collaborative care has four components: collaborative identification of problems; goal-planning; self-management training and support to facilitate intervention plans, behaviour change and emotional coping; and active monitoring and follow-up.

A key feature of these models is to highlight the complementary roles played by specialists in neuropsychological provision (clinical neuropsychologist/clinical psychologist and assistants) and by other members of the stroke team. In these models the latter provide psychological support at the first and second levels whilst the clinical neuropsychologist/clinical psychologist's role is principally at level three/high intensity provision and in training other service providers.

One further model of psychological care is comprehensive neuropsychological rehabilitation, based on a biopsychosocial model of illness. Comprehensive programmes integrate evaluation of cognition, behaviour and emotional needs to formulate the individual's difficulties. They assist in developing alternative or compensatory expectations and behaviours, leading towards independent self-management (see Section 2.13). They acknowledge that people with stroke may have limited awareness of impairments or their impact, and that many therapies require motivation for engagement.

Evidence to recommendations

Both NICE (2011b) and the former NHS Stroke Improvement Programme (Gillham, 2011) advocate a stepped-care model based on an initial awareness of need and which places individuals on an appropriate step, or quickly identifies those who need to be immediately stepped up. Essentially, this is matched care. No stroke-specific evidence was found for stepped care. The literature from general mental health includes one systematic review including non-controlled trials (Firth et al, 2015) and one meta-analysis (van Straten et al, 2015). These focused on stepped care for depression and there were no trials in anxiety. They conclude that stepped care is as effective as usual care, with some results favouring stepped care. Both papers noted that the evidence for stepped care was limited and further research was required comparing stepped care with other models such as matched care and collaborative care, both in terms of efficacy and cost-effectiveness. Additionally, what is considered to be stepped care is highly variable, including the quality of services provided and the use of mixed models of service delivery (Firth et al, 2015, van Straten et al, 2015). A Cochrane review (Archer et al, 2012) of the effectiveness of collaborative care for the treatment of depression and anxiety in mental health concluded that collaborative care is associated with greater improvement in depression and anxiety outcomes compared with usual care.

Most of the evidence for comprehensive/holistic rehabilitation programmes after acquired brain injury, including stroke, comes from case series or cohort studies. Two RCTs in acquired brain injury support the integration of cognitive, interpersonal and functional skills (Salazar et al, 2000, Cicerone et al, 2008). Evidence for long-term improvement is mixed. Methodological concerns were reported in two reviews of traumatic brain injury (Cicerone et al, 2009, Cattelani et al, 2010) suggesting a need for more well-designed trials.

2.12.1 Recommendations

A Services for people with stroke should have a comprehensive approach to delivering psychological care that includes specialist clinical neuropsychology/clinical psychology input within the multi-disciplinary team.

B Services for people with stroke should offer psychological support to all patients regardless of

whether they exhibit specific mental health or cognitive difficulties, and use a matched care model to select the level of support appropriate to the person's needs.

C Services for people with stroke should provide training to ensure that clinical staff have an awareness of psychological problems following stroke and the skills to manage them.

D Services for people with stroke should ensure that the psychological screening and assessment methods used are appropriate for use with people with aphasia and cognitive impairments.

E Services for people with stroke should provide screening for mood and cognitive disturbance within six weeks of stroke (in the acute phase of rehabilitation and at the transfer of care into post-acute services) and at six and 12 months using validated tools and observations over time.

F Services for people with stroke should include specialist clinical neuropsychology/clinical psychology provision for severe or persistent symptoms of emotional disturbance, mood or cognition.

G Services for people with stroke should consider a collaborative care model for the management of people with moderate to severe neuropsychological problems who have not responded to high-intensity psychological interventions or pharmacological treatments. This care model should involve collaboration between the GP, primary and secondary physical health services and case management, with supervision from a senior mental health professional and should include long-term follow-up.

2.12.2 Sources

A Salazar et al, 2000; Cicerone et al, 2008; NICE, 2016; Working Party consensus

B, C Working Party consensus; Gillham and Clark 2011; NICE, 2010a

D Working Party consensus

E NICE, 2016; Working Party consensus

F, G Working Party consensus

2.12.3 Implications

Stroke services need to consider how to develop and maintain the knowledge and skills in all clinical staff to provide appropriate psychological support to people with stroke, and how to provide the high-intensity support needed by a minority of people with cognitive and mental health issues. Compared to historical levels of provision, this will require considerable investment which is likely to prove cost-effective in the longer term. Commissioners of therapy services for people with stroke should bear in mind that many current arrangements do not include psychological provision, or it may be separately commissioned often from another provider. The 2016 NICE Quality Standard QS2 is clear that a clinical neuropsychologist/clinical psychologist with expertise in stroke rehabilitation should be a core member of the multi-disciplinary team. Commissioners should also plan for the long term management of psychological difficulties of delayed onset (e.g. anxiety, depression).

2.13 Self-management

There is increasing evidence of psychological factors that influence confidence and adjustment to life after stroke. Self-efficacy has been defined as an 'individual's belief in their own capability' and has been found to be positively associated with mobility, activities of daily living, and quality of life and negatively associated with depression after stroke (Korpershoek et al, 2011). Self-efficacy is closely related to mood and self-esteem, and there are relations between self-efficacy and emotional states (depression, anxiety) and quality of life.

Self-efficacy may mediate self-management skills such as problem solving and goal setting and is used as an outcome measure in some self-management programmes (Korpershoek et al, 2011, Lennon et al, 2013, Parke et al, 2015, Warner et al, 2015). There is emerging evidence on the utility of changing self-efficacy to influence independence and the promotion of self-management after stroke. Self-management has been defined in various ways but many programmes refer to the 'actions and confidence of individuals to manage the medical and emotional aspects of their condition in order to maintain or create new life roles' (Corbin, 1998, Parke et al, 2015). Programmes mainly focus on supporting the knowledge and skills required to self-manage, and range from educational approaches to interventions to support behaviour change.

Evidence to recommendations

Evidence suggests that self-management programmes based on self-efficacy can influence functional capability and social participation. Recent systematic reviews support self-management interventions after stroke although meta-analysis was not possible because of heterogeneity in the methods of delivery, clinical outcomes and stroke severity (Lennon et al, 2013, Parke et al, 2015, Warner et al, 2015). Not all studies in these reviews used self-efficacy as a mediator nor explicitly used self-efficacy outcome measures. A recent feasibility cluster RCT showed it was feasible to integrate stroke self-management into community rehabilitation and provided data to design future definitive trials (Jones et al, 2016). More research is needed to understand the role of self-efficacy in rehabilitation, the skills required by professionals, and how participants perceive the impact of self-management interventions on their self-efficacy.

2.13.1 Recommendations

A People with stroke should be offered self-management support based on self-efficacy, aimed at the knowledge and skills needed to manage life after stroke, with particular attention given to this at reviews and transfers of care.

B People with stroke whose motivation and engagement in rehabilitation appears reduced should be assessed for changes in self-esteem, self-efficacy or identity and mood.

C People with significant changes in self-esteem, self-efficacy or identity after stroke should be offered information, support and advice and considered for one or more of the following psychological interventions:

- increased social interaction;
- increased exercise;
- other psychosocial interventions, such as psychosocial education groups.

2.13.2 Sources

A Lennon et al, 2013; Parke et al, 2015; Warner et al, 2015; Working Party consensus

B Working Party consensus

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

2.13.3 Implications

These recommendations serve to emphasise the important interaction between newly-recognised psychosocial concepts of self-efficacy and self-management, and functional outcomes and social participation after recovery from stroke. Stroke services need to consider how to develop the knowledge and skills in rehabilitation staff to support self-management, and how to provide psychological interventions as an adjunct to more familiar physical treatments, including in community stroke services.

2.14 Stroke services for younger adults

Stroke occurs at all ages and about a quarter of people with stroke 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 an unusual cause for their stroke, rehabilitation may require specific attention to work and bringing up children, and social needs and expectations may be different. Thus, although all stroke services should respond to the particular needs of each individual regardless of age or other factors, it is appropriate to draw attention to this group of younger people with stroke. Guideline users should also refer to the section on work and leisure (Section 4.1.4).

A separate guideline covering stroke in children has been produced (Paediatric Stroke Working Group, 2004) and is being updated (http://www.rcpch.ac.uk/improving-child-health/clinical-guidelines/clinical-guidelines-and-standards).

2.14.1 Recommendations

A Younger adults with stroke should receive the same hyperacute and acute stroke care as older adults.

B Acute stroke services should:
- recognise and manage the particular physical, psychological and social needs of younger people with stroke (e.g. vocational rehabilitation, child care);
- liaise with regional neurorehabilitation services specialising in the neurorehabilitation of young adults.

C People who have had a stroke in childhood and require ongoing healthcare into adulthood should have their care transferred in a planned manner to appropriate adult services.

2.14.2 Sources

A, B Working Party consensus

C Department of Health, 2005; Working Party consensus

2.14.3 Implications

These recommendations can most readily be met by a specialist neurological rehabilitation service as such services generally, though not exclusively, focus on people of working age. Each locality (health economy) should have a specialist neurological rehabilitation service to comply with the National Service Framework for Long-term (Neurological) Conditions (Department of Health, 2005). There also needs to be a close link between neurological and stroke rehabilitation services and a system in place to ensure that there is a seamless transition for younger people with stroke from paediatric to adult neurological services.

2.15 End-of-life (palliative) care

About one in 20 people with acute stroke will be receiving end-of-life care within 72 hours of onset, and one in seven people with acute stroke will die in hospital (Intercollegiate Stroke Working Party, 2016), making stroke one of the most lethal acute conditions in modern medicine. This means that providing high-quality end-of-life care is a core activity for any multi-disciplinary stroke team. Predicting the prognosis after acute stroke can be challenging and may account for the low proportion of people with stroke identified for end-of-life care in hospital and community settings. Stroke may cause a range of problems including pain and distress, depression, confusion and agitation, and problems with nutrition and hydration. When these issues are appropriately and holistically managed, distress associated with the end-of-life experience for both the person and the family/carers can be alleviated. In particular, rigid adherence to recommendations elsewhere in this guideline on access to oral food and/or fluids while there is the risk of aspiration could, in palliative care, impose burdensome restrictions that may exacerbate suffering. The

application of such restrictions in individual situations should be interpreted with the primary purpose of relieving suffering under the 'principle of double effect'.

Advance care planning should take place for those people who may survive the acute stroke with limited life expectancy, to facilitate timely referral to specialist palliative care services.

Evidence to recommendations

Much of the research in end-of-life care has come from the field of cancer, and there are few good quality end-of-life studies in stroke. A Cochrane review by Good et al (2014) reviewed medically assisted hydration in adults receiving palliative care, and concluded there was no clear evidence of benefit with assisted hydration as problems from side effects can be as distressing as symptoms associated with withholding fluids. Gardiner et al (2013) conducted a small qualitative study of focus groups and interviews with the multi-disciplinary team, and concluded that more people with stroke should benefit from end-of-life care, and collaboration between palliative care and stroke teams at an earlier stage could improve patient care.

2.15.1 Recommendations

A Services providing acute and long-term care for people with stroke should provide high-quality end-of-life care for those who need it.

B Staff caring for people dying of stroke should be trained in the principles and practice of end-of-life care, including the recognition of people who are approaching the end of life.

C Decisions to withhold or withdraw life-prolonging treatments after stroke including artificial nutrition and hydration should be taken in the best interests of the person and whenever possible should take their prior expressed wishes into account.

D End-of-life (palliative) care for people with stroke should include an explicit decision not to impose burdensome restrictions that may exacerbate suffering. In particular, this may involve a decision, taken together with the person with stroke, those close to them and/or a palliative care specialist, to allow oral food and/or fluids despite a risk of aspiration.

E People with stroke with limited life expectancy, and their family where appropriate, should be offered advance care planning, with access to community palliative care services when needed.

F People dying of stroke should have access to specialist palliative care, including the timely transfer of care to their home or to a hospice or care home according to the wishes of the person and their family/carers. This should also include timely communication and involvement of the primary care team.

2.15.2 Sources

A, B NICE, 2015c; Working Party consensus

C-E Royal College of Physicians and British Society of Gastroenterology, 2010; Working Party consensus

F Payne et al, 2010; NICE, 2015c; Working Party consensus

2.15.3 Implications

The main implication of these recommendations is that staff in stroke teams will need to increase their awareness and expertise in end-of-life/palliative care and recognise that this is a core part of the work of a comprehensive stroke service. This includes high-quality liaison with palliative care and primary care teams. A systematic mortality audit can identify and encourage good practice in this important area of clinical care.

2.16 Carers

The term 'carers' can refer both to formal, paid carers (people with professional training) and to informal and unpaid carers such as family and friends who undertake care. This section is relevant to informal, unpaid carers: their role and involvement with the person with stroke is vital from the outset and is likely to be a constant and continuing relationship with the person, long after other services have ended.

The 2014 Care Act enshrines the legal duty of a Local Authority to assess any carer who requests an assessment or who appears to need support. The authority can use the assessment to identify support needs, and to discuss how these could be met. This might mean providing help or putting the carer in touch with other organisations, such as local charities.

Evidence to recommendations

Two Cochrane reviews have addressed this issue: Legg et al (2011) and Forster et al (2012). Research into interventions that prepare carers for the role have focused on three main areas; support and information, procedural knowledge, and psycho-educational training (Legg et al, 2011). Whilst these systematic reviews are of high-quality and support the provision of information and training for caregivers, information on implementation is lacking. With regard to long-term follow up, only one Dutch trial (Fens et al, 2014) provided 18-month follow up data but this was non-randomised and thus subject to bias. An earlier, single site RCT found that a structured caregiver training programme, delivered in an in-patient setting by stroke unit staff significantly reduced carer burden, anxiety and depression (Patel et al, 2004). However a much larger cluster RCT and economic evaluation did not reproduce these benefits when using a cascade training model i.e. training some staff to train all staff and then to train carers (Forster et al, 2013). A nested process evaluation indicated that many carers had not been trained to the necessary competency level (Clarke et al, 2013) and so the efficacy and generalizability of the cascade model for delivering caregiver training is still unproven, and recommendations remain largely based on consensus regarding best practice.

2.16.1 Recommendations

A The views of the person with stroke should be sought, to establish the extent to which they wish carers and others to be involved in the planning and delivery of their care.

B If the person with stroke agrees, family/carers should be involved in significant decisions as an additional source of information about the person both clinically and socially.

C The primary carer(s) of a person with stroke should be offered an educational programme which:
- explains the nature, consequences and prognosis of stroke and what to do in the event of a further stroke or other problems e.g. post-stroke epilepsy;
- teaches them how to provide care and support;
- gives them opportunities to practise giving care;
- provides advice on secondary prevention, including lifestyle changes.

D When care is transferred out of hospital to the home or care home setting, the carer of a person with stroke should be offered:
- an assessment of their own needs, separate to those of the person with stroke;
- the practical or emotional support identified as necessary;
- guidance on how to seek help if problems develop.

E The primary carer(s) of a person with stroke should be provided with the contact details of a named healthcare professional (e.g. a stroke co-ordinator) who can provide further information and advice.

F After a person with stroke has returned to the home or care home setting, their carer should:
- have their need for information and support reassessed whenever there is a significant change in circumstances (e.g. if the health of the carer or the person with stroke changes);

– be reminded and assisted in how to seek further help and support.

2.16.2 Sources

A, B Working Party consensus

C Patel et al, 2004; Legg et al, 2011; Forster et al, 2012

D Working Party consensus; obligations under the 2014 Care Act

E NICE, 2016; Working Party consensus

F Working Party consensus; obligations under the 2014 Care Act

2.17 People with stroke in care homes

One in twelve people with stroke in the UK have to move into a care home because of their stroke (Intercollegiate Stroke Working Party, 2016). Conversely, about a quarter of care home residents have had a stroke, often in association with other significant co-morbidities. At present people in care homes rarely receive any ongoing rehabilitation or equipment provision by the NHS despite this being their main domicile. Reducing dependency as far as is possible and improving the quality of life for people with stroke whatever their place of residence is an important and compassionate objective of community provision for people with stroke.

Evidence to recommendations

A Cochrane review (Crocker et al, 2013) examined the evidence for physical rehabilitation for older people in care homes with a range of co-morbidities that included stroke. The review identified small reductions in disability that may not be applicable to all residents, without adverse effects, and called for further trials. In a large cluster RCT of people with stroke living in care homes (1042 participants in 228 care homes), Sackley et al (2015) found no benefits in disability, mood or quality of life from a 3-month person-centred goal setting intervention for residents and staff delivered by occupational therapists and assistants. This may be because the functional limitations in this group of people were so severe, and a third of all participants died over the course of the trial. On the strength of current evidence, the best means to reduce dependency and improve quality of life for people with stroke living in care homes is not known.

2.17.1 Recommendations

A People with stroke living in care homes should be offered assessment and treatment from community stroke rehabilitation services to identify activities and adaptations that might improve quality of life.

B Staff caring for people with stroke in care homes should have training in the physical, cognitive/communication, psychological and social effects of stroke and the management of common activity limitations.

C People with stroke living in care homes with limited life expectancy, and their family where appropriate, should be offered advance care planning, with access to community palliative care services when needed.

2.17.2 Sources

A Crocker et al, 2013; Working Party consensus

B, C Working Party consensus

2.17.3 Implications

The extent of unmet need in people living in care homes is unknown, but resource implications are likely. The level of need may be considerable and not easily met within existing resources or with existing interventions. Presently, 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. Furthermore in practice it would be difficult within a single home, both morally and practically, to restrict input to people with stroke when many other residents may also need and benefit from specialist rehabilitation assessment, advice and interventions.

3 Acute Care

3.0 Introduction

This chapter covers the acute presentation and treatment of stroke and TIA. The recommendations relate to the diagnosis and management of the underlying disease (at the WHO-ICF framework level of pathology) over the course of the first few days while clinical stability is being achieved, complications prevented and rehabilitation can begin in earnest. A detailed examination of the evidence for rehabilitation is contained in Chapter 4.

There have been significant advances in the medical management of acute stroke since the previous edition of this guideline, principally in imaging, mechanical thrombectomy, and in the acute management of intracerebral haemorrhage. As the evidence has moved on, this has resulted in a divergence of this guideline from the 2008 NICE Clinical Guideline CG68 *Stroke and transient ischaemic attack in over 16s: diagnosis and initial management*, and the Working Party would now regard the 2008 NICE CG68 as obsolete and hope to see it updated in due course.

3.1 Pre-hospital care

Most people with acute stroke (95%) have their first symptoms outside hospital. It is vital that members of the public and healthcare professionals (e.g. primary care team members, telephone advice line staff, paramedics, accident and emergency (A&E) personnel) can recognise stroke as early and accurately as possible to facilitate an appropriate emergency response. Measures taken by clinicians outside hospital (such as reduced time at the scene) can reduce the overall time to treatment, and thereby improve the prospects for the patient to respond to time-critical treatments.

Evidence to recommendations

A number of pre-hospital screening tools have been developed that are sensitive in detecting the majority of people with acute stroke that present with facial weakness, speech disturbance or unilateral limb weakness. The FAST test is accepted as the screening tool of choice for clinicians and the general public (Harbison et al, 2003). However, some people with symptoms of stroke will not be identified by the FAST test (e.g. sudden onset visual disturbance, lateralising cerebellar dysfunction) and thus stroke may not be suspected. The Working Party considers that community-based clinicians should continue to treat a person as having a suspected stroke if they are suspicious of the diagnosis despite a negative FAST test. Further evidence is required before the Working Party could recommend the use of other screening tools (e.g. forms of the National Institutes of Health Stroke Scale [NIHSS], Recognition of Stroke in the Emergency Room) that screen for non-FAST symptoms in the pre-hospital phase.

Community-based clinicians are likely to assess people whose neurological symptoms have already resolved before reaching hospital, suggesting a diagnosis of TIA rather than stroke. These people should be given antiplatelet treatment with aspirin immediately (Rothwell et al, 2016) and referred for urgent investigation in a specialist neurovascular clinic since the risk of subsequent stroke is substantial in the first few days. There was insufficient precision in the current evidence for the Working Party to make recommendations concerning risk stratification by community-based clinicians. When considering the diagnosis of TIA and making a direct referral, clinicians need to be aware that a person may have ongoing focal neurological deficits despite a negative FAST test – such people should be managed along the acute stroke pathway rather than a TIA pathway.

There is a general paucity of research evidence on the management of the person with suspected stroke before arrival at the hospital. The majority of recommendations are based on consensus and widely accepted practice in the pre-hospital management of people with suspected stroke or TIA. Pre-hospital brain imaging in other healthcare settings may reduce onset-to-treatment time (Ebinger et al, 2014), but cost-effectiveness and clinical outcomes have not been tested in UK settings.

3.1.1 Recommendations

A People seen by ambulance clinicians outside hospital with the sudden onset of focal neurological symptoms should be screened for hypoglycaemia with a capillary blood glucose, and for stroke or TIA using a validated tool. Those people with persisting neurological symptoms who screen positive using a validated tool should be transferred to a hyperacute stroke unit as soon as possible.

B People who are negative when screened with a validated tool but in whom stroke is still suspected should be treated as if they have stroke until the diagnosis has been excluded by a specialist stroke clinician.

C The pre-hospital care of people with suspected stroke should minimise time from call to arrival at hospital and should include a hospital pre-alert to expedite specialist assessment and treatment.

D Patients with suspected stroke whose airway is considered at risk should be managed appropriately with suction, positioning and airway adjuncts.

E Patients with residual neurological symptoms or signs should remain nil by mouth until screened for dysphagia by a specifically trained healthcare professional.

F Patients with suspected TIA should be given 300mg of aspirin immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic or an acute stroke unit.

G Patients with suspected stroke or TIA should be monitored for atrial fibrillation and other arrhythmias.

3.1.2 Sources

A Harbison et al 2003; Working Party consensus

B-E Working Party consensus

F Rothwell et al, 2007; Lavallee et al, 2007; Giles and Rothwell, 2007; Rothwell et al, 2016

G Working Party consensus

3.1.3 Implications

The training of primary care teams, other healthcare personnel and the general public in the recognition of the signs of possible stroke using the FAST involves an ongoing public health commitment requiring multiple approaches (see Section 2.1). Patients in groups at high risk of stroke (e.g. older people with diabetes, hypertension or atrial fibrillation) and their family and/or carers should have training in the FAST test as part of their disease education.

3.2 Management of TIA – assessment and diagnosis

Any person with a fully resolved acute onset neurological syndrome that might be due to cerebrovascular disease needs urgent specialist assessment to establish the diagnosis and to determine whether the cause is vascular, given that about half have an alternative diagnosis.

Evidence to recommendations

A systematic review of observational studies of the risk of stroke within 7 days of confirmed TIA (Giles and Rothwell, 2007) showed a risk of stroke at 2 days of between 2.0 and 4.1%, and at 7 days of between 3.9 and 6.5%. The risk of completed stroke was much lower in studies of emergency treatment in specialist stroke services compared to non-urgent settings (0.9% v. 11.0%). Patients with suspected TIA should therefore have a full diagnostic assessment urgently without further risk stratification (Lavallee et al, 2007, Wardlaw et al, 2014). Secondary prevention measures which can reduce the risk of recurrence should be promptly initiated (Rothwell, 2007). Additional risk may be conferred by the presence of atrial fibrillation or anticoagulant therapy, or with recurrent attacks, while patients presenting with symptoms more than a week ago can be considered at lower risk.

There is little evidence to guide the use of brain imaging after TIA. The consensus of the Working Party is that imaging all people referred to a neurovascular clinic is not appropriate or cost-effective given the high rate of TIA mimics in most clinics. Patients with suspected TIA should be assessed by a specialist physician before a decision on brain imaging is made, and imaging can 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. When the exclusion of haemorrhage is the objective of imaging, early unenhanced computed tomography (CT) remains the most sensitive investigation (Wardlaw et al, 2014). The greater sensitivity of magnetic resonance imaging (MRI) to detect ischaemic lesions using diffusion-weighted imaging (DWI) makes it the modality of choice if positive confirmation of the presence or location of a lesion is the objective, but the significant false-negative rate with DWI precludes its use as a diagnostic tool in isolation from clinical assessment, particularly in unselected patients (Wardlaw et al, 2014).

3.2.1 Recommendations

A Patients with acute neurological symptoms that resolve completely within 24 hours (i.e. suspected TIA) should be given aspirin 300 mg immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic or an acute stroke unit.

B Patients with suspected TIA that occurred more than a week previously should be assessed by a specialist physician as soon as possible within 7 days.

C Patients with suspected TIA and their family/carers should receive information about the recognition of stroke symptoms and the action to be taken if they occur.

D Patients with suspected TIA should be assessed by a specialist physician before a decision on brain imaging is made, except when haemorrhage requires exclusion in patients taking an anticoagulant or with a bleeding disorder when unenhanced CT should be performed urgently.

E For patients with suspected TIA in whom brain imaging cannot be undertaken within 7 days of symptoms, T2* MRI imaging should be the preferred means of excluding haemorrhage.

F Patients with a confirmed diagnosis of TIA should receive clopidogrel (300 mg loading dose and 75 mg daily thereafter) and high intensity statin therapy (e.g. atorvastatin 20-80 mg daily) started immediately.

3.2.2 Sources

A Lavallee et al, 2007; Rothwell et al, 2016; Working Party consensus

B Giles and Rothwell, 2007

C Working Party consensus

D,E Wardlaw et al, 2014

F Rothwell et al, 2007

3.2.3 Implications

Additional training of healthcare professionals and other primary care staff may be required so that they are able to appreciate the immediate risk in people presenting with a suspected TIA, advise immediate aspirin use and expedite the process of referral for diagnostic assessment. Referrers and neurovascular clinics should discontinue the practice of triaging patients with suspected TIA according to risk stratification tools, and ensure that all patients with suspected TIA are assessed and diagnosed urgently.

3.3 Management of TIA – treatment and vascular prevention

Patients who have short-lived symptoms due to cerebrovascular disease remain at high risk of further vascular events, and this risk is highest in the first few days. Consequently their management is urgent. This section covers medical and surgical management following confirmation of the diagnosis.

Evidence to recommendations

Ischaemic stroke and TIA are similar manifestations of vascular disease and their treatment for the prevention of recurrent vascular events reflects this. Long-term risk factor management is reviewed in Chapter 5 on secondary prevention. In the acute setting, there is no evidence to support the use of anticoagulation for recurrent TIAs in sinus rhythm. There are also no studies specifically addressing the clinical benefit of early anticoagulation for patients with cardioembolic TIA, but the consensus of the Working Party is that the balance of risk and benefit from the early secondary prevention of cardioembolism with a rapidly-acting anticoagulant is favourable in the majority of patients. A large Chinese study indicated an early benefit in the prevention of vascular events with the use of combination antiplatelet treatment (aspirin plus clopidogrel) compared to aspirin monotherapy for an initial 3-month period after TIA or minor stroke (Wang et al, 2013). However a recent systematic review did not find the combination to be superior to clopidogrel monotherapy, which remains the UK recommendation once the diagnosis of TIA is confirmed (Gouya et al, 2014).

Carotid imaging is essential for any patient presenting with symptoms suggesting anterior circulation cerebral ischaemia who might be suitable for intervention for carotid stenosis. There are two methods for reporting the degree of carotid stenosis that give differing results, derived from the North American Symptomatic Carotid Endarterectomy Trial (NASCET) and the European Carotid Surgery Trial (ECST). Both are valid but the Working Party considers that the NASCET method should be preferred (Rothwell et al, 2003b). After carotid territory TIA or non-disabling stroke, the Working Party consensus was that carotid intervention should be performed as soon as possible.

A Cochrane review of carotid stenting for symptomatic carotid stenosis identified 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 (Bonati et al, 2012). This section should be read in conjunction with Section 5.3 (Carotid artery stenosis).

3.3.1 Recommendations

A Patients with non-disabling stroke or TIA should receive treatment for secondary prevention introduced as soon as the diagnosis is confirmed, including:
- discussion of individual lifestyle factors (smoking, alcohol excess, diet, exercise);
- clopidogrel 300 mg loading dose followed by 75 mg daily;
- high intensity statin therapy with atorvastatin 20-80 mg daily;
- blood pressure-lowering therapy with a thiazide-like diuretic, long-acting calcium channel blocker or angiotensin-converting enzyme inhibitor.

B Patients with non-disabling stroke or TIA in atrial fibrillation should be anticoagulated as soon as intracranial bleeding has been excluded and with an anticoagulant that has rapid onset, provided there are no other contraindications.

C Patients with non-disabling stroke or TIA who after specialist assessment are considered candidates for carotid intervention should have carotid imaging performed urgently within 24 hours.

D The degree of carotid artery stenosis should be reported using the North American Symptomatic Carotid Endarterectomy Trial (NASCET) method.

E Patients with TIA or an acute non-disabling stroke with stable neurological symptoms who have symptomatic severe carotid stenosis of 50–99% (NASCET method) should:
- be assessed and referred for carotid endarterectomy to be performed as soon as possible within 7 days of the onset of symptoms in a vascular surgical centre routinely participating in national audit;
- receive optimal medical treatment: control of blood pressure, antiplatelet treatment, cholesterol reduction through diet and drugs, and lifestyle advice including smoking cessation.

F Patients with TIA or an acute non-disabling stroke who have mild or moderate carotid stenosis of less than 50% (NASCET method) should:
- not undergo carotid intervention;
- receive optimal medical treatment: control of blood pressure, antiplatelet treatment, cholesterol reduction through diet and drugs, and lifestyle advice including smoking cessation.

G Patients with recurrent attacks of transient neurological symptoms despite optimal medical treatment, in whom an embolic source has been excluded, should be reassessed for an alternative neurological diagnosis.

H Patients who meet the criteria for carotid intervention but who are unsuitable for open surgery (e.g. inaccessible carotid bifurcation, re-stenosis following endarterectomy, radiotherapy-associated carotid stenosis) should be considered for carotid angioplasty and stenting.

I People who have undergone carotid revascularisation should be reviewed post-operatively by a stroke physician to optimise medical aspects of vascular secondary prevention.

