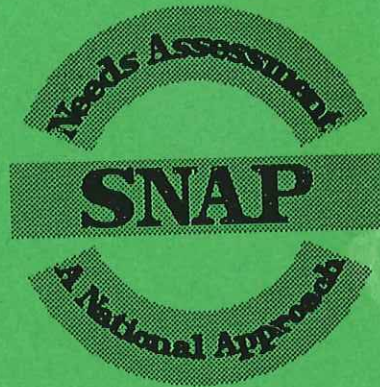


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Scottish Needs Assessment Programme



Acute Stroke

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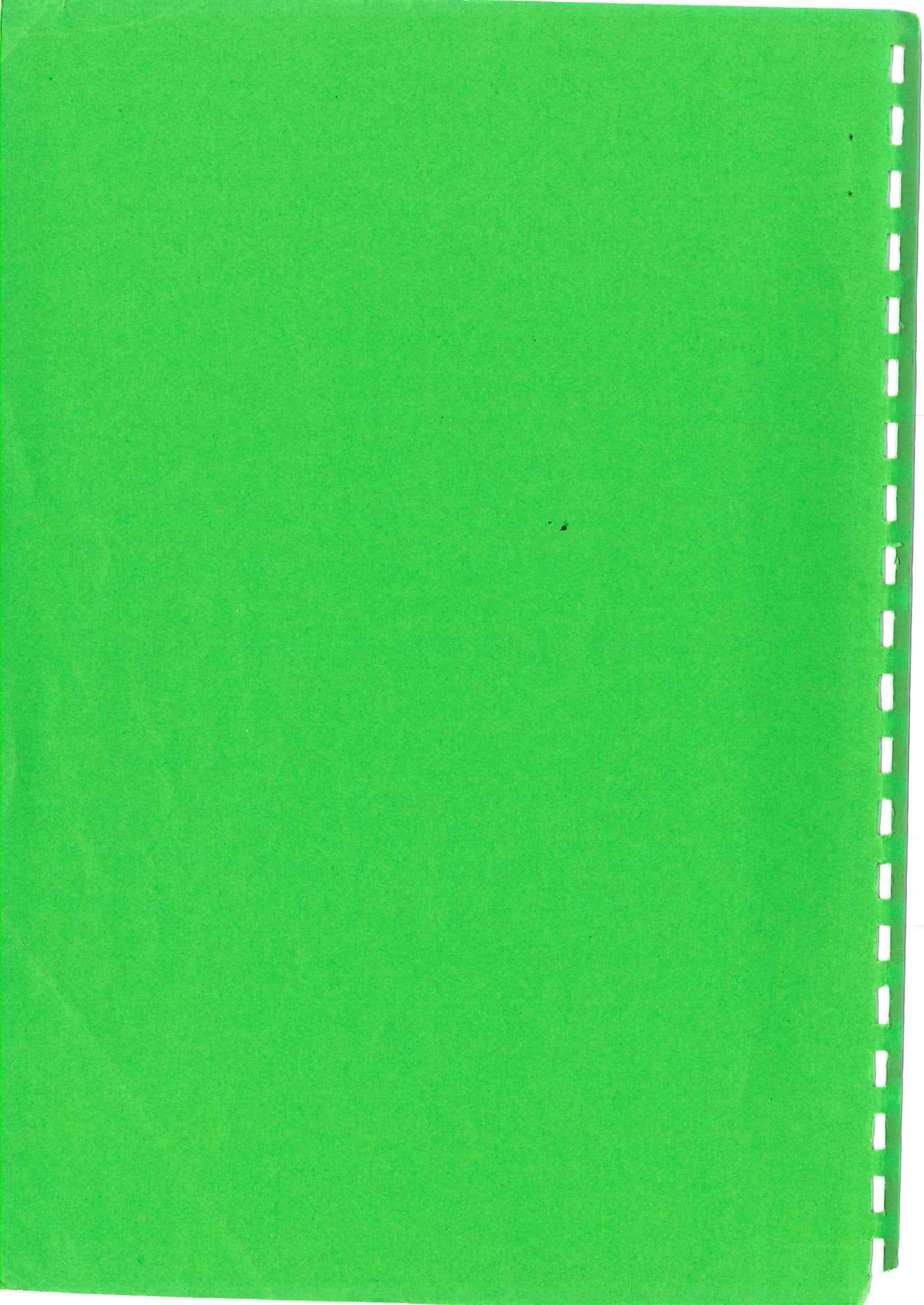
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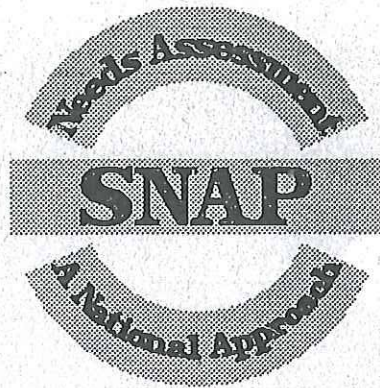


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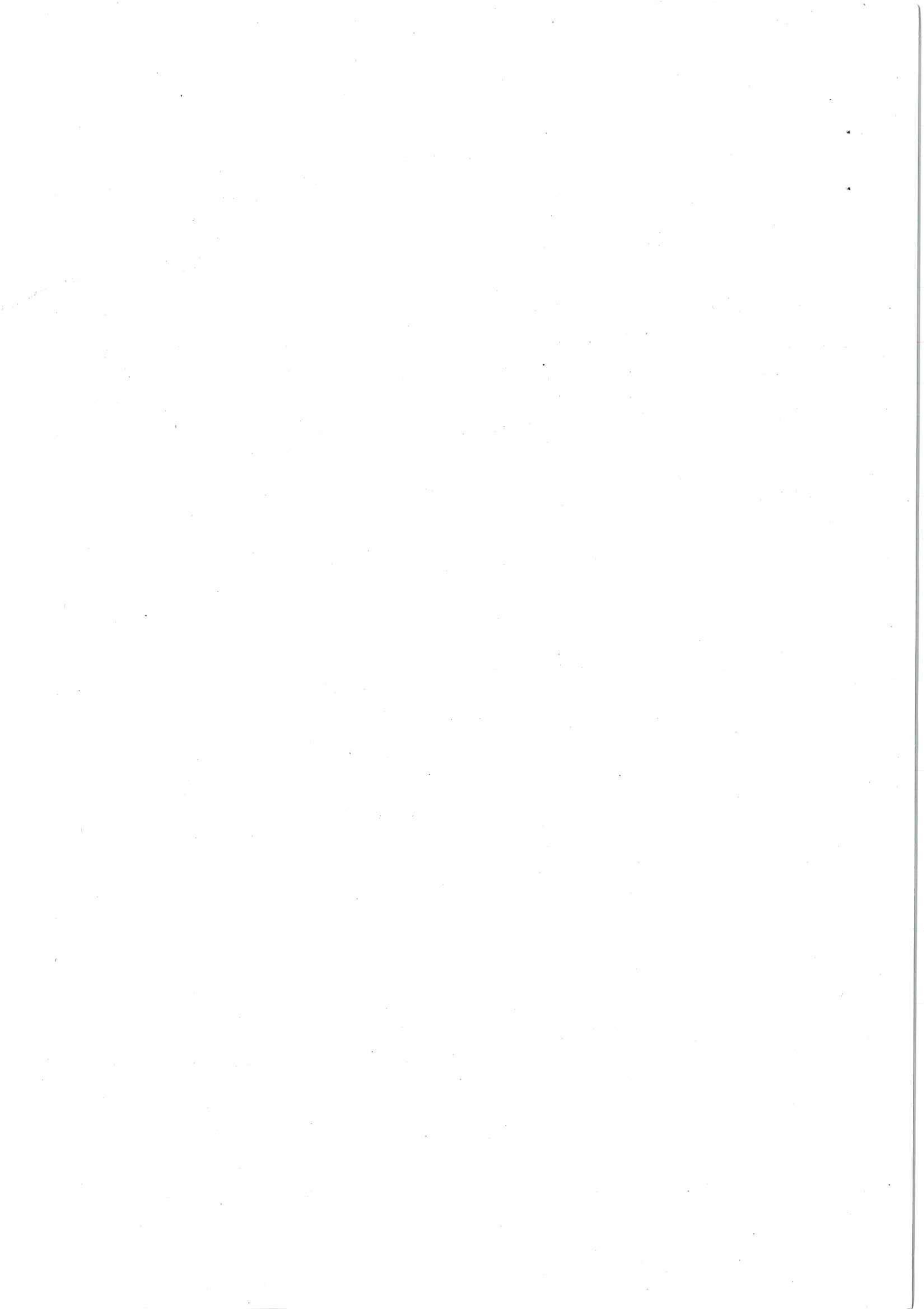
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Scottish Needs Assessment Programme

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This report very much depended on the advice given by the many clinicians, staff and carers who look after patients with stroke who are listed in the appendix on consultation. We are grateful for their support, time, patience and provision of relevant literature on stroke. If we have failed to name all we do apologise. Information and Statistics Division at Trinity Park House were invaluable for the statistical analysis and ad hoc data and we would like to thank Dr John Clarke and Adam Redpath and especially the record linkage team, most notably Dr Steve Kendrick and Bruce Whyte. We are very grateful to have the contribution from Dr John Forbes and Kathy McGregor for chapter 9. In our own Health Boards the respective library, information and secretarial staff were supportive, particularly Mrs Evelyn Thomas of Lanarkshire Health Board who undertook the collation and incorporation of editorial points to produce the final report. Lastly, we would like to thank our respective CAMOs and General Managers for facilitating the time to undertake this project and Susie Stewart and her staff for publishing the report. Further copies of the report may be obtained from Ms Jackie Gegan, Scottish Needs Assessment Programme, 69 Oakfield Avenue, Glasgow G12 8QQ.

SNAP Reports currently available

Total Elective Hip and Knee Replacement - a comparative assessment
Cataract Surgery
Congenital Dislocation of the Hip
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Increasing Choice in Maternity Care in Scotland - Issues for Purchasers and Providers
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Improving Gynaecological Services Within Existing Resources - A Programme
Budgeting and Marginal Analysis Approach
Cancer Care in Glasgow - A Model for Regional Cancer Care in Scotland
Inpatient Resources for Communicable Disease in Scotland
Dental Caries in Children
Oral Cancer
Addictions - Overview and Summary
 - Alcohol Misuse
 - Tobacco
 - Problem Drug Use

SNAP Reports due to be published shortly

Teenage Pregnancy in Scotland
Accidents in Scotland
Cardiac Disease
Mental Health

INTRODUCTORY NOTE

The Importance of Stroke

Stroke could be said to be a condition that has eventually come into a period where it should get the attention it deserves. It is a major cause of death and not only in the elderly for a quarter of cases occur before the age of 65. More importantly, it is a cause of significant morbidity in the community for the survivors and their carers. It has been neglected in the past and is possibly the most expensive single disease entity requiring care in the National Health Service with a conservative estimated cost of £124 million in Scotland for inpatient care alone in 1992.

Advances for Stroke Care in Scotland

Recent advances in imaging have demonstrated that stroke is not a single condition and this is important in the management of stroke patients. Scotland has led the way with the early appointment of two stroke physicians and it is known that there is active collaboration throughout Scotland between clinicians and other professional staff, especially paramedical, and funding from the stroke charities, especially Stroke Chest and Heart Scotland, and we believe that this is an example of the collaboration which is required for this group of patients.

Care of Stroke Patients

To undertake this needs assessment we saw and examined much evidence that demonstrated that organised stroke care and services can improve the outcome for patients with stroke. Awareness of what can be done for stroke patients is the key and this was obvious in units where organised stroke services were running successfully. This was not necessarily expensive and in many instances a question of organising available resources in a focused manner and auditing the care provided.

Prevention of Stroke

The other key issue is that evidence from major clinical trials shows that prevention of stroke following transient ischaemic attacks or after a first stroke is now a distinct possibility for most patients. Accurate diagnosis of the type of stroke is necessary through CT scanning and fortunately the majority of strokes are of the thrombotic type which is amenable to prevention. Long term low doses of aspirin are sufficient for most cases but a small number of patients will require surgery to the damaged arteries in the neck that supply the brain. Carotid endarterectomy has now been shown to be of benefit in selected cases. This needs assessment has not addressed this issue in detail and we believe it requires a needs assessment on its own in the immediate future to avoid inappropriate supply of this procedure.

Longer Term Needs

Much of the attention on stroke in recent years and in this needs assessment has focused on the first six months, or up to a year, of care. We believe this to be correct as it acts as a focus for stroke care as a whole but we are aware, in our consultation period, of the largely unmet needs of the long term survivors with significant disability and the stress that this brings to them and their carers. Some primary care aspects are covered in the report but no specific recommendations are made as this was outwith the present remit.

Stroke and Disability

It is important to stress that the focus of this report has a very strong hospital bias which is deliberate - hence its title Acute Stroke. Management of stroke patients and their carers in the community is equally important and this area deserves a separate dedicated report with the focus very much on primary care. It must also be recognised, however, that after the acute or early phase, the needs that require to be addressed relate more to the residual handicap or disability rather than the stroke itself. The issue then becomes the broader one of managing disability (from a variety of causes) in the community.

Stroke and Purchasing

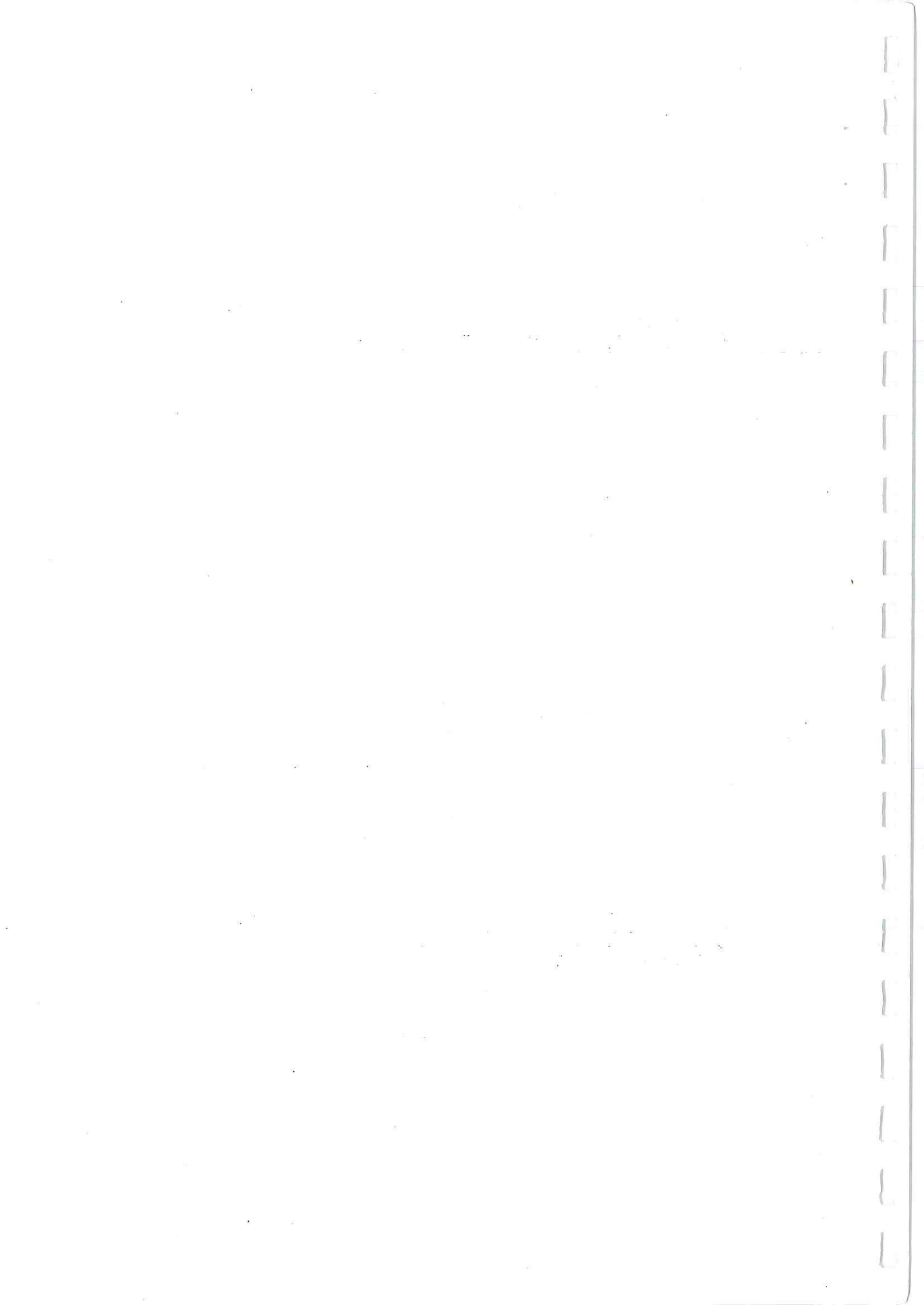
This report has carefully evaluated the literature and drew on the English Needs Assessment by Dr Derek Wade and the Scottish Clinical Advisory Group's Report on Stroke under the chairmanship of Professor Warlow. We have tried to make the many issues comprehensive to purchasers and providers. The simple model modified from Dr Wade's report is what we believe Health Boards should use to consider the range of services to be provided for stroke patients. The Executive Edition which accompanies this is intended as a synopsis of the full report.

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cerebrovascular disease which is the correct description for the group of conditions described. Stroke is the term generally used and understood by lay people and most working in the health service not primarily involved in diagnosis. This needs assessment is looking at diseases of the arteries of the brain even if, in certain instances, some of the origin of the pathology occurs before the circulation enters the brain.

2.5 The other main reason for using this convention is that the International Classification of Diseases is inadequate for separating true strokes (the majority) from the other conditions and for epidemiological and statistical monitoring purposes the full grouping is conventionally used. Modern brain imaging has done much to differentiate this group of conditions but because it is not universally available, the grouping remains essential for stroke work even if mainly describing the "classic" stroke. Where relevant this report will refer separately to an individual type of stroke, especially if the clinical needs are different. The term "acute" will not be used to prefix stroke unless relevant but used for the acute phase of stroke management.

2.6 Type of Needs Assessment

Needs assessment methodology is an evolving process based on experience and very much determined by the topic under study. It is further modified if it is a single or multiple group of conditions and that information is available to frame the needs assessment in terms of service provision. Each project is unique and must be so although the methodology will improve with experience. For stroke there are definitional problems for it is a heterogeneous group of conditions although with many aetiological features in common and, apart from subarachnoid haemorrhage, similar clinical requirements.

2.7 Standard epidemiological and comparative methods have been used for this report although we accept that there is a significant group of stroke patients that do not interface with the hospital services where the principal statistical enumeration occurs. Some adjustment has been made for this and in keeping with the most recent SNAP reports a formal consultation process was undertaken and a more extensive economic appraisal included.

2.8 Consultation in Needs Assessment

Consultation is an essential part of needs assessment, especially when there is insufficient epidemiological evidence in terms of numbers with the condition or knowledge of their ability to benefit from treatment and this can be assessed from clinical experience. This was relevant for stroke and, in addition, the views of patients with stroke and their carers are important because of the nature of the condition and the frequent long term impairments. For this the voluntary agencies were consulted as proxy as they have long and active experience in funding research and supporting services. Their money is raised from voluntary contributions and their work is influenced by patients' experience and expert clinical advice. The list of those consulted is included in Appendix 1.

2.9 Objectives of Needs Assessment

The primary objective of the SNAP needs assessment reports in general and this report on stroke in particular, is to provide a comprehensive but manageable synthesis of information and solutions for health services managers. Needs assessment is now central to the planning and purchasing of health services. The public health perspective facilitates these objectives with its ability to bridge the purchaser, provider and population aspects of needs assessment.

2 PREFACE

2.1 Scottish Needs Assessment Project

The Scottish Needs Assessment Programme (SNAP) was established by the Scottish Forum for Public Health Medicine in early 1992 with six networks - acute services, priority services, women's health, child health, health promotion and communicable disease/environmental health. A seventh network - information advisory - provides advice on information and data systems and availability across the programme. SNAP started as a self-help initiative by Public Health Medicine with the central aim of encouraging co-operation and sharing of work in needs assessment in Scottish Health Boards. The networks have the ability to consult widely and using research and needs assessment methodologies achieve a national perspective of needs for the specific priority topic. This may take the form of a consensus or a range of options to act as guidance for health service provision in the Boards.

2.2 Priorities for Needs Assessment

The Acute Services Network agreed that the acute care aspects of stroke mainly affecting hospital provision would be a priority project for 1993/4 because:

- a) It is a major cause of mortality and even more so for morbidity, possibly incurring the highest costs to the health service for a single clinical entity.
- b) Stroke has been recommended as a target for action in health authorities through the monitoring of death rates.
- c) Mortality from stroke is falling but this may not be reflected in incidence.
- d) There are variations in death rates that need to be examined.
- e) There are few organised services for stroke patients who are often blamed for bed blocking in acute specialties.
- f) There is scope for prevention of stroke, especially subsequent strokes.
- g) The technological advances for the diagnosis and management of stroke need to be considered by purchasers.
- h) The longer term care of strokes, especially in the community, must be explored.

2.3 Stroke as a Subject for Review

Since the King's Fund Consensus on the treatment of stroke¹ in 1988 this long neglected condition has come to the forefront of clinical and governmental attention as a priority for improved care. In this short time there have been some remarkable improvements in the possibilities for the management of stroke, with every reason to expect yet further developments. There is now extensive research on this topic with a rapidly expanding literature.

2.4 Need for Definition of Stroke

Definition of Stroke will be discussed in more detail in chapter 4 but this report will use the term stroke not cerebrovascular accident nor, more accurately,

3.7 Computer tomography (CT) scanning is a valuable aid to the investigation of patients with acute stroke. CT scanning has become a central element of the modern management of stroke and most patients presenting with stroke would benefit from a CT scan. If CT scanning resources are limited, the King's Fund Consensus Statement on stroke indications for CT scanning should be adopted.

3.8 The effectiveness of stroke rehabilitation (Physiotherapy, Occupational Therapy and Speech Therapy) from published trials does seem to indicate that rehabilitation is effective. The quality of evidence is not high and more research in this area is needed.

3.9 Purchasers of services for stroke must take the needs of the carers into account, especially in the provision of respite care. The voluntary organisations play a significant role in helping with carers. Their talents and resources should be augmented by a joint project with the health service.

3.10 The prevention of stroke is a good example of how risk factors interact and hence the need to have a non disease specific, multiple risk factor prevention strategy for health promotion. If this is augmented with opportunistic screening in primary care for specific risk factors and their effective management, especially for hypertension, prevention of stroke can be an effective approach for health gain.

