FINAL REPORT TO THE NATIONAL STROKE AUDIT TEAM, ROYAL COLLEGE OF PHYSICIANS

STROKE:
PREVALENCE, INCIDENCE AND CARE IN GENERAL PRACTICES 2002 TO 2004

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Executive Summary

This report has been commissioned by the National Stroke Audit Team in the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians, acting on behalf of the Intercollegiate Stroke Working Party. The care for people with stroke has been given increased prominence since two National Service Frameworks – those for Older People[1,2] and for Cardiovascular Disease. Although the National Stroke Audit has examined hospital care[3,4] and follow-up care in the community, this is the first report to use aggregated data from general practice to examine prevalence, incidence and care of stroke in primary care. The analyses in this report have been undertaken using the QRESEARCH database, a new aggregated database derived from the clinical electronic health records in 200 general practices.

We have reported an audit on two separate populations and the structure of the report reflects this.

Prevalent Population
The first section concerns patients with pre-existing or prevalent stroke. These are patients who were registered with the practices on 31st March 2004 who had been given a diagnosis of stroke before that date. For this group of patients we have examined the care in the previous 15 months. The key findings were

- Using the Read code definition of stroke from the new GMS contract, we identified 10,888 patients with stroke from a total population of 1,475,890 patients, giving a crude prevalence of 7.38 per 1000 population.
- Three quarters of people with prevalent stroke have a major co-morbidity
- In terms of blood pressure control, 47% of all patients, and 54% of those with a blood pressure recorded, with prevalent stroke were normotensive (less that or equal to 140/ 85).
- Of those on hypotensive medication the normotensive group is 49% overall, 52% of those with a blood pressure recorded, and of those with a diagnosis of hypertension and on hypotensive therapy, the percentage who are normotensive is 45% (47% of those with blood pressure recorded).
- Overall 67% (76% of the 88% with a blood pressure recording in the previous 15 months) of patients with prevalent stroke had a last blood pressure of 150/90 or less.
- Altogether 78% of prevalent stroke patients were recorded as having received an anticoagulant or aspirin within the previous 15 months.
- The level of measurement of serum cholesterol recorded within the past 15 months is 58.7%
- Of those with a cholesterol level recorded, 35% had a level over 5 mmol/l
- Half of all patients with prevalent stroke are on a lipid lowering agent

Incident Population
The second population is patients with new or incident stroke. These are patients who had a first ever recorded episode of stroke in the two year period 1st April 2002 to 31st March 2004. For these patients we examined their care in the year immediately before their stroke and the year afterwards. The key findings were

- We identified 3733 patients with incident stroke in the two year study period which period forms 2,742,505 person years of observation. This gave an incidence of stroke of 1.36 per 1000 patient years.
- Of the 3733 patients with incident stroke, 910 (24.4%) died within the two year study period. Deaths were greatest in the immediate post-stroke period.
- 37% overall (41% of those with a blood pressure recording) of patients with incident stroke had a high blood pressure recording (>150/90 mm Hg) in the year before their stroke. In the year after stroke, 25% of those patients with a blood pressure reading had a raised blood pressure recording.
- Of the 3677 patients with incident stroke who were registered with the practice for the whole year before their stroke, 1796 (48.8%) were already on an anti-platelet drug.
- There were 1981 patients with incident stroke who were registered for the whole of the year after their stroke, 1266 (63.9%) were prescribed an anti-platelet drug.
- Of the 3677 patients who were registered with the practice for the year before their stroke, 66.8% had no record of a serum cholesterol value on computer in the year before their stroke.
- Overall 815 patients (22.2% of 3677) were prescribed a lipid lowering agent in the year prior to their stroke. Of the 1981 patients who were registered for the whole of the year after their stroke, 851 (43.0%) were prescribed a statin or a fibrate in the year following their stroke.

Reading this report

This report should not be read in isolation: the accompanying spreadsheets and documents are integral to the report itself (See "Reading this Report").

National Stroke Audit data specification 2004.doc	This file contains the agreed specification for the work described in this report.
Understanding QRESEARCH data structures.doc	This file describes the QRESEARCH data structure for use in interpreting this report
National Stroke Audit Diagnostic Codes 2004.xls	This spreadsheet (5 sheets) describes the Read Codes used in undertaking the analyses presented here.
National Stroke Audit Results Tables 2004.xls	This spreadsheet reports the full results of this audit in Excel tables. Some of the findings are presented in this report.

