

ORIGINAL ARTICLE

# Stroke units: research and reality. Results from the National Sentinel Audit of Stroke

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**Objectives:** To use data from the 2001-2 National Stroke Audit to describe the organisation of stroke units in England, Wales and Northern Ireland, and to see if key characteristics deemed effective from the research literature were present.

**Design:** Data were collected as part of the National Sentinel Audit of Stroke in 2001, both on the organisation and structure of inpatient stroke care and the process of care to hospitals managing stroke patients.

**Setting:** 240 hospitals from England, Wales and Northern Ireland took part in the 2001-2 National Stroke Audit, a response rate of over 95%. These sites audited a total of 8200 patients.

**Audit tool:** Royal College of Physicians Intercollegiate Working Party Stroke Audit Tool.

**Results:** 73% of hospitals participating in the audit had a stroke unit but only 36% of stroke admissions spent any time on one. Only 46% of all units describing themselves as stroke units had all five organisational characteristics that previous research literature had identified as being key features, while 26% had four and 28% had three or less. Better organisation was associated with better process of care for patients, with patients managed on stroke units receiving better care than those managed in other settings.

**Conclusion:** The National Service Framework for Older People set a target for all hospitals treating stroke patients to have a stroke unit by April 2004. This study suggests that in many hospitals this is being achieved without adequate resource and expertise.

There is strong evidence that organised stroke care reduces mortality and morbidity from stroke.<sup>1</sup> A meta-analysis of trials comparing organised inpatient stroke unit care with an alternative service concluded that acute stroke patients should be offered organised inpatient (stroke unit) care, which is typically provided by a coordinated multi-disciplinary team operating within a discrete stroke ward (box 1).<sup>2</sup>

The national clinical guidelines for stroke state that all stroke patients should be admitted to hospital and managed on specialist units.<sup>3</sup> There is as yet no widely accepted definition of what a stroke unit is and the facilities they should provide but, until trials have been conducted to unpack the "black box" of stroke units, the aim should be to replicate those core service characteristics identified in randomised controlled trials. The concept of a stroke unit has evolved over the past 20 years and a number of different models have emerged. Langhorne and Dennis,<sup>4</sup> however, report that the similarities are more striking than the differences. The Stroke Unit Trialists' Collaboration (SUTC)<sup>1</sup> identified the characteristics of stroke unit care in descending order to be:

- coordinated multidisciplinary rehabilitation incorporating meetings at least once per week;
- staff with a specialist interest in stroke or rehabilitation;
- routine involvement of carers in the rehabilitation process; and
- regular programmes of education and training.

Provision of information to patients and carers was also identified as an important component by Langhorne and Dennis<sup>4</sup> and has therefore also been included in this analysis.

In England considerable pressure is being applied from government to develop stroke services. The National Service Framework for Older People,<sup>5</sup> a policy document produced by the Department of Health, requires that, by April 2004, all general hospitals treating people with stroke in England must have a "specialised stroke service as defined in the stroke service model". Given that no additional ring fenced resources were set aside to help achieve the milestone, concern was expressed that stroke units may be opened by hospitals in name rather than substance. In other words, that the sign would be put up above a ward but without providing the specialist resources needed to provide high quality care. Specialist stroke care in the UK has developed with extraordinary rapidity over the last few years.

The National Sentinel Stroke Audit<sup>6</sup> is the main source of comprehensive information about the structure of stroke inpatient care in England, Wales and Northern Ireland. With a participation rate of over 95%, it is able to describe both how services within hospitals are structured and how individual patients are managed on the path through the

### Box 1 Effects of stroke unit care on morbidity and mortality

- 3% absolute reduction in mortality
- 2% absolute reduction in need for institutionalisation
- 5% absolute reduction in long term dependency

Data from systematic review of almost 5000 patients included in 23 clinical trials by Langhorne and Dennis<sup>2</sup> in 2004.