3.11 Until the last few years, stroke care has been a neglected area. The subject is now firmly on the agenda, however, especially since the publication of the King's Fund Consensus Statement on Stroke. A document for stroke care by the Scottish Health Services Advisory Council has just been published. The key message from recent research findings is the fact that *organised* stroke care can save lives, increase health gain and reduce the requirement for hospital care. Organised stroke care is being provided by the few pioneering Stroke Units. Despite the grandiose title of these units, their set up and running costs are marginal. *Purchasing organised stroke care will be highly cost effective.*

3.12 Economic analysis demonstrates the high cost of stroke and will become more important for determining any health gain from organised stroke services and prevention strategies.

3 SUMMARY

3.1 Stroke is a term used confusingly and inconsistently because of differences in definition criteria. In this report stroke is inclusive of all vascular causes of cerebrovascular disease which includes Subarachnoid Haemorrhage and Transient Ischaemic Attacks (TIAs). Stroke is not, therefore, a single disease entity. The classification and distinction of different types of stroke are fundamental to the modern management of stroke.

3.2 Scotland has the second highest death rate for stroke in Western Europe. There are large differences in the death rates within Scotland and between countries. There were 7861 deaths from stroke in Scotland in 1992. There has been a steady decline in the age-adjusted mortality from stroke since the 1950s. The female/male stroke death ratio is 1.7.

3.3 Record linkage can provide useful estimates of incidence and prevalence of stroke. In 1992 the number of new cases of stroke in Scotland was 15 250 and the total number of people alive with history of stroke for Scotland was 53 748. The prevalence : inpatient discharge episode ratio is 0.55 which indicates that the demand for health care outside hospital is high relative to inpatient care.

3.4 The cost of stroke is high. The indirect cost of stroke represents 70 000 life years lost for Scotland at an estimated £49 million loss of gross productive earnings and "£1.3 billion loss in value of life". The direct cost of stroke is equivalent to £23 per head of Scottish population per year, 7.9% of total Scottish hospital cost or 4.9% of overall Scottish health budget. The direct cost per case of stroke is in the region of £8198. The cost information for stroke is crude. Cost per case contract in the short term should be avoided.

3.5 There is strong evidence which indicates that *organised stroke care* can save lives, increase health gains and reduce the requirement for hospital care. This is by far the most important advance in stroke care. Dedicated stroke units in all district general hospitals is the way forward. This change can be achieved in an evolutionary manner by using existing facilities.

3.6 The Stroke Service Matrix, as shown below, is a useful method of mapping out systematically the service provision and contract specification of stroke care.

Stroke Service Matrix

TIME	PATHOLOGY		DISABILITY		Support for carers
	Diagnosis	Treatment	Diagnosis	Treatment	
Prevention					
Early Phase 0-7 Days					
Recovery Phase 1-26 Weeks					
Long Term 27+ Weeks					

4 WHAT IS A STROKE?

4.1 Introduction

One of the main reasons for failure to develop a treatment for stroke is that it has been generally seen as a single clinical entity with varying clinical signs according to the site of the "stroke". It is in fact a heterogeneous entity and modern diagnostic techniques, especially CT scanning, have made diagnostic classification possible. This is leading to the possibilities of specific treatment. The need for definition of sub-groups is not only important clinically but also for interpreting epidemiological data.

4.2 Definition of Stroke

The World Health Organisation's definition of stroke is the most generally accepted: "a clinical syndrome consisting of rapidly developed clinical signs of focal (or global) disturbance of cerebral function, lasting more than 24 hours or leading to death with no apparent cause other than vascular origin"². "Global" is applied to patients in deep coma³. This definition includes subarachnoid haemorrhage and excludes transient ischaemic attacks. Subarachnoid haemorrhage, although vascular in origin, is a distinct clinical entity with very different treatment.

4.3 Transient Ischaemic Attack (TIA)

This is a stroke-like episode of similar aetiology which resolves itself completely within 24 hours. The transient nature often makes diagnosis difficult but these episodes have a high recurrence rate. Some short-lived strokes resolve quickly leaving no residual symptoms but brain imaging will demonstrate evidence of cerebral damage. In practice, the 24 hour limit separating stroke from TIAs is entirely arbitrary and little separates the management of TIAs and minor ischaemic strokes. In this report transient ischaemic attacks will be discussed in relation to stroke prevention and investigation rather than as a separate entity.

4.4 Subarachnoid Haemorrhage (SAH) and other conditions

SAH is the most important of other conditions and occurs when there is a rupture in an arterial or "berry" aneurysm of the external arteries at the base of the brain with blood leaking into the space (subarachnoid) between the layers of membranes covering the brain. The aetiology, epidemiology and management of these conditions are quite distinct and separate from stroke but historically have always been included in the statistical monitoring of stroke or more accurately cerebrovascular disease (see below). The rarer conditions including subdural haemorrhage will not be discussed in this report.

4.5 Clinical Features of Stroke

Stroke is largely a disease of the elderly but can occur at any age. Diagnosis of stroke is a clinical process⁴ and much will depend on the type of pathology which is either infarction, because of thromboembolism, or haemorrhage and the site of the abnormality, in particular the area of the brain damage. The differential diagnosis of stroke is not usually difficult although about 5% of patients with a clinical "stroke" will have another pathology - for example, brain tumour.

4.6 Strokes and TIAs can have any of the following clinical features:

- Loss of power on one side (hemiplegia) of either arm, hand, leg or face in isolation or in various combinations - the classical stroke
- Numbness or paraesthesia and rarely pain in a similar anatomical distribution
- Problems with language or slurred speech
- Problems of spatial orientation
- Visual disturbance or loss
- Other symptoms encountered are headache, diplopia, vertigo, nausea, vomiting, deafness, tinnitus, dysphagia, ataxia, amnesia and bilateral motor defect or bilateral sensory defect
- For SAH, the clinical features are the sudden onset of severe headache often leading to coma, rarely with any focal sign.

4.7 The onset of symptoms is usually rapid or during sleep although there can be a subacute progression in a step-like fashion over a few hours or even days. In severe stroke consciousness is usually impaired. The most important complication is cerebral oedema, or swelling of the brain, which is the main cause of mortality in the first week. For the stroke patient the constraints of the above impairments and cardiac complications because of associated systemic vascular disease are major burdens and a cause of distress.

4.8 Outcome of Stroke

The outcome of stroke will be discussed in detail in chapter 5. Recovery to some extent is the rule after stroke unless the infarct or haemorrhage has been severe enough to cause death in the first two days.

4.9 There may be marked changes in disability over the first week, with up to 25% of patients deteriorating and another 25% improving. Accurate prediction of clinical outcome in individual patients is usually very difficult in the early stages.

4.10 Statistical Classification of Stroke

The International Classification of Diseases (ICD) is used throughout the world to classify medical conditions both in terms of mortality and morbidity⁵. There are rules for its use in death certification and hospital record summaries which are not always applied causing problems of reliability. The ICD is, however, well established and accepted for government and epidemiological statistical purposes. even if it is not entirely satisfactory for stroke coding (see below). The Tenth Revision, Read Coding and Health Service Resource Groups HRGs (which is a UK development of DRGs) offer possible improvements in the future for these purposes but clinicians require additional classification systems for clinical and research purposes.

may represent a biased group⁸. When they return to the community there is evidence⁹ of significant stress for them and their carers with some deterioration in functioning after one year.

4.15 Potential Benefits from Classifying Strokes

The classification of stroke is, therefore, more than just an academic exercise. It has the following potential benefits:

- More accurate prediction of prognosis.
- Identification and modification of underlying pathophysiological processes to reduce acute damage and risk of recurrent stroke.
- Identification of different treatment for each type of stroke.
- Ability to plan immediate supportive care and long term rehabilitation programme.
- Ability to put results of clinical trials into the context of individual physician's practice.
- Enabling acute intervention of trials to be done with the best chance of demonstrating benefit if present.
- The development of more sensitive measures of case-mix for comparative audit and contracting purposes.

RECOMMENDATION 1

4.16

KEY POINTS

- Stroke is a heterogeneous group of diseases. CT scanning is now permitting accurate diagnosis which is the key for modern management of stroke.
- Definition of stroke is fraught with confusion and inconsistency. The WHO definition includes subararoid haemorrhage but excludes TIA. The distinction of TIA and "mild" stroke is difficult and probably unnecessary for their management and the purchasing of their service needs.
- The definition of stroke adopted by this report is a practical one which includes all vascular causes of stroke (TIA inclusive).
- 5% of patients with "clinical" stroke have non vascular causes such as tumours.
- 20% of patients die in the first month, 30% by the end of the first year.
- In the first week 25% of the patients recover from their disability, 25% deteriorate.
- The Wade Matrix, with modification, is a useful way of mapping out services for stroke.

5 EPIDEMIOLOGY OF STROKE

5.1 Introduction

There are few incidence and prevalence studies in the world literature for Stroke, and much of the epidemiology is, therefore, derived from mortality and clinical studies. The Oxford Community Stroke Project (OCSP)²⁰ is the principal study in the United Kingdom but its rate may not be applicable to Scotland because of known higher overall mortality in the main forms of vascular disease north of the border.

5.2 Difficulties in diagnosis of Stroke

Stroke is frequently misdiagnosed in the community¹⁰. Norris and Hatchinski¹¹ found that up to 13% of patients admitted to an acute stroke unit in Canada had been misdiagnosed and this was particularly common in the elderly. In the Oxford Community Stroke Project, of 736 individuals referred as having suffered a possible stroke, 132 did not have clinical evidence of stroke¹².

5.3 Mortality Data

Statistical analysis of mortality data is always undertaken using underlying cause of death. In Scotland Salmond¹³ demonstrated that there is a significant proportion of stroke recorded in the supplementary part of the death certificate and this may over-estimate the apparent fall in mortality and explain some of the variations between geographical areas (see below). The overall quality of death certification needs improvement and its use must be treated with caution.

5.4 International Comparisons

Stroke is the third most common cause of death in most developed countries¹⁰. Scotland has the second highest death rate for cerebrovascular disease in people aged 15 - 64 years in Western Europe, second only to Portugal².

5.5 Mortality Trends

There has been a substantial decrease in mortality from stroke in the last 30 years in most countries where data have been available¹⁴. Scotland also showed an average annual decline in age-adjusted mortality from stroke of 4.0 per 100 000 for men and 5.5 per 100 000 for women between 1950 and 1986¹⁵.

5.6 Regional Variations within Scotland and the United Kingdom

There are regional variations to stroke mortality, with age-adjusted mortality being highest in the north and west of Britain¹⁶. Within Scotland, age-adjusted mortality rates were highest in West and Central Scotland and lowest in the East for all 13 years from 1974 - 1986¹⁵. Carstairs and Morris¹⁷ found a correlation of 0.65 between deprivation and cerebrovascular disease for ages 0 - 64, but not for older age groups. These findings suggest that estimates of population incidence and prevalence drawn from other populations may not be generally applicable to the Scottish population.

5.7 Ethnic Differences in Stroke Mortality

There are ethnic differences in stroke mortality in England and Wales. Mortality from stroke between 1979 and 1983 was highest in Caribbean, African, Indian and

Irish immigrant groups. Men from the Indian subcontinent showed the lowest rate of decline in incidence¹⁸.

5.8 Incidence of Stroke

Mortality statistics provide limited information on the incidence of stroke because of differences in diagnosis and classification, reporting rates, case ascertainment and whether they refer to first ever stroke¹⁰. Few studies overcome these problems and so the information on stroke incidence is provided by a limited number of studies¹⁹.

5.9 Age-specific incidence of first ever stroke varied in different areas, but the Oxford Community Stroke Project is consistent with most²⁰. It found a sharp increase in the incidence of stroke with increasing age, rising from 57 per 100 000 per year for both sexes at 45-54 years, to 199 in those aged 85 and over. Age-specific incidence rates were higher for men than women in all age groups except in those aged 85 years and over, where women had a slightly higher incidence.

5.10 The incidence of both acute and recurrent stroke is 15 - 30% higher than that for first ever stroke given above⁷. The incidence of transient ischaemic attacks is about 42/100 000 per year²¹.

5.11 Subarachnoid Haemorrhage

Subarachnoid haemorrhage is more difficult to study because of its comparative rarity. It constitutes between 3% and 5% of all cerebrovascular events⁷. The incidence of subarachnoid haemorrhage is about 9 - 14/100 000 population per year, and rises with age²². Women have a slightly higher rate than men, except in the 15-34 year age group.

5.12 Natural History of Stroke

Studies of the natural history of stroke are dependent upon identifying community cases which are not admitted to hospital. Intracerebral haemorrhage (excluding subarachnoid haemorrhage) is responsible for 10% - 11% of all strokes and the remainder by cerebral infarction²⁰. The most common complications of stroke in the first week are caused by cerebral oedema²³.

5.13 One month case-fatality from first ever stroke is between 17% and 34% with an average of about 24%²⁴. For specific lesions - for example, supratentorial haemorrhage - the one month case-fatality can be considerably higher²³. One year mortality rates are about 31% for all strokes, including those not admitted to hospital²⁵. Mortality is higher in those admitted to hospital, with about 50% dying by one year⁷.

5.14 Compared to the general population of the same age and gender structure, stroke survivors have significantly poorer survival at all lengths of follow-up. Much of this is explained by the early case-fatality rate²⁴ but survivors continue to have an increased risk of death compared to the general population²⁶. The most common cause of death after the first year is non-stroke cardiovascular disease - for example, myocardial infarction.

5.15 There are few useful epidemiological studies allowing examination of changes in case-fatality over time. In the Soderhamn study, three-year survival improved by 15.4% in men, and 5.5% for women between 1975-8 and 1983-7, despite no improvement in one-month case fatality²⁷. These changes seem likely to reflect improvements in treatment of respiratory and cardiac disorders in survivors, rather than improvement in acute care for stroke²⁸.

5.16 Natural History of Transient Ischaemic Attack

There is an 11.6% risk of stroke in the first year after a transient ischaemic attack and about 5% a year in subsequent years. The major causes of death in the group of individuals who have suffered a transient ischaemic attack are cardiac disease and stroke²⁹.

5.17 Natural History of Subarachnoid Haemorrhage

About 15% of people with a subarachnoid haemorrhage die before reaching hospital, and a further 20% within 48 hours of onset³⁰. The Oxford project found a case-fatality of 46% by 30 days and 48% at one year²⁵.

5.18 Post-Stroke Morbidity

Interpretation of studies on the prevalence of disability after stroke is difficult because some stroke victims have pre-existing disabilities. At six months, between 60% and 70% of survivors of first ever stroke are likely to live at home and about two-thirds of these will consider themselves independent²⁵. Findings are conflicting, with some studies finding considerably higher rates of disability. This may reflect differences in case-finding and definitions, as well as differences between communities. There is some suggestion that the severity of completed stroke may have decreased in some populations over time, but this remains unclear³¹.

5.19 Specific Disabilities after Stroke

Specific post-stroke disabilities include persistent aphasia and dementia³². Although some workers disagree³³, the bulk of the available evidence also points to substantial psychiatric morbidity among survivors of stroke³⁴ with depressed mood being associated with loss of independence and increased subsequent mortality³⁵.

5.20 Post-Stroke Survival

A life-table analysis published in 1969 suggested that half of the stroke victims who were chair or bed bound survived for a year after onset, while in those who were dependent on others and could walk only with assistance, 50% survived for almost three years³⁶. The OCSF, in a six and a half year follow-up of people with first-ever stroke, found an average annual risk of death of 9.1% a year after the first month²⁶.

Because of these survival rates, stroke survivors as a group will make a significant impact on social and health care services¹⁰.

5.21 CLASSIFICATION OF RISK FACTORS FOR STROKE

For stroke, like coronary heart disease, a number of risk factors can be identified. The vast majority of patients presenting with a stroke will have more than one of these known risk factors and will be at risk for other vascular diseases. Marmot and Poulter³⁷ divided these into the following five groups which summarises the risk factors for stroke:

- a) Inherent biological traits - such as age, sex and race that cannot themselves be altered.
- b) Physiological characteristics that predict occurrence of stroke - blood pressure, serum cholesterol concentration, fibrinogen, weight/height, blood sugar.
- c) Behavioural - diet including salt intake, smoking, alcohol, oral contraceptive use, because they link with the above and other mechanisms.
- d) Social characteristics - the effect of social class and ethnicity resulting in differences in incidence whether due to the above risk factors, genetics or social and cultural factors as yet unidentified.
- e) Environmental factors - largely physical (for example, temperature) although psychological and biological factors may have an influence.

Of practical importance is the combined risk of increasing age with other risk factors, most notably hypertension, smoking and atrial fibrillation³⁸.

5.22 These risk factors apply to all cerebrovascular disease including subarachnoid haemorrhage and, apart from blood pressure which is common to all, the effects of the other risk factors varies between type of stroke, TIA and SAH. Most of the literature concerning stroke prevention restricts itself to the risk factors of blood pressure, smoking, obesity/diet, alcohol, but stresses the multifactorial and interdependent nature of these risk factors and in particular the effect of other intercurrent diseases such as generalised vascular disease and diabetes.

5.23 Hypertension and Stroke

High blood pressure is the major risk factor for stroke and this finding is consistent in both sexes and in different races. Although a raised diastolic pressure is considered the greater risk, high systolic pressure is of equal interest especially in the elderly. The Multiple Risk Factor Intervention Trial (MRFIT) confirmed that blood pressure is the most important risk factor for stroke and that 40% of strokes can be attributed to a systolic blood pressure of more than 140mm Hg. Salt intake is associated with hypertension and results of trials to date indicate simple restriction of intake reduces blood pressure. It has been postulated this could result in 26% fewer strokes in the United Kingdom.

5.24 Cigarette Smoking

Smoking is an important risk factor for stroke. Later work from the Framingham study has found that smoking is significantly related to stroke, even when hypertension and age are taken into account⁴¹. The risk increases with the number of cigarettes smoked. In ex-smokers, the risk has decreased significantly two years after stopping and is similar to that of non-smokers five years after stopping. Overall, the strength of the association between smoking and stroke is similar to that between smoking and coronary heart disease³⁷.

5.25 Cardiac Disease

Impaired cardiac function is associated with increased risk of stroke, including ischaemic heart disease, left ventricular hypertrophy and atrial fibrillation⁴². The association with atrial fibrillation is particularly strong with a relative risk of about five compared to similar individuals without atrial fibrillation.

5.26 Transient Ischaemic Attacks

As discussed earlier, TIAs are followed by an increased risk of stroke.

5.27 Diet and Alcohol

Consumption of alcohol is linked to blood pressure level. The relationship between increasing alcohol consumption and increased risk of stroke may be causal, but this is uncertain. Some evidence points to the existence of a J-shaped curve, with moderate alcohol consumption being associated with slightly reduced levels of stroke⁴³. The links between diet and stroke are unclear. High sodium and low potassium may be independently related to blood pressure level⁴⁴ while intake of fruit and vegetables may help to reduce stroke⁴⁵. There is some evidence to suggest that stroke incidence increases with weight, particularly in women⁴⁶.

5.28 Cholesterol is not included as a risk factor for stroke per se because currently its role is uncertain. There is evidence that low cholesterol levels are a risk factor for intracerebral haemorrhage. This is being examined by further epidemiological studies. The association of the combined risk for developing both coronary and cerebral vascular disease with the inter-relation of risk factors and thrombo-embolism means that cholesterol control is still of importance for prevention of stroke.

5.29 Other Risk Factors

There are other minor risk factors for stroke, including diabetes mellitus and high dose oestrogen oral contraceptives.

5.30 Early Influences for Developing Stroke

The impact of risk factors occurs well before the development of clinical disease and may extend back to early childhood including intrauterine development. Genetic and intrauterine factors (especially dietary and environmental) will be of increasing importance in the future. Absence of clinical disease, however sophisticated the detection, is insufficient for preventive issues and reinforces the need for healthy lifestyles at an early age hence health promotion and health protection.

5.31 Reversibility of Risk Factors

There is now increasing evidence that prompt action in risk behaviour modification is reversible and at a quicker pace than initially first thought. This is particularly so for blood pressure management and smoking and is of particular importance for secondary prevention initiatives.

KEY POINTS

- Diagnosis of stroke remains a clinical diagnosis but CT scanning is increasingly becoming a mandatory investigation for modern management of stroke
- Scotland has the second highest death rate for cerebrovascular disease in people aged 15 - 64 years in Western Europe, second only to Portugal.
- Scotland showed an average annual decline in age-adjusted mortality from stroke of 4.0 per 100 000 for men and 4.5 per 100 000 for women between 1950 and 1986.
- Within Scotland, age-adjusted mortality rates are highest in West and Central Scotland and lowest in the East. Estimates from other populations may not be appropriate for Scotland.
- The incidence of first ever stroke rises rapidly with increasing age. Age-specific incidence rates are higher for men than for women in all age groups other than over 85 years.
- 10% - 11% of all strokes are caused by intracerebral haemorrhage (excluding subarachnoid haemorrhage) and the remainder by cerebral infarction.
- The average one month case-fatality from first ever stroke is 24%. One year mortality rates are about 31% for all strokes, including those not admitted to hospital. Mortality is higher in those admitted to hospital, with about 50% dying by one year.
- There is evidence of a decrease in case-fatality over time. The improvement seems likely to reflect improvements in treatment of respiratory and cardiac disorders in survivors, rather than improvements in acute care.
- At six months, between 60% and 70% of survivors of first ever stroke are likely to live at home, and about two-thirds of these will consider themselves independent.
- Hypertension, smoking and pre-existing cardiac disease are important risk factors for stroke.

6 STROKE IN SCOTLAND

6.1 Stroke Mortality

Stroke is the third most common cause of death in Scotland. In 1992 there were 7861 deaths from cerebrovascular diseases (ICD 430-438), with a female:male ratio of 1.7, although the male age specific death rates are higher. A quarter of the stroke deaths occur under the age of 65 years. The crude death rate for 1992 was 1.5 per 1000 population for Scotland (Table 6.1). There are minor variations in the crude death rates between the Scottish Health Boards, with the range of 1.3 to 2.1 per 1000 population. The death rate increases sharply with age, especially after the age of 75 years. The age specific rate for each Health Board is provided in Table 6.2.

6.2 Standardised Mortality

In order to compare the crude death rates from Health Boards meaningfully, it is necessary to take account of the differences of the age and sex structure of the Boards. This is demonstrated in Table 6.3, derived from the Public Health Common Data Set⁴⁷, as the Standardised Mortality Ratio (SMR) for Strokes for Scottish Health Boards and Local Government Districts. There are significant variations between the Health Boards. Argyll and Clyde Health Board had the highest SMR of 110 in 1992 which was almost 11% higher than the Scottish ratio; while the Borders Health Board SMR is the lowest at 85.3. This difference is also observed for the sex specific SMRs.