Methods

This audit of the care of stroke patients has been conducted using an intermediate version of the QRESEARCH database that contains data from 200 practices. [The full database will contain approximately 500 practices once the uploads are complete towards the end of 2004]. Data from these practices were downloaded on 10th May 2004 and hence included entries made by the practices up to and including that date. The practices were distributed throughout the UK (except Northern Ireland) covering 31 of the 33 Strategic Health Authority Areas in England and Wales and including three practices in Scotland.

Table 1a: Distribution of QRESEARCH stroke audit practices within Strategic Health Authorities

Strategic Health Authority	Number of practices in each area included in the audit
Avon, Gloucestershire & Wiltshire	13
Bedford & Hertfordshire	9
Birmingham & the Black Country	4
Cheshire & Merseyside	7
County Durham & Tees Valley	3
Cumbria & Lancashire	6
Dyfed Powys	2
Essex	1
Greater Manchester	3
Gwent	1
Hampshire & Isle of Wight	2
Kent & Medway	3
Leicestershire, Northamptonshire & Rutland	3
Norfolk, Suffolk & Cambridgeshire	12
North & East Yorkshire & Northern Lincolnshire	16
North Central London	6
North East London	14
North Wales	3
North West London	7
Northumberland, Tyne & Wear	6
Scotland	3
Shropshire & Staffordshire	5
Somerset & Dorset	10
South East London	2
South West London	2
South West Peninsula	6
South Yorkshire	1
Surrey & Sussex	7
Thames Valley	13
Trent	18
West Midlands South	4
West Yorkshire	8

Description of the QRESEARCH population

On the 31st March 2004, there were 1,475,890 patients registered with the practices. The age, gender profile of the population is as follows:

Table 1b: Age, gender profile of register patients with QRESEARCH database used for this report on 31st March 2004**.**

	Both	Females	Males
<45 years	857749	416518	441231
45 to 64 years	368310	179906	188404
65 to 74 years	125948	65159	60789
75 plus	123883	75558	48325
Total	*1475890*	*737141*	*738749*

Inclusion criteria for practices

We included all practices that had been using EMIS since 1st April 2002 as this would mean that the computer database would have entries covering the relevant observation periods. 200 practices met this inclusion criterion. There were no exclusion criteria since variation in data recording is one of the outcomes of interest.

Definition and selection of patients for the audit

The QRESEARCH database contains data for all patients who have ever been registered with the practices and includes patients who have left, died or who are currently registered. The records of patients who have died and those who have left the practice are retained on the computer long term. The registration status of each patient is determined by the administrative codes which are updated as part of the national electronic 'registration links' process. We are able to identify the date on which patients register with the practice and the date on which they leave or die. We are therefore able to identify cohorts or cross sectional samples.

For this report we have defined two groups of patients with cerebrovascular disease to distinguish between prevalent cases (i.e. existing cases on a particular date) and incident cases (i.e. new cases in a particular time period). Some analyses in the report have been conducted on 'prevalent cases', some on 'incident cases' and some analyses on both groups.

The reason for making this distinction is that hospital based stroke audit has tended to focus on patients admitted within a certain time period and examine their acute care. In general practice, however, there is less opportunity to focus on acute care of the episode. Therefore, general practitioners are more concerned with two other key aspects of the care for stroke patients – primary prevention of stroke i.e. preventative care delivered in the year before first stroke (hence incident cases are important) and secondary prevention i.e. long term management of risk factors after the patient has

had a stroke (hence prevalent cases are important). Such patients may have had a stroke many years ago or in the recent past.

In summary therefore, QRESEARCH (and general practice computer systems in general) offer a unique opportunity for examining care before and after stroke and also the long-term management of patients with stroke.

SECTION ONE: CARE OF PATIENTS WITH PREVALENT STROKE

Identification of patients with prevalent cerebrovascular disease as at 1/7/03

In order to identify patients with prevalent stroke, we first identified all patients registered with the 200 practices on 31st March 2004, by examining data on their registration date, year of birth and gender.

From this group, we then identified all patients with any computer recorded Read code for cerebrovascular disease (i.e. any Read code under the G6 hierarchy) at any time in their records before 31st March 2004. This group is labelled "Any cerebrovascular disease"

We used the GMS code specification (version 2, released 12/11/2003) to identify four subgroups of patients that are mutually exclusive as follows:

(a) Patients with 'pure stroke' i.e. those with GMS codes for stroke only in their records
(b) Patients with pure TIA i.e. those with GMS codes for TIA only i.e. excluding anyone who also had stroke codes as in (a).
(c) Patients with 'mixed TIA and stroke' i.e. those with both stroke and TIA codes in the records.
(d) Patients with 'CVS not specified' i.e. those with G6 related codes which are excluded from the GMS specification 'CVA not specified'

The individual lists of codes can be found in the accompanying Excel workbook (National Stroke Audit Diagnostic Codes).