clinical service. A key feature of the audit is that, after each round of data collection, there is an active implementation policy involving regional workshops for clinicians and managers as well as lectures and publications. The 2001 audit was the third cycle of national stroke audit, a methodology that has previously been shown to be an effective tool for change.<sup>7</sup> Between the first audit in 1998 and 2001, the proportion of hospitals with a stroke unit rose from approximately 46% to 73%. The Scandinavian countries have, however, been far more successful at implementing a system for managing the majority of stroke patients on specialist stroke units than any other parts of Europe with 60% in Norway and 70% in Sweden. This contrasts with 36% in the UK,<sup>8</sup> 4% in France,<sup>9</sup> 30% in Germany,<sup>10</sup> and 9% in Italy.<sup>11</sup>

Studies from Sweden using data from their national audit (RIKS) have also shown that managing patients on stroke units outside a clinical trial setting is effective at reducing mortality and morbidity both in the short and long term.<sup>12 13</sup> This has not been documented from other countries, not least because the only countries currently undertaking national audit involving most or all hospitals are Sweden and the UK.

A study was undertaken with the following objectives:

- To use data from the 2001 National Sentinel Audit of Stroke to describe how stroke units are organised in England, Wales and Northern Ireland.
- To compare the quality of care provided to patients on stroke units with that in other clinical settings.
- To determine how the organisation of stroke unit care in reality compares with the key criteria identified from the systematic review of stroke unit trials and to explore whether the organisation of stroke unit care influences the process of care delivered to patients.

**METHODS**

**Data collection**

All hospitals within England, Wales, Northern Ireland and the Channel Islands were invited to take part in the third round of the National Sentinel Audit of Stroke. The minimum requirements were that they had inpatient services

for stroke patients and had admitted a minimum of 20 patients with a primary diagnosis of stroke (ICD10 I61, I63 and I64) between 1 April and 30 June 2001. Data collection took place between January and February 2002. The audit tool comprised both organisational and clinical audit questionnaires.<sup>6</sup> Reports sent to the individual participating hospitals following the audit presented some of the results grouped into domains to aid interpretation (box 2).<sup>8</sup> These domains have been used in the analyses in this paper.

The clinical proforma was completed on up to 40 consecutive patients to assess compliance with standards from evidence based guidelines for stroke, to define case mix and outcome. An inter-rater reliability study was conducted in the 2001–2 audit to estimate whether the results would be comparable if data were collected by a second auditor with access to the same information.<sup>14</sup> The first five cases were audited twice by different auditors.

**Defining specialist care**

Local clinicians defined for themselves whether they had a stroke unit or not, but a “Help Booklet” was provided to help standardise the terminology used. The definition of a stroke unit was “any unit or ward within the hospital/trust that is designated by local agreement as a stroke unit either for the acute care or rehabilitation of stroke or both”. Table 1 outlines some of the key features common to the stroke units that contributed data to the Stroke Unit Trialist’ Collaboration (SUTC)<sup>1</sup> used for this study to identify how closely hospitals defining themselves in the national stroke audit comply with these key characteristics. The five key organisational features were derived as explained above and matched to the closest question available from the 2001–2 audit. Spearman correlation methods were used to measure the association of the number of key features with total organisational score, process domain, and total scores and with the percentage of patients admitted to a stroke unit.

**Box 2 Domains included in stroke audit**

- Service organisation
  - Organisation of care
  - Interdisciplinary services
  - Continuing education in stroke
  - Multidisciplinary records
  - Team meetings
  - Agreed assessment measures
  - Availability of information to inform practice
  - Communication with patients and carers
  - Service evaluation
- Clinical care
  - Acute management
  - Assessment
  - Rehabilitation interventions
  - Transfer to community
  - Secondary prevention
  - Long term care

**Table 1** Key features of a stroke unit chosen as markers for stroke unit organisation from a review of the literature<sup>1 2</sup>