3.3.2 Sources

A PROGRESS Collaborative Group, 2001; Rothwell et al, 2007; NICE, 2010c, 2011a, 2014c

B-D Working Party consensus

E, F Barnett et al, 1998; Rothwell et al, 2003b; NICE, 2014c; Working Party consensus

G Working Party consensus

H Economopoulos et al, 2011; International Carotid Stenting Study investigators, 2010; Bonati et al, 2012

I Working Party consensus

3.3.3 Implications

Local health economies and networks must establish clinical pathways designed to expedite referral of appropriate patients to vascular surgical centres, especially where reconfiguration has resulted in vascular services being at another site.

A protocol should be in place for the use of parenteral or non-vitamin K oral anticoagulants in the setting of a neurovascular clinic, with a process to supervise the transition from acute to long-term anticoagulation.

3.4 Diagnosis of acute stroke

Stroke is a medical emergency and if outcomes are to be optimised there should be no time delays in diagnosis and treatment. Any person with the acute onset of a neurological syndrome with persisting symptoms and signs (i.e. suspected stroke) needs urgent diagnostic assessment to differentiate between acute stroke and other causes needing their own specific treatments. To maximise the potential benefit from revascularization treatments and the acute management of intracerebral haemorrhage, the Working Party has further reduced the recommended maximum time between admission and brain imaging for suspected stroke from 12 hours to 'urgently and at most within 1 hour of arrival at hospital'. Progress in the medical management of acute stroke demands a corresponding increase in the availability of advanced imaging techniques, and all hyperacute stroke services will need immediate, round the clock access to brain imaging including CT angiography when necessary (See Section 2.3). In centres capable of providing immediate stroke-specific MRI, this is an alternative method to facilitate urgent stroke treatments. Multi-modal imaging is becoming more widely available and quicker to undertake and interpret.

Underlying causes of stroke such as heart disease, diabetes and hypertension need diagnosis and management in their own right, but these are outside the scope of this guideline.

Evidence to recommendations

The evidence supporting stroke unit care from the Stroke Unit Trialists in the 1990s has been updated in the 2013 Cochrane review, which found that patients with stroke who receive organised in-patient care in a stroke unit are more likely to be alive, independent, and living at home one year after a stroke (Stroke Unit Trialists' Collaboration, 2013). Imaging patients with suspected stroke immediately is cost-effective compared to other approaches because it enables emergency treatments directed to the pathology of stroke (Wardlaw et al, 2004a), although MRI with diffusion-weighted imaging may be required when diagnostic uncertainty persists (Wardlaw et al, 2014). Interpretation of acute stroke imaging by trained non-radiologists is safe and effective (Spokoyny et al, 2014). The recommendations regarding endovascular therapy contained in Section 3.5 require CT angiography to be performed immediately in potentially eligible patients, but image processing and interpretation should not be allowed to delay intravenous thrombolysis if this is indicated.

3.4.1 Recommendations

A Patients with suspected acute stroke should be admitted directly to a hyperacute stroke unit and be assessed for emergency stroke treatments by a specialist physician without delay.

B Patients with suspected acute stroke should receive brain imaging urgently and at most within 1 hour of arrival at hospital.

C Interpretation of acute stroke imaging for thrombolysis decisions should only be made by healthcare professionals who have received appropriate training.

D Patients with ischaemic stroke who are eligible for endovascular therapy should have a CT angiogram from aortic arch to skull vertex immediately. This should not delay the administration of intravenous thrombolysis.

E MRI with stroke-specific sequences (diffusion-weighted imaging, T2*) should be performed in patients with suspected acute stroke when there is diagnostic uncertainty.

3.4.2 Sources

A, B Follows from the evidence for emergency stroke treatments in Sections 3.5 and 3.6

C Working Party consensus; Spokoyny et al, 2014

D Follows from the evidence for emergency stroke treatments in Sections 3.5 and 3.6

E Wardlaw et al, 2014

3.4.3 Implications

These recommendations align with the recommendations in Chapter 2 concerning the organisation of acute stroke care. Hyperacute stroke services will need to review their provision of specialist assessment and imaging policies for suspected acute stroke, which in many centres will involve a step-change in provision.

3.5 Management of ischaemic stroke

Thrombolysis with alteplase is now administered to one in nine patients with acute stroke in the UK (Intercollegiate Stroke Working Party, 2016). The safety of alteplase has been recently re-examined by an independent inquiry of the Medicines and Healthcare Products Regulatory Agency (MHRA), which has reaffirmed the net benefit of treatment in appropriately selected cases (Medicines and Healthcare products Regulatory Agency, 2015). 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 and the management of complications such as neurological deterioration (in 13% of patients) and anaphylaxis (in 0.7% of patients) (Intercollegiate Stroke Working Party, 2016).

Endovascular therapy for acute ischaemic stroke is a major development since the 2012 edition and new guidance is included in this section. Urgent neurosurgical intervention for acute ischaemic stroke is also considered in this section.

Evidence to recommendations

Research has established that the current licensed indications for alteplase treatment should be widened. The IST-3 trial and the updated Cochrane systematic review and individual patient meta-analysis published by the Stroke Thrombolysis Trialists' Collaborative Group have added significantly to our understanding of when and to whom intravenous thrombolysis (IVT) should be offered (IST Collaborative Group et al, 2012, Wardlaw et al, 2012, Emberson et al, 2014). These analyses emphasise how critical it is that treatment is given as quickly as possible after the onset of stroke. Despite the higher risk of early (within 7 days) fatal and non-fatal intracerebral haemorrhage with IVT, mortality at 6 months is not increased. The Cochrane review and meta-analysis 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 mild and severe stroke and those with early signs of infarction on initial brain imaging also benefit from treatment, as long as early radiological changes are consistent with the stated time of onset. However, IST-3 only recruited patients with a level of disability that did not significantly restrict the patient's activities of daily living, and care should be taken in making the decision to administer IVT to a patient who has significant pre-stroke co-morbidity. The Enhanced Control of Hypertension and Thrombolysis Stroke Study (ENCHANTED) of lower (0.6 mg/kg) versus standard dose alteplase showed a lower risk of intracerebral haemorrhage and early mortality with the lower dose, without conclusively demonstrating that the doses were of equivalent efficacy (Anderson et al, 2016). These findings suggest that there may be circumstances in which the treating physician and/or the patient wish to forgo some of the potential disability benefit from standard dose alteplase in order to reduce the early risk of intracerebral haemorrhage through the use of the lower dose. A meta-analysis of risk factors for intracerebral haemorrhage with alteplase (Whiteley et al, 2012) suggested a greater risk with atrial fibrillation, congestive cardiac failure, renal impairment, prior antiplatelet treatment, leukoaraiosis and visible cerebral infarction on pre-treatment brain imaging, but the extent to which any of these factors should influence dose selection for alteplase remains unknown.

Patients presenting with acute ischaemic stroke whilst taking a non-vitamin K oral anticoagulant (NOAC) should be excluded from receiving alteplase unless, in the case of dabigatran, the prothrombin time and activated partial thromboplastin time are both normal. The use of reversal agents (idarucizumab or andexanet alfa) in order to then administer alteplase for an ischaemic stroke that has occurred during NOAC treatment is not recommended. Further research may clarify the remaining uncertainties regarding IVT between 4.5 and 6 hours after onset, the effectiveness of other thrombolytic agents such as

tenectaplase, and the treatment of patients with 'wake-up' stroke or in whom the time of onset is unknown.

Since the 2012 edition of the guideline, five RCTs have been published evaluating the effects of endovascular treatment in addition to IVT, compared with standard treatment (IVT alone administered within 4.5 hours) in proven large arterial occlusive stroke (Berkhemer et al, 2015, Campbell et al, 2015, Goyal et al, 2015, Jovin et al, 2015, Saver et al, 2015) with others due to publish. In an individual patient meta-analysis of these 5 trials involving 1287 patients (Goyal et al, 2016) endovascular therapy showed significant improvements in functional outcomes at 90 days. The number needed to treat for one additional patient to have reduced disability of at least one point on the mRS was 2.6. The trials were heterogenous in their patient selection (age, National Institutes of Health Stroke Scale [NIHSS] score) and only included patients with pre-stroke mRS of 2 or less. There was also variation in imaging criteria, in particular whether the identification of salvageable brain tissue on neuroimaging was a trial inclusion criterion (EXTEND-IA, ESCAPE, SWIFT-PRIME, and REVASCAT beyond 4.5 hours) or not (MR CLEAN). Three trials included some patients for whom IVT was contraindicated. The trials varied in onset to endovascular treatment from a maximum of 6 up to 12 hours, and it is pertinent that all the trials with an extended time window required a favourable profile of salvageable brain tissue imaging prior to randomisation. The proven time window for endovascular therapy without such imaging is to perform thrombectomy (i.e. obtain reperfusion) within 6 hours. The SWIFT-PRIME trial had the fastest process times with a median time from hospital arrival to groin puncture of 90 minutes, and the median procedure time in the five trials was just under 60 minutes. Thus it follows that for thrombectomy based upon CT/CTA imaging alone, commencing the procedure more than 5 hours after onset is not of proven benefit. An NIHSS score of 6 or more was an inclusion criterion for several trials with clear positive subgroup effects for NIHSS 6-19 (ESCAPE) and 6-17 (SWIFT-PRIME). Not all trials reported a positive effect on mortality. The Working Party concludes that mechanical thrombectomy (MT) is an effective acute stroke treatment for selected patients with proximal large artery occlusions as an adjunct to IVT, and for those patients with contraindications to IVT but not to MT (extensive early infarct changes on brain CT are a contraindication to both – either greater than 1/3 of the middle cerebral artery [MCA] territory or for thrombectomy an Alberta Stroke Program Early CT Score [ASPECTS] of less than 6). If the major vessel occlusion is in the posterior circulation, MT may be considered up to 24 hours from known onset. There are significant challenges to the implementation of this treatment in the UK. Centres that provide endovascular treatment should meet the professional standards set out by the joint societies' working group (National Institute for Health and Care Excellence, 2015b, White, 2015)

The DESTINY II trial of decompressive hemicraniectomy for older patients with severe space-occupying MCA territory infarction has shown a substantial survival benefit for patients over the age of 60 years (Juttler et al, 2014) akin to that seen in young patients (Cruz-Flores et al, 2012). Decisions to undertake major life-saving surgery need to be carefully considered on an individual basis, but patients should not be excluded from treatment by age alone.

3.5.1 Recommendations

A Patients with acute ischaemic stroke, regardless of age or stroke severity, in whom treatment can be started within 3 hours of known onset should be considered for treatment with alteplase.

B Patients with acute ischaemic stroke under the age of 80 years in whom treatment can be started between 3 and 4.5 hours of known onset should be considered for treatment with alteplase.

C Patients with acute ischaemic stroke over 80 years in whom treatment can be started between 3 and 4.5 hours of known onset should be considered for treatment with alteplase on an individual basis. In doing so, treating clinicians should recognise that the benefits of treatment are smaller than if treated earlier, but that the risks of a worse outcome, including death, will on average not be increased.

D Patients with acute ischaemic stroke otherwise eligible for treatment with alteplase should have their blood pressure reduced to below 185/110 mmHg before treatment.

E Alteplase should only be administered within a well-organised stroke service with:
- processes throughout the emergency pathway to minimise delays to treatment, to ensure that thrombolysis is administered as soon as possible after stroke onset;
- 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 training in acute stroke and thrombolysis;
- immediate access to imaging and re-imaging, and staff appropriately trained to interpret the images;
- protocols in place for the management of post-thrombolysis complications.

F Emergency medical staff, if appropriately trained and supported, should only administer alteplase for the treatment of acute ischaemic stroke provided that patients can be subsequently managed on a hyperacute stroke unit with appropriate neuroradiological and stroke physician support.

G Patients with acute ischaemic stroke should be considered for combination intravenous thrombolysis and intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have a proximal intracranial large vessel occlusion causing a disabling neurological deficit (National Institutes of Health Stroke Scale [NIHSS] score of 6 or more) and the procedure can begin (arterial puncture) within 5 hours of known onset.

H Patients with acute ischaemic stroke and a contraindication to intravenous thrombolysis but not to thrombectomy should be considered for intra-arterial clot extraction (using stent retriever and/or aspiration techniques) if they have a proximal intracranial large vessel occlusion causing a disabling neurological deficit (National Institutes of Health Stroke Scale [NIHSS] score of 6 or more) and the procedure can begin (arterial puncture) within 5 hours of known onset.

I Patients with acute ischaemic stroke causing a disabling neurological deficit (a National Institutes of Health Stroke Scale [NIHSS] score of 6 or more) may be considered for intra-arterial clot extraction (using stent retriever and/or aspiration techniques, with prior intravenous thrombolysis unless contraindicated) beyond an onset-to-arterial puncture time of 5 hours if:
- the large artery occlusion is in the posterior circulation, in which case treatment up to 24 hours after onset may be appropriate;
- a favourable profile on salvageable brain tissue imaging has been proven, in which case treatment up to 12 hours after onset may be appropriate.

J Hyperacute stroke services providing endovascular therapy should participate in national stroke audit to enable comparison of the clinical and organisational quality of their services with national data, and use the findings to plan and deliver service improvements.

K Patients with middle cerebral artery (MCA) infarction who meet the criteria below should be considered for decompressive hemicraniectomy. Patients should be referred to neurosurgery within 24 hours of stroke onset and treated within 48 hours of stroke onset:
- pre-stroke modified Rankin Scale score of less than 2;
- clinical deficits indicating infarction in the territory of the MCA;
- National Institutes of Health Stroke Scale (NIHSS) score of more than 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 on diffusion-weighted MRI.

L Patients with acute ischaemic stroke treated with thrombolysis should be started on an antiplatelet agent after 24 hours unless contraindicated, once significant haemorrhage has been excluded.

M Patients with acute ischaemic stroke should be given aspirin 300mg as soon as possible within 24 hours (unless contraindicated):

- orally if they are not dysphagic;
- rectally or by enteral tube if they are dysphagic.

Thereafter aspirin 300 mg daily should be continued until 2 weeks after the onset of stroke at which time long-term antithrombotic treatment should be initiated. Patients being transferred to care at home before 2 weeks should be started on long-term treatment earlier.

N Patients with acute ischaemic stroke reporting previous dyspepsia with an antiplatelet agent should be given a proton pump inhibitor in addition to aspirin.

O Patients with acute ischaemic stroke who are allergic to or intolerant of aspirin should be given an alternative antiplatelet agent (e.g. clopidogrel).

3.5.2 Sources

A-C Wardlaw et al, 2012; Emberson et al, 2014

D, E Wardlaw et al, 2012; Working Party consensus

F Working Party consensus

G-I Goyal et al, 2016

J Working Party consensus; obligations under the NHS Standard Contract

K Cruz-Flores et al, 2012; Jüttler et al, 2014

L, M Sandercock et al, 2015; Working Party consensus

N, O NICE, 2010c; Working Party consensus

3.5.3 Implications

These recommendations underpin the earlier recommendations concerning the organisation of acute stroke care (Sections 2.2 and 2.3), with significant implications for the organisation of acute stroke services and referrals to tertiary neurosurgical and interventional neuroradiology services. Provision of hyperacute stroke care should be organised to minimise time to treatment for the maximum number of people with stroke, and in some areas this will require reconfiguration of hyperacute stroke services with some hospitals stopping providing acute stroke services altogether.

3.6 Management of primary intracerebral haemorrhage

About 11% of all patients presenting to hospital in the UK with acute stroke have intracerebral haemorrhage (ICH) as the cause (Intercollegiate Stroke Working Party, 2016). Patients with ICH can deteriorate quickly and should be admitted directly to a hyperacute stroke unit for urgent specialist assessment and monitoring. This edition contains some important changes to recommendations for the immediate management of ICH.

Evidence to recommendations

The effect of reducing blood pressure in the first few hours after the onset of ICH has been tested in two recent international RCTs. In INTERACT2, the rapid lowering of systolic blood pressure (SBP) to a target below 140 mmHg within 1 hour in 2839 patients presenting within 6 hours of onset with mainly small, deep

(thalamic or basal ganglia) ICH did not reduce haematoma expansion or improve the primary outcome of death or major disability (mRS 3-6), but secondary outcomes (ordinal shift analysis of the mRS and health-related quality of life measures) were improved. Death (12% at 3 months) and institutionalisation (9%) were not affected by intensive treatment (Anderson et al, 2013). In ATACH-2, pursuing a lower SBP target of 110-139 mmHg within 2 hours in 1000 patients presenting within 4.5 hours of onset with small, deep ICH tended to reduce haematoma expansion but conferred no reduction in severe disability or death (mRS 4-6) compared to a target of 140-179 mmHg (Qureshi et al, 2016). Mortality (6.7%) was also not affected. More intensive SBP lowering was associated with more renal adverse events in the first 7 days. In comparing these two trials, it is noteworthy that a lower SBP was achieved in the acute phase in the standard treatment arm of ATACH-2 (all of whom received intravenous nicardipine) than in the intensive treatment arm of INTERACT2 (141 mmHg vs. 150 mmHg respectively). As the intensive arm of ATACH-2 led to a still greater SBP reduction, ATACH-2 can be interpreted as showing no additional benefit from a more aggressive blood pressure target than that tested in INTERACT2. More research is still needed to clarify the effect on clinical outcomes from hyperacute BP reductions in acute ICH, including in lobar haemorrhage.

Abnormalities of clotting, especially in patients taking anticoagulants, should be urgently reversed, using prothrombin complex concentrate (PCC) to reverse vitamin K antagonists. A recent trial of idarucizumab in patients taking the direct thrombin inhibitor dabigatran has shown the agent to be safe, rapid in action and effective in reversing the anticoagulant effect (Pollack et al, 2015), and andexanet alfa has been shown in normal volunteers to reverse the anticoagulant effect of the factor Xa inhibitors apixaban and rivaroxaban (Siegal et al, 2015).

In contrast to the long-standing and clear role for neurosurgical intervention in posterior fossa haemorrhage, the role of neurosurgery for supratentorial intracerebral haemorrhage remains small, with a recent neutral neurosurgical trial in lobar haemorrhage without intraventricular haemorrhage (Mendelow et al, 2013). Most patients with primary intracerebral haemorrhage do not require surgical intervention and should receive monitoring and initial medical treatment on a hyperacute stroke unit, such as those with small, deep haemorrhage; lobar haemorrhage without hydrocephalus, intraventricular haemorrhage or neurological deterioration; large haemorrhage and significant co-morbidities before the stroke; and those with supratentorial haemorrhage with a Glasgow Coma Scale score below 8 unless this is because of hydrocephalus.

3.6.1 Recommendations

A Patients with intracerebral haemorrhage in association with vitamin K antagonist treatment should have the anticoagulant urgently reversed with a combination of prothrombin complex concentrate and intravenous vitamin K.

B Patients with intracerebral haemorrhage in association with dabigatran treatment should have the anticoagulant urgently reversed with idarucizumab.

C Patients with intracerebral haemorrhage in association with factor Xa inhibitor treatment should receive urgent treatment with 4-factor prothrombin complex concentrate.

D Patients with primary intracerebral haemorrhage who present within 6 hours of onset with a systolic blood pressure above 150mmHg should be treated urgently using a locally agreed protocol for blood pressure lowering to a systolic blood pressure of 140 mmHg for at least 7 days, unless:
- the Glasgow Coma Scale score is 5 or less;
- the haematoma is very large and death is expected;
- a structural cause for the haematoma is identified;
- immediate surgery to evacuate the haematoma is planned.

E Patients with intracerebral haemorrhage should be admitted directly to a hyperacute stroke unit for monitoring of conscious level and referred immediately for repeat brain imaging if

deterioration occurs.

F Patients with intracranial haemorrhage who develop hydrocephalus should be considered for surgical intervention such as insertion of an external ventricular drain.

3.6.2 Sources

A Working Party consensus

B Pollack et al, 2015

C Working Party consensus

D Anderson et al, 2013; Qureshi et al, 2016; Working Party consensus

E, F Working Party consensus

3.6.3 Implications

The therapeutic nihilism that has pervaded the management of acute primary intracerebral haemorrhage has been partially reversed by the findings of INTERACT2, and all hyperacute stroke units will need to develop processes to quickly identify patients presenting with intracerebral haemorrhage within 6 hours of onset and rapidly and safely lower the blood pressure for the majority of these patients. As in Section 2.3, referral protocols will need to be developed or refined to specify the role of neurosurgery in intracranial haemorrhage.

3.7 Management of subarachnoid haemorrhage

The incidence of subarachnoid haemorrhage (SAH) has been declining in the UK and mortality has improved significantly in recent years with improvements in diagnosis and management (Mukhtar et al, 2016). SAH still accounts for approximately 5% of all acute strokes. 10–15% of those affected die before reaching hospital and overall survival is about 70%, but amongst patients admitted to a neurosurgical unit with a confirmed aneurysm, 85% will survive (Society of British Neurosurgeons, 2006). Case fatality and unfavourable outcomes rise with age and are highest in the over 65 age group (Society of British Neurosurgeons, 2006), and in those patients of a 'poor clinical grade' (Hunt and Hess or World Federation of Neurological Surgeons grades 4 & 5). Recurrent haemorrhage from the culprit aneurysm is the most frequent cause of death after the initial presentation. Diagnosis, referral to a tertiary centre and treatment to prevent rebleeding are therefore urgent. CT scanning is the most sensitive method to detect subarachnoid blood but when CT is negative lumbar puncture for xanthochromia after 12 hours may still be required, particularly if there has been a delay in presentation as the sensitivity of CT for SAH declines with time from ictus. Usually non-invasive angiography (CT or MR) is required prior to intra-arterial angiography undertaken in the referring or neurosciences centre. After SAH many patients will have residual disability requiring neurorehabilitation and most will experience long-term symptoms, especially fatigue and cognitive disability.

Evidence to recommendations

There have been a number of recent negative trials in SAH management. Statins (Liu and Chen, 2015), magnesium (Mees et al, 2012) and endothelin receptor antagonists (Guo et al, 2012) have all been shown not to improve clinical outcome after SAH. The mainstay of the recommendations regarding SAH therefore remain unchanged from the 2012 edition.

3.7.1 Recommendations

A Any person presenting with sudden severe headache and an altered neurological state should have the diagnosis of subarachnoid haemorrhage investigated by:

- immediate CT brain scan (also including CT angiography if a protocol is agreed with the neurosciences centre);
- lumbar puncture 12 hours after ictus (or within 14 days if presentation is delayed) if the CT brain scan is negative and does not show any contraindication;
- spectrophotometry of the cerebrospinal fluid for xanthochromia.

B Patients with spontaneous subarachnoid haemorrhage should be referred immediately to a neurosciences centre and receive:
- nimodipine 60 mg 4 hourly unless contraindicated;
- frequent neurological observation for signs of deterioration.

C Following transfer to the neurosciences centre, patients with spontaneous subarachnoid haemorrhage should receive:
- CT or MR angiography (if this has not already been done by agreed protocol in the referring hospital) with or without intra-arterial 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 undertaken within 48 hours of ictus for good grade patients (Hunt and Hess or World Federation of Neurological Sciences grades 1-3), or within a maximum of 48 hours of diagnosis if presentation was delayed.

D After any immediate treatment, patients with subarachnoid haemorrhage should be monitored for the development of treatable complications, such as hydrocephalus and cerebral ischaemia.

E After any immediate treatment, patients with subarachnoid haemorrhage should be assessed for hypertension treatment and smoking cessation.

F Patients with residual symptoms or disability after definitive treatment of subarachnoid haemorrhage should receive specialist neurological rehabilitation including appropriate clinical/neuropsychological support.

G People with two or more first-degree relatives affected by aneurysmal subarachnoid haemorrhage and/or a polycystic kidney disease should be referred to a neurovascular and/or neurogenetics specialist for information and advice regarding the risks and benefits of screening for cerebral aneurysms.

3.7.2 Sources

A Working Party consensus

B Allen et al, 1983; Barker and Ogilvy, 1996; Pickard et al, 1989

C Molyneux et al, 2005; Society of British Neurological Surgeons, 2006

D-F Working Party consensus

G Bor et al, 2008

3.8 Cervical artery dissection

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

Evidence to recommendations

The CADISS randomised controlled trial in symptomatic carotid and vertebral artery dissection showed no significant difference between anticoagulant and antiplatelet treatment in the prevention of recurrent stroke or death (CADISS Trial Investigators et al, 2015). The incidence of either outcome was low, with a 2% stroke rate within 3 months and no deaths. This low rate may reflect greater diagnostic yield in patients previously classified as 'cryptogenic'. There is no evidence to suggest that thrombolysis carries any greater risk in patients with cervical artery dissection compared to stroke from other causes (Engelter et al, 2012).

3.8.1 Recommendations

A Any patient suspected of cervical artery dissection should be investigated with CT or MR including angiography.

B Patients with acute ischaemic stroke suspected to be due to cervical arterial dissection should receive alteplase if they are otherwise eligible.

C Patients with acute ischaemic stroke suspected to be due to cervical arterial dissection should be treated with either an anticoagulant or an antiplatelet agent for at least 3 months.

3.8.2 Sources

A Working Party consensus

B Zinkstok et al, 2011; Engelter et al, 2012

C CADISS Trial Investigators, 2015

3.9 Cerebral venous thrombosis

Cerebral venous thrombosis (CVT) is a rare cause of an acute stroke syndrome. Headache, seizures and focal (sometimes bilateral) neurological deficits are typical presenting features. CVT is more likely in patients with a prothrombotic tendency (e.g. around the time of pregnancy), or who have local infection, dehydration or malignancy, and it is important to investigate for a possible underlying cause. In the largest published registry series of 11,400 patients with CVT, 232 (2%) died in hospital due to the CVT (Nasr et al, 2013). Older patients and those with sepsis had the greatest risk of in-hospital mortality. Hydrocephalus, intracranial haemorrhage, and motor deficits were also associated with a worse outcome.

Evidence to recommendations

Case series suggest that anticoagulation is the treatment of choice for CVT, 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 CVT. Although not reaching statistical significance, there was a trend toward a positive benefit from anticoagulation for at least three months. Non-vitamin K oral anticoagulants are licensed for venous thromboembolism but not for CVT. There is no evidence to support the use of corticosteroids in the management of CVT; 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).

3.9.1 Recommendations

A Any patient suspected of cerebral venous thrombosis should be investigated with CT or MRI including venography.

B Patients with cerebral venous thrombosis (including those with secondary cerebral haemorrhage) should receive full-dose anticoagulation (initially full-dose heparin and then warfarin with a target INR of 2–3) for at least three months unless there are comorbidities that preclude their use.

3.9.2 Sources

A Working Party consensus

B Coutinho et al 2011; Working Party consensus

3.10 Acute stroke care

Many patients presenting with acute neurological deficits secondary to vascular disease will have other problems requiring attention during and after the initial diagnosis (Section 3.4) and the pathology-specific treatments described in Sections 3.5 and 3.6. Three-quarters of patients with acute stroke admitted to hospital in the UK have at least one co-morbidity, and one in ten have at least three (Intercollegiate Stroke Working Party, 2015). Patients need specialist care on a stroke unit focused initially on preserving life, limiting brain damage and preventing complications before rehabilitation can begin in earnest. Patients with stroke often have significant disturbances of physiological homeostasis with raised temperature, raised blood glucose, hypoxia, etc. During the first week, 5% of patients with acute stroke develop urinary sepsis, and 9% require antibiotic treatment for pneumonia (Intercollegiate Stroke Working Party, 2016).

Evidence to recommendations

Patients with acute stroke are at high risk of dehydration, malnutrition, infection, hypoxia and hyperglycaemia. Middleton et al (2011) showed that training stroke unit staff in the use of standardised protocols to manage physiological status can significantly improve outcomes. The management of blood pressure after acute ischaemic stroke remains an area with little evidence to guide practice (see Section 3.6 for the recommendation regarding blood pressure management in acute intracerebral haemorrhage). There is no evidence for the use of hyperbaric oxygen therapy in stroke (Bennett et al, 2014) nor for the use of supplemental oxygen in normoxic patients (Roffe et al, 2011) and from the evidence available, the Working Party recommends that mannitol for the treatment of cerebral oedema should not be used outside of a clinical trial.

There is very little trial evidence on which to base the management of hydration in acute stroke. A Cochrane review of the signs and symptoms of impending and current water-loss dehydration in older people (Hooper et al, 2015) concluded that there is little evidence that any one symptom, sign or test, including many that clinicians customarily rely on, have any diagnostic utility for dehydration.

There is good evidence that a multi-item dysphagia screening protocol that includes at least a water intake test of 10 teaspoons and a lingual motor test was more accurate than screening protocols with only a single item (Martino et al, 2014). There is good evidence from a systematic review (Kertscher et al, 2014) that the investigation of dysphagia with instrumental assessments providing direct imaging for evaluation of swallowing physiology help to predict outcomes and improve treatment planning.

In contrast to acute myocardial infarction, tight glycaemic control has not been shown to improve outcome in stroke (Gray et al, 2007) and studies have warned against aggressive lowering with insulin infusions due to the risk of hypoglcaemia. This has led the Working Party to recommend a broadening of the target range for blood glucose in acute stroke from 4-11 mmol/L to 5-15mmol/L.

Two recent studies showed no clinical benefit from the prophylactic use of antibiotics in dysphagic stroke patients and thus routine antibiotic prophylaxis is not recommended (Kalra et al, 2015, Westendorp et al, 2015).

3.10.1 Recommendations

A Patients with acute stroke should be admitted directly to a hyperacute stroke unit with protocols to maintain normal physiological status and staff trained in their use.

B Patients with acute stroke should have their clinical status monitored closely, including:

- level of consciousness;

- blood glucose;
- blood pressure;
- oxygen saturation;
- hydration and nutrition;
- temperature;
- cardiac rhythm and rate.

C Patients with acute stroke should only receive supplemental oxygen if their oxygen saturation is below 95% and there is no contraindication.

D Patients with acute stroke should have their hydration assessed using multiple methods within four hours of arrival at hospital, and should be reviewed regularly and managed so that normal hydration is maintained.