For the audit, we were interested in patients who had ever had a stroke, whether or not they also had a TIA. Therefore we combined patients in groups (a) 'pure stroke' with patients in group (c) 'mixed TIA and stroke' to create a group which will be used as the stroke patient group unless specified otherwise.

RESULTS

Prevalence of cerebrovascular disease

First, we calculated point prevalence per 1000 population for each of the four groups and for patients with any type of cerebrovascular disease overall. An age-sex

breakdown can also be found in table P1 in the accompanying Excel Workbook (National Stroke Audit Results Tables 2004 .xls).

The overall rate for any cerebrovascular disease was 17.3 per 1000 and was similar for males and females. The overall rate for pure stroke was 5.9 per 1000, for pure TIA was 7.5 per 1000, for patients with both TIA and stroke was 1.4 per 1000. Stroke and TIA was more common in males over 75 years than females over 75. The prevalence of stroke compares well with published data (see appendix).

Table 2 (Derived from table P1): Prevalence of stroke per 1000 population

Both	Any cerebrovascular disease	Pure stroke	Pure TIA	Both stroke and TIA	CVA not specified
<45 years	1.0	0.4	0.2	0.0	0.3
45 to 64 years	12.7	4.7	4.5	0.8	2.6
65 to 74 years	50.2	17.1	22.0	4.0	7.0
75 plus	110.3	36.4	52.5	10.5	10.9
Total	17.3	5.9	7.5	1.4	2.4

The case definition for the new GMS contract has been used to derive the four mutually exclusive groups presented in the Table 2. The highest level code G6 'Cerebrovascular disease' is not included in the GMS case definition. In other words, if a patient has the highest level code of G6 without any other more specific codes in the hierarchy, then that patient will not be identified and included in the GMS target population. Of the 25512 patients with any code under the G6 hierarchy, 3492 patients had the highest level code alone.

These patients could well be patients with genuine stroke or TIA or both but the coding is not specific enough to be sure. Practices should therefore examine the notes of patients who have G6 codes only and attach a more specific code to their records if appropriate or possible.

The frequency with which the GMS excluded codes are used for patients in general practice is shown in detail in table P2 in the accompanying Excel workbook (National Stroke Audit Results Tables 2004.xls). The code G6 – the highest level code 'Cerebrovascular Disease' was used a total of 10693 times. Note this is a frequency of usage of Read codes and is not linked to individual patients but it does indicate that GPs are using codes which are not included in the contract and if no other more specific code is used, then these patients will not be identified for the GMS audits.

Definition of stroke used in the audit of care

There were 8762 patients with 'pure stroke' and another 2126 patients with 'mixed stroke and TIA', making an overall total of 10888 patients with stroke. These 10888 patients form our target group for the purposes of the remaining audit.

Pathological subtype of stroke

Table P3 shows the subtype of stroke by sex for the 10888 patients with prevalent stroke. The Excel workbook (National Stroke Audit Diagnostic Codes 2004) shows the categorisation of codes used. 6.4% had Read codes indicating pure haemorrhagic stroke, 20.0% had Read codes indicating pure ischaemic stroke (i.e. no codes indicating haemorrhage), 0.4% had codes for both. The remaining 73.3% of patients had no codes indicating haemorrhage or infarct i.e. had non specific codes. This means that it is not possible to determine pathological subtype of stroke for the vast majority of patients with prevalent stroke.

Table 4 (Derived from table P3): identifiable sub-type of stroke in GP records

	Both %	Females %	Males %
Haemorrhagic	6.4	5.8	7.0
Ischaemic	20.0	17.9	22.0
Mixed haemorrhagic and ischaemic	0.4	0.2	0.5
Unspecified	73.3	76.1	70.6
Total	100.0	100.0	100.0

Comorbidity in patients with prevalent stroke

Table P4 shows the co-morbidity for the 10888 patients with prevalent stroke. In keeping with the hospital audit, we examined the following conditions: atrial fibrillation, diabetes mellitus, hyperlipidaemia (diagnosis), hypertension, ischaemic heart disease and peripheral vascular disease. The Read codes used are found in the Excel workbook (Stroke codes.xls).