6.3 At Local Government District level the differences in SMR for stroke mortality is more striking; the lowest SMR is in the Districts of Bearsden and Milngavie of 72.1 in Greater Glasgow Health Board and the highest SMR is in the District of Wigtown at 121.5 in Dumfries and Galloway Health Board. Some of the difference may be explained by a small number of events as demonstrated by the wide confidence intervals for the smaller districts. However, it is outside the scope of this report to analyse the small area differences in detail. The findings of regional differences within Scotland from published studies were discussed in chapter 5.

6.4 Incidence and Prevalence of Stroke

As discussed in chapter 5, the mortality statistics provide limited information on the incidence of stroke and there are few community studies that provide incidence for a specific population. In view of the geographical differences, it is probably not valid to apply population statistics by generalisation from studies from elsewhere. In the SHSAC document, the incidence of stroke for Scottish Health Boards was estimated by the application of the rates from the Oxford Study²⁵ which estimated the annual number of new cases of stroke for Scotland for 1990 to be 10 246 cases.

6.5 Scottish Record Linkage Study

The Information and Statistics Division of the Common Services Agency⁴⁷ has successfully linked the SMR1 (Scottish Morbidity Records) episodes of inpatient activity and deaths into person based data for the 12 years 1981 to 1992. This record linkage provides an estimate of the incidence and prevalence of stroke for Scotland by linking the first hospital discharge since 1981 to subsequent admissions (including recurrent strokes). It must be stressed that this is an under-estimation because firstly it only includes cases discharged from hospital with diagnoses of stroke and there is evidence that there is a significant degree of under-reporting, even within this category of cases; secondly, the short duration of the linkage to date; and thirdly the incidence estimate includes only first ever stroke⁴⁸.

Although there is no way of quantifying this level of under-estimation there are likely to be the cases that require a low level of inpatient care - that is, "mild" stroke or cases that deteriorated rapidly and died at home. The detailed results of the linkage study for Scottish Health Boards and Local Government Districts are given in Appendix 3.

RECOMMENDATION 2

6.6 Linkage Incidence of Stroke

From Table 1 of Appendix 3, the incidence of stroke in 1992 is estimated to be 2.98 per 1000 population in Scotland which is higher than the United Kingdom estimate of 2 per 1000 population from the Oxford Study. The linkage study estimated the number of stroke cases in Scotland for 1992 to be 15 250. When compared with the SHSAC estimate of 10 246 for 1990, the later figure would appear to underestimate the number of new cases by around a third. As discussed, the linkage incidence figure is itself likely to be an under-estimate, although this may be offset by the documented over-recording of cases because of mis-diagnoses⁴⁸.

6.7 Linkage Prevalence of Stroke

The linkage study estimated the prevalence of Stroke in 1992 to be 10.52 per 1000 population. The "12 year period" prevalence of stroke is 53 748 or about 1% of the Scottish population. The total number of hospital episodes were 29 494 and consumed 18.4 million bed days or equivalent of 5029 beds. This prevalence linkage was to individuals which include second or subsequent strokes. A further study could be undertaken from 1992 data to estimate the total episodes of first and subsequent strokes which reflect the burden of stroke more accurately.

6.8 Operations for Stroke

It is important to recall the definition of stroke used in this report as stated in chapter 4, which includes subarachnoid haemorrhages and TIA. Appendix 4 contains tables which show the number of discharges for Scotland for 1992, cross tabulating hospital of treatment with the Health Board of residence for the following:

- Subarachnoid operation
- Endarterectomy
- Other operations for stroke

In 1992 there were 239 discharges of strokes cases associated with subarachnoid operations. A total of 258 endarterectomies were performed on patients with stroke in Scotland in 1992. This report is not addressing the level of need for these operations, especially endarterectomy for TIAs and selected strokes which is relatively new and merits separate study. However, they should be taken into account when specifying the contracts for Stroke Services.

RECOMMENDATION 3

KEY POINTS

- Stroke is the third most common cause of death after ischaemic heart disease and cancer for Scotland. There were 7861 deaths from stroke in Scotland in 1992.
- The male death rates are higher, but the female:male death ratio is 1.7 due to longer female life expectancy.
- The crude stroke death rate is relatively stable over recent years.
- There are considerable variations in the SMR for stroke between the Scottish Local Government Districts.
- Record Linkage Study can provide useful estimates of incidence and prevalence of stroke. In 1992 the number of new cases of stroke in Scotland was 15 250 and the total number of people alive with history of stroke for Scotland was 53 748.
- Record linkage study needs to be ongoing to delineate the number of subarachnoid operation, carotid endarterectomy and other neurosurgical operation requirements of stroke patients.

7 SERVICES FOR STROKE

This is the largest chapter of this report and it provides a description of the investigations, treatments and services for stroke and highlights the evidence for development of a cost effective service. Much of what is described for stroke services conventionally relates to patients admitted to hospital, but for the classic stroke and TIAs, it is known that some are treated at home. OCSP²⁰ estimated a quarter were treated at home, although discussion with clinicians in Scotland indicated this proportion varies between areas due to historical provision of services, attitude and geography. Those treated in hospital were managed in a variety of ward types.

7.1 Stroke Service Matrix

A matrix for systematically mapping out the service provision for stroke care was introduced in chapter 4. Since the matrix is an important concept it is now discussed in further detail. The modified Wade's matrix is as shown below:

TIME	PATHOLOGY		DISABILITY		Support for carers
	Diagnosis	Treatment	Diagnosis	Treatment	
Prevention					
Early Phase (0-7 Days)					
Recovery Phase (1-26 Weeks)					
Long Term (27+ Weeks)					

Table 1: Stroke Service Matrix

The times given are arbitrary but provide an indication of the periods for which the elements of care require to be considered or provided. This model has a *Time* dimension with four stages: *Prevention* (years preceding risk); *Immediately post stroke the Early Phase*; *the stage of changing disability the Recovery Phase*; and the stage of *Long Term care*. The second axis relates to the *Two levels* of the disease - *Pathology* and *Disability* - and within each level there are two processes of *Diagnosis* and *Treatment*. To this modified Wade's matrix a third axis is added to delineate the need to provide *Support for Carers*. This matrix allows purchasers to check systematically whether a complete service is being provided. It will also be used as the framework for discussion for this chapter. Primary prevention is the subject for chapter 8. Only aspects of secondary prevention will be highlighted in this chapter. One consequence of using a matrix to describe the complex services provision for stroke is the recognition of inevitability of overlaps between the categories. As a result there will be some repetition in this discussion.

RECOMMENDATION 4

7.2 Place of Care

Although some classic stroke patients are managed at home, most are admitted to acute medical wards, geriatric wards or, with some younger patients, to neurology or neurosurgical wards. The main reasons for admission to hospital are for diagnosis, nursing care, rehabilitation and social reasons⁴⁹. Most of this could be provided at home if there was appropriate community support. The provision of acute cerebrovascular clinics (see 7.31) facilitates care in the community and there is a need to develop guidelines for admission of stroke patients and for the use of these clinics as part of overall guidelines for the management of stroke. An example are those currently being developed in Grampian, which also form the basis of the CRAG guidelines being undertaken by the Royal College of Physicians and Surgeons in Glasgow.

7.3 Assessment of Stroke Patients

Assessment of stroke patients are poorly recorded, especially for pre-stroke and acute phase impairments and disabilities including social functioning. This is much improved in centres where proformas incorporating disability scales are used, such as that being developed by Dr Martin Dennis in Edinburgh for the Royal College of Physicians (London). These proformas allow for subsequent assessment and medical audit studies and can form the basis of a stroke register.

RECOMMENDATION 5

7.4 PATHOLOGICAL DIAGNOSIS

As discussed earlier in 4.12, stroke is not a homogeneous condition. An accurate history and careful examination are paramount in the diagnosis of stroke in the acute phase and tests should be directed to specific questions:¹

- 1) Has the patient had a stroke? - That is, to separate strokes from non-strokes, for example, trauma and tumour.
- 2) Is the stroke the result of an infarct or haemorrhage?
- 3) Is the stroke a manifestation of an underlying disease which requires treatment in its own right?
- 4) Are there identifiable factors such as high blood pressure which, if treated, may reduce the chance of recurrence?

This can be undertaken either in the home or in hospital if there is access to stroke services (see 7.30 to 7.32). Protocols would do much to facilitate the first stage of stroke care.

7.5 Routine Investigations

Routine investigations such as full blood count (including platelet) and erythrocyte sedimentation rate (ESR), biochemical screen including analysis of glucose, cholesterol, urea, electrolyte concentrations, electrocardiogram (ECG) and chest x-rays should be done in most stroke patients. None of these investigations necessarily require hospital admission since most can be performed at home and all can be performed on an outpatient basis⁵⁰.

b) Stroke by Arterial Area⁶

This is only of importance for clinical and research purposes and of limited use currently for needs assessment. The site of the arterial defect, however, indicates the clinical defects and outcomes in terms of survival and disability.

c) Stroke by Severity

Severity of stroke is the major determinant of outcomes and service requirements and requires classification both for clinicians and for those planning, monitoring and evaluating stroke services. The World Health Organisation Classification of Impairments, Disabilities and Handicaps is recommended for this purpose⁷. The classification is by the extent and/or location of the pathological process; by the extent and/or nature of the impairment; or by the extent and/or nature of the disability. In practice some features will occur in each measure but they correlate and all provide an estimate of processes such as the expected disability at some future time and rehabilitation needs.

d) Stroke by Time

In the progress of a stroke, the emphasis passes from pathology to disability and this can be divided into three distinct clinical phases which can be given arbitrary times to indicate possible periods involved. These correlate in some way to service provision requirements with the possible thesis that the third phase no longer represents a stroke but the impairments, disabilities and handicaps that require further management. The phases are the acute phase or Immediate Post Stroke (0-7 days); the Recovery Phase or the Stage of Changing Disability (1-26 weeks); and the Phase of Long Term Care (27 weeks onwards).

4.13 A Classification Matrix for Stroke Care

Wade⁷ proposed a matrix taking into account most of the above classifications which could be used to determine service provision both in terms of the individual and groups of patients with stroke. This used time, pathology, disability with the two processes of diagnosis and treatment. Wade added the additional dimension of prevention and gave indicators of where he considered the amount and focus of attention would be required. Below is given Wade's original matrix:

TIME	CARE	PATHOLOGY		DISABILITY	
	Care	Diagnosis	Treatment	Diagnosis	Treatment
Prevention	0	X	X	0	0
0-7 Days	XXX	XX	?0	?X	?0
1-26 Wks	XX	0	0	XX	XXX
27+ Wks	X	0	0	?X	?X

0 = no input needed

?0 = probably no input needed

?X = possible input needed

X = minor input needed

XX = moderate input needed

XXX = major input needed

This model should be the basis for interpreting needs assessment numbers into health service provision although after much discussion it has been modified to include Support for Carers. (see 7.11)

4.14 Much of the literature on stroke has focused on the hospital or health service issues for stroke patients. Not all patients enter hospital, and those that do

4.11 The following are the standard ICD9 codes for stroke:

ICD	DISEASE
430-438	CEREBROVASCULAR DISEASE
430	Subarachnoid Haemorrhage
431	Intracerebral haemorrhage
432	Other intracranial haemorrhage
433	Occlusion and stenosis of precerebral arteries
434	Occlusion of cerebral arteries
435	Transient cerebral ischaemia
436	Acute but ill-defined cerebrovascular disease
437	Other and ill-defined cerebrovascular disease
438	Late effects of cerebrovascular disease

In practice most strokes will be allocated to ICD 436 or 437 but improved specification after imaging allows more use of the 431-434 codes. Transient ischaemic attacks are coded under 435. The diagnosis of hemiplegia ICD343 is favoured by geriatricians for subsequent rehabilitation or old strokes, especially in long stay facilities. The Royal College of Physicians and Surgeons in Glasgow Stroke Audit Group are examining coding and this is being undertaken by the Information Services Division (in progress). Early evidence indicates that hemiplegia is occasionally used (about 5%) in principal position throughout Scotland. The convention for this report will be, however, only to use ICD 430-438 in principal position or underlying cause for the major information although the record linkage study uses all mentions for the prevalence data.

4.12 Clinical Stroke Classifications

Various classifications of stroke exist and some are given below:

a) Stroke by Pathological Type

(i) Cerebral Infarction

The brain damage resulting from arterial occlusion caused by thrombus formed locally or elsewhere - for example, embolism from carotid arteries or heart. Thrombus formation is a feature of arterial disease in the ageing population. Other processes in the formation of cerebral infarction are blood disorders and arteritis.

(ii) Intracerebral Haemorrhage

Blood leaks from vessels within the brain producing local destruction and displacement of brain structures. The causes, though largely hypertensive, include anticoagulant therapy, trauma and arterial malformation including aneurysm.

The relative frequency of the different types of stroke varies in different parts of the world. In the United Kingdom approximately 85% of first strokes are cerebral infarctions and 15% are intracerebral haemorrhages. This classification is becoming increasingly important because of the potential treatment in the acute phase and prevention of subsequent strokes. The distinction between the two types cannot be made clinically and CT scanning soon after onset (see later) is required to distinguish the type of stroke and to exclude non-vascular causes (about 5%).

7.6 Cardiological Investigations

Echocardiography may be required if blood clots from the heart are suspected and full anti-coagulation is a treatment option. Abnormalities on chest X-ray or ECG in association with cardiac abnormalities on clinical examination may indicate the need for echocardiography⁵⁰.

7.7 Neurological Investigations

Computer tomography (CT) scanning is an invaluable aid to the investigation of patients with acute stroke to distinguish between cerebral infarction and primary intracerebral haemorrhage for determination for antithrombotic therapy and to exclude non-vascular cerebral lesions such as tumour or chronic subdural haematoma. The treatment of the majority of patients presenting with stroke would benefit from a CT scan within the first 24 hours⁵⁰. Early CT scan is essential because delayed scan by more than 1 to 2 weeks after the neurological event may be misleading since the distinctive appearance of haemorrhage are lost. The evidence from the review of the antiplatelet trials for secondary prevention of stroke has confirmed the need for improved diagnosis and the role of CT Scanning in stroke⁵¹. If CT scanning resource is limited the King's Fund Consensus Statement on Stroke¹ indications for CT scanning should be adopted. They are as listed below and provide a way of selection of patients for scanning :

Major Indications for CT Scanning:

- Uncertain diagnosis of stroke versus non-stroke intracranial pathology
- Suspected cerebellar stroke
- Suspected subarachnoid haemorrhage
- Current or contemplated anticoagulation or antiplatelet treatment
- Possible need for carotid endarterectomy in the future
- Young patients

RECOMMENDATION 6

7.8 In general, magnetic resonance imaging (MRI) provides relatively little extra useful information and is not as good as CT scanning in distinguishing cerebral infarction from intracerebral haemorrhage in the acute stage⁵⁰.

7.9 Other Investigations

Lumbar puncture should only be used where meningitis is suspected or where subarachnoid haemorrhage cannot be diagnosed by CT scanning. Isotope brain scanning is appropriate only when subdural haematoma has to be excluded and CT scanning is not available. The use of angiography in an ischaemic stroke is usually linked to the intention to carry out carotid endarterectomy. However, ultrasound scanning as a preliminary screen will reduce this requirement.¹

7.10 PATHOLOGICAL TREATMENT

This is largely limited to early and recovery phases and is carried out in either hospital or community. Secondary prevention strategies to prevent further stroke are also important, and are discussed in greater detail in chapter 8.

7.11 Acute Treatment

At present, no treatment has been shown conclusively to be effective in limiting the neuronal damage associated with stroke and neurosurgery may be indicated in a few patients¹. There are extensive reviews by Wade⁷ and others for the evidence of efficacy of specific treatments, which is summarised below:

a) Stroke

Many treatments have been proposed and are in use for acute stroke. Wade⁷ and Warlow⁵⁰ highlighted the following key points from an extensive review:

- Eleven controlled trials have investigated anticoagulation therapy in acute stroke and there is no evidence of any improvement in the case-fatality rate or increased haemorrhagic transformation of infarcted brain tissue.
- Trial of treatment using Dexamethosone (steroid) to reduce post stroke cerebral oedema found no benefits in reducing mortality or impairment. In view of the side effect of steroids, further trials were not justified.
- Haemodilution is the treatment to reduce the viscosity of the blood in an attempt to increase cerebral blood flow and increase delivery of oxygen. Trials concluded that this form of treatment is ineffective in changing the mortality or morbidity.
- A number of trials using intravenous glycerol have shown a reduction in death rate. The evidence is, however, not sufficient as yet to recommend intravenous glycerol to all patients with severe stroke.
- Drugs such as naftidrofuryl which modify cerebral metabolism have been claimed to exert a beneficial effect on the recovery from acute stroke. There is insufficient evidence to justify their use outside large randomised trials.
- Nimodipine, a calcium channel blocker, has been shown to have no effect when given orally after stroke, although it is now widely used after SAH to prevent the occurrence of late stroke from vasospasm.
- Beta-blockage (propranolol, atenolol) after stroke showed no benefit in terms of mortality and morbidity.
- Neurosurgeons offer two interventions. The first, of unproven benefit, is the evacuation of intra-cerebral haemorrhage. The second, also unproven, is the treatment of acute hydrocephalus arising from cerebral haemorrhage.

b) Transient Ischaemic Attacks (TIA)

Transient Ischaemic Attacks are by definition vascular events which resolve completely within 24 hours, and usually within six hours. Consequently no specific "treatment" is required and no patients are admitted to hospital in the early phase. The main importance of TIA is that the patient carries a future risk of developing stroke or myocardial infarction and should be referred for investigation (see chapter 8).

c) Subarachnoid Haemorrhage (SAH)

All patients with SAH should be admitted to hospital. Treatment after SAH is aimed at modifying the risk of re-bleeding and cerebral infarction secondary to cerebral vasospasm. The primary treatment after SAH is surgical repair or removal of weak arterial lesion, usually by clipping an aneurysm. Although this procedure has never been subjected to a randomised trial, historical studies suggest the procedure reduces the rate of re-bleeding over the first six months but not thereafter. Several randomised controlled trials show that the use of nimodipine pre-operatively reduces morbidity from cerebral vasospasm⁷.

7.12 The Prevention of Future Strokes

For strokes that survive the acute phase and TIAs it is important to recognise that treatment for the prevention of subsequent or future strokes starts almost immediately and is part of patient care⁵². Many patients will require consideration for more than one prevention strategy and these are discussed in more detail in chapter 8. They can be summarised as three principal actions:

a) Antiplatelet Therapy

Long term regular daily aspirin must be considered for all ischaemic strokes, TIAs and some haemorrhagic strokes with ticlopidine for those who cannot tolerate it. The dosage is still under discussion but evidence suggests between 75 to 325 mgs per day can prevent 25% of future strokes.

b) Vascular Risk Factor Modification

Assessment and modification of risk factors (see chapter 5: sections 5.21-5.28) is essential and especially blood pressure control including salt intake restriction. This also includes management of other diseases especially cardiac and diabetes.

c) Consideration for Surgery

For selected patients evidence from European and American trials shows that patients with 70-90% or severe occlusion of the carotid arteries in the neck benefit from carotid endarterectomy or surgical removal or bypassing of the damaged area. This is not without risk and should only be purchased from centres of known excellence. Patients with SAH often require clipping of the berry aneurysm(s) to prevent further bleeds and should be sought from specialist centres.

Patients with atrial fibrillation present difficulties for success in these strategies for it cannot always be controlled and is the source of embolism in some strokes. The treatment consists of anticoagulant therapy which unfortunately to date has failed to show a benefit in stroke management or prevention per se. The role of anticoagulant therapy is restricted to the management of the cardiac origins of stroke (b).

RECOMMENDATION 7

7.13 General Care of Patients

In the early and recovery phase care should be taken to avoid early complications of stroke including chest infections and other causes of hypoxia, venous thromboembolism, urinary infections and incontinence, dehydration, constipation, pressure sores, falls and injuries, painful shoulders and spasticity¹. Early identification and treatment of psychiatric problems especially depression is also important. The management of most of these conditions is discussed in detail in Warlow's report⁵⁰. As many of the patients are elderly, the management of inter-current illness is part of stroke care.

7.14 DISABILITY DIAGNOSIS

Rehabilitation after stroke aims to minimise disability and handicap and to maximise life satisfaction for both patient and carers. Rehabilitation begins in the early phase and must include patients in the community. Stroke rehabilitation has been reviewed in detail by "Effective Health Care"⁵³. The aims of rehabilitation after stroke should be:⁵³

- To aid physical recovery from stroke.
- To promote physical, psychological and social adaptation to stroke-related disability and handicap.
- To encourage a return to independence and activities of daily living.
- To prevent secondary complications of stroke and related conditions, such as pneumonia and depressive illness.

Various scoring systems are used to assess disability, impairment and handicap of stroke sufferers, of which the Barthel is the most commonly used. Modern stroke care must include objective assessments at appropriate phases of the clinical management.

7.15 Variation in Rehabilitation Needs

The extent of need is difficult to define. Most patients will have some degree of disability and its associated problems. Not all problems are soluble and it is unlikely that the effort and resources required to resolve problems necessarily relate directly to the measured disability or outcome achieved. Severely disabled patients, for example, may need some form of long term care which is relatively easy to provide. A less disabled person who wishes to return to independent living in the community may require more investment of time and effort if they are to return home⁷. There is a need, therefore, to assess each patient individually in order to take account of all aspects of the living requirement and those of the carers.

7.16 Multidisciplinary Assessment of Disability of Stroke

The key factor in achieving the appropriate disability diagnosis is to have a **Multidisciplinary Assessment** which involves doctors, nurses, physiotherapists, occupational therapists, speech therapists, dietitians, chiropodists, social workers and psychologists as soon as possible. This can take place in the community or in

the hospital. This will formulate the rehabilitation plan and also allows a prognosis to be made. A key worker should be identified for every patient at every stage to co-ordinate an individual rehabilitation plan¹.

RECOMMENDATION 8

7.17 The assessment should cover motor and sensory function, swallowing, cognitive function and mood, communication skills and performance of activities of daily living. From the carers' perspective the assessment should also include general health of the carers, their psychological and social problems, support network, housing, finance, employment and leisure activities. The findings of the assessment, impairment, disabilities and handicaps should be documented where possible using simple but valid scales¹.

7.18 DISABILITY TREATMENT

Treatment should begin in the early phase, including those treated in the community, and can last for up to six months. Treatment can be as specific stroke rehabilitation or in general units such as geriatric facilities. There are usually limits on the amount and length of rehabilitation treatment available. Despite competing regimes, there is little evidence that any pattern of rehabilitation is superior to another⁵³. Assessment of effectiveness of stroke rehabilitation is difficult because there are very few well designed and reliable randomised controlled trials and the research is compounded by the fact that most patients make some "spontaneous" improvement after stroke in the absence of rehabilitation.