E Patients with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within four hours of arrival at hospital and before being given any oral food, fluid or medication.

F Until a safe swallowing method is established, patients with dysphagia after acute stroke should:
- be immediately considered for alternative fluids;
- have a comprehensive specialist assessment of their swallowing;
- be considered for nasogastric tube feeding within 24 hours;
- be referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- receive adequate hydration, nutrition and medication by alternative means.

G Patients with swallowing difficulties after acute stroke should only be given food, fluids and medications in a form that can be swallowed without aspiration.

H Patients with acute stroke should be treated to maintain a blood glucose concentration between 5 and 15 mmol/L with close monitoring to avoid hypoglycaemia.

I Patients with acute ischaemic stroke should only receive blood pressure-lowering treatment if there is an indication for emergency treatment, such as:
- systolic blood pressure above 185 mmHg or diastolic blood pressure above 110 mmHg when the patient is otherwise eligible for treatment with alteplase;
- hypertensive encephalopathy;
- hypertensive nephropathy;
- hypertensive cardiac failure or myocardial infarction;
- aortic dissection;
- pre-eclampsia or eclampsia.

J Patients with acute stroke admitted on anti-hypertensive medication should resume oral treatment once they are medically stable and as soon as they can swallow medication safely.

K Patients with acute ischaemic stroke should receive high intensity statin treatment with atorvastatin 20-80 mg daily as soon as they can swallow medication safely.

L Patients with primary intracerebral haemorrhage should only be started on statin treatment based on their cardiovascular disease risk and not for secondary prevention of intracerebral haemorrhage.

3.10.2 Sources

A, B Middleton et al, 2011

C Working Party consensus; Roffe et al, 2011

D Working Party consensus

E NICE, 2016; Kertscher 2014; Martino et al, 2014; Bray et al, 2016

F NICE, 2006a, 2008b; Geegenage et al, 2012

G, H Working Party consensus

I, J NICE, 2011a; Bath and Krishnan, 2014; Working Party consensus

K Amarenco et al, 2009; NICE, 2014c

L Amarenco et al, 2009; NICE, 2014c

3.11 Positioning

Following a stroke many patients are left with varying degrees of physical impairments which can reduce their ability to change position and posture. Therapeutic positioning, whether in bed, chair or wheelchair, aims to reduce skin damage, limb swelling, shoulder pain or subluxation, and discomfort, and maximise function and maintain soft tissue length. Good positioning may also help to reduce respiratory complications and avoid compromising hydration and nutrition.

Evidence to recommendations

One systematic review (Olavarria et al, 2014) examined four small non-randomised trials of head position in acute ischaemic stroke patients which studied cerebral blood flow using transcranial Doppler but did not report on functional outcome.

3.11.1 Recommendations

A Patients with acute stroke should have an initial specialist assessment for positioning as soon as possible and within 4 hours of arrival at hospital.

B Healthcare professionals responsible for the initial assessment of patients with acute stroke should be trained in how to position patients appropriately, taking into account the degree of their physical impairment after stroke.

C When lying or sitting, patients with acute stroke should be positioned to minimise the risk of aspiration and other respiratory complications, shoulder pain and subluxation, contractures and skin pressure ulceration.

3.11.1 Sources

A-C Working Party consensus

3.12 Early mobilisation

Immobility and/or bed rest are well-documented to have detrimental effects on hospital patients in general. Early mobilisation (e.g. activities such as sitting out of bed, transfers, standing and walking) aims to minimise the risk of the complications of immobility and improve functional recovery.

Evidence to recommendations

Recommendations have been changed as a result of a recent international RCT of over 2000 people with acute stroke (AVERT Trial Collaboration group, 2015). Although two small RCTs previously showed that very early mobilisation (beginning within 24 hours) was feasible in an acute setting, the AVERT trial showed that very early, more frequent, higher dose mobilisation focused on out-of-bed activities in addition to usual care was worse than usual care alone. Very early mobilisation led to greater disability at three months with no effect on immobility-related complications or walking recovery. The trial included people with previous stroke, severe stroke, intracerebral haemorrhage and those who were thrombolysed, if they required help to mobilise and were expected to remain in hospital for at least three days. It excluded those who were medically unstable or with significant previous disability.

To implement this evidence into practice it is important to understand the nature of the usual care and the other factors within this complex intervention. In AVERT's very early intervention, 92% were mobilised within 24 hours of stroke onset (as opposed to admission) and 23% were mobilised within 12 hours. This was carried out by nurses or therapists an average of six times per day, and included an average daily amount of 31 minutes of mobilisation by a physiotherapist measured over 14 days or until transfer of care if earlier. Given the trial outcomes, such very early mobilisation cannot be recommended.

The more beneficial usual care was still early but slightly later, less frequent and at a lower dose. Almost everyone (93%) was mobilised within 48 hours of onset, 59% within 24 hours and 14% within 12 hours, by nurses or therapists an average of three times per day, and including an average daily amount of 10 minutes of mobilisation by a physiotherapist. A subsequent exploration of dose hypothesised that early mobilisation might be best delivered in short, frequent amounts (Bernhardt et al, 2016) but this requires further research.

3.12.1 Recommendations

A Patients with difficulty moving after stroke should be assessed as soon as possible within the first 24 hours of onset by an appropriately trained healthcare professional to determine the most appropriate and safe methods of transfer and mobilisation.

B Patients with difficulty moving early after stroke who are medically stable should be offered frequent, short daily mobilisations (sitting out of bed, standing or walking) by appropriately trained staff with access to appropriate equipment, typically beginning between 24 and 48 hours of stroke onset. Mobilisation within 24 hours of onset should only be for patients who require little or no assistance to mobilise.

3.12.2 Sources

A Working Party consensus

B AVERT Trial Collaboration group 2015; Bernhardt et al, 2016

3.13 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 risk of symptomatic intracerebral haemorrhage outweighs the benefit from the prevention of venous thromboembolism (VTE) with routine anticoagulation with low dose heparin (including low molecular weight heparin) following acute ischaemic stroke (Geeganage et al, 2013). It is also not possible to predict which patients with acute stroke may be at sufficiently high risk of VTE compared to haemorrhagic complications to inform the targeted use of heparin treatment in selected patients (Whiteley et al, 2013). The CLOTS 1 and 2 trials showed that graduated compression stockings were ineffective in preventing VTE or improving functional outcome in stroke (CLOTS Trials Collaboration et al, 2013). The CLOTS 3 trial showed that intermittent pneumatic compression (IPC) using sequential compression with venous refill technology in immobile patients in the first 30 days after stroke is an effective treatment for reducing proximal DVT and improves survival but not functional outcomes (CLOTS Trials Collaboration, 2014). In evaluating the cost-effectiveness of IPC in stroke, NICE recommended that healthcare professionals explain to the patient or their family members or carers that IPC reduces the risk of DVT and may provide an increase in survival, but it will not help them recover from their stroke, and there may be an associated increased risk of surviving with severe disability (National Institute for Health and Care Excellence, 2015c).

If proximal DVT does occur in a patient with ischaemic stroke, the risk of PE is high and such patients should receive treatment-dose anticoagulation. If DVT occurs in a patient with ICH there are no randomised trial data to support any particular treatment, but single-centre case series have reported that in such cases a vena caval filter is probably safe and effective for the prevention of PE (Somarouthu et al, 2011). There is no evidence to guide the management of patients with ICH and PE, and the decision to use or to avoid the use of anticoagulant treatment can only be made on the physician's individualised assessment of the balance of risk and benefit.

3.13.1 Recommendations

A Patients with immobility after acute stroke should be offered intermittent pneumatic compression within 3 days of admission to hospital for the prevention of deep vein thrombosis. Treatment should be continuous for 30 days or until the patient is mobile or discharged, whichever is sooner.

B Patients with immobility after acute stroke should not be routinely given low molecular weight heparin or graduated compression stockings (either full-length or below-knee) for the prevention of deep vein thrombosis.

C Patients with ischaemic stroke and symptomatic deep vein thrombosis or pulmonary embolism should receive anticoagulant treatment provided there are no contraindications.

D Patients with intracerebral haemorrhage and symptomatic deep vein thrombosis or pulmonary embolism should receive treatment with a vena caval filter.

3.13.2 Sources

A CLOTS Trials Collaboration, 2014

B Geeganage et al, 2013; CLOTS Trials Collaboration, 2013

C Working Party consensus

D Working Party consensus

4 Recovery and Rehabilitation

4.0 Introduction

This chapter focuses on recovery and the importance of stroke specialist multidisciplinary rehabilitation, but is not restricted to a fixed period of time or setting in the stroke pathway. It intentionally overlaps with Chapters 3 (acute care) and 5 (long-term management) and relates to multiple settings including acute stroke units, stroke rehabilitation units, early supported discharge services and other community rehabilitation services. Many impairments and activity restrictions are present from the onset of stroke. Some recover rapidly and completely and may no longer be present when care is transferred from the in-patient setting. Other problems will persist over weeks, months and years and may even increase over time as the person's priorities alter and an awareness develops of the challenges of life after stroke. Service organisation and the delivery of rehabilitation are typically focused in the first months of stroke and often fail to meet the long-term and evolving needs of people with stroke. Over time the nature of rehabilitation will shift from restorative to compensatory and adaptive approaches but rehabilitation should not end solely because natural recovery appears to have reached a plateau.

This guideline provides a range of recommendations on the management of specific losses and limitations that arise following the brain damage that occurs from stroke. For clarity and to promote a patient-centred approach, this chapter is structured alphabetically by problems (e.g. cognition, communication, continence) which contain recommendations for specific impairments (e.g. spasticity), activity limitations (e.g. driving), and restricted social participation and quality of life (e.g. sex). To implement these recommendations as intended, guideline users must do so in the context of the recommendations in Chapter 2 that cover the principles of rehabilitation (Sections 2.9-2.11) and the organisation of care (Sections 2.3, 2.4, 2.12). It is also important to note that several rehabilitation interventions have been included in Chapter 3 as they should occur in the first hours or days of stroke and prevent the development of complications (Sections 3.10-3.12). Likewise, several interventions from Chapter 4 should be considered for delivery as part of 'further rehabilitation' (Section 5.9).

The evidence base for stroke rehabilitation is increasing but substantial gaps remain. Commissioning more rehabilitation research has the potential to greatly improve service delivery and patient outcomes.

4.1 Activities of daily living

This section covers difficulties that can occur after stroke affecting personal, domestic and extended activities of daily living (e.g. work and driving), and recommendations to help the person with stroke to engage in independent living and social participation. These activities can be affected by a range of difficulties (e.g. cognition [Section 4.3], arm function [Section 4.2], fatigue [Section 4.6]) and the guidelines user should refer to all relevant sections.

4.1.1 Independence in daily living

Personal activities of daily living (PADL) refer to a range of basic activities such as washing, dressing, bathing, going to the toilet, eating and drinking; these activities usually depend on the ability to transfer and the use of at least one hand. After a stroke PADL can be difficult due to both physical and cognitive impairments. The resultant loss of function can have implications on a person's ability to live independently at home and is therefore a key part of stroke rehabilitation.

Evidence to recommendations

There is limited new research in this area since the previous guideline. The main evidence is summarised in a Cochrane systematic review (Legg et al, 2006) which found that people with stroke who received occupational therapy targeting PADL performed better and had a reduced risk of a poor outcome (dependency in PADL, deterioration or death) compared to those without occupational therapy input. However, there was limited information on the content of the therapy and research investigating the specific interventions that improve PADL is still required. A feasibility RCT has shown potential benefits of a systematic neuropsychological approach to dressing therapy after stroke (Walker et al, 2011) but more robust evidence is required to guide practice. A recent Cochrane review (Elsner et al, 2016) found low to moderate quality evidence that transcranial direct current stimulation (tDCS) was effective in eliciting short term improvements in ADL, but it is unclear whether these effects are lasting and benefits were not seen in an analysis confined to high-quality RCTs. There are many ongoing trials of tDCS which may improve the quality of the evidence. Informal carers often provide support with PADL but, as described elsewhere (Section 2.16), how and when to train informal carers remains unclear despite a large recent RCT (Forster et al, 2012).

4.1.1.1 Recommendations

A People with stroke should be formally assessed for their safety and independence in all relevant personal activities of daily living by a clinician with the appropriate expertise, and the findings should be recorded using a standardised assessment tool.

B People with limitations of personal activities of daily living after stroke should be referred to an occupational therapist with experience in neurological disability, be assessed within 72 hours of referral, and be offered treatment for identified problems (e.g. feeding, toileting) by the occupational therapist, who should also involve other members of the specialist multidisciplinary team.

C People with stroke should be offered, as needed, specific treatments that include:
- dressing practice for people with residual problems with dressing;
- as many opportunities as appropriate to practice self-care;
- assessment, provision and training in the use of equipment and adaptations that increase safe independence;
- training of family/carers in how to help the person with stroke.

4.1.1.2 Sources

A Working Party consensus

B Legg et al, 2006; Working Party consensus

C Walker et al, 2011; Working Party consensus

4.1.2 Extended activities of daily living

Extended activities of daily living (EADL) encompass both domestic and community activities such as shopping, cooking and housework that allow complete or virtually complete independence. These activities also enable community and social participation. See Sections 4.1.3 and 4.1.4 for Driving, and Work and Leisure.

Evidence to recommendations

New evidence in this area is problematic and has not changed the recommendations since a systematic review (Legg et al, 2004) found that therapy improved EADL. Although several studies have included EADL as a secondary outcome, the interventions did not plausibly target EADL. For example, a systematic review of transcranial direct current stimulation found only limited evidence of any effect on EADL (Elsner et al,

2016). The Working Party excluded for methodological reasons one small, non-randomised trial of community-dwelling people with stroke which substituted a portion of physiotherapy time with virtual reality games (Singh et al, 2013).

One large multi-centre RCT included people with stroke who wanted to get out of the house more often. It compared an intervention to increase outdoor mobility (e.g. exercise, activities and confidence-building, provided by a therapist over an average of seven sessions) with a single session of personalised advice and leaflets on transport and mobility (Logan et al, 2014). This increased the number of journeys made and had a lasting effect, but practical limitations in collecting the data on number of journeys may have limited the reliability of the outcome measure. The intervention did not affect the primary (quality of life) or any other outcome, and was not cost-effective. More appropriate and reliable outcome measures are needed in future trials.

4.1.2.1 Recommendations

A People whose activities have been limited by stroke should be:
- assessed by an occupational therapist with expertise in neurological disability;
- trained in how to achieve activities safely and given as many opportunities to practise as reasonable under supervision, provided that the activities are potentially achievable;
- provided and trained in how to use any adaptations or equipment needed to perform activities safely.

B People with stroke who cannot undertake a necessary activity safely should be offered alternative means of achieving the goal to ensure safety and well-being.

4.1.2.2 Sources

A Legg et al, 2004

B Working Party consensus

4.1.3 Driving

Being able to drive is important to people with stroke for practical reasons and because it influences self-esteem and mood. However, there are potential risks associated with driving after stroke. Healthcare professionals therefore need to discuss and give advice on fitness to drive. The current UK regulations regarding driving are available online (https://www.gov.uk/government/publications/assessing-fitness-to-drive-a-guide-for-medical-professionals).

Evidence to recommendations

A recent Cochrane review of four small trials of interventions to improve on-road driving skills after stroke concluded there was insufficient evidence to guide practice (George et al, 2014). No trials evaluated on-road driving lessons, and one study investigated simulator training. This showed promise but is not sufficient to recommend routine use in stroke rehabilitation.

Observational studies of the predictive value of neuropsychological tests and screening tools for on-road driving performance suggest several that may support decision-making when referring people with stroke for on-road driving tests (Korner-Bitensky et al, 2011, Aslaksen et al, 2013, Devos et al, 2014). A systematic review suggested that the Road Sign Recognition and Compass subtests of the Stroke Drivers Screening Assessment, together with Trail Making Test B, may be indicators of those at risk of failing an on-road assessment (Devos et al, 2011). Many cognitive tests are not valid for people with aphasia (Section 4.4.1) for whom on-road assessment may be needed. Studies investigating fitness to drive often exclude people with visual impairments and therefore clinicians should ensure that they assess all relevant impairments including vision (Section 4.17) and cognition.

4.1.3.1 Recommendations

A People who have had an acute stroke or TIA should be asked about driving before they leave the hospital or specialist outpatient clinic.

B People with stroke who wish to drive should:
- be advised of the exclusion period from driving and their responsibility to notify the DVLA if they have any persisting disability which may affect their eligibility;
- be asked about or examined for any absolute bars to driving e.g. epileptic seizure (excluding seizure within 24 hours of stroke onset), significant visual field defects, reduced visual acuity or double vision;
- be offered an assessment of the impairments that may affect their eligibility, including their cognitive, visual and physical abilities;
- receive a written record of the findings and conclusions, copied to their general practitioner.

C People with persisting cognitive, language or motor disability after stroke who wish to return to driving should be referred for on-road screening and evaluation.

D People who wish to drive after stroke should be informed about eligibility for disabled concessions (e.g. Motability, the Blue Badge scheme).

4.1.3.2 Sources

A, B Working Party consensus

C Devos et al, 2011; Working Party consensus

D Working Party consensus

4.1.4 Work and leisure

This refers to two related but different types of activity: productive work (paid or voluntary) and leisure activities. People with stroke may require specialist advice and support to enable them to resume these activities.

Evidence to recommendations

A systematic review of the effectiveness of vocational rehabilitation interventions to improve return to work rates highlighted a lack of evidence (Baldwin and Brusco, 2011). A more recent RCT (Ntsiea et al, 2015) reported benefits from workplace interventions versus usual care on improving return to work rates after stroke (60% versus 20%). Although this study was conducted in South Africa the findings are considered relevant for the UK, but clinicians should be mindful of cultural and policy differences in workforce support. See Section 5.9 for a systematic review of leisure therapy (Dorstyn et al, 2014).

4.1.4.1 Recommendations

A People with stroke should be asked about their pre-stroke work and leisure activities.

B People who wish to return to work after stroke (paid or unpaid employment) should:
- have their work requirements established with their employer (provided the person with stroke agrees);
- be assessed cognitively, linguistically and practically to establish their potential for return;
- be advised on the most suitable time and way to return to work, if return is feasible;
- be referred through the job centre to a specialist in employment for people with disability if extra support or advice is needed;
- be referred to a specialist vocational rehabilitation team if the job centre specialist is unable to provide the necessary rehabilitation.

C Vocational rehabilitation programmes for people after stroke should include:
- assessment of potential problems in returning to work, based on the work role and demands from both the employee's and employer's perspectives;
- an action plan for how problems may be overcome;
- interventions specifically designed for the individual which may include: vocational counselling and coaching, emotional support, adaptation of the working environment, strategies to compensate for functional limitations in mobility and arm function, and fatigue management;
- clear communication between primary and secondary care teams and including the person with stroke, to aid benefit claims or to support a return to work.

D People with stroke who wish to return to or take up a leisure activity should have their cognitive and practical skills assessed, and receive support to pursue their activity.

4.1.4.2 Sources

A Working Party consensus

B Ntsiea et al, 2015; Working Party consensus

C, D Working Party consensus

4.2 Arm function

Approximately 70% of people experience altered arm function after a stroke, and this persists for about 40% of survivors. This section includes interventions used in routine practice to improve arm function and those that might help deliver repetitive and functionally relevant practice. Guideline users should also refer to other relevant sections e.g. weakness (Section 4.9.1), sensation (Section 4.13), shoulder pain and subluxation (Section 4.12.3) and activities of daily living (Section 4.1).

Evidence to recommendations

A recent Cochrane overview of 40 systematic reviews found no high-quality evidence for any arm interventions currently used as part of routine practice, and the evidence is insufficient to enable comparisons between interventions (Pollock et al, 2014b). By contrast there is good quality evidence (Pollock et al, 2014c) for interventions that include intensive, repetitive, task-orientated and task-specific training. These include constraint-induced movement therapy (CIMT), mental practice, virtual reality and interactive video games (Pollock et al, 2014b). It remains unclear whether practising unilateral functional activities is more beneficial than bilateral practice. CIMT, also referred to as 'forced use' and 'restraint' in the literature, includes an extended period of daily constraint of the non-paretic arm and regular sessions of repetitive task training for the paretic arm (shaping). Outcomes generally relate to arm function and effects are mostly confined to the trained activities (Pollock et al, 2014c, Pollock et al, 2014b, Veerbeek et al, 2014). The evidence base for virtual reality and interactive video gaming-based interventions for the arm (as an adjunct to usual care to increase overall therapy time) is developing, though studies are often of low quality and further research is needed.

Mental practice with motor imagery – the practising of movements and activities 'in the mind' – has been advocated to aid recovery following stroke (Zimmermann-Schlatter et al, 2008, Barclay-Goddard et al, 2011). Mental practice was included in the Cochrane overview (Pollock et al, 2014c) but only very limited meta-analysis was possible due to different study protocols. However, in general, this supports the use of mental practice as an adjunct to conventional therapy techniques for arm rehabilitation in the acute, sub-acute and chronic phases of stroke.

Neuromuscular electrical stimulation (NMES) has been used as an adjunctive treatment in stroke rehabilitation for many years. The most common forms are functional electrical stimulation with the

immediate aim to improve function, and therapeutic electrical stimulation in which longer-term use aims to improve recovery of function or reduce impairments. The literature on NMES (functional or therapeutic) contains small to moderate-sized RCTs and systematic reviews (Rosewilliam et al, 2012, Veerbeek et al, 2014, Vafadar et al, 2015). These report reductions in impairment and improved function which are not clearly translated into improved activities of daily living or quality of life. NMES is also used for walking (Section 4.9.3).

Robot-mediated treatment utilises automated devices to provide passive, active or resistive limb movement. Robotics could allow extended periods of treatment and treatments that are responsive to the particular needs of the individual by using the person's movement as feedback, as ability changes over time. A recent Cochrane review concluded there is only low quality evidence on electromechanical and robot-assisted arm and hand training (Mehrholz et al, 2015). Mirror therapy is considered in the section on sensation (Section 4.13).

4.2.1 Recommendations

A People with stroke with potential or actual arm movement should be given every opportunity to practice functional activities. Practice should be characterised by movements that are of high intensity, repetitive and are task-specific. These activities may be bilateral or unilateral depending on the task.

B People with stroke who have 20 degrees of active wrist extension and 10 degrees of active finger extension in the affected hand should be considered for constraint-induced movement therapy.

C People with stroke who have been assessed as cognitively suitable to participate in mental practice of an activity should be trained and encouraged to use it to improve arm function, as an adjunct to conventional therapy.

D People with reduced arm function after a stroke should only be offered robot-assisted movement therapy or neuromuscular electrical stimulation as an adjunct to conventional therapy in the context of a clinical trial.

E People without movement in the affected arm after a stroke should be trained in how to care for their affected arm and monitored for any change.

4.2.2 Sources

A Langhorne et al, 2009; Pollock et al, 2014b; Veerbeek et al, 2014

B Wolf et al, 2006; Page et al, 2008

C Page et al, 2009; Barclay-Goddard et al, 2011; Pollock et al, 2014b; Veerbeek et al, 2014

D Veerbeek et al, 2014, Mehrholz et al, 2015

E Working Party consensus

4.3 Cognition

This section covers the range of cognitive problems that can occur after stroke with recommendations to help the person with stroke to reduce the impact of these difficulties on social participation. General issues are covered (Section 4.3.1) followed by recommendations for specific cognitive domains (Sections 4.3.2 – 4.3.7) and mental capacity (Section 4.8). These recommendations should be implemented in the context of recommendations for the organisation of psychological care (Section 2.12).

4.3.1 Cognitive impairment – general

Cognitive impairment is associated with poor outcomes after stroke, such as increased length of hospital stay and reduced independence. Cognitive losses are probably present in the early post-stroke period for the majority of people, even those without limb weakness. Each cognitive domain (e.g. perception, attention, memory) should not be considered in isolation because most everyday activities draw on a range of abilities. Assessment and treatment need to take this overlap into account. Screening tools provide a general overview of a person's cognitive functioning, but can fail to detect specific problems, and have limited ability to identify specific cognitive strengths and weaknesses. Examples of standardised screening tools used in UK stroke services include the Montreal Cognitive Assessment (MOCA) (Nasreddine et al, 2005) and the Oxford Cognitive Screen (OCS) (Demeyere et al, 2015). Some individuals will need a more detailed assessment for work or driving (Sections 4.1.3, 4.1.4), the administration and interpretation of which may require specific training. Clinicians should note that the presence of cognitive impairment does not necessarily mean that the individual lacks mental capacity (Section 4.8).

Evidence to recommendations

Cognitive research usually focuses on a specific impairment meaning there is little research into general cognitive rehabilitation. Two new RCTs were reviewed but recommendations remain based on Working Party consensus. Schmidt et al (2013) evaluated a self-awareness intervention based on a meal preparation activity, comparing three groups: video with verbal feedback, verbal feedback alone and no feedback. Video with verbal feedback was superior to the other methods but the type of brain injury was unspecified and the relevance to stroke is unclear. Alvarez-Sabin et al (2013) evaluated citicoline (a complex nucleotide composed of ribose, pyrophosphate, cytosine and choline). They cautiously concluded that citicoline showed promise on a composite score derived from multiple cognitive tests, but larger trials with functional outcomes are needed.

4.3.1.1 Recommendations

A People with stroke should be considered to have at least some cognitive impairment in the early phase. Routine screening should be undertaken to identify the person's level of functioning, using standardised measures.

B Any person with stroke who is not progressing as expected in rehabilitation should receive a detailed assessment to determine whether cognitive impairments are responsible, with the results explained to the person, their family and the multidisciplinary team.

C People with communication impairment after stroke should receive a cognitive assessment using valid assessments in conjunction with a speech and language therapist. Specialist advice should be sought if there is uncertainty about the interpretation of cognitive test results.

D People with cognitive problems after stroke should receive appropriate adjustments to their multidisciplinary treatments to enable them to participate, and this should be regularly reviewed.

E People with acute cognitive problems after stroke whose care is being transferred from hospital should receive an assessment for any safety risks from persisting cognitive impairments. Risks should be communicated to their primary care team together with any mental capacity issues that might affect their decision-making.

F People with stroke returning to cognitively demanding activities such as driving or work should have their cognition fully assessed.

G People with continuing cognitive difficulties after stroke should be considered for comprehensive interventions aimed at developing compensatory behaviours and learning adaptive skills.

H People with severe or persistent cognitive problems after stroke should receive specialist assessment and treatment from a clinical neuropsychologist/clinical psychologist.

4.3.1.2 Source

A–H Working Party consensus

4.3.2 Apraxia

Apraxia is the difficulty performing purposeful actions due to disturbance of the conceptual ability to organise actions to achieve a goal. People with apraxia often have problems carrying out everyday activities such as dressing or making a hot drink despite adequate strength and sensation. They may also have difficulties in selecting the right object at the right time or in using everyday objects correctly. Apraxia can be detected using standardised tools (e.g. Test of Upper Limb Apraxia [TULIA]) and is usually associated with damage to the left cerebral hemisphere.

Evidence to recommendations

In the absence of new evidence of sufficient quality the recommendations have not changed. One Cochrane review found insufficient evidence for the effectiveness of strategy training, transfer of training or gesture training (West et al, 2008). 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.

4.3.2.1 Recommendations

A People with difficulty executing tasks after stroke despite adequate limb movement should be assessed for the presence of apraxia using standardised measures.

B People with apraxia after stroke should:
- have their profile of impaired and preserved abilities determined using a standardised approach;
- have the impairment and the impact on function explained to them, their family/carers, and the multidisciplinary team;
- be offered therapy and/or trained in compensatory techniques specific to the deficits identified, ideally in the context of a clinical trial.

4.3.2.2 Sources

A Working Party consensus

B West et al, 2008; Vanbellingen et al, 2010, 2011

4.3.3 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 in non-dominant hemisphere stroke. Attention impairments may persist in the longer term and may be specific (e.g. focusing, dividing or sustaining attention) or more generalised, affecting alertness and speed of processing and be evident in poor engagement or general slowness. Attention problems may lead to fatigue, low mood and difficulty with independent living.

Evidence to recommendations

Recommendations have not changed as the only new evidence of sufficient quality is one Cochrane review of six small studies (Loetscher and Lincoln, 2013). This found limited evidence that cognitive rehabilitation interventions (attention process training, time pressure management and/or computer based training

packages) improved some aspects of attention in the short term, but insufficient evidence for any persisting effects.

4.3.3.1 Recommendations

A People who appear easily distracted or unable to concentrate after stroke should have their attentional abilities assessed using standardised measures.

B People with impaired attention after stroke should have cognitive demands reduced by:
- having shorter treatment sessions;
- taking planned rests;
- reducing background distractions;
- avoiding activities when tired.

C People with impaired attention after stroke should:
- have the impairment explained to them, their family/carers and the multidisciplinary team;
- be offered an attentional intervention (e.g. time pressure management, attention process training, environmental manipulation), ideally in the context of a clinical trial;
- be given as many opportunities to practise their activities as reasonable under supervision.

4.3.3.2 Sources

A–B Working Party consensus

C Loetscher and Lincoln, 2013; Working Party consensus

4.3.4 Executive function

Executive function refers to the ability to plan and execute a series of tasks, inhibit inappropriate automatic impulses, regulate emotional responses, foresee the consequences of actions and make judgments about risk. The 'dysexecutive syndrome' encompasses various impairments, including difficulties with problem solving, planning, organising, initiating, inhibiting and monitoring behaviour. It also includes impairments in cognitive flexibility, which is the ability to change cognitive or behavioural strategies to adapt to novel or evolving task demands. These can be detected using standardised tools (e.g. the Behavioural Assessment of the Dysexecutive Syndrome [BADS]). Executive functions rely heavily upon attention (Section 4.3) and are associated with deficits in everyday function and independence.