Table 5 (derived from table P4): co-morbidity among patients with stroke

	% of patients with stroke
Atrial fibrillation	14.5
Diabetes mellitus	14.2
Hyperlipidaemia (diagnosis)	12.8
Hypertension	57.7
Ischaemic heart disease	25.3
Peripheral vascular disease	7.8
None of the above	24.7
number of comorbidities	
One of the above	36.8
Two of the above	24.4
Three or more of the above	14.2

Overall 75.3% of patients had one or more of the co-morbidities listed. 36.8 % had one, 24.4% had two and 14.2% had three or more of the co-morbidities listed. Hypertension was the commonest co-morbidity and was present in 57.7% of patients. Ischaemic heart disease was present in 25.3% of patients.

Recording of risk factors in the 15 months prior to the audit date

We identified the most recent date and value associated with the recording of risk factors which had occurred in the 15 months before the audit date (31st March 2004). We also identified whether the patient had ever had that risk factor recorded.

The results are shown in table P5 (cholesterol is shown later). Smoking advice was recorded for 33.9% of patients ever and in 22.3% of patients in the last 15 months. 25.3% of patients had dietary advice recorded and 88% of patients had a blood pressure recording in the last 15 months.

Blood pressure control in last 15 months

Table P6 shows the distribution of systolic blood pressure for patients who had been prescribed any anti-hypertension drugs in the last 15 months and those who had not. It is interesting to note that the thresholds for definition of hypertension are very important as the population mean is around 140-150 for systolic blood pressure and 80-90 for diastolic. This is even more important when aligning different targets National Stroke Guidelines, GMS contract (150/90), British Hypertension guidelines

Table P7 shows blood pressure control for 10890 patients with prevalent stroke according to whether they had been prescribed one or more anti-hypertension agents in the last 15 months. We used the most recent blood pressure value in the patients recorded from the previous 15 months. In addition, the table has also been broken

down according to whether the patient had a computer-recorded diagnosis of hypertension in their medical record.

Table 6 (derived from table P7): latest blood pressure readings in patients with stroke with or without medication for beta-blockers, thiazides or ACEIs.

	% of all patients in group	% patients with stroke on no drug	% patients with stroke on 1 or more drugs
All patients			
Hypertensive (>150 and/or >90)	21.0	11.7	24.0
Borderline (141-150 and/or 86-90)	19.7	14.2	21.4
Normotensive (<=140 and <=85)	47.3	43.3	48.6
Not known	12.0	30.8	6.0
Overall total	**100.0**	**100.0**	**100.0**

Of the 10890 patients with prevalent stroke, 2292 (21.0%) had a blood pressure of > 150 or > 90. There were 2141 patients (19.7% of 10890) had a borderline blood pressure (141-150/86-90), and 47.3% were normotensive.

Table P8 shows which anti-hypertension drugs have been prescribed in the last 15 months. We have divided patients into those with a computer recorded diagnosis of hypertension and those without. Overall, of the 10890 patients with prevalent stroke 45% had been prescribed an ACE inhibitor or A2 blocker in the last 15 months; 59.3% had been prescribed a beta blocker or calcium channel blocker and 28.8% had been prescribed thiazides.

Of the 10890 patients with prevalent stroke, 29.5% were not on any of the anti-hypertension drugs listed in Table P8 and 70.5% were on one or more of these groups of agents.

Table P9 shows similar information but according to the level of blood pressure control achieved.

Use of anti-thrombotics

Table P10 shows use of anti-thrombotics in the previous 15 months for the 10890 patients with prevalent stroke. 69.2% of patients had been prescribed aspirin or had a Read code indicating that they took it. 68.9% of patients were prescribed any anti-platelet drugs.

13.1% were on anticoagulants and 4.7% of patients were on both aspirin and warfarin in the same 15 months (note this doesn't necessarily indicate concurrent use).

Table 7 (derived from Table P10): Use of anti-thrombotics among patients with prevalent stroke in past 15 months

	% of patients with prevalent stroke
Prescribed aspirin in the last 15 months	62.3
OTC aspirin in the last 15 months	31.7
Aspirin prescribed or OTC in the last 15 months	69.2
Dipyramidole in the last 15 months	11.3
Clopidogrel in the last 15 months	8.1
Any antiplatelet in the last 15 months	68.9
Anticoagulant in the last 15 months	13.1
Anticoagulant and aspirin in the last 15 months	4.7

Use and effectiveness of lipid lowering medication

Table P11 shows use of lipid lowering drugs and last serum cholesterol values in 10890 patients with prevalent stroke. Just over half of all patients with prevalent stroke (4494, 41.3% of 10890) did not have a serum cholesterol recorded in their notes in the last 15 months. 2244 (20.6% of 10890; 35% of those with a known reading) had a value of more than 5 mmol/l.