7.19 Effectiveness of Rehabilitation

The following are the main findings from the Effective Health Care review on stroke rehabilitation⁵³:

- An improvement in activity of daily living (extra improvement of being able to dress and wash without help) has been demonstrated for patients with moderate disability receiving intensive and conventional occupational and physiotherapy up to six months after discharge compared with a control group who received no formal rehabilitation. The intensive group attended outpatients for four full days a week. Conventional rehabilitation required three half days' attendance at outpatients each week.
- Elderly stroke patients' mobility improved (9% improvement in 10 metres walking time) but after cessation of treatment patients experienced a gradual decline in mobility.
- There are no reliable trials which study the effectiveness of occupational therapy as a treatment.
- The evidence that speech therapy for aphasia after stroke is an effective treatment is conflicting.

"Effective Health Care"⁵³ concludes that while the evidence from published trials does seem to suggest that rehabilitation after stroke is effective, the quality of evidence is not high. More research is, therefore, required.

RECOMMENDATION 9

7.20 The Roles of the Therapists

The roles of the therapists in Scotland are fully described by Warlow⁵⁰ and draw attention to the contribution of speech therapists in the management of swallowing difficulties in the early phase. Wade⁷ further highlighted the role of speech therapists in stroke rehabilitation as the facilitator of communication by advising the professionals and carers about the best level and means of communication after assessment of individual patients; expose the patients to as many opportunities as possible to communicate at an appropriate level.

7.21 Barriers to Rehabilitation

The King's Fund Consensus Statement on stroke rehabilitation¹ identified the main problems in the rehabilitation phase which need to be addressed and these are as follows:

- Misunderstandings and rivalries between professionals
- Breakdown of communication between professionals, patients and their carers
- Insufficient appreciation of the impact of stroke on the patient's family
- Ill-prepared and sometimes unplanned discharge home
- Serious shortage of therapy
- Long periods in which patients are unoccupied
- Ill-considered admission to hospital
- Failure to recognise and respond to mood disturbances
- Delegation of care to inadequately trained medical staff
- Confusion caused by too many people being involved

Little is known about the rehabilitation received by the patients managed in the community.

7.22 CARING FOR THE CARERS

A significant proportion of the burden of care for people with disabilities lies with the informal carers such as spouse, relatives, friends and neighbours. Under the National Health Service and Community Care Act 1990 the concern for carers has been given more prominence. Carers' needs should be assessed where necessary as part of the comprehensive assessment of the patients. The role and contribution of

informal carers should be recognised and support should be given to them. They should not be taken for granted. The carers need:

- Advice about the physical, social and psychological needs of the patients and how to look after them.
- Support to enable them to care for stroke patients in the community.
- Information about sources and availabilities of physical and financial benefits; and how to obtain them.
- Locally based social support network.
- Respite care on a regular basis to allow the carers a period of rest and relief; and emergency respite facilities when there is a breakdown of the normal care mechanism.

7.23 Burden on Carers

Most informal carers have no choice but to accept the burden of care and many suffer health and financial problems as a result of their caring responsibilities⁵⁴. The purchasers of services for stroke must take the needs of the carers into account.

RECOMMENDATION 10

7.24 Information Needs for Patients and Carers

The most often expressed concern from the carers is the general lack of information^{55,56} given about the health of the person being cared for, the prospects for recovery and the sources and availability of physical and financial support. The range of support is considerable as listed in the document produced by the Royal College of Physicians⁵⁷. Many useful information leaflets are produced and distributed by Voluntary Organisations such as Chest, Heart and Stroke Scotland. The stroke unit at Stirling Royal Infirmary Hospital Trust has a Resource Room where carers can access information on a wide range of services. The mechanism for dissemination and availability of information to the carers is haphazard and unsystematic. There is a need to have a systematic and proactive method of providing relevant and useful information to the carers.

RECOMMENDATION 11

7.25 Role of Voluntary Organisations

The Voluntary Agencies, self-help and support networks are providing the main bulk of carer support. The Chest, Heart and Stroke Scotland (CHSS) is the principal voluntary agency concerned with stroke care. Its objectives are related to research, health education, rehabilitation and welfare of stroke victim and their carers. CHSS Volunteer stroke schemes attempt to address the needs of stroke patients with communication problems and Stroke Clubs, run by the CHSS, provide a useful social outlet where patients can compare progress and gain moral support from each other. In addition to social activities, some Stroke Clubs provide an active programme of therapy including special speech support and respite for carers. Another organisation, Crossroads, runs a care attendance scheme and plays a valuable part in relieving stress on carers and avoiding admission to hospital or residential care should a breakdown in the caring arrangement occur.

7.26 CHSS is funding and evaluating a pilot Stroke Family Support Worker working with a stroke unit in Edinburgh. This worker provides the crucial link for the patients and carers with the service providers and is an important source of information. This is a scheme which may provide cost effective carer support. Following an audit project in Glasgow and a pilot trial of a Stroke Liaison Health Visitor, two such posts are now established in Glasgow.

7.27 Future Roles of Voluntary Organisations

Chest Heart and Stroke Scotland is proposing a new pilot project (see Appendix 5) to collaborate with the health service in providing care for patients and their carers in the community (CHS Scotland Community Stroke Service), via a Stroke Liaison post which gives access to community services as well as those of Chest Heart and Stroke Scotland. The post will support patients and carers at home and will assist the delivery of "seamless" care by creating a support network and facilities. While this innovative proposal is promising for people who are admitted to hospital, this approach must also capture those managed in the community. The proposal has the potential of developing into a stroke register for Scotland. (see 10.7).

RECOMMENDATION 12

7.28 ORGANISATION OF STROKE SERVICES

Using the Stroke Service Matrix as shown in 7.1 it is clear that most components of the service are being provided with different degrees of comprehensiveness, availability and effectiveness for different Health Boards. The components are being provided by a large number of professionals, most of whom work in general medicine or primary care. Many of these professionals have no specific interest or expertise in the management of stroke. No specialty group offered a really comprehensive service and it is rare to have a coordinator of the services. Experience and expertise in managing patients with stroke is diluted among a large number of health professionals. This hinders both the organisation of stroke services and reduces the effectiveness of patient care⁵⁰.

7.29 Organised Stroke Care

There is now strong evidence which indicates that *organised* stroke care can save lives, increase health gains and reduce requirement for hospital care. Over the past decade, a series of randomised trials have compared organised stroke care (Stroke Units) with routine care. Each trial suggested that a systematic approach to care of patients with acute stroke led to better short term and long term outcome, though none was large enough to convince on its own. Formal statistical overview concluded that organised stroke care significantly reduces early death by more than a quarter. Long term mortality was also significantly reduced (odds of death at 12 months was 21% lower for inpatients in stroke units). Preliminary analyses of the effects on dependency at about six months after stroke, the need for long term institutional care and the length of hospital care also suggested that organised care provided in the early phase of stroke produced better results than routine management^{58,59}.

RECOMMENDATION 13

7.30 Stroke Unit

Some European countries now have stroke units in most of their District General Hospitals, but in Scotland there are few such units. The detail of the first stroke unit in the Western Infirmary in Glasgow has been outlined by Lees⁴⁹. There is at present no consensus as to what constitutes an acute stroke unit; but the key factor is to have one focal point and one person responsible for the organisation and evaluation of the service. A stroke unit should aim to provide the following⁵⁰:

- Prompt and accurate diagnosis
- Thorough assessment of patients' impairments, disabilities, handicaps and co-morbidities
- Access to acute beds
- A framework in which acute medical (and occasionally surgical) treatments can be given and evaluated in large randomised trials
- Rehabilitation
- Terminal care
- Follow-up
- Secondary prevention to reduce the risk of subsequent stroke
- Provision of information, education and advice to all levels
- Links with other agencies

7.31 Acute Cerebrovascular Outpatient Clinics

The development of rapid access symptom specific clinics with consultant opinion and full investigative facility is becoming the way forward for a number of conditions where there is evidence of effectiveness of care. These clinics are usually situated in Teaching Hospitals and the principal examples are for stroke, chest pain and GI conditions. These clinics meet with the emphasis now in the National Health Service to reduce acute inpatient care and improve care in the community, which are of major importance for stroke. These symptom specific clinics that exist in Scotland are available either on a daily or alternate day basis but may not be feasible in small district general hospitals although some form of "fast track" access to a consultant led clinic is needed.

7.32 Clinical Responsibility for Management of Stroke Care

The King's Fund Consensus Statement¹ highlights the need to have a designated physician with a special interest in stroke recruited from general medicine, geriatrics or neurology. To stimulate this, the CHSS pump-funded the first stroke physician in Scotland in 1989 (Dr M Dennis, Edinburgh). A second stroke physician has since been appointed in Glasgow (Dr K Lees), funded by Glasgow University. These full-time posts have substantial research and teaching commitments. A number of district general hospitals in Scotland have identified a physician from their existing staff to undertake the responsibility of coordinating stroke care, albeit on a part-time basis, as part of Stroke Unit development. The role of the neurologist in stroke management is probably limited to atypical cases.

7.33 Model of Stroke Care

Models of stroke care in Scotland were reviewed by Russell et al⁶⁰. There are three main categories of care model:

- **Existing Models:** characterised by care mainly based within acute medical wards with or without genuine collaboration between the hospital and the community. This model has the shortcomings highlighted in this discussion.
- **Radical models:** these are exemplified by the creation of centres of excellence within hospitals, for example, the Acute Stroke Units and Stroke Rehabilitation Units. Another example is the Enhanced Home Care for stroke which is intended to enhance home care for stroke through the establishment of a small multidisciplinary team.
- **Evolutionary models:** to date four such schemes were identified. These are characterised by the creation of a stroke area by pooling, adapting or converting existing general medical and/or geriatric facilities.

7.34 Strategy for Stroke Services

Russell and colleagues indicated that progress is more likely to come from a strategy of improvement characterised by:

- Evolutionary changes in stroke care
- Adoption of well-defined policies and guidelines
- Monitoring adherence to these policies and guidelines
- Rigorous evaluation of untested treatments
- Adherence to the established principles of "change management"

KEY POINTS

- Stroke Service Matrix is a useful method of systematically mapping out the service provision and contract specification of stroke care.
- Stroke is *not* a homogenous condition and this must be fully reflected in the contracts for stroke services.
- Routine investigations such as haematological and biochemical investigations, ECG and chest X-ray should be done in most stroke patients. None of these investigations necessarily require hospital admission.
- Computer tomography (CT) scanning is a valuable aid to the investigation of patients with acute stroke. The treatment of most patients presenting with stroke would benefit from a CT scan. If CT scanning resource is limited, the King's Fund Consensus Statement on Stroke indications for CT scanning should be adopted.
- Echocardiography may be required if a blood clot from the heart is suspected.
- Magnetic resonance imaging (MRI) provides relatively little extra useful information.
- Lumbar puncture should only be used where meningitis is suspected or where subarachnoid haemorrhage cannot be diagnosed by CT scanning.
- Isotope brain scanning is appropriate only when subdural haematoma has to be excluded and CT scanning is not available.
- Neurosurgery is only indicated in a few patients and treatment of SAH.
- Trials show that the use of nimodipine pre-operatively reduces morbidity from cerebral vasospasm.
- Prevention of subsequent stroke is part of the acute and recovery phase as is modification of risk factors, especially hypertension.
- Regular low aspirin reduces the risk of future strokes.
- Carotid endarterectomy will become increasingly purchased for certain strokes but care must be taken in the selection of patients and provider unit as the procedure is not without risk.
- Many treatments have been proposed and are in use for acute strokes: Dexamethosone (steroid), haemodilution, intravenous glycerol, naftidrofuryl, Nimodipine and Beta-blockers have not been shown to be effective.

KEY POINTS

- Care should be taken to avoid early complications of stroke including chest infections and other causes of hypoxia, venous thromboembolism, urinary infections and incontinence, dehydration, constipation, pressure sores, falls and injuries, painful shoulders and spasticity.
- Rehabilitation after stroke aims to minimise disability and handicap and to maximise life satisfaction for both patients and carers. The extent of needs is difficult to define and is not necessarily directly proportional to the degree of disability.
- Documented multidisciplinary assessment which covers all aspects of needs for both the patient and the carers coordinated by a key worker is the way forward.
- Evidence of effectiveness of stroke rehabilitation (Physiotherapy, Occupational Therapy and Speech Therapy) from published trials does seem to indicate that rehabilitation is effective. The quality of evidence is not high, however, and more research in this area is needed.
- Speech Therapists, in addition to assisting the rehabilitation of the patients, play an important but not frequently recognised role as the facilitator of communication by advising the professionals and carers about the best way to communicating with the patients.
- Problems of rehabilitation are mainly caused by breakdown of communication between professional, patients and the carers; lack of care planning and coordination; failure to address the carers' needs; inappropriate hospital admission; shortage of therapy and poor training.
- Purchasers of services for stroke must take the needs of the carers into account, especially in the provision of respite care and good information.
- The voluntary organisations play a significant role; their talents and resources should be augmented by joint projects with the health service.
- ***There is strong evidence that organised stroke care can save lives, increase health gains and reduce requirement for hospital care. This is by far the most important advance in stroke care. Dedicated stroke units in all general district hospitals with a designated clinician augmented by "fast-track" outpatient assessment is the way forward. This change need not be an expensive option as it is possible to develop stroke units using an evolutionary approach of using existing facilities.***

8 PREVENTION OF STROKE

The important message is that many strokes are preventable or their occurrence can be delayed through action to prevent the development of complications from cerebrovascular disease.

8.1 Structure for Action in the Prevention of Stroke

It is considered correct to examine the prevention of disease with health promotion and health protection but for this needs assessment it will be discussed as a single issue divided into the three classical components:

- Primary Prevention - the action required to prevent the development of stroke or TIA in people without known cerebrovascular disease.
- Secondary Prevention - The action required to minimise the effect of known cerebrovascular disease and prevent further occurrence and hence prevalence of stroke in the community.
- Tertiary Prevention - the reduction of the impairments, disabilities and handicaps resulting from stroke.

8.2 PREVENTION OF STROKE

The traditional approach is to identify people at high risk of stroke and modify their risk factors by treatment or other means. The other approach is directed at the population to modify risk behaviour so as to prevent high risk groups. Both approaches should be complementary and Health Boards have the responsibility for promoting individual care and responsibility through dietary, smoking and fitness campaigns as well as providing effective medical services to detect and treat disease.

8.3 Public Health Measures for the Prevention of Stroke

Primary prevention is directed at modification of the risk factors as set out in chapter 5 (sections 5.21 - 5.28) through local and national health promotion programmes. The most significant risk factors for stroke are raised blood pressure, smoking, diet including alcohol, obesity and deprivation. All are inter-related to each other and in the aetiology of other forms of vascular disease and cancer.

8.4 Blood Pressure Control and the Prevention of Stroke

This is the most significant risk factor and action to reduce it should be part of national and local campaigns directed at the reduction of salt in the diet and encouraging people to go to their general practitioner to determine their blood pressure level and get it managed if it is high. The reduction in salt intake from 170 to 70 mmol per day is estimated would reduce systolic blood pressure by 5 mm Hg in the population. Coupled with reduction in weight and alcohol consumption the INTERSALT study⁶¹ estimated this would double the fall in population BP.

8.5 Population detection of raised blood pressure should be encouraged in a range of facilities not necessarily medical, providing the staff are trained, the equipment is standardised and high readings are validated in the appropriate clinical setting later. Blood pressures greater than 160 systolic and 95 diastolic require treatment and it should be aimed to have 50% of these people controlled to

140/90 or less. Recent evidence suggests the rule of halves in the management of blood pressure is only slowly improving in Scotland compared to the United States where it is now known blood pressure control is good at nearly 70% and having a significant impact on the incidence of strokes.

Note - the rule of halves states that only half of the patients with hypertension are known to the health service and of those only half are receiving treatment for which half of these are receiving effective treatment or in practice only 12% of hypertensives are being properly treated.

8.6 Blood pressure control is possibly best managed in general practice with protocols such as has been established in Lothian for many years. For those patients managed in hospital, computerised shared care systems should be encouraged such as that developed in Grampian (PRS) and currently being redeveloped nationally. Research also indicates that the management of mild/moderate hypertension needs to be considered with care as the side effects and cost of medication can outweigh the benefits in stroke prevention. The occurrence of stroke in patients under 65 years with raised blood pressure is a well known audit point and highlights the needs for preventive action to begin at an early age.

RECOMMENDATION 14

8.7 Primary Prevention of Stroke in General Practice

As stated above general practice has a key role to play and the health service reforms require that multiphasic screening is offered to patients every three years and yearly for those over 75 years of age. This should have an effect in the future on blood pressure control and modification of other risk factors. The new reforms in general practice will identify at risk patients for vascular disease so that a register could be established to facilitate care and audit of outcomes of management on a local scale.

8.8 It has also been claimed by identifying the important risk factors for stroke in the asymptomatic population it is possible to identify the 10% from whom 50% of strokes will emerge. Data from the British Regional Heart Study of men 40 to 55 years has been recently used⁶² to develop an at risk score which identified 77% of all strokes in a five year period. This is of importance for the question of the use of small doses of aspirin to the population as a whole or to identified high risk groups. Results, however, from the recent aspirin trials demonstrates as yet no clear evidence on the balance of risks and benefits of antiplatelet therapy in the primary prevention of stroke among low risk patients. The role of aspirin in TIAs, previous strokes and related cardiac disease is clear (see below).

8.9 Primary Prevention of Stroke as Part of a Strategy for Health

Primary prevention of the other known risk factors should not be undertaken as a programme for the prevention of stroke alone as they are closely related to the other major killing diseases of heart disease and cancers. There is increasing evidence that single or even multiple action programmes of prevention have little effect and are not cost effective. Primary prevention should be directed towards the Health Education Board for Scotland's programme of healthy lifestyles which indirectly includes avoidance of the known risk factors for stroke. The role of aspirin in the primary prevention of strokes other than in selected high risk groups remains unproven so it is not recommended for population intervention. Virtually no attention has been given to date, on action to alleviate the effects of deprivation on stroke prevention.

8.10 SECONDARY PREVENTION OF STROKE

Action here is directed at the prevention of further strokes in people with known vascular disease and after a first stroke or TIA. This is the most effective strategy to decrease the number of strokes and their associated mortality and disability in the community. After the first stroke or TIA there is a 12% risk in the first year and about 7% in subsequent years which is seven times the risk of stroke in the normal population for the same age.

RECOMMENDATION 15

8.11 Prevention of Recurrent Stroke

In stroke and TIA patients, the prevalence of known risk factors combined with age, frequency of TIAs, peripheral vascular disease, and left ventricular hypertrophy can identify patients at particularly high risk of further vascular events. Low to moderate risk patients should have low risk therapy such as aspirin and minimal investigation (although they should have CT scan for diagnosis) whereas the high risk patient have more to gain from intensive investigation and rigorous management with potentially hazardous and expensive treatment such as carotid surgery.

8.12 Vascular Risk Factor Modification

These risk factors have been described in chapter 5 and their management has been described in some detail above. Hypertension is present in nearly half of those who have survived their first stroke. All risk factors should be identified and acted upon, even in the elderly although care must be taken to avoid over treating hypertension. Hypotension is to be avoided in certain TIAs and patients with carotid artery disease to prevent hypotensive cerebral infarction. The occurrence of a stroke or TIAs is an indication of not only cerebrovascular disease but possible cardiac and peripheral vascular disease which requires management and prevention measures (similar to stroke).

8.13 Anti Thrombotic Therapy

There are two forms of therapy to prevent and aid dissolving of blood clots forming in the cerebral and extracerebral circulations:

a) **Antiplatelet drugs** - There have been numerous clinical trials⁵¹ with now convincing evidence that long term antiplatelet drugs reduce the risk of recurrent stroke and other serious vascular events by a quarter. The effect is similar in young and old, male and female, TIAs and ischaemic stroke (not haemorrhagic because of risk of bleeding), diabetes and with or without hypertension. The best drug is aspirin and after that ticlopidene which can be prescribed for those who cannot tolerate aspirin. Treatment must be initiated in the acute phase after a diagnosis is established.

b) **Anticoagulants** - Evidence tends to suggest the risk of the drug therapy outweighs the benefits, except possibly for cardiogenic embolism. Heparin is often given initially followed by warfarin but these must be used with caution.

8.14 Surgical and other Invasive Approaches to Prevent Ischaemic Strokes and TIAs

As discussed, there is a need to assess those who would benefit most from these interventions against the high risk of stroke from those procedures themselves.

Most common and still controversial after 40 years is carotid endarterectomy where there are risks of stroke and/or death both during the investigation and the surgery. These patients should only be operated on within randomised controlled trials. There is now adequate research evidence of benefit from this operation for symptomatic patients with severe (70-99%) carotid stenosis, but with equal evidence in other groups that there is no benefit in morbidity or reduced mortality despite successful surgery.

8.15 Carotid endarterectomy has now a place in the prevention of further stroke but only in selected patients. These patients need to be identified and referred to the appropriate centre for investigation and operation. Investigation of the extracranial and intracranial arteries is usually done with duplex carotid doppler ultrasound with the selective use of angiography.

8.16 The actual surgery is carried out principally by vascular surgeons and in 1992 there were 293 operations recorded in Scotland in a variety of hospitals. There has been a significant trend in this operation in recent years and it is expected to increase causing further strain on vascular units. The SHSAC recent report on Vascular Surgery Services only briefly mentions this form of surgery but the findings of variations in outcomes between units applies to this form of surgery. Carotid endarterectomy surgery should, therefore, only be purchased for carefully selected patients and from centres with proven record of success.

8.17 There are other surgical procedures involving anastomosis to other cerebral vessels and other vascular operations such as angioplasty of cerebral arteries. Details of carotid endarterectomy trends with place of residence and treatment and operations for subarachnoid haemorrhage are given in Appendix 4.

8.18 Little is known about the risk of recurrence of stroke in haemorrhagic strokes other than the treatment of underlying risk factors or diseases.

8.19 TERTIARY PREVENTION OF STROKE

This is defined as the outcome of rehabilitation in the recovery phase for patients who are disabled from stroke and was largely discussed in chapter 7: section 7.14 to 7.27. There is certain spontaneous recovery but the amount of therapy required to prevent disability and handicap from stroke remains to be scientifically quantified. Most services for this stage of care are known to have limited value after the first three to six months and are usually withdrawn leaving many patients and their carers in the long term coping with significant disability and unknown to statutory services. Sections 7.21 to 7.27 highlight the role of support and information sharing for patients and their carers in this usually neglected phase of stroke care. Action as described in that section of this report, is to prevent the distress and handicap in the long term survivor with disability.

