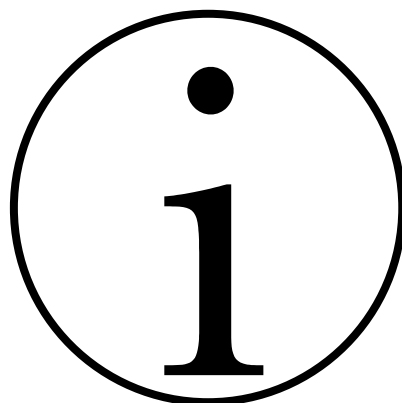




The clinical and cost effectiveness of physiotherapy in the management of elderly people following a stroke. A Forster and J Young

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Executive Summary

- The National Service Framework is a landmark policy initiative for stroke. It represents a genuine opportunity for physiotherapists to improve the care of patients following a stroke.
- Physiotherapists will have a critical contribution to make if the NSF is to be implemented successfully.
- The NSF implications for physiotherapy touch on service provision, research, education and training. The evidence-base incorporated in the NSF stipulates that there should be a specialist stroke service in every district general hospital, which cares for people with stroke by 2004.
- The co-ordinated multidisciplinary team has been identified as an important feature of post-stroke care, but the evidence for the effectiveness of individual components (nursing, therapy, and medical care) remains limited. However, progress is being made in developing this evidence base. For physiotherapy, there are emerging findings relating to treadmill training, muscle strengthening and focused interventions. Physiotherapists will need to have a good understanding of research to be able to critically appraise studies and be prepared to incorporate new knowledge into clinical practice.
- The NSF calls for a lead clinician in each district general hospital to progress whole district stroke service development, encompassing primary and secondary care, health and social services. In some cases, perhaps as physiotherapy consultants, it will be appropriate for a senior physiotherapist to take on this responsibility.
- The NSF recommends that rehabilitation should continue until maximum recovery has been achieved.
- Greater flexibility in cross-discipline working that goes beyond even an interdisciplinary approach will be expected. Already a new programme of pilot work (The Changing Workforce Programme: New Ways of Working) has been established by the Modernisation Agency with one of the designated areas to be stroke. Increasingly, physiotherapists will have dual responsibilities: as clinicians for patients, and as educators for other stroke team members.

1.0 Introduction

1.1 Background to the National Service Framework: Older People

The National Service Framework (NSF) for Older People (England) was launched on 28 March 2001 (Department of Health, 2001). The framework presents eight standards which focus on: rooting out age discrimination; person-centred care; intermediate care; general hospital care; stroke; falls; mental health in older people and promoting an active healthy lifestyle in older age. The NSF will impact on physiotherapy and provide important opportunities for developing services centred on the needs of older people, by setting standards of service delivery for implementation at a local level.

The Government is to invest an extra £1.4 billion in services for older people in England by 2004 in order to improve the health and social care services for this sector of the population. The framework aims to ensure:

- High quality care and treatment, regardless of age
- That older people are treated as individuals, with respect and dignity
- Fair resources for conditions which most affect older people
- Easing of the financial burden of long term residential care

The Chartered Society of Physiotherapy (CSP) has produced a Policy Briefing on the NSF. It provides an overview of the content of the NSF for older people (England); considers the impact of each of the NSF

standards on the profession and the delivery of physiotherapy services as well as highlighting the opportunities available to the profession; and makes recommendations for action (CSP, 2001a).

The NSF for Older People asserts rightly that older people have the right to top quality healthcare and challenges the healthcare professions to deliver this so that older people can live full and active lives, with minimal pain and disability and optimal independence and dignity. Delivering this will be challenging because older people are the largest consumers of healthcare, the prevalence of multiple pathologies increases with age and the number of people living longer has increased and will increase further over the next 2-3 decades. In addition, this will have to be performed with finite healthcare resources, necessitating the best use of available resources.

The National Plan for England (which preceded the NSF) states that an extra 2,500 therapists and other professionals, as well as an extra 7,800 nurses and 200 consultants, will be provided to deliver on the standards (Department of Health, 2000a). Funding is also earmarked to provide on-site rehabilitation equipment. There is the expectation that each older person who needs it will receive a one-stop assessment service and have their own individual care plan. A full assessment of likely rehabilitation potential will take place before any decisions on long-term care. Rehabilitation services will also see an expansion with 5,000 more intermediate care beds. There is also increased emphasis on healthy active living, including access to advice and support, to reduce the risk of falls at home (Department of Health, 2001).

1.2 Purpose of this Report

The CSP is committed to supporting physiotherapists in maximizing the opportunities provided by the NSF to improve patient care. Feedback from previous reports produced by the CSP, to support the mental health and coronary heart disease NSFs, suggests that physiotherapists are using these reports to:

- Inform service reviews and planning
- Develop business cases
- Inform Continuing Professional Development (CPD) activities, including qualifying programmes and postgraduate courses
- Develop research areas
- Submit topics for research priorities
- Inform briefing papers
- Provide evidence to commissioners
- Raise the profile of physiotherapy

This report is one of four commissioned to support physiotherapists implementing the Older People's NSF. They are:

Effectiveness of falls prevention and rehabilitation strategies in older people: implications for physiotherapy.

- The effectiveness of physiotherapy in the palliative care of older people.
- The clinical and cost effectiveness of physiotherapy in the management of common rheumatological conditions of old age.
- The clinical and cost effectiveness of physiotherapy in the management of older people following a stroke.

A report on the clinical effectiveness of physiotherapy in mental health, produced by the CSP to support physiotherapists implementing the NSF on Mental Health, is also relevant to physiotherapists implementing the NSF for Older People (Donaghy and Durward, 2000). The Society has also produced a position statement on intermediate care and rehabilitation (CSP, 2001b).

Physiotherapists can use these reports and the position statement, alongside the NSF, to develop business plans, ensuring that physiotherapy is at the forefront of delivering improvements in services for older people.

While the NSF refers to England, Frameworks and action plans for the other Nations will draw on the same evidence base, but local application and context may vary, affecting how services are delivered.

1.3 Background to the NSF - Stroke

The NSF sets national standards and defines service models for stroke, which encompass both health and social services. It puts in place strategies to support implementation and establishes performance measures against which progress within an agreed timescale will be measured. Standard five (shown in Box 1) is devoted to stroke care.

Box 1: National Service Framework for Older People - Standard 5 (Department of Health, 2001)

The NHS will take action to prevent strokes, working in partnership with other agencies where appropriate. People who are thought to have had a stroke have access to diagnostic services, are treated appropriately by a specialist stroke service, and subsequently, with their carers, participate in a multidisciplinary programme of secondary prevention and rehabilitation.

The NSF was informed by advice from an External Reference Group (ERG). Separate Task Groups were formed to address cross-cutting themes of selected common conditions and various locations of care for older people. Involvement of older people and their representative organisations was prominent. The incorporation of stroke care was a late one and arose partly by effective lobbying of well-organised pressure groups, most notably by the Stroke Association, and partly because national deficiencies in stroke care were evident. A national survey sponsored by the Stroke Association reported that the hospital care of stroke patients was "a matter of chance" with only about a half the patients receiving optimal care (Ebrahim and Redfern, 1999). The report estimated that between 4,500 and 7,000 avoidable deaths and institutional placements each year could be ascribed to this care deficiency. These findings were replicated in the first of the now annual National Sentinel Stroke Audits conducted by the Royal College of Physicians (Rudd et al, 1999). Stroke was included in the NSF by the establishment of an additional Task Group (Stroke Task Group). The group organised their advice to the ERG in such a way that it drew fully on the clinical research evidence-base. The Group were fortunate to have available the National Clinical Guidelines for Stroke (Intercollegiate Working Party, 2000). These guidelines synthesise research evidence of best practice and present a series of clinical and service model guidelines that, if implemented locally, would improve clinical outcomes for stroke patients.

The NSF should not be seen in isolation. There are supporting and operational backdrops which are important to its implementation. Firstly, there is the NHS Plan (Department of Health, 2000b): a ten-year programme to modernise the health service. Secondly, the NSF will be adopted within the strategic policy of a primary care-led NHS now expressed by the new structure of the Primary Care Group/Trust (PCG/T) "Investing in Primary Care", introduced by the Department of Health in April 2001 (see www.doh.gov.uk/pricare/investment/index.htm). The PCG/T is expected to have a strategic role in the planning and commissioning of a broad range of services. General practitioners and their supporting managerial and clinical teams will be increasingly held responsible for local health services. This devolution of responsibility, power and resources has been reinforced with the recent announcement of a further structural health service reform. There will be a massive reduction in health authorities (from 99 to 30) and the PCG/Ts will have greater operational freedom. Lastly, agencies are in place to enforce the NSF Standards. The enforcement comes from three directions: the new strategic health authorities described above, the

newly conceived Modernisation Agency and through the regular inspection process of all NHS Trusts by the Commission for Health Improvement (CHI).

1.4 Literature Search

The literature search for this report was informed by searches undertaken for updating the National Clinical Guidelines for Stroke (Intercollegiate Working Party, 2002) and topic specific searches in CINAHL, PUBMED, and EMBASE, and MEDLINE.