Evidence to recommendations

For this guideline, the Working Party evaluated a Cochrane review (Chung et al, 2013), another systematic review (Poulin et al, 2012) and two RCTs (Levine et al, 2011, Schmidt et al, 2013). The Cochrane review identified 19 trials (and selected 13 for meta-analysis) but concluded that there was insufficient high-quality evidence to guide practice. Further high-quality research is needed.

4.3.4.1 Recommendations

A People with stroke who appear to have adequate skills to perform complex activities but fail to initiate, organise or inhibit behaviour should be assessed for the dysexecutive syndrome using standardised measures.

B People with an impairment of executive function and activity limitation after stroke should be trained in compensatory techniques, including internal strategies (e.g. self-awareness and goal setting), structured feedback on performance of functional tasks and external strategies (e.g. use of electronic reminders or written checklists).

C People with an executive disorder after stroke should have the impairment and the impact on function explained to them, their family/carers, and the multidisciplinary team.

4.3.4.2 Sources

A Working Party consensus

B Chung et al, 2013; Working Party consensus

C Working Party consensus

4.3.5 Memory

Subjective problems with memory are very common after stroke, and memory deficits are often revealed on formal testing with standardised measures (e.g. the Rivermead Behavioural Memory Test [RBMT]). Memory deficits can lead to longer hospital stay, poorer outcomes, risks to personal safety, and cause distress to people with stroke and their family. Memory loss is a characteristic feature of dementia, which affects about 20% of people after stroke, but this section is not directly concerned with the impairments associated with diffuse cerebrovascular disease. It should also be noted that subjective memory problems can result from attentional or executive difficulties.

Evidence to recommendations

Previous editions of this guideline identified one Cochrane review of two small trials (Das Nair and Lincoln, 2007), one RCT of mostly younger people with subarachnoid haemorrhage suggesting temporary benefits from electronic paging reminder systems, and two inconclusive studies of the impact of active music listening (Fish et al, 2008, Winkens et al, 2009, Sarkamo et al, 2010). For this guideline the Working Party included one small RCT of sufficient quality (Das Nair and Lincoln, 2012). The ReMiND trial compared two memory rehabilitation strategies (compensation and restitution) against a control condition ('self-help'). People with stroke were in the minority in this mixed neurological sample. The compensation and restitution groups used more internal memory strategies than the control group but there was no difference in outcomes. Further research is needed to establish the clinical effectiveness (at the level of activities or participation) and acceptability of memory rehabilitation approaches, recruiting larger, more representative, groups of people with stroke.

4.3.5.1 Recommendations

A People with stroke who report memory problems and those considered to have problems with learning and remembering should have their memory assessed using standardised measures.

B People with memory impairment after stroke causing difficulties with rehabilitation should:
- have the impairment explained to them, their family/carers and the multidisciplinary team;
- be assessed for treatable or contributing factors (e.g. delirium, hypothyroidism);
- have their profile of impaired and preserved memory abilities determined, including the impact of other cognitive deficits e.g. attention;
- have nursing and therapy sessions altered to capitalise on preserved abilities;
- be trained in approaches that help them to encode, store and retrieve new information e.g. spaced retrieval (increasing time intervals between review of information) or deep encoding of material (emphasising semantic features);
- be trained in compensatory techniques to reduce their prospective memory problems (e.g. use of electronic reminders or written checklists);
- receive therapy in an environment as similar as possible to their usual environment.

4.3.5.2 Sources

A Working Party consensus

B Fish et al, 2008; Das Nair and Lincoln 2012; Working Party consensus

4.3.6 Perception

Perception involves the processing and interpretation of incoming sensations, which is essential to everyday activities. Perceptual functions include awareness, recognition, discrimination and orientation. Disorders of perception are common after stroke and may affect any sensory modality. However, visual perception has been the most widely studied, particularly visual agnosia (impaired object recognition). Perceptual disorders can be detected using standardised assessment tools (e.g. the Visual Object and Space Perception battery [VOSP]). It is important to distinguish between deficits affecting the whole perceptual field (covered in this section) and unilateral deficits (Section 4.3.7) or damage to the visual pathway or eye movements (Section 4.17).

Evidence to recommendations

A Cochrane 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 merits of any one approach over any other. The updated literature search for the current guideline did not find any further trials of effectiveness.

4.3.6.1 Recommendations

A People who appear to have perceptual difficulties after stroke should have a perceptual assessment using standardised measures.

B People with agnosia after stroke should:

- have the impairment explained to them, their family/carers and the multidisciplinary team;
- have their environment assessed and adapted to reduce potential risks and promote independence;
- be offered a perceptual intervention, such as functional training, sensory stimulation, strategy training and/or task repetition, ideally in the context of a clinical trial.

4.3.6.2 Sources

A Working Party consensus

B Bowen et al, 2011; Working Party consensus

4.3.7 Spatial awareness

Problems with spatial awareness (also referred to as visuospatial neglect, sensory inattention etc.) refer to a reduced awareness of some part of the person's body or their environment. It is more common in people with non-dominant hemisphere stroke (typically causing left-sided neglect) and those with hemianopia. Behavioural symptoms include bumping into objects on the affected side or only reading one side of pages in newspapers or books. Neglect can be detected using standardised assessments (e.g. the Behavioural Inattention Test).

Evidence to recommendations

Current evidence consists of a Cochrane review of 23 RCTs (Bowen et al, 2013) and three more recent RCTs which investigated mirror therapy (Pandian et al, 2014), galvanic vestibular stimulation (Wilkinson et al, 2014) and sensory cueing (Fong et al, 2013). Transcranial magnetic stimulation (TMS) was outside the scope of the review. There is insufficient high-quality evidence to recommend any specific interventions to increase independence. However, there is some very limited evidence that cognitive rehabilitation may have an immediate beneficial effect on tests of neglect (Bowen et al, 2013). The trials of mirror therapy, galvanic vestibular stimulation, sensory cueing and TMS showed promise, but these require evaluation in larger trials with higher quality research design and reporting.

4.3.7.1 Recommendations

A People with stroke affecting the non-dominant cerebral hemisphere should be considered at risk of impaired awareness on the contralateral side and should be assessed for this using standardised measures.

B When assessing problems with spatial awareness in people with stroke, clinicians should use a standardised test battery in preference to a single subtest, and the effect on functional tasks such as dressing and mobility should be included.

C People with impaired awareness to one side after stroke should:
- have the impairment explained to them, their family/carers and the multidisciplinary team;
- be trained in compensatory strategies to reduce the impact on their activities;
- be given cues to draw attention to the affected side during therapy and nursing activities;
- be monitored to ensure that they do not eat too little through missing food on one side of the plate;
- be offered interventions aimed at reducing the functional impact of the reduced awareness (e.g. visual scanning training, limb activation, sensory stimulation, eye patching, prism wearing, prism adaptation training, mirror therapy, galvanic vestibular stimulation, transcranial magnetic stimulation), ideally in the context of a clinical trial.

4.3.7.2 Sources

A Working Party consensus

B Jehkonen et al, 2006

C Bowen et al, 2013; Working Party consensus

4.4 Communication

This section covers a range of speech and language problems that can occur after stroke with recommendations to help the person with stroke to communicate and increase social participation. Swallowing difficulty (dysphagia) is covered elsewhere (Section 4.16).

4.4.1 Aphasia

Aphasia refers to an impairment of language function affecting abilities including speaking, understanding, reading and writing. Aphasia affects about a third of people with stroke, and can have a significant impact on the lives of individuals and their family/carers. Aphasia can affect mood, self-image, well-being, relationships, employment, leisure and social opportunities. Problems with communication can also occur following damage to the non-dominant hemisphere.

Several treatments have been evaluated (e.g. cognitive-linguistic therapy, communication/conversation therapy, constraint-induced speech and language therapy (SLT), drug therapy and computerised SLT) but there remains a need for further research. To strengthen the evidence of effectiveness, interventions should be evaluated within RCTs and include at least one of several possible control groups e.g. social support/stimulation, usual care/no therapy, or alternative types of SLT. Most trials investigate one aspect of management – impairment-based face-to-face treatment. There are not enough RCTs to inform other aspects of rehabilitation such as promoting adaptation and compensation, adapting the environment or training communication partners, or the potential benefit of an accurate assessment of the person's abilities.

Evidence to recommendations

An updated Cochrane review (Brady et al, 2016) identified 57 RCTs, many of which were of poor quality and very few had a low risk of bias. A meta-analysis of 13 RCTs provides evidence that SLT is better than no intervention and helps with functional communication, reading comprehension, expressive language and writing. Benefits were not evident at follow up but there are too few trials to conclude this with confidence. There is an absence of evidence from more than 30 RCTs that any one intervention is better than any other. There is an absence of evidence in 5 RCTs that SLT is better than social support/ stimulation, but there is higher drop-out from the latter. The benefits of intensive intervention (6 RCTs) are confounded by greater drop-out from higher intensity treatment, but drop-out is only seen in trials in the first few months after stroke with no drop-out from trials offering high intensity treatment later. Drop-out rates may provide important information on the acceptability of therapy for people with aphasia at different time points after stroke. Overall the evidence from trials is not straightforward and must be interpreted with caution.

In addition to the RCT evidence, single case experiments, small group and qualitative studies can provide a basis for further large RCTs. Well-designed case series support the use of semantic and phonological therapies for anomia (Royal College of Speech and Language Therapists, 2005) and there is some evidence that communication partner training can improve participation (Simmons-Mackie et al, 2010). A qualitative study within the ACT NoW trial (Young et al, 2013) found that early, regular, sustained and flexible contact with either a SLT or an employed visitor was highly valued by service users, had good uptake and was perceived by service users as having a positive impact on mood and confidence.

4.4.1.1 Recommendations

A People with communication problems after stroke should be assessed by a speech and language therapist to diagnose the problem and to explain the nature and implications to the person, their family/carers and the multidisciplinary team. Reassessment in the first four months should only be undertaken if the results will affect decision-making or are required for mental capacity assessment.

B In the first four months after stroke, people with aphasia should be given the opportunity to practise their language and communication with a speech and language therapist or other communication partner as frequently as tolerated.

C After the first four months, people with communication problems after stroke should be reviewed to determine their suitability for further treatment with the aim of increasing participation in communication and social activities. This may involve using an assistant or volunteer, family member or communication partner guided by the speech and language therapist, computer-based practice or other impairment-based or functional treatment.

D People with communication problems after stroke should be considered for assistive technology and communication aids by an appropriately trained, experienced clinician.

E People with aphasia after stroke whose first language is not English should be assessed and provided with information about aphasia and communication practice in their preferred language.

F The carers and family of a person with communication problems after stroke, and health and social care staff, should receive information and training from a speech and language therapist which should enable communication partners to optimise engagement in rehabilitation, and promote autonomy and social participation.

G People with persistent communication problems after stroke that limit their social activities should be offered information about local or national groups for people with aphasia, and referred as appropriate.

4.4.1.2 Sources

A Brady et al, 2016; Working Party consensus

B Young et al, 2013; Brady et al, 2016

C,D Brady et al, 2016; Working Party consensus

E Working Party consensus

F Kagan et al, 2001; Simmons-Mackie et al, 2010

G Working Party consensus

4.4.2 Dysarthria

Dysarthria is a neurological 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. Impaired muscular control affects speech intelligibility, which is usually described as slurred or blurred. Dysarthria is common in the early stages of stroke, and is often associated with dysphagia (swallowing difficulties, Section 4.16).

Evidence to recommendations

There are only two small RCTs on this topic, neither of which provides definitive evidence regarding treatment. Bowen et al (2012) included a planned subgroup of 66 people with dysarthria and Mackenzie et al (2014) was a feasibility study of 39 people. In the former, there was no significant difference between SLT and an attention control in the first few months after stroke, but a nested, qualitative study found that early, regular and frequent contact from a therapist or trained visitor was positively rated by people with stroke and their family/carers (Young et al, 2013). Mackenzie et al (2014) involved people with chronic dysarthria, and there was no difference in outcomes between individuals who received only speech practice and those who received speech practice and oro-motor exercises, although both groups improved over time. Participants were compliant with both interventions and many completed daily independent practice and reported an increase in confidence with treatment. There is little evidence to support the interventions in common use but there is some evidence of qualitative benefits (Palmer and Enderby, 2007).

4.4.2.1 Recommendations

A People with unclear or unintelligible speech after stroke should be assessed by a speech and language therapist to diagnose the problem and to explain the nature and implications to the person, their family/carers and the multidisciplinary team.

B People with dysarthria after stroke which limits communication should:
- be trained in techniques to improve the clarity of their speech;
- be assessed for compensatory and augmentative communication techniques (e.g. letter board, communication aids) if speech remains unintelligible.

C The communication partners (e.g. family/carers, staff) of a person with severe dysarthria after stroke should be trained in how to assist the person in their communication.

4.4.2.2 Sources

A Working Party consensus

B King and Gallegos-Santillan, 1999; Mackenzie and Lowit, 2007; Palmer and Enderby, 2007

C King and Gallegos-Santillan, 1999

4.4.3 Apraxia of speech

A few people with stroke 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 damage to the non-dominant hemisphere, and requires careful separation from aphasia and dysarthria. 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.

Evidence to recommendations

Studies in apraxia of speech are often small and the most recent Cochrane review (West et al, 2005) found no trials. There has been one recent crossover trial (Varley et al, 2016) which compared self-administered computerised communication therapy with a sham computerised treatment for people with chronic speech apraxia. Improvements in spoken word production (naming and repetition) were greater for the intervention group after the six week treatment but limited to trained single words.

4.4.3.1 Recommendations

A People with marked difficulty articulating words after stroke should be assessed for apraxia of speech and treated to maximise articulation of key words to improve speech intelligibility.

B People with severe communication difficulties but good cognitive and language function after stroke should be assessed and provided with alternative or augmentative communication techniques or aids to supplement or compensate for limited speech.

4.4.3.2 Sources

A Wambaugh et al, 2006a, b; Aichert and Ziegler, 2008; Brendel and Ziegler, 2008; Varley et al, 2016; Working Party consensus

B Wambaugh et al, 2006a, b; Working Party consensus

4.5 Continence

Loss of bladder and bowel control is common in the acute phase of stroke and may persist. Incontinence of urine greatly increases the risk of skin breakdown and pressure ulceration. Incontinence of faeces is associated with more severe stroke and is more difficult to manage. Constipation is common, occurring in 55% of people within the first month of stroke, and can compound urinary and faecal incontinence. Incontinence has a detrimental effect on mood, confidence, self-image and participation in rehabilitation and is associated with carer stress. Incontinence is an area of stroke that has received little research interest, despite its substantial negative impact. It needs to be managed proactively to allow people with stroke to fully participate in their own care and recovery both in the acute phase and beyond e.g. people with mental capacity (Section 4.8) should be involved in decisions around the use of catheters and sheaths.

Evidence to recommendations

A 2013 review of bowel management strategies (Lim and Childs, 2013) identified three small studies of varying quality, and concluded that the evidence was limited but a structured nurse-led approach may be

effective. In a review of therapeutic education for people with stroke, Daviet et al (2012) concluded from small non-randomised studies that a nurse-targeted education programme may improve longer term continence. A small RCT by Moon et al (2012) provided no evidence for bladder reconditioning with intermittent clamping. A small study by Guo et al (2014) examined the use of transcutaneous electrical nerve stimulation for the treatment of urinary incontinence over six months and found an improvement in nocturia, urgency and frequency. Thomas et al (2015) demonstrated the feasibility of a cluster RCT of a systematic voiding programme for urinary incontinence and proposed a definitive trial. Recommendations are therefore largely based on NICE guidance and Working Party consensus.

4.5.1 Recommendations

A Stroke unit staff should be trained in the use of standardised assessment and management protocols for urinary and faecal incontinence and constipation in people with stroke.

B People with stroke should not have an indwelling (urethral) catheter inserted unless indicated to relieve urinary retention or when fluid balance is critical.

C People with stroke who have continued loss of bladder and/or bowel control 2 weeks after onset should be reassessed to identify the cause of incontinence, and be involved in deriving a treatment plan (with their family/carers if appropriate). The treatment plan should include:
- treatment of any identified cause of incontinence;
- training for the person with stroke and/or their family/carers in the management of incontinence;
- referral for specialist treatments and behavioural adaptations if the person is able to participate;
- adequate arrangements for the continued supply of continence aids and services.

D People with stroke with continued loss of urinary continence should be offered behavioural interventions and adaptations such as:
- timed toileting;
- prompted voiding;
- review of caffeine intake;
- bladder retraining;
- pelvic floor exercises;
- external equipment

prior to considering pharmaceutical and long-term catheter options.

E People with stroke with constipation should be offered:
- advice on diet, fluid intake and exercise;
- a regulated routine of toileting;
- a prescribed drug review to minimise use of constipating drugs;
- oral laxatives;
- a structured bowel management programme which includes nurse-led bowel care interventions;
- education and information for the person with stroke and their family/carers;
- rectal laxatives if severe problems persist.

F People with continued continence problems on transfer of care from hospital should receive follow-up with specialist continence services in the community.

4.5.2 Sources

A,B Working Party consensus

C Thomas et al, 2008; Working Party consensus

D NICE, 2013c, 2015a

E NICE, 2007b; Coggrave et al, 2006; Working Party consensus

F Working Party consensus

4.6 Fatigue

Fatigue is common after stroke and may be the sole residual problem in people who have made an otherwise complete recovery. In a large survey of long-term stroke survivors half of the respondents reported fatigue and 43% of those with fatigue said they had not received the help they needed (McKevitt et al, 2011). The most common features of fatigue are a lack of energy or an increased need to rest every day, but fatigue is characteristically not relieved by rest. Both mental and physical activity can cause fatigue, and some people are affected more by one than the other. Fatigue can be a source of distress and the causes are unknown. Many people with stroke have to make a greater effort to carry out their activities and this explanation can provide reassurance, as can the information that for many people fatigue decreases over time. Fatigue is associated with depression after stroke (Section 4.10), and may be a predictor of shorter survival. Other factors associated with fatigue include side-effects of medication, disturbed sleep as a result of pain (Section 4.12), anxiety (Section 4.10) or respiratory problems. Fatigue can be assessed by the routine use of a structured assessment scales (Mead et al, 2007). Management strategies include the identification of triggers and re-energisers, environmental modifications and lifestyle changes, scheduling and pacing, cognitive strategies to reduce mental effort, and psychological support to address mood, stress and adjustment.

Evidence to recommendations

Recommendations are based on one Cochrane review of intervention trials (Wu et al, 2015), a systematic review of assessment measures (Mead et al, 2007) and Working Party consensus. Some pharmacological interventions (antidepressants or stimulants), psychological interventions and physical training are potential treatments but they require robust evaluation and there is insufficient evidence to recommend any specific intervention (Wu et al, 2015). Graded activity training and cognitive behavioural approaches such as activity scheduling have proved useful for non-stroke fatigue but their applicability to stroke is not known, and further research is needed. Future studies should assess fatigue systematically, provide treatment for a sufficient duration, follow up participants for sufficient time, and report adverse effects. The Cochrane review identified nine ongoing trials including three assessing fatigue as a secondary outcome e.g. evaluations of fluoxetine in stroke recovery.

4.6.1 Recommendations

A People with stroke who are medically stable but who report fatigue should be offered an assessment for mental and physical factors that may be contributing, particularly when engagement with rehabilitation or quality of life is affected.

B People with fatigue after stroke and their family/carers should be given information, reassurance and support to identify their personal indicators and triggers for fatigue and supported to develop strategies to anticipate and manage fatigue.

4.6.2 Sources

A Mead et al, 2007

B Working Party consensus

4.7 Hydration and nutrition

Dehydration and malnutrition are common in hospital in-patients with stroke and associated with poor outcomes (Foley et al, 2008, Rowat et al, 2012). Malnutrition is associated with increased mortality and

complications, as well as poorer functional and clinical outcomes (Davalos et al, 1996, Yoo et al, 2008). Up to one quarter of stroke patients become more malnourished in the first weeks following stroke, and the risk of malnutrition increases with increasing hospital stay (Davalos et al, 1996, Yoo et al, 2008).

Poor nutritional intake, weight loss, and feeding and swallowing problems can persist for many months (Finestone et al, 2002, Perry, 2004, Jonsson et al, 2008). Multiple factors may contribute to a high risk of dehydration and malnutrition after stroke including physical, social and psychological issues. These include swallowing problems (Section 4.16), reduced ability to self-feed, cognitive impairment (Section 4.3), anxiety or depression (Section 4.10), unfamiliar foods and fatigue (Section 4.6). In people requiring nasogastric tube feeding, delays in initiating feeding and frequent dislodgement can further affect nutritional status, although the use of nasal bridles may be helpful (Beavan et al, 2010). There is insufficient evidence to determine whether hand mittens prevent nasogastric tube dislodgement. The assessment of dehydration is complex, and when used in isolation many common assessment methods are inaccurate (Hooper et al, 2015). Structured screening tools for malnutrition (e.g. the Malnutrition Universal Screening Tool [MUST]) have been validated in stroke (Gomes et al, 2016).

Evidence to recommendations

There is little RCT evidence for the management of dehydration in acute stroke. A Cochrane review by Hooper et al (2015) of the signs and symptoms of impending and current water loss dehydration in older people concluded that there is little evidence that any one symptom, sign or test, including many that clinicians customarily rely on, has any diagnostic utility for dehydration.

A 2012 Cochrane review (Geeganage et al, 2012) included eight trials of the effectiveness of nutritional support in non-dysphagic acute and sub-acute stroke (less than six months). Although nutritional supplementation resulted in significantly reduced pressure sores, increased energy intake and increased protein intake, this did not affect length of hospital stay, dependency or mortality. Studies included people with variable baseline nutritional status, not just those who were malnourished or at risk of malnutrition.

Since the last guideline, two Cochrane reviews have compared routes of enteral tube feeding. One reviewed 11 RCTs comparing gastrostomy versus nasogastric tubes in adults with swallowing difficulties (Gomes Jr et al, 2015), including four trials in people after stroke (Norton et al, 1996, Bath et al, 2000, Dennis et al, 2005, Hamidon et al, 2006). Although gastrostomy reduced intervention failure, there was no difference between the interventions in weight change, pneumonia or mortality. Most studies were small with considerable heterogeneity and methodological limitations. Geeganage et al (2012) reviewed five RCTs comparing gastrostomy with nasogastric tube feeding in acute and sub-acute stroke. Although gastrostomy feeding was associated with fewer feeding failures, less gastrointestinal bleeding and fewer pressure sores, there was no significant difference in length of hospital stay, dependency or mortality.

Beavan et al (2010) conducted a multicentre RCT with people with stroke who required nasogastric tube feeding due to dysphagia (Section 4.16). In a sample of 104 people, those who had a nasogastric tube secured using a nasal bridle received a higher proportion of prescribed feed and fluid compared to the control group who had tubes secured using standard practice. Mahoney et al (2015) identified the need for training and protocols in confirming the placement and securing of nasogastric tubes.

4.7.1 Recommendations

A Patients with acute stroke should have their hydration assessed using multiple methods within four hours of arrival at hospital, and should be reviewed regularly and managed so that normal hydration is maintained.

B Patients with acute stroke should be screened for the risk of malnutrition on admission and at least weekly thereafter. Screening should be conducted by trained staff using a structured tool.

C Patients with acute stroke who are adequately nourished on admission and are able to meet their nutritional needs orally should not routinely receive oral nutritional supplements.

D Patients with acute stroke who are at risk of malnutrition or who require tube feeding or dietary modification should be referred to a dietitian for specialist nutritional assessment, advice and monitoring.

E Patients with stroke who are at risk of malnutrition should be offered nutritional support. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding in accordance with their expressed wishes or, if the patient lacks mental capacity, in their best interests.

F Patients with stroke who are unable to maintain adequate nutrition and fluids orally should be:
- referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- be considered for nasogastric tube feeding within 24 hours of admission;
- assessed for a nasal bridle if the nasogastric tube needs frequent replacement, using locally agreed protocols;
- assessed for gastrostomy if they are unable to tolerate a nasogastric tube with nasal bridle.

G People with stroke who require food or fluid of a modified consistency should:
- be referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- have the texture of modified food or fluids prescribed using nationally agreed descriptors.

H People with stroke should be considered for gastrostomy feeding if they:
- need but are unable to tolerate nasogastric tube feeding;
- are unable to swallow adequate food and fluids orally by four weeks from the onset of stroke;
- are at high long-term risk of malnutrition.

I People with difficulties self-feeding after stroke should be assessed and provided with the appropriate equipment and assistance (including physical help and verbal encouragement) to promote independent and safe feeding.

J People with stroke discharged from specialist care services with continuing problems meeting their nutritional needs should have their dietary intake and nutritional status monitored regularly.

K People with stroke receiving end-of-life (palliative) care should not have burdensome restrictions imposed on oral food and/or fluid intake if those restrictions would exacerbate suffering.

4.7.2 Sources

A,B Working Party consensus

C NICE, 2006a, 2008a; Geegenage et al, 2012

D NICE, 2008a

E Geegenage et al, 2012; Working Party consensus

F NICE, 2008b; Beavan et al, 2010; Working Party consensus

G Royal College of Speech and Language Therapists and British Dietetic Association, 2003; Carnaby et al, 2006; National Patient Safety Agency, 2011

H Dennis et al, 2005; NICE, 2006a

I Working Party consensus

J NICE, 2006a

K Working Party consensus

4.8 Mental capacity

This section covers the ability of people with stroke to make decisions about their health, with reference to the specific and legally-defined framework described in the Mental Capacity Act 2005 (in Scotland the Adults with Incapacity (Scotland) Act 2000). The Act lays out statutory principles underpinning practice including that "a person must be assumed to have capacity unless it is established that he lacks capacity". The Act states that "a person is not to be treated as unable to make a decision unless all practicable steps to help him to do so have been taken without success" and "the fact that a person is able to retain the information relevant to a decision for a short period only does not prevent him from being regarded as able to make the decision". This is of particular relevance to people with communication (e.g. aphasia, Section 4.4) and cognitive impairments (Section 4.3) after stroke. The Act obliges those taking a decision on behalf of an adult who lacks mental capacity to decide in their best interests and "must consider so far as is reasonably ascertainable…the person's past and present wishes and feelings and, in particular, any relevant written statement made by him when he had capacity".

4.8.1 Recommendations

A When making decisions with and on behalf of people with stroke, professionals should adhere to the principles defined in the Mental Capacity Act 2005 (or in Scotland the Adults with Incapacity (Scotland) Act 2000), especially with regard to determining mental capacity and making decisions in the best interests of a person who lacks mental capacity.

B The specialist multidisciplinary team should be involved in making decisions about mental capacity, and should provide information and advice to the person with stroke (when appropriate) and their family/carers.

4.8.2 Sources

A http://www.legislation.gov.uk/ukpga/2005/9/contents; http://www.legislation.gov.uk/asp/2000/4/contents

B Working party consensus

4.9 Mobility

This section covers problems that people have with mobility after a stroke, including balance, falls, and walking. These are prefaced with a general section on motor impairment i.e. weakness. Guideline users should also refer to recommendations for positioning (Section 3.11), early mobilisation in the first few days after stroke (Section 3.12), arm function (Section 4.2), spasticity (Section 4.15), driving (Section 4.1.3), and physical activity and longer term community-based rehabilitation (Section 5.9).

4.9.1 Weakness and ataxia

Stroke frequently results in weakness, lack of co-ordination of movement (ataxia) and loss of selective movement. Weakness on one side of the body (hemiparesis or hemiplegia) is a hallmark of stroke, affecting around 80% of people with stroke. It causes substantial disability, mainly through limiting mobility but also in affecting arm function (Section 4.2). Ataxia occurs in around 3% of ischaemic strokes, principally in cases involving the cerebellum but also as a consequence of severe sensory dysfunction (known as sensory ataxia). Examples of standardised measures of motor impairment include the Motricity Index and the Scale for the Assessment and Rating of Ataxia (SARA).

Evidence to recommendations

Recommendations on motor function are based on systematic reviews (Pollock et al, 2014c, Pollock et al, 2014a, Veerbeek et al, 2014) and the consensus of the Working Party. There is little research evidence

specific to stroke to direct the management of ataxia which is therefore informed by recommendations for the inherited ataxias (Ataxia UK, 2009) and multiple sclerosis (National Institute for Health and Care Excellence, 2014d). A systematic review of 19 studies of ataxia included a small proportion of people with stroke (Marquer et al, 2014). It recommended intensive rehabilitation programmes with balance and co-ordination exercises, but did not recommend type, repetition, or duration or intensity of training.

4.9.1.1 Recommendations

A People with stroke should be assessed for motor impairment and/or ataxia using a standardised approach, and have the impairment explained to them, their family/carers and the multidisciplinary team.

B People with loss of movement and/or ataxia after stroke sufficient to limit their activities should be assessed by a physiotherapist with experience in neurological rehabilitation.

C People with loss of movement and/or ataxia after stroke should be taught task-specific, repetitive, intensive exercises or activities that will increase strength.

4.9.1.2 Sources

A, B Working Party consensus

C Pollock et al, 2014a; Pollock et al, 2014c; Veerbeek et al, 2014

4.9.2 Balance

Many people experience difficulty with balance after stroke. This is usually due to a combination of reduced limb and trunk motor control, altered sensation and sometimes centrally determined alteration in body representation such that the person misperceives their posture in relation to the upright. Whatever its cause, impaired balance reduces confidence and increases the risk of falls (Section 4.9.3). See also Section 4.9.4 on walking.

Evidence to recommendations

A 2013 systematic review provides evidence that trunk training exercises improve trunk performance and dynamic sitting balance (Cabanas-Valdes et al, 2013). There is moderate evidence from Cochrane reviews that task specific training improves dynamic balance i.e. sit to stand and functional walking (Pollock et al, 2014a). There is no evidence for the effectiveness of a walking stick for balance (i.e. light touch) rather than for weight-bearing (Boonsinsukh et al, 2009), but a systematic review found short-term improvements in balance with the use of an ankle-foot orthosis (Tyson and Kent, 2013). A number of small RCTs have investigated the effects of video gaming on balance but further research is required to evaluate long term outcomes as an adjunct to progressive balance training (Hung et al, 2014, Morone et al, 2014).