KEY POINTS

- Strokes can be prevented and particularly recurrent strokes.
- Population based action can be used to identify high risk patients and to prevent stroke in high risk groups.
- Overall measures should be part of local and national initiatives for all major diseases because of common aetiology.
- Hypertension is the major risk factor for stroke and can be reduced by population and individual patient management.
- General practice has a key role to play in both aspects although there could be greater access to blood pressure measurement.
- GP screening should be able to identify patients at risk and enable the establishment of an at risk register for monitoring outcomes.
- There is a need to ensure adequate levels of hypertension control although that for mild to moderate disease requires careful assessment to avoid hypotension.
- Antiplatelet therapy (aspirin) is of limited value for those with no evidence of cerebrovascular disease.
- For those with TIAs and ischaemic stroke long term aspirin should be given early to prevent subsequent strokes.
- Preventive action is cumulative so attention to other risk factors such as cigarette smoking, diet, alcohol and obesity must be included at the same time.
- Carotid endarterectomy will have an increasing place in a selected group of patients only.

9 COST OF STROKE

9.1 Type of Costs

The cost of an illness should draw a distinction between direct and indirect costs⁶³. Direct costs comprise the costs of stroke prevention, diagnosis, treatment, rehabilitation and terminal care. In addition to these direct costs with impact on health and social services, there are the indirect costs relating to the values of lives lost, personal suffering, the welfare of the family and friends and so on.

9.2 Life Years Lost from Stroke

The number of life years lost from stroke in the community can be estimated by using the Registrar General routine data on age, sex and cause specific deaths in conjunction with life expectancy at various ages. In 1990, 7998 deaths were recorded in Scotland, where the principal cause was stroke (ICD 430 - 438): these represent around 70 000 life years lost. The average number of life years lost per stroke deaths in Scotland was nine.

9.3 The human capital approach to valuing indirect costs places a monetary value on the "economically productive" life lost from cerebrovascular disease from the number of deaths from stroke before 65 years and applying average gross annual earnings, in Scotland, the foregone productive life year generates a gross productive loss of £49 million at 1991 prices.

9.4 Value of Life

The monetary values per "statistical life" saved tend to be many times larger than those values generated by the human capital approach. The United Kingdom Department of Transportation uses a monetary value of one statistical life saved of around £925 000 in cost-benefit studies of road investment options. If similar figures are expressed as per life year lost, for the Scottish deaths attributed to stroke, the indirect cost is around £1.3 billion.

9.5 Direct Costs of Stroke

A common approach to measuring direct costs has been to make use of routinely available average speciality or hospital costs. Taking this approach the total costs in Scotland in 1988 of inpatients and other health services provided for stroke were estimated to be £118 million or £23 per head of population, compared to £89 million £17 per head in 1974 (1991 prices). The hospital cost for 1990 based on proportional number of discharges and bed day use, amounted to £135 million or around £7500 per discharge where stroke was recorded as a primary diagnosis. Around £39 000 was spent per each of the 3759 staffed beds accounted for by stroke cases. The level of expenditure is equivalent to 7.9% of the total Scottish hospital cost or 4.9% of the total Scottish health care expenditure.

9.6 Specific Stroke Costs

Results of a recent study by the Information and Statistics Division of the Common Services Agency, using patient linkage data provided cost estimates for inpatient, outpatient and general practice costs for Scotland. The cost estimations per patient discharged in 1991 was £8199. The total cost per inpatient, outpatient and general practice consultation was estimated to be around £129 million for Scotland in 1991. The cost information at the global level is useful for illustration of the degree of burden of stroke care in the Health Service, but the costing estimate for

individual discharges is too crude to be useful for contracting. There are also considerable variations across Scotland.

9.7 Direct Stroke Costs in North Lothian

To have better cost information it is necessary to extend the costs beyond the crude unadjusted average costs to provide a more detailed summary of the resources actually consumed by stroke patients. A recent study, funded by the Scottish Office, attempted to address this problem. Data were gathered on patients admitted to hospitals in the North Lothian area with acute stroke, TIA, or investigations for cerebrovascular diseases between October 1990 and May 1991. The patients were mainly concentrated in the Western General Hospital, Edinburgh.

9.8 The cost analysis concentrated specifically on stroke patients. The majority were located in general medical wards with the remainder housed in geriatric and neurology wards. Not all the patients were primary admissions, some were already inpatients and others were secondary referrals. The average cost per case for patients in general medical wards (1991 figures) was estimated to be £6895.

9.9 Methodology of Study

Measuring direct costs involved three stages. First the resources used were identified. Every ingredient necessary for the treatment of stroke patients was listed - for example, investigations, drugs, staff and so on. Secondly the amount of each item used was quantified - for example, hours of nursing time, doses of drugs administered, number of investigations carried out. This information was obtained from patients' records and from advice from the staff involved in treating stroke patients. Finally a unit value for each component of service was established - for example, hourly wage rates, drug prices. Inpatient costs tended to vary throughout the patients' hospital stay. Investigation costs, for example, were high in the early part of the patients' hospital stay. The majority of costs, mainly nursing and overhead costs, remained fairly constant throughout length of stay.

9.10 Economic Evaluations and Stroke

Given that both the direct and indirect costs of stroke are high it is important to assess the resource implications of competing treatment strategies for stroke patients. A formal economic evaluation looks at both the input and outputs of a health intervention - that is, the costs and outcomes. The clinical efficacy and efficiency of a health intervention should be established before the economic evaluation is undertaken.

There are several types of economic evaluations. Cost minimisation studies are appropriate when the health outcomes of competing strategies are likely to be the same or similar. Where health outcomes are likely to be different there are three main types of economic evaluations.:

- Cost-effectiveness analysis
- Cost-benefit analysis
- Cost-utility analysis

In cost-effective analysis, health benefits are measured in natural or health units (life years saved or strokes prevented). In cost-benefit analysis, both the costs and consequences of a health intervention are measured in monetary terms (£ or \$). In the case of cost-utility analyses, the health outcomes incorporate some measure of patients' preferences.

In terms of stroke most economic evaluations have focused on primary prevention. Using data from England and Wales during the past 30 years, Teeling Smith⁶⁴ assessed the economic benefits of effectively controlling hypertension. A study carried out in New Zealand considered the cost-effectiveness of using anti-hypertensive drugs with mild to moderate hypertensive patients⁶⁵. A Swedish study⁶⁶ investigated the cost-effectiveness of providing anticoagulants or aspirins to people in atrial fibrillation.

Young and Forster⁶⁷, building on a community stroke trial, compared the direct and indirect costs of day hospital and home physiotherapy as two alternative rehabilitation strategies for stroke patients. Their study was essentially a cost minimisation study.

Many health interventions which reduce the incidence of stroke and associated morbidity and mortality have not been economically appraised. Organised stroke care in the form of stroke units has been shown to be effective in saving lives. A comprehensive economic evaluation comparing management of stroke patients in stroke units to conventional non-specialist care in general medical wards, could be of great value.

The extra costs of providing intensive rehabilitation in stroke units should be estimated. The costing exercise carried out in the Western General Hospital showed that the majority of costs in the general medical ward setting varied with length of stay. A comparison, therefore, of trends in patients length of stay in both settings would be important. In addition, such an undertaking should incorporate non-mortality outcome indicators, for example, assessment of functional outcome, patients' preferences and general health. There is a need to continue this type of analysis.

RECOMMENDATION 16

9.11

KEY POINTS

- The cost of stroke is high. The indirect cost of Stroke represents 70 000 life years lost for Scotland at an estimated £49 million loss of gross productive earning, and "£ 1.3 billion loss in value of life".
- The direct cost of stroke is equivalent to £23 per head of Scottish population per year, 7.9% of total Scottish hospital cost or 4.9% of overall Scottish health budget.
- The direct cost per case of stroke is in the region of £8198.
- The cost information for stroke is crude. Cost per case contract in the short term should be avoided.
- A specific study in North Lothian established direct hospital average costs of £6895 per patient, which was largely dependent on length of stay.

10 OUTCOME INDICATORS

10.1 Mortality Measures

The Scottish health target document, "Scotland's Health: a Challenge To Us All"⁶⁸, contains no specific target for stroke. In the UK document "The Health of the Nation"⁶⁹ the targets for stroke were to reduce death rates for stroke under 65 years by at least 40% by the year 2000 from 12.5 per 100 000 population in 1990 to no more than 7 per 100 000; and for those aged 65 to 75 years by at least 40% by the year 2000 from 265 per 100 000 population in 1990 to no more than 159 per 100 000.

10.2 Many health boards have set their own mortality targets for stroke. While mortality indicators are useful in long term monitoring, other indicators are necessary for a disease that causes multiple disabilities. Disability outcomes are time consuming to collect and for the purpose of monitoring the quality of care and contract proxy measures should be used.

10.3 Structure indicators

The nature of the service for stroke was discussed in detail in chapter 7. Measures of structure can include:

- clearly designated consultants responsible for stroke care
- availability of dedicated stroke units
- availability of fast-track neurovascular out patient clinics for patients that do not need inpatient care

10.4 Process indicators

These measures can include:

- explicit criteria for admission to stroke unit
- early assessment by consultant responsible for the stroke unit
- multidisciplinary assessment of disability which is properly documented
- provision of information for patients, relatives and carers
- protocol for care and discharge policy
- multidisciplinary audit

10.5 Outcome indicators

Outcome indicators are at present being developed by CRAG (Clinical Resource and Audit Group), Royal Colleges and the Scottish Forum for Public Health Medicine for the Management Executive (ME) of NHSIS. A preliminary list is at discussion stage. Until these are available, indicators generated from routine health information can be used. These indicators, although easy and simple to use, have limitations and should be interpreted with caution.

10.6 SNAP Outcome Indicators

The following suggestion from this report should be considered for use as outcome indicators:

- Record linkage is discussed in chapter 6 and should be developed into a mechanism for monitoring stroke.
- Scottish Record Linkage on Stroke should be used to monitor the rate of recurrent stroke.
- Mortality data from the linkage study for a specific time period, for example 8 weeks after stroke, could be used as a very crude measure of effectiveness of acute care.
- Duration of stay in stroke unit can be used as a measure to check adherence to agreed care protocol.
- Monitoring of discharge destination may help to identify local difficulties with supported accommodation and this could be linked to the length of stay in acute wards.
- Functional ability at discharge is not easily available. This type of information should be collected as part of the local clinical audit process and the aggregated data should be made available for contract monitoring. Ideally this should be collected longitudinally, for example, six month after discharge.

RECOMMENDATION 17

10.7 Audit in Stroke Care

Audit is now established in stroke management with many hospitals in Scotland using the proforma for data collection and associated computer programme developed by Dr M Dennis for the Royal College of Physicians. A working group from the Royal Colleges of Physicians and Surgeons in Glasgow is currently preparing national guidelines for management and audit of stroke. The proposed audit will examine structure and process aspects in all health boards and selected hospitals and Trusts. In addition there will be a comprehensive clinical audit of a sample of stroke sufferers in all hospital facilities excluding long stay hospitals. This initiative will provide a much needed survey on the current situation of stroke care in Scotland and indicate where future purchasing strategies should be directed.

11 PURCHASING ISSUES

11.1 Organised stroke care can save lives, increase health gains and reduce requirement for hospital care. This is by far the most important advance in stroke care. Dedicated stroke units in all general district hospitals with a designated consultant augmented by "fast-track" outpatient assessment, is the way forward. This change need not be an expensive option as it is possible to develop stroke units in an evolutionary way by using existing facilities. *Stroke Units are necessary, feasible and affordable. All purchasers should initiate discussion with all local provider units with the objective of setting up Stroke Units within the next 12 months.*

11.2 Organised Stroke Care also implies the setting up of protocols for the investigation, treatment and follow-up care of patients both in the hospital and community. This will cut across the function and responsibility of Acute hospital provider units, Community and Priority Services Unit and Social Work Department. It is an issue which should be taken up urgently by the Joint Planning Team for Community Care.

11.3 Computer tomography (CT) scanning will become a central element of modern stroke care. In the interim period, there is a need to address the current usage of the limited number of existing scanners and if necessary, the King's Fund Consensus Statement on Stroke Indications for CT scanning should be adopted

11.4 The new pilot project (see Appendix 5) proposed by the Chest Heart and Stroke Scotland, to collaborate with the health service in providing care for patients and their carers in the community (CHS Scotland Community Stroke Service), via a Stroke Care Co-ordinator which gives access to community services as well as those of Chest Heart and Stroke Scotland. The Stroke Care Co-ordinator will support patients and carers at home and will assist the delivery of "seamless" care by creating a support network and facilities through this proactive and comprehensive capturing of all hospital cases of stroke. This proposal is innovative and should be fully considered.

11.5 The prevention of stroke is a good example of how risk factors interact and hence the need to have non disease specific, multiple risk factor prevention strategy for health promotion. If this is augmented with opportunistic screening in primary care for specific risk factors and their effective management, especially for hypertension, prevention of stroke can be an effective approach for health gains.

12 RECOMMENDATIONS

- 1) Health Boards should encourage the clinical classification of strokes as this would improve the statistical recording and monitoring of stroke.
- 2) Record linkage should be further developed and used by Health Boards for epidemiological and monitoring purposes.
- 3) The role of carotid endarterectomy in Scotland requires further examination as to the level to be purchased and the number of providers.
- 4) Health Boards should use a framework to ensure the variety of services for stroke patients and their carers are considered for purchasing.
- 5) All stroke patients should have a structured assessment of their clinical condition and disabilities to facilitate care and this should be used for audit and incorporated in any stroke register.
- 6) Health Boards should ensure that most patients with stroke have access to CT scanning either directly or through acute cerebrovascular clinics.
- 7) Health Boards should ensure all TIAs and ischaemic strokes that survive start early antiplatelet therapy and risk factor modification to prevent subsequent strokes.
- 8) Health Boards need to ensure key workers are identifiable for stroke patients and their carers as well as other staff because of the multidisciplinary nature of stroke management.
- 9) Further research is required on the quantity, duration and type of rehabilitation for stroke to be purchased and provided.
- 10) The needs of carers, including respite care, must be considered in purchasing services for stroke both by the Health Boards and other agencies responsible for their care.
- 11) Health Boards and GPs should ensure there is adequate information for patients and their carers about stroke and local stroke services.
- 12) Health Boards should liaise with voluntary organisations and private agencies as appropriate, as well as social services as possible providers of new innovative care especially for patients who may need long term care.
- 13) Health Boards should define the services they require for stroke including designated facilities (stroke units) and expected outcomes.
- 14) Health Boards should undertake studies to determine blood pressure control in their population and have audited guidelines on its management.
- 15) Health Boards should ensure they have programmes for the prevention of stroke and they have monitoring systems to measure the outcomes.
- 16) Further economic studies are required to determine the health gain and release of resources from organised stroke services and secondary prevention strategies.
- 17) Much research on stroke care, especially on outcomes, is still to be done and should be supported and facilitated by all purchasers, and linked to clinical audit.

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TABLE 6.1

Numbers and Rates per 1 000 pop.

**Mortality for selected causes;
by age and health board: 1992**

Age group/Cause of death ¹	Scotland	Argyll & Clyde	Ayrshire & Arran	Dumfries & Galloway	Fife	Forth Valley	Grampian Glasgow	Highland	Lanarkshire	Lothian	Orkney	Shetland	Tayside	Western Isles
45-64														
All Causes	No. 9 954 Rate 8.9	No. 904 Rate 9.3	No. 740 Rate 8.8	No. 282 Rate 7.9	No. 624 Rate 8.4	No. 517 Rate 8.4	No. 783 Rate 7.3	No. 369 Rate 8.0	No. 1 105 Rate 9.6	No. 1 292 Rate 8.2	No. 38 Rate 8.5	No. 34 Rate 7.5	No. 762 Rate 8.6	No. 56 Rate 8.5
Heart disease (390-429)	No. 3 242 Rate 2.9	No. 297 Rate 3.0	No. 243 Rate 2.0	No. 96 Rate 2.7	No. 206 Rate 2.0	No. 193 Rate 3.2	No. 230 Rate 2.1	No. 123 Rate 3.6	No. 431 Rate 3.5	No. 303 Rate 2.4	No. 9 Rate 2.0	No. 9 Rate 2.0	No. 240 Rate 2.7	No. 19 Rate 2.9
of which														
Ischaemic (410-414)	No. 2 922 Rate 2.6	No. 277 Rate 2.8	No. 221 Rate 2.6	No. 89 Rate 2.5	No. 107 Rate 2.5	No. 101 Rate 3.0	No. 202 Rate 1.9	No. 106 Rate 3.1	No. 396 Rate 3.2	No. 339 Rate 2.1	No. 9 Rate 2.0	No. 9 Rate 2.0	No. 211 Rate 2.4	No. 19 Rate 2.9
Malignant neoplasms (140-209)	No. 3 732 Rate 3.3	No. 310 Rate 3.3	No. 303 Rate 3.5	No. 105 Rate 2.9	No. 244 Rate 3.3	No. 150 Rate 2.6	No. 307 Rate 2.8	No. 138 Rate 4.1	No. 422 Rate 3.4	No. 532 Rate 3.4	No. 8 Rate 1.8	No. 13 Rate 2.9	No. 290 Rate 3.3	No. 21 Rate 3.2
of which														
Trachea, bronchus and lung (162)	No. 1 111 Rate 1.0	No. 90 Rate 1.0	No. 95 Rate 1.1	No. 32 Rate 0.9	No. 67 Rate 0.9	No. 54 Rate 0.9	No. 77 Rate 0.7	No. 40 Rate 0.9	No. 116 Rate 0.9	No. 157 Rate 1.0	No. 2 Rate 0.4	No. 3 Rate 0.7	No. 87 Rate 1.0	No. 4 Rate 0.6
Stomach (151)	No. 161 Rate 0.1	No. 0 Rate 0.1	No. 16 Rate 0.2	No. 4 Rate 0.1	No. 9 Rate 0.1	No. 5 Rate 0.1	No. 15 Rate 0.1	No. 6 Rate 0.1	No. 24 Rate 0.2	No. 22 Rate 0.1	-	-	No. 16 Rate 0.2	No. 1 Rate 0.2
Cerebrovascular disease (430-439)	No. 628 Rate 0.6	No. 55 Rate 0.6	No. 47 Rate 0.6	No. 20 Rate 0.6	No. 45 Rate 0.6	No. 38 Rate 0.6	No. 50 Rate 0.5	No. 148 Rate 0.7	No. 71 Rate 0.6	No. 70 Rate 0.4	No. 2 Rate 0.4	No. 1 Rate 0.2	No. 44 Rate 0.5	No. 2 Rate 0.3
65-74														
All Causes	No. 15 204 Rate 34.5	No. 1 403 Rate 37.4	No. 1 170 Rate 34.5	No. 480 Rate 32.4	No. 1 051 Rate 33.9	No. 835 Rate 36.2	No. 1 205 Rate 29.8	No. 543 Rate 31.7	No. 1 623 Rate 37.3	No. 1 982 Rate 31.6	No. 37 Rate 21.6	No. 53 Rate 32.5	No. 1 170 Rate 31.4	No. 96 Rate 34.0
Heart disease (390-429)	No. 5 393 Rate 12.2	No. 491 Rate 13.1	No. 441 Rate 12.9	No. 100 Rate 12.7	No. 392 Rate 12.7	No. 302 Rate 13.1	No. 427 Rate 10.6	No. 196 Rate 13.2	No. 607 Rate 13.9	No. 667 Rate 10.6	No. 19 Rate 11.1	No. 19 Rate 11.7	No. 412 Rate 11.0	No. 34 Rate 12.1
of which														
Ischaemic (410-414)	No. 4 067 Rate 11.0	No. 453 Rate 12.1	No. 404 Rate 11.0	No. 174 Rate 11.8	No. 360 Rate 11.6	No. 275 Rate 11.9	No. 393 Rate 9.7	No. 181 Rate 10.6	No. 550 Rate 12.0	No. 570 Rate 9.2	No. 17 Rate 9.9	No. 10 Rate 11.0	No. 360 Rate 9.6	No. 32 Rate 11.3
Malignant neoplasms (140-209)	No. 4 933 Rate 11.2	No. 465 Rate 12.4	No. 356 Rate 10.4	No. 147 Rate 9.9	No. 336 Rate 10.9	No. 245 Rate 10.6	No. 397 Rate 9.8	No. 103 Rate 13.4	No. 490 Rate 11.3	No. 650 Rate 10.5	No. 8 Rate 4.7	No. 17 Rate 10.4	No. 381 Rate 10.2	No. 35 Rate 12.4
of which														
Trachea, bronchus and lung (162)	No. 1 751 Rate 4.0	No. 181 Rate 4.0	No. 123 Rate 3.6	No. 53 Rate 3.6	No. 113 Rate 3.6	No. 76 Rate 3.3	No. 113 Rate 2.8	No. 443 Rate 5.4	No. 165 Rate 3.8	No. 249 Rate 4.0	No. 2 Rate 1.2	No. 2 Rate 1.2	No. 126 Rate 3.4	No. 8 Rate 2.8
Stomach (151)	No. 275 Rate 0.6	No. 40 Rate 1.1	No. 10 Rate 0.5	No. 9 Rate 0.6	No. 13 Rate 0.4	No. 13 Rate 0.6	No. 10 Rate 0.4	No. 65 Rate 0.8	No. 34 Rate 0.8	No. 34 Rate 0.5	-	-	No. 18 Rate 0.5	No. 3 Rate 1.1
Cerebrovascular disease (430-439)	No. 1 509 Rate 3.4	No. 151 Rate 3.7	No. 127 Rate 3.7	No. 51 Rate 3.4	No. 110 Rate 3.8	No. 84 Rate 3.6	No. 106 Rate 2.6	No. 51 Rate 3.9	No. 154 Rate 3.5	No. 100 Rate 3.0	No. 3 Rate 1.8	No. 6 Rate 3.7	No. 118 Rate 3.2	No. 9 Rate 3.2
75 and over														
All Causes	No. 32 733 Rate 99.9	No. 2 791 Rate 102.8	No. 2 346 Rate 95.3	No. 1 075 Rate 100.3	No. 2 202 Rate 97.2	No. 1 681 Rate 101.7	No. 3 166 Rate 99.1	No. 6 047 Rate 96.3	No. 2 958 Rate 107.3	No. 4 817 Rate 98.4	No. 169 Rate 114.0	No. 154 Rate 104.3	No. 2 988 Rate 101.7	No. 250 Rate 96.8
Heart disease (390-429)	No. 10 433 Rate 31.8	No. 927 Rate 34.1	No. 779 Rate 31.6	No. 342 Rate 31.9	No. 730 Rate 32.2	No. 536 Rate 32.4	No. 1 000 Rate 31.3	No. 1 002 Rate 31.6	No. 980 Rate 35.6	No. 1 490 Rate 30.4	No. 62 Rate 41.8	No. 34 Rate 23.0	No. 1 007 Rate 34.3	No. 69 Rate 26.7
of which														
Ischaemic (410-414)	No. 8 549 Rate 26.1	No. 764 Rate 28.1	No. 639 Rate 25.9	No. 293 Rate 27.3	No. 633 Rate 27.9	No. 459 Rate 27.0	No. 813 Rate 25.5	No. 1 427 Rate 23.5	No. 845 Rate 30.7	No. 1 163 Rate 23.7	No. 56 Rate 37.8	No. 27 Rate 18.3	No. 824 Rate 28.0	No. 59 Rate 22.8
Cerebrovascular disease (430-439)	No. 5 645 Rate 17.2	No. 497 Rate 18.3	No. 436 Rate 17.7	No. 200 Rate 18.7	No. 396 Rate 17.5	No. 300 Rate 18.6	No. 534 Rate 16.7	No. 963 Rate 15.8	No. 514 Rate 18.6	No. 860 Rate 17.6	No. 30 Rate 20.2	No. 21 Rate 14.2	No. 458 Rate 15.6	No. 51 Rate 19.7
Malignant neoplasms (140-209)	No. 5 951 Rate 18.2	No. 507 Rate 18.7	No. 411 Rate 16.7	No. 200 Rate 18.5	No. 305 Rate 17.0	No. 306 Rate 18.5	No. 568 Rate 17.8	No. 1 182 Rate 19.5	No. 400 Rate 17.4	No. 826 Rate 18.9	No. 24 Rate 16.2	No. 26 Rate 17.6	No. 521 Rate 17.7	No. 48 Rate 18.6
of which														
Trachea, bronchus and lung (162)	No. 1 405 Rate 4.3	No. 140 Rate 5.2	No. 82 Rate 3.3	No. 34 Rate 3.2	No. 76 Rate 3.4	No. 76 Rate 4.6	No. 125 Rate 3.9	No. 347 Rate 5.7	No. 104 Rate 3.8	No. 205 Rate 4.2	No. 7 Rate 4.7	No. 2 Rate 1.4	No. 131 Rate 4.5	No. 4 Rate 1.5
Stomach (151)	No. 381 Rate 1.2	No. 37 Rate 1.4	No. 30 Rate 1.2	No. 12 Rate 1.1	No. 18 Rate 0.8	No. 22 Rate 1.3	No. 31 Rate 1.0	No. 83 Rate 1.4	No. 35 Rate 1.3	No. 61 Rate 1.2	No. 4 Rate 2.7	No. 1 Rate 0.7	No. 25 Rate 0.9	No. 3 Rate 1.2

Source: Registrar General for Scotland

¹ ICD numbers (9th Revision) for each cause of death are given in brackets.