Characteristic from research	Wording of the questions used within the organisational audit 2001–2
(1) Staff with a specialist interest in stroke or rehabilitation	Is there a consultant physician with specialist knowledge of stroke who is formally recognised as having principal responsibility for stroke services?
(2) Routine involvement of carers in the rehabilitation process	Does the stroke service have formal links with patients’ and carers’ organisations for communication on service provision, audit and future plans?
(3) Coordinated multidisciplinary team care incorporating meetings at least once per week	Are there team meetings at least once a week for the interchange of information about individual patients?
(4) Information provided to patients and carers	Is there patient information literature displayed in unit/ward on the following: condition specific literature on stroke? Is there patient information literature displayed in unit/ward on the following: patient versions of national or local guidelines/standards?
(5) Regular programmes of education and training	Is there an in-house programme for the continuing education of qualified staff in the management of stroke?

**Table 2** Number of beds and staffing ratios for 175 stroke units, 2001–2

	Median	Interquartile range	10–90th centiles	Sites with data
Patients with stroke on day organisational audit form was completed	30	20–42	13–55	174
Total number of stroke beds	20	14–27	8–43	175
Ratio of stroke patients/stroke beds	1.45	1.04–2.13	0.66–2.97	174
Ratio of stroke beds/qualified nurses at 10.00 hours on a normal weekday	7.7	5.6–9.5	3.4–12.0	169
Ratio of stroke beds/qualified nurses plus care assistants at 10.00 hours on a normal weekday	3.2	2.4–3.8	1.6–4.3	173
Whole time equivalent (WTE) establishment				<b>Sites with no WTE</b>
WTE clinical psychologists per 10 stroke beds	0.16	0.08–0.32	0.05–0.90	130 (74%)
WTE dietitians per 10 stroke beds	0.16	0.09–0.33	0.05–0.50	54 (31%)
WTE occupational therapists per 10 stroke beds	0.83	0.56–1.17	0.26–1.67	11 (6%)
WTE physiotherapists per 10 stroke beds	1.18	0.82–1.67	0.45–2.20	10 (6%)
WTE speech and language therapists per 10 stroke beds	0.36	0.18–0.56	0.10–0.88	32 (18%)

### Data analysis

Process of inpatient care was measured for each site by the percentage compliance on each of 33 process standards grouped into seven domains, each a simple average of component standards. A total process score was then derived as a simple average of the domain scores. Similarly, a total organisational score was derived from answers to organisational questions relating to the organisation of care, interdisciplinary services, continuing education, multidisciplinary records, team working, agreed assessment measures, availability of information to inform practice, and communication with patients and carers. Both process and organisational total scores were used initially in reports sent to each participating hospital providing details of their performance benchmarked against the national data.

The presentation of results is primarily descriptive of the characteristics of stroke units from the 2001–2 National Stroke Audit. Participation in the organisational audit was almost 100% so the results presented are more in the nature of census than of sample. We have not therefore applied

methods of statistical inference to comparisons between sites with and without stroke units. Statistical inference was appropriate for the patient data.

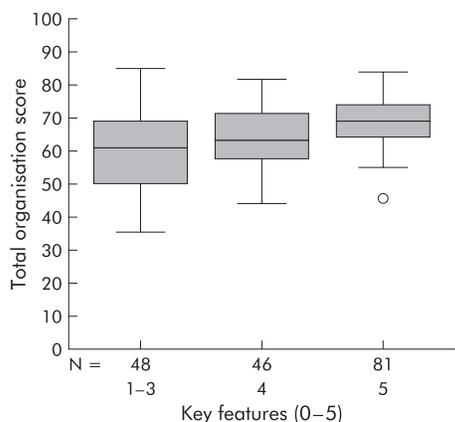
**Table 3** Organisation of stroke care within hospitals according to whether or not they have stroke units, 2001–2