2.0 Statement of the Problem

2.1 Definition

A stroke is defined by the World Health Organisation (WHO) as 'a clinical syndrome characterised by rapidly developing clinical symptoms and/or signs of focal and at times global (applied to patients in deep coma and to those with subarachnoid haemorrhage) loss of cerebral function, with symptoms lasting more than 24 hours or leading to death, with no other apparent cause other than that of vascular origin' (Hatano, 1976).

A neurological event producing symptoms that last less than 24 hours is termed a transient ischaemic attack (TIA). A deficit that lasts longer than 24 hours but recovers within seven days is known as a reversible ischaemic neurological deficit (RIND).

2.2 Incidence

Stroke incidence can be defined as the number of first-ever in a lifetime cases of stroke occurring in a given population over a defined time period (Warlow et al, 2001). Identification of patients with stroke is dependent on the completeness of available records, which is difficult, particularly as not all patients are admitted to hospital.

The first comprehensive UK epidemiological survey was the Oxford Community Stroke Project (OCSP). This was a large scale, prospective study designed to identify all first-ever strokes and TIA's in a population of some 105,000 people who were registered with 49 general practitioners (Bamford et al, 1988). Rigorous procedures were used to register all people who had a stroke and to confirm the diagnosis by a combination of rapid clinical assessment and computed tomographic (CT) brain scan or necropsy. Over the four-year period of the register (from 1981 to 1985), 675 first-ever strokes were recorded: an estimated annual incidence in the study population of 1.60/1,000. When adjusted to the age and gender distribution of the 1981 population of England and Wales, this equated to an annual incidence of 2.0/1,000. There was an exponential rise in stroke incidence with increasing age.

Establishing incidence rates for stroke in a local population is important for service planning but difficult to achieve. Not all patients are seen by their GP, and hospital admission rates vary from 55% (Bamford et al, 1986) to 78% (Wolfe et al, 1993). Service planning is consequently difficult but should always encompass the whole stroke population and not be restricted to those people admitted to hospital.

Within the NSF, every general practice is required to have in place a system to identify people who have had a stroke. Several centres have already established a stroke register and this has yielded useful practical information on their more widespread replication. The Information Strategy for Older People is to be published shortly and will provide advice on the construction of community-based stroke registers.

2.3 Prevalence

Prevalence describes the number of people with a condition at a point of time. Stroke prevalence studies generally include all those people who have had a stroke, including people who have made a good recovery. However, estimates of stroke prevalence have varied widely (Terent, 1993) and are influenced by geographical area, methods used for case finding and changes in incidence and survival rates of stroke

patients (Shahar et al, 1995). A study in the north of England estimated prevalence for stroke of 1,470 per 100,000 (Geddes et al, 1996). Prevalence amongst African-Caribbean and South Asian men is 40% - 70% higher than that of the general population when adjusted for age (Department of Health, 2001).

2.4 Mortality

In 1995, stroke accounted for almost 60,000 deaths in England and Wales. This represented 10% of all deaths: 8% for males and 13% for females (Office for National Statistics, 1997). There has been a gradual decline in stroke mortality that pre-dates treatment of hypertension (the major treatable risk factor for stroke) and is not well understood.

2.5 Recovery Following a Stroke

People who survive the initial stages of stroke generally show some improvement over time in their ability to move and perform functional tasks. A variety of mechanisms have been suggested to explain recovery that include neuroplasticity and adaptive changes (Warlow et al, 2001). The OCSP reported that approximately 37% of survivors were dependent at one year and at subsequent visits (Burn et al, 1989). The likelihood of independence at six months decreased with increasing age (Burn et al, 1989). It is estimated that one year after stroke, 30% of patients will have died, 25% will be dependent and 45% independent. These estimates relate to a summary of all stroke types and it is important to be aware that recovery, mortality and recurrence are influenced considerably by the clinical stroke sub-types (Warlow et al, 2001). These sub-types are: Total Anterior Circulation Infarct (TACI); Partial Anterior Circulation Infarct (PACI); Lacunar Infarct (LACI); Posterior Circulation Infarct (POCI) (Bamford, 1991).

2.6 Rehabilitation - Definition

Rehabilitation remains the corner stone of treatment for patients after stroke. The provision of physiotherapy is a major component of this. Rehabilitation may be defined as "...a problem solving and educational process aimed at reducing the disability and handicap experienced by someone as a result of disease, always within the limitations imposed both by available resources and by the underlying disease" (Wade, 1992).

A problem solving approach is an important aspect of stroke care particularly because patients and their families present with many different problems in both the short and the longer-term. It follows that all staff treating patients should be fully aware of the continuing range of challenges facing stroke patients and their families, which encompass acute medical problems, physical disability, practical issues and longer-term psychosocial adjustment.

3.0 Early Medical Management

3.1 General Management

The role of the acute stroke unit as part of routine care in a district general hospital remains unclear. Acute stroke units are specialist units providing care during the immediate post-stroke period and until the patient is sufficiently medically stable for rehabilitation. They are invaluable for recruiting patients to acute drug trials (research), as a platform to provide safe thrombolysis (see below) and to monitor for early stroke related complications. However, many hospitals now have central medical admission units where early medical stroke care, which can be guideline driven (Pushpangadan et al, 1999), is provided. The relative advantages of the two acute service models need further evaluation in randomised controlled trials (RCTs). However, the main stimulus to a widespread implementation of the acute stroke unit model would be if a safe, widely applicable medical treatment for acute stroke became available.

The main early medical issues are detection and aggressive treatment of fever and hypoxia, prevention of pressure sores, evaluation of swallowing function and risk of aspiration, and prevention of deep vein thrombosis (Pushpangadan et al, 1999).

The NSF has recommended TIA clinics for rapid assessment and selected secondary prevention treatments to minimise the progression to a more disabling stroke. A description of such services is available (Blight et al, 2000) and should fast track selected patients with significant carotid artery stenosis for carotid artery surgery. The service is also cost-effective (Blight et al, 2000).

3.2 Cerebral Infarction

Occlusion of a cerebral artery results in a central area of severe focal ischaemia surrounded by an area of moderate ischaemia where the neuronal cell membrane is intact but the cell becomes electrically silent and synaptic transmission fails (ischaemic penumbra). A complex and incompletely understood process (Pulsinelli, 1992) may further damage this area of relative ischaemia, extending the final infarct size. Pharmacological modification of the ischaemic penumbra process is an attractive goal but no drug has yet proved clinically successful (Langhorne and Stott, 1995).

3.3 Aspirin

Two large studies (CAST, 1997; ISTCG, 1997) have shown benefit when aspirin is started within 48 hours of stroke onset (10 deaths or recurrent strokes per 1000 patients treated). Both studies committed patients to an early head CT scan to exclude intracerebral haemorrhage, when antiplatelet agents are contraindicated. Continued aspirin treatment beyond two weeks is beneficial and reduces the risk of further stroke and other vascular events by 22% (40 vascular events avoided per 1,000 patients treated) (Antiplatelet Trialists' Collaboration, 1994).

3.4 Atrial Fibrillation

The European Atrial Fibrillation Trial (EAFSG, 1993) recruited patients presenting with TIA or minor ischaemic stroke within the previous 3 months and demonstrated that anticoagulation with warfarin reduced the risk of a further stroke by 67% and aspirin by 14%. Patients for anticoagulation treatment need careful selection and fastidious INR monitoring (adjustment of warfarin dosing) to avoid complications from haemorrhage.

3.5 Thrombolysis

The role of thrombolysis ('clot busting') by intravenous drug infusion is contentious in routine care. Randomised trials have demonstrated definite effectiveness (reduced death and dependency at six months) but also definite hazard (increased symptomatic intracranial haemorrhage) (Wardlaw et al, 2001). The time window for efficacy is a challenging three hours post-stroke onset, and requires a major emergency services reconfiguration to achieve. Moreover, many patients have contra-indications to the treatment such that only about 10% are eligible.

3.6 Cerebral Haemorrhage

At present there are no proven effective interventions for cerebral haemorrhage (only 10-15% of all strokes). Treatments for associated cerebral oedema are unreliable and the benefit of surgical evacuation of haematoma is inconclusive (Hankey and Hon, 1997).

Research into prevention and medical management of stroke is ongoing. Systematic reviews on the Cochrane Library are being continually updated.