Overall of the 10890 patients with prevalent stroke, 5445 were on either statins or fibrates. Of these, 17% did not have a recorded cholesterol values. 1329 (24.4% of 5445; 29% of those with known cholesterol level) had a serum cholesterol of more than 5 mmol/l and 3202 (58.8% of 5445; 71% of those with known cholesterol level) had a value of <=5 mmol/l.

The charts below show the distribution of the last serum cholesterol recorded in the computer record within the last 15 months. There are two charts. The first shows value for patients not on any lipid lowering drugs within the previous 15 months. The second shows the values for patients who had been on lipid lowering drugs in the last 15 months.

Chart 1a: Last serum recorded cholesterol in patients with prevalent stroke who had not been on any lipid lowering drugs in the last 15 months

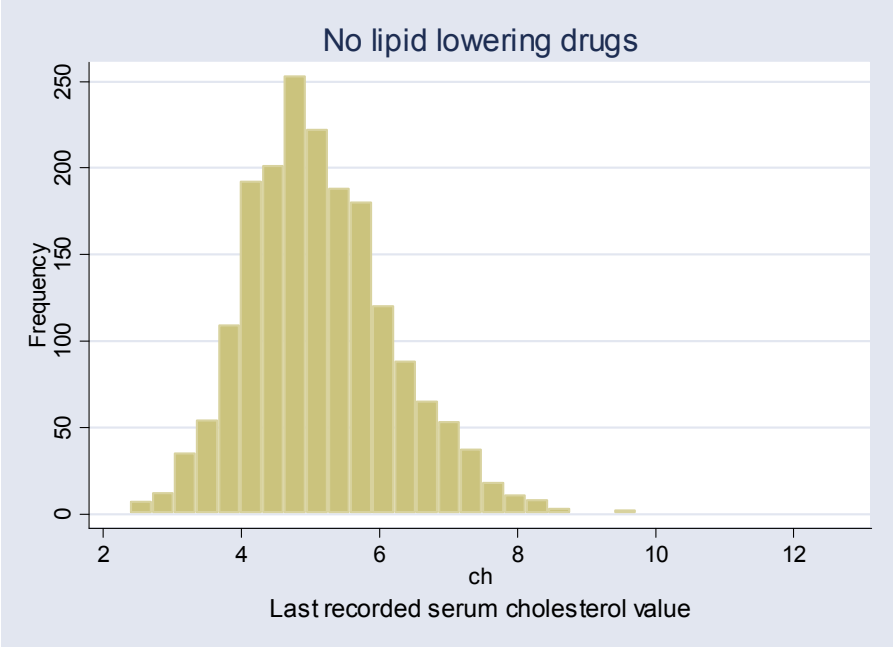
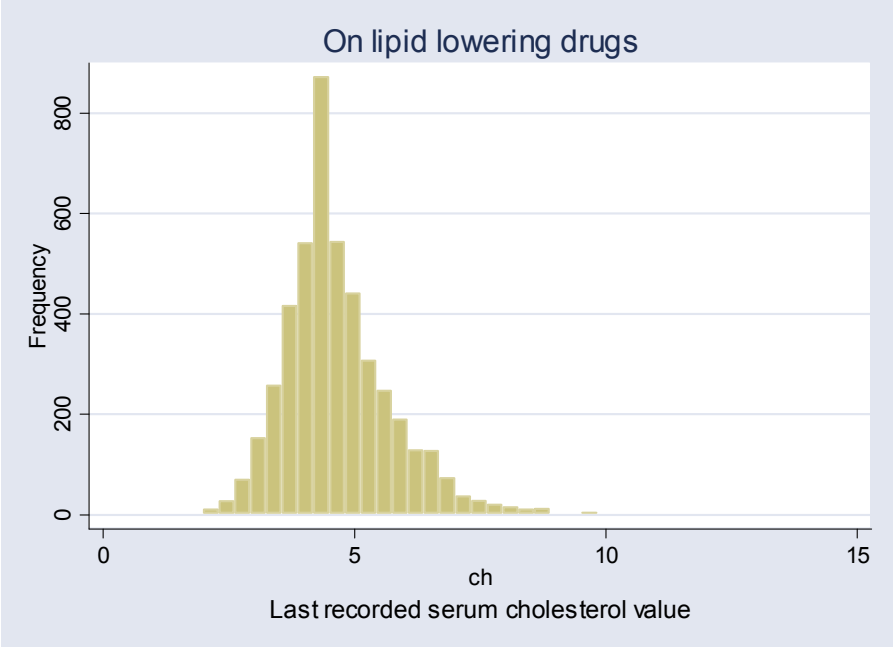


Chart 1b: distribution of last serum recorded cholesterol in patients with prevalent stroke who had been on lipid lowering drugs in the last 15 months



SECTION 2: CARE OF PATIENTS WITH INCIDENT STROKE

Identification of patients with incident cerebrovascular disease

Our second group of patients are those with incident stroke i.e. patients with a first episode of stroke or TIA occurring in a defined two year study period between 1st April 2002 and 31st March 2004.