Mortality for selected causes;
by age and health board: 1992

Numbers and Rates per 1 000 pop.

TABLE 6.2

Age group/Cause of death ¹	Scotland	Argyll & Clyde	Ayrshire & Arran	Dumfries & Galloway	Fife	Forth Valley	Grampian	Greater Glasgow	Highland	Lanarkshire	Lothian	Orkney	Shetland	Tayside	Western Isles
All Ages															
All Causes	No. 60 937 Rate 11.9	No. 5 368 Rate 12.3	No. 4 405 Rate 11.9	No. 1 358 Rate 13.0	No. 1 927 Rate 13.0	No. 4 051 Rate 11.7	No. 3 181 Rate 11.7	No. 5 446 Rate 10.6	No. 12 110 Rate 13.1	No. 6 085 Rate 10.8	No. 8 533 Rate 11.4	No. 253 Rate 12.9	No. 252 Rate 11.2	No. 5 162 Rate 13.2	No. 415 Rate 14.1
Heart disease (390-429)	No. 19 336 Rate 3.8	No. 1 734 Rate 4.0	No. 1 405 Rate 3.9	No. 432 Rate 4.1	No. 631 Rate 4.3	No. 1 344 Rate 3.9	No. 1 039 Rate 3.8	No. 1 688 Rate 3.3	No. 3 652 Rate 4.0	No. 2 057 Rate 3.7	No. 2 575 Rate 3.4	No. 91 Rate 4.6	No. 64 Rate 2.8	No. 1 675 Rate 4.3	No. 122 Rate 4.1
Malignant neoplasms (140-208)	No. 15 132 Rate 3.0	No. 1 333 Rate 3.1	No. 1 113 Rate 3.0	No. 347 Rate 3.3	No. 470 Rate 3.2	No. 995 Rate 2.9	No. 739 Rate 2.7	No. 1 313 Rate 2.6	No. 3 185 Rate 3.5	No. 1 453 Rate 2.6	No. 2 191 Rate 2.9	No. 42 Rate 2.1	No. 56 Rate 2.5	No. 1 236 Rate 3.2	No. 108 Rate 3.7
Cerebrovascular disease (430-438)	No. 7 861 Rate 1.5	No. 709 Rate 1.6	No. 613 Rate 1.6	No. 162 Rate 1.6	No. 273 Rate 1.6	No. 567 Rate 1.6	No. 430 Rate 1.6	No. 695 Rate 1.4	No. 1 450 Rate 1.6	No. 746 Rate 1.3	No. 1 129 Rate 1.5	No. 35 Rate 1.8	No. 29 Rate 1.3	No. 627 Rate 1.6	No. 63 Rate 2.1
Under 1															
All Causes	No. 449 Rate 6.8	No. 40 Rate 7.0	No. 39 Rate 8.2	No. 7 Rate 5.6	No. 13 Rate 7.2	No. 29 Rate 6.5	No. 21 Rate 6.0	No. 41 Rate 6.1	No. 18 Rate 6.8	No. 41 Rate 5.5	No. 71 Rate 7.3	No. 2 Rate 8.3	No. 1 Rate 3.1	No. 26 Rate 5.3	No. 2 Rate 5.9
Certain conditions originating in perinatal period (760-779)	No. 214 Rate 3.2	No. 20 Rate 3.5	No. 15 Rate 3.1	No. 6 Rate 4.0	No. 10 Rate 5.5	No. 12 Rate 2.7	No. 8 Rate 2.3	No. 21 Rate 3.1	No. 9 Rate 3.4	No. 26 Rate 3.5	No. 34 Rate 4.1	No. 1 Rate 4.1	No. 1 Rate 3.1	No. 10 Rate 2.0	No. 1 Rate 3.0
Congenital anomalies (740-759)	No. 137 Rate 2.1	No. 11 Rate 1.9	No. 17 Rate 3.6	No. -	No. 1 Rate 0.6	No. 10 Rate 2.2	No. 8 Rate 2.3	No. 10 Rate 1.5	No. 3 Rate 1.1	No. 11 Rate 1.5	No. 26 Rate 2.7	No. -	No. -	No. 10 Rate 2.0	No. -
Pneumonia (400-406)	No. 1 Rate -	No. -	No. -	No. -	No. -	No. -	No. -	No. -	No. -	No. -	No. 1 Rate 0.1	No. -	No. -	No. -	No. -
External causes of injury (E000-E099)	No. 9 Rate 0.1	No. -	No. -	No. -	No. 1 Rate 0.2	No. -	No. -	No. 2 Rate 0.3	No. 1 Rate 0.4	No. -	No. -	No. -	No. -	No. 1 Rate 0.2	No. 1 Rate 3.0
Infectious and parasitic diseases (000-139)	No. 3 Rate -	No. 1 Rate 0.2	No. -	No. -	No. -	No. -	No. -	No. -	No. -	No. 1 Rate 0.1	No. -	No. -	No. -	No. 1 Rate 0.2	No. -
1-14															
All Causes	No. 209 Rate 0.2	No. 13 Rate 0.2	No. 20 Rate 0.3	No. 1 Rate 0.1	No. 2 Rate 0.1	No. 17 Rate 0.3	No. 15 Rate 0.3	No. 26 Rate 0.3	No. 6 Rate 0.2	No. 24 Rate 0.2	No. 21 Rate 0.2	No. 2 Rate 0.5	No. 1 Rate 0.2	No. 21 Rate 0.3	No. 1 Rate 0.2
Motor vehicle traffic accidents (E810-E819)	No. 33	No. 2	No. 3	No. -	No. -	No. 2	No. 4	No. 3	No. -	No. 1	No. 3	No. 1	No. -	No. 4	No. -
Malignant neoplasms (140-208)	No. 38	No. 3	No. 4	No. -	No. 1	No. 2	No. 1	No. 3	No. 1	No. 6	No. 4	No. 1	No. -	No. 4	No. 1
Congenital anomalies (740-759)	No. 26	No. 1	No. 3	No. -	No. -	No. 2	No. 2	No. 4	No. -	No. 2	No. 3	No. -	No. -	No. 4	No. -
Respiratory diseases (460-519)	No. 15	No. 1	No. -	No. 1	No. -	No. -	No. 1	No. 3	No. -	No. -	No. 2	No. -	No. 1	No. 3	No. -
Accidents in the home (E050-E069, E800-E829 parts)	No. 11.0	No. -	No. 1.0	No. -	No. -	No. 2.0	No. -	No. 4.0	No. 2.0	No. -	No. 1.0	No. -	No. -	No. 1.0	No. -
15-44															
All Causes	No. 2 388 Rate 1.1	No. 217 Rate 1.1	No. 154 Rate 1.0	No. 52 Rate 1.2	No. 75 Rate 1.3	No. 128 Rate 0.8	No. 112 Rate 0.9	No. 225 Rate 1.0	No. 490 Rate 1.2	No. 254 Rate 1.0	No. 350 Rate 1.0	No. 5 Rate 0.6	No. 9 Rate 0.9	No. 195 Rate 1.2	No. 10 Rate 0.9
Malignant neoplasms (140-208)	No. 478 Rate 0.2	No. 40 Rate 0.2	No. 39 Rate 0.2	No. 12 Rate 0.3	No. 17 Rate 0.3	No. 20 Rate 0.2	No. 29 Rate 0.2	No. 30 Rate 0.2	No. 80 Rate 0.2	No. 55 Rate 0.2	No. 71 Rate 0.2	No. 1 Rate 0.1	No. -	No. 40 Rate 0.2	No. 3 Rate 0.3
Motor vehicle traffic accidents (E810-E819)	No. 258 Rate 0.1	No. 13 Rate 0.1	No. 16 Rate 0.1	No. 16 Rate 0.4	No. 18 Rate 0.3	No. 18 Rate 0.1	No. 13 Rate 0.1	No. 38 Rate 0.2	No. 24 Rate 0.1	No. 28 Rate 0.1	No. 34 Rate 0.1	No. 1 Rate 0.1	No. 1 Rate 0.1	No. 17 Rate 0.1	No. 1 Rate 0.1
Heart disease (390-429)	No. 260 Rate 0.1	No. 19 Rate 0.1	No. 22 Rate 0.1	No. 7 Rate 0.2	No. 5 Rate 0.1	No. 14 Rate 0.1	No. 8 Rate 0.1	No. 31 Rate 0.1	No. 50 Rate 0.1	No. 38 Rate 0.1	No. 34 Rate 0.1	No. 1 Rate 0.1	No. 2 Rate 0.2	No. 16 Rate 0.1	No. -
Cerebrovascular disease (430-438)	No. 78 Rate (0.0)	No. 6 Rate 0.0	No. 3 Rate 0.0	No. -	No. 2 Rate 0.0	No. 8 Rate 0.1	No. 6 Rate 0.1	No. 5 Rate 0.0	No. 18 Rate 0.0	No. 7 Rate 0.0	No. 11 Rate 0.0	No. -	No. 1 Rate 0.1	No. 7 Rate 0.0	No. 1 Rate 0.1

Table 5 Hospital Costs for Stroke Patients 1992

Health Board of Residence	Acute		Geriatric Long Stay		All Specialities	
	Total Costs Discharged (£000's) in 1992	Cost per Patient	Total Costs Discharged (£000's) in 1992	Cost per Patient	Total Costs Discharged (£000's) in 1992	Cost per Patient
Argyll & Clyde	6559	4969	6580	42177	13139	9169
Ayrshire & Arran	2724	2886	3500	23645	6224	5916
Borders	800	2943	386	18385	1186	4134
Dumfries & Galloway	1240	2634	1930	21928	3170	5981
Fife	2648	3222	7526	27772	10174	10225
Forth Valley	1841	2816	1701	27002	3543	5032
Grampian	6527	4926	3667	33339	10194	7266
Greater Glasgow	15239	5090	14457	38348	29696	9059
Highland	1954	3802	5651	42168	7605	12825
Lanarkshire	3823	3221	3552	18993	7375	5630
Lothian	9076	4676	8119	36082	17195	8130
Orkney	558	9797	0	0	558	9797
Shetland	274	7206	412	58800	685	15232
Tayside	5503	4195	5897	29783	11400	8120
Western Isles	415	4822	1224	68005	1639	16387
Scotland	59184	4247	64600	32252	123784	8087

1. Costs are calculated by applying average inpatient specialty costs per inpatient day to lengths of stay in the relevant hospital/specialty and summing the costs by HB of residence of patient.

2. Day Cases are included and costed applying average inpatient specialty costs per inpatient day.



TABLE 6.3

SMRs for selected causes of death in the period 1988 to 1992

	MALES				FEMALES				DOTH SEXES			
	Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit	Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit	Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit
SCOTLAND	14 861	100.0	100.0	100.0	25 553	100.0	100.0	100.0	40 414	100.0	100.0	100.0
C0 Argyll & Clyde	1 205	100.2	105.0	111.8	2 406	109.4	113.0	116.5	3 691	107.4	110.9	114.5
A0 Ayrshire & Arran	1 146	98.7	104.0	110.8	1 951	99.6	104.1	108.8	3 097	100.7	104.3	108.0
B0 Borders	322	72.4	81.0	90.4	506	80.9	87.9	95.3	900	85.3	85.3	91.0
Y0 Dumfriesshire & Galloway	530	93.4	101.9	110.9	846	96.7	103.5	110.8	1 376	97.6	102.9	100.5
F0 Fife	1 092	90.9	104.9	111.3	1 807	104.9	109.7	114.7	2 979	104.1	107.9	111.0
V0 Forth Valley	801	95.5	102.5	109.9	1 351	101.5	107.0	112.9	2 152	101.0	105.3	109.9
N0 Grampian	1 320	84.2	80.0	93.7	2 181	84.9	80.5	92.3	3 501	85.8	80.6	91.6
G0 Greater Glasgow	2 649	96.3	100.0	103.9	4 710	93.9	96.6	99.4	7 359	95.6	97.0	100.1
H0 Highland	627	93.5	101.3	109.5	996	94.4	100.4	106.8	1 623	96.0	100.7	105.8
L0 Lanarkshire	1 399	99.5	104.9	110.5	2 251	100.4	104.5	109.0	3 650	101.4	104.7	100.1
S0 Lothian	2 197	98.0	102.1	106.5	3 965	90.5	101.6	104.0	6 162	99.3	101.0	104.3
T0 Tayside	1 244	89.9	95.0	100.4	2 008	84.3	89.0	91.9	3 252	87.5	90.5	93.7
R0 Orkney	84	91.7	114.9	142.3	112	85.3	103.0	124.6	196	93.5	108.2	124.4
Z0 Shetland	64	72.3	93.9	119.9	91	65.0	81.7	100.3	155	73.3	86.3	101.0
W0 Western Isles	101	68.5	84.1	102.2	212	89.7	103.1	110.0	313	85.0	96.1	107.4
C1 Argyll & Bute	271	103.4	118.9	131.7	480	107.6	117.0	120.0	759	109.3	117.5	126.2
C2 Dumbarton	178	73.4	85.0	99.2	405	102.4	113.1	124.7	501	84.9	103.1	111.8
C3 Inverclyde	282	95.7	107.8	121.3	483	95.0	104.1	113.0	765	113.2	105.5	113.2
C4 Renfrew	558	99.0	107.8	117.1	1 030	110.5	117.4	124.8	1 506	108.4	113.8	119.6
A1 Dumfries & Galloway	135	94.3	112.4	133.1	183	89.5	104.1	120.3	318	96.0	107.5	119.9
A2 Cunninghame	397	96.2	106.4	117.4	664	95.7	103.4	111.6	1 061	90.5	104.5	111.0
A3 Kilmarnock & Loudoun	240	92.0	104.9	119.0	394	90.0	100.5	110.9	634	94.3	102.1	110.3
A4 Kyle & Carrick	374	90.2	100.1	110.0	710	99.2	106.9	115.1	1 084	90.4	104.4	110.9
B1 Berwickshire	43	38.6	53.3	71.8	106	69.9	85.4	103.4	149	61.6	72.8	85.5
B2 Ettrick & Lauderdale	98	63.0	77.8	95.0	173	69.8	81.5	94.0	269	70.8	80.1	90.3
B3 Roxburgh	135	86.2	102.8	121.6	225	86.0	90.4	112.2	360	90.0	100.0	110.9
B4 Tweeddale	48	57.1	77.5	102.7	82	63.9	80.3	89.7	130	66.2	79.2	84.1
Y1 Annandale & Eskdale	101	59.0	73.2	88.9	188	78.1	90.5	104.5	289	74.2	83.6	93.0
Y2 Nithsdale	197	93.3	107.8	124.0	311	90.4	101.4	113.3	508	95.0	103.8	113.2
Y3 Stewartry	93	76.4	84.7	116.0	171	100.9	110.0	137.0	264	95.9	100.6	122.5
Y4 Wigton	139	115.2	137.0	161.8	176	95.7	111.0	129.3	315	108.5	121.5	135.7
F1 Dumfries	367	84.4	104.8	110.2	505	97.0	106.2	115.2	952	99.2	105.7	112.6
F2 Kirkcaldy	467	97.6	107.1	117.2	841	109.6	117.4	125.6	1 308	107.6	113.5	119.8
F3 North East Fife	258	89.1	101.1	114.2	461	92.5	101.6	111.3	719	94.1	101.4	109.1
V1 Clackmannan	130	88.4	105.9	125.7	181	76.7	89.3	103.3	311	85.2	95.5	106.8
V2 Falkirk	437	90.4	100.1	116.5	761	106.8	114.8	123.3	1 198	105.4	111.5	118.0
V3 Stirling	234	83.2	94.9	107.9	409	93.3	103.1	113.6	643	92.4	99.9	108.0

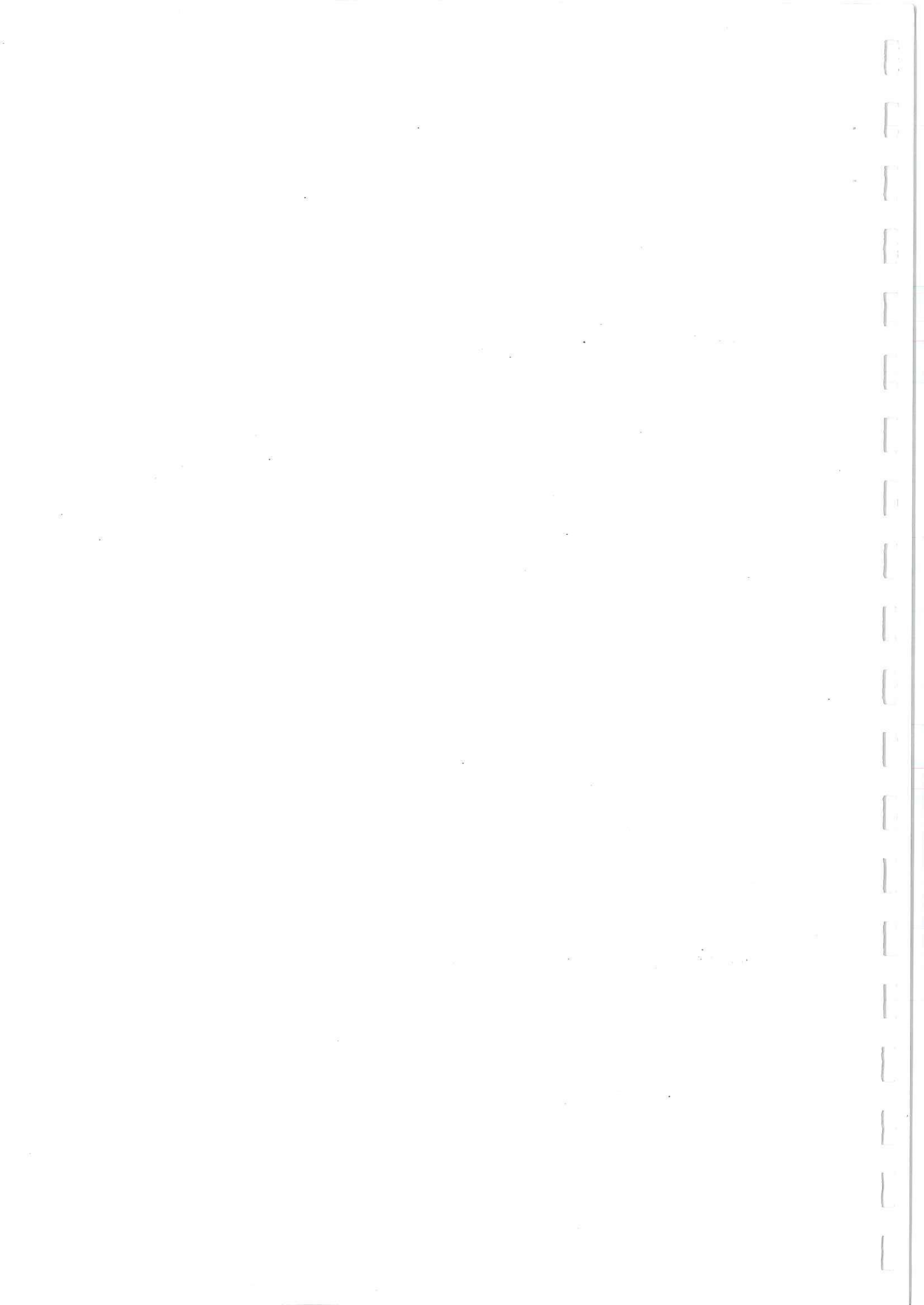
Cerebrovascular disease
(ICD 430-438)

TABLE 6.3 cont.