4.0 Organisation of Early Stroke Care

4.1 Stroke Units

The Stroke Unit Trialists' Collaboration (SUTC) identified, by a comprehensive search strategy, 20 randomised trials (n=3,864) that compared patients in receipt of 'organised in-patient stroke care' such as that provided

in stroke units, with patients treated on a general medical ward. They reviewed the trials and undertook a meta-analysis to combine trial results and obtain an overall estimate of treatment effects. The findings were statistically conclusive: that stroke unit care confers better outcomes in terms of reduction in deaths, reduction in death or dependency, and reduction in death or institutionalisation. The size of the treatment effect is surprisingly large with numbers needed to treat (NNT, a measure of absolute benefit) of 32, 16, and 18 respectively. Thus, for example, only 18 patients need to be treated on a stroke unit to save one patient unnecessarily dying or requiring institutional care. This is a powerful treatment effect. Subsequent analysis of the trials indicated that the benefits of a stroke unit were not related to age, sex or stroke severity. Access to such care, therefore, should not be restricted to a particular age or patient group (Stroke Unit Trialists' Collaboration, 1997, 2001)

Early stroke unit trials observed that the stroke unit effect appeared to wane rapidly such that independence at twelve months became similar for patients who had received treatment on a stroke unit or general ward (Garraway et al, 1980a, 1980b). This was ascribed to a mixture of over protection by the families of the stroke unit patients causing loss of acquired independence skills and improvement in the general medical patients who had been discharged before their full potential had been realised. However, more recent stroke unit trials have reported a persisting stroke unit effect with advantages still apparent at five years (Lincoln et al, 2000; Indredavik et al, 1997). This reported improvement in longer-term outcomes for stroke unit care may be related to better community follow-up of patients. One of the attributes of stroke unit care may be that they are better able to engage community services and/or provide links to continuing rehabilitation.

It is important to be clear what was investigated in the stroke unit trials. At the heart of the stroke unit concept lies the notion of 'organised care'. Essentially, the trials examined organised hospital stroke care against less organised or more haphazard care. Thus, a clear understanding of the properties of organised care becomes critical to the wider replication of stroke unit service model. Interviews with the stroke unit trialists' were undertaken to attempt a more transparent definition of organised care. The trialists' identified three main features:

- co-ordinated multidisciplinary teams
- staff with expertise and interest in stroke
- continued education and training programmes for staff, patients and carers.

The NSF has emphasised these features and made plain that they are pre-requisites for new stroke units. However, these features represent the opinions of the trialists'. The additional effectiveness of stroke unit care observed in the trials might also be related to the special commitment and enthusiasm of the trialists and their staff. Replicating such enthusiasm and sustaining it over several years is likely to be a critical operational service challenge. Potential strategies to achieve this could include:

- affiliations of local stroke units meeting to share ideas and developments;
- regular attendance of stroke unit staff at specialist national meetings;
- regular team building and "time-out" days.

Such approaches need to be considered and supported by management when planning and maintaining high quality stroke unit care.

The trial evidence primarily relates to stroke units providing combined acute care and a period of rehabilitation. Rehabilitation stroke units have also been shown to be more effective than conventional care in general medical wards. Peripatetic stroke teams that visit several wards to provide advice and treatment are best avoided as these have been insufficiently investigated to be adopted into routine practice and are almost certainly not cost-effective (Stroke Unit Trialists' Collaboration, 2001; Kalra et al, 2000; Evans et al, 2001).

One practical consequence of the conclusions of the SUTC is that the majority of disabled stroke patients should be admitted to hospital. A recently published randomised trial has reinforced this. The trial examined the efficacy of stroke unit care compared to a stroke team or to domiciliary care for early stroke rehabilitation. Stroke unit care was more effective in reducing mortality, the need for institutional care and dependence. Moreover, rehabilitation of patients randomised to domiciliary care proved difficult as one third of the 153 patients so randomised were admitted to the stroke unit within two weeks for a variety of care reasons (Kalra et al, 2000).

The issue of generic intermediate care for older people (Standard 3, NSF) is contentious as there is a concern that such services may become an institutional barrier restricting or delaying ready access to district general hospital services for older people (Grimley Evans and Tallis, 2001). The evidence from the SUTC, and from community stroke trials, strongly supports specialist care and specialist (single condition) services. The provision of these services will facilitate better outcomes for patients and carers. To ignore this research conclusion risks exposing patients and carers to sub-optimum care with associated poor outcomes.

The NSF has stipulated that every general hospital, which cares for people with stroke, will introduce a specialised stroke service by 2004. The National Clinical Guidelines (Intercollegiate Working Party, 2000) state that stroke services should operate from "a geographically identified unit acting as a base, and as part of the inpatient service". The NSF describes a service model in which a stroke team led by a clinician with expertise in stroke should include: a physician specialising in stroke medicine; a clinical nurse specialist; a speech and language therapist; an occupational therapist; a physiotherapist; a dietician; a clinical psychologist; a pharmacist; a social worker/family support; a trained bi- or multi-lingual co-worker to reflect language needs of local populations; a stroke care co-ordinator (a specific post or role undertaken by a member of the team). Such an extensive team might, at first, appear to have considerable resource and staffing implications. For example, the British Association of Stroke Physicians estimate that over 200 additional stroke physicians might be required (Rodgers, personal communication). However, as stroke patients are already located in the 'system' - usually scattered among several general medical and elderly care wards - the requirement is primarily that of a reconfiguration of a service to geographically re-locate the patients and staff in a single area. Much should be achieved within existing resources, augmented by carefully selected new posts.

4.1.1 Stroke Unit Costs

There is a dearth of economic evaluations in stroke care (Evers et al, 2000). The SUTC report little information about the costs of stroke unit care. One analysis has suggested that stroke unit care was more cost-effective than care provided in general medical settings (Major and Walker, 1998). Length of hospital stay is likely to dominate any individual cost component of patient care. Nursing staff salaries contribute particularly to these hospital costs, with much smaller amounts being spent on therapy and specific treatments (Bowen and Yaste, 1994; Dennis et al, 1995; Stroke Unit Trialists' Collaboration, 2001).

A recent study in Sweden compared all costs in the first year after stroke incurred by patients randomised to stroke unit care or 'conventional' care. Total costs did not differ significantly between the two treatment groups. Seventy per cent of the total cost was for inpatient care and 30% for outpatient and informal care (Claesson et al, 2000).

Table 1 Comparison of estimates of the effectiveness and costs of early stroke treatment (extracted from Hankey and Warlow, 1999)

	Death or dependency Numbers needed to treat (NNT)	Estimated target population	Approximate cost per death or dependency avoided
Stroke unit	18	80%	? nil additional cost
Aspirin	83	80%	£39
Thrombolysis	16	10%	£16,920

A summary comparison of estimates of the effectiveness and costs of early stroke treatment with three evidenced-based interventions is shown in table 1. Effectiveness is expressed in absolute terms by the numbers needed to treat (NNT) to avoid one poor outcome (death or dependency). The benefits of the stroke unit (organised rehabilitation) are apparent with reasonable effect-size, high patient applicability and low additional cost. Thrombolysis is effective, but has low applicability and high cost.

4.2 Multidisciplinary Team Care

Teamworking is incorporated in the National Clinical Guidelines, which also recommends that nurses should be an integral part of the team. Team co-ordination is supported by regular meetings to share patient assessments and progress and to plan patient treatment. However, teamworking may be dysfunctional, hierarchical and hampered by professional boundaries (Strasser et al, 1994). There is need for a more focused examination of the nature of teamworking in stroke units (Stroke Unit Trialists' Collaboration 1997; Gibbon, 1999; Pound and Ebrahim, 2000). It has been suggested that effective teamwork requires at least three components: agreed and explicit aims; recognition of the contribution of different team members; and structures to facilitate collaborative working (McGrath and Davis, 1992). Development work to enhance practice, knowledge and skills is essential but a critical factor is to create an environment of interdisciplinary care. Such interdisciplinary working involves acknowledging the overlap between professional disciplines, with greater sharing of duties and responsibilities. Formal strategies to promote interdisciplinary working are largely untested but include appropriate education (Gibbon, 1999), collaborative clinical records, shared rehabilitation goal setting and closer working practices.

4.3 Continued Education and Training Programmes

Educational and training programmes for staff were a common feature of the stroke units evaluated within the randomised trials. Such training programmes can be established within existing resources and may have a positive effect on staff attitudes and behaviour (Jones et al, 1998; Forster et al, 1999a, 1999b).

In order to more generally improve the level of care provided to stroke patients, the NSF recommends that specialist teams provide training for all staff who may have contact with stroke patients. They recommend that such training should be wide-ranging, cover acute and rehabilitation care, and address patients' and carers' personal, information, emotional, social and employment needs. With the increase in intermediate care, and the corresponding diversity of post-discharge placements available, such training will become increasingly important to ensure that all patients receive a high quality and relevant standard of care. There will need to be a trade-off between a centrally located, highly specialised unit and the effort and costs required to train adequately peripheral staff.

4.4 Assessment and Outcome Measures

Thorough and repeated assessment is an integral part of rehabilitation and requires input from each member of the multidisciplinary team to ensure that some problems are not overlooked (Cunningham et al, 1996). In addition to a professional evaluation of a patient, standardised measurement instruments should be used to facilitate a more systematic approach and to enable progress to be monitored, as stated in the CSP's Core Standards (CSP, 2000). It is a concern that a recent survey suggested that 22% of therapists are not measuring outcome and that many are using measures not tested for reliability and validity (Lennon et al, 2001). There is much debate, and little consensus, about the selection of appropriate outcome measures for routine clinical use. A measure for which evidence of validity, reliability and sensitivity has been researched is recommended (Wade, 1992). Also, a measurement instrument should be appropriate to the treatment intervention and relevant to the patient. Different instruments are available according to whether a measure of impairment [for example, Rivermead Motor Assessment, (Lincoln and Leadbitter, 1979)]; disability [for example, Barthel Index, (Mahoney and Barthel, 1965; Collin et al, 1988)]; or handicap [for example, London Handicap Scale (Harwood et al, 1994)] is required.

