Development of a stroke and neurological rehabilitation unit in a district general hospital

ABSTRACT—We describe the experience of setting up a 16-bed unit for the rehabilitation of non-progressive and progressive neurological disorders. Its aim was the active involvement of patients and their families in the rehabilitation process. Various innovations were instigated by the multidisciplinary teams, including early visits home and a leisure service. Over the first two years, 318 patients were admitted to the unit, 51% attributable to stroke.

Evidence-based medicine—the application of research to clinical practice—is a high priority in the National Health Service (NHS). The available evidence suggests that stroke units should be developed more widely [1-9]. However, planning a stroke unit is a major enterprise.

The most obvious problem is to decide the number of beds for such a unit. An analysis in our own hospital over a 15-month period in the early 1980s indicated that there were, on average, 23 stroke patients in hospital on any one day, the number ranging from 14 to 33 (6-17 men and 6-21 women) [10].

Acute neurological disease accounts for about 20% of admissions to medical wards [11], and neurological diseases (such as multiple sclerosis, Parkinson's disease, and motor neurone disease)—as well as stroke—represent a substantial burden of disability [12,13]. Consequently, specialist rehabilitation/disability wards have been suggested as an efficient way of managing patients needing active neurological rehabilitation [14,15].

This paper describes our experience of planning and developing a stroke and neurological rehabilitation ward.

Background

In 1975 the Department of Health opened a stroke research unit at Frenchay hospital [16]. It contained space for remedial therapy and a number of offices, but had no dedicated beds of its own and no additional consultant sessions were allocated. Patients were referred from the medical wards or from outpatient clinics. In 1989, the Stroke Association provided funds for a consultant to develop stroke services in the health district, with designated beds for stroke patients on one ward. Two wards adjacent to the stroke research unit were refurbished as a 16-bed acute neurology ward and a 16-bed stroke and neurological rehabilitation ward, with 10 beds designated for stroke patients. These 10 beds were to be used primarily by stroke patients initially admitted to the general medical wards.

Before the new rehabilitation ward opened, a senior education officer was appointed and a new philosophy developed with the multidisciplinary team. The aim was to move away from a biomedical model of care towards a biopsychosocial model [17] which concentrated on team-work and improving patient and family participation in the rehabilitation process. Previous work in the stroke research unit suggested that the organisation of the multidisciplinary team was an important factor in the success of a new regimen for recovery of arm function following stroke [18]. This research also indicated that increasing a patient's participation in rehabilitation is likely to benefit outcome in terms of greater levels of activity and of independence, and higher morale [19,20].

The unit

The stroke and neurological rehabilitation ward was opened in October 1992 and named the Lime Tree Rehabilitation Unit (LTRU).

Physical environment

A homely environment was created as far as possible. There is a patients' lounge, kitchen (designed at two levels: normal standing height and wheelchair height) and a pre-discharge bedroom. Between the acute neurology and rehabilitation wards (both based on a traditional Nightingale design) there is a large open dining and activities area with patio doors opening on to landscaped gardens. Special features of the unit include a hearing induction loop system and an attractive decorative scheme which includes dark door frames and skirting boards to assist those with visual problems.

Staffing

Medical support for the LTRU was provided by the department of neurology. A professor of neurology (RLH) had a limited-term 10-session contract to
develop stroke services. Three other neurologists had a total of 12 consultant sessions, covering mainly outpatients and acute neurology; they also had access to beds on the LTRU. A similar arrangement applied to junior medical staff, which included a senior registrar, registrar and two senior house officers. There were 14 whole-time equivalent (WTE) nurses (9.3 on day duty and 4.7 at night) on LTRU, supervised by a full-time nursing sister (grade G).

Three WTE physiotherapists treated all patients with neurological problems for the departments of neurology and general medicine elsewhere in the hospital. The needs of all stroke patients under the departments of neurology and general medicine were covered by 1.5 WTE speech therapists, and one WTE speech therapist covered all other neurological problems on the acute neurology ward, LTRU, and three neurosurgical wards. There were 1.5 WTE social workers (funded by social services) and 1.75 WTE occupational therapists who covered the acute neurology ward and LTRU only. All therapists also had an outpatient workload.