4.9.2.1 Recommendations

A People with impaired sitting balance after stroke should receive trunk training exercises.

B People with significant impairment of their balance and walking ability after stroke should receive progressive balance training, functional task-specific training, lower limb strengthening exercises and be considered for an ankle-foot orthosis.

C People with moderate to severe limitation of their walking ability after stroke should be assessed for a walking aid to improve their stability.

4.9.2.2 Sources

A Cabanas-Valdes et al, 2013

B Tyson and Kent, 2013; Pollock et al, 2014a; Veerbeek et al, 2014

C Working Party consensus

4.9.3 Falls and fear of falling

People with stroke are at high risk of falls at all stages in their recovery (Verheyden et al, 2013). Stroke-related balance deficits include reduced postural stability during standing and delayed and inco-ordinated responses to both self-induced and external perturbations. Gait deficits include reduced propulsion at push-off, decreased hip and knee flexion at swing-phase and reduced stability at stance-phase (Weerdesteyn et al, 2008). The high incidence of falls may be attributable to impairments of cognitive function, motor weakness, dual tasking and the planning and execution of tasks (Baetens et al, 2013). Non-stroke factors that increase the risk of falling in older people (e.g. multiple medications) are also common in people with stroke. Falls may have serious physical and psychological consequences, including an increased risk of hip fracture (usually on the weaker side) and greater mortality and morbidity compared to people without stroke (Ramnemark et al, 2000, Pouwels et al, 2009). Fear of falling may lead to decreased physical activity, social isolation and loss of independence (Schmid et al, 2015). Interventions to prevent falls include education and adaptations e.g. low bed, chair alarms and are often multi-factorial, addressing physical and psychological aspects.

Evidence to recommendations

Several studies have tried to identify people with stroke at risk of falls using composite and single tests, but none of these tools accurately predict falls (Nystrom and Hellstrom, 2013, Breisinger et al, 2014) and nearly all people with stroke can be presumed to be at high falls risk (as high as 73% in the first year after severe stroke (Sackley et al, 2008)) and their care planned accordingly (National Institute for Health and Care Excellence, 2013a).

Despite evidence for the effectiveness of falls prevention for older people living in the community (progressive muscle strengthening and balance training), a Cochrane review (Verheyden et al, 2013) found that these interventions have not been successfully replicated in people with stroke. In two of the trials bone protection medication (vitamin D or alendronic acid) showed positive trends towards a reduction in falls and the number of people falling, but low statistical power meant that these interventions cannot be recommended. More research is needed to evaluate interventions to reduce falls, injuries and fear of falling in people with stroke. Future studies should evaluate multifactorial interventions including strength and balance training, bone protection and strategies that target specific stroke-related factors.

4.9.3.1 Recommendations

A People with stroke should be offered falls risk assessment and management as part of their stroke rehabilitation, including training for them and their family/carers in how to get up after a fall.

B People with stroke should be offered an assessment of fear of falling as part of their falls risk assessment.

C People at high risk of falls after stroke should be offered a standardised assessment of fragility fracture risk as part of their stroke rehabilitation.

D People with stroke with symptoms of vitamin D deficiency, or those who are considered to be at high risk (e.g. housebound) should be offered calcium and vitamin D supplements.

E People at high risk of falls after stroke should be advised to participate in physical activity/exercise which incorporates balance and co-ordination at least twice per week.

4.9.3.2 Sources

A NICE 2013a; Working Party consensus

B Working Party consensus

C NICE, 2012b; Working Party consensus

D NICE, 2014g; Working Party consensus

E Department of Health, 2011; Working Party consensus

4.9.4 Walking

The highest priority for many people with limited mobility after stroke is to walk independently. This section focuses on treatments and equipment aimed at improving walking and includes exercise. Orthoses are external devices that support or enhance an impaired limb. Those most commonly used after stroke are ankle-foot orthoses (AFOs) to support a hemiplegic foot and ankle. People with stroke sometimes 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). See also early mobilisation (Section 3.12).

Evidence to recommendations

Evidence considered by the Working Party included Cochrane (Mehrholz et al, 2014, Pollock et al, 2014c) and other systematic reviews (Veerbeek et al, 2011, Pereira et al, 2012, Veerbeek et al, 2014) and an RCT (Nadeau et al, 2013). Both early and late after stroke, people benefit from time spent in task-specific, walking-orientated leg exercises which have a cardiorespiratory focus. Interventions include strengthening exercises for the leg, over-ground walking, circuit classes and treadmill training without body weight support (Mehrholz et al, 2014, Veerbeek et al, 2014). Regardless of the intervention, treatment should be of a sufficient intensity with a focus on progression, task-specificity and challenge to improve outcomes (Veerbeek et al, 2011, Nadeau et al, 2013).

For people with stroke who can walk independently at the start of treatment, treadmill training with or without body weight support may improve walking speed and endurance (Mehrholz et al, 2014); however treadmill training is not more effective than other walking-orientated interventions of matched intensity for improving walking ability (Nadeau et al, 2013, Mehrholz et al, 2014). People who are not able to walk independently at the start of treatment do not appear to benefit from treadmill training (Mehrholz et al, 2014) but may benefit from electro-mechanical-assisted gait training (Mehrholz et al, 2013). A systematic review and meta-analysis of AFO after stroke (Tyson and Kent, 2013) found improvements in walking activity in short-term studies. NICE recommends that functional electrical stimulation is offered for improving gait in people with foot drop of central neurological origin (National Institute for Health and Care Excellence, 2009b).

4.9.4.1 Recommendations

A People with limited ability to walk after stroke should be assessed by a physiotherapist with experience in neurological rehabilitation to guide management.

B People with limited mobility after stroke should be assessed, provided and trained in how to use appropriate mobility aids including a wheelchair to enable safe independent mobility.

C People with stroke who are able to walk with or without assistance should undergo task-specific walking training with a cardiorespiratory and/or muscle strength focus at sufficient intensity to improve endurance and walking speed.

D People with stroke, including those who use wheelchairs or have poor mobility, should be advised to participate in exercise with the aim of improving aerobic fitness and/or muscle strength unless there are contraindications.

E People who are able to walk independently after stroke should be offered treadmill training with or without body weight support or other walking-orientated interventions at a higher intensity than usual care and as an adjunct to other treatments.

F People who cannot walk independently after stroke should be considered for electromechanical-assisted gait training including body weight support.

G People with stroke who have compromised ankle/foot stability and/or reduced ability to dorsiflex the foot ('foot-drop') that impedes safe and efficient walking should be offered an ankle-foot orthosis to improve walking and balance. The orthosis should be evaluated and individually fitted before long-term use.

H People with stroke who have reduced ability to dorsiflex the foot ('foot-drop') should be offered functional electrical stimulation to improve their gait.

I People with stroke should only receive therapeutic electrical stimulation for treatment of the leg (other than for foot-drop) in the context of a clinical trial.

4.9.4.2 Sources

A Working Party consensus

B Laufer, 2002; Singh et al, 2006; Working Party consensus

C Pollock et al, 2014c; Veerbeek et al, 2014

D Meek et al, 2003; Saunders et al, 2004; Ada et al, 2006; Pang et al, 2006; Brazzelli et al, 2011

E Mehrholz et al, 2014

F Mehrholz et al, 2013

G de Wit et al, 2004; Pohl et al, 2006; Tyson and Kent, 2013

H NICE, 2009b; Pereira et al, 2012

I Working Party consensus

4.10 Mood and well-being

This section covers a range of emotional problems that can occur as a direct result of a stroke, with recommendations to help the person with stroke to achieve well-being. It includes anxiety, depression, distress and emotional lability. The following recommendations should be implemented in the context of those relating to the organisation of psychological care (Section 2.12). See also the sections on self-management and self-efficacy (Section 2.13).

4.10.1 Anxiety, depression and psychological distress

Mood disturbance is common after stroke. It may present as depression or anxiety, limit functional recovery and be associated with increased mortality (Morris et al, 1993, House et al, 2001). Depression affects about one-third of people with stroke and persists long-term (Hackett et al, 2009a, Ayerbe et al, 2014). Anxiety is also common, affecting around 25% of people with stroke, and may only become evident after several months (Campbell Burton et al, 2011). Depression and anxiety are closely linked and may be part of a single emotional response to stroke. Furthermore, many people with stroke are troubled by psychological distress that does not meet diagnostic criteria for depression and anxiety. A survey of long-term needs found that nearly three-quarters of people with emotional difficulties felt their needs had not been fully met (McKevitt et al, 2011). If possible, assessment measures should be adapted for use with people with mild aphasia, and several have been designed specifically for people with more severe aphasia (e.g. the Stroke Aphasic Depression Questionnaire [SADQ], the Depression Intensity Scale Circles [DISCS] or the Behavioural Outcomes of Anxiety [BOA] scale).

Evidence to recommendations

The previous edition of the guideline was largely based on three Cochrane reviews: treating anxiety (Campbell Burton et al, 2011), and preventing and treating depression (Hackett et al, 2009a, Hackett et al, 2009b). For anxiety, psychological interventions and drug treatments appear useful (Campbell Burton et al,

2011, Mead et al, 2012). SSRIs reduce anxiety but no single SSRI is superior to any other (Mead et al, 2012). The Working Party considered a small RCT of a self-help relaxation recording (Golding et al, 2015) but a larger sample would be needed to inform recommendations. More research is needed into psychological interventions for anxiety after stroke.

For preventing depression, there is insufficient evidence for drug therapy (Hackett et al, 2009a, Tsai et al, 2011). Brief psychological interventions, such as motivational interviewing or problem-solving therapy, may help prevent and treat depression (Hackett et al, 2009a, Watkins et al, 2011). Drug treatments alone (Hackett et al, 2009b, Mead et al, 2012) or in combination with psychological interventions (Mitchell et al, 2009) may be helpful in treating depression. SSRIs did reduce depression but no single SSRI was superior to any other (Mead et al, 2012). For treating low mood (psychological distress), individual behavioural therapy from an assistant psychologist was more effective than usual care at improving mood in people with aphasia after stroke (Thomas et al, 2013).

4.10.1.1 Recommendations

A People with stroke with one mood disorder (e.g. depression) should be assessed for others (e.g. anxiety).

B People with or at risk of depression or anxiety after stroke should be offered brief psychological interventions such as motivational interviewing or problem-solving therapy (adapted if necessary for use with people with aphasia or cognitive problems) before considering antidepressant medication.

C People with mild or moderate symptoms of psychological distress, depression or anxiety after stroke should be given information, support and advice and considered for one or more of the following interventions:
- increased social interaction;
- increased exercise;
- other psychosocial interventions such as psychosocial education groups.

D People with aphasia and low mood after stroke should be considered for individual behavioural therapy e.g. from an assistant psychologist.

E People with depression or anxiety after stroke who are treated with antidepressant medication should be monitored for adverse effects and treated for at least four months beyond initial recovery. If the person's mood has not improved after 2-4 weeks, medication adherence should be checked before considering a dose increase or a change to another antidepressant.

F People with severe or persistent symptoms of emotional disturbance after stroke should receive specialist assessment and treatment from a clinical neuropsychologist/clinical psychologist.

G People with persistent moderate to severe emotional disturbance after stroke who have not responded to high intensity psychological intervention or pharmacological treatment should be considered for collaborative care. Their care should involve collaboration between the GP, primary and secondary physical health services and case management, with supervision from a senior mental health professional and should include long term follow-up.

4.10.1.2 Sources

A Working Party consensus

B Hackett et al, 2009a,b; NICE, 2009a; Campbell Burton et al, 2011, Watkins et al, 2011

C Working Party consensus

D Thomas et al, 2013

E Hackett et al, 2009a,b; Mitchell et al, 2009; NICE, 2009a; Mead et al, 2012; Working Party consensus

F, G Working Party consensus

4.10.2 Emotionalism

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

Evidence to recommendations

Recommendations have not changed since the previous guideline when they were based on one Cochrane review (Hackett et al, 2010) and the consensus of the Working Party, as there have been no subsequent high-quality research studies. There is no evidence regarding the choice of antidepressant or length of treatment, and well designed longer-term studies are needed.

4.10.2.1 Recommendations

A People with stroke who persistently cry or laugh in unexpected situations or are upset by their fluctuating emotional state should be assessed by a specialist member of the multidisciplinary team trained in the assessment of emotionalism.

B People diagnosed with emotionalism after stroke should be appropriately distracted from the provoking stimulus when they show increased emotional behaviour.

C People with severe or persistent emotionalism after stroke should be given antidepressant medication, monitoring effectiveness by the frequency of crying. They should be monitored for adverse effects and treated for at least four months beyond initial recovery. If the person's emotionalism has not improved after 2-4 weeks, medication adherence should be checked before considering a dose increase or a change to another antidepressant.

4.10.2.2 Sources

A,B Working Party consensus

C Hackett et al, 2010

4.11 Mouth care

Mouth care (oral health) refers to the promotion and maintenance of healthy teeth and gums, and a clean oral cavity. A clean mouth is not only pleasant for the person with stroke but the practice of oral hygiene (removing dental plaque and traces of food) maintains the health of the mouth, teeth and gums. Poor oral hygiene can lead to the development of ulceration, soreness and cracked lips, and is associated with increased bacteria in the mouth and in saliva; in people with dysphagia (Section 4.16) this increases the risk of aspiration pneumonia and sepsis. People with problems chewing and swallowing and soreness of the mouth report a decrease in the range of food they are able to eat, so a clean and healthy mouth will prevent discomfort and help to achieve good nutrition (Section 4.7). Maintaining good oral hygiene can be difficult due to cognitive impairment, dysphagia or arm weakness, and be made worse by inadequate control of saliva and medication side-effects such as xerostomia (dry mouth).

Evidence to recommendations

For this guideline the Working Party reviewed eight new papers but none was considered sufficient to alter previous recommendations based on a Cochrane review (Brady et al, 2006) and Working Party consensus. The recent work consists of three small RCTs (Lam et al, 2013, Kim et al, 2014a, Kuo et al, 2015) including mouth care in intensive care (Kim et al, 2014a) and a home-based training programme (Kuo et al, 2015). A scoping review has identified a need for professional education in oral hygiene (Kwok et al, 2015). A pilot RCT suggested chlorhexidine and brushing may reduce plaque (Chipps et al, 2014) and electric toothbrushes appeared to be well tolerated (Lam et al, 2013).

4.11.1 Recommendations

A People with stroke, especially those who have difficulty swallowing or are tube fed, should have mouth care at least 3 times a day including:
- brushing of teeth and cleaning of gums with a suitable cleaning agent (toothpaste and/or chlorhexidine dental gel), for which an electric toothbrush should be considered;
- removal of excess secretions;
- application of lip balm.

B People with stroke who have dentures should have their dentures:
- put in during the day;
- cleaned regularly using a toothbrush, toothpaste and/or chlorhexidine dental gel;
- checked and replaced if ill-fitting, damaged or lost.

C People in hospital or living in a care home after stroke should receive mouth care from staff who have been trained in:
- assessment of oral hygiene;
- selection and use of appropriate oral hygiene equipment and cleaning agents;
- provision of oral care routines;
- awareness and recognition of swallowing difficulties.

D People with stroke and their family/carers should receive information and training in mouth care and maintaining good oral hygiene before transfer of their care from hospital.

4.11.2 Sources

A Working Party consensus

B Brady et al, 2006

C Working Party consensus

D Brady et al, 2006

4.12 Pain

Pain is a frequent problem after stroke and can be due to many causes including 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. This section includes musculoskeletal pain, neuropathic pain and shoulder pain as well as shoulder subluxation. Guideline users may need to refer to separate sections on sensation (4.13) and spasticity (4.15). Pain management includes non-pharmacological and medical approaches and may require collaboration with a specialist pain management team.

4.12.1 Neuropathic pain (central post-stroke pain)

Stroke is one cause of pain following damage to neural tissues (called neuropathic pain or central post-stroke pain [CPSP]). The incidence of CPSP is uncertain, with estimates varying between 5% and 20% of

people with stroke, and it can often be overlooked. There may be some overlap with spasticity which can cause pain, and with sensory loss which can be associated with unpleasant sensory phenomena. It is separate from musculoskeletal pain, which is considered in Section 4.12.2.

Evidence to recommendations

There is very little trial evidence specific to the management of CPSP, and it may well be that CPSP is different from neuropathic pain resulting from other conditions such as peripheral neuropathy or spinal cord pathology. There is no evidence that simple or opioid analgesics have any role in the treatment of neuropathic pain, and many anticonvulsant and antidepressant drugs have a very poor quality evidence base despite their frequent use. The NICE guideline CG173 on neuropathic pain (National Institute for Health and Care Excellence, 2013d) recommends the initial use of amitriptyline, duloxetine (based purely on evidence of effectiveness in painful diabetic neuropathy), gabapentin or pregabalin for neuropathic pain, switching between them if the response is inadequate.

4.12.1.1 Recommendations

A People with central post-stroke pain should be initially treated with amitriptyline, gabapentin or pregabalin:
- amitriptyline starting at 10 mg per day, with gradual titration as tolerated, but no higher than 75 mg per day (higher doses could be considered in consultation with a specialist pain service);
- gabapentin starting at 300 mg twice daily with titration as tolerated to a maximum of 3.6 g per day;
- pregabalin starting at 150 mg per day (in two divided doses; a lower starting dose may be appropriate for some people), with titration as tolerated but no higher than 600 mg per day in two divided doses.

B People with central post-stroke pain who do not achieve satisfactory pain reduction with initial pharmacological treatment at the maximum tolerated dose should be considered for treatment with another drug of or in combination with the original drug:
- if initial treatment was with amitriptyline switch to or combine with pregabalin;
- if initial treatment was with gabapentin switch to pregabalin;
- if initial treatment was with pregabalin switch to or combine with amitriptyline.

C People with central post-stroke pain should be regularly reviewed including physical and psychological wellbeing, adverse effects, the impact on lifestyle, sleep, activities and participation, and the continued need for pharmacological treatment. If there is sufficient improvement, treatment should be continued and gradual reductions in the dose over time should be considered if improvement is sustained.

4.12.1.2 Sources

A–C NICE, 2013d; Wiffen et al, 2013

4.12.2 Musculoskeletal pain

Musculoskeletal pain is not uncommon in people with stroke. Prolonged immobility and abnormal posture can cause pain and exacerbate pre-existing musculoskeletal conditions such as osteoarthritis. The most specific musculoskeletal pain problem after stroke, shoulder pain, is separately considered in Section 4.12.3. Pain management may be non-pharmacological (e.g. physiotherapy) as well as pharmacological.

Evidence to recommendations

The Working Party did not find any research evidence on musculoskeletal pain specific to stroke. Recommendations are based on NICE guidance for osteoarthritis and the consensus of the Working Party.

4.12.2.1 Recommendations

A People with musculoskeletal pain after stroke should be assessed to ensure that movement, posture and moving and handling techniques are optimised to reduce pain.

B People who continue to experience musculoskeletal pain should be offered pharmacological treatment with simple analgesic drugs. Paracetamol, topical non-steroidal anti-inflammatory drugs (NSAIDs) or transcutaneous electrical nerve stimulation (TENS) should be offered before considering the addition of opioid analgesics.

4.12.2.2 Sources

A, B NICE, 2014d; Working Party consensus

4.12.3 Shoulder pain and subluxation

Estimates of the prevalence of shoulder pain after stroke are 17-25% 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 and the two may have different causes.

Evidence to recommendations

The literature on hemiplegic shoulder pain and shoulder subluxation in stroke consists of small trials and systematic reviews that evaluate interventions such as electrical stimulation of the long head of biceps (Manigandan et al, 2014), subacromial injections of corticosteroid (Rah et al, 2012) or local injections of botulinum toxin (Singh and Fitzgerald, 2010). The evidence is insufficient to recommend electrical stimulation for shoulder subluxation. Botulinum toxin injections showed some positive benefits in reducing pain severity and improving shoulder function and range of motion. Low statistical power means that this intervention cannot be confidently recommended and larger high-quality RCTs are required. There is little evidence to support shoulder strapping as a way of preventing or treating shoulder subluxation. Strapping may have a preventative role by making it clear to carers that the shoulder is at risk of damage from incorrect handling or positioning.

4.12.3.1 Recommendations

A People with functional loss in their arm after stroke should have the risk of shoulder pain reduced by:
- careful positioning of the arm, with the weight of the limb supported;
- ensuring that family/carers handle the affected arm correctly, avoiding mechanical stress and excessive range of movement;
- avoiding the use of overhead arm slings and pulleys.

B People with arm weakness after stroke should be asked regularly about shoulder pain.

C People who develop shoulder pain after stroke should:
- have the severity monitored and recorded regularly, using a validated pain assessment tool;
- have preventative measures put in place;
- be offered regular simple analgesia.

D People with shoulder pain after stroke should only be offered intra-articular steroid injections if they also have inflammatory arthritis.

4.12.3.2 Sources

A–C Working Party consensus

D Kalita et al, 2006; Lakse et al, 2009; Rah et al, 2012

4.13 Sensation

Sensory loss after stroke is a recognised impairment. Reported prevalence rates vary, with 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 but one example of a standardised assessment tool is the Nottingham Sensory Assessment. Sensory retraining can be passive using electrical stimulation, or active involving repeated exposure to varying stimuli such as texture, temperature, joint position sense or shape.

Evidence to recommendations

There is no good evidence to support any particular passive or active intervention for sensory impairment after stroke. Studies evaluating mirror therapy (Thieme et al, 2012) and electrical stimulation (Veerbeek et al, 2014) show promising results but further research is needed into specific interventions as part of goal-directed rehabilitation (Pollock et al, 2014b).

4.13.1 Recommendations

A People with stroke should be screened for altered sensation and if present, assessed for sensory impairments using standardised measures.

B People with sensory loss after stroke should be trained in how to avoid injury to the affected body parts.

4.13.2 Sources

A Stolk-Hornsveld et al, 2006; Connell et al, 2008; Working Party consensus

B Working Party consensus

4.14 Sex

The physical and psychological impact of stroke can affect role identity and relationships with sexual partners, and sexual dysfunction can amplify these problems. Sexual dysfunction is common after stroke, affecting both the person with stroke and their male or female partner (Korpelainen et al, 1999, Thompson and Ryan, 2009, Rosenbaum et al, 2014). It is typically multifactorial including other vascular disease, altered sensation, limited mobility, the effects of drugs, mood changes and fear of precipitating further strokes. Regaining intimacy with partners can have a positive effect on self-esteem and quality of life and help to strengthen relationships. Discussion of sex and sexual dysfunction after stroke can be overlooked - healthcare professionals are often reluctant to raise the issue, and people with stroke are unlikely to raise the subject without encouragement (Rosenbaum et al, 2014).

Evidence to recommendations

The Working Party found no new evidence that could inform a recommendation. A narrative literature review (Rosenbaum et al, 2014) identified the need for staff training and a structured approach to assessment. There is little evidence of the risks and benefits of phosphodiesterase type 5 inhibitors after

stroke (e.g. sildenafil), as people within 6 months of stroke or with ischaemic heart disease were excluded from 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 before prescribing sildenafil, once blood pressure is controlled.

4.14.1 Recommendations

A People with stroke should be asked, soon after discharge and at their 6-month and annual reviews, whether they have any concerns about sex. Partners should also have an opportunity to raise any problems.

B People with sexual dysfunction after stroke who want further help should be:
- assessed for treatable causes including a medication review;
- reassured that sexual activity is not contraindicated after stroke and is extremely unlikely to precipitate a further stroke;
- assessed for erectile dysfunction and the use of a phosphodiesterase type 5 inhibitor (e.g. sildenafil);
- advised against the use of a phosphodiesterase type 5 inhibitor for 3 months after stroke and/or until blood pressure is controlled;
- referred to a professional with expertise in psychosexual problems if sexual dysfunction persists.

4.14.2 Sources

A Thompson and Ryan, 2009; Schmitz and Finkelstein, 2010; Rosenbaum et al, 2014; Working Party consensus

B Cheitlin et al, 1999; Melnik et al, 2007; Lorberboym et al, 2010; Song et al, 2011

4.15 Spasticity and contractures

There is considerable debate on the definition, physiological nature and importance of spasticity. Spasticity can cause discomfort or pain for the person with stroke, difficulties for carers and is associated with activity limitation. Spasticity is common, especially in a non-functional arm - estimates of prevalence vary from 19% (Sommerfeld et al, 2004) to 43% (Urban et al, 2010) depending on the timing of assessment. The close association between spasticity and other impairments of arm function (Section 4.2) and mobility (Section 4.9) makes it difficult to determine the extent to which it is a specific cause of disability or one factor affecting the overall impairment.

Any joint that does not move frequently is at risk of developing shortening of surrounding tissues leading to restricted movement. This is referred to as a contracture, and is not uncommon in limbs affected by spasticity. Contractures can impede activities such as washing or putting on clothes, and may also be uncomfortable or painful and limit the ability to sit in a wheelchair or mobilise. Splinting is the process of applying a prolonged stretch through an external device, most commonly splints or serial casts, to prevent or treat contractures. Splinting is used to help manage tone, reduce pain and improve range of movement and function (passive and active). Standardised measures for ease of care and resistance to passive stretches include the Arm Activity measure and modified Ashworth Scale respectively.

Evidence to recommendations

The evidence for spasticity management includes a clinical guideline (Royal College of Physicians, 2009) and several recent RCTs of botulinum toxin (McCrory et al, 2009, Shaw et al, 2011, Ward et al, 2014, Gracies et al, 2015). There are systematic reviews (Rosales and Chua, 2008, Elia et al, 2009, Rosales et al, 2012) and a Cochrane review (Katalinic et al, 2011) of splinting and stretching.

Botulinum toxin administration improves spasticity, range of movement and ease of care (i.e. passive function) and clinical goal attainment (Turner-Stokes et al, 2013) but not activity-level function (i.e. active function). This may partly reflect limitations in some of the measurement tools used. Improvements in activity for leg spasticity require further evaluation, but one study indicates improvements in goal attainment and ambulatory outcomes (Demetrios et al, 2014).

The evidence base for splinting remains limited and therapists must be circumspect in identifying who and when to splint and when not to splint. Splints should only be assessed, fitted and reviewed by appropriately skilled staff. NICE-accredited national guidance has been published to support best practice (College of Occupational Therapists and Association of Chartered Physiotherapists in Neurology, 2015).

4.15.1 Recommendations

A People with motor weakness after stroke should be assessed for spasticity as a cause of pain, as a factor limiting activities or care, and as a risk factor for the development of contractures.

B People with stroke should be supported to set and monitor specific goals for interventions for spasticity using appropriate clinical measures for ease of care, pain and/or range of movement.

C People with spasticity after stroke should be monitored to determine the extent of the problem and the effect of simple measures to reduce spasticity e.g. positioning, passive movement, active movement (with monitoring of the range of movement and alteration in function) and/or pain control.

D People with persistent or progressive focal spasticity after stroke affecting one or two areas for whom a therapeutic goal can be identified (e.g. ease of care, pain) should be offered intramuscular botulinum toxin. This should be within a specialist multidisciplinary team and be accompanied by rehabilitation therapy and/or splinting or casting for up to 12 weeks after the injections. Goal attainment should be assessed 3-4 months after the injections and further treatment planned according to response.

E People with generalised or diffuse spasticity after stroke should be offered treatment with skeletal muscle relaxants (e.g. baclofen, tizanidine) and monitored for adverse effects, in particular sedation and increased weakness. Combinations of antispasticity drugs should only be initiated by healthcare professionals with specific expertise in managing spasticity.

F People with stroke should only receive intrathecal baclofen, intraneural phenol or similar interventions in the context of a specialist multidisciplinary spasticity service.

G People with stroke with increased tone that is reducing passive or active movement around a joint should have the range of passive joint movement assessed. They should only be offered splinting or casting following individualised assessment and with monitoring by appropriately skilled staff.

H People with stroke should not be routinely offered splinting for the arm and hand.

4.15.2 Sources

A Working Party consensus

B Turner-Stokes et al, 2013; Working Party consensus

C Royal College of Physicians, 2009; Working Party consensus

D Royal College of Physicians, 2009; McCrory et al, 2009; Shaw et al, 2011; Rosales et al, 2012; Ward et al, 2014; Demetrios et al, 2014; Gracies et al, 2015

E Montane et al, 2004; Working party consensus

F Sampson et al, 2002; Royal College of Physicians, 2009

G College of Occupational Therapists and Association of Chartered Physiotherapists in Neurology, 2015; Working party consensus

H Lannin et al, 2007b

4.16 Swallowing

Dysphagia (swallowing difficulty associated with foods, fluids and saliva) is common after acute stroke with an incidence between 40 and 78%. There is a link between dysphagia and poor outcomes including a higher risk of longer hospital stay, chest infection, disability and death (Martino et al, 2005). Evidence from national audit shows that delays in the screening and assessment of dysphagia are associated with an increased risk of stroke-associated pneumonia (Bray et al, 2016). Prompt detection of dysphagia in patients with acute stroke is therefore essential. In patients with dysphagia on initial screening, a specialist swallowing assessment is indicated that includes consideration of function and cognition and a broader range of food and fluids of varying texture.

The majority of people with dysphagia after stroke will recover, in part due to bilateral cortical representation of neurological pathways (Hamdy et al, 1998). A proportion will have persistent abnormal swallow and continued aspiration at 6 months (Mann et al, 1999) and a small proportion, particularly those with brainstem lesions, will have chronic and severe swallowing difficulty. People with persistent swallowing problems may avoid eating in social settings and thus lose the physical and social pleasures connected with food and drink.

This section should be read in conjunction with the sections on hydration and nutrition (4.7), mental capacity (4.8) and end-of-life (palliative) care (2.15). In particular, these recommendations are not intended to impose burdensome restrictions on oral food and/or fluid intake for people with stroke receiving holistic palliative care, when pragmatic care with the purpose of relieving suffering predominates over other considerations of risk.