	Have a stroke unit (n = 175)	No stroke unit (n = 65)
Consultant physician with specialist knowledge having main responsibility for stroke services	90% (n = 157)	54% (n = 35)
Stroke service has formal links with patients and carers organisations for communication on service provision, audit and future plans	66% (n = 116)	48% (n = 31)
Specialist stroke community team linked to the trust	36% (n = 63)	18% (n = 12)
Formal sessions of consultant time per week for the management of stroke (including outpatient clinics):		
No sessions	9% (n = 16)	57% (n = 37)
>3 sessions	38% (n = 66)	6% (n = 4)
Median (IQR)	3 (2–5)	0 (0–2)
Trust has an interdisciplinary care pathway for stroke	46% (n = 80)	23% (n = 15)
Locally agreed protocol for appropriate measures of		
Conscious level	88% (n = 154)	71% (n = 46)
Motor impairment	66% (n = 115)	42% (n = 27)
Cognitive function	91% (n = 159)	69% (n = 45)
Activities of daily living	87% (n = 152)	69% (n = 45)
Community user group for stroke	59% (n = 103)	54% (n = 35)

These questions were asked at the hospital level.

**Table 4** Other characteristics of stroke units (n = 175) from the National Stroke Audit, 2001–2

	% (n)
Routine access to specialist nursing for:	
Continence advice	65% (n = 113)
Pressure sore prevention	76% (n = 133)
Stroke care	69% (n = 121)
Social worker attached to multidisciplinary team	63% (n = 111)
In-house training for:	
Qualified staff	74% (n = 129)
Unqualified staff	64% (n = 112)
All professions contribute to a single set of notes	54% (n = 94)
Team meetings at least once a week for interchange of information about individual patients	82% (n = 144)
Disciplines which regularly attend team meetings	
Clinical psychology	13% (n = 23)
Dietetics	37% (n = 64)
Medicine (senior doctor)	81% (n = 142)
Nursing	84% (n = 147)
Occupational therapy	82% (n = 144)
Physiotherapy	83% (n = 145)
Social work	59% (n = 103)
Speech and language therapy	63% (n = 111)
Reference information on functional tools used locally	69% (n = 121)
Practice guidelines on	
Clinical management of stroke	77% (n = 135)
Continence management	70% (n = 123)
Swallowing difficulties	81% (n = 141)
Pressure area care	82% (n = 143)
Up to date information on local and national patients'/carers' support organisations	79% (n = 139)
Records of all patient's management in acute phase	80% (n = 140)
Patient access to management plan	62% (n = 108)
Patient information literature displayed in unit on	
Condition specific literature on stroke	85% (n = 148)
Patient versions of national or local guidelines/standards	43% (n = 76)
Social services local community care arrangements	58% (n = 102)
The Benefits Agency	56% (n = 98)
Local voluntary agencies	70% (n = 122)
How to complain	78% (n = 136)



**Figure 1** Association between number of key features\* and the National Audit total organisational score for 175 sites with stroke units 2001–2. \*From a review of the literature,<sup>1,2</sup> five key features of a stroke unit were chosen as markers for stroke unit organisation (table 1).

## RESULTS

### Organisation of stroke care

A total of 240 hospitals from England, Wales and Northern Ireland took part in the 2001–2 National Stroke Audit, a response rate of over 95%. These sites audited a total of 8200 patients. One hundred and thirty six sites (58%) submitted 652 cases for the inter-rater study. There was moderate to good reliability, with kappa statistic values of 0.60 and higher dominating the results, similar to that found in the first round of the audit in 1998.<sup>7</sup> None of the data items included in the analyses in this paper scored a kappa value of less than 0.47.