In addition, there was fixed-term funding during 1992–94 for a project manager and, during 1993–95, for a leisure coordinator (0.75 WTE remedial instructor grade III) and helper (0.5 WTE); they were integral members of the rehabilitation team. The established post of clinical neuropsychologist has remained unfilled since the unit opened.

**Admission policy**

Adults (16+) with neurological disability were considered for admission to LTRU—provided that

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### Table 1. Profile of patients admitted to the rehabilitation ward over two years (n = 318).

| Patient characteristic | Stroke (n=163*) | Other neurological disorder (n=76) | Post-neurosurgery (n=56**) | Miscellaneous (n=23) |
|------------------------|----------------|-----------------------------------|---------------------------|---------------------|
|                        | no. (%)        | no. (%)                           | no. (%)                   | no. (%)             |
| Age (years):           |                |                                   |                           |                     |
| <65                    | 58 (35.5)      | 62 (82)                           | 31 (55)                   | 12 (52)             |
| 65–74                  | 58 (35.5)      | 11 (14)                           | 21 (38)                   | 6 (26)              |
| 75+                    | 47 (29)        | 3 (4)                             | 4 (7)                     | 5 (22)              |
| mean age               | 66 (52)        |                                   | 58 (63)                   |                     |
| Sex:                   |                |                                   |                           |                     |
| male                   | 94 (58)        | 36 (47)                           | 38 (68)                   | 10 (43)             |
| female                 | 69 (42)        | 40 (53)                           | 18 (32)                   | 13 (57)             |
| Mobility:              |                |                                   |                           |                     |
| immobile               | 77 (47)        | 8 (11)                            | 11 (20)                   | 0 (0)               |
| W/C with help          | 32 (20)        | 6 (8)                             | 15 (27)                   | 2 (9)               |
| independent in W/C     | 13 (8)         | 20 (26)                           | 10 (18)                   | 1 (4)               |
| independent            | 31 (19)        | 10 (13)                           | 11 (20)                   | 4 (17)              |
| not recorded           | 10 (6)         | 32 (42)                           | 9 (16)                    | 16 (70)             |
| Incontinent/           | 59 (36)        | 12 (16)                           | 22 (39)                   | 2 (9)               |
| catheterised           |                |                                   |                           |                     |
| Swallowing problems    | 35 (21)        | 14 (18)                           | 12 (21)                   | 1 (4)               |
| Dysphasia              | 58 (36)        | 2 (3)                             | 5 (9)                     | 2 (9)               |
| Barthel ADL score:     |                |                                   |                           |                     |
| 0–4 (very severe)      | 11 (7)         | 1 (1)                             | 3 (5)                     | 0 (0)               |
| 5–9 (severe)           | 61 (37)        | 12 (16)                           | 10 (18)                   | 0 (0)               |
| 10–14 (moderate)       | 45 (28)        | 19 (25)                           | 19 (34)                   | 3 (13)              |
| 15–19 (mild)           | 31 (19)        | 9 (12)                            | 14 (25)                   | 3 (13)              |
| 20 (independent)       | 5 (3)          | 3 (4)                             | 1 (2)                     | 1 (4)               |
| not recorded           | 10 (6)         | 32 (42)                           | 9 (16)                    | 16 (70)             |
| mean ADL score         | 10.86          | 12.39                             | 11.77                     | 15.29               |

* includes 17 patients who had neurosurgery
** excludes 17 'stroke' patients who had neurosurgery
ADL = activities of daily living
W/C = wheelchair
appropriate contractual arrangements existed. They were admitted if assessment, either by the consultant (or his deputy), a nurse and one therapist from the team, or at a consultant’s outpatient clinic, indicated potential to benefit from the rehabilitation facilities in the unit and they agreed. Major reasons for non-acceptance included:

- medical or surgical problems which precluded participation in a rehabilitation programme,
- extreme frailty,
- major problems relating to behaviour (especially following head injury),
- patients requiring solely respite or social care,
- patients requiring to be in hospital solely for healing of pressure sores.