Evidence to recommendations

There is good evidence that a multi-item dysphagia screening protocol that includes at least a water intake test of 10 teaspoons and a lingual motor test is more accurate than screening protocols with only a single item (Martino et al, 2014). Additionally a systematic review (Kertscher et al, 2014) and cost effectiveness analysis (Wilson and Howe, 2012) suggest that the investigation of dysphagia with instrumental assessments (providing direct imaging for evaluation of swallowing physiology) helps to predict outcomes and improve treatment planning (Bax et al, 2014).

A number of treatments for dysphagia after stroke have been studied, including swallowing exercises, acupuncture, drugs, neuromuscular electrical stimulation, pharyngeal stimulation, thermal stimulation, and transcranial direct current or magnetic stimulation. Treatment aims to improve swallowing and to reduce the risk of the person developing aspiration pneumonia, but most studies were of insufficient quality to derive recommendations. A Cochrane review of interventions for dysphagia (Geeganage et al, 2012) concluded there was insufficient data on whether swallowing therapy affects dependency, disability or death. There was some evidence that acupuncture and behavioural interventions (dietary modification, swallowing exercises and environmental changes including positioning) may reduce dysphagia, although the specific components of each remain unclear. There was insufficient evidence to guide the use of other interventions. NICE guidance specific to neuromuscular electrical stimulation found the current evidence to be limited and recommended further research (National Institute for Health and Care Excellence, 2014e). Further trials are ongoing but more are likely to be needed as current evidence on efficacy is limited, including details on the timing of interventions after stroke onset and the intensity of the intervention. Outcomes should focus on freedom from tube feeding, quality of life and the duration of treatment effect.

4.16.1 Recommendations

A People with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional within four hours of arrival at hospital and before being given any oral food, fluid or medication.

B Until a safe swallowing method is established, people with swallowing difficulty after acute stroke should:
- be immediately considered for alternative fluids;
- have a comprehensive specialist assessment of their swallowing;
- be considered for nasogastric tube feeding within 24 hours;
- be referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- receive adequate hydration, nutrition and medication by alternative means.

C Patients with swallowing difficulty after acute stroke should only be given food, fluids and medications in a form that can be swallowed without aspiration.

D People with stroke with suspected aspiration or who require tube feeding or dietary modification should be considered for instrumental assessment (videofluoroscopy or fibre-optic endoscopic evaluation of swallowing).

E People with stroke who require instrumental assessment of swallowing (videofluoroscopy or fibre-optic endoscopic evaluation of swallowing) should only receive this:
- in conjunction with a specialist in dysphagia management;
- to investigate the nature and causes of aspiration;
- to direct an active treatment/rehabilitation programme for swallowing difficulties.

F People with swallowing difficulty after stroke should be considered for swallowing rehabilitation by a specialist in dysphagia management. This should include one or more of:
- compensatory strategies such as postural changes (e.g. chin tuck) or swallowing manoeuvres (e.g. supraglottic swallow);
- restorative strategies to improve oropharyngeal motor function (e.g. Shaker headlifting exercises);
- sensory modification, such as altering the taste and temperature of foods or carbonation of fluids;
- texture modification of food and/or fluids.

G People with stroke who require modified food or fluid consistency should have these provided in line with nationally agreed descriptors.

H People with difficulties self-feeding after stroke should be assessed and provided with the appropriate equipment and assistance (including physical help and verbal encouragement) to promote independent and safe feeding.

I People with swallowing difficulty after stroke should be provided with written guidance for all staff/carers to use when feeding or providing fluids.

J People with stroke should be considered for gastrostomy feeding if they:
- need but are unable to tolerate nasogastric tube feeding;
- are unable to swallow adequate food and fluids orally by four weeks from the onset of stroke;
- are at high long-term risk of malnutrition.

K People with stroke who are discharged from specialist treatment with continuing problems with swallowing food or fluids safely should be trained, or have family/carers trained, in the management of their swallowing difficulty and be regularly reassessed.

L People with stroke receiving end-of-life (palliative) care should not have burdensome restrictions imposed on oral food and/or fluid intake if those restrictions would exacerbate suffering.

4.16.2 Sources

A Kertscher et al, 2014; Martino et al, 2014; Bray et al 2016

B NICE, 2006a, 2008a; Geegenage et al, 2012

C Working Party consensus

D Wilson and Howe, 2012; Bax et al, 2014; Kertscher et al, 2014

E Martino et al, 2005; Carnaby et al, 2006; Royal College of Speech and Language Therapists, 2007, 2008; Terre and Mearin, 2012

F Foley et al, 2008; Speyer et al, 2010; Geegenage et al, 2012; Terre and Mearin, 2012; Rofes et al, 2013; Nakamura and Fujishima, 2013

G National Patient Safety Agency et al, 2011

H,I Working Party consensus

J Dennis et al, 2005; NICE, 2006a; Geegenage et al, 2012

K NICE, 2006a; Heckert et al, 2009; Drury et al, 2014; Working Party consensus

L Working Party consensus

4.17 Vision

People with stroke often have visual problems including altered acuity, field loss such as hemianopia and disruption of eye movements causing diplopia, nystagmus, blurred vision and loss of depth perception (National Institute for Health and Care Excellence, 2013b, Hepworth, 2015). Ocular stroke can cause visual loss due to central or branch retinal artery occlusion, but central visual loss can be due to coexistent ocular conditions. Cognitive disorders such as visual agnosia (Section 4.3.6) and visuospatial neglect (Section 4.3.7) should not be confused with visual impairments. There are a range of specialists, including orthoptists, ophthalmologists, optometrists and low vision rehabilitation workers, who advise on the identification of post-stroke visual impairment, assessment of functional and driving implications (Section 4.1.3) and management including interventions such as compensatory (e.g. visual scanning training), substitutive (e.g. prisms) and restitutive (e.g. visual restoration training) approaches.

Evidence to recommendations

There is insufficient evidence regarding the effectiveness of interventions aimed at improving function in people with visual field defects and eye movement disorders. For visual field defects, a Cochrane review (Pollock et al, 2011b) found limited evidence for compensatory scanning training. Subsequent evidence includes only small RCTs: one for in-patient stroke (Modden et al, 2012) and three in chronic stroke (Plow, 2012) or mixed populations (Aimola et al, 2014, Bowers et al, 2014). The Cochrane review of eye movement disorders (Pollock et al, 2011a) found an absence of relevant trials and the updated search for this guideline found only two small non-stroke trials (Claassen et al, 2013, Cifu et al, 2014). One Cochrane review found insufficient evidence regarding the effectiveness of interventions to improve visual function in people with central retinal artery occlusion (Fraser Scott and Adams, 2009). A further Cochrane review (Pollock et al, 2012) concluded that evidence from other Cochrane reviews of the management of age-related visual problems in people from the general population is likely to be the best evidence available for making treatment decisions about individuals with stroke.

4.17.1 Recommendations

A People with stroke should be:

- assessed for visual acuity whilst wearing the appropriate glasses to check their ability to read newspaper text and see distant objects clearly;
- examined for the presence of visual field deficit (e.g. hemianopia) and eye movement

disorders (e.g. strabismus and motility deficit).

B People with altered vision, visual field defects or eye movement disorders after stroke should receive information, support and advice from an orthoptist and/or an ophthalmologist.

C People with visual loss due to retinal artery occlusion should be jointly managed by an ophthalmologist and a stroke physician.

4.17.2 Sources

A-C Working Party consensus

4.18 Implications of recommendations

The recommendations contained in this chapter have significant implications for the organisation and delivery of problem-based recovery and rehabilitation with the aim of achieving the best possible level of activities, social participation and autonomy for people with stroke. Fully implemented, these recommendations will reduce the long-term burden of stroke on patients, families and on health and social care. Local health economies should:

- Establish clinical pathways to provide rehabilitation beyond the in-patient setting and into the community to ensure continuity and minimal delays, paying specific attention to local need for provision beyond the first few months when most gaps occur.
- Invest in rehabilitation teams across the pathway that are multidisciplinary and have the necessary stroke specialist experience and skills, paying particular attention to commonly under-resourced staffing e.g. SLT, orthoptics, clinical psychology/clinical neuropsychology.
- Ensure that specialist multidisciplinary teams liaise effectively with other primary care services and social care.
- Identify staff training needs and provide these as required, paying particular attention to areas where staff feel less confident e.g. sex, vocational rehabilitation, continence, fatigue, cognition.
- Provide staff with easy access to assistive technology and to sufficiently resourced services e.g. specialist seating, wheelchairs, orthotics.
- Ensure that rehabilitation is person-centred, promoting awareness that interventions should be offered in accordance with the expressed wishes of the person with stroke, or in their best interests if they lack mental capacity.
- Ensure that people receiving end-of-life (palliative) care receive holistic, person-centred care appropriate to their prognosis and do not have burdensome restrictions imposed if those restrictions would exacerbate suffering e.g. on oral food and/or fluid intake.
- Develop clear protocols for involving family/carers, where appropriate, in information-sharing and decision-making and for meeting statutory requirements for identifying carers' own needs.

5 Long-term Management and Secondary Prevention

5.0 Introduction

From the moment a person has a stroke or TIA they are at substantial increased risk of further events; 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 such as acute coronary syndrome. Stroke is not a single disease entity and in some cases (e.g. arterial dissection) the underlying pathology is associated with a relatively low risk of recurrence. Clinicians should seek to identify and reduce the risks that are specific to each individual.

The greatest risk of a vascular event is early after stroke or TIA and may be as high as 25% within three months, half of which is within the first four days (Johnston et al, 2000). Secondary prevention should therefore be commenced as soon as possible, and recent registry evidence suggests these measures can substantially reduce the risk of recurrent events (Amarenco and Steering Committee Investigators of the TIAregistry.org, 2016). 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 3 have been implemented, and the recommendations concerning early risk reduction are not repeated here. However, it is important that attention to secondary prevention is continued throughout the recovery and rehabilitation phase, and persistence with treatment is vital to long-term risk reduction.

Diet and lifestyle issues such as smoking, exercise and alcohol intake contribute significantly to cardiovascular risk, including the risk of first and recurrent stroke; their modification provides an important mechanism for influencing recurrent events. Much of the evidence here comes from primary prevention studies or from patients with coronary artery disease, with the presumption that the evidence translates to the secondary prevention of stroke based on the two conditions often sharing the same underlying pathology. Given the different causes of stroke, this will not always be the case.

People with stroke and their family/carers often face substantial challenges returning to life in the home, community and workplace. The huge variety of individual circumstances and the complex nature of the outcomes concerned complicate the design, conduct and interpretation of research into living with the long-term effects of stroke. As a consequence, the evidence to guide recommendations here is more difficult to interpret; this does not diminish the importance of the topics under consideration nor the need for expert guidance on best practice.

5.1 A comprehensive and personalised approach

Ensuring the identification and modification of all risk factors, including lifestyle issues, should lead to more effective secondary prevention of stroke and other vascular events. This section covers advice and general principles of management – specific interventions are covered in subsequent sections.

5.1.1 Recommendations

A People with stroke or TIA should receive a comprehensive and personalised strategy for vascular prevention including medication and lifestyle factors, which should be implemented as soon as possible and should continue long-term.

B People with stroke or TIA should receive information, advice and treatment for stroke, TIA and vascular risk factors which is:
- given first in the hospital or clinic setting;
- reinforced by all health professionals involved in their care;
- provided in an appropriate format.

C People with stroke or TIA should have their risk factors and secondary prevention reviewed and monitored at least once a year in primary care.

D People with stroke or TIA who are receiving medication for secondary prevention should:
- receive information about the reason for the medication, how and when to take it and common side effects;
- receive verbal and written information about their medicines in an appropriate format;
- be offered compliance aids such as large-print labels, non-childproof tops and dosette boxes according to their level of manual dexterity, cognitive impairment, personal preference and compatibility with safety in the home;
- be aware of how to obtain further supplies of medication;
- have their medication regularly reviewed;
- have their capacity to take full responsibility for self-medication assessed (including cognition, manual dexterity and ability to swallow) by the multidisciplinary team as part of their rehabilitation prior to the transfer of their care out of hospital.

5.1.2 Sources

A Working Party consensus

B Ovbiagele et al, 2004; Maasland et al, 2007; Sit et al, 2007

C, D Working Party consensus

5.2 Identifying risk factors

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

5.2.1 Recommendations

A People with stroke or TIA for whom secondary prevention is appropriate should be investigated for risk factors as soon as possible within 1 week of onset.

B Provided they are eligible for any resultant intervention, people with stroke or TIA should be investigated for the following risk factors:
- ipsilateral carotid artery stenosis;
- atrial fibrillation;
- structural cardiac disease.

C People with evidence of non-symptomatic cerebral infarction on brain imaging (silent cerebral ischaemia) should have an individualised assessment of their vascular risk and secondary prevention.

5.2.2 Source

A-C Working Party consensus

5.2.3 Implications

The 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 primary care may require additional resources.

5.3 Carotid artery stenosis

Atheroma and stenosis of the carotid arteries is commonly associated with stroke and TIA, and surgical or radiological interventions (endarterectomy or stenting) have been used to reduce the risk of recurrent ipsilateral stroke.

Evidence to recommendations

The principal evidence for carotid endarterectomy for people with recent symptoms is from the European Carotid Surgery Trial (ECST) and the North American Symptomatic Carotid Endarterectomy Trial (NASCET) (Rothwell et al, 2003a). Only people 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. People with possible cardioembolism were also excluded. When allowance is made for the different methods used to measure stenosis from angiograms, the two trials report consistent findings. To avoid confusion regarding the degree of stenosis 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 more distal internal carotid artery, expressed as a percentage). In a pooled analysis of the individual data from 6,092 patients, carotid endarterectomy reduced the 5-year absolute risk of ipsilateral ischaemic stroke by 16.0% in patients with 70–99% stenosis, and by 4.6% in patients with 50–69%. There was no benefit for patients with 30–49% stenosis and surgery increased the risk in patients with less than 30% stenosis. There was no evidence of benefit for patients with a near-occlusion. In these trials conducted in the 1980s the operative risk of stroke (ocular or cerebral) and death within 30 days of endarterectomy was 7%.

There is evidence of considerable heterogeneity in individual risk according to age, gender, degree of stenosis, presenting symptom, time from presenting symptom and presence of plaque ulceration (Rothwell et al, 2004). Prognostic models based on these characteristics have been derived which may be useful in the decision making process (Rothwell et al, 2005b). These models are based on trial data which are now over 20 years old and with improvements in other treatments these models are likely to overestimate the absolute risk of stroke. Modified prognostic models incorporating corrections to allow for improvements in 'best medical therapy' have been developed (e.g. the Carotid Artery Risk score - www.ecst2.com/), but await validation.

In a systematic review of operative risks in relation to timing of surgery, no statistically significant difference for early versus late surgery was identified for patients with stable stroke (Rerkasem and Rothwell, 2009). In patients undergoing emergency surgery the pooled absolute risk of stroke and death was 20.2% for those with 'stroke-in-evolution' (fluctuating or progressive deficit) and 11.4% for those with crescendo TIA (more than 2 episodes in a week), significantly higher than for those undergoing non-emergency surgery (odds ratio [OR] 4.6). Such patients are likely to be at increased risk if surgery is not performed, but given these risks and the effectiveness of medical management it cannot be assumed that emergency surgery is beneficial in neurologically unstable patients. The outcome from carotid endarterectomy is not significantly influenced by whether the procedure is carried out under local or general anaesthesia (Vaniyapong et al, 2013), and if the person has a particular preference, this should be taken into account.

Compared to surgical endarterectomy, endovascular therapy involving carotid angioplasty and stenting is associated with an increased risk of stroke of any severity or death (Bonati et al, 2012). This increased risk is modified by age, with no difference in stroke or death when the comparison is confined to those below 70 years of age (International Carotid Stenting Study investigators et al, 2010). Long term follow-up identifies an excess of procedure-related and non-disabling strokes with endovascular therapy (Bonati et al, 2015). By contrast, carotid endarterectomy is associated with an excess of cranial nerve palsy and myocardial infarction (Bonati et al, 2012). For endovascular procedures undertaken within the first few days after symptom onset there is an excess of disabling and fatal, as well as non-disabling strokes in comparison to carotid endarterectomy (Rantner et al, 2013).

There is no high-quality evidence to guide decision making regarding the timing and indications for carotid revascularisation in patients presenting with ischaemic stroke who have been treated with intravenous thrombolysis. A number of case series have been reported with small numbers and few outcome events (Naylor, 2015). Activation of the coagulation system and fibrin formation occurs following alteplase therapy with changes peaking at 1 to 3 hours but detectable for up to 72 hours (Fassbender et al, 1999). It is not clear what impact if any these changes in the coagulation system may have on the balance of risks and benefits, but in the absence of high-quality data it would seem reasonable to advise caution if considering surgery within 72 hours of intravenous thrombolysis.

5.3.1 Recommendations

A Following stroke or TIA, the degree of carotid artery stenosis should be reported using the North American Symptomatic Carotid Endarterectomy Trial (NASCET) method.

B People with non-disabling carotid artery territory stroke or TIA should be considered for carotid revascularisation, and if they agree with intervention:
- they should have carotid imaging (duplex ultrasound, MR or CT angiography) performed urgently to assess the degree of stenosis;
- if the initial test identifies a relevant severe stenosis (greater than or equal to 50%), a second or repeat non-invasive imaging investigation should be performed to confirm the degree of stenosis. This confirmatory test should be carried out urgently to avoid delaying any intervention.

C People with non-disabling carotid artery territory stroke or TIA should be considered for carotid revascularisation if the symptomatic internal carotid artery has a stenosis of greater than or equal to 50%. The decision to offer carotid revascularisation should be:
- based on individualised risk estimates taking account of factors such as the time from the event, gender, age and the type of qualifying event;
- supported by risk tables or web-based risk calculators (e.g. the Oxford University Stroke Prevention Research Unit calculator, www.stroke.ox.ac.uk/model/form1.html).

D People with non-disabling carotid artery territory stroke or TIA and a carotid stenosis of less than 50% should not be offered revascularisation of the carotid artery.

E Carotid endarterectomy for people with symptomatic carotid stenosis should be:
- the treatment of choice, particularly for people who are 70 years of age and over or for whom the intervention is planned within seven days of stroke or TIA;
- performed in people who are neurologically stable and who are fit for surgery using either local or general anaesthetic according to the person's preference;
- performed as soon as possible and within 1 week of first presentation;
- deferred for 72 hours in people treated with intravenous thrombolysis;
- only undertaken by a specialist surgeon in a vascular centre where the outcomes of carotid surgery are routinely audited.

F Carotid angioplasty and stenting should be considered for people with symptomatic carotid

stenosis who are:

- unsuitable for open surgery (e.g. high carotid bifurcation, symptomatic re-stenosis following endarterectomy, radiotherapy-associated carotid stenosis);

or:

- less than 70 years of age and who have a preference for carotid artery stenting.

The procedure should only be undertaken by an experienced operator in a vascular centre where the outcomes of carotid stenting are routinely audited.

G People who have undergone carotid revascularisation should be reviewed post-operatively by a stroke physician to optimise medical aspects of vascular secondary prevention.

H Patients with atrial fibrillation and symptomatic internal carotid artery stenosis should be managed for both conditions unless there are contraindications.

5.3.2 Sources

A Working Party consensus

B Wardlaw et al, 2006

C, D Rothwell et al, 2004, 2005; Rerkasem and Rothwell, 2011

E Rerkasem and Rothwell, 2011; Bonati et al, 2012; Vaniyapong et al, 2013; Rantner et al, 2013; Working Party consensus

F Economopoulos et al, 2011; Bonati et al, 2015; Working Party consensus

G, H Working Party consensus

5.3.3 Implications

Vascular surgery services should offer the option to perform carotid endarterectomy surgery under local or general anaesthetic. Multidisciplinary teams should include a carotid interventionist able to advise on and deliver carotid artery angioplasty and stenting.

5.4 Blood pressure

Blood pressure (BP) is the pre-eminent treatable risk factor for first and recurrent stroke. It is estimated to cause about 50% of ischaemic strokes and is the principal risk factor for intracerebral haemorrhage. The relationship to cerebral perfusion pressure means that changes in BP in hyperacute stroke may influence the extent of brain damage. Treatment recommendations therefore differ when comparing hyperacute management (Sections 3.5 and 3.6) with long-term secondary prevention, with this section concentrating on the latter.

Evidence to recommendations

There is high-quality RCT evidence that BP 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 classified as normotensive, reduced BP by 12/5 mmHg and resulted in a 42% reduction in recurrent stroke and 35% fewer major coronary events. A net benefit was seen for those with baseline BP levels as low as 115/75 with the lowest risk of recurrent stroke seen in those achieving the lowest follow-up BP levels. There was no evidence of increased stroke risk at lower BP (Arima et al, 2006). In the Secondary Prevention of Small Subcortical Strokes (SPS3) trial targeting a systolic BP of below 130 mmHg in patients with recent lacunar stroke, reductions in the rate of all stroke, disabling or fatal stroke and the composite outcome of myocardial infarction or vascular death were not significant, but the rate of cerebral haemorrhage was reduced and the lower target was well tolerated (S. P. S. Study

Group et al, 2013). A meta-analysis of 123 studies and 613,815 subjects found BP-lowering treatment significantly reduced cardiovascular events and death in proportion to the magnitude of BP reduction achieved, with no differences in the proportional benefits between trials with lower (below 130 mmHg) or higher systolic BP at baseline (Ettehad et al, 2016). There was also no difference in the proportional risk reductions for major cardiovascular events by baseline medical conditions, but calcium-channel blockers were found to be superior to other drug classes in the prevention of stroke. Overall, a 10mm Hg reduction in systolic BP reduced the risk of cardiovascular disease by 20% and stroke by 27%.

There is uncertainty regarding the best time to start antihypertensive therapy following ischaemic stroke. Whilst BP can be successfully and safely reduced in the acute phase, there is no evidence that such early intervention results in long-term benefits (Bath and Krishnan, 2014). For patients admitted with stroke who are already taking antihypertensive medication, treatment can be safely withheld until patients are medically and neurologically stable and have suitable oral or enteral access (Bath et al, 2015). Unless there is severe hypertension or treatment is required for acute intracerebral haemorrhage (Section 3.6) or to facilitate intravenous thrombolysis treatment (Section 3.5), antihypertensive medication should generally be initiated prior to the transfer of care out of hospital or at 2 weeks, whichever is the soonest, or at the first clinic visit for people not admitted.

5.4.1 Recommendations

A People with stroke or TIA should have their blood pressure checked, and treatment should be initiated and/or increased as tolerated to consistently achieve a clinic systolic blood pressure below 130 mmHg, except for people with severe bilateral carotid artery stenosis, for whom a systolic blood pressure target of 140–150 mmHg is appropriate.

B For people with stroke or TIA aged 55 or over, or of African or Caribbean origin at any age, antihypertensive treatment should 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 or angiotensin II receptor blocker should be added.

C For people with stroke or TIA not of African or Caribbean origin and younger than 55 years, antihypertensive treatment should be initiated with an angiotensin converting enzyme inhibitor or an angiotensin II receptor blocker.

D Blood pressure-lowering treatment for people with stroke or TIA should be initiated prior to the transfer of care out of hospital or at 2 weeks, whichever is the soonest, or at the first clinic visit for people not admitted.

E Blood pressure-lowering treatment for people with stroke or TIA should be monitored frequently and increased to achieve target blood pressure as quickly as tolerated and safe in primary care. People whose blood pressure remains above target despite treatment should be checked for medication adherence before being referred for a specialist opinion.

5.4.2 Sources

A Rothwell et al, 2003; Ettehad et al, 2016

B PROGRESS Collaborative Group, 2001; NICE, 2011a

C NICE, 2011a

D, E Rothwell et al, 2007; NICE, 2011a; Working Party consensus

5.4.3 Implications

There should be a move away from concept of treating hypertension and towards the concept of modifying BP as a risk factor. It is appropriate to lower BP in patients who previously would have been considered normotensive.

5.5 Lipid modification

Raised lipid levels, especially hypercholesterolaemia, are an important modifiable risk factor for cardiovascular events, especially myocardial infarction. Lipid-lowering treatment is an effective intervention for primary and secondary prevention of 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 specifically those with cerebrovascular disease. The UK Heart Protection Study (HPS) studied the effect of simvastatin 40 mg daily in adults at high risk of cardiovascular events and showed a relative risk reduction of 17% in vascular death, 27% in major coronary events and 25% in stroke. Long term follow up confirmed persisting benefits with no adverse effects emerging, including non-vascular morbidity and mortality (Heart Protection Study Collaborative et al, 2011). The SPARCL trial investigated the effect of atorvastatin 80 mg daily in patients with 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 (Amarenco et al, 2006).

In primary and secondary prevention studies, lowering low density lipoprotein (LDL) cholesterol by 1 mmol/L reduces the relative risk of major vascular events by 21%, total mortality by 9% and stroke (of any type) by 15% irrespective of baseline cholesterol and gender (Fulcher et al, 2015). Thus the decision to initiate treatment should be determined by a person's absolute cardiovascular risk rather than their cholesterol level. NICE clinical guideline CG181 (National Institute for Health and Care Excellence, 2014c) for lipid modification provides recommendations in line with the findings from HPS and SPARCL, and recommends the use of 'high-intensity' statin therapy with atorvastatin 80 mg daily with a lower starting dose for people at high risk of adverse events or drug interactions. The Working Party has modified its recommendations to match those of NICE CG181 with regard to secondary prevention of TIA or stroke.

In HPS, 3,280 patients had a history of stroke, TIA or carotid revascularisation and this group showed a non-significant 91% (95% CI –8 to 395) increase in the risk of intracerebral haemorrhage with statin therapy. The risk of intracerebral haemorrhage in SPARCL was increased by 67% (95% CI 9 to 156) for those on a statin, with a higher risk in those with haemorrhagic stroke as the qualifying event. Any association between statin use and cerebral haemorrhage may require the presence of pre-existing intracranial small vessel disease (Goldstein et al, 2008).

5.5.1 Recommendations

A People with ischaemic stroke or TIA should be offered advice on lifestyle factors that may modify lipid levels, including diet, physical activity, weight, alcohol and smoking.

B People with ischaemic stroke or TIA should be offered treatment with a statin drug unless contraindicated. Treatment should:

- begin with a high intensity statin such as atorvastatin 20-80mg daily;
- be with an alternative statin at the maximum tolerated dose if a high intensity statin is unsuitable or not tolerated;
- aim for a greater than 40% reduction in non-HDL cholesterol. If this is not achieved within 3 months, the prescriber should:
- discuss adherence and timing of dose;

- optimise dietary and lifestyle measures;
- consider increasing to a higher dose if this was not prescribed from the outset.

C People with ischaemic stroke or TIA should not be prescribed fibrates, bile acid sequestrants, nicotinic acid or omega-3 fatty acid compounds for secondary vascular prevention. Ezetimibe should be used only in people who also have familial hypercholesterolaemia.

D People with primary intracerebral haemorrhage should avoid statin treatment unless it is required for other indications.

5.5.2 Sources

A-C NICE, 2014c

D Vergouwen et al, 2008

5.6 Anti-thrombotic treatment

5.6.1 Antiplatelets

Antiplatelet treatment is one of the most important interventions for reducing the risk of recurrent vascular events including stroke. Most evidence relates to aspirin, with renewed interest in combination antiplatelet therapy which may offer the prospect of greater efficacy, tempered by an increased risk of bleeding.

Evidence to recommendations

The Antithrombotic Trialists' Collaboration (2002) 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. Comparative trials such as CAPRIE (CAPRIE Steering Committee, 1996), ESPRIT (ESPRIT Study Group et al, 2006) and PRoFESS (Sacco et al, 2008) show that aspirin plus modified-release dipyridamole and clopidogrel monotherapy are equally effective, with both options superior to aspirin monotherapy.

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 clopidogrel alone, with evidence of increased adverse effects particularly bleeding. There is evidence that even in short-term use the combination carries an increased risk of bleeding, particularly in aspirin-naive individuals (Geraghty et al, 2010). The CHANCE RCT compared combination aspirin and clopidogrel to aspirin monotherapy in patients with minor stroke or high-risk TIA (Wang et al, 2013). Treatment was commenced within 24 hours of the event and continued for 3 weeks. The trial showed greater efficacy of the dual antiplatelet regimen, with a 90-day stroke rate of 8.2% for aspirin plus clopidogrel versus 11.7% for aspirin monotherapy. There was no difference in the rate of moderate or severe bleeding (0.3%) or haemorrhagic stroke (0.3%) between the two groups, probably due to the exclusion of moderate and severe stroke and the relatively short period of dual therapy. The epidemiology of stroke in the Chinese population differs from that of Western European populations and patients in CHANCE were highly selected. Recent and ongoing RCTs may provide more information on the merits of early combination antiplatelet treatment in a broader stroke and TIA population, and on the time-course of benefit from antiplatelet treatment, which may be shorter than previously supposed (Rothwell et al, 2016). Antiplatelet treatment within the first two weeks after stroke or TIA is addressed in Sections 3.3 and 3.5.

NICE technology appraisal TA210 recommends clopidogrel as the most cost-effective antiplatelet therapy for secondary prevention following ischaemic stroke (National Institute for Health and Care Excellence, 2010c). Aspirin plus modified-release dipyridamole is recommended for those unable to take clopidogrel, although this combination may be more difficult to tolerate, with a higher discontinuation rate compared

to clopidogrel in the PRoFESS trial (Sacco et al, 2008). Clopidogrel is not licensed for the management of TIA and therefore NICE recommends aspirin plus modified-release dipyridamole for this indication; the Working Party considers that a unified approach to the treatment of TIA and ischaemic stroke is more appropriate. Whilst clopidogrel does not have a licence for use after TIA, the Working Party considers that the benefits of recommending this drug first-line outweigh any disadvantages.

5.6.1.1 Recommendations

A For long-term vascular prevention in people with ischaemic stroke or TIA without paroxysmal or permanent atrial fibrillation:
- clopidogrel 75mg daily should be the standard antithrombotic treatment;
- aspirin 75 mg daily with modified-release dipyridamole 200 mg twice daily should be used for those who are unable to tolerate clopidogrel;
- aspirin 75mg daily should be used if both clopidogrel and modified-release dipyridamole are contraindicated or not tolerated;
- modified-release dipyridamole 200 mg twice daily should be used if both clopidogrel and aspirin are contraindicated or not tolerated.