Requirements may change over time as the focus in the early stroke phase may primarily be on impairment and later treatment and measurement may be more appropriately targeted on disability and handicap. The range of the scale should also be considered. The Barthel Index might be appropriate to measure

improvement in the early stages after a stroke but after discharge its low ceiling means that further improvements may not be reflected in scale score changes (Parker et al, 1994).

4.4.1 Extended Activities of Daily Living

Living independently at home requires a more extensive repertoire of skills including kitchen, domestic, transport use and leisure activities. These types of activities are referred to variously as instrumental, extended, social or advanced activities of daily living. Examples of these measures include the Frenchay Activities Index (Wade et al, 1985) and the Nottingham Extended Activities of Daily Living scale (Nouri and Lincoln, 1987). These measures are less reliable both in total scores and individual items than ADL scores, probably because they rely on recall of activities undertaken during the preceding weeks (Green et al, 2001).

4.4.2 Handicap / Participation

The ICDH classification scheme of impairment, disability and handicap is currently undergoing a major revision (ICIDH-2 available on www.who.ch/icidh) with the introduction of the new terms 'activity' and 'participation'. Participation, the nature and extent of a person's involvement in a life situation in relation to impairment, activities, health condition, and contextual factors, is the critical level to effect change from the patients point of view. There is an increasing recognition that the ultimate goal of rehabilitation for older people should be the reintegration into normal patterns of life (Wood-Dauphine et al, 1988). This involves placing the individual in the context of their home, local environment and facilities, their relationships, motivation, mood and expectations. The uniqueness of this context makes the development of a generic standardised assessment tools difficult. The development of robust measures of handicap has proved difficult (Wade, 1992), and only recently described for stroke (London Handicap Scale). Even here it remains a research tool for assessing the outcome of services rather than describing handicap to assist rehabilitation assessment (Harwood et al, 1994).

A single measurement tool may not encompass all domains requiring assessment so a measure of functional ability could be supplemented by a 'quality of life' measure such as the Nottingham Health Profile (Hunt et al, 1986), or by an assessment of mood state using the Hospital Anxiety and Depression score (HAD) (Zigmond and Snaith, 1983).

4.5 Rehabilitation Goals

Rehabilitation goals are highly focused statements of intent, which result from a distillation of the patient assessment process. Goal setting refers to the identification of, and agreement on, a target that the patient, therapist or team will work towards over a specific period of time (Intercollegiate Working Party, 2000). As such, they contribute to the process of rehabilitation.

Research evidence has demonstrated that using goals does improve rehabilitation outcome provided that significant patient involvement occurs and that both short and long-term goals are developed. Goal setting, like assessment, needs to be supported by appropriate interventions. However, the research base is derived almost exclusively from non-stroke studies, usually in the context of outpatient rehabilitation, and the extent to which these studies can be generalised to stroke is speculative (Wade, 1998; 1999).

The goal setting process itself may highlight differences in expectations between patients and therapists (Reid and Chesson, 1998). Importantly, while goal setting may be a recognised and established part of the rehabilitation process, an understanding of the term is not shared by patients and carers (Lawler et al, 1999).

4.6 Management of Urinary Incontinence

Urinary incontinence is a common problem after stroke, reported incidence varies between 37% and 79% (van Kuijk et al, 2001). Recovery from post-stroke urinary incontinence is associated with less disability and lower rates of institutionalisation than persisting incontinence (Patel et al, 2001). However, treatment evidence specific to stroke is limited. The National Clinical Guidelines were informed by the Continence Advisory Group, who made a number of recommendations (Intercollegiate Working Party, 2000, Section 8.4). These include the implementation of established assessment and management protocols from admission,

that a specialist continence advisory service should be available to all stroke patients, and the arrangement of appropriate post-discharge services

5.0 Physiotherapy for Patients after Stroke

Whilst the advantages of organised inpatient care such as that provided in a stroke unit are well demonstrated, the challenge now is to determine the effective components of such organised care. There are many current research projects addressing this objective. The role of physiotherapy within the multidisciplinary rehabilitation team is well established, but it remains a research challenge to determine the 'value added' contribution of a particular physiotherapy intervention over and above spontaneous, intrinsic brain recovery. The type, intensity, duration and optimum physiotherapy treatment strategy remains unclear.

5.1 Early Intervention

The NSF recommends early commencement of rehabilitation, within 24 hours. The National Stroke Audit (Rudd et al, 1999) reported that only 56% of patients were seen by a physiotherapist within 72 hours. However, the evidence for the effectiveness of early engagement of rehabilitation remains sparse. In an evaluation of stroke unit care in Norway, the authors emphasised their view that a programme of early intensive mobilisation focused on functional training contributed to superior outcomes (Indredavik et al, 1999). Patients (n=206) were randomised to stroke unit care or treatment on general wards at a mean of 16.5 hours after stroke onset and the majority of patients were seen by a physiotherapist within eight hours of admission to the unit, compared to 2 ½ days on the general medical wards. There were a number of other differences in care between the stroke unit patients and those patients randomised to treatment on the general wards, so differences ascribed to therapy treatment approaches should be interpreted cautiously. However, a similar recent report has also emphasised the perceived importance of early intervention (Evans et al, 2001).

5.2 Intensity of Physiotherapy after Stroke

There is a commonly held belief that more "intensive" physiotherapy improves outcome. However, it is important to note first how little physiotherapy is routinely provided to patients. Current normal practice is 20 - 40 minutes' physiotherapy a day (Langhorne et al, 1996). This equates to 4% of the waking day. Two reviews of seven (Langhorne et al, 1996) and nine trials (Kwakkel et al, 1997) investigating intensity of physiotherapy have been undertaken. However, comparisons of individual trial results were difficult because of the wide variety of outcome measures used. Both reviews concluded that there is a positive link between intensity of therapy and improved outcome. Clinical improvement however, was small, equivalent to a one point score change on the Barthel Index (Langhorne et al, 1996).

A UK stroke trial (Kalra et al, 1993) reported similar amounts of therapy - an average of 24 hours per patient stay on the stroke unit compared to 26 hours per patient stay on the general medical ward but improved outcome for the stroke unit patients. This is a small amount of therapy and implies strongly that improved patient outcomes of stroke unit care must be attributed to factors other than simple quantity of time spent in therapy. This is likely to be a whole environment effect, which includes a different style of nursing care and better inter-disciplinary teamwork. There may be practical difficulties in providing more therapy, including patient tolerance and resource issues (Parry et al, 1999).

A planned systematic review by members of the Stroke Therapy Evaluation Programme in Glasgow will provide further information.

5.3 Prevention of Complications Relevant to Physiotherapy

5.3.1 Shoulder Pain

Post-stroke shoulder pain is common. Prevalence estimates vary according to how and when it is measured but up to 80% of patients may be affected within the first year after stroke (Hanger et al, 2000). The

aetiology of shoulder pain remains uncertain but is associated with poor recovery of arm function. Prevention strategies should include education of the multidisciplinary team, including patients and carers, in appropriate manual handling techniques. The literature relating to the positioning of acute stroke patients has been reviewed (Carr and Kenney, 1992) and the effects of positioning evaluated in a small randomised trial (n=28) (Dean et al, 2000). Further research evaluating the effectiveness of an educational programme for nurses designed to increase the incidence of 'correct' patient positioning is ongoing (Jones, 2001). Although a range of preventative measures have been described, including external supports, slings, and exercise (avoiding use of overhead pulleys (Kumar et al, 1990), there is limited evidence of benefit (Forster, 1994).

Application of shoulder strapping for the first six weeks after admission to a stroke rehabilitation ward has been evaluated in a randomised trial (n= 98). There was no evidence that strapping reduced pain, maintained range of movement or improved functional outcome (Hanger et al, 2000). A review of four trials of electrical stimulation for post-stroke shoulder pain (n=170) reported little effect on pain or motor recovery but a small improvement in pain-free passive range of lateral rotation (Price and Pandyan, 2001).

The uncertainty over aetiology and treatment strategies is reflected in a study undertaken by Pomeroy and colleagues from The Stroke Association's Therapy Research Unit. Semi-structured themed interviews were used to develop a postal questionnaire to obtain information on treatment interventions for the prevention and treatment of post-stroke shoulder pain. The questionnaire was sent to a national sample of nurses, occupational therapists and physiotherapists (sample n=996, returned n=576, 58%) and 175 different types of intervention were identified (Pomeroy et al, 2001).

5.3.2 Falls

Falls are common after stroke. A frequency of 25% of has been reported during inpatient rehabilitation (Langhorne et al, 2000). A small proportion of these (5%) lead to serious injury. Causes are multifactorial and include motor, sensory and visual impairment, use of diuretics, sedatives and antidepressants (Warlow et al, 2001; Nyberg and Gustafson, 1997). Careful assessment of patients will help to identify those at greatest risk. Prevention is important and includes environmental factors such as appropriate flooring, furniture, ward layout and appropriate provision of aids. Falls are common during transfers (Nyberg and Gustafson, 1995) and appropriate assessment and implementation of handling and lifting strategies by all members of the team is again paramount (Warlow et al, 2001). Risk of falling remains a long term problem for patients and they may become increasingly susceptible to more serious injury, such as fractured neck of femur, from which rehabilitation is difficult (Forster and Young, 1995; Ramnemark et al, 2000).