In order to identify our cohort of patients with incident stroke, we identified all patients registered with the 200 practices on 1st April 2002. We identified patients with a first ever code for either stroke or TIA in the two-year study period up until 31st March 2004. Patients with any evidence of cerebrovascular disease in their record before 1st April 2002 were excluded. We used the Read codes described above to identify patients with incident stroke or incident TIA.

RESULTS

Table I1 shows the incidence of stroke and TIA per 1000 person years, broken down by age and sex. There were 2,742,505 person years of observation during the period 1st April 2002 and 31st March 2004. Overall, the incidence of stroke is 1.4 per 1000 person years and that for TIA is 1.2 per 1000 person years. The combined incidence of either stroke or TIA is 2.5 per 1000 person years. As expected the incidence of stroke was highest in patients aged 75 and over with similar rates for males and females (8.9 and 9.9 stroke per 1000 person years). The incidence of stroke compares well to other analyses (see appendix).

Table 8 (derived from Table I1): incidence of stroke and TIA over 2 years

	age bands	incidence rate of TIA per 1000 patient years	incidence rate of stroke per 1000 person years	overall incidence of stroke or TIA
Both	<45 years	0.05	0.07	0.11
	45 to 64 years	0.93	0.96	1.77
	65 to 74 years	3.62	3.49	6.73
	75 plus	8.00	9.49	16.70
	Total	**1.23**	**1.36**	**2.46**

Table I2 shows the registration status of incident cases of stroke and TIA at the end of the observation period (i.e. by 31st March 2004). Of the 3734 patients with incident stroke, 2571 were currently registered (68.9% of 3734) at the end of the two year study period, 910 had died (24.4%) and 253 (6.8%) had left the practice. A higher proportion of the incident TIA patients were still registered (83.8%) with only 372 deaths (11.0% of 3380).

Table I3 shows the timing of death for the 885 patients with incident stroke who died. Of these, 33.2% of patients died within 7 days, 50.9% died within 0 to 30 days and 49.2% died between 30 days and 2 years.

Table 9 (derived from Table I3): timing of death for those incident stroke patients who died

	% of incident stroke patients who died
0-7 days	33.2
0-30 days	50.9
31 days and over	49.2

Table I4 (and associated figures), show similar data but in the form of life tables and Kaplin Meier plots for 3734 patients with incident stroke. 76.1% of all patients were alive at a year. As expected mortality varied by age band with highest mortality in those over 75 years. Just under 65% of patients aged over 75 years were alive at two years compared with around 85% of patients age 65 to 74 years.

Table I5a shows risk factor recording in the year before and after stroke for male and female patients. Table I5b shows the same information broken down by age group.

Only patients who were registered with the same practice for the preceding year were included (i.e. 3677 cases). Similarly, only 1981 patients still registered with the practice after a year were included. The notable thing is that blood pressure recording in the year following stroke was 74.6% compared with 79.6% in the year before. It is important to note that the patients included in the analysis for the year prior to stroke are likely to be different from the group of patients registered in the year after stroke due to deaths, patients leaving the practice and new registrations.

Table 9 (derived from Table I5a): recording of risks factors in year before and after stroke and of advice given

	% of patients registered for whole year before stroke	% of patients registered for whole year after stroke
	% of 3677	% of 1981
Alcohol advice given	4.1	4.4
Dietary advice given	13.2	15.0
Number of smokers	8.2	7.1
Smoking status recorded	35.2	35.3
Smoking advice given	10.8	10.9
BMI recorded	28.5	25.4
Number obese (BMI > 30 kg/m2)	7.4	6.9
SBP recorded	79.6	74.6
DBP recorded	79.5	74.5

Table I6 shows blood pressure control before and after stroke and use of any anti-hypertension medication in the same time period.

In the year before stroke 1197 patients (32.6 % of 3677; 41% of those with a blood pressure reading) had a raised blood pressure value (<150 or > 90) and of these 888 were on anti-hypertension medication and 309 were not.

In the year after stroke, 371 patients (18.7 % of 1981; 25% of those with a blood pressure reading) had a raised blood pressure (i.e. > 150 or > 90) and of these 319 were on medication and 52 were not.