The combination of aspirin and clopidogrel is not recommended unless there is another indication e.g. acute coronary syndrome, recent coronary stent.

B People with ischaemic stroke with haemorrhagic transformation should be treated with long-term antiplatelet therapy unless the clinician considers that the risks outweigh the benefits.

5.6.1.2 Sources

A NICE, 2010c; Working Party consensus

B Working Party consensus

5.6.2 Anticoagulation

Anticoagulation treatment is now largely restricted to long-term secondary prevention following cardioembolic stroke, particularly in atrial fibrillation (AF). For over 50 years, the drugs of choice have been vitamin K antagonists such as warfarin. Non-vitamin K oral anticoagulants (NOACs) which inhibit thrombin or factor Xa offer a number of practical advantages and there is substantial interest in how safety and efficacy of the NOACs compare with warfarin.

Evidence to recommendations

Anticoagulation is not more effective than antiplatelet therapy in people with non-cardioembolic ischaemic stroke or TIA and carries a greater risk of bleeding (Mohr et al, 2001, Sandercock et al, 2009). 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 lower risk of haemorrhagic transformation it may be appropriate to commence treatment sooner, at the discretion of the treating clinician.

There is strong evidence for the superiority of anticoagulation for long-term secondary prevention for people with paroxysmal or permanent AF (Saxena and Koudstaal, 2004) and the 12% attributable risk of recurrent stroke per year (EAFT Study Group, 1993) substantially alters the balance of risk and benefit in favour of anticoagulation in almost every instance. In people 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 usually influence treatment discussions. Given the high attributable risk, unmodifiable relative contraindications (e.g. 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). Current NICE guidelines do not recommend the use of aspirin in these circumstances aside from when there are other indications unrelated to AF (National Institute for Health and Care Excellence, 2014b).

For selected patients with AF who cannot be treated with anticoagulation, it may be appropriate to consider a left atrial appendage occlusion device if the short-term anticoagulation required following the procedure can be tolerated. In the PROTECT AF trial percutaneous left atrial appendage closure with a filter device (Watchman) was non-inferior to warfarin for stroke prevention in non-valvular AF (Holmes et al, 2009, Reddy et al, 2013). Device implantation was accompanied by warfarin anticoagulation for the first 45 days.

For people 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 (Little and Massel, 2003, Dentali et al, 2007). 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 beneficial, but there is clear evidence of harm (Hart et al, 2005).

The NOACs may ultimately replace warfarin in secondary stroke prevention for people with non-valvular AF. These drugs have a rapid onset of action, have fewer interactions with other drugs and foodstuffs, and do not require coagulation monitoring. Meta-analysis of three pivotol studies RELY (Connolly et al, 2009), ROCKET AF (Patel et al, 2011) and ARISTOTLE (Granger et al, 2011) involving 44,563 subjects has shown significantly more effective stroke prevention, with a reduced risk of intracranial bleeding compared to warfarin (Miller et al, 2012). No significant differences were found in relation to major or gastrointestinal bleeding risk. Bearing in mind that participants had to be eligible for both treatments in all the comparative studies of NOACs with warfarin, the existing studies do not provide evidence regarding the safety or efficacy of the new agents in people for whom the bleeding risk is considered to be too high to use warfarin safely, although such patients were included in the AVERROES trial comparing apixaban with aspirin (Connolly et al, 2011).

5.6.2.1 Recommendations

A For people with ischaemic stroke or TIA and paroxysmal, persistent or permanent atrial fibrillation (AF: valvular or non-valvular) or atrial flutter, anticoagulation should be the standard treatment. Anticoagulation:
- should not be given until brain imaging has excluded haemorrhage;
- should not be commenced in people with uncontrolled hypertension;
- for people with disabling ischaemic stroke should be deferred until at least 14 days from onset - aspirin 300 mg daily should be used in the meantime;
- for people 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 after a TIA once brain imaging has excluded haemorrhage, using an agent with a rapid onset (e.g. low molecular weight heparin or a direct thrombin or factor Xa inhibitor - the latter confined to people with non-valvular AF).

B People with stroke or TIA in sinus rhythm should not receive anticoagulation unless there is an indication such as a cardiac source of embolism, cerebral venous thrombosis or arterial dissection.

C Anticoagulation for people with TIA or stroke should be with:

- adjusted-dose warfarin (target INR 2.5, range 2.0 to 3.0) with a target time in the therapeutic range of greater than 72%;

or

- a direct thrombin or factor Xa inhibitor (for people with non-valvular AF).

D For people with cardioembolic stroke for whom treatment with anticoagulation is considered inappropriate:

- antiplatelet treatment should not be used as an alternative for people with absolute contraindications to anticoagulation (e.g. undiagnosed bleeding);
- 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;
- consider a left atrial appendage occlusion device as an alternative.

E People with recurrent TIA or stroke should receive the same antithrombotic treatment as 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.

5.6.2.2 Sources

A EAFT Study Group, 1993; Miller, 2012; Working Party consensus

B De Schryver et al, 2012

C EAFT Study Group, 1993; Miller, 2012; NICE, 2014b; Working Party consensus

D Reddy et al, 2013; NICE, 2014b

E Working Party consensus

5.6.2.3 Implications

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 NOACs, 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. Multidisciplinary teams should include or have access to an interventional cardiology opinion for those people in whom left atrial appendage device closure is considered.

5.7 Other risk factors

In about a quarter of people with stroke, and more commonly in younger age groups, no cause is evident on initial investigation. Other causes that should be considered include paroxysmal atrial fibrillation (PAF), intracranial arterial disease, cervical artery dissection, antiphospholipid syndrome and other prothrombotic conditions, and patent foramen ovale (PFO). In younger people in whom no cause is identified with a history of venous or arterial thrombosis or early miscarriage, a thrombophilia screen should be performed.

5.7.1 Paroxysmal atrial fibrillation

Intermittent episodes of atrial fibrillation (AF) can be classified as paroxysmal if self-limiting and lasting less than a week, and persistent if lasting more than a week. There is no consensus concerning the shortest

duration of PAF that constitutes a risk of cardioembolism, though many studies have used a threshold of 30 seconds. Compared with permanent AF, PAF tends to be found in younger individuals with fewer cardiovascular risks and may be associated with a lower risk of stroke and systemic embolism (Al-Khatib et al, 2013, Vanassche et al, 2015). For both paroxysmal and permanent AF secondary prevention with anticoagulation is the preferred intervention after ischaemic stroke or TIA.

Evidence to recommendations

PAF may not be detected by a standard 12-lead ECG and may require more prolonged monitoring. In a systematic review involving 5038 subjects, the detection rate for new AF was 11.5% (Kishore et al, 2014). In general, the more prolonged the period of ECG monitoring the greater the likelihood of detection (Grond et al, 2013, Higgins et al, 2013, Gladstone et al, 2014, Sanna et al, 2014). A sequential approach to investigation, involving four incrementally more prolonged phases of monitoring provided detection rates of AF ranging from 7.7% to 16.9%; overall, AF was detected in 23.7% after all phases (Sposato et al, 2015). In selecting patients for prolonged ECG monitoring, those with unexplained (cryptogenic) stroke are more likely to have PAF (Kishore et al, 2014). Likewise, certain patterns of ischaemic change seen on brain imaging increase the likelihood of an underlying cardioembolic source such as cortico-subcortical infarcts or multiple lesions in anterior and posterior circulations and/or both cerebral hemispheres (Kang et al, 2003).

5.7.1.1 Recommendations

A People with ischaemic stroke or TIA who would be eligible for secondary prevention treatment for atrial fibrillation (anticoagulation or left atrial appendage device closure) should undergo a period of prolonged (at least 12 hours) cardiac monitoring.

B People with ischaemic stroke or TIA who would be eligible for secondary prevention treatment for atrial fibrillation and in whom no other cause of stroke has been found should be considered for more prolonged ECG monitoring (24 hours or longer), particularly if they have a pattern of cerebral ischaemia on brain imaging suggestive of cardioembolism.

5.7.1.2 Sources

A Kishore 2014; Working Party consensus

B Kang et al., 2003; Kishore 2014; Sposato 2015; Working Party consensus

5.7.1.3 Implications

These recommendation are likely to increase the number of patients requiring prolonged ECG monitoring with implications for cardiac investigation resources. As yet there is no consensus as to the minimum duration of paroxysmal AF that warrants intervention; including a cardiologist in the MDT will help the decision-making process.

5.7.2 Patent foramen ovale

A PFO may increase stroke risk by acting as a conduit for paradoxical embolism of venous thrombus into the arterial circulation. A PFO is found in a quarter of the healthy population but at higher frequency in those with stroke, particularly younger individuals with cryptogenic ischaemic stroke, in whom a prevalence of around 40% is typically quoted (Mesa et al, 2003). It is more likely to be relevant in younger patients (<55 years), 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.

Evidence to recommendations

In some people with stroke or TIA, the finding of a PFO will be an incidental finding and usual secondary prevention strategies should be used. There is no evidence that anticoagulation is superior to antiplatelet therapy in patients with cryptogenic stroke and PFO (Homma et al, 2002). There have been three RCTs of device closure for PFO after ischaemic stroke (Furlan et al, 2012, Carroll et al, 2013, Meier et al, 2013), and a Cochrane review and meta-analysis found no significant benefit for the intervention and an increased risk of new-onset AF with device closure (Li et al, 2015). Recurrent stroke rates in these studies were low (below 2.0% per annum) and they may have been underpowered to detect a true treatment effect. There is some support for this from per-protocol analyses and so a case can be made for further RCTs of device closure, with the goal of the identification of individuals with a high risk of stroke despite medical therapy. Whilst awaiting further evidence, there may be circumstances in which device closure may be a reasonable option. In these cases, the decision should be made by a MDT, including a cardiologist, and the patient should be provided with unbiased information on which to judge the balance of risk and benefit. Ideally people with stroke or TIA and a PFO should be entered into a clinical trial, or outcomes should be recorded in a register subject to appropriate audit.

5.7.2.1 Recommendations

A People with ischaemic stroke or TIA and a patent foramen ovale should receive optimal secondary prevention, including antiplatelet therapy, blood pressure treatment, lipid-lowering therapy and lifestyle modification. Anticoagulation is not recommended unless there is another recognised indication.

B People with stroke or TIA and patent foramen ovale should not be routinely offered device closure except in the context of a clinical trial or prospective register.

5.7.2.2 Sources

A Homma et al, 2002; Working Party consensus

B Li et al, 2015; Working Party consensus

5.7.3 Other cardioembolism

Between 20-30% of ischaemic strokes can be attributed to cardioembolism (Sandercock et al, 1989, Kolominsky-Rabas et al, 2001), with the majority of these accounted for by AF. A variety of other cardiac pathologies have been implicated, often categorised as high risk (mitral stenosis, left ventricular thrombus, mechanical valve prosthesis) and low/uncertain risk (PFO, atrial septal aneurysm [ASA], mitral annular calcification, aortic stenosis). The value of echocardiography in people with TIA and stroke depends upon the assumption that the risk of recurrent stroke can be modified by treatment which would otherwise not have been considered, should one of these pathologies be detected. Identifying a potential cardioembolic source does not prove a cardioembolic mechanism, particularly in individuals with competing risk factors. With the notable exception of AF, it is unclear for the majority of putative cardioembolic pathologies what risk of stroke recurrence they pose, whether or not intervention genuinely lessens this risk and if so, whether the benefit outweighs the risk associated with intervention.

Evidence to recommendations

A systematic review and economic evaluation sought to evaluate the cost-effectiveness of routine echocardiography in the assessment of individuals presenting with first-ever ischaemic stroke or TIA (Holmes et al, 2014). Clinically identifiable cardiac pathologies were excluded. Across a range of cardiac pathologies, transthoracic echocardiography (TTE) was found to be less sensitive compared with transoesophageal (TOE), with both demonstrating high specificity. In consultation with an expert panel it

was determined that only the identification of left atrial and left ventricular thrombus by echocardiography would alter patient management. A median prevalence of 0.8% was reported for left ventricular thrombus and of 1.4% for left atrial thrombus. Considerable variability was found for the reported prevalence of ASA (median 9.3%, range 0.4-28) and PFO (median 17%, range 0.25-73). Economic analysis concluded that TTE is a cost-effective use of NHS resources compared with TOE, when clinicians deem it the most appropriate test, and might be applied primarily to people with stroke of undetermined aetiology if they are also candidates for oral anticoagulation. Certain patterns of ischaemic change seen on brain imaging increase the suspicion of a cardioembolic source such as cortico-subcortical infarcts or multiple lesions in anterior and posterior circulations and/or both cerebral hemispheres (Kang et al, 2003). The review identified a lack of robust data and uncertain benefits from identifying conditions such as ASA, PFO and complex aortic atheroma in people with stroke or TIA.

5.7.3.1 Recommendation

A People with stroke or TIA should be investigated with transthoracic echocardiography if the detection of a structural cardiac abnormality would prompt a change of management and if they have:

- clinical or ECG findings suggestive of structural cardiac disease that would require assessment in its own right, or
- unexplained stroke or TIA, especially if other brain imaging features suggestive of cardioembolism are present.

5.7.3.2 Sources

A Holmes et al, 2014; Working Party consensus

5.7.4 Vertebral artery disease

Stroke in the vertebrobasilar (VB) territory accounts for 20% of all strokes and is more often associated with corresponding large artery stenosis than is the case for carotid territory stroke (Marquardt et al, 2009). Pooled individual patient data from two prospective studies found a 90-day risk of stroke after VB stroke or TIA of 9.6% in those with VB stenosis and 2.8% in those without, with the highest risk (13.9%) if the stenosis was intracranial (Gulli et al, 2013).

Evidence to recommendations

The open randomised phase 2 study VAST compared stenting with medical management in patients with recently symptomatic vertebral artery stenosis of more than 50% (Compter et al, 2015). The study was terminated early, after enrolment of 115 patients. There were no significant differences between the two groups, and based on the low stroke recurrence rate seen in the trial, a conclusive phase 3 trial would need to include 9500 patients. The median delay from last clinical event to enrolment in VAST was 25 days so that early recurrent events may have been missed. Full publication of the phase 3 VIST trial, comparing vertebral artery stenting with medical therapy alone, is awaited for the 182 patients that were randomised. There is thus no evidence to suggest that revascularisation for vertebral artery stenosis (stenting, endarterectomy or reconstruction/transposition) is superior to best medical therapy.

5.7.4.1 Recommendation

A People with ischaemic stroke or TIA and symptomatic vertebral artery stenosis should receive optimal secondary prevention including antiplatelet therapy, blood pressure treatment, lipid-lowering therapy and lifestyle modification. Angioplasty and stenting of the vertebral artery should only be offered in the context of a clinical trial.

5.7.4.2 Sources

A Compter et al, 2015; Working Party consensus

5.7.5 Intracranial artery stenosis

In Western populations, atherosclerotic stenosis of the large intracranial arteries is found in about 40% of patients with ischaemic stroke and is likely to be causative in about 7% (Sacco et al, 1995, Mazighi et al, 2008). Significantly higher rates are seen in African-Americans, and in Asian populations it is the dominant pathology.

Evidence to recommendations

The recurrent stroke rate in intracranial artery stenosis is high; in the WASID RCT comparing aspirin with warfarin in people with greater than 50% stenosis of intracranial arteries, those on aspirin had a 22% risk of stroke or death during a mean follow-up of 1.8 years (Chimowitz et al, 2005). This trial confirmed an association between increasing degree of intracranial stenosis and stroke risk and showed that the development of an effective collateral circulation is protective (Liebeskind et al, 2011). Warfarin anticoagulation was no more effective than aspirin for stroke prevention in WASID, including for the subgroup enrolled with stroke whilst on antithrombotic therapy, but was associated with significantly more adverse events.

The SAMMPRIS trial (Chimowitz et al, 2011) compared angioplasty and stenting of intracranial stenosis of greater than 70% with medical management, including an initial 90 days of dual antiplatelet therapy with clopidogrel plus aspirin. The 30-day rate of stroke or death in the SAMMPRIS control group was lower than in WASID (5.8% versus 10.7%) suggesting dual antiplatelet therapy may be superior to aspirin alone. Targeted risk factor modification, particularly BP and LDL-cholesterol reduction, was also more frequently achieved in SAMMPRIS, and the trial found that medical management was superior to angioplasty and stenting with the difference maintained over a median follow up of 32 months (Derdeyn et al, 2014). The VISSIT trial exploring the effect of balloon-expandable stents in people with symptomatic intracranial stenosis was halted following the results of SAMMPRIS, with analysis also demonstrating an increased risk of recurrent stroke with endovascular intervention (Zaidat et al, 2015). No comparison of dual antiplatelet therapy with clopidogrel monotherapy in this setting has yet been conducted.

5.7.5.1 Recommendation

A People with ischaemic stroke or TIA due to severe symptomatic intracranial stenosis should be offered dual antiplatelet therapy with aspirin and clopidogrel for the first three months in addition to optimal secondary prevention including blood pressure treatment, lipid-lowering therapy and lifestyle modification. Endovascular or surgical intervention should only be offered in the context of a clinical trial.

5.7.5.2 Sources

A Chimowitz et al, 2005, 2011; Working Party consensus

5.7.6 Oral contraception and hormone replacement therapy

The observation that stroke tends to affect women at a later age than men raises the possibility that female sex hormones, and specifically oestrogens, might protect against vascular disease. This was initially

supported by observational studies suggesting hormone replacement therapy (HRT) might reduce the risk of stroke in post-menopausal women. There is now evidence that oestrogen actually increases the risk of cardiovascular events including ischaemic stroke both when used by younger women as the combined oral contraceptive (COC) and by post-menopausal women as HRT.

5.7.6.1 Oral contraception

Evidence to recommendations

No studies have assessed how the COC modifies the risk of recurrent stroke or TIA. Studies in women with no history of stroke or TIA indicate that there may be an approximate doubling of the relative risk of ischaemic stroke associated with use of combined (low-dose) oestrogen oral contraception. A Cochrane review of one cohort study and 23 case-control studies compared the risk of myocardial infarction or ischaemic stroke in users and non-users of COC (Roach et al, 2015). The relative risk of ischaemic stroke was 1.7 for COC users and the risk increased according to the dose of oestrogen. The risk was not influenced by the progestogen used. It has been estimated that for 10,000 women using a 20µg oestrogen COC for 1 year, 2 will have an arterial thrombosis (Lidegaard et al, 2012). Pregnancy is associated with a risk of stroke of about 3 per 10,000 deliveries (James et al, 2005).

A meta-analysis of six case-control studies comprising 3,091 cases and 11,385 controls found no association between progestogen-only contraceptive (POC) use and stroke risk (Chakhtoura et al, 2009). The analysis provides limited support for use of the POC in situations where hormonal contraception is necessary, but the full range of contraceptive methods (hormonal and non-hormonal) should be considered.

5.7.6.1.1 Recommendation

A Pre-menopausal women with stroke and TIA should not be offered the combined oral contraceptive pill. Alternative hormonal (progestogen-only) and non-hormonal contraceptive methods should be considered instead.

5.7.6.1.2 Source

A Working Party consensus

5.7.6.2 Hormone replacement therapy

Evidence to recommendations

Treatment decisions concerning HRT must balance clinical need (treatment of premature menopause or relief of menopausal symptoms) against a number of different risks. A Cochrane review of 19 RCTs (40,410 subjects) comparing hormonal therapy with placebo or no treatment found no benefit in all-cause mortality, cardiovascular death, non-fatal myocardial infarction, angina or revascularisation (Boardman et al, 2015). An increased risk of stroke was found in primary prevention studies, but the effect was not significant in secondary prevention studies (5172 participants in 5 studies). For the subgroup of women starting HRT within a mean of 10 years after the menopause or who were less than 60 years of age, treatment was associated with a significant all cause mortality benefit and coronary heart disease benefit compared with placebo, though with a persisting risk of venous thromboembolism and a trend towards increased risk of stroke (9838 participants in 3 studies). In a nested case-control study of 15,710 cases of stroke matched to 59,958 controls from the UK General Practice Research Database, the risk of stroke was not increased with use of low-dose oestrogen patches (alone or with progestogen) when compared with no

use in post-menopausal women (Renoux et al, 2010). The stroke rate was increased with use of high-dose patches.

5.7.6.2.1 Recommendations

A Post-menopausal women with ischaemic stroke or TIA who wish to start or continue hormone replacement therapy should receive advice based on the overall balance of risk and benefit, taking account of the woman's preferences.

B Post-menopausal women with ischaemic stroke or TIA should not be offered hormone replacement therapy for secondary vascular prevention.

5.7.6.2.2 Sources

A Working Party consensus

B Boardman et al, 2015

5.7.7 Obstructive sleep apnoea

There is a prevalence of obstructive sleep apnoea (OSA) of between 30-70% in people with ischaemic or haemorrhagic stroke, depending upon the diagnostic criteria used (Johnson and Johnson, 2010). Not only are typical cardiovascular risk factors such as hypertension, hyperlipidaemia, diabetes, smoking, AF and obesity more prevalent in people with OSA, but OSA itself is an independent risk factor for stroke (Loke et al, 2012).

Evidence to recommendations

People with stroke and OSA have been shown to have worse functional outcomes, longer hospitalisation and an increased risk of stroke recurrence (Kaneko et al, 2003, Rola et al, 2008). Treatment with continuous positive airways pressure (CPAP) has been shown to favourably modify cardiovascular risk factors such as hypertension (Marin et al, 2012) and in a prospective observational study to reduce the risk of recurrent cardiovascular events (Martinez-Garcia et al, 2012). Several small RCTs have failed to confirm a reduction in cardiovascular events with CPAP (Sandberg et al, 2001, Hsu et al, 2006, Bravata et al, 2011, Parra et al, 2011, Ryan et al, 2011, Parra et al, 2015). Whilst uncertainty remains concerning stroke recurrence, there are other benefits from recognising and treating OSA and given the high reported prevalence, presentation with stroke provides an opportunity to screen patients for OSA. As in the general population, patients with stroke and OSA may not declare a classical history of severe snoring and subjective daytime sleepiness. The use of a simple clinical screening tool (such as the 'STOP-BANG' questionnaire) in people with stroke or TIA will identify those who are likely to benefit from further specialist assessment (Silva et al, 2011).

5.7.7.1 Recommendation

A People with stroke or TIA should be screened for obstructive sleep apnoea with a valid clinical screening tool. People who screen positive who are suspected of having sleep apnoea should be referred for specialist respiratory/sleep medicine assessment.

5.7.7.2 Source

A Working Party consensus

5.7.7.3 Implications

There will be resource implications for sleep services from an increased awareness of OSA among people with stroke or TIA.

5.7.8 Antiphospholipid syndrome

Antiphospholipid syndrome (APS) is an autoimmune disorder which may occur with or without associated rheumatic disease, particularly systemic lupus erythematosus. Patients with APS are at increased risk of venous and arterial thrombotic events, including ischaemic stroke. Pregnancies in women with APS have an increased risk of miscarriage, intrauterine growth retardation and premature birth (Cervera et al, 2015). The condition is diagnosed in individuals with a history of venous or arterial thrombosis and/or pregnancy-related morbidity in the presence of persistent antiphospholipid antibodies. A finding of antiphospholipid antibodies is more likely to be of relevance in people younger than 50 years in whom other risk factors for stroke have been excluded.

Evidence to recommendations

There is uncertainty concerning the most effective strategy to prevent arterial thrombotic events in APS. Recommendations include long-term low-dose aspirin, low-, medium- and high-intensity warfarin and the combination of aspirin and warfarin. There is little RCT evidence and those that are available have either not shown an advantage for any particular strategy (Crowther et al, 2003, Levine et al, 2004, Finazzi et al, 2005) or have included only very small numbers (Okuma et al, 2010). Until better evidence becomes available, the Working Party recommends that treatment decisions should be made on an individual basis, ideally involving multispecialty input.

5.7.8.1 Recommendations

A People with ischaemic stroke or TIA in whom other conditions such as atrial fibrillation and large or small vessel atherosclerotic disease have been excluded should be investigated for antiphospholipid syndrome (with IgG and IgM anticardiolipin ELISA and lupus anticoagulant), particularly if the person:
- is under 50 years of age;
- has any autoimmune rheumatic disease, particularly systemic lupus erythematosus;
- has a history of one or more venous thromboses;
- has a history of recurrent first trimester pregnancy loss or at least one late pregnancy loss (second or third trimester).

B People with antiphospholipid syndrome who have an ischaemic stroke or TIA:
- should be managed acutely in the same way as people without antiphospholipid syndrome;
- should have decisions on long-term secondary prevention made on an individual basis in conjunction with appropriate specialists including haematology and/or rheumatology.

5.7.8.2 Source

A, B Working Party consensus

5.7.9 Insulin resistance

Insulin resistance is a component of the metabolic syndrome in which a diminished target cell response to insulin results in a compensatory increase in insulin secretion to maintain normoglycaemia. The resulting hyperinsulinaemia leads to complex metabolic changes and the development of hypertension, central

obesity, glucose intolerance, elevated triglyceride levels and reduced HDL-cholesterol. Genetic predisposition, ageing, oversupply of dietary lipid, sedentary lifestyle and central obesity are associated with the development of insulin resistance. It is estimated that about half of non-diabetic people with stroke or TIA have insulin resistance (Kernan et al, 2003), an independent risk factor for ischaemic stroke (Rundek et al, 2010, Thacker et al, 2011). Insulin resistance may be a modifiable target for secondary stroke prevention. Insulin-sensitizing thiazolidinedione ('glitazone') drugs have been developed to treat diabetes, with pioglitazone the only drug in this class currently licensed in the UK.

Evidence to recommendations

The PROactive study (Dormandy et al, 2005) assessed secondary prevention with pioglitazone in people with diabetes and prior vascular disease and was neutral in terms of the primary outcome of major vascular events, but did show a reduction in a secondary outcome that included stroke. A subsequent Cochrane review (Liu and Wang, 2015) found that glitazones might reduce recurrent stroke in people with stroke or TIA. The IRIS trial (Kernan et al, 2016) compared pioglitazone with placebo in 3876 non-diabetic subjects with insulin resistance and a history of stroke or TIA, excluding those with diabetes, structural heart disease or congestive cardiac failure. The primary outcome (first fatal/non-fatal stroke or non-fatal MI) occurred in 9% with pioglitazone and 11.8% with control over 4.8 years of follow-up. Progression to diabetes was also reduced, but weight gain, oedema and bone fractures were all significantly increased with pioglitazone. Based on these results, for every 100 patients treated with pioglitazone for about 5 years, 3 fewer would suffer stroke or MI; 4 fewer would develop diabetes mellitus; 2 more would suffer bone fracture requiring hospitalisation; 18 more would gain >4.5 kg in weight, and 11 more would have new or worsening peripheral oedema. The study did not report quality of life outcomes and more evidence would be required before glitazone treatment can be recommended routinely for patients with insulin resistance. Targeting lifestyle modification, particularly exercise and diet, appears to be a safe and effective approach for reducing insulin resistance and progression to diabetes (Knowler et al, 2002, Lindstrom et al, 2006, Ivey et al, 2007).

5.7.9.1 Recommendation

A People with stroke or TIA should not receive pioglitazone for secondary vascular prevention.

5.7.9.2 Source

A Kernan et al, 2016

5.7.10 Fabry disease

Fabry disease is a multi-system disorder in which reduced activity of the enzyme α-galactosidase leads to the accumulation of glycolipid in various organs damaging tissues, particularly the skin, eye, kidney, heart, brain, and peripheral nervous system. The disorder is X-linked, affecting 1 in 40,000-60,000 males; females can also be affected. Onset is usually in childhood or adolescence, typical symptoms and signs including episodes of severe pain in the extremities (acroparesthesias), cutaneous vascular lesions typically more pronounced in the bathing-trunk distribution (angiokeratomas), decreased sweating, corneal opacities, tinnitus, hearing loss and proteinuria. Premature cardiovascular disease occurs as well as progressive deterioration in renal function leading to end-stage renal disease. Cerebrovascular manifestations primarily relate to small vessel disease and may be ischaemic or haemorrhagic.

Evidence to recommendations

Early diagnosis allows timely screening for secondary complications, treatment to delay renal and cardiovascular effects, lifestyle advice particularly in relation to smoking cessation, and genetic counselling. The diagnosis should be considered in people with any of the clinical features above, and can be confirmed

by tests measuring α-galactosidase activity and/or with molecular genetic testing for mutations of the GLA gene. Treatment with α-galactosidase A enzyme replacement therapy has been available for some years, but long-term effectiveness in preventing cerebrovascular complications has not so far been demonstrated (Rombach et al, 2013, Anderson et al, 2014, Germain et al, 2015).

5.7.10.1 Recommendations

A Young people with stroke or TIA should be investigated for Fabry disease if they have suggestive clinical features such as acroparesthesias, angiokeratomas, sweating abnormalities, corneal opacities, unexplained renal insufficiency or a family history suggesting the condition.

B People with stroke or TIA and a diagnosis of Fabry disease should receive optimal secondary prevention and be referred to specialist genetic and metabolic services for advice on other aspects of care including the provision of enzyme replacement therapy.

5.7.10.2 Source

A, B Working Party consensus

5.8 Lifestyle measures

The evidence for lifestyle interventions relates mainly to the primary prevention of vascular events; little high-quality research has studied the secondary prevention of stroke or TIA. It would seem that changes in lifestyle are as important in secondary prevention as they are in primary prevention. Effective lifestyle interventions require changes in behaviour such as smoking, exercise, diet and alcohol consumption. Although it is the responsibility of the individual to change his or her own behaviour, healthcare practitioners have a responsibility to give accurate information, advice and support to help people to make and maintain lifestyle changes. In theory, the combination of lifestyle changes and other secondary prevention measures could deliver a greater than 80% risk reduction for vascular events for people with stroke or TIA (Hackam and Spence, 2007). In practice, the paucity of data makes it difficult to confirm the expected benefits (Lennon et al, 2014).