Private patients were eligible for admission and received the same care as NHS patients.

Initiatives

In addition to developing patient-centred team-work and optimising independence and ‘normality’, a number of specific innovations were instigated:

- Leisure activities: group-based activities in the unit and in the community (eg quizzes, bingo, boules, cooking, shopping trips, picnics, boat trips, sailing) and individual personal interests (eg printing, calligraphy, gardening and painting). The leisure activities coordinator and helper developed the service. The former was able to give advice to people and information on general recreational facilities in the community, holidays, transport, access to buildings, etc.
- Ward-based computer therapy for patients with aphasia.
- Group exercises and discussions.
- Involvement of ex-patients.

Planned discharge

Most patients do not wish to remain in hospital unnecessarily, and doing so wastes NHS resources. On the other hand, premature discharge may have undesirable effects and may place an unsupported burden on the spouse/lay carer. Every effort was therefore made to ensure that patients were discharged at an appropriate stage. The social workers were crucial in attaining this objective. Specific initiatives included:

- Early visits home: even a few hours at home shortly after admission can implant the idea of normality and the probability of eventual discharge home.
- The setting of a tentative discharge date at an early stage: this could be changed, but gave a target towards which to work for the patient, his/her family and the rehabilitation team.
- A pre-discharge home assessment, usually undertaken with an occupational therapist.
- Early reservation of home aide, etc: the ordering of essential equipment, and training of the spouse or lay carer in, for instance, handling techniques.

The patients (Table 1)

Of the 318 patients admitted to LTRU over the first two years (5th October 1992 to 4th October 1994), 163 (51%) had suffered a stroke. The majority (71%) of the stroke patients were referred by general physicians, 11% by physicians to the elderly, 10% by neurosurgeons, and the remainder (8%) were direct referrals from general practitioners. The mean age of the 163 stroke patients was 66 years; 69% of the strokes were attributable to cerebral infarction, 16% to cerebral haemorrhage, 9% to subarachnoid haemorrhage (SAH), and 6% were brainstem/cerebellar strokes (see Table 1 of accompanying paper, page 539).

Disability and clinical problems

Forty-seven per cent of the patients were initially immobile, 36% incontinent and 21% had swallowing problems. There was right-sided weakness in 48% of the stroke patients, left-sided weakness in 42%, bilateral weakness in 2%, and no weakness in 8%. In one case, this information was unrecorded in the medical case notes.

The number of subsidiary medical and other problems in the stroke population on LTRU was considerable (Table 2). The most frequent were hypertension (15%) and urinary tract infection (13%). During their hospital stay, four patients (3%) had a further stroke, and five (3%) a transient ischaemic attack. Falls (22%), leg swelling (14%) and painful shoulder (13%) were also common subsidiary problems for rehabilitation. No one who fell on the ward sustained a fracture.

Management of the stroke patients

Most (85%) stroke patients had a computed tomo- 

graphy (CT) scan and 26% carotid artery Doppler ultrasound. Seventeen (10%) of them had neuro-

surgical intervention, 10 following SAH and seven following cerebral haemorrhage.

Length of stay

Stroke patients stayed on the unit an average of 34 days (standard deviation (SD) 31.1; range 1–215; median 24). Their average total length of stay in hospital was 49 days (SD 41.3; range 1–272; median 38).

Discharge arrangements

A considerable number of community services and housing adaptations (mainly grab rails) needed to be
organised (with health and social services) before the 158 survivors could be discharged home (Table 3). Most patients were given appointments for a medical outpatient follow-up, and about one-third received outpatient therapy in the stroke unit following discharge.

**Discharge outcome of the stroke patients**

Five stroke patients died whilst on LTRU. Of the remaining 158, 138 (87%) were discharged to a private address—either to their own home or to a relative prior to going home. Eleven (7%) were discharged to a nursing/residential home, and nine (6%) to another hospital.