Readers are also referred to 'Effectiveness of falls prevention and rehabilitation strategies in older people: implications for physiotherapy' (Lamb, 2001).

5.4 Physical Therapy Treatment Strategies

Within stroke rehabilitation there has been a tendency to adopt labelled approaches such as 'Bobath', 'Brunnstrom', 'Rood' but little evidence for effectiveness to support one particular approach over another (Ashburn et al, 1993; Ernst, 1990; Partridge and de Weedt, 1995; Duncan, 1997; Pomeroy and Tallis, 2000a).

The Bobath approach, 'a problem-solving approach to the assessment and treatment of individuals with disturbances of function, movement and tone' (Panturin, 2001), is still the most widely used and preferred approach in the UK (Lennon et al, 2001; Lennon, 1996; Davidson and Waters, 2000; Sackley and Lincoln, 1996). The Motor Relearning Programme, which focuses on task-orientated strategies, is popular in Australia (Carr et al, 1994; Carr and Shepherd, 1998). There has been a recent randomised comparison trial (n=61) of these two different therapy approaches employed in the first three months after stroke. The authors concluded that the Motor Relearning Programme (MRP) was more beneficial in terms of shorter hospital stay and improved motor function (Langhammer and Stanghelle, 2000). However, patients in the Bobath group were slightly more dependent on recruitment to the study, follow-up was short and greatest treatment effect was shown in the first two weeks. Nevertheless the reduction in length of stay (21 days for the MRP compared to 34 days in the Bobath group) has potentially significant health economic implications.

Generalisable evaluations of these treatment approaches is challenging as patient characteristics vary considerably, physiotherapists may have different skills and it is difficult to describe, capture and replicate the complexity of an individual approach (Pomeroy et al, 2001; Ballinger et al, 1999, Lennon and Ashburn, 2000; Barrett et al, 2001). Despite these difficulties, critical evaluation of therapy interventions is crucial. Stroke rehabilitation research has developed steadily since one of the first randomised trials by Smith et al (1981). A progression of evidence from theoretical concepts, to single case experiments, to small RCT's to investigate efficacy, to explanatory RCTs to study patient selection, to single centre and multicentre pragmatic RCTs to assess effectiveness in routine care, should be the aim. The next sections provide examples of how the evidence-base for specific techniques (muscle strengthening and focused intervention) can be developed.

5.4.1 Muscle Strengthening

Motor impairment, including muscle weakness, is common after stroke (Adams et al, 1990). Current physiotherapy programmes do not include muscle strengthening as it has been argued that strength training increases spasticity (Bobath, 1990). However, uncontrolled clinical trials and case studies (Sharp and Brouwer, 1997; Engardt et al, 1995) have shown that resistive training for the lower limb can produce significant strength gains for patients who were at least six months post-stroke and able to walk independently. However, such gains may not be translated into improved functional performance (Weis et al, 2000) and it seems training is most effective when it is specific to the action desired (Ng and Shepherd, 2000). For example, Butefisch et al, (1995) reported in a small study that repetitive hand and finger flexion and extensions against various loads improved the strength of hand grip and isometric wrist extension. Further studies have reported that muscle strengthening does not increase impairment of motor control (Brown and Kautz, 1998; Dawes et al, 2000).

5.4.2 Focused Therapy Intervention

Treadmill training is an example of a focused training programme. Visintin used case studies to explore the use of a treadmill for hemiplegic patients (Visintin et al, 1987; Visintin and Barbeau, 1989). Feasibility and practical application of these techniques were further explored by Malouin and colleagues (Malouin et al, 1992). This research team then progressed to a small explanatory trial (n=27) to determine whether an early 'gait focused' intensive treatment programme which included muscle strengthening and use of a treadmill (commenced eight days after stroke for one hour fifty minutes per day) provided superior outcomes to early intensive conventional physiotherapy (neurophysical techniques not focused on gait), or conventional therapy (13 days after stroke for forty minutes a day) (Richards et al, 1993). The study confirmed the feasibility of implementing this new treatment regime and indicated some positive effects. At six weeks after stroke, gait velocity was faster in the experimental group but similar in the two groups receiving conventional treatment thus giving some indication that the differences between type of therapy have more influence on outcome than duration of therapy.

There are number of other reports of case studies further refining the effects and design of treadmill walking (for example see Hesse et al, 1995,1999; Smith et al, 1999).

In 1998 Visintin and colleagues reported a larger RCT (n=100) comparing the effect of treadmill training with a body weight support system. The research team concluded that treadmill training with up to 40% of body weight support provided significant improvement on a range of outcomes including walking speed and motor recovery (Visintin et al, 1998).

In a small study Dean and Shepherd (1997) demonstrated that a focused two-week training programme was effective in improving the ability to balance during seated reaching activities after stroke. Recently the evidence-base has been developed further by an explanatory randomised trial undertaken by Kwakkel and colleagues (1999).

Kwakkel and colleagues (1999) investigated the effects of focused therapy intervention on three groups of patients within two weeks of stroke onset. One group of patients received additional rehabilitation with an

emphasis on arm-training, one group received additional rehabilitation with an emphasis on leg training and the final 'control' group a programme in which the arm and leg were immobilised with an inflatable pressure splint. Entry criteria for the trial were: patients (between 30 and 80 years) with a diagnosis of primary middle-cerebral artery stroke; no complicating medical history; no severe deficits in communication, memory or understanding; impaired motor function of the arm and leg; inability to walk at first assessment. Such criteria ensured a homogenous patient group. The positive design features of this high quality trial included: concealed random allocation; double blind assessment and multicentre setting (seven hospitals). The intervention was implemented by a number of staff, increasing potential generalisability. The interventions selected were protocol driven, based on evidence-based guidelines and delivered for 30 minutes per day for 5 days a week. For the leg training group, these included use of a treadmill training, limb strengthening exercises and functional movements (sitting, standing, and walking). For the arm-training group, these included strategies that encouraged forced use. All three groups also received as usual practice 30 minutes a week arm and leg physiotherapy. At the 20 week reassessment, treatment specific improvement was reported: the leg-training group demonstrated improvement in functional ambulation; and the arm training group had improved functional dexterity of the affected arm. The differences between these two groups and the control groups were most noticeable in the first 12 weeks and evened out thereafter (Kwakkel et al, 1999). Differences in functional activities were larger: at 20 weeks 62% of the leg training group and 43% of the arm training group were fully or nearly independent compared to only 35% in the control group. Although the authors suggest that the 'value added' by the intervention is small compared to the effect of spontaneous recovery, the findings do demonstrate that a focused, evidenced-based physical therapy does provide treatment specific improved outcomes when evaluated on a carefully selected homogenous group of stroke patients.

This short overview is an example of how a research programme can gradually generate useful guidance for clinical practice. Further work will progress these concepts to explore clinical and practical applicability. For example, the feasibility and effectiveness of running a community-based exercise programme in leisure centres is currently being explored by a team from the Department of Health Sciences, University of East London (Stroke Association funded).

5.4.3 Constraint Induced Movement

One method of promoting movement in the affected arm is by constraint-induced movement in which the unaffected arm is purposefully restricted. Randomised trial evaluation of constraint of the unaffected arm by use of a mitten (6 hours per day for 14 days), and 'forced use' of the affected arm by a focused therapy intervention soon after stroke (mean six days), is feasible (Dromerick et al, 2000). To date the intervention, similar to above, has been primarily evaluated in later stage patients with some active wrist and hand movement (n=66) (van der Lee et al, 1999). The intervention was associated with a small but significant reduction in arm impairment, especially for patients with sensory disorders and hemi-neglect. However there was a high number (n=21) of deviations from the randomised treatment schedule. The effect and practical implications of constraining the unaffected arm needs further careful investigation.

5.4.4 Upper Limb Function

Upper limb impairment affects 85% of stroke patients at stroke onset, of whom 55-75% still experience problems three to six months later. Identifying effective programmes to improve upper limb function remains a challenge for rehabilitation services. A recent review of 13 exercise therapy trials (n=939) reported insufficient evidence to draw definitive conclusions about the effects of exercise therapy on arm function. Trials comparing different types of exercise therapy showed no difference in effectiveness, but five of the eight studies that investigated a contrast in the amount or duration of therapy reported positive results in favour of the increased intervention group. It seems that more intensive exercise therapy is beneficial (van der Lee et al, 2001) but it has not been possible to identify a sub-group of patients who are most likely to benefit. The reviewers concluded that, in clinical practice, patients should be offered extensive opportunity and encouragement to exercise the affected arm.

A recent UK trial of increased intensity was included in the review and was unusual in finding no positive benefit from increased treatment. However, only half the patients so randomised completed the course of

additional treatment, mainly due to patients inability to tolerate the extra treatment (Lincoln et al, 1999). This trial was a three-group comparison of routine physiotherapy, additional therapy provided by a therapist and additional treatment provided by a trained supervised assistant. A post-hoc analysis indicated that a sub-group with less severe arm impairment benefited from treatment provided by the assistant. The authors speculate that the difference in outcome may have been due to therapy content, for patients in the assistant group treatment included a greater proportion of repetitive active movements and functional activities (Parry et al, 1999).