5.8.1 Physical activity

People who have sustained a stroke often become physically deconditioned, with low cardiorespiratory fitness, muscle strength and muscle power reported (Smith et al, 2012, Saunders et al, 2013). This low physical fitness is associated with functional limitation and disability (Saunders et al, 2013). Physical activity programmes to improve fitness and/or muscle strength have been implemented without adverse effects in people with stroke screened for contraindications (Billinger et al, 2014). A systematic review (Ammann et al, 2014) identified the need for better reporting of exercise prescription to improve the delivery of physical activity programmes, and the importance of peer support.

Evidence to recommendations

There are Cochrane reviews (English and Hillier, 2010, Saunders et al, 2013), other systematic reviews (Ada et al, 2006, van de Port et al, 2007, Veerbeek et al, 2014) and one high-quality, moderate-sized RCT (English et al, 2015) on physical activity after stroke. Overall, the evidence shows that activity programmes have a positive effect on global disability, albeit in the predominantly ambulant stroke population (Saunders et al, 2013). Treatment benefits physical function and supports the use of aerobic exercise and mixed training programmes to improve gait (English and Hillier, 2010, Marsden et al, 2013, Saunders et al, 2013, Kendall and Gothe, 2015). Other studies also suggest positive effects on outcomes such as vascular function (Moore et al, 2015) and psychosocial benefits (Faulkner et al, 2015).

5.8.1.1 Recommendations

A People with stroke or TIA should participate in physical activity for fitness unless there are contraindications. Exercise prescription should be individualised, and reflect treatment goals and activity recommendations.

B People with stroke or TIA should aim to be active every day and minimise the amount of time spent sitting for long periods.

C People with stroke or TIA should aim to achieve 150 minutes or more of moderate intensity physical activity per week in bouts of 10 minutes or more (e.g. 30 minutes on at least 5 days per week). They should also engage in muscle strengthening activities at least twice per week.

D People with stroke or TIA who are at risk of falls should engage in additional physical activity which incorporates balance and co-ordination at least twice per week.

E Physical activity programmes for people with stroke or TIA may be delivered by therapists, fitness instructors or other appropriately trained people, supported by interagency working where possible; regular monitoring and progression should occur to promote physical fitness.

F Physical activity programmes for people with stroke or TIA should be tailored to the individual after appropriate assessment, starting with low-intensity physical activity and gradually increasing to moderate levels.

5.8.1.2 Sources

A Ada et al, 2006; English and Hillier, 2010; Marsden et al, 2013; Saunders et al, 2013; Kendall and Gothe, 2015

B-F Department of Health, 2011; Working Party consensus

5.8.2 Smoking cessation

About 1 in 5 adults in the UK are smokers. Each year, an estimated 454,700 hospital admissions in England can be attributed to smoking including around 1 in 4 strokes. Smokers have up to three times the risk of stroke and double the risk of recurrent stroke compared to non-smokers, but if they are able to stop, the risk decreases significantly and is at the level of non-smokers after about five years. The health benefits of reducing rather than stopping smoking are not clear. About two-thirds of smokers express the desire to stop but long-term success rates are low at 2-3%.

Evidence to recommendations

There have been a large number of Cochrane reviews assessing a variety of interventions to promote smoking cessation in the general population (for the individual reviews, see http://onlinelibrary.wiley.com/cochranelibrary/). A beneficial effect has been demonstrated for nicotine replacement therapy, nicotinic receptor partial agonists (varenicline, cytisine), antidepressant drugs (bupropion, nortriptyline), combined pharmacotherapy and behavioural interventions, financial incentives, motivational interviewing, e-cigarettes, exercise, print-based self-help, telephone counselling and brief physician and nurse interventions. The evidence for interventions to increase smoking cessation in people with stroke is limited. A systematic review identified only four studies involving a total of 354 patients (Edjoc et al, 2012). Meta-analysis was not possible and a simple summed cessation rate of 24% for those receiving an intervention compared with 21% for controls was reported.

NICE public health guidelines (NICE PH10 Stop smoking services, 2008 and NICE PH45 Smoking: harm reduction, 2013) (National Institute for Health and Care Excellence, 2008b, National Institute for Health and

Care Excellence, 2013e) provide guidance on smoking cessation services for all smokers. Stopping in one step is recommended as the approach must likely to provide lasting success. Recommended interventions include behavioural counselling, group therapy, pharmacotherapy (licensed nicotine containing products, varenicline or bupropion) and referral to NHS Stop Smoking Services, alone or in combination.

5.8.2.1 Recommendation

A People with stroke or TIA who smoke should be advised to stop immediately. Smoking cessation should be promoted in an individualised prevention plan using interventions which may include pharmacotherapy, psychosocial support and referral to NHS Stop Smoking Services.

5.8.2.2 Sources

A NICE, 2008b, 2013e; Working Party consensus

5.8.3 Nutrition (secondary prevention)

Long-term adherence to cardioprotective diets, when combined with other lifestyle modifications, may reduce stroke recurrence (Appel et al, 1997, Appel et al, 2003, Fung et al, 2008). While there is evidence that tailored dietary modifications can favourably modify cardiovascular risk factors, there is limited evidence that this translates into a reduction in stroke recurrence and mortality (Rees et al, 2013, Adler et al, 2014).

Evidence to recommendations

Cardioprotective diet

A Cochrane review of the Mediterranean diet in the primary prevention of cardiovascular disease found very small reductions in total and LDL-cholesterol (Rees et al, 2013). Three of five RCTs showed a positive effect on BP, with reductions of 0.7-7.8 mmHg in systolic and 0.7-3.7 mmHg in diastolic BP. The Dietary Approaches to Stop Hypertension (DASH) diet lowered systolic and diastolic BP when followed for 8 weeks (Appel et al, 1997). Long-term follow-up for up to 24 years (Fung et al., 2008) demonstrated that adherence to a DASH-style diet is associated with a lower risk of coronary heart disease and stroke among middle-aged women. Effects on stroke recurrence and mortality are not known. A Cochrane review (Adler et al, 2014) of dietary salt reduction for the prevention of cardiovascular disease confirms that small reductions in BP can be achieved in normotensive individuals, and greater reductions in hypertensive individuals. Many of the component trials lacked sufficient detail to assess bias; any benefits in terms of cardiovascular mortality and morbidity were modest or non-significant and confined to hypertensive groups.

Weight-reducing diet

Overweight and obesity is a significant risk factor for the development of cardiovascular disease and is associated with an increase in all-cause mortality (Adams et al, 2006, Bazzano et al, 2006). Both overweight (body mass index [BMI] greater than 25 kg/m^2) and obesity (BMI greater than 30 kg/m^2) are associated with an increased risk of ischaemic stroke (Strazzullo et al, 2010). Customary advice has targeted a healthy BMI to reduce risk of stroke but high-quality intervention studies to support this approach are lacking. Some observational studies have reported a paradoxical inverse relationship between BMI and mortality following stroke (Kim et al, 2011, Vemmos et al, 2011) with overweight and obese people having reduced mortality, but how this observation might translate into an intervention to reduce recurrent stroke is unclear.

Alcohol

A meta-analysis of 27 prospective studies with 1,425,513 participants reviewed the dose-response relation between alcohol and risk of stroke (Zhang et al, 2014). In the majority of the component studies, alcohol intake was self-reported. Low alcohol intake (below 15 g/day) was associated with a reduced risk of total stroke, ischaemic stroke and stroke mortality with no significant effect on haemorrhagic stroke (one UK unit = 8 g of alcohol). Moderate alcohol intake (15-30 g/day) had little or no effect on risk of total stroke, haemorrhagic stroke, ischaemic stroke or stroke mortality. Heavy alcohol intake (above 30 g/day) was associated with an increased risk of total stroke. It is not known if a similar relationship would apply to people who have already experienced stroke.

Micronutrient supplementation

A Cochrane review (Marti-Carvajal et al, 2015) examined the use of B-vitamin supplementation to prevent cardiac events. No benefit was found for homocysteine-lowering interventions in the form of supplements of vitamins B6, B9 or B12 given alone or in combination, at any dosage. Two meta-analyses (Alkhenizan and Al-Omran, 2004, Bin et al, 2011) and one systematic review (Eidelman et al, 2004) examined the effects of vitamin E supplementation on stroke recurrence and mortality, with no benefit seen. Dietary calcium and/or vitamin D supplementation has not been shown to reduce cardiovascular risk (Elamin et al, 2011, Bolland et al, 2014) and in one systematic review it was associated with a modest increased risk (Bolland et al, 2010). Confining the analysis to people with vitamin D deficiency likewise showed no benefit. The impact of other nutrients, including plant stanols/sterols, antioxidants such as vitamins A and C or selenium in stroke prevention is unknown (Hookway et al, 2015).

5.8.3.1 Recommendations

A People with stroke or TIA should be advised to eat an optimum diet that includes:
- five or more portions of fruit and vegetables per day from a variety of sources;
- two portions of oily fish per week (salmon, trout, herring, pilchards, sardines, fresh tuna).

B People with stroke or TIA 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 meat.

C People with stroke or TIA who are overweight or obese should be offered advice and support to aid weight loss including adopting a healthy diet, limiting alcohol intake to 2 units a day or less and taking regular exercise. Targeting weight reduction in isolation is not recommended.

D People with stroke or TIA should be advised to reduce their salt intake by:
- not adding salt to food at the table;
- using little or no salt in cooking;
- avoiding high-salt foods, e.g. processed meat such as ham and salami, cheese, stock cubes, pre-prepared soups and savoury snacks such as crisps and salted nuts.

E People with stroke or TIA who drink alcohol should be advised to limit their intake to 14 units a week, spread over at least three days.

F Unless advised to do so for other medical conditions, people with stroke or TIA should not routinely supplement their diet with:
- B vitamins or folate;
- vitamins A, C, E or selenium;
- calcium with or without vitamin D.

5.8.3.2 Sources

A He et al,2006; NICE, 2007b; Chowdhury et al 2012; Rees et al, 2013

B Marik and Varon, 2009; Galan et al, 2010; Hooper et al, 2011

C NICE, 2006a; Working Party consensus

D Adler et al, 2014

E Zhang et al, 2014; Department of Health 2016

F Bazzano et al, 2006; Galan et al, 2010; Bin et al, 2011; Bolland et al, 2010, 2014; Marti-Carvajal et al, 2015

5.9 Life after stroke

Stroke research has tended to concentrate on the acute and early phases of recovery yet for about half of those who survive, life after stroke involves some permanent impairment and restriction of their activities. As well as coping with the physical consequences, many people with stroke and their family/carers have long-term psychological and emotional needs. Defining these needs is challenging, and researchers and healthcare professionals may not prioritise the same outcomes as people with stroke. In a UK survey of patients between 1 and 5 years after stroke, about half reported having one or more (median three) unmet needs (McKevitt et al, 2011). Communication problems, worsening disability and ethnicity were associated with a greater number of reported unmet needs, as was living in a more deprived area. Self-reported outcomes after stroke included 52% with a negative change in work activity, 67% a change for the worse in relation to leisure activities or interests, 18% a loss of income, 31% an increase in expenses, and 42% a negative impact on the relationship with their partner. Over half of respondents reported needing more information about stroke, including diet, applying for benefits, aids and adaptations to the home and driving. Of those who reported emotional problems (over a third), the great majority felt they did not receive the support they needed. No relationship between unmet need and time since stroke was identified, indicating that these needs are persistent and long-term.

5.9.1 Further rehabilitation

Many patients wish to continue rehabilitation and therapy in the longer term, either continuously or on an intermittent basis. As well as facilitating recovery, exercise or rehabilitation delivered later after stroke may prevent regression of physical or cognitive gains achieved in the earlier stages of recovery. A number of factors mitigate against such provision including limited resources, the concept of a plateau in functional recovery (often quoted as occurring 6 to 12 months after the stroke) and the poverty of high-quality evidence to inform decision-making. Self-management plans reviewed by a healthcare professional may be one cost-effective approach.

Evidence to recommendations

A Cochrane review of five RCTs including 487 subjects reported no conclusive evidence that therapy-based rehabilitation delivered in the community more than one year after stroke influenced outcomes (Aziz et al, 2008). In a systematic review of fifteen RCTs including 700 subjects, therapy interventions delivered more than six months after stroke provided a small but significant 8% improvement from baseline in walking measures, together with a non-significant improvement in ADL (Ferrarello et al, 2011). There is uncertainty about how to select people who will benefit from late therapy and how best to deliver any intervention. Forster et al (2009) found no significant benefit from a structured reassessment at 6 months for people with mild to moderate disability after stroke.

The Working Party recognises that the course of recovery after stroke in any individual may fall outside expected time frames. Some people start or continue to improve many months after the event and these people may benefit from further rehabilitation at a late stage. Whilst the evidence is limited, there is

evidence to suggest that for some people improvements in communication, walking and ADL can be achieved with interventions more than 6 months after stroke (Palmer and Enderby, 2007, Duncan et al, 2011, Ferrarello et al, 2011, Veerbeek et al, 2014). In order to try and capture this group and to monitor and address other significant unmet needs, the consensus of the Working Party is that comprehensive reassessment should be undertaken at 6 months(National Institute for Health and Care Excellence, 2016).

5.9.1.1 Recommendations

A People with stroke, including those living in a care home, should be offered a structured health and social care review at six months and 1 year after the stroke, and then annually. The review should consider whether further interventions are needed, and the person should be referred for further specialist assessment if:
- new problems are present;
- the person's physical or psychological condition, or social environment has changed.

B People with stroke should be offered further therapy if goals for specific functions and activities can be identified and agreed and the potential for change is likely.

C People with stroke should be provided with the contact details of a named healthcare professional (e.g. a stroke co-ordinator) who can provide further information and advice.

D People with stroke should be helped to develop their own self-management plan.

5.9.1.2 Sources

A-D NICE, 2016; Working Party consensus

5.9.1.3 Implications

Primary care teams, in collaboration with hospital/ESD teams, will need to consider the resource implications of implementing follow up and annual review for people with stroke living in the community.

5.9.2 Social integration and participation

Helping people with stroke to integrate back into the community in the way that they want is a key goal of healthcare; engagement in community activity is associated with improved quality of life. Most healthcare focuses on improving a person's capacity to undertake activities. The wider task of achieving social and community integration depends upon factors such as the person with stroke and their family/carers having information about local opportunities and being aware of the physical and mental health benefits of activity and engagement, the availability of accessible social settings and transport and the appropriate training of community providers of leisure and social activities. Stroke voluntary sector services and peer support groups can play an important role in helping community integration. Lack of accessible transport is often a significant barrier to participation for disabled people.

Other aspects of stroke and stroke recovery of relevance to integration and participation are covered in other parts of this guideline and include the sections on transfers of care (2.7), psychological care (2.12), extended activities of daily living (4.1.2), driving (4.1.3), work and leisure (4.1.4), fatigue (4.5), mood and well-being (4.7) and sex (4.12).

Evidence to recommendations

A metasynthesis of qualitative research identified several themes which, from the perspective of people with stroke, acted as barriers or facilitators to community reintegration (Walsh et al, 2015). As well as the primary effects of the stroke (impairments and fatigue), these comprised personal factors (perseverance,

adaptability, emotional challenges, relevance of activities), social factors (sense of belonging versus stigmatisation, levels of support, environmental limitations) and interactions with professionals (levels of support, joint decision-making, relevance of rehabilitation to real world requirements). Anger, frustration and more challenging behavioural problems may present barriers to social and community integration but other than generic principles, there is limited evidence to guide management for people or families/carers with these problems.

A systematic review of leisure therapy including 8 studies including 615 subjects identified methodological shortcomings but nonetheless some evidence of short-term improvements in quality of life and mood as well as increased participation and satisfaction with leisure activities (Dorstyn et al, 2014). In a review of 24 studies (including 2042 people with stroke) which included measures of social participation as an outcome, a small beneficial effect was identified for interventions utilising exercise (Obembe and Eng, 2015). A community walking training programme in which people with stroke undertook walking therapy in a real-world environment resulted in greater improvements in walking function and social participation (Kim et al, 2014b), but a Cochrane review found the current evidence insufficient to establish effectiveness (Barclay-Goddard et al, 2015).

5.9.2.1 Recommendations

A As part of their self-management plan, people with stroke should be supported to identify social and leisure activities that they wish to participate in, taking into account their cognitive and practical skills. Healthcare professionals should:
- advise the person with stroke and their family/carers about the benefits of participating in social and leisure activities;
- identify and help to overcome any barriers to participation (e.g. low self-confidence or lack of transport).

B People with stroke should be provided with information and referral to statutory and non-statutory community organisations that can support the person in social participation.

C People with stroke whose social behaviour is causing distress to themselves or others should be assessed by an appropriately trained healthcare professional to determine the underlying cause and advise on management. Following the assessment:
- the nature of the problem and its cause should be explained to family/carers, other people in social contact and the rehabilitation team;
- the person should be helped to learn the best way to interact without causing distress;
- those involved in social interactions should be trained in how 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 person is at risk of harm to themselves or others. The balance of risk and benefit from antipsychotic medication should be carefully considered. Treatment should be started with a low dose and increased slowly according to symptoms, and should be short-term (e.g. one week) or intermittent and withdrawn slowly.

5.9.2.2 Sources

A Langstaff et al, 2014; Dorstyn et al, 2014; Obembe and Eng, 2015

B Working Party consensus

C NICE, 2006b, 2010a; Obembe and Eng, 2015; Working Party consensus

6 Commissioning of Stroke Services

6.0 Introduction

Clinical guidelines usually focus on how an individual patient should be treated, and draw upon evidence concerning the efficacy, effectiveness and costs of interventions. This chapter brings together key recommendations to guide those responsible for commissioning the entire pathway of stroke care other than primary prevention (in this chapter the term 'commissioner', which has a specific meaning in the NHS in England, is used to refer to all those responsible for planning and acquiring services for the populations they serve e.g. Health Boards in Wales). Clinical teams can only provide services that are commissioned and paid for. The recommendations in the *National Clinical Guideline for Stroke* will not provide the anticipated benefits for people with stroke if the organisations that commission healthcare do not support their implementation.

The recommendations for commissioners contained in this chapter are derived directly from the clinical and organisational recommendations made elsewhere in the guideline. In practice, commissioning organisations often do not include people with expertise in specific areas of clinical practice such as stroke care and close collaboration and the sharing of expertise between commissioners and healthcare providers is vital. Commissioners therefore have a critical part to play in the wider implementation of this guideline and the achievement of its aim to improve the care of all people with stroke.

Given the often complex and long-term needs of people with stroke, collaboration between commissioners from health and social care is required to deliver comprehensive, integrated services. Partnership working may also be required between commissioners across geographical boundaries, for example in providing hyperacute stroke care and tertiary neuroscience services. Clinical Networks with an understanding of the complexity of the stroke pathway have brought commissioners and providers together, and have proved to be successful in quality improvement and service re-design. There needs to be an acknowledgement that investment of resources in one particular part of the pathway, e.g. acute stroke care by health services, may lead to a reduction in demand for services in another part of the pathway, e.g. long-term social care. Commissioners and providers need to work closely to ensure that financial disincentives do not become barriers to the provision of seamless, evidence-based care or to achieving better outcomes for people with stroke. Services must always be designed with appropriate consideration given to the needs of people with stroke and their family/carers, and not around misplaced organisational priorities.

Service specifications need to take account of best practice contained within expert guidelines, and commissioners can reasonably expect that the services they obtain for people with stroke will deliver all the recommendations outlined in the preceding chapters of this guideline. Individual contracts should be monitored against the service specification which should include meaningful performance and person-centred outcome measures. All services in all settings should be required to scrutinise their services through national comparative audit, and undertake periodic patient and carer surveys.

6.1 Overall structure of stroke services

People with stroke present to health services with a broad range of problems, covering all illness domains over a prolonged period of time. Consequently, it is vital to have an organised service that can respond in a timely and effective way to each person's unique needs as they arise.

The commissioning of a well-led, appropriately trained and skilled workforce providing holistic and compassionate care to patients and their families is one of the principal implications of the landmark 2013 report into the failings in hospital care at Mid-Staffordshire NHS Foundation Trust produced by Robert

Francis (Francis, 2013), and this needs to be reflected in the services provided to people with stroke in both NHS and non-NHS settings.

6.1.1 Recommendations

A Commissioning organisations should ensure that their commissioning portfolio includes the whole stroke pathway from prevention (including neurovascular services) through acute care, early rehabilitation, secondary prevention, early supported discharge, community rehabilitation, systematic follow-up, palliative care and long-term support.

B Stroke services should be commissioned based upon an estimate of the needs of the population served, and derived from the best available evidence locally and nationally.

C Commissioners should commission services which ensure that:
- people with suspected stroke or TIA are diagnosed and treated urgently, using evidence-based treatments;
- adequate provision is made for people with stroke with long-term disability covering the full range of their needs (e.g. nursing, therapy, emotional support, practical support, family/carer support);
- people with stroke who live in care homes or are unable to leave their own home have equivalent access to specialist stroke services;
- people with stroke can re-access specialist stroke services when necessary;
- people dying with stroke receive end-of-life (palliative) care from the acute stroke service and whenever possible in their own homes.

D Commissioners should commission a public education and professional training strategy to ensure that the public and emergency personnel (e.g. staff in emergency call centres) can recognise when a person has a suspected stroke or TIA and respond appropriately. This should be commissioned in such a way that it can be formally evaluated.

E Commissioners should require that all those caring for people with stroke have the knowledge, skills and attitudes to provide safe, compassionate and effective care, especially for vulnerable people with restricted mobility, sensory loss, impaired communication and cognition and neuropsychological problems.

F Commissioners should ensure that there is sufficient information provided to people with stroke and their family/carers about which services are available and how to access them at all stages of the pathway of care. All information should be provided in a format accessible to those with communication disability.

G In commissioning services for people with stroke along the whole pathway of care, commissioners should ensure that there are:
- protocols between healthcare providers and social services that enable seamless and safe transfers of care without delay;
- protocols in place that enable rapid assessment and provision of all equipment, aids (including communication aids) and structural adaptations needed by people with disabilities after stroke.

H Commissioners should require the stroke services they commission to participate in national audit, auditing practice against the recommendations made in this guideline.

I Commissioners should require the stroke services they commission to regularly seek the views of those who use their services, and use the findings to design services around the needs of the person with stroke.

J Commissioners should ensure that the stroke services they commission are monitored and evaluated regularly in terms of the process of care, the patient experience and person-

centred outcomes.

6.1.2 Implications

These recommendations should result in a comprehensive stroke service that is more coherent, responsive and cost-efficient. In some instances there will be costs associated with start-up or with changes in practice, but the evidence indicates that well-organised services deliver better outcomes at approximately the same cost. Early supported discharge services are a good example of this, with costs being transferred out of the hospital sector into community provision. Achieving change consistent with these recommendations will require considerable initial effort and commitment involving 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 commissioning the service or pathway from an alternative provider.

6.2 Commissioning acute stroke services

This part covers aspects of acute care that will be of particular relevance to commissioners of acute hospital services.

6.2.1 Recommendations

A Ambulance services, including call handlers, should be commissioned to respond to every person with a suspected acute stroke as a medical emergency.

B Commissioners should commission acute stroke services in accordance with the recommendations in this guideline to provide:

- urgent brain imaging for patients with suspected acute stroke;
- treatment with alteplase for patients with acute ischaemic stroke;
- an endovascular service for patients with acute ischaemic stroke;
- a neuroscience service to admit, investigate and manage patients referred with subarachnoid haemorrhage, both surgically and with interventional radiology;
- a neuroscience service delivering neurosurgical interventions for intracerebral haemorrhage, malignant cerebral oedema, and hydrocephalus;
- direct admission of patients with acute stroke to a hyperacute stroke unit providing active management of physiological status and homeostasis within 4 hours of arrival at hospital;
- an acute neurovascular service for the diagnosis and treatment of people with suspected TIA;
- an acute vascular surgical service to investigate and manage patients with TIA and non-disabling stroke due to carotid artery stenosis.

C Commissioners of acute stroke services should ensure the active participation of people with stroke and their family/carers in the planning and evaluation of acute stroke services.

6.2.2 Implications

The commissioning of acute stroke 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), or telemedicine networks and other forms of cross-site working. The optimum disposition of acute stroke services will depend on the geography of the area served, with the objective of delivering the maximum number of time-critical treatments to the greatest number of people with stroke. Some of the

recommendations in this section fall under the responsibility of specialised rather than local commissioners, and will require co-ordination between those two bodies to ensure equitable and comprehensive provision. Substantial service change will create obligations for commissioners to consult with people with stroke and the public in accordance with their statutory responsibilities.

6.3 Commissioning secondary prevention services

At least one quarter of all strokes are recurrences, and people who have already suffered a stroke or TIA have a 5-year risk of a further vascular event as high as 22.4% even with modern multiple risk factor treatments (Amarenco et al, 2006, Mohan et al, 2011). Improving risk factor management in this group therefore offers the potential to deliver large reductions in cardiovascular events (Rothwell, 2007), but the incomplete implementation of the evidence for secondary vascular prevention described in this guideline leaves many people at high risk of recurrence and fails to deliver the anticipated benefits for patients and the NHS (Johnson et al, 2007). Commissioners will need to ensure that secondary prevention services are effective and prompt, and support people with stroke and TIA in maintaining their treatments long-term.

6.3.1 Recommendations

A Commissioners should ensure that healthcare providers enact all the secondary stroke prevention measures recommended in this guideline, through a process of regular audit and monitoring.

B Commissioners should commission stroke services in accordance with the recommendations in this guideline to:
- identify and treat modifiable vascular risk factors as soon as possible, including symptomatic carotid artery stenosis;
- provide all people with stroke or TIA with information and advice on treatments and lifestyle changes to reduce their risk of stroke, tailored to the needs of the individual;
- liaise with and support general practitioners in the long-term management of risk factors in people with stroke or TIA.

C Commissioners should support the lifestyle recommendations for stroke prevention made in this guideline through:
- providing smoking cessation services;
- working with other organisations to make it easier for people with disabilities to participate in exercise;
- supporting healthy eating;
- supporting people who drink alcohol in excess to abstain or maintain their intake within recommended limits.

6.3.2 Implications

Commissioners should play an active role in promoting secondary vascular prevention, which is a public health issue as well as being relevant to the individual person with stroke. Addressing medical risk factors and making lifestyle changes are effective in reducing the risk of recurrent stroke, but clinical practice in primary and secondary care needs to support people with stroke to persist with their treatments long-term, something that could be done through annual review of people with stroke or TIA (National Institute for Health and Care Excellence, 2016).

6.4 Commissioning rehabilitation services

Rehabilitation services should be commissioned to reduce limitation in activities, increase participation and improve the quality of life of people with stroke using therapeutic and adaptive strategies. With stroke being the third largest cause of disability in the UK (Newton et al, 2015), providing effective rehabilitation is cost-effective in reducing long-term disability and the costs of domiciliary and institutional care.

6.4.1 Recommendations

A Commissioners should commission stroke rehabilitation services in accordance with the recommendations in this guideline to provide:
- an inpatient stroke unit capable of providing stroke rehabilitation for all people with stroke admitted to hospital;
- a specialist early supported discharge service to enable people with stroke to receive rehabilitation at home or in a care home;
- specialist rehabilitation services capable of meeting the specific health, social and vocational needs of people with stroke of all ages;
- services capable of delivering specialist rehabilitation in out-patient and community settings in liaison with in-patient services.

B Commissioners should ensure that they specify within a stroke rehabilitation service, or commission separately, services capable of meeting all the needs of people with stroke identified by members of the specialist team (e.g. orthotics, specialist seating, equipment provision, continence, vocational rehabilitation, family/carer support).

C Commissioners should ensure that people with stroke whose mental capacity is impaired can access independent specialist advice and support in relation to advocacy.

6.4.2 Implications

Commissioners will need to ensure they commission 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), and that they meet their obligations under the Mental Capacity Act 2005 as they relate to people with acquired brain injury including stroke.

6.5 Commissioning long-term services

Stroke is only one of many causes of long-term neurological disability including other conditions such as head injury, dementia and multiple sclerosis. Furthermore, many of the needs of a person with stroke will relate to other co-morbidities such as osteoarthritis, cognitive impairment or other vascular disease, or other social issues such as loneliness and isolation from mainstream society. These recommendations will inevitably be more general and overlap with other long-term disabling conditions, but emphasise the specific needs of stroke patients.

6.5.1 Recommendations

A Commissioners should commission services that provide:
- routine follow-up of people with stroke six months after hospital discharge and annually thereafter;
- reassessment and further treatment of people with stroke who are no longer receiving rehabilitation. Services should be accessible from primary or secondary care, social services or by self-referral.

B Commissioners should ensure that, between health and social services and other agencies, people with stroke can:
- receive the practical (e.g. housing, employment) and emotional support they need to live with long-term disability;
- access suitable social and leisure activities outside their homes;
- receive maintenance interventions (e.g. provision of exercise programmes and peer support) to enhance and maintain health and well-being.

C Commissioners in health and social care should ensure that the carers of people with stroke:
- are aware that their needs can be assessed separately;
- are able to access the advice, support and help they need;
- are provided with information, equipment and appropriate training (e.g. manual handling) to enable them to care for a person with stroke;
- have their need for information and support reassessed whenever there is a significant change in circumstances (e.g. if the health of the carer or the person with stroke changes).

D Commissioners should ensure that advance care planning and community palliative care services are available for people with stroke with limited life expectancy, and their family/carers where appropriate.

6.5.2 Implications

In the context of living with the long-term consequences of stroke for the person and their family, integrated care from the health, social and voluntary sectors can do much to alleviate the personal and social impact of dependency. The high mortality from severe stroke dictates that access to palliative care services is an important means of relieving suffering for people with stroke and their families, who tend not to view stroke in the same way as other life-threatening or 'terminal' conditions. These needs and the interventions to mitigate them should be considered as part of a whole-system approach to physical and cognitive disability in the community, and include the obligations to carers placed upon health and social services under the Care Act 2014.

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