There was a stroke unit in 73% (175/240) of the sites, although only 36% (2859/7975) of admitted patients spent any time on a stroke unit. For 80% (n = 192) of sites there was a consultant physician with specialist knowledge of stroke formally recognised as having principal responsibility for stroke services with a median of two sessions weekly, and for 31% (n = 75) of sites there was a specialist stroke team linked to the trust. At some point in their stay 36% (2859/7975) of patients nationally were admitted to a stroke unit while 27% (2192/7997) spent more than half their time in a stroke unit. For sites with a stroke unit 45% (2736/6056) of patients were admitted to it at some stage and 35% (2130/6058) spent more than half their time there.

Table 2 gives the details of bed numbers and staffing levels on stroke units. The total number of stroke beds in the hospitals audited was 4055, of which 18% were said to be for acute stroke care, 63% for rehabilitation, and 19% in a combined unit. A typical stroke unit had between 14 and 27 beds. At 10.00 hours on a normal weekday there were, on average, eight stroke unit beds per qualified nurse. There was no dietetic input for 31% of stroke units, no speech and language therapists for 18%, and no clinical psychology for

74%. Wide variations in staffing levels for physiotherapy and occupational therapy were reported.

### Quality of care on stroke units and general wards

Table 3 indicates that standards achieved for the organisation of stroke care in hospitals with stroke units were generally better than for hospitals without stroke units. Table 4 describes other characteristics of stroke units as documented from the National Audit. The various characteristics of stroke units as described in tables 2–4 were combined (see Methods section) to obtain a total organisational score for each site. For the 175 hospitals with stroke units the median organisational score was 67, interquartile range (IQR) 59–73, range 36–85. Hospitals with no stroke unit had a median score of 41 (IQR 31–50), although this difference is partly self-fulfilling as, by definition, sites scored higher on the organisational score by simple virtue of having a stroke unit.

Tables 2–4 indicate the full range of questions asked by the organisational audit and it is clear that stroke units varied considerably in how they were organised and in what they offered to patients.

### Research stroke units versus real life units

Table 5 shows that only about half (81/175) of hospitals describing themselves as having stroke units could claim that they had all five key features of a stroke unit. A quarter of stroke units (46/175) had four of the five features with most of these missing a formal link with patients and carers. This leaves a quarter of units (48/175) having three key features at most. There was a clear trend in total organisational score according to the five key features: median 70 (IQR 65–75) for sites with all five features, median 64 (IQR 58–72) for sites with four features, and median 61 (IQR 50–70) for sites with three features at most (fig 1). The Spearman correlation coefficient between the number of key features and the national audit total organisational score was 0.36 ( $p < 0.001$ ).

### Associations between organisation of stroke unit care and process of care

From the national process audit a total process score was computed and the median score for the 175 sites with a stroke unit was 62 (IQR 52–71). This process score tended to be higher for sites with four or five key features (table 6), and these sites also admitted a greater proportion of patients to a stroke unit. There was a clear difference in median scores between sites with no stroke unit and sites with all five features, with differences for initial patient assessment and total process scores being significant ( $p < 0.01$ , Mann-Whitney test). It was evident generally that the better organised hospitals had better process of care results for their audit patients (table 7).

## DISCUSSION

Of the hospitals participating in the audit, 73% now have a stroke unit with 36% of all patients spending some time on such a unit and 45% of patients in hospitals with access to

**Table 5** Concordance with the key features of a stroke unit as defined by the Stroke Unit Trialists' Collaboration<sup>1</sup>

No of features	No (%) of sites	Consultant physician	Formal links with patients and carers	Team meetings	Patient information	Continuing education
1	10 (6%)	8 (80%)	2 (20%)	0	0	0
2	19 (11%)	17 (89%)	17 (89%)	2 (11%)	2 (11%)	2 (11%)
3	19 (11%)	12 (63%)	2 (11%)	17 (89%)	19 (100%)	7 (37%)
4	46 (26%)	39 (85%)	14 (30%)	44 (96%)	46 (100%)	41 (89%)
5	81 (46%)	81 (100%)	81 (100%)	81 (100%)	81 (100%)	81 (100%)
Total	175					