A further trial has been published since the review. Partridge and colleagues (2000) report that a double dose of therapy intervention provided no added benefit for patients. Partridge et al (2000), Lincoln et al (1999) and Sunderland et al (1992) all reported little treatment gains for patients with severe initial impairment. However Kwakkel et al (1999) and Feys (1998) included patients with severe impairment in their trials and reported positive treatment effects.

5.5 Treatment Modalities

5.5.1 Biofeedback

Biofeedback is a way of providing the patient with auditory or visual cues of muscle activity or joint position. It is usually based on electromyography (EMG). Its role in stroke has been subject to a number of systematic reviews with conflicting conclusions reflecting different study selection. (Schleenbaker and Mainous, 1993; Moreland and Thompson, 1994 [upper limb]; Moreland et al, 1998 [lower limb]). It seems that biofeedback is unlikely to provide a substantive clinical benefit (Duncan, 1997).

5.5.2 Functional Electrical Stimulation

Functional electrical stimulation (FES) may be therapeutic or orthotic. Therapeutic is where movement benefit is seen after a series of treatments, and orthotic is where a specific functional outcome is required, for example, correction of dropped foot during walking. A meta-analysis of four studies concluded that FES enhanced strength (Glanz et al, 1996). However, conclusions are limited by the methodology of the trials (small sample size, inadequate blinding) and it was difficult to link improved strength with improved function.

A recent well-conducted study suggested that an eight-week course of electrical stimulation significantly increased isometric strength of wrist extensors in selected acute stroke patients. Recruited patients (n=60) were 2 to 4 weeks post-stroke onset, with a Medical Research Council power of wrist extension grade 4/5. A short-term improvement of upper limb disability (grasp and grip) was not maintained at follow-up 32 weeks after recruitment (Powell et al, 1999).

A specific review of FES on common peroneal nerve stimulation for the correction of dropped foot identified 16 papers, only three of which were randomised trials (n=113). The authors (BurrIDGE et al, 1998) concluded that FES may be beneficial for a subgroup of hemiplegic patients. However, selection of appropriate patients is difficult as potential problems include compliance and skin irritation at electrode sites. Success of treatment may be enhanced by careful application of the stimulator, responsive technical back-up support and regular follow-up (BurrIDGE et al, 1998).

5.6 Evidence for Treatment Strategies - The Way Forward

Reviews of physiotherapy for patients after stroke have concluded that therapy, regardless of intervention approach, is effective and that 'more is better' (Langhorne et al, 1996; van der Lee et al, 2001). However, there are recent indications that content of therapy may influence outcome (Kwakkel et al, 1999; Parry et al, 1999). From the rapidly developing evidence-base, strategies of task specific intervention, training, muscle strengthening and enhancing motor learning (Majsak, 1996) offer interesting possibilities for the future (Lennon and Ashburn, 2000). The feasibility and effectiveness of acupuncture (Park et al, 2001) and imagery (Page et al, 2001) are also being explored.

The importance of linking clinical treatment to evidence is paramount. There is a need to move away from the 'labelled' approach to treatment because within the many different approaches are common components of potentially successful interventions. Many of the earlier trials evaluating therapy interventions are small and/or methodologically weak. Further research is needed to explore potentially beneficial interventions (clarifying content and intensity), and to ensure that they are delivered to appropriate patients. Greater transparency of interventions and evaluations is required to maximise generalisability and to promote optimum physiotherapy treatment for all stroke patients.

However, a balance needs to be struck between testing out a specific treatment approach and evaluating it in an overly isolated fashion. In clinical practice it is often diversity of approach that is effective: the clinician using trial and error to determine a strategy which appears helpful to the individual patient. Indeed, Wade (2001) has recently warned of the danger of excessively deconstructing the 'black box' of rehabilitation suggesting that a 'type III error' could occur, i.e. falsely rejecting the experimental hypothesis if the interactive effects of complex interventions are not considered.

The National Clinical Guidelines for Stroke (Intercollegiate Working Party, 2000), published by the Royal College of Physicians provides a comprehensive review of all available evidence. An overview of physical therapy post-stroke and suggestions for future research has been published by Pomeroy and Tallis (2000a, 2000b, 2002).

The Stroke Therapy Evaluation Programme in Glasgow has been established to undertake and disseminate information on systematic reviews. Ongoing reviews include: therapy based rehabilitation services for stroke patients at home; treadmill training and body weight support for walking after stroke; physiotherapy treatment approaches for the recovery of postural control and lower limb function following stroke; electrical stimulation for promoting recovery of movement or functional ability after stroke (Protocols available Cochrane Library, 2001, Issue 4).

5.7 Psychosocial Dimension

Whilst there is much emphasis on the technical aspects of physiotherapy after stroke, some of the less tangible and 'softer' aspects of rehabilitation should also be considered (Young, 1996). In interviews with patients' ten months after stroke, 19 of 24 interviewed expressed positive views about physiotherapy. It is interesting to note, however, that only 13 patients believed that physiotherapy contributed to physical improvements (Pound et al, 1994). Eight patients (25% of this sample) identified physiotherapists as a source of advice and information and seven suggested that they were providers of faith and hope.

Rehabilitation professionals and patients themselves often believe that motivation has an important role in determining outcome. Motivation is a nebulous concept and there is a lack of shared understanding of the term (Maclean and Pound, 2000). Factors effecting motivation in stroke in-patients have been explored by Maclean et al, (2000) and it seems probable that environmental factors including the hospital setting contribute to lower motivation (Widén Holmqvist and von Koch, 2001).

A narrow focus on physical recovery may obscure consideration of the wider psychosocial issues facing patients and carers (Pound et al, 1994). Rehabilitation should always be placed in the context of the patients own activities and belief system (Wade, 2000). Recent research has highlighted differences in understanding and expectation between patients and physiotherapists (Ashburn et al, 2000). These more psychosocial aspects of recovery need careful consideration, particularly in view of the documented poor longer-term outcome for patients and carers (House et al, 1991; Han and Haley, 1999). Rehabilitation of physical function by itself may be inadequate to improve the long-term care of patients. It has been reported that patients remain socially isolated despite relatively good physical recovery (Greveson and James, 1991).

The report for the Intercollegiate Working Party for Stroke: Stroke Rehabilitation: Patient and Carer Views produced by Kelson and colleagues for the Royal College of Physicians with the College of Health (Kelson et al, 1998) provides considerable insight into the diverse and complex life changes associated with stroke.

6.0 Information Provision

The provision of appropriate, accurate, timely information and advice about stroke has been recommended as a key component of service provision (King's Fund, 1988; Department of Health, 1999). It is the responsibility of all staff who come into contact with patients and carers after stroke. There is a wide range of nationally and locally produced leaflets, booklets, videos and audiotapes available for patients and carers (Coulter et al, 1998). However, despite this emphasis on giving information, research suggests that patient's understanding of stroke, its consequences and the support available, remains poor. Stroke patients and their carers often have a poor understanding of stroke (Wellwood et al, 1994; Drummond et al, 1996) and have expressed dissatisfaction with the information and advice received about stroke disease, services and benefits available (O'Mahony et al, 1997). Inadequate provision and receipt of such information has important consequences for compliance with secondary prevention and the longer-term psychosocial outcome for patients and carers (O'Mahony et al, 1997). Enhanced knowledge of stroke care by carers may improve the quality of discharge home from hospital for stroke patients (Evans et al, 1991). A systematic review of research addressing the provision of information and /or education to patients and carers after stroke has been undertaken (Forster et al, 2001a).

A comprehensive search strategy identified over 100 relevant studies. Qualitative methods have been used extensively to explore patient and carers' information needs and satisfaction with information provided. Quantitative research has been more limited: nine completed RCTs were identified. Of the nine trials, three evaluated an education intervention consisting of a programme of lectures and opportunity to ask questions, the other six trials evaluated the provision of information in the form of information packs, individualised leaflets or provision of medical notes.

There is some trial evidence that information combined with educational sessions (Evans et al, 1988; Rodgers et al, 1999; Johnson and Pearson, 2000) improved knowledge and was more effective than providing information only. However, in one of these trials (Rodgers et al, 1999) attendance at the educational sessions was low. Information provision only had no effect on mood, perceived health status or quality of life for patients or carers. A combined analysis of the Hospital Anxiety and Depression scores for three trials showed no difference in outcome between the intervention and control groups. The effectiveness of structured information provision has not been demonstrated (Forster et al, 2001a). Future research needs to be directed towards education rather than information and reflect the expressed needs of patients and carers (Coulter et al, 1999; van Veenendaal et al, 1996; Wiles et al, 1998; Wiles 1995).