Table 10 (derived from table I6): blood pressures in year before and year after incident stroke, by use of anti-hypertension treatment in those periods

	% of all patients with incident stroke	% of patients not on anti-hypertension Rx	% of patients on one or more anti-hypertension Rx
BP in the year before stroke			
Hypertensive (>150 and/or >90)	32.6	23.7	37.4
Borderline (141-150 and/or 86-90)	15.4	11.4	17.5
Normotensive (<=140 and <=85)	31.7	27.5	33.9
Not recorded	20.4	37.4	11.1
Total	**100.0**	**100.0**	**100.0**
BP in the year after stroke			
Hypertensive (>150 and/or >90)	18.7	7.3	25.2
Borderline (141-150 and/or 86-90)	16.2	8.8	20.3
Normotensive (<=140 and <=85)	39.7	30.5	44.9
Not recorded	25.4	53.5	9.6
Total	**100.0**	**100.0**	**100.0**

Table I7 shows which antihypertensive agents had been prescribed at least once in the year after stroke. Of the 1981 patients registered for the year after their stroke, 40.6 % were not on any anti-hypertensive medication, 25.6 % were on one of the four groups of drugs, 23.1 % were on two and 10.7 % were on three or more of the four groups of drugs.

Use of anti-thrombotics

Table I8 shows use of antithrombotic agents in the year before and year after stroke.

Of the 3677 patients with incident stroke who were registered with the practice for the whole year before their stroke, 1796 (48.8 %) were already on an anti-platelet drug. The most common agent used was aspirin which was prescribed or recorded as being taken over the counter in 49.1 % of patients before their stroke.

There were 1981 patients with incident stroke who were registered for the whole of the year after their stroke. Of these, 1266 (63.9 %) were prescribed an anti-platelet

drug. There were 216 patients (10.9% of 1981) who were prescribed any oral anticoagulant.

Use of lipid lowering drugs

Table I9 shows use of lipid lowering medication and last recorded serum cholesterol value in the year before and after stroke.

Of the 3677 patients who were registered with the practice for the year before their stroke, 66.8% had no record of a serum cholesterol value on computer. Of those 1222 patients with a serum cholesterol value, 335 had a value of more than 5 mmol/l.

Overall 815 patients (22.2% of 3677) were prescribed a lipid lowering agent in the year prior to their stroke.

Of the 1981 patients who were registered for the whole of the year after their stroke, 1109 (56.0% of 1981) had no record of serum cholesterol on the computer records in the year after stroke.

There were 851 patients (43.0% of 1981) prescribed a statin or a fibrate in the year following their stroke.

DISCUSSION

First, this analysis highlights some of the strengths and weaknesses of using a dataset, such as the pilot QRESEARCH database used here, derived from routine GP clinical recording. The data cannot be used reliably to give insight into the acute events, except perhaps in terms of timing, type of stroke and much of the advice that might have been given to patients with stroke are not coded. However, the data can be used to give real insight into the incidence, prevalence and care of people with stroke.

Although these searches were “tailor made” (see attached documentation) in future the new General Medical Services Contract will determine what is recorded using which codes in most general practices. In order to ensure completeness and accuracy we recommend that future analyses for the National Stroke Audit undertaken using general practice data concentrate on the GMS contract variables. This will inevitably lead to most analyses being concerned with prevalent cases.

Stroke is common. In this population the prevalence of cerebrovascular disease was 17.3 per 1000; however in the 75 years and over population, the prevalence was 105 per 1000 in females and 118 per 1000 in males. These were, of course, the survivors of their strokes. In terms of new cases, the incidence rate of stroke or TIA was, overall, 2.46 per 1000 patient years. Not surprisingly, the incidence was much higher – 16.7 per 1000 patient years – in those patients aged 75 years or over.

This report shows wide inter-practice variation in the calculated prevalence rates for stroke (including TIA). Some of this will be due to population characteristics such as age, gender and social class differences; some will be due to differences in the quality of data recording and use of codes (will reduce with the introduction of the new GMS contract); and some due to clinical definitions and subjective variation in diagnosis.

The issue of use of codes was illustrated when we looked at the subtype of stroke. Clinicians cannot distinguish the stroke type and until recently the management was the same regardless of the aetiology. Thus GPs record at a coarse code level. As the use of brain scanning defines more precisely the type of stroke (as encouraged by the new GMS contract) and the therapeutic implications are enacted, the precision in recording subtypes should increase. Again, the recording of "advice given" for diet, smoking etc is patchy. Historically, general practitioners have recorded smoking habit, which has implicitly included the giving of advice to stop smoking to smokers. However the new GMS contract, again, will require explicit recording of advice given so the completeness of this data item should improve in the next few years.