**Table 6** Results of the National Stroke Audit 2001–2 according to how well the 175 stroke units were organised

Process domain	No stroke unit (n = 65)	Key features*			Spearman
		1–3 (48 sites)	4 (46 sites)	5 (81 sites)	
(1) Initial patient assessment	64 (53–78)	69 (59–84)	73 (63–87)	77 (67–87)	0.11
(2) Clinical diagnosis	52 (40–64)	63 (48–74)	67 (45–77)	60 (47–73)	–0.02
(3) Multidisciplinary assessment	50 (38–69)	49 (37–67)	49 (41–67)	57 (44–66)	0.12
(4) Screening and functional assessment	58 (48–72)	52 (43–71)	62 (50–79)	64 (52–79)	0.15
(5) Management/care planning	53 (32–69)	51 (32–67)	60 (44–67)	60 (47–73)	0.15
(6) Communication with patients and carers	61 (47–77)	54 (40–77)	65 (53–76)	66 (54–81)	0.17*
(7) Primary/secondary interface	60 (49–76)	63 (47–73)	66 (46–83)	68 (53–83)	0.12
Total process score	57 (50–67)	58 (45–69)	62 (54–73)	65 (53–75)	0.15*
% patients admitted to a stroke unit	0 (0–0)	38 (25–61)	43 (28–60)	47 (28–69)	0.12
% patients with >50% of stay on a stroke unit	0 (0–0)	28 (13–42)	33 (19–46)	34 (22–57)	0.21**

The table shows median process domain scores, median (interquartile range) percentage of patients, and Spearman correlation coefficients with the number of key features (1–5).

\*From a review of the literature, five key features of a stroke unit were chosen as markers for stroke unit organisation (table 1).<sup>1,2</sup>

\*\*p<0.01, \*0.01<p<0.05.

stroke units. While the number of stroke units is increasing in England, Wales and Northern Ireland, the organisation of care being delivered by many of these units does not replicate standards described as being central to the success of units that participated in the Stroke Unit Trialists' Collaboration.<sup>1</sup> If complying with at least three characteristics identified from the Stroke Unit Trialists' Collaboration were used to define the minimum necessary for a unit to justifiably call itself a stroke unit, only 83% of sites would qualify. If the target is set as requiring all five characteristics, which should not be difficult to achieve, only 46% comply.

A significant number of units have no dietetic input or designated social worker. Nearly one in five units has no speech and language therapy and three quarters have no clinical psychology. Despite this, organisation and the process of care is better on stroke units than when treatment is provided in other hospital settings. Arguably, the most important of all the characteristics of an effective stroke unit is the holding of regular multidisciplinary meetings to discuss the management of individual patients. Thirty one of the 175 stroke units (18%) do not hold such meetings at least once weekly. Of those that do, nearly 20% are not attended regularly by physiotherapists, occupational therapists, nurses, or senior doctors. Over 40% are not attended by a social worker. Staffing—both in terms of skill mix and staff to bed ratios within the units—varies widely. Hospitals with stroke units perform better overall than those without, and those that comply with the five features used to define a basic stroke unit and those with well organised services generally tended to deliver better quality of care to the individual stroke patients.

### Limitations of the study

One of the limitations of this study was that local clinicians completed the data without any external validation, although it might be expected that, if anything, this would result in overoptimistic descriptions of the service. Furthermore, the audit was not designed originally to measure directly the five characteristics of stroke units used for this study so, to some extent, the measures used can only be proxies for the standard. For example, having staff with a specialist interest could only be achieved if there was a specialist stroke physician and did not assess whether there was adequate specialisation in the other professions delivering care. Involvement of carers in the rehabilitation process was not measured directly, therefore for this audit we used the presence or absence of links with patient and carer organisations. Future studies should aim to measure these characteristics more directly.