7.0 Transfer of Care

Discharge home is often a time of stress and upheaval for the stroke patient. Ideally this should be well planned for with an appropriate home visit and full assessment of health and care needs with the multidisciplinary team. However, this does not always take place and a recent audit has reported evidence of poor communication, lack of co-ordination, and a focus on discharge in itself (Tyson and Turner, 2000). The hospital staff are often unaware of the problems facing patients once discharged home (Tyson and Turner, 2000; Kelson et al, 1998). Good liaison between hospital and community based therapists is essential.

Community-based stroke rehabilitation teams have primarily been evaluated within the context of early discharge schemes (Rodgers et al, 1997; Rudd et al, 1997; Widén Holmqvist et al, 1998; Anderson et al, 2000; Mayo et al, 2000; Early Supported Discharge Trialists', 2001). The trials demonstrate the feasibility of earlier hospital discharge without adversely effecting patient outcomes but may be associated with increased carer stress (Rodgers, 2000). All these trials established new teams of specialised staff to provided the support on discharge, two of which also included the provision of enhanced home care.

Whilst early supported discharge can make savings of hospital costs, these are offset by increased community costs. Costing data are available from the London (Beech et al, 1999) and Newcastle trials (Rodgers et al, 1997; McNamee et al, 1998). These are shown in table 2. In practice any apparent cash releasing savings are

difficult to realise (essentially they amount to 1-2 beds 'saved' per stroke unit) as more patients are found to fill the vacancy (greater efficacy of the stroke unit).

Table 2 Comparative costs between early supported discharge and conventional care (from Early Supported Discharge Trialists' Collaboration, Cochrane Library, Issue 4, 2001.)

	Estimated costs per patient	
	Early Supported Discharge	Conventional Care
Newcastle Average costs up to six months	£7,155	£7,480
London Average costs up to one year	£6,800	£7,432

A further study of post-acute rehabilitation in Norway (n=251, 10 days post-stroke onset) compared stroke unit rehabilitation to rehabilitation in the community where a wide variety of services were available (including nursing home rehabilitation as an inpatient or day patient, domiciliary rehabilitation) (Ronning and Guldvog, 1998). This study reported a significant difference in outcomes with 23% of patients who received stroke unit rehabilitation being dead or dependent seven months after stroke compared to 38% who were discharged to generic community services. It is clear that early discharge from hospital without enhanced specialist stroke services leads to a significant increase in morbidity and mortality. A strategy of early supported discharge requires appropriate resourcing for successful implementation and attention should be paid to providing practical and emotional support to carers.

The NSF recommends the identification of a stroke care co-ordinator who will provide a link between hospital and community based services. There should be a full assessment before discharge, resulting in a statement of need and an individual care plan that identifies services required, professionals responsible and the aims and potential outcomes of rehabilitation. The stroke care co-ordinator will be responsible for care plans ensuring that there is a smooth transfer between care settings and that support and secondary prevention measures are in place before discharge. Patients and their families will be able to contact the stroke care co-ordinator for advice and to facilitate access to services after the patient's discharge.

8.0 Aids and Appliances

The timely and appropriate provision of aids and/or appliances is one of the crucial aspects of stroke care. The National Clinical Guidelines for Stroke recommend that all patients should be assessed fully to determine whether equipment or adaptations could increase safety or independence. There is some evidence that provision of aids and equipment reduces health care costs (Mann et al, 1999). Procedures (and funding) should be in place for re-assessment to check existing aids and appliances and identify and provide new requirements.

The provision and organisation of even simple aids and adaptations in the UK is poor. The mean delay between requesting and fitting an access ramp for wheelchair users in one study was 14 weeks with the longest delay reported of eleven months (Wanklyn et al, 1996). Many patients experience multiple waiting lists for essential equipment and adaptations. A recent Audit Commission report was highly critical (Audit Commission, 2000). It investigated the five equipment services that are the largest in terms of user numbers and cost: orthotics, prosthetics, wheelchair services, community equipment and audiology. In some sites, and some services, the situation was well organised but for most it was not and the main findings of the audit were: lack of involvement of users; low priority afforded by senior managers; under-investment; and geographic variations in people eligible to receive services, in the range and quantity of equipment provided, the time spent waiting for its delivery, and in the number of staff trained (Audit Commission, 2000).

The NSF standards are that the need for home adaptations, repairs and improvements are identified and work completed pre-discharge.

9.0 Longer-Term Stroke Rehabilitation

9.1 Community Stroke Teams

Considerable progress has been made to determine appropriate hospital care for patients after stroke, but organisation of community care remains a more exacting challenge. The practical difficulties for patients include lack of information about their condition (Hanger and Mulley, 1993), poor knowledge of services and benefits available (Wellwood et al, 1994; O'Mahony et al, 1997) and fragmented community services. Many people may not receive the help that they require (Ebrahim et al, 1987; Tyson and Turner, 2000). A survey of patients six weeks after hospital discharge revealed a wide range and variation in services used emphasising the complexity of the primary care of stroke patients and highlighting the need for co-ordination, review and effective links with the hospital (Bisset et al, 1997).

Other than the early supported discharge teams, organised care provided by community stroke teams have not been evaluated in a randomised trial, although the Stroke Association has identified a number of examples of good practice (Stroke Association). Key features for successful community rehabilitation teams were identified as:

- Regular and informed communication with all stake holders
- Investment in the team's personal and professional development
- Autonomy and control, particularly of resources (Geddes and Chamberlain, 2001).

With the expected proliferation of intermediate care services, equality of service provision and continuity of care is essential. However, an obvious conflict is apparent as a community rehabilitation team can realistically offer only a time-limited service, whereas a patient-centred service requires an open-ended service. Observational follow-up studies of stroke patients demonstrate continuing, changing, diverse and complex pattern of stroke related problems, even at 12 months post-stroke onset (Dowswell et al, 2000).

9.2 Therapy Interventions

There have been several RCTs evaluating additional occupational therapy intervention after hospital discharge (Corr and Bayer, 1995; Logan et al, 1997; Drummond and Walker, 1995; Gilbertson et al, 2000) It is interesting to note tangible gains were reported with even relatively small service inputs. However, a recent large, multi-centre evaluation of leisure therapy and conventional occupational therapy has disappointingly reported no benefits (Parker et al, 2001). This may have been because of the (perhaps artificial) distinction between activities of daily living based OT and leisure based OT.

Physiotherapy treatment given at home was found to be more effective and resource efficient than attendance at a day hospital for post-discharge stroke rehabilitation follow-up (Young and Forster, 1992, 1993). Further trials in Nottingham (Gladman et al, 1993, 1994a, 1994b) and East Dorset (Roderick et al, 2001) similarly found no difference in outcome between home and hospital based rehabilitation. A combined analysis of the Nottingham and Bradford trials concluded that home therapy was marginally better with an optimum provision of 15 sessions over six months (Gladman et al, 1995). Physiotherapy delivered in the home setting offers greater opportunity to focus on handicap rather than disability, is able to facilitate access to other community services and be more responsive to patients' and carers' needs (von Koch et al, 1998).

Potential benefits of rehabilitation in a day hospital include access to the multidisciplinary team in a supportive environment. It may also provide some relief for carers but this may be offset by the extra work required in preparing someone for the arrival of the ambulance (Forster and Young, 1989). A systematic review and meta-analysis of 13 trials of day hospital care for patients with mixed conditions (including stroke) reported that attendance at a day hospital appeared to be more effective than no intervention but may have no clear advantage over other forms of "comprehensive" elderly medical services (Forster et al, 2001b). Comprehensive care included a range of inpatient, outpatient and domiciliary geriatric outpatient

services. For six of the eight trials reporting cost information, day hospital care was more expensive than alternative treatment. This cost-benefit information needs to be considered if new community rehabilitation services are being established.

Mobility problems are common for stroke patients at home. It has been demonstrated in a pragmatic cross-over trial that the provision of further physiotherapy late (over one year) after stroke has a small transient effect on gait speed (Wade et al, 1992). These findings have been confirmed by a recent pragmatic randomised trial undertaken in Bradford (Green et al, 2002). In this trial the treatment effect was slightly greater for the pre-randomisation sub-groups of patients who had fallen in the previous three months and for patients who had a greater initial mobility impairment, but in both studies the treatment effect was unsustainable.

Other smaller studies evaluating more intensive and longer duration interventions have demonstrated reduced disability for a similar patient group (Tangeman et al, 1990; Werner and Kessler 1996; Rodriguez et al, 1996), or for patients unable to walk at three months post-stroke (Dam et al, 1993). However, only one of these studies was a randomised trial (Werner and Kessler 1996) and most of the studies had other interventions in addition to physiotherapy (occupational therapy, group activities, and speech therapy). More focused training programmes have also been evaluated recently (Dean and Shepherd, 1997; Smith et al, 1999; Weiss et al, 2000) with suggestions of positive benefit, but the sample size in all the studies was small. Further work is required to more clearly delineate the effective components of a 'later' stage interventions which may encompass strength training (Weiss et al, 2000) and/or task specific exercises (Dean and Shepherd, 1997). Provision of a home-based exercise programme is feasible and not detrimental to patient outcomes (Baskett et al, 1999; Duncan et al, 1998). Treatment and research strategies appropriate to the severely disabled, including those in nursing homes have been minimally explored (See Gladman and Sackley, 1998 and Disability and Rehabilitation 2000, 22; 188-200 for a debate on this issue).