The Barthel Index (BI) (activities of daily living (ADL) score) was recorded for 142 stroke patients on admission and at discharge. Improvement in ADL was demonstrated in 126 (89%). The mean improvement on the BI between admission and discharge was 4.7 points (Fig 1), and the overall mean BI score at discharge was 15.6.

**Conclusions**

The information presented in this paper describes the experience of planning and developing a neurological rehabilitation unit. The process of rehabilitation is evaluated in an accompanying paper and elsewhere.

About half the admissions to the LTRU were attributable to stroke. Most stroke patients were referred there by general physicians and were younger (mean age: 66 years) than the total hospital stroke population [10]. The intention was to provide a stroke rehabilitation service for patients admitted to general medical wards, not to compete with or replace the care of the elderly service. This explains the referral pattern and the age structure of the ward patients.

No additional therapy staff were allocated with the opening of LTRU. We consider active involvement of patients and relatives in the rehabilitation process, in goal-setting and planning, to be of paramount importance. This can only be achieved with an appropriately resourced multidisciplinary team. In the light of our experience, we would also recommend the appointment of a (clinical) manager of the multidisciplinary team.

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**Table 2. Medical and subsidiary problems of stroke patients during hospital admission (n = 163).**

| Problem                      | No. of patients | %   |
|------------------------------|-----------------|-----|
| **Medical problems:**        |                 |     |
| hypertension                 | 25              | 15  |
| urinary tract infection      | 22              | 13  |
| atrial fibrillation          | 10              | 6   |
| diabetes                     | 10              | 6   |
| DVT                          | 10              | 6   |
| further stroke/TIA           | 9               | 6   |
| pneumonia                    | 6               | 4   |
| myocardial infarction        | 5               | 3   |
| epilepsy                     | 4               | 2   |
| chronic breathlessness       | 4               | 2   |
| Other                        | 52              | 32  |
| **Miscellaneous problems:**  |                 |     |
| falls (6 major/30 minor)*    | 36              | 22  |
| leg swaying                  | 23              | 14  |
| painful shoulder             | 21              | 13  |
| pressure sore**              | 18              | 11  |
| obesity                      | 13              | 8   |
| behavioural problems         | 12              | 7   |
| contractures                 | 3               | 2   |
| Other                        | 33              | 20  |

NB: 5 patients died

* Major fall was defined as a fall resulting in loss of consciousness and/or requiring medical/nursing attention. No one who fell on the ward sustained a fracture.

** A high percentage of these patients were admitted to LTRU with an existing or potential sore. Other patients developed heel sores, for example, due to self propelling a wheelchair. Following identification of such risk factors, prevention strategies were implemented, and pressure sores have now been reduced.

DVT = deep vein thrombosis
TIA = transient ischaemic attack

**Table 3. Arrangements for stroke survivors at or prior to discharge (n = 158).**

| Housing arrangement         | No. of patients | %   |
|------------------------------|-----------------|-----|
| **Medical problems:**        |                 |     |
| grab rails                   | 38              | 24  |
| access                       | 23              | 15  |
| toilet                       | 20              | 13  |
| stairlift                    | 4               | 3   |
| other                        | 7               | 4   |
| **Services:**                |                 |     |
| district nurse               | 43              | 27  |
| home aide                    | 42              | 27  |
| health visitor               | 35              | 22  |
| home care                    | 24              | 15  |
| social worker                | 20              | 13  |
| community physiotherapist    | 8               | 5   |
| community occupational therapist | 8  | 5   |
| other                        | 10              | 6   |
| **First medical follow-up:**|                 |     |
| <6 weeks                     | 6               | 4   |
| 6 weeks–3 months             | 131             | 83  |
| 4 months–1 year              | 1               | 1   |
| no follow-up                 | 20              | 13  |
| **Therapy follow-up:**       |                 |     |
| physiotherapy                | 62              | 39  |
| speech therapy               | 45              | 28  |
| occupational therapy         | 41              | 26  |
Fig 1. Change in Barthel Index activities of daily living (ADL) score between admission and discharge in 142 stroke patients. The mean change for the whole group was 4.7 points (23.5% improvement); 66 were better than average, 76 worse than average, 18 showed no change, and two deteriorated.

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