### Implications of the study

It is suggested that clear criteria be required in the organisation of stroke unit care before the label "stroke unit" can be awarded. The best way of addressing these issues would be to introduce a formal accreditation system linked to quality standard requirements. Such a system has been developed for acute stroke units in Germany, although it does not extend into the rehabilitation sector. Already in England there is a well established system for undertaking quality assessment through Department of Health performance indicators and hospital inspections by the Health Care Commission. If all these bodies combined with the professional clinical bodies to

**Table 7** Results of the National Stroke Audit 2001–2 according to how well the 175 stroke units were organised

Process domain (D)	No stroke unit (n = 65)	Total organisational score†			Spearman
		<60 (47 sites)	60–69 (62 sites)	70+ (66 sites)	
(1) Initial patient assessment	64 (53–78)	66 (57–79)	73 (62–87)	82 (69–89)	0.30**
(2) Clinical diagnosis	52 (40–64)	57 (46–71)	58 (50–70)	63 (47–76)	0.14
(3) Multidisciplinary assessment	50 (38–69)	47 (40–60)	51 (39–66)	62 (49–76)	0.26**
(4) Screening and functional assessment	58 (48–72)	58 (43–75)	62 (46–75)	69 (55–82)	0.26**
(5) Management/care planning	53 (32–69)	47 (36–65)	56 (35–67)	65 (51–77)	0.30**
(6) Communication with patients and carers	61 (47–77)	56 (42–69)	63 (48–75)	72 (59–84)	0.28**
(7) Primary/secondary interface	60 (49–76)	59 (46–73)	65 (45–78)	71 (58–87)	0.25**
Total process score	57 (50–67)	55 (46–64)	60 (50–70)	68 (60–77)	0.34**
% patients admitted to a stroke unit	0 (0–0)	36 (24–56)	45 (30–60)	43 (28–80)	0.16*
% patients with >50% of stay on a stroke unit	0 (0–0)	28 (16–44)	37 (23–54)	32 (21–58)	0.15*

The table shows median process domain scores, median (interquartile range) percentage of patients, and Spearman correlation coefficients with the total organisational score.

†See Methods section for further description.

No stroke unit v stroke unit sites with 70+ organisational score: p<0.001 for D1 and total process score, 0.001<p<0.01 for D2, D4, D5, D7, 0.01<p<0.05 for D3, D6 (Mann-Whitney test).

### Key messages

- 73% of hospitals audited have a stroke unit but only 36% of stroke admissions spend any time on one.
- Staffing and skill mix within stroke units varies widely.
- The quality of care provided on some units defining themselves as specialist stroke units often fails to meet basic standards. Only 46% of stroke units offer all five key features chosen for this paper to define specialist stroke unit care and 28% offer three or less.
- The quality of care in the UK is better for patients managed on stroke units than in other settings.

set standards and perform audit, services would have the impetus to improve year on year. However, resources are needed. The English National Service Framework for Older People milestone requiring all hospitals to have a stroke unit by 2004 has not been accompanied by any ring fenced money to enable it to be achieved in anything other than name in a significant number of hospitals.

Although it could be argued that the research defining the important components of the stroke unit “black box” is limited, most stroke clinicians accept that they are likely to be contained within the five broad features described above. If the maximum reductions in mortality and morbidity after stroke—suggested as feasible by the research—are to be achieved nationally, it must be recognised that hospitals have to be able to provide adequate levels of staffing and expertise. Currently only 36% of patients are managed on a stroke unit for even part of their stay in hospital. This probably results in several thousand people each year unnecessarily dying or surviving with significant dependency. This figure is likely to be even higher if the stroke unit care that is provided is substandard.

The solution to the problem is to make the organisation of stroke unit care a top priority. Twenty years ago many patients with myocardial infarction were not managed on specialist units. Evidence showing that coronary care units are effective combined with political, managerial, and clinical determination has transformed cardiac services. The evidence for stroke is equally strong, and the solution is the same.

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