SMRs for selected causes of death
in the period 1988 to 1992

	MALES					FEMALES					BOTH SEXES				
	Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit		Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit		Observed deaths	SMR Lower confidence limit	SMR	SMR Upper confidence limit	
N1 Aberdeen City	529	78.9	86.0	93.7		945	77.2	82.3	87.7		1 474	79.5	83.6	88.0	
N2 Banff & Buchan	263	89.9	101.9	114.9		370	85.9	95.3	105.6		633	90.5	97.9	105.9	
N3 Gordon	148	59.5	70.4	82.7		259	74.7	84.7	95.7		407	71.4	78.9	86.9	
N4 Kincardine & Deeside	132	74.7	89.3	105.9		237	92.7	105.8	120.1		369	89.4	89.2	109.9	
N5 Moray	248	85.5	97.2	110.1		370	83.5	92.7	102.7		618	87.2	94.5	102.2	
G1 Dearsden & Milngavie	85	60.5	75.7	93.6		138	50.9	70.1	82.8		223	62.9	72.1	82.2	
G2 Clydebank	151	99.4	117.4	137.7		227	84.3	107.9	122.9		378	100.6	111.5	123.4	
G3 Eastwood	130	81.3	73.4	87.1		245	73.9	84.1	95.3		375	72.1	80.0	88.8	
G4 Glasgow City	2 101	99.0	103.2	107.8		3 831	95.8	98.7	101.8		5 932	97.7	100.2	102.8	
G5 Strathkelvin	182	80.0	93.1	107.6		269	80.7	91.3	102.9		451	83.7	92.0	100.9	
H1 Badenoch & Strathspey	35	66.2	95.0	132.2		50	72.8	96.4	125.2		91	77.2	95.9	117.7	
H2 Caithness	95	100.2	123.8	151.4		137	93.0	110.8	131.0		232	101.4	115.8	131.7	
H3 Inverness	165	80.0	93.7	109.2		308	89.4	100.3	112.2		471	89.3	97.9	107.2	
H4 Lochaber	50	85.7	112.8	145.8		80	74.4	93.8	116.8		138	84.8	101.0	119.3	
H5 Nairn	40	82.2	115.0	156.6		81	84.9	111.1	142.7		101	91.7	112.6	136.8	
H6 Ross & Cromarty	134	79.3	94.7	112.2		219	91.2	104.6	119.4		353	90.4	100.6	111.7	
H7 Skye & Lochalish	38	54.5	77.8	107.8		69	73.0	93.9	118.8		105	71.7	87.6	100.1	
H8 Sutherland	64	88.7	115.1	147.0		68	64.1	82.8	104.7		132	80.1	95.7	113.5	
L1 Clydesdale	167	86.8	101.4	118.0		301	99.8	112.1	125.6		468	98.5	108.0	118.3	
L2 Cumbarnauld & Kilsyth	116	82.1	111.5	133.7		158	80.0	94.2	110.0		274	89.2	100.8	113.5	
L3 East Kintyre	147	69.8	82.4	96.9		227	71.6	81.9	93.2		374	74.0	82.1	90.8	
L4 Hamilton	267	82.0	104.0	118.2		434	87.3	107.2	117.7		701	98.5	106.2	114.4	
L5 Montrose	274	90.8	111.4	125.4		442	100.8	110.7	121.5		716	103.0	111.0	119.4	
L6 Motherwell	428	100.5	110.0	121.8		609	100.5	108.4	116.8		1 117	103.1	109.3	115.9	
S1 East Lothian	301	95.6	107.4	120.3		439	87.3	96.1	105.6		740	93.3	100.4	107.9	
S2 Edinburgh City	1 317	91.3	96.3	101.7		2 722	97.3	101.0	104.8		4 039	96.4	99.4	102.5	
S3 Midlothian	233	99.7	113.9	129.5		310	95.4	107.0	119.8		543	100.8	109.8	119.5	
S4 West Lothian	348	103.7	115.5	128.4		494	97.8	107.0	118.9		840	103.0	110.4	118.1	
T1 Angus	290	79.9	90.0	101.0		497	83.3	91.1	99.5		787	84.5	90.7	97.3	
T2 Dundee City	511	87.8	95.9	104.8		791	74.5	88.0	85.0		1 302	81.1	85.6	90.4	
T3 Perth & Kinross	443	88.8	97.4	106.9		720	89.4	96.3	103.6		1 163	91.4	96.7	102.5	
Glasgow City District															
G4a Area 1 West	419	80.2	97.3	107.1		709	84.0	91.1	97.6		1 208	88.1	93.1	98.5	
G4b Area 2 North	288	94.4	108.4	119.4		478	90.4	99.1	108.4		764	94.6	101.7	109.2	
G4c Area 3 East	479	97.0	106.3	116.3		842	99.4	106.5	113.9		1 321	100.9	106.4	112.3	
G4d Area 4 South East	431	87.1	95.9	105.4		809	87.2	93.6	100.3		1 240	89.3	94.4	99.8	
G4e Area 5 South West	488	101.9	111.8	122.0		913	97.3	103.8	110.8		1 399	101.0	106.4	112.1	

APPENDIX 4



DISCHARGES FOR SUBARACHNOID OPERATIONS BY HOSPITAL AND HEALTH BOARD OF RESIDENCE, 1992

HOSPITAL	ARGYLL & CLYDE	AYSHIRE & ARRAN	BORDERS	DUMFRIES & GALLOWAY	FIFE	FORTH VALLEY	GRAMPIAN	GREATER GLASGOW	HIGHLAND	LANARK-SHIRE	LOTHIAN	ORKNEY	SHETLAND	TAYSIDE	WESTERN ISLES	OTHER/KN OUTSIDE SCOTLAND	TOTAL
SOUTHERN GENERAL HOSPITAL	18	19	0	2	0	7	0	48	0	33	0	0	0	0	1	0	128
GARTNAVEL GENERAL HOSPITAL	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
GREATER GLASGOW HEALTH BOARD	18	19	0	2	0	8	0	48	0	33	0	0	0	0	1	0	129
ABERDEEN ROYAL INFIRMARY	0	0	0	0	0	0	26	0	7	0	0	0	1	0	0	2	36
GRAMPIAN HEALTH BOARD	0	0	0	0	0	0	26	0	0	0	0	0	1	0	0	2	36
WESTERN GENERAL HOSPITAL	0	0	3	0	18	6	0	0	0	1	30	0	0	0	0	1	60
LOTHIAN HEALTH BOARD	0	0	3	0	18	6	0	0	0	1	30	0	0	0	0	1	60
DUNDEE ROYAL INFIRMARY	0	0	0	0	2	0	0	0	0	0	0	0	0	12	0	0	14
TAYSIDE HEALTH BOARD	0	0	0	0	2	0	0	0	0	0	0	0	0	12	0	0	14
TOTAL	18	19	3	2	21	14	26	48	7	34	30	0	1	12	1	3	239

SOURCE : SMR1 / MOR4/157

FOOTNOTE : SUBARACHNOID OPERATIONS = L33 (ANY POSITION WITH ICD9 CODE OF 430 IN ANY POSITION)

DISCHARGES FOR ENDARTERECTOMY OPERATIONS FOR STROKE BY HOSPITAL AND HEALTH BOARD OF RESIDENCE, 1992

HOSPITAL	HEALTH BOARD OF RESIDENCE	ARGYLL & CLYDE	AYRSHIRE & AHRAN	BORDERS	DUMFRIES & GALLOWAY	FIFE	FORTH VALLEY	GRAMPIAN	GREATER GLASGOW	HIGHLAND	LANARK-SHIRE	LOTHIAN	ORKNEY	SHETLAND	TAYSIDE	WESTERN ISLES	OTHER/KN OUTSIDE SCOTLAND	TOTAL
THE AYR HOSPITAL		0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
ARRAN & AYRSHIRE HEALTH BOARD		0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17
GLASGOW ROYAL INFIRMARY		8	1	0	0	0	0	0	23	0	7	0	0	0	0	0	0	41
STODHILL HOSPITAL		0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2
GARTNAVEL GENERAL HOSPITAL		19	3	0	0	0	1	0	34	0	4	0	0	0	0	0	0	61
GREATER GLASGOW HEALTH BOARD		27	4	0	2	0	1	0	58	0	11	0	0	0	0	0	0	104
RAIGMORE HOSPITAL		0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
HIGHLAND HEALTH BOARD		0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
MONKLANDS DISTRICT GENERAL HOSPITAL		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
LANARKSHIRE HEALTH BOARD		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
ABERDEEN ROYAL INFIRMARY		0	0	0	0	0	0	10	0	0	0	0	0	0	1	0	0	11
GRAMPIAN HEALTH BOARD		0	0	0	0	0	0	10	0	0	0	0	0	0	1	0	0	11
ROYAL INFIRMARY		0	0	4	0	5	4	0	0	0	0	35	0	0	1	0	0	49
LOTHIAN HEALTH BOARD		0	0	4	0	5	4	0	0	0	0	35	0	0	1	0	0	49
NINEWELLS HOSPITAL		0	0	0	0	6	0	0	0	0	0	0	0	0	39	0	0	45
DUNDEE ROYAL INFIRMARY		0	0	0	0	1	0	0	0	0	0	0	0	0	20	0	0	21
TAYSIDE HEALTH BOARD		0	0	0	0	7	0	0	0	0	0	0	0	0	59	0	0	60
FALKIRK AND DISTRICT ROYAL INFIRMARY		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
FORTH VALLEY HEALTH BOARD		0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
DUMFRIES AND GALLOWAY ROYAL INFIRM.		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DUMFRIES & GALLOWAY HEALTH BOARD		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL		27	21	4	8	12	6	10	59	2	12	35	0	0	61	0	0	258

SOURCE : SMR1 /MORA4/157

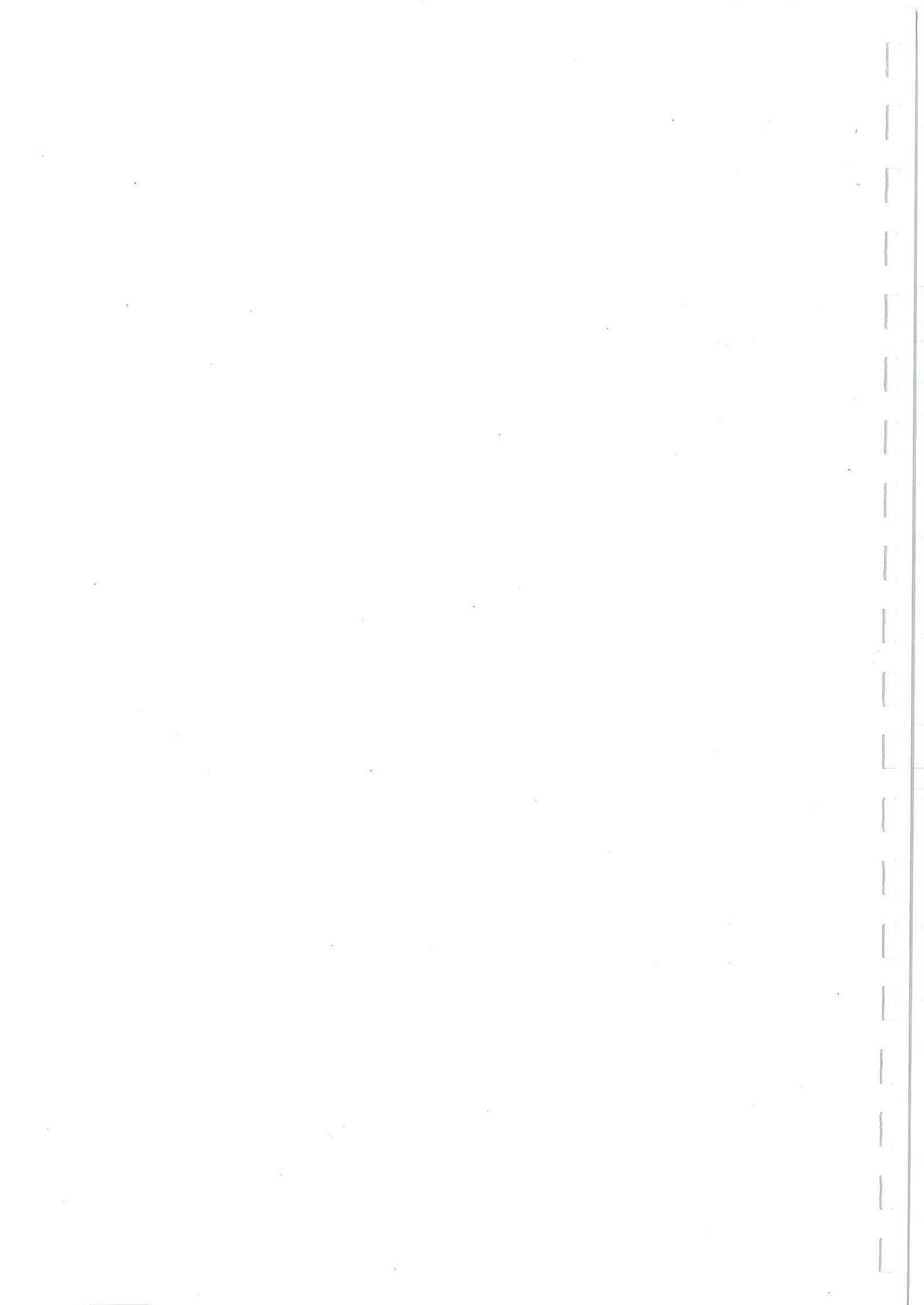
FOOTNOTE : ENDARTERECTOMY OPERATIONS = L29 (ANY POSITION WITH ICD8 CODE OF 430-438 IN ANY POSITION)

ALL DISCHARGES BETWEEN 1980 & 1993 SHOWING
DIAGNOSIS OF 430-438 IN ANY POSTITION WITH AN
OPERATION OF RECONSTRUCTION OF CAROTID ARTERY

YEAR	CASES
1980	62
1981	88
1982	89
1983	108
1984	119
1985	107
1986	114
1987	80
1988	75
1989	59
1990	64
1991	127
1992	258
1993	293

SOURCE : SMR1 / MORA4/157

FOOTNOTE : ENDARTERECTOMY OPERATIONS = L29(OPCS4)&082(OPCS3)
{ANY POSTITION WITH ICD9 CODE OF 430-438 IN ANY POSITION}



APPENDIX 5

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**CHEST HEART AND STROKE SCOTLAND
STROKE SERVICES PILOT**

PROPOSAL FOR A PILOT STROKE CARE SERVICE

Background

Stroke is the third leading cause of mortality in the UK and the leading cause of long term disability. In 1988 the King's Fund Forum produced a consensus statement about stroke care services stating that it was generally "haphazard, fragmented and poorly tailored to patients' needs".

Chest Heart and Stroke Scotland is a medical charity which funds research projects investigating more effective diagnosis, prevention and treatment of chest, heart and stroke illness. It supports health education programmes, rehabilitation projects and gives information and advice to those who have these illnesses.

Aim

To provide a Stroke Care Service for stroke patients and their carers in the community.

Method

Invite Health Boards/Trusts to purchase this service for stroke patients:- eg, buying a "membership" of the service on discharge from hospital.

Introduction

The purpose of this document is to outline a three-year pilot programme for the development of stroke services within one Health Board Unit.

Chest Heart and Stroke Scotland is the only major Scottish voluntary organisation which is an active provider of support in the community for people who have had a stroke.

The first phase would involve the appointment of a Stroke Care Coordinator who would review the number of stroke patients in the area and identify existing resources.

The second phase would introduce a Volunteer Stroke Service to the area. The Volunteer Stroke Service (VSS) is a service for those who have had a stroke and who have language and communication problems. Established in 1976, Chest Heart and Stroke Scotland has a network of VSS throughout Scotland. This phase would also include a review of the existing general stroke groups in the area.

The third phase would be the extension of the project to the wider Health Board area and the inclusion of a health promotion, secondary prevention and education service promoting the awareness of risk factors of stroke.

**CHEST HEART AND STROKE SCOTLAND
STROKE SERVICES PILOT**

VOLUNTEER STROKE SERVICE

The VSS aims to:

- Encourage those who have had a stroke and who have language and communication problems to regain maximum independence in the community.
- Enhance their quality of life, build up confidence and widen social horizons in the community.
- Encourage and support the families and carers of those who have had a stroke.

This is achieved by considering:

COMMUNICATION - working with people who have had a stroke and have associated speech and language problems by providing a regular stroke group and a home visit service aimed at encouraging maximum possible recovery.

QUALITY OF LIFE - helping and encouraging people who have had a stroke improve their quality of life and social skills using mixed ability groups in a social and therapeutic setting to support and encourage each other.

SOCIAL ISOLATION - reducing the amount of social isolation experienced by people who have had a stroke and their carers using volunteers to undertake a range of stimulating activities and outings with people who have had a stroke.

CARERS - providing a support network for carers and regular (opportunities for) breaks from caring where the need is established to run Carers' Groups and generally providing support and encouragement to all carers.

YOUNGER PEOPLE - helping young stroke people (under 55) improve their quality of life and social isolation. We meet this by providing a young stroke group geared to their specific needs.

WEEKLY STROKE GROUPS - providing a regular weekly outing for people with the same disability and using mixed ability groups in a social and therapeutic setting, to undertake a range of varied and stimulating activities to encourage and motivate people who have had a stroke and have a communication problem. The duration of the group is two hours every week.

Activities are geared to the interests of those who have had a stroke in an attempt to increase motivation and build confidence and volunteers at the group establish a relaxed neighbourly relationship with the members using common interests, games, puzzles, craft and other simple methods to stimulate and help overcome communication difficulties.

The weekly group meetings also provide valuable free time for the carers.

**CHEST HEART AND STROKE SCOTLAND
STROKE SERVICES PILOT**

STROKE CARE COORDINATOR

The Stroke Care Coordinator (SCC) will be the key person within this pilot project. He/she will act as a liaison person between hospital, community and families.

The SCC should be based within the community, possible within a major Health Centre and would maintain close contact with the hospital to ensure that patients and their relatives have access to optimal community or hospital care from the earliest stage of their illness.

The Stroke Care Coordinator would:

- visit all patients admitted to hospital wards to reassure and inform and be available to meet relatives of patients to provide early advice, information and support.
- introduce a rolling programme of advice and information sessions aimed at relatives, friends and carers.
- collate a membership pack for the patients and families to be given at the initial meeting and which gives access to basic information about a stroke and stroke services.
- be a member of the team responsible for planning the discharge of stroke patients and following their progress in the community.
- set up a 24 hour contact point via a telephone line and answering machine.
- establish a directory of local resources suitable for stroke patients and update it assisted by Chest Heart and Stroke Scotland. This would be made available to Health Centres.
- liaise with the Volunteer Stroke Service and General Stroke Clubs and be involved with the training of Organisers and Volunteers.
- develop a Carers Support Group with the assistance of the VSS Organiser.
- be recognised as the local contact for stroke for voluntary organisations, statutory agencies and for health care services.
- be involved in the education of student nurses, post registration nurses and paramedic students.
- assist in the delivery of "seamless" care to patients on discharge from hospital, by liaising with community nurses, social workers and voluntary agencies and fostering more positive attitudes to care among these workers.

**CHEST HEART AND STROKE SCOTLAND
STROKE SERVICES PILOT**

**LOCAL STROKE SERVICES
PRE & POST DISCHARGE**

**STROKE CARE COORDINATOR
REVIEW OF LOCAL SERVICES**

**HELPLINE/MEMBERSHIP PACKS
CONTACT/LIAISON**

**DEVELOPMENT OF VOLUNTEER STROKE SERVICE
GENERAL STROKE CLUBS**

**STROKE PREVENTION
DEVELOPMENT AND EXTENSION OF SERVICES**

APPENDIX 2

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CONSULTATION

The members of the Project were grateful for the assistance of the following in providing and developing the information and data required to prepare this needs assessment report.

CLINICAL SERVICES

Western General, Edinburgh

Professor C Warlow, Medical Neurology

Dr M Dennis, Stroke Physician

Mr M Smith, Stroke Physiotherapist

Ms T Staniforth, Stroke Family Liaison Worker

and the nursing and other support staff in the Stroke Unit.

Western Infirmary, Glasgow

Dr Kennedy Lees, Stroke Physician

and the multidisciplinary team for stroke appraisal and nursing staff in the Stroke Unit.