Over three quarters of people with prevalent stroke have a major co-morbidity, illustrating the complexity of their care and the balances that need to be reached in deciding on therapeutic interventions.

Half of patients with prevalent stroke (just under half of all sample; just over half of those with a blood pressure reading) were normotensive (less that or equal to 140/85). Of those on hypotensive medication the level of normotension is unchanged, and of those with a diagnosis of hypertension and on hypotensive therapy, the percentage who are normotensive is 45% overall, and 47% of those with a recorded blood pressure. Overall 76% of patients with prevalent stroke and a recorded blood pressure (88% had a blood pressure in the past 18 months) had a last blood pressure of 150/90 or less.

Altogether 78% of prevalent stroke patients were recorded as having received an anticoagulant or aspirin within the previous 15 months. More will be on aspirin OTC (but not recorded in the clinical system) or have contra-indications to anti-thrombotics. It is debatable how much higher the numbers on anti-thrombotics can become.

The low level of measurement of serum cholesterol recorded within the past 15 months (58.7%) may reflect the policy of not repeating cholesterols in those with a normal cholesterol recording; however it will also reflect low, but increasing, levels of monitoring. Of those with a level recorded, just over one-third had a level over 5 mmol/l. Half of all patients with prevalent stroke are on a lipid lowering agent, a level that may well increase in the coming years as lipid management is taken more seriously.

In terms of incident stroke, these data suggest that the overall mortality was 24% by the end of the two-year recording period. The death rate was much lower (11%) for those with a TIA. As expected, deaths were greatest in the immediate post-stroke period.

We have no cogent explanation for the fact that blood pressure is better recorded in the year before a stroke than in the year after (for those registered, and therefore alive, throughout the relevant one year periods). Indeed there is an overall trend for lower recording of risk factors after a stroke.

However it is noticeable that 33% (41% of those with a blood pressure reading) had a BP of over 150/90 in the year before but only 19% (25% of those with a recorded blood pressure) in the year after stroke. This could be due to a higher mortality rate among those with a higher blood pressure or a hypotensive effect of strokes. However since 65% were on hypotensive treatment before and 64% after their stroke, it is most likely to be due to increased medication leading to better blood pressure control.

There are some items which are difficult to measure using routinely entered data from general practices and which have not been attempted in this audit. For example, the delay in admission to hospital is unlikely to be difficult to measure. This is because of the processes which occur in clinical practice. The process can be best understood as follows: a GP sees patient with a possible stroke but is not sure of the diagnosis. The patient is admitted to hospital and a diagnosis is made of stroke. The patient is discharged and some weeks later the GP receives a discharge letter with a diagnosis on it. The GP then enters the diagnosis on receipt of the letter or when the patient is next seen. The date associated with the diagnosis of stroke may well be the date when the GP enters the information rather than the date some weeks or months before when the event actually occurred. The date may then follow the admission date rather than precede it.

We have not looked at the recording of living accommodation as this is unlikely to be coded in a suitable way within the practice. Most practices look after nursing homes or other multi-occupancy accommodation. The practice would know that 'The Meadows' is the name of their local nursing home and we wouldn't expect them to identify a Read code for 'nursing home' and attach that to the patients' records as they already know this information. Since QRESEARCH (and other systems which extract data from GP databases), do not extract strong identifiers such as postal address then it is not possible to identify patients in nursing homes using this methodology.

Patients with stroke in the community may well be in receipt of care by physios, speech therapists or district nurses. Such care may have been arranged by the hospital at the point of discharge rather than by the GPs so a code for referral to speech therapy is unlikely to be present. The nurses, physios etc do not tend to keep records of their clinical care on GP computer systems as they have their own recording systems and hence codes associated with the delivery of care by these professionals are unlikely to be recorded on the database. Receipt of this type of care by patients is probably best audited by questionnaires of individual patients and/or their respective lay carers.

The recording of MRI and CT scanning has not been included in this audit but will be include in the second audit which will be conducted in May/June 2004 on a larger group of practices contributing to QRESEARCH nationally. Recording of MRI and CT scanning for patients with a first ever stroke after 1st April 2003 is one of the indicators in the new GMS contract. We expect that this will increase the recording of scans in primary care within the computer record. In interpreting this though, we need to remember that the actual rate of scanning might not have changed, just the recording of it.

Appendix

Comparative prevalence rates:

	KHS 211 practices (MSGP4 60)	Northern Ireland (38 practices)	Published data
Stroke	2.2 (3.4)	4.4	2.3 to 9.0 [5,6,7]
Stroke incidence	(1.5)	0.8	
TIA			5.0 [8]

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