Despite the increasing research activity in this area, therefore, it is difficult to make evidence-based recommendations for appropriate longer-term physiotherapy provision for stroke patients. An appropriate service might involve careful selection of patients (for example, those at risk of falling or with a history of falling) who would benefit from regular reviews and further input of goal directed therapy within their own home rather than at an out-patient department or day hospital.

The NSF makes the important recommendation that rehabilitation should continue until maximum recovery has been achieved. This presents a considerable challenge to existing service provision, both in reassessing patients and in providing treatment. The patients should have access to the stroke care co-ordinator who can provide advice, reassessment and co-ordinate long-term support or specialist care. Any patient reporting a significant disability should be re-assessed and offered further targeted rehabilitation if this can help them to recover further function.

9.3 Interventions Addressing Longer Term Psychosocial Needs

The NSF recommends that social and emotional support be provided to minimise the loss of independence following the stroke, and help manage the consequences of stroke.

The NSF service model emphasises the importance of an integrated stroke service providing acute care, rehabilitation and longer-term support for patients and carers with access to appropriate services and strong community links with primary and community based professionals, housing departments and voluntary organisations.

Several non-physical therapy approaches have been developed in an attempt to address the longer-term needs of patients and carers. These interventions include social work (Christie and Weigall, 1984); family care workers (Dennis et al, 1997); family support organisers (Mant et al, 2000); and specialist nurses (Forster and Young, 1996) who aimed to provide continued information, advice and social support. Whilst such interventions may generally be thought to be a 'good thing', Dennis and colleagues (1997) reported that at final assessment patients in the treatment group were possibly more helpless, less well adjusted socially and more depressed than control group patients. These services appear to be appreciated by families, but few

positive outcomes are reported. These supportive approaches can reduce emotional stress for carers but not for patients (Mant, 2001). One explanation for the negative findings is that the intensity of many of the interventions might have been insufficient to produce a benefit. For example, the family support worker in the Edinburgh trial (Dennis et al, 1997) saw patients a median of three times in six months. Interventions should be designed that are theoretically sound and practically plausible. Theories of coping (Lazarus and Folkman, 1984), for instance, suggest that providing only support or information would not result in changes to patient or carer mood. Tackling internal resources to enhance individual coping skills might have greater potential to effect a mood change.

10.0 Conclusion

The NSF for Older People has focused the attention of health service planners on the needs of stroke patients and their families. This has been preceded by a decade of considerably increased research activity in which the evidence-base for stroke has developed rapidly. The National Clinical Guidelines for Stroke (Intercollegiate Working Party, 2000) is a benchmark of the progress made. Previously regarded in a nihilistic fashion, stroke is now being approached in a more dynamic and pro-active way.

It has been reliably established that organised stroke care, such as that typically provided in a stroke unit, reduces mortality and institutionalisation compared to care provided in a general medical ward. This robust evidence base is to be implemented nationally as every general hospital that cares for people with stroke must have a specialist stroke service in place by 2004 (and plans ready by 2002). Therapists have an important contribution to make in the provision of organised care including facilitating interdisciplinary working and promoting continued education and training programmes.

The co-ordinated multidisciplinary team has been identified as an important feature of post-stroke care, but the evidence for the effectiveness of individual components (nursing, therapy, and medical care) remains limited. However, progress is being made in developing this evidence base. For physiotherapy, there are emerging findings relating to treadmill training, muscle strengthening and focused interventions. Some interventions may only be appropriate for selected groups of patients. It is imperative that all physiotherapists have a good understanding of research to be able to critically appraise studies and be prepared to incorporate new knowledge into clinical practice. In this way appropriate strategies of treatment will be developed in parallel with emerging research.

There is now considerable evidence to suggest that stroke sufferers require a longer period of support and contact than the few months currently provided by hospital departments. A greater recognition of the long-term consequences of stroke and the development of systems to focus attention upon them, would be a major cultural breakthrough for the future. The NSF recommendation that rehabilitation should continue until maximum recovery has been achieved is a step forward. All physiotherapists in contact with patients and carers need to be aware of the longer-term consequences and contribute to addressing the families' needs so that they feel supported at all stages of their care pathway. Advice about exercise programmes could be provided, and provision of information needs to be appropriate, accurate and timely.

Physiotherapists have a fundamental role to play in the successful implementation of the NSF. It is vital that physiotherapists seize the opportunities now offered to enhance the well being of all stroke patients and their families.

11.0 Important Resources

Copies of the National Clinical Guidelines for Stroke are available from the Royal College of Physicians' (London) Publications Department: 020 7935 1174 and cost £22 or visit the website: www.rcplondon.ac.uk/pubs/books/stroke/index.htm
This site also provides access to those sections updated in February 2002 (Intercollegiate Working Party, 2002).

Details of the Royal College of Physicians stroke programme of work, including the national audits can be found at:

www.rcplondon.ac.uk/college/ceeu/ceeu_stroke_home.htm

A physiotherapy summary leaflet of the Guidelines is expected to be published in Spring 2002.

The Royal College of Physicians of Edinburgh have organised two Consensus Conferences on stroke care. The first in 1998 reviewed the Medical Management of Stroke, the second in November 2000 reviewed the Stroke Treatment and Service Delivery. The Consensus Statements are available on:

www.rcpe.ac.uk/esd/consensus/stroke_98.html

www.rcpe.ac.uk/esd/consensus/stroke_2000.html

The Scottish Intercollegiate Guideline Network's (SIGN) clinical guideline on 'Management of patients with stroke; rehabilitation, prevention and management of complications, and discharge planning' is to be published shortly. SIGN Executive, Royal College of Physicians, 9 Queen Street, Edinburgh EH2 1JQ

www.sign.ac.uk

12.0 Useful Organisations and Websites

Age Concern

www.ageconcern.org.uk/

Age Concern England Astral House 1268 London Road London SW16 4ERTel: 020 8765 7200 Age Concern Scotland 113 Rose Street Edinburgh EH2 3DT Tel: 0131 220 3345

Age Concern Cymru (Wales) 4th Floor, 1 Cathedral Road, Cardiff CF11 9SDTel: 029 2037 1566 Age Concern Northern Ireland 3 Lower Crescent Belfast BT7 1NR Tel: 028 9024 5729

American Stroke Association

www.strokeassociation.org

Association of Chartered Physiotherapists in Neurology (ACPIN)

www.acpin.net/

Chartered Physiotherapists Working With Older People: AGILE

www.agile-uk.org/

Cochrane Stroke Group

www.dcn.ed.ac.uk/csrg/

Department of Clinical Neurosciences
Western General Hospitals NHS Trust

Crewe Road

Edinburgh

EH4 2XU

Phone: +44 131 537 2273

Fax: +44 131 332 5150

Email: csrg@skull.dcn.ed.ac.uk

Department of Health Social Care Policy Branch 5

www.doh.gov.uk/scg/bran5.htm

Advises Government on policies to do with adult social care services in general and social care for older people specifically.

Different Strokes

www.differentstrokes.co.uk

Head Office
162, High Street
Watford
Hertfordshire
WD1 2EG

Help the Aged

www.helptheaged.org.uk/

Head Office: 207-221 Pentonville Road London N1 9UZ Tel: 020 7278 1114 Fax: 020 7278 1116 Scotland: Heriot House Heriothill Terrace Edinburgh EH7 4DY Tel: 0131 556 4666 Fax: 0131 557 5115

Wales Office: Room 123 CSV House Williams Way Cardiff CF10 5DY Tel: 02920 415 711 Fax: 02920 415 700

Northern Ireland: Ascot House 24-30 Shaftesbury Square Belfast BT2 7DB Tel: 02890 230 666 Fax: 02890 248 183

National Service Framework for Older People: Department for Health England

NSF for Older People Implementation Team

Department of Health

133-155 Waterloo Road

London SE1 8UG

Telephone: 020 7972 3000

Fax: 020 7972 4863

Email: nsf-for-older-people@doh.gsi.gov.uk

Main website:

www.doh.gov.uk/nsf/olderpeople.htm

Standard six good practice examples - Stroke:

www.doh.gov.uk/nsf/olderstroke.htm

The single assessment process - key implications for therapists: www.doh.gov.uk/scg/sap/therapists.htm

New Zealand Clearing House for Health Outcomes and Health Technology Assessment

nzhta.chmeds.ac.nz/stroke.htm

Weir RP. (1999) Rehabilitation of cerebrovascular disorder (stroke): early discharge and support. A critical review of the literature. Volume 2 Number 1

Northern Ireland Multidisciplinary Association for Stroke Teams

stroke.cwc.net

Stroke Association

www.stroke.org.uk
Head Office
Stroke House,
123 Whitecross Street,
London, EC1Y 8JJ.
Tel: 020 7566 0300

Stroke Therapy Evaluation Programme (STEP)

www.dcn.ed.ac.uk/step
Academic Section of Geriatric medicine
3rd Floor, Centre block
Glasgow Royal Infirmary
Glasgow
G4 OSF

The National Stroke Foundation (Australia)

www.strokefoundation.com.au/

[All websites correct and operating at time of publication]

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