Lanarkshire Health Board

Dr R Petterson, Consultant Geriatrician

Dr J McCallion, Consultant Geriatrician

Area Drugs and Therapeutics Committee

INFORMATION AND STATISTICS DIVISION

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Mr A Redpath, Principal Statistician

Dr S Kendrick, Record Linkage

Mr B Whyte, Record Linkage

HEALTH ECONOMICS

University of Edinburgh

Dr J Forbes, Health Economist

Ms K McGregor, Research Assistant

VOLUNTARY AGENCY

Chest Heart and Stroke Scotland

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Ms L Munro

Ms J Bennett

Ms I McLeod

JOINT WORKING GROUP ON PURCHASING

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Table 4g Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Renfrew	Strathkelvin	Angus	City Of Dundee	Perth & Kinross	Orkney	Shetland	Western Isles
Males	0 to 44	0.33	0.32	0.07	0.27	0.08	0.16	0.13	0.33
	45 to 54	1.80	0.92	1.71	2.65	1.16	2.28	2.01	1.08
	55 to 64	5.80	5.60	5.33	8.73	4.01	2.93	4.13	4.31
	65 to 74	16.73	13.99	13.93	21.55	10.15	3.98	7.01	10.99
	75 to 84	32.90	27.22	43.54	36.96	23.07	44.05	32.75	25.99
	85+	54.97	43.48	62.81	48.30	46.59	61.22	34.09	47.06
	All Ages	3.62	2.82	4.35	5.05	3.17	3.71	2.52	3.48
Females	0 to 44	0.16	0.26	0.18	0.15	0.17	0.00	0.14	0.12
	45 to 54	1.66	1.21	2.04	1.89	0.62	0.78	0.00	1.76
	55 to 64	4.53	2.97	2.65	3.15	2.14	2.92	2.15	1.92
	65 to 74	10.92	6.20	8.65	12.35	8.54	8.89	4.34	9.04
	75 to 84	28.23	28.34	29.43	28.43	22.00	23.15	23.02	25.75
	85+	47.65	42.51	36.83	43.04	33.93	21.74	24.00	48.39
	All Ages	4.16	2.95	4.60	4.83	3.87	3.30	2.60	5.17
Both Sexes	0 to 44	0.25	0.29	0.12	0.21	0.12	0.08	0.13	0.23
	45 to 54	1.73	1.07	1.88	2.26	0.88	1.54	1.06	1.40
	55 to 64	5.13	4.25	3.93	5.78	3.03	2.92	3.16	3.14
	65 to 74	13.41	9.63	10.99	16.36	9.25	6.65	5.51	9.92
	75 to 84	29.84	27.94	34.40	31.37	22.40	31.44	26.56	25.83
	85+	49.26	42.78	43.01	44.15	37.26	33.54	26.63	48.05
	All Ages	3.90	2.89	4.48	4.94	3.53	3.50	2.56	4.33

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4f Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	City Of Glasgow	Hamilton	Inverclyde	Kilmarnock & Louden	Kyle & Carrick	Lanark	Monklands	Motherwell
Males	0 to 44	0.32	0.37	0.32	0.24	0.27	0.11	0.15	0.30
	45 to 54	3.13	1.22	3.07	2.10	2.26	1.09	3.12	2.55
	55 to 64	8.26	6.72	9.43	5.65	4.91	6.26	4.37	6.15
	65 to 74	18.12	16.13	17.38	13.23	13.11	14.22	12.52	14.41
	75 to 84	35.11	37.16	31.90	29.02	35.18	30.39	34.81	25.62
	85+	64.00	61.73	33.96	36.53	48.28	50.25	33.33	46.32
	All Ages	4.58	3.51	4.39	3.30	4.19	3.35	2.96	3.30
Females	0 to 44	0.35	0.09	0.43	0.20	0.12	0.33	0.30	0.09
	45 to 54	2.25	1.91	2.06	0.81	1.76	1.36	1.66	1.52
	55 to 64	4.84	2.97	5.34	3.80	3.49	3.76	4.42	4.60
	65 to 74	11.82	8.67	13.75	8.11	9.21	9.32	10.22	9.51
	75 to 84	28.46	30.28	23.63	18.76	23.03	17.16	28.42	23.16
	85+	49.85	48.95	39.40	31.21	38.01	22.18	29.38	35.68
	All Ages	5.19	3.63	4.78	3.18	4.36	3.02	3.59	3.51
Both Sexes	0 to 44	0.33	0.23	0.37	0.22	0.20	0.22	0.22	0.20
	45 to 54	2.68	1.57	2.56	1.44	2.00	1.23	2.37	2.03
	55 to 64	6.42	4.75	7.26	4.68	4.16	4.94	4.40	5.33
	65 to 74	14.47	11.83	15.30	10.33	10.93	11.48	11.20	11.61
	75 to 84	30.67	32.66	26.46	22.31	27.26	22.14	30.70	24.03
	85+	52.76	51.77	38.21	32.35	40.38	29.30	30.27	38.17
	All Ages	4.90	3.58	4.59	3.24	4.28	3.18	3.29	3.41

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4e Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Bearsden & Milngavie	Clydebank	Cumbernauld	Cumnock & Doon Valley	Cunninghame	Dumbarton	East Kilbride	Eastwood
Males	0 to 44	0.08	0.43	0.18	0.38	0.14	0.22	0.25	0.16
	45 to 54	0.70	5.16	1.06	3.10	1.81	1.35	1.82	1.29
	55 to 64	2.59	7.30	4.14	6.69	6.47	5.69	4.72	5.68
	65 to 74	13.03	17.68	10.55	16.09	13.52	16.25	12.31	11.21
	75 to 84	30.88	32.45	25.28	29.25	23.92	25.62	45.32	23.34
	85+	67.16	38.83	23.26	34.48	26.91	41.67	89.17	41.47
	All Ages	3.04	4.64	1.79	3.95	3.04	2.96	3.26	2.85
Females	0 to 44	0.08	0.21	0.32	0.15	0.25	0.12	0.15	0.21
	45 to 54	0.00	2.23	1.47	1.83	0.57	0.66	2.06	0.73
	55 to 64	4.10	5.01	3.22	2.35	2.40	3.52	3.85	0.90
	65 to 74	5.46	7.72	11.17	8.05	9.67	7.39	6.56	6.87
	75 to 84	20.41	23.44	19.48	27.40	20.81	24.42	29.43	20.84
	85+	15.84	44.39	42.11	29.70	31.54	49.52	77.80	32.35
	All Ages	2.49	4.06	2.55	3.22	3.24	3.64	3.37	2.92
Both Sexes	0 to 44	0.08	0.32	0.25	0.26	0.20	0.17	0.20	0.19
	45 to 54	0.34	3.65	1.27	2.44	1.18	1.00	1.95	1.00
	55 to 64	3.37	6.05	3.66	4.38	4.34	4.54	4.25	3.16
	65 to 74	8.82	11.74	10.89	11.76	11.33	11.14	9.19	8.76
	75 to 84	24.25	26.50	21.45	28.10	21.91	24.84	35.16	21.74
	85+	27.78	43.21	37.74	31.03	30.42	47.89	80.81	34.48
	All Ages	2.76	4.33	2.18	3.57	3.15	3.31	3.32	2.89

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4d Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Ross And Cromarty	Skye & Lochalsh	Sutherland	East Lothian	City Of Edinburgh	Midlothian	West Lothian	Argyll
Males	0 to 44	0.00	0.27	0.00	0.19	0.18	0.35	0.18	0.11
	45 to 54	1.86	5.41	1.20	1.16	1.78	1.80	2.04	1.48
	55 to 64	4.47	1.73	6.12	4.64	6.17	7.52	5.41	4.29
	65 to 74	16.36	13.86	12.16	16.53	14.74	13.02	15.73	18.40
	75 to 84	35.51	92.53	41.78	29.25	33.93	41.73	52.91	30.53
	85+	41.18	94.59	14.29	56.82	59.72	35.53	99.60	58.28
	All Ages	3.48	7.91	4.71	4.00	3.82	3.76	3.56	4.61
Females	0 to 44	0.26	0.00	0.29	0.16	0.13	0.28	0.20	0.11
	45 to 54	1.61	0.00	2.40	1.33	1.02	1.54	1.75	0.75
	55 to 64	4.23	4.98	2.19	4.20	3.34	4.18	5.14	3.77
	65 to 74	8.12	6.87	2.48	8.07	8.85	9.77	11.12	10.11
	75 to 84	30.78	30.24	28.74	26.27	27.48	22.30	28.44	27.55
	85+	37.34	82.42	99.38	37.96	47.17	50.45	43.93	47.24
	All Ages	3.96	5.98	5.66	4.35	4.54	3.48	3.36	5.49
Both Sexes	0 to 44	0.13	0.14	0.14	0.18	0.15	0.32	0.19	0.11
	45 to 54	1.74	2.70	1.80	1.25	1.39	1.67	1.89	1.12
	55 to 64	4.35	3.39	4.05	4.41	4.67	5.79	5.27	4.01
	65 to 74	11.92	10.12	6.83	11.78	11.37	11.25	13.19	13.77
	75 to 84	32.60	53.76	34.05	27.37	29.64	29.70	37.52	28.58
	85+	38.34	85.94	73.59	42.60	49.78	46.54	56.45	49.96
	All Ages	3.72	6.93	5.19	4.18	4.20	3.62	3.46	5.07

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4c Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Gordon	Kincardine & Deeside	Moray	Badenoch & Strathspey	Caitness	Inverness	Lochaber	Nairn
Males	0 to 44	0.18	0.11	0.11	0.30	0.00	0.10	0.00	0.30
	45 to 54	2.04	1.46	1.41	1.34	1.81	1.91	0.82	0.00
	55 to 64	4.54	4.09	4.66	1.69	6.55	6.05	4.00	5.16
	65 to 74	7.11	8.72	14.75	10.37	14.63	11.85	12.84	6.16
	75 to 84	35.36	30.07	31.60	55.78	41.10	32.02	46.51	50.85
	85+	34.70	33.90	42.21	0.00	37.50	16.22	84.75	52.63
	All Ages	2.57	2.45	3.37	3.99	3.70	2.94	3.38	4.18
Females	0 to 44	0.04	0.06	0.04	0.31	0.13	0.00	0.17	0.00
	45 to 54	0.66	1.49	1.19	0.00	0.60	0.77	0.00	1.55
	55 to 64	3.88	2.85	3.25	1.64	4.51	3.06	1.80	0.00
	65 to 74	12.03	7.68	7.57	9.52	11.39	6.72	9.82	15.79
	75 to 84	23.42	20.05	18.41	16.48	26.79	29.69	26.00	32.18
	85+	23.87	23.29	36.91	48.61	31.01	44.14	39.80	62.50
	All Ages	2.82	2.64	3.12	3.68	3.88	3.59	3.44	6.00
Both Sexes	0 to 44	0.11	0.08	0.07	0.30	0.06	0.05	0.08	0.16
	45 to 54	1.37	1.47	1.30	0.67	1.20	1.32	0.41	0.80
	55 to 64	4.21	3.47	3.93	1.66	5.52	4.49	2.84	2.48
	65 to 74	9.74	8.15	10.78	9.89	12.87	8.96	11.13	11.35
	75 to 84	28.18	23.81	23.39	32.52	31.91	30.53	33.03	38.75
	85+	27.08	26.28	38.30	34.83	32.54	38.00	50.00	59.70
	All Ages	2.70	2.55	3.25	3.83	3.79	3.27	3.41	5.11

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4b Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Nithsdale	Stewartry	Wigtown	Dunfermline	Kirkcaldy	North East Fife	City Of Aberdeen	Banff & Buchan
Males	0 to 44	0.35	0.00	0.11	0.21	0.17	0.09	0.13	0.21
	45 to 54	2.00	1.45	3.58	1.81	1.16	1.47	2.39	1.65
	55 to 64	5.16	6.99	4.49	5.20	5.80	6.10	5.45	5.91
	65 to 74	14.33	11.69	16.11	13.18	13.39	8.21	13.53	14.99
	75 to 84	42.77	34.64	41.88	36.15	26.56	29.73	40.49	42.24
	85+	50.00	69.23	44.64	40.94	63.83	40.58	43.17	46.24
	All Ages	4.39	5.25	4.67	3.24	3.37	3.43	3.50	3.97
Females	0 to 44	0.12	0.00	0.12	0.12	0.07	0.09	0.18	0.26
	45 to 54	1.36	2.01	3.46	1.53	0.79	0.71	1.01	0.94
	55 to 64	3.60	1.88	5.12	3.27	2.68	1.30	3.74	2.49
	65 to 74	14.08	6.46	18.72	11.65	11.91	5.98	9.90	9.71
	75 to 84	27.37	32.19	29.89	22.72	26.60	20.82	26.68	24.81
	85+	49.02	59.21	33.03	36.45	43.45	37.75	41.02	34.52
	All Ages	4.82	5.39	5.90	3.49	4.12	3.61	4.12	3.51
Both Sexes	0 to 44	0.23	0.00	0.12	0.17	0.12	0.09	0.15	0.24
	45 to 54	1.67	1.74	3.52	1.67	0.97	1.08	1.69	1.30
	55 to 64	4.35	4.30	4.82	4.19	4.16	3.57	4.54	4.19
	65 to 74	14.19	8.91	17.51	12.33	12.57	6.97	11.47	12.06
	75 to 84	33.01	33.17	34.16	27.71	26.58	24.03	31.34	31.52
	85+	49.26	62.21	35.96	37.54	48.27	38.46	41.47	37.86
	All Ages	4.61	5.33	5.31	3.37	3.76	3.52	3.81	3.74

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 4a Stroke Patient Hospitalisation Rates/ 1000 population by Age, Sex and Local Government District, 1992

Sex	Age	Berwickshire	Etrick & Lauderdale	Roxburgh	Tweeddale	Clackmannan	Falkirk	Stirling	Annandale & Eskdale
Males	0 to 44	0.18	0.19	0.30	0.00	0.25	0.13	0.20	0.36
	45 to 54	0.00	0.95	2.72	0.00	1.01	1.95	0.60	1.30
	55 to 64	5.37	3.01	8.11	1.19	5.99	5.46	5.36	4.32
	65 to 74	9.48	13.17	12.51	10.78	11.67	13.54	11.60	9.98
	75 to 84	38.46	38.90	25.70	18.57	24.55	33.18	25.35	18.33
	85+	10.99	17.96	29.63	12.82	50.00	45.25	45.77	68.49
	All Ages	3.85	3.76	4.26	2.33	2.79	3.45	2.96	3.25
Females	0 to 44	0.00	0.20	0.00	0.23	0.33	0.20	0.16	0.19
	45 to 54	0.79	0.00	1.77	1.91	1.66	2.04	0.75	0.00
	55 to 64	4.25	4.18	3.61	2.18	3.20	3.03	3.75	1.36
	65 to 74	7.96	8.23	9.78	7.80	9.73	10.42	8.78	11.52
	75 to 84	11.10	16.95	19.65	16.64	17.65	22.19	25.66	26.48
	85+	22.81	37.78	31.03	36.14	34.80	42.60	37.04	32.33
	All Ages	2.99	3.67	4.30	3.96	3.19	3.70	3.84	4.09
Both Sexes	0 to 44	0.09	0.19	0.15	0.12	0.29	0.17	0.18	0.28
	45 to 54	0.40	0.47	2.24	1.00	1.34	1.99	0.68	0.64
	55 to 64	4.79	3.64	5.73	1.71	4.55	4.20	4.52	2.80
	65 to 74	8.65	10.40	11.01	9.15	10.57	11.79	10.02	10.83
	75 to 84	21.46	25.07	21.87	17.34	20.15	26.21	25.55	23.23
	85+	19.77	32.41	30.77	30.58	38.11	43.30	39.01	41.45
	All Ages	3.40	3.71	4.28	3.19	2.99	3.58	3.41	3.68

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 3 Stroke Patient Hospitalisation Rates/1000 population by Age, Sex and Health Board of Residence 1992 (Stroke = ICD9 430-438)

Sex	Age	A&C	A&A	Borders	D&G	Fife	F Valley	Grampian	G Glasgow	Highland	Lothian	Orkney	Shetland	Tayside	W Isles	Scotland	
Males	0 to 44	0.29	0.24	0.23	0.28	0.16	0.15	0.14	0.29	0.09	0.26	0.21	0.13	0.18	0.33	0.22	
	45 to 54	2.08	2.29	1.39	2.19	1.61	1.50	1.97	2.72	2.05	1.82	1.69	1.34	2.04	1.08	2.01	
	55 to 64	6.40	5.67	5.54	5.60	5.77	5.59	5.30	7.62	4.84	5.65	5.97	4.13	6.44	3.69	6.08	
	65 to 74	17.28	13.90	12.07	13.25	12.54	12.75	12.65	17.13	13.34	13.62	15.28	5.61	16.31	9.42	14.68	
	75 to 84	31.37	29.29	31.30	35.21	30.40	29.72	36.63	33.05	46.04	32.47	37.85	32.75	33.33	25.99	33.86	
	85+	51.56	36.18	23.35	59.52	50.99	47.28	41.01	57.98	38.56	52.63	61.50	61.22	34.09	50.06	52.94	50.24
	All Ages	3.88	3.57	3.90	4.45	3.39	3.22	3.29	4.21	3.88	3.11	3.84	3.91	2.35	4.33	3.35	3.74
Females	0 to 44	0.23	0.19	0.17	0.09	0.10	0.21	0.15	0.30	0.13	0.22	0.16	0.00	0.15	0.12	0.19	
	45 to 54	1.39	1.22	1.34	1.57	1.10	1.57	1.13	1.89	0.85	1.77	1.20	0.00	1.42	2.34	1.42	
	55 to 64	4.46	3.23	3.70	3.08	2.81	3.41	3.45	4.35	3.46	3.95	3.83	2.15	2.84	1.92	3.68	
	65 to 74	11.34	9.43	9.31	13.41	10.45	9.82	9.72	10.26	9.09	9.46	9.29	4.34	9.97	9.68	9.99	
	75 to 84	26.43	21.30	18.82	29.70	24.39	21.81	24.05	27.15	30.34	25.70	27.30	24.46	26.98	27.41	25.75	
	85+	46.61	32.94	32.43	45.78	40.31	39.67	35.39	45.50	49.35	42.26	46.00	21.74	24.00	39.23	41.85	
	All Ages	4.47	3.59	4.11	5.12	3.86	3.63	3.57	4.57	4.30	3.48	4.20	3.40	2.60	4.49	4.37	4.10
Both Sexes	0 to 44	0.26	0.22	0.20	0.19	0.13	0.18	0.15	0.30	0.11	0.24	0.18	0.07	0.16	0.23	0.21	
	45 to 54	1.73	1.74	1.36	1.87	1.35	1.54	1.55	2.30	1.44	1.79	1.44	0.71	1.72	1.68	1.71	
	55 to 64	5.37	4.38	4.57	4.29	4.22	4.46	4.34	5.88	4.13	4.75	4.84	3.16	4.54	2.82	4.82	
	65 to 74	13.89	11.38	10.54	13.34	11.38	11.10	11.02	13.17	11.00	11.26	11.90	4.90	12.75	9.56	12.04	
	75 to 84	28.14	24.12	23.43	31.79	26.56	24.70	28.63	29.15	36.17	28.10	30.98	27.47	29.25	26.91	28.62	
	85+	47.72	33.71	30.30	49.34	42.90	41.51	36.81	48.16	46.63	44.71	49.39	33.54	26.63	41.79	43.81	
	All Ages	4.18	3.58	4.01	4.79	3.63	3.43	3.43	4.40	4.09	3.30	4.03	3.65	2.47	4.41	4.36	3.92

1. Patient hospitalisation rates refer to all patients (not just first admissions) discharged in 1992

2. GRO population estimates for 1992 were used in the calculation of rates.

Table 2 Hospital based incidence and prevalence rates for Stroke (ICD9 430-438) by LGD, 1992

Local Government District	Incidence		Prevalence		Episodes	Bed Days	Died
	New Cases	Per 1000 popn	(within 12 yrs)	Per 1000 popn			
Berwickshire	53	2.73	228	11.76	107	3568	30
Etrick & Lauderdale	93	2.68	373	10.74	214	4985	66
Roxburgh	115	3.26	425	12.04	217	5439	104
Tweeddale	39	2.54	157	10.21	77	3364	30
Clackmannan	110	2.27	404	8.34	215	11674	88
Falkirk	403	2.82	1189	8.33	727	50243	308
Stirling	209	2.57	736	9.04	378	20518	178
Annandale & Eskdale	93	2.50	370	9.94	224	9519	71
Nithsdale	208	3.65	624	10.94	377	27630	164
Stewartry	100	4.23	293	12.38	195	5958	85
Wigtown	118	3.94	405	13.51	241	21095	92
Dunfermline	324	2.50	1111	8.56	640	32331	240
Kirkcaldy	440	2.95	1485	10.00	817	68238	355
North East Fife	205	2.86	626	8.74	374	18398	149
City Of Aberdeen	618	2.85	2253	10.41	1139	77327	438
Banff & Buchan	244	2.81	895	10.29	461	31621	171
Gordon	171	2.18	550	7.00	284	17615	112
Kincardine & Deeside	120	2.18	411	7.47	189	17166	93
Moray	213	2.50	656	7.69	405	29880	199
Badenoch & Strathspey	29	2.58	105	9.36	77	3928	18
Caithness	87	3.26	247	9.27	150	14795	59
Inverness	156	2.47	539	8.52	302	12190	110
Lochaber	51	2.64	151	7.80	101	9522	37
Naim	50	4.65	114	10.59	78	4126	33
Ross And Cromarty	145	2.92	462	9.29	285	20053	97
Skye & Lochalsh	59	4.98	164	13.85	134	4269	25
Sutherland	47	3.59	164	12.53	131	5257	32
East Lothian	274	3.22	935	10.98	518	29103	197
City Of Edinburgh	1353	3.08	5168	11.75	2788	189205	1119
Midlothian	221	2.77	808	10.12	428	19654	144
West Lothian	355	2.44	1225	8.41	1026	46160	232
Argyll	261	4.12	817	12.90	479	27925	174
Bearsden & Milngavie	84	2.05	367	8.95	158	3833	63
Clydebank	151	3.26	546	11.77	294	20871	137
Cumbernauld	117	1.83	448	7.02	216	9535	77
Cumnock & Doon Valley	123	2.87	368	8.59	204	9233	75
Cunninghame	352	2.53	1293	9.31	597	26756	241
Dumbarton	212	2.68	693	8.75	369	40118	143
East Kilbride	229	2.70	710	8.38	397	18892	142
Eastwood	123	2.03	453	7.48	262	21317	101
City Of Glasgow	2449	3.58	8923	13.04	4714	297663	1853
Hamilton	309	2.88	1075	10.03	553	26539	222
Inverclyde	304	3.34	1151	12.65	577	45589	233
Kilmarnock & Loudon	199	2.45	682	8.40	362	18529	154
Kyle & Carrick	402	3.54	1217	10.71	701	26645	263
Lanark	145	2.49	561	9.64	269	14105	117
Monklands	284	2.74	987	9.54	522	40243	217
Motherwell	373	2.59	1436	9.95	679	31596	323
Renfrew	637	3.17	2026	10.09	1186	104360	427
Strathkelvin	178	2.07	752	8.75	362	33661	136
Angus	305	3.16	1071	11.10	709	52497	248
City Of Dundee	621	3.62	2009	11.71	1386	57784	459
Perth & Kinross	338	2.67	1238	9.78	667	43595	309
Orkney	61	3.09	145	7.36	79	6768	40
Shetland	46	2.03	150	6.63	74	12850	37
Western Isles	94	3.20	332	11.31	197	27462	69
Scotland	15100	2.95	52723	10.32	29312	1833197	11336

1. New Cases are defined as patients with a stroke diagnoses in 1992 not previously admitted with a stroke in the period 1981-1991. Thus not all will be true first instances of stroke because some patients may have been in hospital prior to 1981 with a stroke.

2. Prevalence is defined as the number of persons alive at the end of 1992 who have had a stroke in the period 1981-1992.

3. The 1992 RG estimates of Local Government District populations have been applied to produce rates.

Table 1 Hospital based incidence and prevalence rates for Stroke (ICD9 430-438) by Health Board of Residence, 1992

Health Board of Residence	Incidence		Prevalence		Episode	Bed Days	Died
	New Cases	Per 1000 popn.	(within 12 yrs)	Per 1000 popn.			
Argyll & Clyde	1085	2.50	3618	8.33	1879	82306	734
Ayrshire & Arran	1429	3.79	4814	12.78	2610	216089	979
Borders	308	2.94	1217	11.61	623	17942	236
Dumfries & Galloway	525	3.55	1731	11.70	1038	64083	413
Fife	978	2.80	3279	9.37	1836	115636	745
Forth Valley	726	2.66	2374	8.71	1330	82610	574
Grampian	1382	2.65	4846	9.28	2492	172791	1014
Greater Glasgow	3012	3.28	11202	12.20	5857	381230	2296
Highland	637	3.09	1996	9.69	1264	74083	412
Lanarkshire	1464	2.61	5345	9.52	2646	139716	1099
Lothian	2226	2.97	8281	11.03	4795	287661	1697
Orkney	62	3.15	147	7.46	79	6775	40
Shetland	47	2.08	154	6.80	76	12851	37
Tayside	1275	3.23	4410	11.18	2768	153919	1019
Western Isles	94	3.20	334	11.38	201	28034	70
Scotland	15250	2.98	53748	10.52	29494	1835726	11365

1. New Cases are defined as patients with a stroke diagnoses in 1992 not previously admitted with a stroke in the period 1981-1991. Thus not all will be true first instances of stroke because some patients may have been in hospital prior to 1981 with a stroke.
2. Prevalence is defined as the number of persons alive at the end of 1992 who have had a stroke in the period 1981-1992.
3. The 1992 RG estimates of Health Board populations have been applied to produce rates.

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APPENDIX 3

APPENDIX 1

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